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The Effectiveness of Pre-Operative Educational Program on Nurses Knowledge and Performance in Cardiac Surgery wards at the Middle Euphrates Region

A Dissertation

Submitted To The Council of College of Nursing/ University of Babylon in Partial Fulfillment of the Requirements for the Degree of

Doctorate of Philosophy in Nursing

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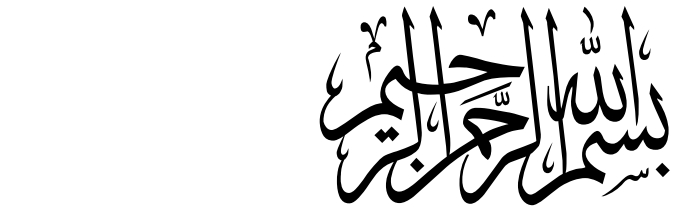

﴿وَعَلَّمَ آدَمَ الْأَسْمَاءَ كُلَّهَا ثُمَّ عَرَضَهُمْ عَلَى الْمَلَائِكَةِ
فَقَالَ أَنبِئُونِي بِأَسْمَاءِ هَٰؤُلَاءِ إِن كُنتُمْ صَادِقِينَ﴾

صدق الله العلي العظيم

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Academic Supervisor Certification

We certify that this dissertation, which is entitled ***(The Effectiveness of Pre-Operative Educational Program on Nurses Knowledge and Performance in Cardiac Surgery ward at the Middle Euphrates Region)****, was prepared under our supervision at the College of Nursing, University of Babylon in partial fulfillment of the requirements for the degree of Doctorate in Nursing.*

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Dedications

This dissertation is lovingly to my second country, Iraq, the cradle of civilizations and my family who are supported and encouraged me in my academic journey. I will do my best to transfer knowledge and skills that I know so far to every students and providing them the right avenue of knowledge acquisition.

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LIST OF ABBREVIATIONS

Acronym	EXPLANATION
ACC	American College of Cardiology
ADA	Anterior Descending Artery
AF	Atrial Fibrillation
AHA	American Heart Association
ANOVA	One- way analysis of variance
ACA	AcetylSalicylic Acid
AV	Atrio-Ventricular
AVR	Aortic Valve Replacement
AVS	Aortic Valve Stenosis
BUN	Natriuretic Peptide
BNP	Blood Urea Nitrogen and Creatinine
CA	Coronary Arteries
CA^{+}	Calcium
CABG	Coronary Artery Bypass Grafting
CAD	Coronary Artery Disease
CBC	Complete Blood Count
CD	Communicable Diseases
CHD	Congenital Heart Disease
CHF	Congestive Heart Failure
CK	Creatine kinase
CK-MB	Creatine kinase-MB
CRP	C. Reactive Protein
CRIT	Hematocrit
CS	Cardiac Surgery
CTs	Computed Tomography Scan
CX-R	Chest X-Ray
DAPT	Dual Anti-Platelet Therapy
D.F	Degree of freedom
DSWI	Infection of Deep Sternal Wounds
ECG	Electrocardiography
e.g.	Example
et. al.	Italia (others)
ERAS	Enhanced Recovery After Surgery
F	Frequency
HIV	Human Immunodeficiency Virus
HF	Heart Failure
HB	Hemoglobin

Acronym	EXPLANATION
HDLs	High-Density Lipoproteins
ICU	Intensive Care Unit
IMA	Internal Mammary Arteries
INR	International Standard Ratio
ITA	Internal Thoracic Arteries
IVC	Inferior Vena Cava
K	Potassium
LA	Left Atrium
LCA	Left Coronary Artery
LDLs	Low-Density Lipoproteins
LIMA	left internal Mammary Artery
LLR	Left Lateral Ridge
LV	Left Ventricle
LVEDD	Left Ventricular Diameter at the End of the Diastole
LVESD	Left Ventricular Diameter at the End of Systole
LVOT	Left Ventricular Outflow Tract
LVR	Left Ventricular Reconstruction
M	Mean
Mg	Magnesium
MR	Mitral Valve Regurgitation
MRA	Magnetic Resonance Angiography
MRI	Magnetic Resonance Imaging
M.S	Mean of score
MV	Mitral Valve
Na	Sodium
No.	Number
NP	Nursing Process
NPO	Nothing by mouth
NPWT	Negative Pressure Wound Therapy
N.S	Non-Significant
NSAIDs	Non-Steroidal Anti-Inflammatory Drugs
OH	Open Heart Surgery
OPCABG	Off-Pump Coronary Artery Bypass Graft
OR	Operating Room
P	Page
PCI	Percutaneous Coronary Intervention
PDA	Posterior Descending Artery
PE	Pulmonary Embolism
PLT	Platelets
PR	Pulmonary Regurgitation

Acronym	EXPLANATION
PT	Prothrombin Time
PTT	Partial Thromboplastin Time
P-value	Probability value
PVR	Pulmonary Valve Replacement
RBC	Red Blood Cells
RCA	Right Coronary Artery
RHD	Rheumatic Heart Disease
RV	Right Ventricle
S.D.	Standard Deviation
Sig.	Significant
SPSS	Statistical Package of Social Sciences
SSIs	Site of Surgical Incision
t	t-test
TAVR	Trans-catheter Aortic Valve Replacement
TEE	Trans-Esophageal Echocardiography
TOF	Tetralogy Of Fallot
TR	Tricuspid Regurgitation
TV	Tricuspid Valve
Vol	Volume
VR	Valve Replacement
VSDs	Ventricular Septal Defects
WBC	White Blood Cells
WHO	World Health Organization
$	American Dollar
<	Less than
≤	Less than or equal
≥	More than or equal
%	percentage

Abstract

Heart disease or cardiopathy is a comprehensive term that refers to a different and diverse group of diseases that affect the heart, some of which require surgical intervention and sometimes only conservative treatment . Heart disease is the number one cause of death in both the United States and England ، in addition to that 25.4% of the total deaths in the United States due to these diseases.

Cardiac surgery patients are generally admitted to the cardiac surgery department or who are in critical condition in intensive care units (ICU). Most of these patients usually suffer from serious diseases such as myocardial infarction, heart failure or coronary artery disease, where the surgical intervention on the heart is performed emergency or selectively according to the patient's condition.

Preoperative nursing is a term that describes a variety of nursing jobs associated with surgery, and includes three phases before, during, and after surgery . Each of these stages begins and ends at a certain point to start the other stage, and each stage includes a set of nursing activities performed by the nurse using the nursing process (NP). All stages of patient care before, during and after surgery are important, but the pre-operative stage is considered one of the most important stages because patients at this stage are unable to meet their physical or psychological needs, which leads to an imbalance in patients, whether emotional or psychological.

Nurses play an essential role in assessing patients prior to cardiac surgery by determining the patient's needs, not only for cardiac surgery but also for complete nursing care for each surgeries (before, during and after surgery). Preoperative assessment is an interactive process to provide information, psychosocial and emotional support, and health education to patients, which helps to enhance the patient's recovery after surgery . The nurse also plays the role of coordinator among team members by collecting and protecting patient information to provide the best healthcare and patient needs before and after surgery . The pre-operative nursing consultation is useful from the patients' point of view, as they are provided with basic information about the surgical procedure and an explanation of the pre- and post-operative care process.

The objective of this thesis is to evaluate the effectiveness of an educational program on nurses' knowledge and performance in relation to cardiac surgery and to prepare patients prior to cardiac surgery for adult patients requiring cardiac surgery.

A quasi-experimental study was conducted on educational program on pre-operative nurses knowledge and performance in cardiac surgery ward at the Middle Euphrates Region. The probability sampling technique was adopted and 48 nurses working in the cardiac surgery wards of two government hospitals and one private hospital were selected.

The use of a questionnaire form for nurses knowledge and performance in the wards of heart surgery ، where this questionnaire has been prepared by the researcher and supervisors were presented to a group of experts were to make appropriate adjustments according to expert opinion . This form consists of three parts:

Firstly : The socio-demographic data of the nurses participating in the study ،

Second : A questionnaire form about the nurses' knowledge regarding heart diseases and surgery (31 questions).

Third : A checklist for the nurses' performance in relation to preparing patients before surgery (32 procedures).

The results of the study showed that more than half of the sample were males 54.2%, and their ages were between 25-29 years, and they have a Bachelor's degree in nursing, and they have 1-5 Years of experience, as well as majority of them don't have previous training courses in the field of heart surgery inside or outside Iraq.

Regarding to nurses' knowledge, the study showed that, more than half of the sample 13 (54.2%) had moderate knowledge about heart diseases and surgery before implementing the educational program, and after implementing of educational program, majority of them 21(87.5%) became have enough knowledge about heart diseases and surgery.

Regarding to nurses' performance and patient preparation before surgery, the study showed that, more than half of sample 17(70.9%) were not preparing the patient in the correct way before implementing educational program and after implementing the program, the majority the nurses 21 (87.5%) became prepare the patient properly before the surgery.

The study also showed that, there is no relationship between nurses' knowledge and performance and age, gender, level of education and number of years of experience before implementing the educational program with a percentage of (0.347, 0.126, 0.392, 0.163, 0.808 respectively).

Finally, the results of the study showed that, there is a relationship between the nurses' knowledge and their performance and the demographic information of the study participants after implementing educational program with a percentage of (0.001 and 0.001 respectively) with a high average after implementing the educational program with a percentage (M=0.73 versus M=0.29) for the nurses' knowledge, as for their performance after implementing the program, it was also with a high average (M=2.38 versus M=2.01) regarding to performance of the nurses participating in the study.

Based on the findings of this study, the most important recommendations are:

-Continuous educational and training programs for all nurses at least once a year.

-Government and private hospitals to continuously establish educational and training programs for nurses who working in the heart surgery wards to overcome all the obstacles that prevent the development of nurses for their knowledge and their performance.

-Encouraging nurses to attend local and international conferences and to conduct workshops for nurses who work in cardiac surgery wards to increase their knowledge and performance

-Provide nurses in the cardiac surgery wards booklet containing knowledge and images simplified for heart disease and methods of treatment and optimal preparation of the patient before surgery

-Finally ، there is an urgent need for more research focused on nurses knowledge and performance, role and impact of nurses on patient care and reduce the risk of complications of surgery before and after the surgery.

Chapter One

1.1. Introduction

Cardiac surgery, also called cardiovascular surgery, is define as a surgery on heart and blood vessels that specialist cardiac surgeons perform to treat ischemic heart diseases or heart valves or congenital heart diseases such as atherosclerosis, rheumatic heart disease (RHD), and endocarditis, heart surgery, and heart transplantation.

Preoperative nursing is a term that describes a variety of nursing functions associated with surgical work, and includes three phases before, during and after surgery. Each of these stages begins and ends at a certain point to start the other stage, and each stage includes a group of nursing activities that the nurse performs using the nursing process (NP) (Celik, Edipoglu.2018). All stages of patient care before, during and after surgery are important, but the preoperative stage is considered one of the most important of these stages because patients at this stage are unable to meet their physical or psychological needs, which leads to an imbalance in patients, whether emotional or psychological(Fudickar A,etal.2012).

The nurses play an essential role in assessing patients before cardiac surgery by determining the patient's needs, not only for cardiac surgery but also for complete per-operative nursing care (before, during and after surgery). Preoperative evaluation is an interactive process to provide

information, psychosocial and emotional support, and health education to patients which help to promote a patient's postoperative recovery. The nurse also plays the role of coordinator among the team members by collecting and safeguard information of patients to provide best healthcare and to meet the patient needs before and after surgery. The nursing consultation before surgery is useful from the patients' point of view. It provides them with essential information about procedure and explains the pre and postoperative care process (Bouamrane, Mair .2014).

Most studies have confirmed that, there are errors occur during preparing the patients for surgery and this is due to the lack of expertise, skills and information among nurses who preparing the patients for surgery. The main problem in prepared patients is the lack of adequate professional knowledge and skills for the patients and even doctors responsible for primary health care and emergency procedures for patients (Helo S and Moulton CE.2017).

preparing the patients for cardiac surgery requires efficiency and performance of nurses, which depends on the nurses' knowledge and awareness and the lack of a gap between theoretical knowledge and clinical skills (Delacroix R.2017).

Since education plays a key role in correct patients preparation before surgery, many studies have indicated that problems not only in

Chapter one -Introduction ……..

performance but also in adequate knowledge and awareness about preparation of patients for cardiac surgery, therefore training programs can be appropriate and effective solutions to eliminate weakness in Nurses who are caring for with the cardiac surgery in hospitals (Jammer, I.2015).

Cardiac surgery is medical specialty of treating diseases related to the heart by surgery. Modern cardiac surgery began at the end of nineteenth century, when heart surgery was developed by many surgeons specializing in this field who presented and still provide more surgical treatments for a variety of heart diseases, and this development continues today (Aris A. Francisco R. 2015)

To develop cardiopulmonary bypass graft, it was necessary to access the internal structures of the heart because of the benefits of these operations and to reduce the high mortality rate as a result of heart surgery. pulmonary bypass or revascularization is one of the most important options for treating ischemic cardiac disease and atherosclerosis. In sixties of last century, surgeons in different countries began to perform Coronary Artery Bypass Grafting (CABG) operations, where the doctor Veinberg implanted left internal mammary artery (LIMA) in the front wall of the heart muscle without performing any anastomosis directly into the coronary vessels and he noticed that, they

are development of vessels collateral when sufficient blood supply was present, and Doctor Forssmann invented cardiac catheterization in 1929, and Doctor Sherry invented media injection in contrast into coronary with angiography to determine location of stenosis in coronary arteries (CA) and from here began the era of reversal of coronary heart disease(Konstantinov. etal.2000).

Constitute bypass grafting operations and revascularization two main possibilities for the treatment of ischemic cardiac disease in addition to medications treatment. Surgical treatment of valvulopathy was first started in 1923 by Cutler. The treatment was by opening the coronary commissures by inserting a finger or a device inside the coronary artery into the stenosis area to expand it or cut the stenosis area. After that, a new technique introduced which called Hufnagel Valve Cage and Ball , this technique was artificial valve which placed inside the descending aorta to treat aortic regurgitation and that was in 1952, 15 years later(Konstantinov. etal.2000).

An artificial valve similar to the firstly which called Edwards Ball Cage, this artificial valve implanted to treatment patients with mitral valve In 1967. After that, valve replacement techniques improved from replacing one valve to replacing the four valves, where special techniques have been introduced, such as the Ross procedure,, where the aortic valve

was replaced by pulmonary valve auto-graft, and that was in 1992. Bental implanted a prosthetic aortic valve accompanied by an ascending aortic limb to treat the nearest aortic anatomy or aneurysm(Lillehei, Varco,1986).

Cardiac system is divided into heart, blood and blood vessels, in addition to lymphatic system, which helps maintain an adequate blood volume within the vascular system by capturing excess fluid from the tissues and returning it to the blood vessels (bloodstream) (Keefe.etal.2014).

The heart is dividing to four hollow chambers, two upper and two lower chambers or right and left chambers which called atrium and ventricles respectively, separated from each other by a longitudinal septum which called the interventricular septum (Rossano, etal,2019). The interrelationships between the heart valves are unified by virtue of the similarities in terms of shape and function. valves of the heart are divide into two groups: atrio-ventricular valves (mitral and tricuspid valves), and semilunar valves (aortic and pulmonary valves) (Bradlow. etal.2014).

The heart is described as a double pump because it receives and exits blood at the same time. The blood circulatory system consists of two

parts: pulmonary circulation, systemic circulation, and coronary circulation (Pratt R, Rebecca A. 2017).

Cardiac conduct system composed of a special electrical circuit inside the heart, which consists of Nodal cells and Purkinje fibers, called electrical cells. These Nodal cells generate and transmit impulses through Purkinje fibers to contractile cells inside the heart, which leads to the occurrence of impulses (systole and diastole).

The classification or types of cardiac surgery are divide into many categories: Acquired valvular heart disease, Coronary artery disease, Surgery for heart failure, Thoracic Aortic Disease, Transplantation, Arrhythmias, Acquired Valvular Heart Disease

1.2. Importance of the study:

Among all healthcare professionals, nursing is the first to deal with patients who need cardiac surgery in any part of the hospital, whether in emergency, and the cardiac care unit or the hospital's internal departments, so their competence in dealing with heart surgical patients is a critical factor in relieving complications after surgery for patients who will undergo open heart operations (Lundy .2014).

In terms of nursing, the educational program affects the knowledge and practices of nursing about preparation of patients before surgery and increase of nurses information about preparation of patients before

cardiac surgery which helps In improving nursing performance during preparation of patients for cardiac surgery. This knowledge and practices may help to reduce mortality among patients who undergoing to cardiac surgery (Battard J.2017).

The impact of the program on patients, it will have a impact on the lives of patients who have cardiac surgery because this research will increase nursing skills and information on preparation of patients and thus increase success ratio of cardiac surgery and reduce the mortality ratio among patients who need surgery and reducing the complications of cardiac surgery on patients due to the systematic work that this research will provide and the definition of each nurse in turn in preparation of patients (Mascioli S, Carrico CB.2016).

As for the impact of the program on the hospital, its impact will be on the ability of nursing to do the optimal recovery in cardiac care, which affect reduce the compensations enhance patients recovery decrease the mortality rate in the hospital and will raise the level and efficiency of the hospital and decrease the financial burden on patient and hospital. This research also helps in identifying medical tools that may be unavailable to prepare patients and direct the hospital administration to obtain and provide them in order to reduce the complications and mortality rate and improve nursing skills and information in the hospital's cardiac care

department, and to improve the hospital from a high death rate due to cardiac surgery to a low mortality rate (Hines S, Kynoch K, Khalil H.2018).

This research focuses on nursing knowledge and performance in conducting preparation of patients before cardiac surgery, in addition; this may have a positive impact.

1-3- statement of study:

Statement of study is effectiveness of pre-operative educational program on nurses knowledge and performance in cardiac surgery wards toward nursing care of patient with cardiac surgery at Middle Euphrates Region.

1.4. Objectives of the study are:

Objectives of the study are to

1-Assess nurses needs for pre-operative education program.

2-Assess the nurses knowledge related to cardiac patients pre-operative: Pre-test.

3-Assess the nurse performance related to cardiac patients pre-operative preparation: Pre-test.

4- To find out the effect of the pre-operative preparation for cardiac surgery post-test.

5- To find out association between knowledge, performance and sociodemographic characteristics.

1.5. Terminology definition

1.5.1. Effectiveness:

1.5.1.a.Theoretical definition:

It is degree which something is successful in producing a desired result (Jammer,et al,2015).

1.5.1.b. Operational definition:

The degree of achievement of objectives related to an the effective of pre-operative educational program on nurses information and performance in cardiac surgery wards at the Middle Euphrates Region.

1.5.2. Educational Program:

1.5.2.a. Theoretical definition:

It is program that provides educational and services which meant to meeting of a public needs (Dorlands 2003).

1.5.2.b. Operational:

They are lectures presented organized for educating nurses and give them more information to be applied in their work session. This educational program is intended to educate nurses on preparation of patients before surgery to performing procedure, or to build upon nurses expertise in given field.

1.5.3. Knowledge:

1.5.3.a. Theoretical definition:

Facts or experiences which known by group or people (British dictionary 2002).

1.5.3.b. Operational definition:

The knowing something about nursing pre-operative cardiac surgery wards at the Middle Euphrates Region to performing the procedures on adult before cardiac surgery.

1.5.4. Performance:

1.5.4.a. Theoretical definition:

Repeatedly performing of activity to learn skill, frequent performance will make you an excellent practitioner and professional. (Collins English Dictionary 2014).

1.5.4.b. Operational definition:

Application of nursing educational program of nurses that lead to good action about performing preparation of patients before of cardiac surgery on adult.

1.5.5. Nursing management

1.5.5.a. Theoretical definition

Nursing management is a coordination system to ensure the effectiveness of health care provided in terms of quality of care provided,

cost and accountability, in order to ensure coordination of and evaluate the effectiveness of health care services provided.

Chapter Two

Literature Review

Targeted and systematic review of relevant literature and research studies was conducted regarding the phenomenon underpinning the current study, and this presentation covered all issues related to the nursing management of preoperative cardiac surgery for the patient.

Part I: Historical review of cardiac surgery (CS).

Part II: Cardiac Surgery (CS).

Part III: Previous Literatures and studied related to nurses information and performance toward patients with cardiac disease preoperative cardiac surgery.

2.1. Historical perspective:

Cardiac surgery, also called cardiovascular surgery, is define as a surgery on heart and blood vessels that specialist cardiac surgeons perform to treat ischemic heart diseases or heart valves or congenital heart diseases such as atherosclerosis, rheumatic heart disease (RHD), endocarditis, and heart transplantation(World Health Organization,2014).

The first operations on the pericardium were performed in the nineteenth century was in 1801 by Francisco Romero, and 1810 by Dominic Jean Larry, then in 1891 by Henry Dalton and in 1893 by Daniel Hale Williams. Axel Cappelen performed first operation on the heart on September 4, 1895 at Rikschospitalet in Christiania which the heart was accessed by thoracotomy in left side, but unfortunately patient died three days after surgery due to fever and inflammation of the mediastinum(Baksaas ST; Solberg S,2003).

Surgery on large vessels (for example, closure of the ductus arteriosus and aortic stenosis repair) became popular in turn of this century. The world knew about heart valves operations in 1925 when Henry Soutard succeeded in performing an operation on a patient with mitral valve stenosis by making aperture in left atrium and then inserting a finger to palpate and explore the mitral valve. After operation the patient was able to live for several years after surgery(Leon MB.etal.2010).

In 1944, the first open heart surgery for pediatric was performed by Helen Tosig, Alfred Blalock and Vivien Thomas for a one-year-old patient who was suffering from Tetralogy of Fallot, and this was done at Johns Hopkins Hospital(Helen T., Joyce B.1992).

Thomas Sellers also performed Tetralogy of Fallot for a patient suffering from pulmonary valve stenosis, where he successful to divide the narrowed valve and that was in 1947 at Middlesex Hospital in London, in addition; Russell Brooke was used a special dilator for several cases of pulmonary valve stenosis, and many cardiac operations were performing in this way until allowed the valve surgery directly after the introduction of the cardiopulmonary bypass into the cardiac operating rooms(Harskamp R.E.etal.2014).

Also in 1948, four successful cardiac surgeries for mitral valve were performed by four surgeons who were working independently of each other, as Horace Smith used the valve opening to remove part of mitral valve, while the other doctors, (Charles Bailey, Dwight Harkin, and Russell Brook), adopted the Souttar's method with some modify (Leon MB.etal.2010).

The firstly success repair of a congenital heart defect by use hypothermia was also carried out by Dr. F. John, with the assistance of Dr. C. Walton Leighi in 1952 at the University of Minnesota, and Alexander Alexandrovich Vishnevsky was able to perform the first surgery on the heart using only local anesthesia. 1953, while the first cardiac surgery was documented in Canada by John Carter Callaghan(Horace G. Smithy, MD,2017).

2.2. Anatomy and physiology of cardiovascular system

Cardiac system is divide to heart, blood and blood vessels, in addition to lymphatic system, which helps maintain an adequate blood volume within the vascular system by capturing excess fluid from the tissues and returning it to blood vessels (bloodstream). The heart

functions as a pump as it pumps blood through a vascular system which reach oxygen and nutrition to cells and removes waste products from these tissues, which result from metabolism. Any defect in function or structure of the cardiac system that affects all body systems and may lead to change in heart rate or rhythm, which affects the functions of body such as tissue perfusion, status of fluid volume, self-care, mobility, respirations, sexual activity, and self-concept(Keefe JH.etal.2014).

The heart is a conical, hollow organ, size of an adult's fist, and it weighs about 500 grams. It is existing in center of the chest cavity between spine and sternum. The heart is covered with a membrane which called pericardium, which envelops heart and forms pericardial sac, which consists of outer and inner layer which called the parietal and visceral pericardium respectively, and between them space which called pericardial cavity and it contain serous fluid that is produced inside the pericardium and its quantity is estimated at about 20 ml, which works to soften the surface of heart which lead to decrease rub during systole(Reed, R.etal.2014).

The cardiac wall consists of three layers, which are, epicardium and myocardium and endocardium. Epicardium covers the heart and large blood vessels and forms the parietal layer of the pericardium and then adhere to surface of heart directly. As for the myocardium, it forms the middle layer, which is made up of special cardiac cells called myofibrils, which make up the largest part of heart muscle, while the deeper part is called endocardium, which is a thin membrane consisting of three layers, which are endothelial cells smooth lining inside the heart chambers, valves, and large vessels(Molina, D. K. & Dimaio, V,2015).

Chambers of heart

The heart is divide to four hollow chambers, two upper and two lower chambers or right and left chambers which called atrium and ventricles respectively, separated from each other by a longitudinal septum which called the inter-ventricular septum. The heart's pumping action is done by relaxing and regularly contracting the muscle walls of its four chambers (Khush KK, & Ball RL. 2020).

The right side receives blood poor in oxygen from the upper and lower hollow veins, as well as from the coronary sinuses, and then pump blood through pulmonary arteries to lungs, and there is the gas exchange where the blood exits carbon dioxide gas and takes the oxygen which travels through the pulmonary veins to left side, where it receives rich blood of oxygen and pump it through aorta artery (Khush KK, et al, 2019).

The thickness of the walls of the atria and ventricles varies due to the different workload of each. The muscular layer of the two atria is thinner than the muscular layer of the ventricles due to the little resistance during pumping of blood from the atria to the ventricles, while there is high resistance of the ventricles due to blood pumping to the body and thus the walls of the ventricles are thicker. The atria and ventricles are separated from each other through valves with one direction of flow, allowing blood flow from atria to ventricles and not vice versa, and they are called atrio-ventricular (AV) valves(Rossano JW.etal.2019).

Heart valves

The interrelationships among the heart valves in normally formed hearts are remarkably uniform. The aortic valve occupies a central

position, wedged between the mitral and tricuspid valves, whereas the pulmonary valve is situated anterior, superior, and slightly to the left of the aortic valve. The annuli of the mitral and tricuspid valves merge with each other and with the membranous septum to form the fibrous skeleton of the heart. The core of the skeleton is the central fibrous body, with its two extensions, the right and left fibrous trigones. The right fibrous trigone forms a dense junction between the mitral and tricuspid annuli, the left ventricular–aortic junction below the noncoronary cusp, and the membranous septum. The trigone is pierced by the bundle of His. The left fibrous trigone, situated more anteriorly and to the left, lies between the left ventricular–aortic junction and the mitral anulus. The tendon of the infundibulum is a fibrous band joining the more superiorly placed pulmonary valve to the central cardiac skeleton. The tendon of Todaro also joins the central fibrous body. By virtue of similarities in morphology and function, the heart valves naturally fall into two groups: AV (mitral and tricuspid) valves and semilunar (aortic and pulmonary) valves(Bradlow, WA,etal,2014).

Atrioventricular valves

Atria and ventricles separated by atrioventricular valves, where tricuspid valve separated between atrium and ventricle right, which named because it consists of three cusps, while the mitral valve, which is named because it consists of only two cusps, separates left atrium from left ventricle (Poelaert JI, Bouchez S,2016).

Mitral Valve

The AV valve of the left ventricle, the mitral valve, is bicuspid, with an anterior (aortic, or septal) leaflet and a posterior (mural, or ventricular)

leaflet. Tissue that could be called commissural leaflets is usually present at the commissures between these two leaflets (Mahmood F.etal.2015). The combined area of the two mitral leaflets is twice that of the mitral orifice, resulting in a large area of coaptation. When this large area is lost because of malalignment of the leaflets, undue stress is placed on the chordae tendineae, and they may rupture. Although there has been some controversy as to the definition of commissural areas, particularly in regard to clefts in the posterior leaflet, Silver and colleagues describe chordae tendineae that define the limits of the septal (anterior) and posterior leaflets. Rusted and colleagues found the depth of commissures in the normal mitral valve averaged 0.7 to 0.8 cm and never exceeded 1.3 cm (Rogers-Vizena CR.etal.2016).

Tricuspid Valve

The tricuspid valve, the AV valve of the right ventricle, has three leaflets: anterior, posterior, and septal. Its orifice is roughly triangular and larger than the mitral orifice. The anulus is relatively indistinct, especially in the septal region. The leaflets and chordae tendineae are thinner than those of the mitral valve. Its orientation is nearly vertical. The anterior (anterosuperior) leaflet is largest of three leaflets. The chordae attaching to this leaflet arise from anterior and medial papillary muscles. The anterior papillary muscle is the larger of the two. The posterior (inferior) leaflet is usually the smallest and is commonly scalloped. Its chordae originate from the posterior and anterior papillary muscles. The transition between the attachments to the posterior wall and septum is associated with a fold in the leaflet. Of major surgical importance is proximity of the conduction system to the septal leaflet and its anteroseptal commissure. The bundle of His penetrates the right trigone beneath the inter-

ventricular component of the membranous septum (usually about 5 mm inferior to the commissure) and runs along the crest of the muscular septum. That portion of the septal leaflet between the membranous septum and the commissure extends around the tricuspid anulus, away from the septum, to the right ventricular free wall. This portion of the tricuspid valve may form a flap over some VSDs (Dahou A. etal. 2015).

The Tricuspid valves are closed during diastole. At this point, the pressure in the pulmonary artery and aorta decreases, causing blood to flow back toward the semilunar valves. This action fills the cusps with blood and closes the valves. The semilunar valves are forced open during ventricular systole as blood is ejected from the right and left ventricles into the pulmonary artery and aorta VSDs(Taramasso M.et al.2016).

Aortic valve

The aortic valve is normally tricuspid and composed of delicate cusps and sinuses of valsalva. These components form three cuplike structures that constitute the entire valve mechanism; the valve is in fibrous continuity with the anterior leaflet of the mitral valve and the membranous septum.

The free edge of each cusp is of tougher consistency than the remainder of the cusp. At the midpoint of each free edge is a fibrous nodules Arantii. On either side of each nodules is an extremely thin, crescent-shaped portion of the cusp termed the lunular. These regions form the area of coaptation during valve closure. The aortic sinuses (sinuses of Valsalva) are dilated pockets of the aortic root that form the outer component of the three cuplike closing structures of the aortic valve (Leon M.B. et al. 2016).

The coronary arteries arise from two of the aortic sinuses. The walls of the sinuses are considerably thinner than the wall of the aorta proper, an important consideration when designing proximal aortotomies. The crown-shaped annulus, fibrous trigones, aortic cusps, aortic sinuses, and sinutubular junction share a dynamic coordinated action to provide unidirectional transmission of large volumes of blood pumped intermittently through the channel while maintaining laminar flow, minimal resistance, optimal coronary artery flow, and least damage to blood elements during widely variable and frequently changing conditions (Oechtering T.M.et al.2016).

Pulmonary Valve

Pulmonary valve structure is similar to that of the aortic valve. The pulmonary valve normally has three cusps, with a nodule at the midpoint of each free edge, and lunular and thin, crescent-shaped coaptive surfaces on both sides of the nodules (Hascoet S.et al.2017).

The pocket behind each cusp is the sinus. Major differences from the aortic valve are (1) lighter construction of pulmonary valve cusps, (2) normal absence of coronary artery origins, and (3) normal lack of fibrous continuity with the anterior tricuspid valve leaflet. Pulmonary valve cusps are supported entirely by freestanding musculature, having no direct relationship with the ventricular septum. The pulmonary valve is lifted away from the ventricular septum by the sub-pulmonary infundibulum. The first septal branch of the left anterior descending coronary artery pierces the ventricular septum below the shortest part of the sub-pulmonary infundibulum. The artery is protected by the sub-pulmonary infundibulum (O'Donnell C. etal. 2017).

Pulmonary valve cusps have been described by several terminologies, usually named by their relationships to the aortic valve: right, left, and anterior (nonseptal). Kerr and Goss found that a commissure of pulmonary valve was adjacent to a commissure of aortic valve (AV). These investigators suggested that the cusps of each arterial valve should be termed right adjacent, left adjacent, and opposite (or, as suggested by Anderson, right facing, left facing, and nonfacing) in relationship to the adjacent commissure of each valve(Armstrong A.K.et al.2014).

Blood circulation

The heart is described as a double pump because it receives and exits blood at the same time. The blood enters right atrium and moves to pulmonary circulation. At same time exact, blood coming from pulmonary circulation and enters to left atrium. The blood circulatory system consists of two parts: pulmonary circulation where blood is pump through capillary circulation which surrounding lungs for gas exchange, and systemic circulation that pumps blood to tissues of body, also to that, there is the coronary circulation where blood is supply to the heart muscle itself(Pratt, Rebecca. 2017).

Systemic circulation

Systemic circulation is consists from left atrium and ventricle, aorta, and arteries which supply blood to surrounding tissues, as well as the systemic venous system which consists from right atrium and ventricle and superior, inferior vena cava. systemic circulation is a high pressure system because it carries blood to peripheral areas of body(State University of New York.2014).

Pulmonary circulation

The pulmonary circulation consists of atrium and ventricle right, pulmonary arteries and veins. Pulmonary circulation is have low pressure because, it is located in the chest near to the heart.

The pulmonary circulation starts from right atrium, where de-oxygenated blood move to right atrium via inferior and superior venacava, and then to right ventricle and then travels to lungs through pulmonary arteries. When the blood reaches to capillaries, gas exchange occurs where CO2 (carbon dioxide) is excreted and replaced with oxygen, and then O2 (oxygenated blood) returning to atria and then to ventricle left through pulmonary veins, then oxygenated blood pump through left ventricle to all tissues of the body through the aorta and its main branches(Guyton, Arthur; Hall, John.2000)

Coronary circulation

The blood supply to the heart muscle by the coronary circulation, which consists from coronary arteries which create at the base of aorta and then divide into multiple branches which encircle the heart muscle and supply it with oxygenated blood and nutrients.

The heart needs a high metabolism as it extracts 70% to 80% of oxygen that is delivered to the heart muscle while other organs extract, on average, only 25% of the oxygen(Goodwill AG.etal.2017).

There are several other arteries supplying the myocardium, which are the anterior descending and circumflex arteries that originate from left coronary artery (LCA), where the anterior descending artery (ADA) supply anterior septum between two ventricles and also left ventricle,

while circumflex arteries supply the branch surrounding LLR (left lateral ridge) of LV (left ventricle). For right ventricle, it is nourished from the posterior descending artery (PDA), Which is branched from right coronary artery (RCA) and nourishes posterior portion of the heart (Goodwill AG.etal. 2017).

The heart is supplies with oxygen and nutrients, unlike the nutrition throughout the body, where the coronary arteries fill with blood and nutrients while the ventricle is relaxed, and after the heart supply process is completed, the pulmonary veins transports the blood to the coronary sinuses, and then into right atrium. Coronary circulation is regulated by several factors, the most important of which it are aortic pressure and heart rate(Bruning RS, Sturek M.2015).

Cardiac conduct system

The cardiac conduction system consists of a special electrical circuit inside the heart, which consists of Nodal cells and Purkinje fibers, called electrical cells. These Nodal cells generate and transmit impulses through Purkinje fibers to contractile cells inside the heart, which leads to the occurrence of impulses (systole and diastole)(National Academies of Sciences. 2019)

The process of stimulating myocytes (contractile cells) occurs through small molecules called ions (electrically charged particles) which are ions of sodium, calcium, and potassium. These ions enter the contractile cells through channels in the cardiac cell membrane that regulate the speed and movement of these ions into and out of the contractile cells (Anderson.etal.2016).

There are two states of contractile cardiac cells, the first is called depolarization or resting, and the second is called repolarization. The state of polarization occurs when sodium is primary ion outside the cell (positive charge), while potassium is primary ion inside the cell (negative charge). This difference in ion concentrations means that inside the cell a negative charge, while outside the cell a positive charge. This condition is called resting or polarization.

While the state of repolarization occurs during cellular stimulation, which occur through entry of sodium and calcium ions into cell through channels on the cell membrane, and at the same time, potassium ions exit outside cell, which lead to becomes inside the cell positively charged while outside the cell is negatively charged, this state is called a state polarization. When the depolarization state is complete, the ion exchange returns to the resting state and this period is called repolarization (Otsuka F.etal.2014).

The cardiac action has five phases:

Stage 0 is process of cellular depolarization begins with the entry of positive ions into the cell, where the atrioventricular muscle cells are rapidly depolarized and the positive sodium ions move into the cell rapidly through sodium channels, where the muscle cells have a rapid response. As for depolarization, it occurs when calcium ions enter the cell through calcium channels more slowly than sodium ions enter the atrioventricular node, and therefore these cells have a slow reaction. Stage 1is during the first stage, the cells are repolarized early through the exit of potassium ions from the inside of the cell to the outside of the cell. Stage 2 in the second stage, which is called the plateau stage, because the repolarization is slow, calcium ions enter the cell. Stage 3at this stage,

repolarization is complete and the cell returns to the resting stage. Stage 4 is the resting stage before the next depolarization process (Ubben JF.etal. 2015)

Refractory Periods.

As reviewed previously, myocardial cells must completely repolarize before they can depolarize again. During this time, the cells are in what is called a refractory period. There are two phases of the refractory period, the effective (or absolute) refractory period and the relative refractory period. During the effective refractory period, the cell is completely unresponsive to any electrical stimulus; it is incapable of initiating an early depolarization. The effective refractory period corresponds with the time in phase 0 to the middle of phase 3 of the action potential. The relative refractory period corresponds with the short time at the end of phase 3. During the relative refractory period, if an electrical stimulus is stronger than normal, the cell may depolarize prematurely. Early depolarizations of the atrium or ventricle cause premature contractions, placing the patient at risk for dysrhythmias. Premature ventricular contractions in certain situations, such as the presence of myocardial ischemia, are of concern because these early ventricular depolarizations can trigger life-threatening dysrhythmias, including ventricular tachycardia or ventricular fibrillation. Several circumstances make the heart more susceptible to early depolarization during the relative refractory period, thus increasing the risk for serious dysrhythmias(Groh C.A.et al. 2019).

2.3. Classification of cardiac surgery

The classification or types of cardiac surgery are divide into many categories:

A. Acquired valvular heart disease

B. Coronary artery disease

C. Surgery for heart failure

D. Thoracic Aortic Disease

E. Transplantation

F. Cardiac Tumors

A. Acquired Valvular Heart Disease

A.1. Mitral Valve Repair

Technique of mitral valve repair was developed by surgeons, Elliott Carr Cutler in 1923 made the first successful surgical mitral valve repair which was rare. Surgical treatment of the mitral valve is one of the most important technical advances in open heart surgery over the past four decades by surgeons for most mitral valve cases, most notably the prolapsed valve with mucosal degeneration. After World War II, Harkin in Boston and Bailey in Philadelphia promoted the method of closed mitral comminisection for mitral valve stenosis, and over the next twenty-five years, into the early 1970s, the closed coronary lapotomy was the most popular procedures. This techniques was used to treat and relieve mitral valve stenosis (Bajwa G, Mihaljevic T. 2019).

The principles of mitral valve repair have developed with experience in each the four causes of mitral regurgitation: rheumatism, endocarditis, ischemia and myxoma. Regardless of the etiology, the principles are basically the same; Create characterization of the anterior and posterior sheets during systole, increase valve movement, prevent valve stenosis, reduce annular expansion, and remodel the annulus(Goldstone AB, Woo YJ.2016).

A-2 Mitral Regurgitation Repair.

The most common mechanical complication in mitral valves is mitral valve regurgitation (MR). One of the main causes of mitral valve repaire is remodeling of left ventricle after infarction, which in turn leads to displacement of papillary muscles that connect the leaflets of the mitral valve and leads to varying degrees of annular dilation in the valve. This entity must be distinguished from coronary artery disease and associated MRI from other causes such as degenerative mitral valve disease. Acute magnetic resonance ischemia is rare and secondary to papillary muscle tearing or cord elongation (De Backer O. etal. 2014).

Mitral regurgitation is defined as the return blood from left ventricle (LV) to left atrium (LA) via the mitral valve (MV). Carpenter made a functional classification of ischemic regurgitation as follows.

In type 1, the patient has normal leaflet motility, and mitral regurgitation based on cyclic dilatation, which may occur if a fundal infarction occurs. And type II dysfunction refers to increased leaflet movement with the free edge of the leaflet, which may occur after a myocardial infarction due to acute papillary muscle rupture or chronic papillary elongation. Type IIIB, which is most common in patients with

ischemic mitral regurgitation, is caused by restriction of leaflet movement during systole and displacement of the apical and lateral papillary muscles(Lim DS.etal.2014).

A.3.Percutaneous Mitral Valve Repair

As the preceding decades have witnessed the maturity of surgical therapies for valve and coronary artery disease, the next decade will witness a tremendous change in our approach to percutaneous therapies for heart valve disease. Recently, we have seen a remarkably explosive growth of per-cutaneously implanted heart valves in Europe, and a myriad of novel devices being developed for repair or replacement of diseased heart valves from a trans-catheter approach (Nickenig G.et al. 2014).

The very first percutaneous therapy for mitral valve disease was the balloon mitral commissurotomy for rheumatic mitral stenosis. Since then, the technique has matured with the use of specific shaped balloons, and a better understanding of the types of rheumatic valve disease amenable to this therapy, as well as the long-term outcomes from this percutaneous approach. However, it is also important to note that the skills and techniques involved with this procedure are complex and involve a trans-septal puncture, which is not commonly performed by most physicians trained today.

Currently, surgery for MR has become a mature therapy, with a wide range of different techniques involving leaflet, chordal, and annular approaches. Concepts behind each of these approaches have been utilized by novel trans-catheter approaches to repair of MR. Additionally, work

continues to create a trans-catheter replacement option for mitral valve disease.

Just as the previous decade comprised a marked explosion in the utility and maturity of transcatheter interventions for coronary artery disease, the next decade will bear a similar focus on transcatheter approaches to heart valve disease. The MitraClip system represents a first-generation step in this direction and is remarkable for its success as such (Maisano F.et al.2013 & Vahanian A.et al.2012)

A.4.Tricuspid Valve Repair

The tricuspid valve (TV) is affected by left-sided heart disease, specifically mitral valve disease. In this case, the pathophysiology of tricuspid valve insufficiency is an increase in the filling pressure of the left heart with subsequent expansion of pulmonary hypertension resulting in hypertrophy or dysfunction of the right ventricle (RV), and ultimately enlargement of annulus of the tricuspid valve (Topilsky Y.et al.2014).

The American College of Cardiology (ACC) and the American Heart Association (AHA) have given instructions for the surgical intervention of tricuspid disease (Barac YD.et al.2019).

Category Ia indications include patients with severe (acute) tricuspid valve insufficiency who have undergone cardiac surgery on the left side of the heart, patients with primary tricuspid valve insufficiency without severe RV dysfunction, and patients with stenosis Tricuspid primary or secondary severe.

Class Ila indications include patients with mild tricuspid (TR) regurgitation without or with dilation of the tricuspid annulus (> 40 mm by echocardiography) (Chikwe J.etal.2015).

A.5.Pulmonary Valve Replacement

Congenital heart disease (CHD) and dysfunction of left ventricular (LV) is one of the difficult and common conditions in children and adults whether due to stricture or regurgitation, is one of the most common conditions. Some of these defects include pulmonary atresias, truncus arteriosus, and most commonly tetralogy of fallot (Geva T. 2011).

Pulmonary valve replacement (PVR) remains gold criterion of surgical treat of progressive right ventricular (RV) failure from these defects due to longstanding pulmonary regurgitation (PR) and pulmonary stenosis(Ferraz Cavalcanti PE.etal.2013).

Often occurring after two to three decades of repair tetralogy of Fallot TOF. PVR has become an increasingly more common clinical situation confronting congenital and adult cardiac surgeons as outcomes and survival have improved for tetralogy of Fallot TOF patients over the past several decades (Cheung EW.etal. 2010).

Tetralogy of Fallot (TOF) still remains most common types of cyanotic heart defect of children. With advances in surgical technique, diagnostic imaging and technology, postoperative and critical care management, and long-term follow-up capabilities, outcomes following primary Tetralogy of Fallot TOF repair have dramatically improved with current mortality rates of 2% to 3% and 20-year survival approaching 90% (Bonello B.etal.2013).

The recognition of certain adverse functional sequelae following Tetralogy of Fallot TOF repair has been increasingly reported and emphasized in recent years. These abnormalities include pulmonary regurgitation, RV failure from progressive volume overload and pulmonary regurgitation PR, persistence of atrial and/ or septal defects, right ventricul flow obstruction, pulmonary arteries stenosis, and tricuspid regurgitation(Maceira AM.etal.2013)**.**

A.6.Aortic Valve Replacement

Aortic valve is contain from three pliable leaflets attached to heart at the section of aorta and left ventricle. Leaflets are attached within the three sinuses of valsalva to the proximal aorta and joined together in three commissures that create the shape of a coronet (Nishimura R.A.et al. 2014).

The leaflets of the aorta are named after the three valsalva sinuses from which they originate, which names right and left coronary and non-coronary leaflets. There are two indication for replacement of aortic valve ; which are aortic regurgitation and aortic stenosis(Adams D.H.et al.2014).

A.6.1.Aortic Stenosis

The diagnosis and severity of aortic stenosis are determined by echocardiography. The normal aortic valve area (AVA) is approximately 3 to 4 cm2, and it has very little gradient across the valve until the AVA has been reduced by approximately one-half.

Therefore, the flow velocity across the normal aortic valve (determined by Doppler echocardiography) is ::5 1 .0 m/ s. With 458 mild

aortic stenosis, the AVA is decreased to > 1.5 cm2, and the flow velocity across the valve is increased to 2.5 to 2.9 m/s. Aortic stenosis is considered moderate when AVA is reduced to 1.0 to 1 . 5 cm2, and the flow velocity across the valve increases to 3.0 to 4.0 m/s. Severe aortic stenosis is diagnosed by an AVA < LO cm2 and a velocity across the valve of >4.0 m/s (Flett A.S.et al. 2015).

Over a period of years, the valve progressively narrows. During this "latent" period, patients are typically asymptomatic. However, the progressive narrowing of the valve occurs in an unpredictable, stepwise manner. The three principal symptoms of aortic stenosis are angina, syncope, and heart failure The presence of symptoms in a patient with aortic stenosis is an indication for an aortic valve replacement (AVR) (Dobson L.E.et al.2016).

A.6.2.Aortic Regurgitation

The diagnosis and severity of aortic regurgitation are also determined by echocardiography. Patients with mild-to-moderate aortic regurgitation are typically asymptomatic and have an excellent prognosis without surgery. Severe aortic regurgitation may produce symptoms of heart failure, and AVR is indicated in the symptomatic patient (Mentias A., et al. 2016).

The aortic valve replacement is doing through two types of surgical technique;

1-Ross Procedure

The Ross procedure, first performed by Mr. Donald Ross in 1967, is the replacement of aortic valve (AV) with autologous pulmonary valve.

It's considered the valve of choice for aortic valve replacement in children. It is also ideal for replacement in younger patients, athletes, women of child-bearing age, and patients with endocarditis. The operation since 1967 has evolved with better standardization of techniques and has produced similarly excellent results (Sharabiani M.T.et al.2016).

A.7.Transcatheter Aortic Valve Replacement

First introduced nearly a decade ago, transcatheter AVR (TAVR) has been established as a safe and effective alternative to AVR in patients previously considered "high risk" or inoperable due to prohibitive predicted preoperative mortality There are currently two transcatheter heart valve (THV) replacement devices approved for use in the United States, each using a unique platform for delivery and having individual nuances regarding patient workup, clinical management, and device deployment (Leon M.B.et al.2016).

B. Coronary artery disease (CAD)

B.1.Coronary Artery Bypass Grafting (CABG) using Cardiopulmonary Bypass

Atherosclerotic heart disease is the major causes which leading to death in United States. While CABG has enjoyed a storied evolution since the 1960s to be among the most spectacular advances in medicine, the field of cardiothoracic surgery is undergoing a significant evolution with the advent of more effective medical therapies, alternative percutaneous and hybrid revascularization techniques, and percutaneous valve procedures. Ironically as these alternative strategies evolve, the need for effective surgical myocardial revascularization techniques using

cardiopulmonary bypass is becoming even more critical in patient with left ventricle dysfunction advanced and atherosclerotic heart disease(Šušak S.etal.2016).

Central to this expanding need is the refinement of indications for CABG procedures in patients criticaly. Older patients with progressing diseases like; left ventricle dysfunction and multiple comorbidities create even greater challenges for the practicing cardiac surgeon (Dieberg G.etal.2016).

The importance of surgical risk reduction in complicated coronary revascularization particularly in patients on platelet inhibitor therapies, that is, clopidogrel as well as evolving perioperative management techniques, has significantly reduced the morbidity and perioperative complications of coronary revascularization(Møller C.H.etal.2012).

Evidence highlighting the advantage of coronary artery bypass grafting continues to demonstrate significant survival advantage in patient with multi-vessel disease compared with percutaneous coronary intervention(Shroyer A.L.et al.2017)**.**

B.2.Hybrid Coronary Artery Bypass Grafting Surgery

Coronary artery bypass grafting (CABG) surgery and percutaneous coronary intervention (PCI) are established treatment for coronary artery disease (CAD). Both have been shown to be effective in both alleviating symptoms and increasing long-term survival.

Coronary artery bypass grafting surgery has been shown to have superior outcomes in the high-risk patient cohorts (diabetics, left main disease, three vessel disease, high SYNTAX scores (The SYNTAX score

is an angiographic grading tool to determine the complexity of coronary artery disease), and patients with reduced cardiac function) (Harskamp R.E.et al.2014).

The advantage of Coronary artery bypass grafting arises from the use of left internal mammary artery (LIMA) to graft the left anterior descending artery (LADA), which has an unparalleled long-term patency. Saphenous vein graft (SVG) failure remains one of the weaknesses of Coronary artery bypass grafting with failure rates, between 6.2% to 30%. Conversely, multi-vessel percutaneous coronary intervention (PCI) with drug eluting stents (DES) has advantage of being a less invasive with faster recovery compared with Coronary artery bypass grafting. drug eluting stents (DES) have lower failure rates at 12 to 18 months compared with Saphenous vein graft (SVG). One of the main disadvantages of percutaneous coronary intervention (PCI) is higher rates of target vessel re-intervention when compared with Coronary artery bypass grafting, especially with respect to percutaneous coronary intervention (PCI) in the LAD territory (Navarese E.P.et al.2013).

The potential of hybrid coronary revascularization (HCR) strategy is the ability to offer patients a tailored approach to the treatment of coronary artery disease (CAD). The left internal mammary artery (LIMA) to left anterior descending artery (LADA) graft is performed with percutaneous coronary intervention (PCI) to non-left anterior descending (LAD) vessels, combining the superior patency of the left internal mammary artery (LIMA) to left anterior descending (LAD) graft with that of drug eluting stents (DES) to non-left anterior descending (LAD) vessels. Several observational studies have shown that hybrid coronary revascularization (HCR) is a feasible and safe technique with short-term

outcomes that are non-inferior to standard Coronary artery bypass grafting (Mohr F.W.et al.2013).

C. Surgery for Heart Failure

C.1.Left Ventricular Reconstruction

Surgically reconstructing the left ventricle of the heart is an optional and therapeutic strategy that aims to reduce the size of LV by removing dead scar tissue, restoring the shape and normal size of LV and improving ejection fraction of ventricle through surgery, devices or medical treatment, thus improving the function of LV and improving patient's clinical condition (Iacobazzi D.etal.2018).

The left ventricular reconstruction technique has been widely adopted by cardiac surgeons and has been developed in order to standardize surgical and therapeutic procedures and improve the outcome of this technique.

Many studies shown that, left ventricular reconstruction is effective and safe relatively , but despite these studies and research, the additional advantages of rebuilding the left ventricle for coronary artery bypass grafting is still under discussion (Sugiura T.etal.2016).

C.2.Surgery for Complications of Myocardial Infarction

Surgical intervention often required to management of acute mechanical complications of myocardial infarctions. These mechanical complications, which responsible for 15% to 20% of deaths after acute myocardial infarction, it include free ventricular wall rupture, acute ischemic mitral regurgitation (MR) and ventricular septal defects (VSDs) (Mozaffarian D.et al.2015).

C.2.1.Free Ventricular Wall Rupture

Free wall rupture occurs in up to 1 1 % of patients after acute infarction. Rupture location depends on the site of the infarct, with the rupture tract most commonly occurring between viable and necrotic myocardium. Rupture usually occurs after acute expansion of a transmural infarction. Free wall rupture has acute, subacute, and chronic presentations. Acute rupture usually results in death within minutes. Subacute rupture represents 20% to 40% of patients. Chronic rupture is rare and involves a contained ventricular leak that results in a pseudoaneurysm. Most patients have symptoms of congestive heart failure (CHF), chest pain, or dyspnea, murmur, although 12% to 23% are asymptomatic (Lopez-Sendon J.et al.2010).

C.2.2.Acute Ventricular Septal Defect (VSD)

Acute ventricular septal defect uncommon but lethal complication of infarction. Acute ventricular septal defect that occurs within 4 to 6 weeks of infarction and the septum is involved in up to 70% of all infarcts.

Acute ventricular septal defect usually occurs after occlusion of a coronary artery that results in a full thickness infarction that is on average larger (25% of the total left ventricular wall mass) than an infarction that is not complicated by an Acute ventricular septal defect (15%). Defect size ranges from 0.3 to 4.0 cm, with an average of 1.7 cm (Ando T.etal.2016).

Posterior Acute ventricular septal defect s result from occlusion of right coronary or a dominant circumflex artery. Defects are classified as simple or complex. the Simple defects usually are existing anteriorly.

Complex defects are usually located inferiorly and have a worse prognosis(Taleyratne J.D., Henderson R.A.2016).

C.2.3.Acute Ischemic Mitral Regurgitation (AIMR)

Ischemic mitral regurgitation is defined as mitral valve insufficiency caused by a myocardial infarction. From 17% to 55% of patients have either echocardiographic evidence of mitral regurgitation or a new mitral systolic murmur early after acute infarction. The mitral regurgitation is mild or disappears in many patients but is moderate to severe in as many as 4% of patients (Sorajja P.et al.2016).

AIMR (Acute ischemic mitral regurgitation) is actually a problem in cardiac muscle, not an intrinsic valve problem. Among the six ingredient of mitral valve (left atrium, leaflets, chordae tendineae, left ventricle, annulus, and papillary muscles), the leaflets, chordae, and annulus are not acutely affected by a myocardial infarction (Bahlmann E., Frerker.et al.2015).

Injury to the heart muscle involving papillary muscle rupture or displacement causes acute or chronic MR. Rupture of papillary muscles and displacement results to regurgitation into left atrium (LA) during systole, which leads to increase in size of left atrium (LA) during systole as well as an increase in volume in left ventricle (LV) during diastole. The regurgitated flow leads to an excess in volume shock and low in cardiac output (Gerber Y.etal.2016).

D. Thoracic Aortic Disease

D.1.Annuloaortic Ectasia

There are basically two types of annuloaortic ectasia operation; replacement of the aortic root and ascending aorta and aortic valve-sparing operations to treat patients with aortic root aneurysms which divide two types; remodeling of the aortic valve and re-implantation of the aortic root(Coselli J.S.et al.2014).

Re-implantation of the Aortic Valve

A small triangular segment is cut from one of the ends of the Dacron graft to correspond to the commissure between the left and right aortic cusps and multiple horizontal mattress sutures are passed from the inside to the outside of the left ventricular outflow tract along a single horizontal plane immediately below the aortic annulus along its fibrous components and following the scalloped shape of the annulus along the muscular inter-ventricular septum (Smith C.R.et al.2011).

D.2.Aortic Dissection

Thoracic aortic dissection is often a very serious disease, with an estimated incidence in United States of between 2.9 and 3.5 per 100,000 patients per year. Aortic dissection occurs as a result of a tear inside intima of aortic walls from inside which lead to blood flows through this damage point to mid layer of aortic walls and lead to splitting of middle layer of aortic wall at same trend flow of blood and lead to create of newfangled channel inside middle layer of the aorta (Della Corte A.et al. 2014).

The aortic dissection process may affect any part of the circulation leading to potential organ mal-perfusion of the heart, the brain, the spinal cord, the gastrointestinal tract, the kidneys, and the extremities. A more focused understanding of the causes of death and morbidity of aortic dissection has allowed the development of operations specifically targeted to improve clinical outcomes. Further refinements in management such as the use of the operating room as the diagnostic suite have also contributed to improved survival(Pape L.A.et al.2015).

Classification of Aortic Dissection

Anatomic classifications of aortic dissection are based on the location of the initial tear and are important in terms of treatment modality and prognosis.

The first classification scheme was designed by DeBakey, who classified dissections into the following:

Type I. The process involves the ascending aorta, the aortic arch, and the descending thoracic and often the abdominal aorta. Type II. The dissection involves the ascending aorta, but stops at the level of the aortic arch, and does not involve the aorta beyond the subclavian artery takeoff. Type III. The dissection starts distal to the subclavian artery and extends to the entire thoracic aorta (Illa) or the thoracic and abdominal aorta (Illb).

The following Stanford classification has become more commonly used as it readily translates to clinical decision-making:

Type A. The dissection involves the ascending aorta, regardless of tear site, and will most often extend into the descending thoracic as well

as abdominal aorta. The subsets of DeBakey types I and II are included in this class. Type B. The dissection starts beyond the aortic arch usually at the subclavian artery and progresses distal, thus not involving the ascending aorta or the aortic arch. The subsets of DeBakey type Illa and Illb are included in this class (DeBakey ME. 1979).

Aortic dissection remains a catastrophic diagnosis with a time-related, high early mortality rate. Improvements in mortality for the treatment of acute type A dissections has been achieved by improvements in diagnostic techniques, expeditious transfer to the operating room prior to cardiovascular collapse, better physiologic understanding of intraoperative malperfusion syndromes especially affecting the arch vessels, intraoperative neurologic monitoring leading to real-time surgical maneuvers to reverse abnormalities, precise repair or replacement of the aortic root, and precise and durable anastomoses at the level of the arch.

Type B dissections have remained a relatively lowrisk early process where medical management remains the mainstay. Thoracic aortic stent grafts have converted extremely highrisk complicated type B dissections into rapidly managed problems with generally good outcomes. Application of stent graft technology to uncomplicated type B dissection to promote distal remodeling, and eventually, novel catheter-based prostheses for type A dissection represent the future directions of innovation in this field(Chiu P.etal.2018).

E. Heart Transplantation

The techniques developed by Richard Laure and Norman Shumway in the USA at Stanford University paved the way for heart transplantation to become the ultimate and preferred treatment for patients who have

end-stage of heart failure. Introduction of trans-venous endo-myocardial biopsy and immunosuppression of cyclosporine greatly increased rate of patient survival and modern era of heart transplantation. Now, heart transplantation is widely recognized in the world as an acceptable surgical option for patients who have end-stage of heart failure, as more than 3,300 heart transplants are performed annually around the world(Nilsson J.etal.2015).

E.1.Recipient Selection

Patients with irreversible cardiac diseases that are not treatable by conventional methods are selected and have a chance of survival and rehabilitation after heart transplantation (Hsich E.M.et al.2014).

E.2.Preoperative Recipient Evaluation

Evaluation for cardiac transplantation begins with a medical history, physical exam, CX-R (chest X-ray) photograph, and lab work including complete blood count, coagulation screen, erythrocyte sedimentation rate, uric acid level, liver function tests, fasting lipid panel, and infectious disease serologies such as; herpes simplex virus, hepatitis (A, B, C), rubella, Toxoplasma, human immunodeficiency virus (HIV), measles, fasting and postprandial blood sugar, thyroid function studies, creatinine, echocardiogram, electrocardiogram, pulmonary function tests, vascular screening(Hsich E.M.et al.2017).

carotid and lower extremity doppler), abdominal ultrasound, psychosocial evaluation, dental evaluation, financial analysis, and screening studies for malignancy (stool guaiac, prostate-specific antigen, mammogram, Papanicolaou smear).

Hypothermia is the cornerstone of organ preservation, and some experimental evidence suggests that 4°C provides the best protection. During graft implantation, myocardial preservation can be augmented with continued use of topical cold saline and retrograde blood cardioplegia(Morris A.A.et al.2015).

E.3.Heart Implantation

When the recipient is ready in OR (operating room), heart of donor is put in cold saline. The aorta and pulmonary artery are separated using electrocautery or scalpel dissection. The left atrium is examined and prepared by excising the excess tissue and then tied to the openings of the pulmonary vein, then the tricuspid and atrial septum are examined.

Implantation begins with a left atrial anastomosis and a 54-inch 4-0 double-armed polypropylene suture is passed through the donor's left atrial fold with the recipient's left atrial fold at the level of left pulmonary vein and deflated from heart. After completion of the left atrial anastomosis, attention is paid to the IVC anastomosis. The anastomosis should be performed from the donor end to the recipient end with 4-0 polypropylene sutures(Hsich E.M.2016).

F.1.Cardiac Tumors

Realdo Columbus first described a cardiac tumor as an anatomic finding in Padua, Italy, in 1559. Centuries later, in 1931, the first classification system similar to what is in current use was reported by Yater. However, the first diagnosis of a heart tumor was not made until 1934, when the tumor was diagnosed (sarcoma) using a lymph node biopsy and an electrocardiogram by Barnes (Oliveira G.H.et al.2015).

The era of operative treatment of cardiac neoplasms was ushered in by Beck in 1936, when he successfully removed a teratoma located on the right ventricular (RV) surface. Bahnson is credited with the removal of the first right atrial myxoma with inflow occlusion, but the patient died postoperatively on day 24. Following the advent of cardiopulmonary bypass in 1953, left-sided intracardiac neoplasms were successfully removed first by Crafoord in Sweden in 1954. By 1964, the removal of 60 intracardiac neoplasms had been reported. The addition of cardiac echocardiography allowed easier diagnosis, and increase in number of tumor resections(Cresti A.et al.2016).

Cardiac neoplasms is divided to primary and secondary type. Primary tumors typically more common, but the overall incidence is still quite low, at 0.15% to 0.2% in autopsy series. Most primary cardiac tumors are benign 70%; such as; Myxoma, Papillary fibroelastoma, Lipoma, Teratoma. More than half of the primary cardiac neoplasms in adults are myxomas.

Malignant primary cardiac tumors such as; Angiosarcoma, Rhabdomyosarcoma, Liposarcoma, Malignant mesothelioma. Of malignant cardiac tumors, metastatic malignancies such as Leukemia, Bronchogenic carcinoma, Melanoma, Sarcoma, Breast cancer, comprise the majority of those noted. Virtually every neoplasm has been shown to metastasize to the heart(Bruce C.J.2011**).**

2.4. Diagnostic test and procedure.

Lab tests

Tests can be done in the laboratory for a number of reasons; like; to diagnosis of heart disease, to determine normal and basic values for any

patient before surgical or therapeutic interventions, to determine risk factors for coronary disease that are adjustable, to ensure the levels of therapeutic drugs within the blood such as warfarin, or to assess response of patients to medical treatment plan such as; the effect of diuretics urine levels of potassium in the blood (Smetana GW, Macpherson DS.2003). lab test values may be different according to healthcare institution and lab. This difference is due to equipment and measurement methods.

Cardiac biomarker.

There are enzymes specific to myocardial cells such as Troponin T and I, CK and CK-MB, myoglobin which are released from the heart cells when necrosis occurs as a result of infarction or shock. these enzymes are transported through the lymphatic system into the circulatory system and Thus, levels of these enzymes in blood can be detected through blood samples which taken from the patient(Erkilet G.et al.2013).

Lipid level

The level of lipoproteins, cholesterol and triglycerides is used to determine the risk occur atherosclerosis, especially who have a family history of heart disease, and also any defect in the patient's lipoprotein.

Lipoproteins are formed by the combination of cholesterol and triglycerides, which combine with plasma proteins and thus transported through the blood. Proteins can be divided into two parts: high-density lipoproteins(HDLs) and low-density lipoproteins (LDLs). When the proportion of cholesterol or low-density lipoproteins (LDL) increases in compared to HDL, the risk of cardiac disease increases, so a blood sample for the lipid profile must be taken after the patient's fast for 12 hours (Rogers-Vizena CR.etal.2017).

Cholesterol Levels

Cholesterol is a very important fat in the body as it helps in the synthesis of hormones and the formation of cell membranes, as it is found in large amount in the tissues of the brain and nerves. The normal level of cholesterol in the body is below 200 mg/dL. The body gets cholesterol from two main sources, namely the foods and from the liver itself, where it produces cholesterol, but there are various factors that effect on to the cholesterol levels in the body from one person to another, such as age, sex, exercise, diet, tobacco, menopause and stress.

The importance of cholesterol stems from the fact that high levels of cholesterol increase risk of cardiovascular and coronary arteries disease. Low-density lipoproteins LDLs transport cholesterol and triglycerides into the cells, which lead to the deposition it on vessels walls, thus increasing risk heart disease. The normal level of LDL is less than 160 mg / dL, so treatment is primarily aimed at reducing levels of LDL to below 70 mg / dL.(Jarcho J.A. and Keaney J.F.2015).

As for high-density proteins HDL, it have a protect role, by transfer cholesterol and triglycerides from arterial wall, cells, and tissue to the liver for processing and excretion, so there are an reverse relation among HDLs and LDLs and coronary arteries diseases (CAD).

Normal ratio for high-density proteins is 35-70 mg / dL; for women, it is 35 to 85 mg / dL, so the main goal of managing HDL is to increase levels of more than 40 mg / dL (Annema W. and von Eckardstein A.2013)**.**

Triglycerides

Triglycerides composed of glycerin and free fatty acids, which store in adipose tissue to be used as a source of energy. The normal range in the body range from 100 to 200 mg/dL. Level of triglyceride raise after eating and stress. Alcohol abuse, diabetes and obesity can raise levels of triglyceride in the body. Triglyceride levels correlate directly with LDL and inversely to HDL(Doenst T.et al.2013).

Brain (type B) natural peptide

The natriuretic peptide (BNP) is a peptide made of 32 amino acids, which was previously thought to be a neurohormone after it was isolated from the brain in 1988, but it was later discovered that it originated from the heart. This hormone helps regulate blood pressure and fluid volume in the body (Magne J.et al.2012).

The main stimulus for synthesis and secretion of this hormone is myocardial wall injury, cardiac ischemia, and elevated of ventricular pressure.

The levels of this hormone increase due to expansion of the ventricular walls, due to the increase pressure, and therefore this hormone is considered a diagnostic tool in case of heart failure (HF). The levels of this hormone may also rise in many conditions, such as pulmonary embolism (PE), ventricular hypertrophy, and myocardial infarction. So, when value of this hormone exceeds 100 pg /ml, this indicates presence of heart failure (HF) (Klaar U.et al.2011).

C.Reactive Protein (CRP)

C-RP is protein which generated in liver cell as reaction to phagocytes, fat cells and any systemic inflammation in the body. It was discovered by Tillett and Francis in 1930, and it can be measured through a venous blood sample. The normal range for C-reactive protein is less than 1.0 mg / dL.

Research indicates that, high levels of C-RP lead to increased risk of developing cardiac disease compared with patients who have moderate or low levels (Kramer NE.et al.2019).

American Heart Association (AHA) has identified groups most at risk for developing CVDs as follows: Low risk: below 1.0mg/dL, and moderate, from 1.0 to 3.0 mg/dL and high from 3.0 mg/dL, Whereas C.RP test doesn't used alone but with other factors of risk, like cholesterol, triglycerides and sugar level of blood, in addition to high blood pressure, smoking and diabetes, and these factors may lead for developing cardiac disease(Alonso-Martinez JL.et al.2002).

Homocysteine

It is one of the amino acids in the body that arise from eating red meat. Studies indicate that an increased homocysteine levels can lead to damage the endothelial lining of blood vessels, which closely attached to CVD such as coronary disease, atherosclerosis, and stroke. There are many factors that effect on homocysteine level in blood, such as low level of vitamin B6, folic acid, and vitamin B12, in addition to genetic factors (Veeranna V.et al.2011).

Determining the level of homocysteine increases the ability of cardiac surgeons to assess the risk of heart disease. When taking a blood sample from the patient to measure the level of homocysteine, It is necessary for the patient to be fasting for at least 12 hours before taking sample in order to obtain an accurate measurement. The results are interpreted in three groups, which are ideal if The results were less than 12 mol / liter, borderline if the results were between 12 to 15 mol / liter, and high risk if the results were greater than 15 mol / liter(Smith A.D.et al.2018).

Blood electrolytes

Sodium (Na, normal range, 135-145 meq/L): Sodium levels in blood affect heart function. Decrease of sodium causes an increase in fluid inside the body and this may be caused heart failure, As for the increase, it leads to a decrease in the amount of fluid inside the body and thus a decrease in cardiac output (National Academies of Sciences, 2019).

Potassium (K, normal range 3.5-5.0 meq/L): Potassium play a very important role in heart's electrical function. Potassium deficiency leads to cardiac arrhythmias, ventricular fibrillation, and ventricular tachycardia, while excess potassium leads to heart block and ventricular arrhythmias (Cogswell ME.et al.2018).

Calcium (Ca,normal range from 8.6 to 10.2 mg/dL): Calcium is an electrolyte of great importance as it helps in neuromuscular activity, blood clotting, and nodal cells automaticity (sinus and atrio-ventricular nodes). Calcium deficiency leads to slowness action of the sinus atrio-ventricular node and thus slow heart muscle and increase the risk of heart

failure, or hyper-calcemia, it leads to increased contraction of the heart muscle and ventricular fibrillation (Stieler, M.et al.2013)

Magnesium (Mg,normal range from 1.3 to 2.3 meq/L): Magnesium is an essential electrolyte for several reasons, the most important of which is; Calcium absorption, conservation potassium stores, muscle contraction, metabolism adenosine triphosphate , and also play a main role in synthesis of carbohydrate ans protein. Magnesium deficiency leads to patients developing atrial or ventricular tachycardia, while excess magnesium leads to depress of contraction and excitability of the heart muscle, which leads to heart block(Cogswell ME.et al.2018).

Blood urea nitrogen and creatinine (BUN10-20 mg / dL):

Both blood urea and creatinine are the most important indicators for evaluating kidney function, but creatinine is the most sensitive measure for evaluating kidney function, as it reaches a normal peak (0.7-1.4 mg / dL). Both urea and creatinine are produced from the metabolism of proteins. A high level of urea nitrogen in the blood indicates a decrease in renal perfusion, either due to dehydration (a decrease in the amount of fluid inside the vessels) or due to low cardiac output, which indicates to presence of a heart problem(Huen S.C. and Parikh C.R.2012).

Fasting glucose (60-110 mg / dL):

The level of glucose in the blood rises for several reasons, including nervous situations and diabetes, which in turn affects the heart and blood vessels(Verma S.et al.2018).

Study of coagulation factors:

Injury to the walls of blood vessels or tissues leads to the formation of clots, as the injury leads to a regulated activation of clotting factors and the occurrence of complex interactions between clotting factors, calcium and phospholipids in the blood that lead to the conversion of prothrombin to thrombin. Regulated activation of coagulation factors has two pathways; internal and external. The internal pathway is stimulation by damage of endothelial collagen, and the external pathway is stimulation by tissue factors which endothelial cells release after external damage. Clotting factors should be studied before any surgical procedures such as heart surgery or catheters (Otuki S.et al.2018).

Partial thromboplastin time (PTT) 60-70sec:

The intrinsic pathway stimulate of coagulation factors is measured by PTT and aPTT and use to assess impact of unfractionated heparin on heparin-treated patients. The treatment dose of heparin is between 1.5-2.5, so the heparin dose should be adjusted to a high dose if the aPTT value is <50 seconds, or a low dose if the aPTT value is> 100 seconds.

Prothrombin time (PT) 9.5-12 sec: The extrinsic pathway of coagulation factors is measured through the PT. It is used to measure and monitor the level of anticoagulants in the blood of patients treated with warfarin.

International Standard Ratio (INR): It is a calculation based on the result of a blood PT test, and is used to monitor patients who are being treated with anticoagulants (warfarin). The treatment range for INR varies according to the diagnosis and disease condition but the therapeutic range for the INR is considered to be 2 - 3.5(Levy JH.2014).

Hematologic study

Complete blood count (CBC): determines acount of red and white blood cells (RBC, WBC), platelets (PLT), hemoglobin (HGB), and hematocrit (Crit).

Percentage of RBC which contain hemoglobin varies according to gender and age. The percentage of hemoglobin (HGB) in the male is (M,13-18 g/dl), and in the female is (F,12-16 g/dl), while in children it varies according to age. Hematocrite which measure perecent of RBC in 100 ml of blood varies according to gender (male: 42-52%, female: 35-47%). The lack of HGB and Crit leads to severe consequences like, MI and AP. (Kaestner L, Bogdanova A. 2014).

As for the white blood cells, which number 4,500-11,000 WBC in a microliter. WBC are first line defence versus germs and viruses. WBC counts must monitoring in patients who suffering from heart diseases, especially those who underwent a heart transplant because they are taking immunosuppressive drugs that lead to immunodeficiency (Machlus KR. et al. 2014).

With regard to platelets, which have a blood count of 150,000-450,000 / mm 3, platelets play the main role in stopping bleeding in the body by forming clots at the site of injury in the blood vessels. Platelet is monitored in heart disease patients before operation for fear of complications during the operation (bleeding), and also patients who take some cardiac drugs that affect the number and function of platelets such as aspirin and clopidogrel (Horvath K.A.et al.2013).

Procedure

Chest X-ray (CX-R):

Although chest CX-R in patients with heart disease does not help in diagnosing myocardial infarction, its help in diagnosing some heart disease complications such as heart failure. It's necessary to perform chest X-ray of patients because it helps to determine the size of the heart and its circumference, to detect calcifications of the heart, and to help determine the correct position of pulmonary artery catheter and pacemaker devices(Rao PS.et al.2014).

Electrocardiography

The ECG is a graphic representation of the electrical currents of the heart. The ECG is obtained by placing disposable electrodes in standard positions on the skin of the chest wall and extremities. Recordings of the electrical current flowing between two electrodes is made on graph paper or displayed on a monitor. Several different recordings can be obtained by using a variety of electrode combinations, called leads.

The 12-lead ECG is used to diagnose dysrhythmias, conduction abnormalities, chamber enlargement, and myocardial ischemia, injury, or infarction. It can also suggest cardiac effects of electrolyte disturbances (high or low calcium and potassium levels) and the effects of antiarrhythmic medications. A 15-lead ECG adds three additional chest leads across the right precordium and is used for early diagnosis of right ventricular and left posterior (ventricular) infarction.

The 18-lead ECG adds three posterior leads to the 15-lead ECG and is useful for early detection of myocardial ischemia and injury(Noordzij PG, et al.2006).

Echocardiography

Conventional echocardiography

Echocardiography is a non-invasive procedure by use ultrasound which use to measure size and shape of atrial and ventricles, ejection fraction, murmurs of heart, assess motion of heart's ventricular walls, evaluate natural and prosthetic heart valves, and is also useful in diagnosing pericardial effusion. Modern technology such as color Doppler shows the velocity and direction of blood flow through the heart (Kato T.S.etal.2018).

Before performing this procedure, the nurse must reassure patient about this procedure, painless at all, and that it may only take about 15-30 minutes.

Radionuclide Imaging

Radionuclide imaging of heart is known as a non-invasive test using radioactive tracers (thallium and technetium), which are radioactive tracers that are injected into the bloodstream and mixed with blood and are captured by healthy heart cells To produce a 3D image for heart. The patient must be in the lying position in a special device with put arms above head, then a special camera rotates around chest and captures the signals from the radioactive tracers that are sent to the computer that converts these signals into a three-dimensional image. Radionuclide imaging is used to evaluate and diagnose many complications and cardiac

disease such as coronary artery disease (CAD), previous heart attack, success of cardiac bypass surgery, evaluation of ventricular function, evaluation of the quality of heart function, and to assess patients at risk of developing heart diseases and needs a cardiac catheterization or Percutaneous coronary intervention (PCI)(DorbalaS.etal.2019).

Computed tomography

A computed tomography scan CTs or computerized axial tomographic CAT scan is device that use x-rays and gives cross-sectional images of heart and large blood vessels.

Computed tomography is used to evaluate and diagnose cardiac masses, congenital heart lesions, aorta diseases, size of the heart chambers, cardiac output and ejection fraction of the heart. CT scanning is preferred for patients without MI or CABG to determine quantity of precipitated calcium insid coronary arteries (CA) and also to diagnose implicit atherosclerosis(Gilard M.et al.2006).

Magnetic resonance angiography (MRA)

Magnetic resonance angiography is used to examine the physiological and anatomical characteristics of heart, also to imaging the vessels (arteries and veins), to diagnoses any stenosis, blockage or dilation of blood vessels. this technique often used to imaging the arteries of the brain, neck, kidneys, legs, also aorta of abdominal and thoracic, but it cannot adequately show the small arteries. MRA is known as a group of techniques based on MRI (magnetic resonance imaging), which are technique without pain and non-invasive. The device use a strong magnetic field and signals are sent to a computer to form three-dimensional images. Before starting the examination, all types of jewelry

and metals must be removed, and some patients may need to take a mild sedative before starting the imaging, or given a headphone for music listen and to communicate with the radiologist, and the patient must keep still during examination(Ferreira V.M.et al.2018).

Cardiac catheterization

Cardiac catheterization (heart cath) is defined as inserting a tube called a catheter through a peripheral arteries like, the femoral, brachial arteries to left ventricle (LV) or coronary arteries. Cardiac catheterization used either diagnostic purposes where the left ventricle or coronary arteries are injected with a contrast medium to facilitate viewing with x-rays or treatment through insertion of treatment materials or equipment. Cardiac catheterization is used to measure pressure levels within the chambers of the heart as well as the level of oxygen saturation, and is also used to diagnose coronary artery diseases such as obstruction or stenosis and to determine if the patient needs CABG (Bashore T.M.et al.2012).

Coronary arteriography

Coronary arteriography is defined as inserting a catheter or flexible tube through the left or right femoral or brachial artery into the heart, to aorta and then to coronary arteries. A contrast material is used during catheterization, where this substance is injected inside arteries, along with use imaging techniques (X-ray), to assess coronary arteries and diagnose presence atherosclerosis, blockage, or congenital malformations in the coronary arteries (Garcia-Garcia HM.etal.2018).

2.5. Indication of cardiac surgery

The indications for cardiac surgery are the decision-making to perform the surgery that is done in accordance with the meeting of cardiologists and cardiac surgeons as a team (Doenst T.et al. 2014).

In valvular heart diseases, a differentiated between stenosis and regurgitation must be done. In the general classification of cardiac valvulopathy, it divided into three levels: mild, moderate, and severe. Valve regurgitation or severe valve stenosis requires surgical intervention, and cardiac surgeons may replace or rebuild affected valve(Baumgartner H.etal.2017).

Also, in diseases of the aortic valve, the distinction must be made between regurgitation and stenosis. After completing all the diagnostic procedures, the surgical team decides the treatment either through conservative treatment or through surgically depending on severity stenosis in aortic valve. Surgical intervention and valve replacement (VR) required in aortic valve stenosis (AVS) severity , either by conventional heart surgery or by trans-catheter aortic valve replacement (TAVR), which was introduced by Dr. Cribrier in 2002 for the first time (Holmes DR.et al.2015).

Before taking surgery decision, the risks of surgery to the patient according to EUROScore must be taken into consideration. EUROScore is a cardiac surgery risk assessment template that was first published in 1999 and the latest new model was announced in 2011. The European Open Heart Surgery Risk Assessment System is a model that allows calculating the risk of death after surgery. The form consists of 17 elements of information, including, for example; Age and gender, renal

impairment, history of open heart surgery, chronic pulmonary disease, active endocarditis, grade 4 angina, diabetes on insulin. This available information allows the model to calculate the risk of surgery, and it has become the most used indicator before surgery and has been widely adopted in the world, and this model has assist to improving results of open heart surgery seen in early 2000s(Leon MB.etal.2010).

Patients with high risk for surgery, which include porcelain aorta, previous coronary artery bypass grafity (CABG), and cirrhotic liver should be manage by trans-catheter aortic valve replacement (TAVR), and also patients with low risk of surgery may have AVR surgically. Also, patients of aortic regurgitation (AR), which have symptoms of aortic regurgitation or enlargement of ascending aorta and even asymptomatic patients of aortic regurgitation but have a decrease in ejection fraction less than 50% or left ventricular diameter at the end of systole (LVESD) greater than 70 mm or left ventricular diameter at the end of the diastole (LVEDD) more than 50 mm, those patients need surgical intervention(O'Gara PT.etal.2017).

For the mitral valve (MV), the main cause of stenosis is rheumatic heart disease (RHD). Valve stenosis can classified into primary and secondary, primary mitral valve stenosis is caused by a defect in the mitral valve structure itself such as the leaflets, annulus, cords, and papillary muscles, while secondary mitral valve stenosis occurs due to left ventricular dilatation, tethering, and ischemia. Severe mitral valve stenosis can be defined by echocardiographic with regurgitation fraction of more 50%, and regurgitation volume of more than 60ml(Argulian E.et al.2016).

For patients who have coronary artery disease (CAD), revascularization is the best option for these patients. The treatment decision is made by cardiologists and surgeons, either by surgery through CABG or without surgery by PCI. One common indications for CABG is triple vascular disease and the left main stem of the heart arteries, but patients with high risk of CABG procedure compared with the risk of percutaneous treatment, the percutaneous treatment is preferred despite the difficult stenosis lesions(Mohammadi S.etal.2012).

Primary myocardial tumors are rare compared with secondary myocardial tumors which most common. Atrial myxoma is one of common benign heart tumors, while the most common metastatic malignant myocardial tumor is sarcoma. These tumors, whether benign or malignant may cause embolic or obstructive symptoms, which require surgical intervention, either to remove the tumor or to treat obstructive in the arteries(Ghosh A.K., 2017).

There are many heart rhythm disorders that cardiac surgery offers a treatment for by implanting pacemakers, such as implantation of pacemakers for atrioventricular blocks, or ventricular arrhythmias. Also terminal heart failure (HF) can be treated by implantation of assistive devices to cardiac resynchronization, or even heart transplantation (Stone ME.etal.2018).

-Technique of Cardiac Surgery

Conventional cardiac surgery is most common cardiac procedures, especially CABG. Access to the heart is done by opening the rib cage, either by sternotomy or upper hemisternotomy of the rib cage. Upon reaching the heart, the pericardial sac should be opened in an inverted T-

shape in order to preserve the phrenic nerves. After opening the pericardial sac, the cannula, cardiopulmonary bypass pumps and cardioplegia are applied to begin the operation. Arterial stiffness is evaluated through the use of ultrasound of the aorta. The grafts are obtained from the patient himself, and there are several types of grafts that are taken from different places of the body which are vein grafts (saphenous vein is vein in the legs), and arterial grafts (internal thoracic arteries called ITA, internal mammary arteries (IMA), and ulnar and radial artery (arm) another type of graft(Bonaros N.et al.2011).

After the operation is completed, the cannula and the cardiopulmonary bypass pumps are separated, the heart is restarted again through electric shocks, the rib cage is gradually closed and the sternum is closed with wires, but the mediastinal and pleural drains are left for several days after the operation. Cardiac rhythmic complications may occur after surgery and therefore; electrodes are placed during surgery and external pacemaker is connected to electrodes and removed with drains before discharge from hospital(Mentzer RM.2011).

There are another type of cardiac surgery which called off-pump coronary artery bypass OPCABG or no-touch technique is especially beneficial for patients who have a high risk of conventional heart surgery and significant atherosclerosis of the aorta. In this technique, stabilizers are needed for accurate coronary vascular anastomosis using the internal mammary arteries, and the pump is not used because the high pressure of the pumps may lead to the release of clots and cause a stroke.

Cardiac surgery is also performed by Endoscopically through small incisions and video aids are directed where the entire endoscopic to coronary artery bypass and minimally invasive CABG are performed, but

this technique is only offered in some centers around the world because it requires special training where the surgical trauma is less. And a faster recovery after surgery. Recently, robotic surgery has been introduced into open heart operating rooms(Verhaegh AJ.et al.2013).

In order to protection cardiac muscle throughout cardiac surgery, the hypothermia and the cardiac palsy technique are used, and the brain can be protected by maintaining the perfusion of the brain and reducing the occurrence of clots through anticoagulants(Li Y.etal.2018).

2.7. Complications of Cardiac Surgery

Open heart surgery (OH) is one of the major and dangerous operations on patients, which leads to many complications after the operation. The mortality rate after cardiac surgery ranges from 2% to 3% due to postoperative complications which include, for example, kidney failure, stroke, atrial fibrillation, cardiogenic shock, and bleeding after surgery(Lomivorotov VV.et al.2018).

Renal failure occurs after open heart surgery, and the kidneys may stop working temporarily in up to 20% of patients. The patient may need dialysis after surgery until the kidneys return to work normally after a few days or weeks. The causes of kidney failure after surgery are not completely known, but there are several possibilities, such as kidney ischemia due to the connection of the heart to the heart and the lung pump during surgery or due to blockage of the small renal vessels, such as the result of the separation of small parts of the clot during surgery and transported to the kidneys(Crosina J.etal.2017).

Postoperative myocardial infarction occurs from 5% to 10% of patients who undergo open heart surgery, but diagnosing postoperative

infarction is very difficult because of the routinely elevated heart enzymes due to work on the heart muscle itself, so focus should be on other diagnostic methods. Such as an ECG, which may show a disturbance in the movement of the atrio-ventricular septal wall, or a coronary angiogram to assess the effectiveness of coronary vessels after surgery, in addition to that there is a group of signs such as arrhythmia and high temperature that suggest the occurrence of infarction. The causes of MI after CABG divided to causes related to the graft itself, such as poor graft effectiveness, which reaches 3%, and non-graft-related causes, such as cardiac embolism(Redfors B.et al.2017).

LVOT obstruction may occur after MVR mitral valve replacement, which is described as anterior systolic movement of the anterior coronary artery leaf. This problem can be remedied by re-operatively with different surgical techniques such as elliptical excision of the front leaflet or shortening of the posterior leaflet (PL)(Varghese R.etal.2012).

Fever, signs of inflammation and edema may occur routinely in patients after surgery, so it is difficult to differentiate between patients who have routine inflammatory symptoms and patients who have sepsis, and tests must be performed to check for infection if these symptoms and signs appear in the patient after the second or third day of work Surgical(Paternoster G.et al.2016).

One of the complications of unique open heart operations is the infection of deep sternal wounds (DSWI), which occurs at a rate of 0.4% to 4%, but this infection may develop into inflammation of the mediastinum, which leads to a large mortality rate. Most frequently pathogen include Staphylococcus aureus and Staphylococcus epidermidis which treated through specific antibiotics after culture and sensitivity

according to antibiotics resistance, and application of negative pressure wound therapy (NPWT) (Howitt SH.et al.2018).

Another complication is bleeding after surgery, and it is normal to have slight bleeding, but the presence of large amounts of bleeding requires reopening the operation again to check the site of bleeding and repair it. Little bleeding after the operation is normal because the surgery on the heart includes a lot of wounds and requires very careful stitching, so before closing the chest, the surgical team checks for any bleeding in the area of the surgical operation, so the surgeons leave drains behind the sternum and reach a collection bottle and the amount is monitored bleeding carefully every hour by the nurses.

If the bleeding continues and the amount of bleeding is large within several hours, the surgical team may take a patient again to OR (operation room) and to investigate site of bleeding and repair it. Also, in some cases, large clots may form and collect around the heart because they cannot exit from the chest through the drains, which leads to the occurrence of cardiac blockage, and thus the surgery team will reopen the chest and remove the clots around the heart (Paternoster G, Guarracino F.2016).

Another complication of heart surgery is stroke that occurs as a result of ischemia in the brain temporarily. Therefore, brain cells are damaged or die as a result of not getting enough oxygen and nutrients, which may lead to temporary or long-term complications that affect speech, movement and swallowing. These complications are sometimes fatal. There is always a risk of stroke after surgery, but this percentage varies according to the nature of the surgery on the heart. In the case of CABG operations, the incidence of stroke is 2-3%, but this percentage

increases in patients who have had AVR to 5%, and for patients who have had previous heart problems such as coronary artery disease, the rate rises to 10% (Généreux P.et al.2014).

Blood clots are a serious complication after heart surgery, but this risk increases if patients smoke, are obese, or do not move (unable to move). These clots usually occur in the legs and are called deep vein thrombosis. Among the signs of a deep vein thrombosis are leg swelling, pain in the calf, and fever and swelling of the affected limb. The danger of these clots is that they can travel to the lungs and lead to pulmonary emboli. Patients suffer from chest pain, tachypnea, shortness of breathing and tachycardia, so these emboli may be fatal if not treated in time(Alfieri O, Lapenna E.2015).

There are also other complications after open-heart surgery and anesthesia, which is the patient's chest infection due to the accumulation of phlegm inside the lungs and difficulty of removing it after surgery, which is a Suitable environment for the growth of bacteria or viruses. Infection occurs in the chest in 10% of patients, but it rises to 20% if the person is a smoker(Ubben JF.etal.2015).

The patient may need oxygen and it is given through an oxygen mask or through the nasal cannula tubes. Also, the patient is given antibiotics to treat chest infection according to the severity of the infection. the medications might be given as tablets or an intravenous drip inserted into a vein, and Intravenously to prevent dehydration in the patient, and nebulization sessions to help soften phlegm and expel it outside the lungs, and here comes the role of the Physiotherapist to teach patients how to breathe deeply and cough to expel phlegm accumulated in the lungs and prevent infection.

Disturbances that occur after open heart surgery that affect the heart rhythm and in different degrees are common disorders in those patients. Of these disorders, AF (atrial fibrillation) happen at 30% patients who undergo CABG, and also 40% at patients who undergo valve surgery. Arrhythmias may be treated with rest and medications that help heart beat to return to normally, but if AF (atrial fibrillation) continues, patient may need short electric shocks to restore the heartbeat to normal, which is done under general anesthesia and the process takes about five minutes only which called cardio-version(Badenes R.etal.2015).

2.8. Medical management

Medical treatment is very important essential to reducing deaths and complications in who have cardiac problems, whether before or after surgery. Medical treatment has an effect on patients in three stages; before, during and after surgery. Before surgery, some medications are introduced and other drugs are stopped to prevent complications before surgery, during surgery, antibiotics are used to prevent infection after surgery, and after surgery, the drugs that were used before operation are re-used and the addition or change of some medicines according to the patient's clinical condition. Medical management used in to reduce the occurrence of infarctions, irregular heart rhythms, heart failure or cardiovascular complications in the long term, to rehabilitate the heart after surgery(WHO.2017).

1-Anticoagulant treatment:

Anticoagulant treatment helps reduce the risk of thromboembolic occurring before surgery, but increases risk of bleeding during and after surgery.

1-1-Acetylsalicylic acid (ASA):

Acetylsalicylic acid (ASA) is first-line treatment of patients who have heart disease. Studies indicate that, use of ASA is related to reduces the incidence of myocardial and vascular infarction, mortality and cerebrovascular infarction, but risk of bleeding increased in those patients.

ASA is stopped before surgery in elective heart operations, but in some emergency cases, the surgery is performed without stopping ASA, so the risks of stopping ASA before surgery such as; the occurrence of infarctions must be compared against the risks of not stopping it such as; bleeding.

After the surgery is completed, ASA should be administered. Several studies and research shown that, the initiation of ASA administration during the first hours of the CABG procedure a significant impact on improving patency of the graft, and also show decrease in the mortality rate in patients who started taking ASA within 48 hours at a rate of 1.3% Compare with patients who don't take treatment in same period which it was 4.0%. There are other studies that showed the importance of starting administration of ASA after surgery, these studies found a decrease incidence of myocardial infarction 48% reduction, the incidence of kidney failure 74% reduction, and stroke 50% reduction. Therefore, acetylsalicylic acid should be administered to patients undergoing open heart surgery directly, after making sure that no bleeding has occurred(Zhao Q.et al.2018).

2-P2Y12 inhibitors

P2Y12 is a receptor on the surface of platelets that participates in the activation of adenosine diphosphate, which in turn stimulates the glycoprotein IIb / IIIa receptor, which leads to the activation of platelets and the production of thromboxane, which in turn leads to platelet aggregation and the production of blood clots.

P2Y12 receptor blockers such as clopidogrel suppress platelet action as reduce the risk blood clots for patients who coronary artery syndrome, especially if used with acetylsalicylic acid called dual antiplatelet therapy (DAPT), but they increased risk of surgical bleeding. There are several generations of P2Y12 receptor blockers that are most effective and reduce the risk of strokes, namely ticagrelor or prasugrel, but they increase the risk of bleeding(Zaccardi F.et al.2015).

Before surgery, P2Y12 receptor inhibitors are discontinuation to prevent bleeding during or after surgery. Studies have shown that discontinuation the P2Y12 receptor blocker 5 days or more before surgery decrease the risk of bleeding, but for the third generation of these drugs, such as prasugrel, it is preferable to discontinuation a before 7 days because it have prolonged effect on platelets and increase incidence of bleeding compared to clopidogrel.

Postoperatively, it is recommended to re-inhibit the P2Y12 receptor with acetylsalicylic acid within two days of surgery to prevent complications such as thrombosis and improve postoperative perfusion(Sibbing D.etal.2019).

Glycoprotein IIb / IIIa (antiplatelet agent) inhibitors

Glycoprotein IIb / IIIa is complex integrin found on blood platelets and helps to activate platelets, it's also considered a fibrinogen receptor. This complex is formed from IIb and IIIa binding depending on calcium. Activation of platelets by adenosine diphosphate leads to a alteration in receptors IIb, IIIa on platelets surface, which in turn stimulates the binding of receptors to fibronigin, which leads to the formation of a blood clot. IIb and IIIa receptors are target for several drugs such as abciximab, eptifibatide, tirofibin. This type of drug is often used with PCI. The platelets return to normal function within 24 - 48 hrs of discontinuation abciximab or within 4 - 8 hrs for eptifibatide and tirofiban(Safley D.M.et al.2015).

Preoperative anticoagulation and bridging

In patients treated with vitamin K antagonists (VKA), VKAs should be stopped 5 days before planned elective surgery to achieve a target international normalized ratio (INR) below 1.5 on the day of surgery. In patients treated with non-vitamin K antagonist oral anticoagulants (NOACs) who are undergoing elective surgery, NOACs should be discontinued before surgery at various time intervals according to renal function and types of drugs.

In patients taking direct factor Xa inhibitors (apixaban, edoxaban and rivaroxaban), treatment should be stopped >2 days before surgery. In patients treated with dabigatran with creatinine clearance <50 ml/min/1.73m2, NOAC should be stopped >4 days before surgery(Butt J.H.et al.2019).

The operation may be safely performed if the plasma concentrations of dabigatran and rivaroxaban are below 30 ng/ml; with higher concentrations, the operation should be delayed for 12 h (if the concentration is 30–200 ng/ml) or 24 h (if the concentration is 200–400 ng/ml). If plasma concentrations are too high and the operation cannot be postponed, the off-label therapeutic use of both non-activated prothrombin complex concentrate (20–50 U/kg) an activated prothrombin complex concentrate (factor eight inhibitor bypassing activity, 30 to 50U/kg) may be considered which FEIBA used for control and prevention of bleeding episodes, use around the time of surgery and routine prophylaxis to prevent or reduce the frequency of bleeding episodes but FEIBA not use in the treatment of bleeding episodes resulting from coagulation factor deficiencies without inhibitors to factor VIII or factor IX(Nijenhuis V.J.et al.2020).

3-Prevention of atrial fibrillation before surgery

Atrial fibrillation (AF) is defined as an irregular heartbeat and is characterized by a rapid and irregular heartbeat of the atrial chambers and often in the form of irregular beats for short periods and then becomes for longer periods or it may start as an atrial flutter that turns into atrial fibrillation.

Atrial fibrillation in heart surgery patients lead to hospitalization stay after surgery, also stroke, and sometimes death. Several study indicated that, patient who taking beta-blockers before surgery have low risk to developing AF after open heart surgery. Beta blockers are a type of drug that acts on the beta receptors and is used to treat an irregular heartbeat, protecting the heart from a second heart attack. Several studies show that, the patients who took amiodarone medication for 6 days before

and after surgery had a lower incidence of AF than patients taking a beta-blocker(Epstein A.E.et al.2016).

In contrast, patients taking amiodarone had more severe and long-term complications than patients taking a beta-blocker. Also, current studies indicate that patients who will undergo cardiac surgery, whether elective or non-elective, should continue to used beta-blockers because this reduces the happening of arrhythmias in early post-operative (January C.T.etal.2014).

Preoperative beta-blockers

Current evidence recommends that patients should continue beta-blockers before elective and non-elective cardiac surgery, because doing so results in a consistent survival benefit plus a reduction in arrhythmic events in the early postoperative period(Kotecha D.et al.2016).

Initiating beta-blockers preoperatively may be considered for the prevention of POAF. Whether beta-blockers prevent perioperative MI and death is controversial. Studies have shown that beta-blockers are particularly beneficial in patients with a recent MI. Indeed, it is suggested that the benefit of beta-blockers before CABG to prevent MI and death is limited only to patients with a recent MI. There is conflicting evidence on whether preoperative beta-blockers are beneficial in patients with reduced left ventricular ejection fraction (LVEF) but without a recent MI. However, if beta-blockers are initiated preoperatively, careful up-titration of short-acting agents according to blood pressure and heart rate, starting several days before surgery, is recommended(Mareev Y.,& Cleland J.G.F.2015).

4-Dyslipidemia Statins Preoperative Therapy

Statins are among the most common drugs used to lower blood cholesterol. These drugs work through inhibit HMG-CoA enzyme , which plays most important role in manufacture cholesterol, as the liver produces 70% of the cholesterol in the body. It is known that high levels of cholesterol in the blood lead to cardiovascular diseases such as arteriosclerosis and clots, researchers have found that lipid-lowering drugs play main role in reducing level of cholesterol in blood and thus reduce the incidence of cardiovascular diseases. Studies have shown that taking lipid-lowering drugs before open heart surgery reduces mortality and atrial fibrillation after surgery. Asteroid trial also showed a decrease in arterial stiffness in patients who take lipid-lowering drugs through the use of ultrasound, in addition; the researchers in this field believe that these drugs help prevent cardiovascular diseases by improving the function of the endothelium of blood vessels, maintaining the amount natural cholesterol inside the vessels, preventing formation of blood clots. Therefore, surgeons recommend taking lipid-lowering drugs before and after open heart surgery(Ramin Ebrahimi.etal.2012).

5-Antibiotic Prophylaxis

Infections that occur after open heart surgeries, including bloodstream infection, pneumonia, and inflammation at the site of the surgical incision (SSIs), have a great impact on survival and have a special importance because it occur in approximately 5% of all patients who have cardiac surgery and lead to an increase in hospitalization period, costs, and may lead to readmission of the patient to the operating room again(Zegri-Reiriz I.et al.2018).

Surgeons always recommend giving intravenous antibiotics before surgery to minimize incidence of infections after cardiac surgery. Studies confirmed that the incidence of infection after open heart surgeries are low in patients who have high concentrations of antibiotics in the blood serum during surgery, and the researchers have also developed a gentamicin collagen sponge to maintain high concentrations of antibiotics in the tissues surrounding the incision site. Several studies show, reduced the incidence of infection after the use of the gentamicin collagen sponge.

Preoperative antibiotics are routinely administered due to their efficacy, ease of use and safety, and their administration to patients depends on standard doses, which should not more than usual dose of adults regardless of weight. As for patients with kidney failure, the dose must be adjusted according to the level of creatinine in the blood serum (Carl M.etal.2010).

7-Preoperative Analgesia

Analgesic drugs affect postoperative outcomes by reducing stress response and pharmacological mechanism to protect organs, which lead to decrease mortality, infarction rates, improving respiratory function such as effective coughing and cardiovascular complications before and after surgery. Poor pain management can also lead to many complications that affect patients' quality of life, increase hospitalization time and healthcare costs(Zughaft D.et al.2013).

Daily assessment of patients' pain intensity helps to improve treatment pain and improve the efficacy of drug analgesics, whether in ICU or ward.

Currently, there are many analgesics and classes of opioids. Opioids are the most common analgesics for pain before and after surgery in the intensive care (ICU). There are many opioids but, remifentanil is considered the best of these opioids due to its protective effects on the heart and its effectiveness in pain relief(Abdikarim A.B.D.I,.& Basgut B.2016).

With regard to non-steroidal anti-inflammatory drugs (NSAIDs), use of acetaminophen (paracetamol) is most widely used drug because it is considered a safe, reduces the consumption of opioid drugs, reduces pain and reduces the patient's need to mechanical ventilation for long time and stay in intensive care. Therefore, analgesic drugs can help relieve pain if given before or after surgery, such as; gabapentine, pregabalin or ketamine(Fleisher L.A.et al.2014).

2.9. Nursing management

Preoperative nursing is a term that describes a variety of nursing functions associated with surgical work, and includes three phases before, during and after surgery. Each of these stages begins and ends at a certain point to start the other stage, and each stage includes a group of nursing activities that the nurse performs using the nursing process (NP) (Celik F,. & Edipoglu IS.2018).

All stages of patient care before, during and after surgery are important, but the preoperative stage is considered one of the most important of these stages because patients at this stage are unable to meet their physical or psychological needs, which leads to an imbalance in patients, whether emotional or psychological. At this stage, the vital role of nursing comes through psychological support, educating the patient,

preparing him for surgery, knowing problems and giving information about surgery, which helps reduce patients' fears about surgery(Fuji KT.et al.2013).

The main goal of nursing staff at this stage is the welfare of patients before the operation, by taking care of them, preparing them for surgery, and providing nursing care according to the surgical procedure. Nursing care includes assessment, guidance, and physical and psychological preparation to promote recovery and reduce postoperative complications.

The process of organizing preoperative nursing care begins with a nursing visit to patients in their own ward, which includes care from admission to postoperative exit of the patient. The nurse collects information's of patient, identifies physical, psychological, and emotional needs and provides nursing care effectively to provide effective recovery (Fudickar A.etal.2012).

Surgery is a technical process carried out by a group of specialized individuals according to the health problem and it is not known to patients, so patients may have a different feelings before the surgery, such as anxiety, fear, discomfort, psychological and physical stress, so a pre-planned nursing care must be done to reduce these feelings, hence minimizing postoperative complications.

It is important that there is cooperation between the surgical team and nursing staff prior operation. The patient who will undergo cardiac surgery must have confidence in nurse who will provide him with the necessary nursing care with high efficiency, and this confidence the nurse builds through the appropriate preparation of the patient and comprehensive information about the patient and surgical technic along

with the high competence and skill that increases the rate of achieving a positive result for the patient after surgery (Bradway C.etal.2012).

Preparing a patient before surgery is a very important matter and is an approved agenda in generality of health foundations. Researchers confirmed that, educating patient before any surgery helps speed recovery and reduces complications after surgery. Since open heart surgery have great privacy and concern for most patients, it is necessary for the nurse to know the appropriate time to prepare the patient and to assess need to learning and provide information timely to reduce level of anxiety (Meleis AI.2012).

During the preoperative period between 5-14 days, the level of anxiety is low among patients, and this is considered an appropriate time to provide health education to patients because the high levels of anxiety do not help to retention the information provided by the nurse, therefore; this period is considered the best period for providing information and health education about surgery. Some patients come to the hospital a few days before the operation to complete the procedures related to surgery and to complete health education about surgery. There are some patients who want to obtain specific details about the surgery, while there are patients who just need reassurance that the medical and nursing staff will provide them with physical, psychological and emotional care before, during and after the operation (Koutoukidis, G.etal.2017).

The professional nurse should individualize pre-operative education to know and meet the specific needs of the patient before surgery. The information may include scenes, pictures, expected duration of surgery, as well as post-operative expectations. The skilled nurse should reassure

the patient that the pain will be controlled after surgery and that effective painkillers are available(Farrell, M. & Dempsey, J.2013).

Patient must be education about the endotracheal tube and it is normally after surgery and not able to talk because of endotracheal tube and the nurse will be by side him continuously and reassurance patient's that endotracheal tube temporary and will be removed as soon as the patient does not need it, so taking care of the respiratory system before surgery using equipment such as an incentive spirometer and coughing effectively is very important because it helps the lungs recover quickly after surgery and remove the endotracheal tube early, also incentive spirometer should use for faster postoperative recovery (Duggin, J.2017).

The professional nurse relieve anxiety and stress among the patient's family by educating them about the surgical procedure, expected results, the expected duration of surgery, the patient's condition after surgery, and when anticipated reunion will be possible after surgery, and this relieves the anxiety of the parents, which is positively reflected on the patient himself. The education points include sounds and Sights from the surrounding environment before surgery, patient monitoring tools, pre-operative medications, use of an incentive spirometer, duration of surgery, availability of analgesics after surgery, presence of the endotracheal tube, and expected time of patient activity after surgery (Xue, X.et al.2020).

Parental education also includes the expected appearance of the patient after surgery and that the patient may appear cold, edematous and pale, and there are equipment connected to the patient such as ventilator, nasogastric tube, chest tubes, central arterial catheter, central venous catheter, and urinary catheter(Tollefson, J.etal.2012).

2.10. Previous Literatures and studied related to nurses information and performance toward patients with cardiac disease preoperative cardiac surgery:

(Durako AR&Mishkel G.2018) reported that, in cardiac surgery, a project of fast track was initiated firstly by perioperative treatments bundling to improve outcomes of surgery. In the 1990s, the Post-operative Enhanced Recovery After Surgery (ERAS) was initiated by a group of team health (surgeouns and nurses) to improve pre and postoperative care, especially toward patients undergoing cardiac surgery, now this project or pathway began to be applied in most areas of general surgery. despite the ERAS program is new to cardiac surgery field, it is very beneficial by improving the quality and safety of services provided to patients. The cardiac surgery team includes a group of doctors and nurses who work in a specific coordination in all phases of pre-operative and post-operative health care, therefore, the education of nurses as well as patients, which is provided by specialists and nurses professionally in this field, is very necessary to implement the best skills and practices provided to patients.

The ERAS Program aims to improve health care provided to patients undergoing surgery before, during and after surgery, as well as reduce postoperative complications and speed up the return of patients to their normal activities. The implementation of ERAS protocols has reduced complications and hospitalization postoperative. These ERAS protocols have shown a promising approach for patients undergoing cardiac surgery (CS). Postoperative enhanced recovery protocols have also been published in specializations various surgical procedures.

(Vazirani S.etal.2012) One of the most important factors in preparing patients before surgery is evaluation, which is of the most important of these factors, especially for patients who have a high risk from surgery. The appropriate evaluation and preparation of the patient before the operation helps to know the patients who have high risks and thus helps in providing the appropriate nursing care and preparing the patient appropriately before the operation, in addition to that, the comprehensive evaluation helps in knowing the severity of the disease and the associated diseases and the need for more diagnostic tests. The purpose of the evaluation and the preparation of the patient before the operation is to inform the medical team of the evaluation results, which can help in changing some medications or modifying some surgical procedures as well as postoperative care. The classic systematic approach to assessment and preparation is one of the best methods as it helps to know all the tiny details about the disease and the patient through the description patient's disease, the quality of his planned surgery, the comprehensive medical history and a focused examination of the patient.

(Martin.etal.2006) reported that, a skilled and professional nurse has a great role in caring of patients preoperative cardiac surgery by assessing risks of surgery and appropriate preparation for the patient before surgery as well as the common complications of surgery, and this role will have positive results on the patient, whether before, during or after surgery.

After cardiac surgery, patient admitted to cardiac ICU, where patient is under influence of general anesthesia, unconscious, connected to a ventilator, and has many invasive connections line such as urinary catheters and drains connected to the chest from the inside, and the patient is dependent on advanced technological devices and the care of

the health team surgery. After a one or two days of the surgery, most invasive connections line are withdrawn and the patient becomes able to breathe alone without the need for mechanical ventilation, and the heart function of the patient's and other functions return to normal. Cardiac surgery gives the patients an opportunity to re-evaluate lifestyle and make it possible to obtain the maximum grad of healthy. the nurses are the most important part of team which helps the patients to return to normal life as much as possible.

(Antonia K .et al.2016) reported that, preoperative anxiety factor has an effect on postoperative mortality percentage at patients who undergoing (CABG). These results supported previous studies and theoretical, which said that, the control of preoperative anxiety factor has a significant role in reducing mortality rates in patients who undergo major surgeries such as open heart surgery. In addition, preoperative anxiety can help predict postoperative mortality. Therefore, it has been suggested that the preoperative anxiety factor be added to the potential risk in order to reduce these potential risks which associated with increased postoperative mortality. The preoperative anxiety factor can be reduced in patients who will undergo open heart surgery by educating patients before surgery.

Also mentioned in reported that, patient education by professional nurses helped reduce the anxiety factor of patients and had a positive effect in reducing post-operative complications, extended stay in hospital, as well as re-admission to the hospital. Knowing the causes of anxiety helps the nurse to provide integrated nursing care by planning and implementing appropriate nursing interventions through providing instructions, education, psychological and behavioral support to reduce

the anxiety factor in patients who will undergo open heart surgeries, and the researchers suggested increasing research into the factors that affect the rate of anxiety in these patients, as well as interventions that may reduce anxiety levels.

Methodology

3.1. The Design of The Study

A quasi-experimental design study was applied using a pre-test post-test approach to study samples from September 29, 2019 to July 25, 2021.Though, this study is intended to evaluate nurses' knowledge and performance regarding to cardiac surgery before and after implementing educational program, and to evaluate the effectiveness of educational program related to preparation of patients preoperatively for the cardiac surgery.

3.2. Administrative Committee Approval

A. Scientific Post Graduate Committee Approval:

Initially, the researcher worked collaboratively with his academic advisor to select a research topic (Prof. Fakhria J Mohabes and Prof. Amean A Yasir). According to the findings of many studies that demonstrated that there is a gap between knowledge and practices among nurses who work in cardiac surgery wards. Worldwide studies are highly recommending ongoing educational activities that can embrace positive change on knowledge and practicum skills of nursing staff and can ultimately lead to quality improvement of nursing care to achieve best patient outcomes.

B. Research Ethical Committee/ Ethical Approval:

Ethical approval is an important step in conducting a research study in terms of ensuring there is no harm or discomfort for the participants. Hence, the researcher provided a printed copy of the educational program, tools for both domains knowledge and practices, and gave brief

explanation about the method of data collection and procedure to conduct the study. The research ethical committee reviewed all materials and provided their permission to carry out this study.

After filling the approval application forms, the ethical approval was obtained from the Scientific Postgraduate Committee University of Babylon/ Research Ethical Committe (Prof. Salma K Jehad, Dr. Saher Adham, and Dr. Haider Alhadrawy). The formal ethical application forms contain restricted rules to ensure safety and confidentiality of the participants. Moreover, the study ethical approval from AL-Najaf, Babylon, and karbala Health Directorates was also obtained before the actual data collection period and there was also an application forms in order to get access to the selected hospitals. The consent of nurses participating in the study was also obtained after explaining the objectives of the study and reassuring them that their personal information will be confidential and will be disposed after completion of the study. The researcher followed all the process and met the requirements of ethical approval.

3.3. Setting of the study

The study was conducted in hospitals in the central Euphrates region at three hospitals Imam Zain Al-Abidin Hospital in holy Karbala, Shahid Al-Mihrab Center in Al-Hilla city, and Najaf Center for Cardiac Surgery and Catheter Interference at AlNajf city to obtain comprehensive and correct data on the study. These hospitals were chosen for several reasons, including:

1-These hospitals is teaching hospitals at Middle Euphrates Region, with accessible services to cardiac surgery for adult clients

2-These hospitals have medical department of cardiac surgery care wards

3-Ease of obtaining the appropriate number of nurses to study within a short period of time

4-Workers in these hospitals, such as hospital managers and administrative staff, were cooperative in carrying out the research.

5-These hospitals contain a lecture hall, a data display screen, chairs for research participants, lighting, loudspeakers, microphone and a writing board.

6- These hospitals were chosen because they have a large capacity of beds in the cardiac wards

3.4. The Sampling of the Study

The study sample (purposive sample) was chosen from the nurses who work in the cardiac surgery departments of the selected participating hospitals, through certain criteria. The study sample consists of 48 nurses (24 nurses study sample and 24 nurses control sample), and the total number of the participants (48 nurses) was divided into three groups distributed over the three participating hospitals in study.

The first group contains 16 nurses (8 study sample and 8 control sample (Najaf city)).

The second group also 16 (8 study sample and 8 control sample (Babylon city)).

The third group 16 nurses (8 study sample and 8 control sample (Holy Karbala)).

where an educational program was provided to the study group, while the educational program for the control group was not presented.

3.4.1.Study Sample Inclusion Criteria:

The nurses participating in the study were selected according to the set of criteria, namely:

1-Nurses working in cardiac surgery wards both (males and females)

2-Nurses who have more than one or more years of experience

3-Nurses who hold various educational certificates such as Bachelor of Nursing, Diploma of Nursing, and Institute of Nursing

4-Nurses who work day shifts

3.4.2.Exclusion criteria

1-The nurses who did not accept to contribute to research were excluded (one nurse from Al Najaf city).

2-Nurses who have less than one year of nursing experience.

3-The nurses who achieved high performance and 60% or more scores in the initial sample selection set (one nurse from Babylon city).

4-The nurses who participated in the beginning of the research, but refused to continue participating in the research for special reasons (one nurse from Al Najaf city**).**

3.4.3.Sample selection

The total number of nurses participating in the research was 61 nurses who work in the cardiac surgery wards and they met all the study

criteria and their consent written to participate in the study were taken in the selected hospitals. 10 nurses who participated in the pilot study sample were excluded, as well as one nurses who participated in the evaluation of the needs of the study but did not accept to contribute to research excluded (one nurse from Al Najaf city), Also, one nurse who refused to continue participating in the study (one nurse from Al Najaf city) excluded, and one nurse who achieved high performance 60% or more scores excluded (one nurse from Babylon city), and the leaving 48 nurses and nurses who accepted to participate in the educational program were divided into three groups, the first group includes 16 nurses (study and control sample, Najaf city) and the second group 16 Nurses (study and control sample, Babylon city) and the third group, 16 nurses (study and control sample, Holy Karbala).

3.5. Study Steps:

The educational program sample divided into (24) study participant and (24) in control sample for the study was implemented according to the many steps

3.5.1.Assessment of knowledge and performance needs of nurses in cardiac surgery wards:

In this step, a closed-ended questionnaire format was used in the form of closed questions, where the content of the questionnaire was based on literature reviews related to the topic of the study as well as a checklist of performance for the study to assess the knowledge and performance of the nurses in the cardiac surgery wards. This evaluation was applied to the study sample consisting of 48 nurses during the period between from September 29, 2019 to July 25, 2021. This questionnaire

consisted of 31 questions related to nurses' knowledge (from January 6, 2020 to July 10, 2020) and 32 skills related to patient preparation before surgery in the cardiac surgery wards (from January 15, 2020 to October, 17, 2020). All nurses were given 40-60 minutes to complete the questionnaire related to nurses knowledge. The nurses performance in preparing the patient for surgery was monitored through a checklist especially to research (every nurse monitoring three time, one time before implementation educational program and tow times after implementation educational program).

After completing the assessment knowledge and performance of nurses who participate in study, the results showed that most of the nurses had a lack of knowledge related to heart disease, as well as a lack of nurses 'performance in preparing the patient before surgery. Through these results, the urgent need for an educational program for nurses working in cardiac surgery wards is indicated in order to improve their knowledge and improve the level of their performance in preparing patients before cardiac surgery.

3.5.2.Construction of educational program:

The educational program was construct to assess knowledge and evaluate performance of the nurses in the cardiac surgery wards towards the patients who will undergo cardiac surgery, where a group of experts evaluated the contents of the educational program and put notes and recommendations on the content of this the program to make it better. The required adjustments were made by the experts in order to achieve the research objectives is done. The educational program is construct to give the participating nurses the knowledge related to the anatomy, functions of the cardiovascular system, etiology, complications of cardiac

surgery, indications and contraindications for cardiac surgery, and patient preparation to pre-operative cardiac surgery.

3.6. Instrument of construction:

To evaluate the effectiveness of the educational program for the knowledge and performance of nurses in the cardiac surgery wards in the Central Euphrates region, a questionnaire was prepared to evaluate nurses 'information and a checklist of nurses' performance related to the preparation of the patient before surgery was also done.

This questionnaire consists of three sheets:

1-A self-administration sheet on the socio-demographic characteristics of the nurses participating in the research filled by nurses.

2-A self-administration questions sheet related to nurses' knowledge about heart surgery answered by nurses.

3-Observational checklist sheet related to nursing performance toward patients who under going to cardiac surgery filled by researcher.

Part I This part of the questionnaire is related to the socio-demographic of the nurses who participating in the research, as these data are collected from the nurses through information such as age, gender, educational level, years of experience, number of training courses related to heart surgery

Part II This part of the questionnaire assesses nurses' knowledge of cardiac surgery:

This part was constructed to assess nursing knowledge toward patients who undergoing cardiac surgery.

It consisted of 31 multiple choice questions, closed-ended question and checklist preoperative nursing care .

Part one: Anatomy and physiology of cardiovascular system.

Part two: Etiology and reason of cardiac surgery disease.

Part three: Complications of cardiac surgery.

Part four: Indications and contraindications of cardiac surgery.

Part fifth: Nursing intervention during the preoperative of cardiac surgery**.**

The nurses' knowledge related to heart surgery was tested through a study questionnaire which consisting of five parts, and all parts, containing a certain number of questions (31 multiple choice questions), and each question has four options to answer, only one of them is correct. This questionnaire related to the nurses' knowledge was distributed during the morning shift of the nurses in the cardiac surgery wards, and to measure the level of knowledge of the nurses. The scale of the number of correct answers for each nurse was calculated in percentage. Each nurse was given 40 to 60 minutes to answer the questions.

3.7.Scaling and Scoring :

A score of one grade was given for the correct answer and a score of zero was given to the wrong answer. The total score was calculated as follows:

Evaluation of nurses 'knowledge according to the sum of scores

If the correct nurses answered were from 0 to 11 questions, the nurse have score Inadequate knowledge, and If the correct nurses

answered were from 11 to 21 questions, the nurse have score Moderate knowledge, and If the correct nurses answered were from 22 to 31 questions, the nurse have score Adequate knowledge as the scaling.

0 – 11 (≤ 32.5%) = Inadequate knowledge.

11 – 21 (35 – 65%) = Moderate knowledge.

22 – 31 (67.5 – 100) = Adequate knowledge.

Part III. Performance of Checklist:

In this part of the Checklist, the performance of the nurses was observed by the researcher three times regarding to the preparation of the patient before the operation through a list of procedures, which consisted of 32 procedures related to the preparation of the patient before the operation, where the checklist was explained to the nurses and a (yes) sign was placed when the nurse performed the correct procedure, and a sign (no) when the nurse is not performing procedure properly, and when the nurse performed procedure correctly twice, this result is considered (yes)**.**

Likert scale was used to classify the contents of the checklist as follows: never (1), sometimes (2), and always (3), as the performance of each nurse was observed three times by researcher in relation to the patient's preoperative preparation and the performance was rated as correct 2 out of three observations and incorrect performance was rated 1 out of three observations. Each nurse's performance was monitored over a 5 to 10 minute time frame for each observation.

The total score was calculated as follows:

Evaluation of nurses' performance according to the sum of scores

0 – 10 = Poor performance.

11 – 21 = Average performance.

22 – 32 = Good performance.

3.7. Structuring Educational Program:

The purpose of developing a preparation of patients preoperative cardiac surgery educational program is to provide nurses with a cohesive body of knowledge and clinical skills based on recent evidence-based clinical practice guidelines that are necessary for professional nursing practice. The educational program is designed to support the achievement of intended study objectives. The educational program is focused on cognitive, psychomotor skills and affective domains of nurses in order to actively engage them into teaching-learning process. According to Billings and Halstead (2012) who stated that planning an educational program is identical to planning patient care and uses similar steps: assessment, planning outcomes (objectives), planning intervention (structuring the activities for providing teaching learning strategies) and evaluation. We follow these four steps in structuring the educational program.

1-Needs Assessment: this phase starts with an assessment of nurses knowledge and performance related to cardiac surgery and determined the needs of nurses to educational program regarding to cardiac surgery.

2-Development phase: During this phase, the researcher carried out a comprehensive search to collect the most relevant resources regarding to cardiac surgery and preparation of patients before cardiac surgery. Consequently, constructing an educational program should start with a

typical outline in order to achieve expected objectives of the program from the participants and questionnaire and checklist developed by researcher and supervisors and group of experts of nursing and medical field. The educational program focuses not only on providing information but also on embracing change for unwanted practices to promote patient safety.

3-Implementation phase: after preparing outline of educational program lectures and questionnaire and checklist related to cardiac surgery and preparation of patient before cardiac surgery, and after taken ethical approval committee accepted, and after taken consent nursing to participant of this study, the educational program is start which consists of eight sessions or lectures related to cardiac surgery and preparation of patients before cardiac surgery with three hospital(Imam Zain Al-Abidin Hospital in the lecture and meeting hall on the sixth floor in Holy Karbala, then in the lecture hall in the Shahid Al-Mihrab Center in Al-Hilla city, and then in the Najaf Center for Cardiac Surgery and Catheter Interference at AlNajf city). Self-administered structured knowledge questionnaire and performance observational checklist (pretest for study and control group) is done one time before implementation educational program who participant in this study, and every lectures given to nurse during one day and the lectures were given to the nurses participating in this study two or three lecture per week and every lecture taken period between 60 to 90 minutes depending on the nurses condition and the availability of the lecture hall which is sometime occupied by the hospital administration.

4-Evaluation phase: progress is determined by evaluation of the participants' knowledge (posttest for study and control group) and

performance observational checklist twice (posttest for study and control group) by comparing pre and post-test statistical findings.

3.8. Group assignment:

The control group:

The nurses in the control group did not receive any educational program on preoperative cardiac surgery.

Study group:

This group received the same instructions and information, in addition to the planned educational program towards the nursing management of preoperative heart surgery patients before surgery.

The program consisted of eight sessions and each session deals with the follows:

First session: Introduction of topic and explanation of the study objectives.

Second session: The activities and topics were performed:

1-Explanation the physiology and anatomy of the cardiovascular system.

2-Eexplain physiology of circulatory system.

Third session:

The activities and topics were performed:

1- Cardiac surgery definition.

2-Explanation of the pathogenesis of cardiac surgery.

Fourth session:

The following activities and topics were performed:

1-Identify the indications of cardiac surgery.

2-Identify the contraindications of cardiac surgery.

Fifth session:

The activities and topics were performed:

1-Explanation of complications of cardiac surgery.

Sixth session:

The following activities and topics were performed:

1-Operative consent signed (surgeon + patient)

2-Surgery type confirmed by patient

3-Describe allergy

4-Contagious disease description

5-Patient financial clearness

6-Blood units prepared

7- NPO (Food, drink and smoking)

8-Surgical sit shaving

9- Bath given

10- Surgical Site marked with “x”

11- IV line checked

12- Patient voided before OR

13- Wear\underwear removed

14- Hospital gown

15- Drains empty, fully empty

16- Dentures removed

17- Glasses \contact lenses removed

18- Auditory prosthesis removed

19- Makeup ,polish removed

20- Jewelry \ hair ornaments

21- ID bracelet available and correct

22- Pre medication given.

23- Laboratory results available.

24- X-ray results available.

25- X-ray sent to OR.

26- EKG report available.

27- Medication record in chart.

28- Nursing Progress Notes.

29- Cardiac catheterization report.

30- Cardiac Anesthesiologist consultation.

31- Stop blood thinners before surgery.

32- Use mupirocin ointment on the place of operation before surgery.

Each lecture of the educational program lasted between 60 to 90 minutes according to the time allowed for nurses, as the lecture hall or meeting rooms were used in the participating hospitals, and the computer, whiteboard and data viewer were used.

3.9. Pilot study:

To find out the reliability of the study tools (questionnaire and checklist), a pilot study was conducted on 10 nurses working in cardiac surgery wards, where they were divided to two groups, which is the study group includes 5 nurses, and the control group includes 5 nurses as well. These ten nurses have the same standards or criteria as the original study sample. This pilot study was conducted at Imam Zain Al-Abidin Hospital in the holy Karbala during the period from September 2, 2019 to September 20, 2019. Both the study and control groups underwent pre-testing, but only the study group was given the educational program, and then both groups underwent a post-test. After this pilot sample was excluded from the original sample of the research.

The purpose of pilot study:

1-To determine the time required to answer the questionnaire questions.

2-To measure the reliability of the questionnaire and checklist.

3-To identify if the contents of the educational program are clear to the study participants**.**

Results of the pilot study:

1-The educational program was clear to the study participants

2- Time needed by the nurse from the research participants between 30-40 minutes to answer questions about the nurses' information

3-The researcher took between 20-30 minutes to observing the performance of each nurse (three times) for preparation of patients to preoperative cardiac surgery, as three observations were made for each nurse

4-Each education session lasted about 90 minutes

3.10. Measurements at baseline after implementation the education program:

Before implementing the educational program for the study, a pretest was performed to assess the nurses information and performances in preparing patients before surgery. The scores of this test were 100 marks and nurses who obtained a score of less than 60 were accepted into the study sample. After that, the same questionnaire and checklist previously used were used in the posttest after implementing the educational program on the accepted nurses to participate in the research.

3.11. Validity of educational program and study tool:

The validity of the educational program content was determined by a (10) experts in the specialty of nursing. These experts were distributed as follows: five experts from the College of Nursing at the University of Babylon, two experts from the College of Nursing at the University of Baghdad, one expert from the College of Nursing at the University of Kufa and one expert from the College of Nursing at Al-Ameed Private University, each expert was handed a copy of the questionnaire and checklist, and they reviewed and evaluated the contents of the

questionnaire and checklist. The results of the experts indicated that the questionnaire and checklist is clear, valid and relevant to the subject of the study with some notes that were corrected and added to questionnaire and checklist.

3.12. Reliability of instrument:

To determine the reliability of the questionnaire for knowledge and checklist for performance, was used to evaluate 10 nurses who were selected from the cardiac surgery wards at Imam Zain Al-Abidin Hospital in the holy Karbala, and the interval period was two weeks.

Table (I):Reliability of the Questionnaire:

Studied criteria	Standard lower boudnd	Actual values		Assessment	
		Before	After	Before	After
Knowledge	0.60	0.48	0.77	Failure	Pass
Performance	0.60	0.42	0.69	Failure	Pass

3.13. Program Implementation:

The implementation of the program started in Imam Zain Al-Abidin Hospital in the lecture and meeting hall on the sixth floor, then in the lecture hall in the Shahid Al-Mihrab Center in Al-Hilla province, and then in the Najaf Center for Cardiac Surgery and Catheter Interference at AlNajf province for the period from September 29, 2019 to July 25, 2021, where the program included several topics, namely

Chapter Three- Methodology……..……

3-13-1- Nurses in the cardiac surgery wards of the participating hospitals in the study filled out a personal and socio-demographic data form for each nurse.

3-13-2-In order to evaluate the information and performance of the nurses about heart diseases and surgery and on preparing the patient preoperative cardiac surgery, a preliminary examination of the nurses' information took about 20-40 minutes and also a preliminary test of the nurses ’performance was done towards the preparation of the patient preoperative cardiac surgery and took about 10-20 minutes. The scores of this test were calculated and the nurses who scored less than 60% were included accepted in the study sample and were asked to come to the lecture hall next morning to participate in the educational program.

3-13-3-The nurses' information was tested through a group of (31) questions, and each question had four options for an answer, and there was only one correct answer. The test contains information on the anatomy and physiology of the cardiovascular system, definition, aetiology, cardiac surgery complications, cardiac surgery indications and contraindications, and preoperative nursing administration.

3-13-4-The performance of nurses in preparing patients preoperation cardiac surgery in the cardiac surgery wards was tested through a list checklist consisting of 32 performances for preparing patients before surgery, where the performance of the nurses was monitored, a YES sign was placed on the correct performance and a NO sign when the correct performance was not performed. It took 5 to 10 minutes to fill out the checklist for each nurse.

3-13-5-An educational program was introduced to the 24 nurses admitted to the study in the lecture halls of the participating hospitals, as the program lasted one month in each hospital, and each lecture lasted between 60-90 according to the appropriate time for the nurses and twice to three lectures per week.

3-13-6-A post-test was done for the nurses participating in the study (the study and control group) after completing the educational program in each hospital participating in the study.

3-13-7-The same previous steps were taken for the control group, with the exception of providing the educational program.

3.14. Methods of data collection (procedure):

Permission letter is provided to respective head nurses of hospitals who participate in study. A brief explanation and discussion about the purpose and procedures of the study were given to the participants. The researcher explained to nurses that observations would be occurred to investigate nursing performance related to preparation of patients before cardiac surgery and questionnaire to evaluate the nurses knowledge related to cardiac surgery. In addition, informed consent was obtained and confidentiality and privacy was guaranteed. A total number of study and control were 48 nurses who are met the inclusion and exclusion criteria was selected by purposive sample technique.

For the knowledge evaluation part, a structured self-administered questionnaire is utilized to evaluate the pre-test (before educational program implementation) and post-test level of nurses' knowledge(after educational program implementation). It required about 40- 60 minutes to filling out the questionnaire and demographic data forms.

For the performance evaluation part, the instrument selected for use in this study were contain a 32 item structured observational schedule which was adapted by researcher and supervisors after taken notes of experts related to questionnaire and checklist. The participants were observed in the cardiac surgery wards during morning by researcher during preparation of patients for cardiac surgery and researcher put yes on checklist when nurse do procedure and no when nurse don't do procedure by using observational checklist to evaluate their actual performance. It took about 5 to 10 minutes for each observational checklist. The observation was done through three consecutive periods, one period before implementing educational program (pretest) and two period after implementing educational program (posttest).

Moreover, after implementing educational program, the researcher used the same observational checklist after one month from educational intervention to evaluate the effectiveness of educational program on nurses' performance. The educational program was implemented in clinical settings for all participants. The nurses were invited to attend a lecture room in the hospital. The education was provided by utilizing PowerPoint projector and white board. The teaching and learning strategies that used during this educational program were lecture, PowerPoint presentation, guided group discussion, handouts, and related video. The learning environment was open, safe, supportive, and non-threatening learning environment. The researcher emphasized on climate of respect, and mutual trust and acceptance in order to maximize benefits of educational program and meet all participants' learning preferences. Furthermore, the teaching approach incorporated flexible strategies in order to meet the need for each nurse in terms of improving knowledge and practices regarding to educational program.

3.15. Statistical Analysis:

The data collection tools of both areas (knowledge and practices) were analyzed statistically using IBM's SPSS version 24. Data were analyzed using independent samples paired t-test with the statistical significance level set at p <0 .05. This statistical test was chosen because this study is testing the differences between pre-test and post-test. This statistical test is an appropriate choice for analysis of the data. The researcher used both descriptive and inferential statistics. Descriptive statistics form the basis for quantitative analysis of data, as it is used to describe the characteristics of the main study data, which provide summaries of the sample and measures and analysis of graphics.

Descriptive statistics are used to describe what the study data shows or to describe what is happening in the study data, while the inferential statistics is used to reach conclusions from the study data to more general conclusions.

The descriptive statistics that were used in this study are as follows:

1-Frequency and percentage tables.

2-Summery statistics (mean and standard deviation)

3-Statistical figures (bar charts)

4-Cutt off point equal to 0.33 due to three levels of measurements (inadequate, moderate, and adequate responses) according to correct and non-correct questions which nurse answered it in questionnaire, to divided the nurses' knowledge into three levels as follow:

-Adequate knowledge (mean 0.68-2.1),(correct answers 22-31 questions).

-Moderate knowledge (mean 0.34-0.67)(correct answers11-21 questions).

- Inadequate knowledge (mean 0-0.33.)(correct answers 0-10 questions).

The cuttof point is calculated through the following steps:

1-Determine the range (R). R = maximum value – minimum value (2-1=1).

2-Dividing the range by the levels of nurses' knowledge. (1/3=0.33)

3-The cutoff point is 0.33.

While for the evaluation of the nurses' practices the cutt off point is equal to 1, and it determined using the same steps of determine cutt off points for the nurses' knowledge.

Data for the study were collected through a questionnaire and checklist from December 5, 2019 to April 10, 2020.

Data collection was carried out through the following steps:

A. Pre-test (for study and control groups) from the period September 29, 2019 to December 15, 2019.

B. Implementing the constructed educational program (for study group) from the period September 29, 2019 to July 25, 2021, the nurses are exposed to post–test I immediately.

C. Four weeks later all nurses are exposed to posttest II.

Data analysis descriptive:

This approach was implemented by defining:

1- Frequency and percentage

$$\text{Percentage } (\%) = \frac{\textbf{Frequencies (F)}}{\textbf{Size of sample}} \times 100$$

2- Mean(x)

$$\mathbf{X} = \frac{\Sigma X}{N}$$

3- Standard deviation(SD)

$$\text{S. D.} = \sqrt{\frac{\sum x^2}{n-1}}$$

4- Statistical tables containing: Mean scores:

$$\text{M.S.} = \frac{\text{f1}*\text{s1} + \text{f2}*\text{s2} + \text{f3}*\text{s3}}{\text{n}}$$

M.S=Mean of Score, S= score, n=sample size, F = frequency,

5- Graphical presentation by using bar-chart.

Inferential Data Analysis

This analysis was used to indicate the significant association.

The Paired t-test is computed according to formula:

$$\text{t} = \frac{\overline{\text{D}}_{\text{x}-\text{y}}}{\sqrt{\frac{\sum \text{d}^2}{\text{N}(\text{N}-1)}}}$$

D_{x-y}= the different between two paired scores

$\overline{D}_{x-y}$=the mean different between the paired scores

d =the deviation scores for the different measure

$\sum d^2$=the sum of the squared deviation scores

N= number of pairs

One-way analysis of variance test (ANOVA):

$$SSt = n\sum_{i=1}^{k}\left(\bar{y}_{i.} - \bar{y}_{..}\right)^2 = \frac{\sum_{i=1}^{k} Y_i^2}{n} - \frac{(Y..)^2}{nk}$$

$$SST = n\sum_{ij}^{kn}\left(\bar{y}_{ij} - \bar{y}_{i.}\right)^2 = \sum y_{ij}^2 - \frac{(Y..)^2}{nk}.$$

(Al-Rawi, 2000).

Chapter Four
Results of the Study

In this part of the study we present the socio-demographic characteristics of the control group and the study group within the framework of the current study and determine the effectiveness of the preoperative educational program on the knowledge and performance of the nurses in the cardiac surgery wards, in addition to finding statistically significant differences between the control group and the study group with respect to their socio-demographic characteristics. Different statistical processes were used to analyze the results of the study, and these results were interpreted.

Table.4.1: Distribution and inferential of study sample according to socio-demographic data (study and control group) No=48 Nurses

Variable	Group		Study		Control		P-value
			Freq	%	Freq	%	
Age	20-24		6	25	2	8.3	t-test p=0.091 N.S
	25-29		9	37.5	10	41.7	
	30-34		4	16.6	5	20.8	
	35-39		3	12.5	3	12.5	
	40-44		1	4.1	3	12.5	
	45-49		1	4.1	1	4.1	
	x±S.D.		30.22±6.61		29.12±5.83		
Gender	Male		13	54.2	19	79.2	FEPT P=0.761 N.S
	Female		11	45.8	5	20.8	
Education Level	Graduate of college nursing		12	50.0	10	41.7	t-test p=0.321 N.S
	Nursing institute Graduate		9	37.5	11	45.8	
	Secondary school nursing graduate		3	12.5	3	12.5	
Years of experience in Employment	1-5 years		14	58.6	10	41.7	t-test p=0.301 N.S
	6-10 years		5	20.8	7	29.3	
	11-15 years		2	8.3	4	16.6	
	16-20 years		1	4.1	1	4.1	
	21-25 years		1	4.1	2	8.3	
	26-30 years		1	4.1	0	0	
Training Sessions	No		12	50	17	70.7	FEPT P=0.291 N.S
	Yes		12	50	7	29.3	
	Inside of Iraq	Yes	13	54.2	12	50	
		No	11	45.8	12	50	
	Outside of Iraq	Yes	3	12.5	1	4.1	
		No	21	87.5	23	95.9	

Freq =Frequencies, %=Percentage, C.S.: Comparison Significant, x±S.D.=Arithmetic Mean and Std.Dev.(S.D.), P=P-value, N.S.=Non-Significant, FEPT=Fisher Exact Probability Test, ≥=More than or Equal

This table shows that, more than third (37.5%) of nurses in study group were in the age (25-29) while, (41.7%) of nurses in the control group were the same age group, and (54.2%, and 79.2% respectively) of nurses in study group and control group were males.

According to the educational level, half of nurses in study group (50%) were graduate from of college nursing, and (45.8%) of nurses in the control group were nursing institute graduate.

In relation to years of experience of nurses, most of nurses have 1 to 5 years of experience in study and control group (58.6%, and 41.7% respectively) in the medical wards of cardiac surgery. The same table revealed that the majority of the training sessions half of nurses in the study group (50%) and (70.7%) of control group did not have session.

Statistically, there were no statistical significant difference between study groups and control groups in relation to (age, gender, education levels, years of experience, and training sessions).

Table.4.2: Comparison of pre-test knowledge results between study group and control group (n=48).

Items	Group	n	Mean	S.D	ŋ	t	P-value
anatomy and physiology of cardiovascular	Study	24	0.50	0.235	0.865	1.120	0.224
	Control	24	0.47	0.251			
etiology of cardiac surgery	Study	24	0.42	0.163	0.591	1.417	0.115
	Control	24	0.35	0.352			
complications of cardiac surgery	Study	24	0.27	0.232	0.672	2.305	0.011
	Control	24	0.34	0.163			
indication and contraindication of cardiac surgery	Study	24	0.25	0.317	0.705	0.639	0.004
	Control	24	0.35	0.292			
nursing management preoperative of cardiac surgery	Study	24	0.33	0.141	0.548	0.413	0.617
	Control	24	0.40	0.112			
Total knowledge	Study	24	0.45	0.121	0.842	0.853	0.272
	Control	24	0.38	0.122			

ŋ =Eta coefficient which is the person correlation between educational group and score, SD=standard deviation, m=mean, t=t test, P=P value>0.05, n=number.

Table 2.2- shows that, there is no statistical significant different among control and study group for pretest information scores (anatomy and physiology of cardiovascular, etiology of cardiac surgery, complications of cardiac surgery, indication and contraindication of cardiac surgery, nursing management preoperative of cardiac surgery) at (P>0.05) when analysis t-test, while there is significant increase information in control group related to (complications of cardiac surgery, indication and contraindication of cardiac surgery) were found that significant difference results of study groups and control groups related to complications and indications and contraindications at P-value are (0.011, and 0.004 respectively).

Table.4.3: Comparison of pretest regarding to patient preparation performance results between study and control groups (n=48).

Items	Group	n	Mean	S.D	ŋ	t	P-value
Name personal details confirmed	Study	24	2.20	0.235	0.865	1.120	0.224
	Control	24	2.05	0.251			
Operative consent signed(surgeon + patient)	Study	24	2.14	0.163	0.591	1.417	0.115
	Control	24	2.23	0.352			
Anesthesiologist consultation	Study	24	2.17	0.232	0.672	2.305	0.011
	Control	24	2.34	0.163			
Ask patients about Allergy	Study	24	2.21	0.317	0.705	0.639	0.014
	Control	24	2.35	0.292			
Use mupirocin ointment	Study	24	2.33	0.141	0.548	1.413	0.617
	Control	24	2.12	0.112			
Pretest NPO (Food, drink and smoking)	Study	24	2.19	0.229	0.663	1.752	0.486
	Control	24	2.15	0.241			
surgical Sit shaving	Study	24	2.34	0.236	0.847	1.589	0.314
	Control	24	2.25	0.209			
IV line checked	Study	24	2.39	0.218	0.938	0.863	0.571
	Control	24	2.31	0.210			
Hospital gown	Study	24	2.26	0.239	0.683	1.915	0.846
	Control	24	2.19	0.228			
Dentures removed	Study	24	2.13	0.223	0.740	1.641	0.146
	Control	24	2.18	0.274			
ID bracelet	Study	24	2.40	0.302	0.829	1.681	0.134
	Control	24	2.32	0.266			
Medication given	Study	24	2.09	0.253	0.683	1.432	0.018
	Control	24	2.02	0.225			
Laboratory results	Study	24	1.92	0.293	0.975	1.742	0.392
	Control	24	2.10	0.245			
X-ray results	Study	24	2.14	0.253	0.728	1.874	0.801
	Control	24	2.05	0.238			
ECG report	Study	24	1.98	0.281	0.845	0.221	0.413
	Control	24	2.16	0.265			
Catheterization report	Study	24	2.22	0.236	0.665	1.838	0.614
	Control	24	2.11	0.214			
Stop Anticoagulants	Study	24	2.37	0.295	0.892	1.665	0.684
	Control	24	2.29	0.249			
Total performance	Study	24	2.23	0.181	0.644	1.205	0.228
	Control	24	2.15	0.310			

ŋ =Eta coefficient which is the person correlation between educational group and score, SD=standard deviation, m=mean, t=t test, P=P value, n=number.

Table4.3 shows that, non-statistical significant for all performance scores (Name personal details confirmed, operative consent signed(surgeon + patient), anesthesiologist consultation, ask patients about allergy, use mupirocin ointment, NPO (Food, drink and smoking), surgical Site shaving, iv line checked, hospital gown, dentures removed, ID bracelet, medication given, laboratory results, X-ray results, ECG report, catheterization report, Stop Anticoagulants) among study and control group. Analysis found that, mean scores and t.test of control group are significantly ($P<0.001$) less than study group.

Table 4.4: Comparison of post-test level of knowledge between the study group and control group (n=48).

Items	Group	n	Mean	S.D	ŋ	t	P-value
Anatomy & physiology of cardiovascular	Study	24	0.73	0.290	0.225	7.176	0.000
	Control	24	0.42	0.261			
Etiology of cardiac surgery	Study	24	0.87	0.143	0.362	7.209	0.000
	Control	24	0.25	0.268			
Complications of cardiac surgery	Study	24	0.80	0.260	0.119	9.887	0.001
	Control	24	0.51	0.316			
Indication and contraindication of cardiac surgery	Study	24	0.79	0.226	0.055	7.881	0.000
	Control	24	0.36	0.359			
Nursing management preoperative of cardiac surgery	Study	24	0.63	0.221	0.815	4.911	0.000
	Control	24	0.49	0.263			
Total knowledge	Study	24	0.72	0.138	0.546	11.927	0.000
	Control	24	0.34	0.130			

ŋ =Eta coefficient which is the person correlation between educational group and score, SD=standard deviation, m=mean, t=t test, P=P value, n=number

Table 4.4 shows, all 5 posttest information scores (anatomy and physiology of cardiovascular, etiology of cardiac surgery, complications of cardiac surgery, indication and contraindication of cardiac surgery, nursing management preoperative of cardiac surgery) are statistical higher significant among study group compared to control group at ($P<0.001$).

Table.4.5: Comparison of post-test performance scores among study group and control group (n=48) (1)

Items	Group	n	Mean	S.D	ŋ	t	P-value
Name personal details confirmed	Study	24	2.31	0.243	0.162	12.242	0.000
	Control	24	2.13	0.139			
Operative consent signed(surgeon + patient)	Study	24	2.21	0.272	0.315	17.000	0.000
	Control	24	2.35	0.241			
Anesthesiologist consultation	Study	24	2.41	0.256	0.420	6.610	0.000
	Control	24	2.57	0.181			
Ask patients about Allergy	Study	24	2.29	0.215	0.264	21.486	0.000
	Control	24	2.34	0.195			
Use mupirocin ointment	Study	24	2.39	0.273	0.486	5.213	0.000
	Control	24	2.45	0.237			
NPO (Food, drink and smoking)	Study	24	2.51	0.263	0.236	22.351	0.000
	Control	24	2.75	0.231			
Surgical Site shaving	Study	24	2.36	0.258	0.059	16.295	0.000
	Control	24	2.81	0.189			
IV line checked	Study	24	2.49	0.242	0.082	5.431	0.000
	Control	24	2.71	0.215			
Hospital gown	Study	24	2.40	0.248	0.375	14.458	0.000
	Control	24	1.81	0.194			
Dentures removed	Study	24	2.26	0.268	0.431	12.320	0.000
	Control	24	2.47	0.210			
ID bracelet	Study	24	2.25	0.252	0.025	18.680	0.000
	Control	24	2.57	0.166			
Medication given	Study	24	2.51	0.262	0.278	21.860	0.000
	Control	24	1.94	0.249			
Laboratory results	Study	24	2.64	0.361	0.382	14.320	0.000
	Control	24	2.76	0.243			
X-ray results	Study	24	2.34	0.147	0.359	6.437	0.000
	Control	24	2.57	0.251			
EKG report	Study	24	2.62	0.269	0.381	22.442	0.000
	Control	24	2.85	0.251			
Catheterization report	Study	24	2.31	0.154	0.323	15.414	0.000
	Control	24	2.79	0.259			
Stop Anticoagulants	Study	24	2.30	0.247	0.451	26.332	0.000
	Control	24	2.47	0.189			
Total performance	Study	24	1.36	0.160	0.022	30.085	0.000
	Control	24	2.07	0.073			

ŋ =Eta coefficient which is the person correlation between educational group and score, SD=standard deviation, m=mean, t=t test, P=P value, n=number

Chapter Four -Results of the Study ……..……...

Table 5 illustrates that, all items posttest performance scores (Name personal details confirmed, operative consent signed(surgeon + patient), anesthesiologist consultation, ask patients about allergy, use mupirocin ointment, NPO (Food, drink and smoking), surgical site shaving, IV line checked, hospital gown, dentures removed, ID bracelet, medication given, laboratory results, X-ray results, ECG report, catheterization report, stop anticoagulants) when analysis t.test, found statistical higher significant among the study and control group at ($P<0.001$).

Table.4.6: Frequency distribution of Participants' Knowledge Regarding to Anatomy and Physiology of the cardiovascular System at the Pre-test and Post-test (study groups).

Items	Response	Pretest		Posttest	
		N	%	N	%
synthetically cardiovascular system consist of	Correct	4	16.5	21	87.5
	Incorrect	20	83.4	3	12.5
The heart beats in adult an average	Correct	16	66.7	22	91.7
	Incorrect	8	33.3	2	8.3
What is the number of heart chambers	Correct	14	58.3	24	100
	Incorrect	10	41.7	0	0
The name of normal heart sound are?	Correct	12	50	23	95.9
	Incorrect	12	50	1	4.1
The number of valves in the heart are?	Correct	11	45.8	21	87.5
	Incorrect	13	54.2	3	12.5
Which circulatory process supplies the heart with blood	Correct	13	54.2	19	79.2
	Incorrect	11	45.8	5	20.8
Your person's pulse rate is 50. You would document this as:	Correct	17	70.8	18	75
	Incorrect	7	29.1	6	25

Table 4.6 shows that more than half of the nurses participating in the study in the pre-test had correct information about the anatomy and physiology of the cardiovascular system, except for the first and fifth questions, where the answer was incorrect and also the fourth question answer was equal pretest among the nurses participants, as the number of those who answer right and wrong answer. In the post test, most of the participants 'answers were correct, and there was an improvement in the study participants' information. The results indicate that there is an improvement in the information of the nurses participating in the study regarding the anatomy and functions of the cardiovascular system in the post-test compared to the pretest.

Table.4.7: Frequency distribution of Participants' Knowledge Regarding to Etiology of the cardiovascular System at the Pre-test and Post-test (study groups).

Items	Response	Pretest		Posttest	
		N	%	N	%
Selected causes of cardiac surgery	Correct	14	58.3	20	83.4
	Incorrect	10	41.7	4	16.6
The only cause of cardiac surgery is?	Correct	12	50	22	91.7
	Incorrect	12	50	2	8.3
The only cardiac reason for heart surgery is it?	Correct	7	29.1	24	100
	Incorrect	17	70.8	0	0
The only heart disease that needs heart surgery is it?	Correct	12	50	23	95.9
	Incorrect	12	50	1	4.1
The etiology of cardiac surgery is?	Correct	9	37.5	19	79.2
	Incorrect	15	62.5	5	20.8
The only congenital heart disease that needs heart surgery is it?	Correct	10	41.7	18	75
	Incorrect	14	58.3	6	25

Table.4. 7 declared that most of the nurses participating in the study in the pre-test had incorrect information about the causes of diseases of the cardiovascular system, except for the first question more than half of participant have correct answer. For the second and fourth questions, the answer was equal among the nurses participants, as the number of those who answered a correct and wrong answer they were equal. In the post test, most of the answers of the participating nurses were correct, and there was an improvement in the information of the study participants. The results indicated an improvement in the information of the nurses participating in the study regarding the causes of diseases of the cardiovascular system in the post-test compared to the pre-test.

Table.4.8: Frequency distribution of Participants' Knowledge Regarding to Complications of the cardiovascular System at the Pre-test and Post-test (study groups).

Items	Response	Pretest		Posttest	
		N	%	N	%
Complications of cardiac surgery in related to heart are?	Correct	12	50	17	70.8
	Incorrect	12	50	7	29.1
Complications of cardiac surgery related to heart are?	Correct	12	50	23	95.9
	Incorrect	12	50	1	4.1
Complications of cardiac surgery related to pulmonary are?	Correct	11	45.8	21	87.5
	Incorrect	13	54.2	3	12.5
The complications of cardiac surgery related to neurologic is?	Correct	13	54.2	22	91.7
	Incorrect	11	45.8	2	8.3
The complications of cardiac surgery related to Renal system is?	Correct	6	25	23	95.9
	Incorrect	18	75	1	4.1
The complications of cardiac surgery related to surgical incision is?	Correct	11	45.8	14	58.3
	Incorrect	13	54.2	10	41.7

Table 4.8. shows that most of the nurses participating in the study in the pre-test had incorrect information about complications of cardiac surgery, except for the fourth question, where more than half of the answers were correct pretest, as well as the first and second questions, the answer was equal among the participants, as the number of those who answered correctly and wrong answer. In the post test, most of the answers of the participating nurses were correct, and there was an improvement in the information of the study participants. The results indicate that there was an improvement in the study nurses' information regarding cardiac surgery complications in the post-test compared to the pre-test.

Table.4.9: Frequency distribution of Participants' Knowledge Regarding to indications and contraindications of cardiac surgery at the Pre-test and Post-test (study groups).

Items	Response	Pretest		Posttest	
		N	%	N	%
Indication of cardiac surgery related to valves are?	Correct	9	37.5	19	79.2
	Incorrect	15	62.5	5	20.8
Indication of cardiac surgery is?	Correct	14	58.3	22	91.7
	Incorrect	10	41.7	2	8.3
Indication of cardiac surgery related coronary heart are?	Correct	5	20.8	24	100
	Incorrect	19	79.2	0	0
Contraindication of cardiac surgery is?	Correct	11	45.8	21	87.5
	Incorrect	13	54.2	3	12.5
Contraindication of cardiac surgery related to heart is?	Correct	10	41.7	18	75
	Incorrect	14	58.3	6	25
Contraindication of cardiac surgery related to heart muscle is?	Correct	9	37.5	19	79.2
	Incorrect	15	62.5	5	20.8

Table.4. 9. indicates that most of the nurses participating in the study in the pretest had incorrect information about the indications and contraindications of heart surgery, except the second question, where more than half of participants answers were correct. In the post test, most of the answers of the participating nurses were correct. The results indicate an improvement in the study nurses' information regarding indications and contraindications for heart surgery in the post-test compared to the pretest.

Table.4.10: Frequency distribution of Participants' Knowledge Regarding to Nursing Management pre-operative of cardiac surgery patients at the Pre-test and Post-test (study groups).

Items	Response	Pretest		Posttest	
		N	%	N	%
Role of the nurses in preoperative phase are?	Correct	7	29.1	16	66.7
	Incorrect	17	70.8	8	33.3
Goals of preparation of patients before cardiac surgery within the hospital?	Correct	8	33.3	22	91.7
	Incorrect	16	66.7	2	8.3
Role of the nurses in preoperative physical assessment needs are?	Correct	8	33.3	19	79.2
	Incorrect	16	66.7	5	20.8
Assess of psychological needs are?	Correct	11	45.8	19	79.2
	Incorrect	13	54.2	5	20.8
Preoperative teaching plane include?	Correct	10	41.7	18	75
	Incorrect	14	58.3	6	25
The most important guidance provided to the patient before discharge from the hospital	Correct	11	45.8	21	87.5
	Incorrect	13	54.2	3	12.5

Table.4.10. shows that all the nurses participating in the study in the pretest had incorrect information about the nursing role towards the patient before cardiac surgery, and in the post test after implementation educational program, all the answers of the participating nurses were correct, and there was an improvement in the knowledge of the study participants. The results indicate that there is an improvement in the information of the nurses participating in the study regarding the role of nursing towards the patient before cardiac surgery in the post-test compared to the pre-test.

Table.4.11:Evaluation of Nurses' Knowledge at the Pre-test and Post-test (Sub-Domain Based Analysis).

Main Studied Domains	Level of Knowledge	pretest			posttest		
		N(%)	Mean	Eval	N(%)	Mean	Eval
anatomy and physiology of cardiovascular system	Adequate	16(66.7)	0.73	Adequate	20(83.4)	0.81	Adequate
	Moderate	2(8.3)			3(12.5)		
	Inadequate	6(25)			1(4.1)		
etiology of cardiac surgery	Adequate	5(20.8)	0.31	Inadequate	14(58.3)	0.68	Adequate
	Moderate	8(33.3)			7(29.1)		
	Inadequate	11(45.8)			3(12.5)		
complications of cardiac surgery	Adequate	5(20.8)	0.63	Moderate	16(66.7)	0.73	Adequate
	Moderate	12(50)			5(20.8)		
	Inadequate	7(29.1)			3(12.5)		
indications and contraindications of cardiac surgery	Adequate	6(25)	0.54	Moderate	18(75)	0.77	Adequate
	Moderate	11(45.8)			3(12.5)		
	Inadequate	7(29.1)			3(12.5)		
nursing management pre-operative of cardiac surgery patients	Adequate	7(29.1)	0.23	Inadequate	21(87.5)	0.85	Adequate
	Moderate	3(12.5)			2(8.3)		
	Inadequate	14(58.3)			1(4.1)		

Eval. = Evaluation; Adequate knowledge = (0.68-2), Moderate knowledge = (0.34-0.67), Inadequate knowledge = (0-0.33).

Table.4.11. This table illustrated that the average score of the participants regarding the anatomy and functions of the cardiovascular system in the pre-test was (0.73) which is an adequate level of knowledge, and in the post-test the average score was increased (0.81). In etiology of cardiac surgery, complications, and indications and contraindications, the average overall score on the pretest was (0.31, 0.63, 0,54 respectively) which is a moderate level of knowledge, then on the post test, the average overall score became (0.68, 0.73, 0.77 respectively) which represents an adequate level of knowledge. The results indicated an improvement in the nurses participants 'knowledge in all fields after implementing the educational program.

Table.4.12: Overall Evaluation of Nurses' Knowledge at the Pre-Test and Post-Test.

Period of measurement	Level of Knowledge	N(%)	Overall Mean	Overall evaluation
Pretest	Adequate	3(12.5)	0.54	Moderate Knowledge
	Moderate	13(54.2)		
	Inadequate	8(33.3)		
Total (N and %)	24 (100%)			
Posttest	Adequate	21(87.5)	0.87	Adequate Knowledge
	Moderate	2(8.3)		
	Inadequate	1(4.1)		
Total (N and %)	24(100%)			

Adequate knowledge = (0.68-2.1), Moderate knowledge = (0.34-0.67), Inadequate knowledge = (0-0.33).

Table.4.12. These table indicated that the overall assessment of nurses' knowledge in cardiac surgery wards in pretest and posttest. The majority of the pre-test nurses participants' responses had moderate knowledge (54.2%), while (33.3%) did not have sufficient knowledge, and (12.5%) had sufficient knowledge. Moreover, in the post-test period, the majority of participants' (87.5%) had adequate knowledge, (8.3%) had moderate knowledge and (4.1%) had insufficient knowledge. Based on the differences in frequency and percentage of all aspects of educational program, the study results indicate that there is an improvement in the general knowledge level of the study sample in the post-test compared to the pretest. The overall mean is (0.54) in the pre-test, which is moderate knowledge, while in the post test the overall mean is (0.87), which is sufficient knowledge.

Table.4.13: Overall Mean Differences of Nurses' Knowledge (Paired t-test) throughout Two Periods of Measurements (Pre-test and Post-test).

Main studied domain	Period of measurement	mean	*SD*	t-value	d.f	*p*-value	IR
anatomy and physiology of cardiovascular system	Pretest	0.762	0.262	3.215	23	0.002	8%
	Posttest	0.857	0.315				
etiology of cardiac surgery	Pretest	0.440	0.239	5.267	23	0.0001	16%
	Posttest	0.703	0.103				
complications of cardiac surgery	Pretest	0.405	0.253	7.301	23	0.0001	27%
	Posttest	0.632	0.101				
indications and contraindications of cardiac surgery	Pretest	0.379	0.283	9.259	23	0.001	35%
	Posttest	0.617	0.167				
nursing management pre-operative of cardiac surgery patients	Pretest	0.359	0.269	9.371	23	0.0001	39%
	Posttest	0.593	0.134				
Overall evaluation	Pretest	0.42	0.19	12.458	23	0.0001	24%
	Posttest	0.79	0.10				

SD = Standard Deviation; IR = Improvement Rate = (*Mean* at the posttest - *Mean* at the pretest)*100

Table.4.13. shows Paired t-test was performed to find the difference between the average level of information of the nurses participating in the study in the pretest and the post test. The results show that there was a significantly high difference in knowledge at $p<0.05$. Based on the statistical average, the results indicate that there is a significant increase in the means in the post-test compared to the pre-test, meaning that there was an improvement in the knowledge level of the nurses after applying the educational program.

Table.4.14:Evaluation of Nurses' Practices Regarding to preparation of patients before cardiac surgery at the Pre-test and Post-test (2).

Items	Response	Pretest	Posttest
		N(%)	N(%)
Operative consent signed (surgeon + patient)	Done	10(41.7)	21(87.5)
	Not done	14(58.3)	3(12.5)
Surgery type confirmed for patient	Done	7(29.1)	24(100)
	Not done	17(70.8)	0(00)
did you have allergy	Done	3(12.5)	23(95.9)
	Not done	21(87.5)	1(4.1)
Did you have Contagious Disease	Done	1(4.1)	12(50)
	Not done	23(95.9)	12(50)
The financial costs are clear to the patient	Done	11(45.8)	17(70.8)
	Not done	13(54.2)	7(29.1)
Blood units prepared	Done	4(16.6)	24(100)
	Not done	20(83.4)	0(00)
NPO (Food, drink and smoking)	Done	8(33.3)	21(87.5)
	Not done	16(66.7)	3(12.5)
Surgical site shaving	Done	4(16.6)	21(87.5)
	Not done	20(83.4)	3(12.5)
Bath given	Done	0(00)	22(91.7)
	Not done	24(100)	2(8.3)
Surgical Site marked with “x”	Done	0(00)	20(83.4)
	Not done	24(100)	4(16.6)
IV line checked	Done	17(70.8)	23(95.9)
	Not done	7(29.1)	1(4.1)
Patient voided before OR	Done	2(8.3)	10(41.7)
	Not done	22(91.7)	14(58.3)
Wear\underwear removed	Done	3(12.5)	16(66.7)
	Not done	21(87.5)	8(33.3)
Hospital gown	Done	24(100)	24(100)
	Not done	0(00)	0(00)
Drains empty, fully empty	Done	1(4.1)	13(54.2)
	Not done	23(95.9)	11(45.8)
Dentures removed	Done	10(41.7)	19(79.2)
	Not done	14(58.3)	5(20.8)
Glasses \contact Lenses Removed	Done	2(8.3)	10(41.7)
	Not done	22(91.7)	14(58.3)
Auditory prosthesis removed	Done	9(37.5)	12(50)
	Not done	15(62.5)	12(50)
Makeup ,polish removed	Done	11(45.8)	15(62.5)
	Not done	13(54.2)	9(37.5)
Jewelry \ hair ornaments	Done	17(70.8)	24(100)
	Not done	7(29.1)	0(00)
ID bracelet available and correct	Done	5(20.8)	24(100)
	Not done	19(79.2)	0(00)
Pre medication given	Done	15(62.5)	21(87.5)

	Not done	9(37.5)	3(12.5)

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Items	Response	Pretest N(%)	Posttest N(%)
Laboratory results available	Done	23(95.9)	24(100)
	Not done	1(4.1)	0(00)
X-ray results available	Done	7(29.1)	11(45.8)
	Not done	17(70.8)	13(54.2)
X-ray sent to OR	Done	23(95.9)	24(100)
	Not done	1(4.1)	0(00)
EKG report available	Done	10(41.7)	21(87.5)
	Not done	14(58.3)	3(12.5)
Medication record in chart	Done	18(75)	22(91.7)
	Not done	6(25)	2(8.3)
Nursing Progress Notes	Done	20(83.4)	24(100)
	Not done	4(16.6)	0(00)
Cardiac catheterization report	Done	9(37.5)	19(79.2)
	Not done	15(62.5)	5(20.8)
Cardiac Anesthesiologist consultation	Done	24(100)	24(100)
	Not done	0(00)	0(00)
Stop Anticoagulants drugs before surgery	Done	14(58.3)	22(91.7)
	Not done	10(41.7)	2(8.3)
Use mupirocin ointment on the place of operation before surgery	Done	2(8.3)	6(25)
	Not done	22(91.7)	18(75)

Not done = (0), incorrectly done = (0.1-1), correctly done = (1.1-2).

Table.4.14. This table declared that increase in the frequency and percentage of correct performance in nurse practitioners about preoperative patient preparation in post-test compared to pretest, which indicated that an improvement in nurses' practices related to preparation of patients before cardiac surgery after program implementation.

Table.4.15:Overall Nurses' Performance Evaluation at the Pre-test and Post-test Analysis.

Main studied domain	Response	Pretest (N%)	Posttest (N%)
Overall nurses performance	Done	7 (29.1)	21(87.5)
	Not done	17 (70.9)	3(12.5)
	Total	24 (100)	24(100)

Not done = (0), incorrectly done = (0.1-1), correctly done = (1.1-2).

Table.4.15. This table showed that, the overall evaluation of the performance of the nurses participating in the study in the pre-test is (70.9%) from incorrect practices and (29.1%) correct practices, while the general evaluation of the performance of the nurses participating in the post-test is (87.5%) for the correct performance and (12.5) %) for incorrect performance. Thus, means that, the performance of the participating nurses were improved significantly after the implementation of the educational program.

Table.4.16: Overall Mean Differences of Nurses' Practices in Two Periods of Measurements (Pre-test and Post-test).

Items	Pretest Mean *SD*	Posttest Mean *SD*	Paired t-test	d.f	p-value	IR
Operative consent signed (surgeon + patient)	1.24(0.283)	2.21(0.375)	6.261	23	0.001	43
Surgery type confirmed for patient	1.42(0.208)	2.14(0.254)	9.943	23	0.0023	58
did you have allergy	0.33(0.225)	2.03(0.259)	6.731	23	0.0221	46
Did you have Contagious Disease	1.63(0.241)	2.32(0.150)	7.356	23	0.0114	51
The financial costs are clear to the patient	1.73(0.342)	1.97(0.208)	8.934	23	0.00231	47
Blood units prepared	0.64(0.136)	2.24(0.213)	5.837	23	0.0001	56
NPO (Food, drink and smoking)	1.46(0.267)	2.31(0.273)	6.847	23	0.0001	62
Surgical sit shaving	1.30(0.234)	2.01(0.265)	7.837	23	0.00211	51
Bath given	1.14(0.326)	2.32(0.237)	9.638	23	0.0241	49
Surgical Site marked with “x”	1.84(0.2.43)	2.10(0.254)	4.724	23	0.0012	62
IV line checked	1.27(0.218)	2.13(0.219)	5.425	23	0.001	47
Patient voided before OR	1.12(0.237)	1.74(0.283)	5.836	23	0.0231	65
Wear\underwear removed	1.41(0.265)	1.96(0.367)	4.816	23	0.0021	45
Hospital gown	0.88(0.234)	2.14(0.612)	4.826	23	0.0001	57
Drains empty, fully empty	1.15(0.231)	1.73(0.342)	5.483	23	0.0023	65
Dentures removed	1.30(0.237)	1.89(0.392)	5.724	23	0.0032	51
Glasses \contact Lenses Removed	1.22(0.213)	1.84(0.243)	7.636	23	0.0024	44
Auditory prosthesis removed	0.59(0.315)	1.32(0.250)	7.653	23	0.0001	57
Makeup ,polish removed	1.61(0.258)	1.95(0.325)	6.928	23	0.0132	46
Jewelry \ hair ornaments	0.87(0.291)	1.14(0.265)	9.836	23	0.0012	44

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Items	Pretest Mean *SD*	Posttest Mean *SD*	Paired t-test	d.f	p-value	IR
ID bracelet available and correct	1.19(0.212)	2.04(0.249)	6.836	23	0.0001	61
Pre medication given	0.59(0.275)	2.01(0.375)	8.637	23	0.0023	51
Laboratory results available	1.65(0.201)	2.03(0.234)	7.653	23	0.0002	62
X-ray results available	1.37(0.308)	1.83(0.242)	9.646	23	0.0013	51
X-ray sent to OR	1.34(0.211)	2.64(0.265)	5.536	23	0.0001	45
EKG report available	1.40(0.217)	2.41(0.215)	5.926	23	0.0117	58
Medication record in chart	0.86(0.225)	2.32(0.317)	7.536	23	0.0004	64
Nursing Progress Notes	1.30(0.212)	2.54(0.234)	6.926	23	0.0001	74
Cardiac catheterization report	1.75(0.125)	1.99(0.292)	9.452	23	0.0012	53
Cardiac Anesthesiologist consultation	0.97(0.201)	2.34(0.264)	7.536	23	0.0023	75
Stop Anticoagulants drugs before surgery	1.70(0.237)	2.32(0.217)	9.424	23	0.0001	56
Use mupirocin ointment on the place of operation before surgery	1.24(0.213)	1.98(0.225)	9.635	23	0.0001	79
Over all evaluation	0.83(0.182)	2.41(0.213)	11.652	23	0.0001	59

High significant at P≤0.0001; IR = Improvement of Rate = (mean at the posttest - mean at the pretest)*100.

Table.4.16. Paired t-test analysis was performed to determine the difference in the mean performance of the nurses participating in the pretest and posttest. The results of the study show that, there was a significantly higher difference in the practices of the participating nurses with a p-value of less than 0.01. Based on the statistical average, the results indicate that there is a significant increase in the statistical average in the post-test compared to the pre-test, meaning that there is an improvement in the practices of the nurses participating in the study after applying the educational program.

Table.4.17:Correlation between Nurses Knowledge and Performance scores at Post-test Analysis. (*N* = 24).

Aspect	Number of items	Mean	percentage	SD	Correlation
Knowledge	31	0.71	79%	0.9	0.102 NS
Performance	32	1.95	72%	0.31	

NS= non-significant

Table.4.17. explains the correlation analysis is performed to determine the relationship between the knowledge and performance of the nurses participating in the study after the implementation of the educational program. The results indicate a weak and direct correlation between the nurses' knowledge and performance and not significant between knowledge and performance of participants.

Table.4.18: Prediction model for post-test knowledge based on pretest knowledge, demographic variable and study sample

Variable	B*	SE	B**	P=0.001
Intercept	**0.61**	**0.21**	**0**	**0.011**
Pretest knowledge	**0.29**	**0.30**	**0.25**	**0.347**
Age	**0.04**	**0.02**	**0.46**	**0.126**
Gender	**-0.04**	**0.05**	**-0.18**	**0.392**
Education Level	**0.05**	**0.04**	**0.30**	**0.163**
Number of years of experience	**-0.03**	**0.05**	**-0.05**	**0.808**
Group	**-0.22**	**0.28**	**0.20**	**0.420**

SE=standard Error, B*=standard parameter estimate with intercept, P=P value. B** = standard parameter estimate without intercept,

Table.4.18. shows for the dependent variable post-test knowledge found the overall ANCOVA model to be non-significant (p=0.42) for the study group, and unrelated to any of the five demographic variables (age, gender, education level, number of years of experience, and time working).

Table.4.19: Prediction model for post-test performance based on pre-test performance, demographic variable and study sample(study and control groups)

Variable	B*	SE	B**	P=0.001
Intercept	**1.48**	**0.35**	**0**	**0.001**
Pre-test knowledge	**0.22**	**0.12**	**0.29**	**0.071**
Age	**-0.01**	**0.07**	**-0.08**	**0.786**
Gender	**-0.08**	**0.04**	**-0.21**	**0.325**
Education Level	**-0.01**	**0.06**	**-0.07**	**0.792**
Number of years of experience	**0.06**	**0.03**	**0.26**	**0.218**
Group	**0.09**	**0.06**	**0.18**	**0.203**

SE=standard Error, B*=standard parameter estimate with intercept, P=P value. B** = standard parameter estimate without intercept,

Table.4.19. This table shows the dependent variable in posttest performance found the overall ANCOVA model was non-significant (p=0.20) for the study group but unrelated to any of five demographic variable (age, gender, education level, and number of years of experience).

Table.4.20: Prediction model for post-test performance based on pre-test performance, demographic variable and study sample(study and control groups)

Score	Groups	N	Mean	SD	P=0.001
Pre-test knowledge	Study	24	0.32	0.118	0.328
	Control	24	0.34	0.119	
Post-test knowledge	Study	24	0.73	0.136	0.000
	Control	24	0.29	0.119	
Pre-test Performance	Study	24	2.11	0.305	0.233
	Control	24	2.17	0.177	
Post-test Performance	Study	24	2.38	0.086	0.000
	Control	24	2.01	0.139	

n=number, m=mean, SD=standard deviation, p-value

Table.4.20. This table indicated that the knowledge pretest score in study groups was higher than in the control group (M=0.34 versus M=0.32) and no statistical significant between socio-demographic data and knowledge of participants, and for posttest knowledge, study group were higher score mean than control group (M=0.73 versus M=0.29) and there was high significant between socio-demographic data and knowledge of participants at $p<0.05$.

Also it showed that performance in pretest scores were higher for the control group than study group (M=2.17 versus M=2.11) and no statistical significant between socio-demographic data and performance of participants, while for posttest performance, in the study group scores were higher (M=2.38 versus M=2.01) and there was high significant between socio-demographic data and performance of participants at $p<0.05$.

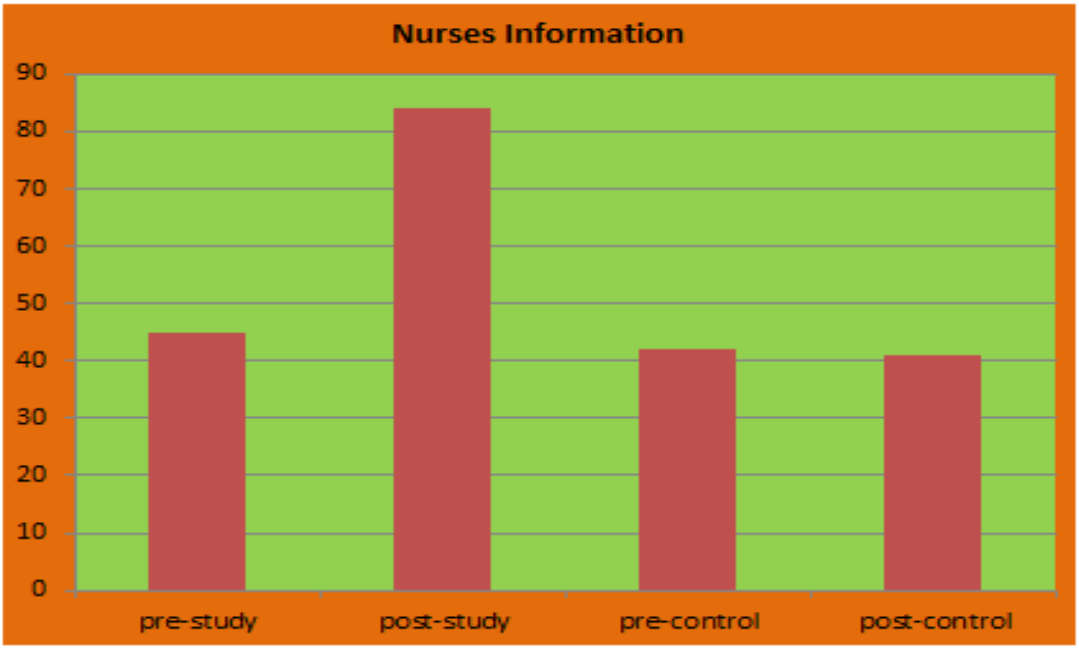

Figure.4.1: Frequency distribution of pre-test and post-test of study and control groups related to knowledge scores (n=48).

Figure 1- This figure illustrated that the highest percentage of the posttest knowledge scores for the study group higher than in the control group.

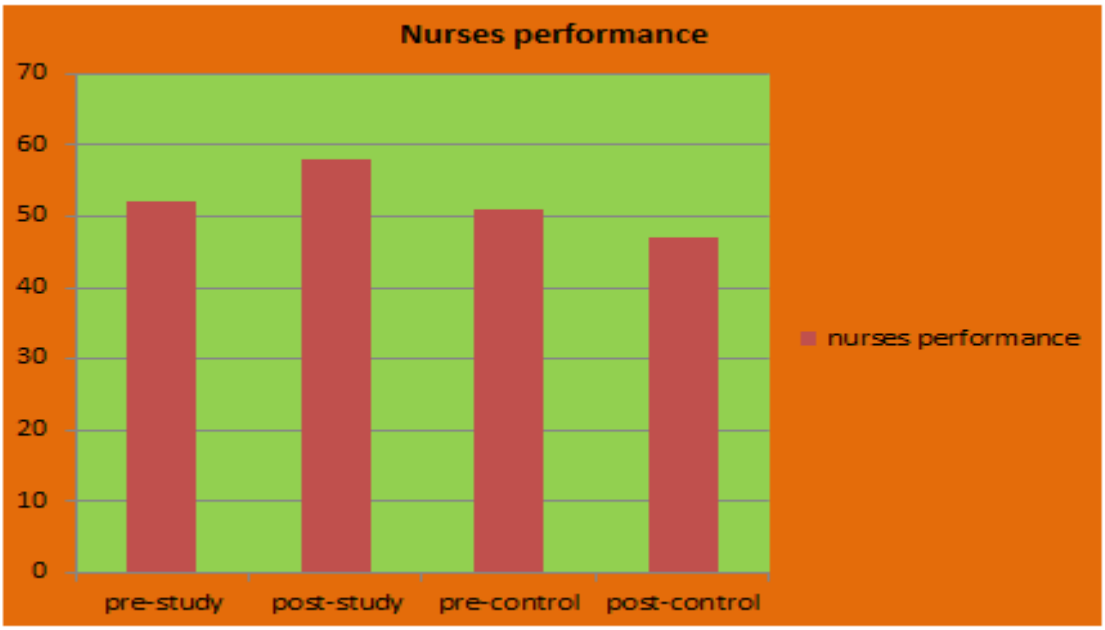

Figure.4.2: Frequency distribution of pre-test and post-test of study and control groups related to performance scores (n=48).

Figure (2)- This figure showed that the highest percentage of the posttest of performance scores for study group was higher than the control group.

Discussion

In this section, the results of the current study will be discussed with the finding of previous research studies and the theoretical framework on which the study was based. The objectives of this research are to assess the knowledge and performance of nurses in cardiac surgery wards before and after implementing an educational program related to preoperative patient preparation in three hospitals, in addition to evaluating the effectiveness of the educational program in terms of improving knowledge and performance and finding the relationship between knowledge and clinical practices of cardiac ward nurses, Finally, to find out the relationship between demographic characteristics and the level of knowledge and practice of cardiac surgery ward nurses with regard to preparing the patient before cardiac surgery.

5.1. Part 1: Discussion the socio-demographic characteristics of nurses in cardiac surgery wards

The our study findings of this study indicate that, the higher percentage (37.5%) of study group of nurses was within the age group of 25 – 29 years, while, (41.7%) of control group were at the same age, (16.6%) was in the age group 30 – 34 years in study group, and (20.8%) of control group were at the same age, (12.5%) was in the age group 35-39 and 45-49 years in control and study group. According to gender, more than half of study group (54.2%) were males and (45.8%) females, and in control group, the majority of participants (79.2%) are males and the remaining (20.8%) are females. This finding is supported by (Silvestri.2017) who reported that, the reasons for men entering the nursing profession are the same as the reasons that prompted women to

do so. They want to take care of the sick and injured, and they want an exceptional profession, which will pay them well with a reasonable degree of job security. According to educational qualification, the half of the nurses in study group was holding bachelor in nursing. This agrees with (Laurant M.et al.2018) who found that most of nurses who work in primary cardiac surgery care department had graduate in nursing, this may impact the level of nurses' knowledge and practices in terms of providing high quality nursing care and each member in team do performance at the top of education, training, licensure, and experience with clearly defined roles for all members. Patients who are critically ill require effective nursing care before surgery to avoid any possible complications after surgery and reduce the period of stay at hospital.

Preoperative stage is considered one of the most important of these stages because patients at this stage are unable to meet their physical or psychological needs, which leads to an imbalance in patients, whether emotional or psychological. At this stage, the vital role of nursing comes through psychological support, educating the patient, preparing him for surgery, knowing problems and giving information about surgery, which helps reduce patients' fears about surgery(Aaronson.et al.2012).

Regarding to years' of employment experience, result shows that more than half (58.6%) of study group had experience from 1-5 years in cardiac surgery departments, and (41.7%) of control group had 1-5 years and (20.8%) of study group had more than five years' experience as a nurse and (29.3%) of control group also had more than five years of experience and there is no statistically significant association between nurses and years of experiences in cardiac surgery department. This congruent with previous research studies which demonstrated that there were no statistically significant associations between nurses' knowledge

and practices and their work experiences respectively before and after educational intervention regarding to cardiac surgery (Nallamothu B.K.et al. 2011). The findings from this study indicate that all demographic characteristics of nurses were not significant for performance domain, while in the knowledge domain, the results indicated that participants' level of education were highly significant at (P=0.001) levels of significance.

Regarding to training session, findings from this study demonstrated that half of the study group did not participate previously in training or educational programs regarding to cardiac surgery, and majority of control group (70.7%) also did not participate previously in training or educational program regarding to cardiac surgery. This also is indicated in (Fleg J.L.et al.2015) study who stated that the most of nurses in cardiac department have not attended any previous instructional or training program regarding cardiac surgery.

Also (Lewinter C.etal. 2015) reported that the majority (70%) of nurses who work in cardiac surgery department did not have any training program about cardiac surgery and preparing patient for surgery previously. Contrastingly, Baughman K.L (2008) found that the most of nurses (57.3%) had received cardiac surgery training regarding to preparation of patients before surgery .

Part II: Discussion nurses knowledge in cardiac surgery wards

The nursing role in preoperative management and treatment of patients with cardiovascular disease is the most important role in caring for patients before surgery, therefore, they should have basic information about this role and everything related to it.

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This study revealed that all six pretest information scores not significantly different between the study and the control groups(table 2), this supported by (Turnock, etal, 2005) who reported that, not enough evidence that information alone reduces complications of cardiac surgery and improves cardiac health status.

Initial review between group comparison (table 3) showed that, there are no significant differences between study and control group at pretest in some domains. (Brush J.E.etal.2015) suggested that, the educational program should incorporate not only teaching various disease educational topic but also provide nurses with specific knowledge and skills aimed at nurses behavior.

The study showed that there were highly significant differences between study and control group in all items of posttest for nurses knowledge concerning the management of cardiovascular disease patients (table-4). this supported by (Hunter and Fairfield 1997, and Puskas JD.et al.2016) stated that management disease is defined as strategy to improving health status and reducing costs of healthcare. These programs include educational about disease, medications, preoperative management and also need support from managers and institution for self-care principles .

The study showed that there are high statistically significant differences in the post-test between the control and the study group with regard to the performance of caring skills for patients who suffering from cardiovascular disease before surgery (Table -5), which indicates that the nurses who received the educational program in the study group achieved great benefit from this program, and the nurses' knowledge and

performances improved towards patients in the cardiac surgery wards in the hospitals in which the study were established.

This finding agrees with the study (Iglehart J.K.2013) on effectiveness of the nurses management of cardiovascular disease patients preoperative cardiac surgery educational program, and the lectures of the program were covering anatomy of cardiac system, cause and complications of cardiac surgery, cardiovascular medications, and prepare of patients preoperative cardiac surgery.

Previous research (Moore P.T.etal.2014 and January C.T.etal.2014) has shown that nurses caring for patients in cardiac surgery wards lack the information and performance skills to perform satisfactory skills towards patients with cardiovascular disease and results confirmed that the nurses undergoing an educational program seemed to provide satisfactory care to patients before surgery in the hospitals in which the study was conducted compared with before.

Regarding to answer questions related to nurses' knowledge, the nurses participants' responses before implementing the educational program showed that, more than half of nurses (69.0%) answered incorrectly related to anatomy and physiology, etiology, complications, indication and contraindication, and role of nurses. after implementing the educational program, majority of nurses participants response correct as illustrated in tables (6-7-8-9-10 respectively). Many researchers emphasis on educational program that should be performed as routine for all staff of nursing who work in cardiac surgery department (Halperin J.L.etal.2015).

Therefore, the department of continuing education and training in all private and government hospitals should carry out continuous training

courses for its nurses in order to increase the nurses' efficiency, improve their knowledge and performance, and provide the latest scientific findings in the field of nursing services to provide model nursing services to patients, which in turn helps reduce complications and reduce From the length of stay of patients in hospitals, thus reducing the costs incurred by hospitals first and then the patient second.

Regarding to subdomain analysis of knowledge, the results showed that, nurses who work in cardiac surgery department had adequate knowledge at pre-test regarding anatomy and physiology of cardiovascular system with the overall mean score was (0.73). and after educational program presenting, the level of nurses' knowledge improve with a high score the overall mean was (0.81). This result supported by research study conducted by (Miller N.H & Froelicher E.S.2004) who reported that, the improvement of nurses knowledge after providing educational program related to anatomy of cardiac surgery which reflected on patients' cardiovascular status. also another study carried out by (Berra K.et.al.2013) which aimed to determine the effectiveness of educational program on nurses' knowledge regarding to cardiovascular system, they reported that, there were highly statistical significant differences between pre and post implementation for educational program regarding to anatomy and physiology of cardiovascular system with the $P<0.0001$. These results confirms our finding regarding to enhancing and improve nurses' knowledge (Table 11)

Concerning the knowledge of etiology of cardiac surgery aspect, the results of this study show that, most of the respondents (n = 11; 45.8%) had inadequate knowledge at pre-test. While at the post-test, more than half of the nurses (n = 14; 58.3%) had an adequate knowledge. Similarly study conducted by (Baumgartner H.et al.2017),the researchers reported

that, more than half of cardiac surgery department nurses (65%) their knowledge was limited, and after providing educational program, the knowledge of participants' nurses increased. educational program plays an important role in improving knowledge and practicing of nurses who work in cardiac surgery department. Knowing the etiology of cardiac surgery can prevent avoidable complications that may occur before and after surgery. nurses must be aware and continuous monitoring of patients before surgery and intervene rapidly when needed and providing periodic ongoing educational program regarding to cardiac surgery is an essential aspect of promoting nurses' competencies.

Regarding nurses' knowledge about complications of cardiac surgery, the results of our study show that 12 nurses (50%) had moderate knowledge, and 7 nurses (29.1%) had in adequate knowledge and only 5 (20.8%) had an adequate knowledge before implementing of educational program at pre-test period and the total mean score of nurses' knowledge in field of complications of cardiac surgery was (0.63). After implementing the educational program, the statistical result of nurses' knowledge regarding to complications of cardiac surgery showed that, the majority (n = 16, 66.7%) of nurses participants had an adequate knowledge, and five nurses (20.8%) had a moderate knowledge and only three nurse (12.5%) had an inadequate knowledge, and the overall mean score of nurses' knowledge related to complications of cardiac surgery at post-test was (0.73), these results are portrayed in table (11). similarly study conducted carried by (Antoniades C.et al.2010) that aimed to assess the effectiveness of educational program on nurses' knowledge preoperative cardiac surgery. The researchers reported that, the teaching of nurses who work in cardiac surgery department lead to positive change on nurses' knowledge and practices and also reported that, there was a

statistically significant score between nurses' knowledge before and after implementation of the teaching program regarding to cardiac surgery. The mean score of pre-test was (15.23±3.090), while the post-test mean score was (22.07±4.013), which indicated that, the implemented educational program has the potential to increase the knowledge level of nurses regarding to cardiac surgery.

Concerning to nurses' knowledge before implementation of educational program, study findings show that, overall knowledge score at the pre-test was moderate. The mean pre-test knowledge score was (0.54). This finding supports the study conducted by Jeyapala et al., (2015) that aimed to assess nurses' knowledge and practices regarding to fluid and electrolyts among patients of cardiac surgery in Punjab Institute of Cardiology. The researchers found that (45.2%) of nurses had moderate knowledge. Another study also conducted by (Lukose, B.S.etal.2014) had also shown that pre-test nurses' knowledge in field of cardiac surgery was with the mean score (15.03). Moreover, several studies had also shown that, the most of nurses who work in cardiac surgery department had poor to moderate knowledge regarding to cardiac surgery before educational program (Mousa, M.A.2015. Badir, A. etal.2014). The reason for poor or moderate nurses knowledge may be because almost all the participants of this study did not receive any educational program previously related to cardiac surgery .

Despite, There was a remarkable enhancement of knowledge among studied nurses after delivered of educational program. The study result showed that, total knowledge score after educational program becomes adequate. The mean posttest knowledge score is (0.87). The findings of post-test confirmed the effectiveness of educational program in terms of significantly improving nurses' knowledge as illustrated in table (12).

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The overall mean score of knowledge evaluation of nurses participants regarding educational program was moderate at pre educational intervention by (Mean = 0.42; SD = 0.19) then the result enhanced significantly to became adequate post educational program by (Mean = 0.79; SD = 0.10). This result indicates the effectiveness of the educational program through increase of nurses' knowledge at post-test with a statistical significant value (P = 0.0001) as illustrated in tables (13).

The result of study supported by (Brush J.E.etal.2015) who reported that, the regulator education program was effective on increasing the level of nursing staff knowledge and practices who work in cardiac surgery department. the structured educational program proved its effectiveness through highly statistical significant score after implementation of educational program in increasing scores level of nurses' knowledge and improving nurses' knowledge and practices regarding to cardiac surgery.

Part III: A Discussion of the nurses Performance in cardiac surgery wards

Regarding to nurses' performance, the researcher observed participants nurses during three times in each period of measurement (pre-test and post-test) to ensure the accuracy of recorded performances. The scoring was formulated as the following (0) not done, (0.1-1) incorrectly done, and (1.1-2) correctly done. The performance observational checklist form contained 32 items, and the finding of current study will be discussed according to statistical analysis.

During pre-educational intervention period, the result of Items "Patient Assessment: did you have allergy, Did you have Contagious Disease, Blood units prepared, Surgical site shaving, Bath given, Surgical

Site marked with "x", Patient voided before OR, Wear\underwear removed, Drains and urinary catheter empty, Glasses \contact Lenses Removed, ID bracelet available and correct, Use mupirocin ointment on the place of operation before surgery?" showed that, the majority of the nurses participants (87.5%, 95.9%, 83.4%, 83.4%, 100%, 91.7%, 87.5%, 95.9%, 91.7%, 79.2%, 91.7% respectively) did not perform any items from checklist during preparation patients for cardiac surgery before sending patient to operation room. This is consistent with previous research study (Currie M.P.et al.2004) who reported that, the most of nurses in cardiac surgery department did not perform all checklist items accurately specially in urgent cases.

Also (Norton L.et al.2016) in a study conducted in USA stated that, the nurses in cardiac surgery department and all surgery department need guideline for preparation of patients before surgery and must to performed all items of checklist because non-check of some items from checklist may lead to complications for patients and surgery team during and after surgery. A similar pattern of results was obtained from study USA that was conducted by (Moore P.T.et al.2014) who reported that (51%) of nurses did not perform preparation technique of patients before surgery. After applying educational program, the majority of nurses participants in this study (87.5%) performed checklist items accurately before cardiac surgery. This explains that the educational program intervention was effective in terms of enhancing nurses participants' practices. Our finding was similar to study which was conducted by (Moote M.et al.2011) concluded that, different educational program regarding to preparation of patients before surgery can be effective and significantly improve nurses' practices.

Also (Nishimura R.A.et al.2014) reported that, the nurses' practices about preparation of patients before cardiac surgery improved after training program and reflected on improve of patient safety and quality of nursing care. The nurse must be aware that, the check of checklist guideline accurately before cardiac surgery is a mandatory to determine any problems before surgery and reduce any complications after surgery. Performing checklist before surgery is one of the most important assessment techniques that nurses should master to detect any problems before surgery (table 14).

Concerning the next subdomain "Patient Assessment: did you have allergy, Did you have Contagious Disease, Blood units prepared, Surgical site shaving, Bath given, Surgical Site marked with "x", Patient voided before OR, Wear\underwear removed, Drains and urinary catheter empty, Glasses \contact Lenses Removed, ID bracelet available and correct, Use mupirocin ointment on the place of operation before surgery?" on the practice observational part, our study findings showed the mean scores was statistically significant and higher after implementing educational program intervention with the total improvement rate (46%, 51%, 56%, 51%, 49%, 62%, 65%, 45%, 65%, 44%, 61%, 79% respectively) as delineated in table (16). These findings are consistent with the findings of (Fernandes, S.et al.2018) who reported that, regular continuing education programs in all hospitals are critically needed to keep nurses up-to-date with evidence-based guidelines for positive patient, nurse, and facility outcomes.

The results at pre-test showed that, the overall evaluation of nurses participants' performance in all domains were correctly done in (29.1%) of the total nurses participants, whereas after applying educational program, the overall practices were correctly performed in (87.5%) as

shown in table (15). the result was statistically highly significant (p = 0.001) after applying educational program. Thus, there will be a statistical significant enhancement on the level of participants' clinical practices about preparation of patients before cardiac surgery after applying educational program as compared to their level of practices at pre-test is accepted at high level of significance (p = 0.001) with total improvement rate (59%) as shown in table (16).

Part III Discussion of Association among Knowledge and Practices

The current study findings indicated that, there is a weak association among knowledge and practices of participant's nurses As shown in the table (17). The reason for this result may be that the participating nurses may have good information but no practical experience or they have learned wrong techniques from their fellow senior nurses who work with them continuously in the same department. A same result was found in study which was conducted by (Majeed, H. M.2017) who reported that, there was no significant correlation between nurses' knowledge and practices. The findings of the present study are found to be compatible with (Sickder, H. K.et al.2014) who found that, there was no association between knowledge and performance, and they explained that, the nurses who have knowledge may not use these knowledge into practice field. regarding to nurses participants' knowledge and practices after implementing educational program, our study finding indicated that, there was a statistically significant improvement as compared with variables pre-test.

In our educational program for nurses, learning strategies are formulated to meet the needs of all participating nurses as much as possible. The educational program promotes the integration of knowledge

and performance in solving problems that may occur in cardiac surgery wards, which is very important for patients working in cardiac surgery wards.

The productivity system was relied upon by transforming inputs into outputs, in other words, making a change in the knowledge and practices of nurses related to surgical heart diseases and preparing the patient before surgery. This system was achieved after applying the educational program, which transformed inputs from information and practices into outputs on the ground. And led to an improvement in the information and practices of nurses participating in the study. The feedback on the educational program also indicated that the educational program was effective in achieving the pre-determined goals of the study, where the feedback is defined as achieving or not achieving the goals of the pre-determined program and it is a source of motivation to continue or end the program**.**

Many research studies have placed a great emphasis on continuing educational or training program to enhance nurses' knowledge and practices. study conducted by (Iglehart J.K.2013) "Expanding the role of advanced nurse practitioners risks and rewards" who stated that "the structured training program proved to be promising and had a meaningful influence to enhance the performance and knowledge of nurses in relation to cardiac surgery. nurses who work in cardiac surgery department need continuing educational program in order to face challenges in health settings.

Also, American Nursing Association (2015) recommended that "cardiovascular nurses need for training programs to update their knowledge and practice regarding the care of patients who undergoing

cardiac surgery before and after cardiac surgery. Our educational program increased the level of nurses' knowledge and practices, and enhanced nursing as a professional autonomy, and many nurses participants in this study were aware that the preparation of patients before cardiac surgery is one of their responsibilities.

Part IV: Discussion of relationship between nurses Knowledge and Performance with socio-demographic characteristics:

The results of the study showed that the study and the control group were similar in terms of information and performance regarding to the socio-demographic characteristics of the nurses participants (Table 18, 19).

Related relationship between nurses information and performance with socio-demographic characteristics, this study shows no association between the nurses information and performance in the study group to age related to nursing management of cardiovascular patients in pretest and posttests.

Regarding to age; the result of this study shows that the educational program may not be effective and suitable for all ages of nurses (Table 18, 19), and this result is consistent with the result of a study conducted in 2014 by (Ahmed and Hakima, 2014), which concluded that there is no significant relationship between the ages of nurses and the educational program towards cardiac rehabilitation, also (Nguyen TC, George I. 2015) who mentioned that the level of nurses performance and their skill declines with age, especially those over the age of 50 years.

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The research confirms that there is a negative relationship before and after the educational program between nurses' information and performance and their ages

Related to years' of experience, this study referred that, no statistical significant relation among nurses information and performance with their years of experiences related toward nursing management of cardiovascular disease patients preoperative in pre-posttest (table 18, 19). (Mohammed A and Hakeema S.2016) reported that no statistical significant differences among information of nurses and years' experience.

The results of this study were contradictory with (Foley.et al.2002) who found that there is a correlation between years of experience of nurses and nursing care provided to patients.

The researcher confirmed that these results show that an education program had a great impact on the experience of nurses in cardiac surgery wards by providing a practical and theoretical base that may become a Kernel for increasing nursing information and skills and using them practical situations while working in hospitals.

Related to level of education, these results in table (table 18,19) this study referred that, there are no statistical significant relation among nurses information and performance and the level of education.

Also (Mohammed A and Hakeema S.2016) reported that, no statistical significant differences among information and performance of nurses and the level of education.

Chapter Five- Discussion of the Study Results…….

In contrast, (Al-Kandari and others (2007) who confirmed that, there are a statistical significant correlation among years of experience, educational level and nurses information.

Also (Awases, etal.2013) emphasized on the importance of enhancing nurses 'performance and develop strategies to improve this performance, and increasing nurses' experience and information about preoperative patient care through educational programs and research.

The researcher confirms that, there are negative relation among information and performance of nurses pre and post program related to level education of nurses.

This study revealed that, the knowledge pretest scores were higher for control group than the study group (M=0.34 versus M=0.32), while, for posttest knowledge study group scores were higher (M=0.73 versus M=0.29), and for practice; the practice pretest scores were close scores for control group and the study group (M=2.17 versus M=2.11), while, for posttest knowledge study group scores were also close scores (M=2.38 versus M=2.01) (table 20).

In one word, in this study conducted by using quasi-experimental design to evaluated participants' knowledge and practices regarding cardiac surgery preparation of patients before surgery. In pretest, most of nurses participant in this study had poor to moderate knowledge and inadequate practices regarding to cardiac surgery and preparation of patients before surgery, and after implementing educational program the majority of the nurses participants gained more knowledge and improved their practices significantly, and his is proof that, the educational program intervention has the potential to bridge the gap between theory and practices. The finding of our study showed that, the educational

program intervention played an important role in increasing knowledge and practices of nurses which reflects on achieving best outcomes for patients, nurses, and hospitals. Lastly, the results of the study suggested that, the implementing educational program in-service regarding to nursing care may increase nurses' knowledge and their practices which reflect on providing high quality nursing care for patients.

Chapter Six

Conclusion and Recommendations

6.1. Conclusion:

Based on our findings of the present study, it can be concluded that:

1- Most nurses who work in cardiac surgery department were males and group age 25-29 years olds.

2- All training sessions show that nurses have do not provide any information about cardiac disease and the role of nurses in assessment and treatment processes.

3- There were that the nurses knowledge toward cardiac disease within this study was insufficient skills of basic management are caused by lack of education and training, limited practice, lack of self-efficacy, and poor skill retention at the pretest period.

4- Our the findings confirmed that the nurses seem to give safer care to patients with cardiac disease, preoperative cardiac surgery after undertaking an education program designed to improve the care of patients with cardiac disease in the hospitals.

5- Our the findings shows that the negative correlation between nurses knowledge and performance pre and post the program in relation to their age.

6- Our the findings shows that the negative correlation between nurses knowledge and performance pre and post the program in relation to their educational level.

7- The results indicated that the vast majority of participants were not self-educator.

8- After providing teaching strategies and valuable information about cardiac surgery, the vast majority of the participants raised their level

scores and become statistically significant in both domains (knowledge and performance). This indicates the benefit of educational program in terms of fostering the participants' knowledge and practices.

Chapter Six- Conclusion and Recommendations……

Recommendations:

Based on the results and conclusion of the present study, the researcher recommends the following:

1-Continuous education and training program for all nurses at least once a year.

2- The Governmental hospitals need to provide checklist preoperative paper appropriate in the cardiac surgery wards and educate nurses how to filled this paper.

3- Education of program for cardiac disease and management preoperative cardiac surgery similar to that offered to the study group of this study, need to be provided as part of nursing education in all nursing school programs curriculums.

4- Hospitals should provide developed and continues practical training for their nurses toward the management of patients with cardiac disease as well as removing of all barriers that could prevent nurses to develop themselves.

5- This study could help in building up and carrying out a national health policy to face the dangerous of cardiac disease by developing nurses skills toward management of cardiac disease which may lead to reduction this problem.

6- Encouraging attending national and international conferences and workshop for nurses working in cardiac surgery wards.

7- Nurses working in cardiac surgery wards should update their information and skills through attending in education program, workshop, lectures scientific congresses and internet conferences.

8- Future studies should be conducted to evaluate nurses' knowledge and performance regarding certain nursing procedures in different healthcare settings.

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Appendices…….

Appendix A

Ethical Approval Form

Appendices…….

Appendix B

Health Directorate Approval Form

Appendices…….

Appendices…….

Appendices…….

Appendix C

Consent Form

Dear Research Participant

This research study is focusing on implementing an educational program regarding to cardiac surgery and preparation of patients before cardiac surgery. The educational program consists of five domains: anatomy and physiology of cardiovascular system; etiology of cardiac surgery, complications of cardiac surgery, indications and contraindications of cardiac surgery, and nurse management of patients preoperative cardiac surgery. The researcher will provide the educational program. However, in-service educational intervention has been found in most studies to be the most important component in wards in terms of increasing nurses' knowledge, enhancing their practices, meeting the nursing continuing education department objectives, and ultimately leading to the favorable patient outcome. In addition, the educational program has been structured according to evidence-based recommended guidelines with the goal of developing the knowledge, skills, and rationales underpinning clinical practice. The purpose of this research study is to evaluate the effectiveness of educational program in terms of fostering nurses' knowledge and practices.

You are invited to participate in this study. Your participation is highly appreciated. This study may help you gain more knowledge and enhance practices. Furthermore, your participation will assist future researchers to recognize the importance of implementing in service educational or

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training activities, and in turn help nurses achieve best and recent evidence-based practice guidelines for certain nursing procedure. If you decide to participate in this study, your personal information and identity will be kept anonymous. In addition, you will not be exposed to any discomfort or harm during participation in this study. There will be no compensation for participation in this research. Choosing to participate or not participate will not affect your job. Your signature on this form signifies that you would like to participate in the study and understand that participation is voluntary and you may withdraw at any time.

Name _____ Date_____ Signature_____

Please contact the researcher if you have any question or you need further explanation.

Name: Ammar Mohammed Thamer Abboud ،

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Appendices…….

نموذج الموافقة على المشاركة الطوعية في البحث

عزيزي المشارك في البحث

تركز هذه الدراسة البحثية على تنفيذ برنامج تعليمي يتعلق بجراحة القلب وإعداد المرضى قبل جراحة القلب. يتكون البرنامج التعليمي من خمسة مجالات: علم التشريح وعلم وظائف الأعضاء في الجهاز القلبي الوعائي. مسببات جراحة القلب ، ومضاعفات جراحة القلب ، ودواعي وموانع جراحة القلب ، وإدارة الممرضات لمرضى جراحة القلب قبل الجراحة. سيقدم الباحث البرنامج التعليمي. ومع ذلك ، فقد وجد في معظم الدراسات أن التدخل التعليمي أثناء الخدمة هو العنصر الأكثر أهمية في الأجنحة من حيث زيادة معرفة الممرضات ، وتعزيز ممارساتهم ، وتلبية أهداف قسم التعليم المستمر للتمريض ، ويؤدي في النهاية إلى النتيجة الإيجابية للمرضى بالإضافة إلى ذلك ، تم تنظيم البرنامج التعليمي وفقًا لإرشادات موصى بها قائمة على الأدلة بهدف تطوير المعرفة والمهارات والأسباب المنطقية التي تقوم عليها الممارسة السريرية. الغرض من هذه الدراسة البحثية هو تقييم فعالية البرنامج التعليمي من حيث تعزيز معرفة وممارسات الممرضات.

أنت مدعو للمشاركة في هذه الدراسة. مشاركتك محل تقدير كبير. قد تساعدك هذه الدراسة على اكتساب المزيد من المعرفة وتعزيز الممارسات. علاوة على ذلك ، ستساعد مشاركتك الباحثين المستقبليين على إدراك أهمية تنفيذ الأنشطة التعليمية أو التدريبية في الخدمة ، وبالتالي مساعدة الممرضات على تحقيق أفضل وأحدث إرشادات الممارسة القائمة على الأدلة لإجراء تمريض معين. إذا قررت المشاركة في هذه الدراسة ، فسيتم إخفاء هويتك ومعلوماتك الشخصية. بالإضافة إلى ذلك ، لن تتعرض لأي إزعاج أو ضرر أثناء المشاركة في هذه الدراسة. لن يكون هناك تعويض عن المشاركة في هذا البحث. لن يؤثر اختيار المشاركة أو عدم المشاركة على وظيفتك. يشير توقيعك على هذا النموذج إلى أنك ترغب في المشاركة في الدراسة وتفهم أن المشاركة طوعية ويمكنك الانسحاب في أي وقت.

الاسم _____ التاريخ _____ التوقيع_____

Appendices…….

يرجى الاتصال بالباحث إذا كان لديك أي سؤال أو كنت بحاجة إلى مزيد من التوضيح.

الاسم: عمار محمد ثامر عبود. الهاتف: ٠٧٨٢١٦٤٢٠٦٩

بريد إلكتروني: ammarabboud98@gmail.com

Appendix D

Part I: Knowledge Tool

Part One: Socio-demographic

Data. Code No____

Personal data of the nurse:

-Age: years 1-20-24 ( ) 2-25-29 ( ) 3-30-34 ( )

4- 35-39 ( ) 5- 40-44 ( ) 6- 45-49 ( )

-Gender: Male..... Female……..

-Academic achievement:

-Graduate of the College of Nursing …….

-Graduate of the Nursing Institute / Branch ……..

-Secondary school nursing graduate…….

-Do you participate in courses on the field of cardiac surgery:

Yes …… No ……

-Place of courses: inside Iraq ……. outside Iraq …….

-Years of experience in employment:

1-1-5 ( ) 2-6-10 ( ) 3-11-15 ( )

4- 16-20 ( ) 5- 21-25 ( ) 6- 26-30 ( )

Appendices…….

<u>Part two:</u> Items related to nurses information

Note: please do not answer in case you are not sure of the correct answer and put √ in front of correct answer

Part one: Assess the knowledge related to anatomy and physiology of cardiovascular system

1-synthetically cardiovascular system consists of?

A-Heart, Blood Vessels, Lymph Nods

B-Heart, Artery, Vein

C-Heart, Blood Vessels, Blood

D- Artery, Vein, Lymph Nodes

2- The heart beats in adult are an average?

A-70 per minute

B-70-80 per minute

C-60-100 per minute

D-70-100 per minute

3-What is the number of heart chambers?

A-Four chambers

B- Two chambers

C- Three chambers

Appendices…….

D- Fife chambers

4-The name of normal heart sound are?

A-S1-S3

B-S2-S4

C-S1-S2

D-S3-S4

5-The number of valves in the heart are?

A-Two valve

B-Fife valves

C-Three valves

D-Four valves

6-Which circulatory process supplies the heart with blood?

A-Systemic circulation

B-Pulmonary circulation

C-Coronary circulation

D-Hepatic circulation

7-Your person's pulse rate is 50. You would document this as?

A- Tachycardia

B- Bradycardia

C-Hypertension

D-Hypotension

Part two: Assess the knowledge related to etiology of cardiac surgery

1- Selected causes of cardiac surgery?

A- Coronary heart disease

Appendices…….

B- Cardiac drug toxicity

C- Electrolyte and acid–base imbalances

D-All of the above

2-The most important one cardiac cause of cardiac surgery are?

A- Pulmonary embolism

B- Cerebral haemorrhage

C- Valve disorders

D- Autonomic dysfunction

3-The non-cardiac cause of cardiac surgery is?

A- Coronary heart disease

B-Valve disorders

C-Dissecting or ruptured aortic or ventricular aneurysm

D-Chocking

4-The one heart disease need of cardiac surgery is?

A-Hypovolemic shock

B-Septic shock

C-Cardiomyopathy

D-Valve diseases, including valve regurgitation, valve blockage and some valve stenosis cases.

5- The etiology of cardiac surgery is?

A-Arrhythmia

B-Heart transplantation

Appendices…….

C-Heart attack

D- All of the above

6- The not congenital heart disease that cause of cardiac surgery?

A- Heart valve defects

B- Heart wall defects

C-Respiratory failure

D- Blood vessel defects

Part three: Assess the knowledge related to complications of cardiac surgery

1-Complications of cardiac surgery in related to heart are?

A- Fractures of the ribs

B- Hypovolemic

C- laceration of the liver or spleen and

D- Gastric rupture

2- Complications of cardiac surgery related to heart are?

A-Pneumothorax

B-Pneumo-mediastinum

C- Laceration and contusion of the lung

D- Cardiac failure

3-Complications of cardiac surgery related to pulmonary are?

A- Fractures of sternum

B- Rupture of the trachea

C- Impaired gas exchange

D- Pneumothorax

Appendices…….

4-The complications of cardiac surgery related to neurologic is?

A-Retroperitoneal hemorrhage

B-Epicardial hematoma

C- Stroke

D- Pulmonary hemorrhage

5-The complications of cardiac surgery related to Renal system is?

A-Hypovolemic shock

B-Septic shock

C-Cardiomyopathy

D-Acute renal failure

6-The complications of cardiac surgery related to surgical incision is?

A- Fractures of the ribs

B- Hepatic failure

C- Infection

D- Gastric rupture

Part four: Assess the knowledge related to indications and contraindications of cardiac surgery

1-Indication of cardiac surgery related to valves are?

A- Valvular heart disease

B- Mitral stenosis

C- Multi-valvular disease

D- All of the above

Appendices…….

2-Indication of cardiac surgery is?

A- Triple vessels disease

B- Pleural space infection

C- Sepsis

D- Uncontrolled lung infection

3-Indication of cardiac surgery related coronary heart are?

A- Triple vessels disease

B- Left main coronary artery disease

C- Unstable angina

D- All of the above

4-Contraindication of cardiac surgery is?

A- Triple vessels disease

B- Left main coronary artery disease

C- Instability of the patient

D- All of the above

5- What are the contraindication of cardiac surgery related to heart is?

A- Valvular heart disease

B- Pleural space infection

C- Unstable angina

D- Patient with myocardial infarction planned for Coronary Artery Bypass Graft (CABG)

6-Contraindication of cardiac surgery related to heart muscle is?

A-Triple vessels disease

B-Unstable angina

Appendices…….

C- Multi-valvular disease

D-Valve replacement in cases of endocarditis

Part fifth: Assess the knowledge related to nursing management pre-operative of cardiac surgery patients

1- What is role of the nurses in preoperative phase are?

A-Pre-operative assessment

B-Pre-operative teaching

C- Physical and psychological preparation of patient

D-All of the above

2- What are goals of preparation of patients before cardiac surgery within the hospital?

A-Rapid improvements of cardiac system function

B-Restoration of movement and physical activity

C- Strength the muscles of the back and arms

D-As mentioned in A and B

3- What is role of the nurses in preoperative physical assessment needs are?

A-Vital signs and ability to communication

B-Level of conscious and level of exercise

C- Ability to move, weight and height

D-All of the above

4- Assess of psychological needs are?

A- Emotional state

B-Level of understanding of surgical procedure

C- Coping strategies, preoperative and postoperative instructions

Appendices…….

D- All of the above

5- Preoperative teaching plan include?

A- preoperative medications and postoperative pain control

B-Deep breathing, coughing exercise and use of incentive spirometry

C- How to support the incision for breathing exercise and moving

D- All of the above

6- The most important guidance provided to the patient before discharge from the hospital

A- Practice of outdoor exercise while taking periods of rest

B-Eat foods rich in omega 3, fibers and vitamins with eating plenty of fluids

C- Refer to the doctor periodically and adhere to the appointments of medicines

D- All of the above

Appendices…….

Answer key

Item	Answer key	score		Item	Answer key	Score
1	B	1		17	D	1
2	C	1		18	C	1
3	A	1		19	D	1
4	C	1		20	A	1
5	D	1		21	D	1
6	C	1		22	C	1
7	B	1		23	B	1
8	A	1		24	D	1
9	C	1		25	D	1
10	D	1		26	D	1
11	D	1		27	D	1
12	D	1		28	D	1
13	C	1		29	D	1
14	B	1		30	D	1

Appendices……

15	D	1		31	D	1
16	D	1				

Score of knowledge questionnaire

No	Score	Percentage	Grade
1	0-10	<33	Inadequate knowledge
2	11-20	36-65	Moderate knowledge
3	21-31	68-100	Adequate knowledge

استمارة استبيانيه (ادوات جمع العينة)

فعالية البرنامج التعليمي قبل الجراحة على معلومات الممرضين وأدائهم في ردهات جراحة القلب في منطقة الفرات الأوسط.

رقم الاستمارة:.....

اسم المستشفى: .....

الجزء الأول: الصفات الديموغرافية- الاجتماعية للممرضين:

لبيانات الشخصية للممرض:

-العمر: ١-٢٠-٢٤ ( ) ٢-٢٥-٢٩ ( ) ٣-٣٠-٣٤ ( )

٤- ٣٥-٣٩ ( ) ٥-٤٠-٤٤ ( ) ٦- ٤٥-٤٩ ( )

-الجنس ذكر..... أنثى.....

التحصيل العلمي:

-خريج كلية التمريض .....

Appendices……

- خريج معهد / فرع التمريض..... ..

-خريج إعدادية التمريض .....

- هل تشارك في دورات في مجال جراحة القلب:

نعم..... لا .....

مكان الدورات:

داخل العراق ..... خارج العراق .....

- سنوات الخبرة في العمل:

١-١-٥ ( ) ٢-٦-١٠ ( ) ٣-١١-١٥ ( )

٤- ١٦-٢٠ ( ) ٥- ٢١-٢٥ ( ) ٦- ٢٦-٣٠ ( )

الجزء الثاني: الأسئلة المتعلقة بمعلومات الممرض\ة

-رجاء: لا تجاوب على السؤال في حال كنت\ي غير متأكد\ة من الجواب

-ضع √ حول الإجابة الصحيحة برأيك

الجزء الأول: تقييم المعرفة المتعلقة بتشريح ووظائف الأعضاء في الجهاز القلبي والأوعية الدموية

١- يتكون نظام القلب والأوعية الدموية من؟

أ-القلب ، الأوعية الدموية ، و العقد اللمفاوية ○

ب-القلب ، الشرايين ، الأوردة ○

ج-القلب ، الأوعية الدموية ، الدم ○

د- الشرايين ، الأوردة ، العقد اللمفاوية ○

٢- يبلغ عدد نبضات القلب عند البالغين في المتوسط؟

أ- ٧٠ نبضة في الدقيقة ○

Appendices…….

ب- ٧٠ - ٨٠ نبضة في الدقيقة ○

ج- ٦٠ - ١٠٠ نبضة في الدقيقة ○

د- ٧٠ - ١٠٠ نبضة في الدقيقة ○

٣-كم هو عدد الأذينات والبطينات في القلب؟

أ- أربعة ○

ب- اثنان ○

ج- ثلاثة ○

د- خمسة ○

٤- ماهي أسماء أصوات القلب الطبيعية؟

أ- S1-S3 ○

ب- S2-S4 ○

ج- S1-S2 ○

د- S3-S4 ○

٥- كم عدد الصمامات في القلب؟

أ- اثنان ○

ب- خمسة صمامات ○

ج- ثلاثة صمامات ○

د- أربعة صمامات ○

٦ - ما هي الدورة الدموية التي تمد القلب بالدم؟

أ- الدورة الدموية الكبرى ○

ب- الدورة الدموية الصغرى ○

ج - الدورة الدموية التاجية ○

د - الدوران الكبدي ○

Appendices…….

٧ - إذا كان معدل نبض المريض هو ٥٠. يمكن للممرض\ة توثيق ذلك على أنه:

أ- عدم انتظام دقات القلب ○

ب- بطء ضربات القلب ○

ج- ارتفاع ضغط الدم ○

D- انخفاض ضغط الدم ○

<u>الجزء الثاني: تقييم المعلومات المتعلقة بدواعي جراحة القلب</u>

١-من أسباب جراحة القلب؟

أ- أمراض القلب التاجية ○

ب- سمية الأدوية القلبية ○

ج- اختلال التوازن الحمضي الشاردي ○

د. كل ما ورد اعلاه ○

٢- السبب القلبي الوحيد لجراحة القلب؟

أ- الصمة الرئوية ○

ب- النزف الدماغي ○

ج- اضطرابات الصمامات ○

د- خلل وظيفية القلب ○

٣-ما هو السبب غير القلبي لجراحة القلب؟

أ- اعتلال عضلة القلب ○

ب- اضطراب صمامات القلب ○

ج- تمزق الشريان الأبهري أو البطني ○

د- الاختناق ○

٤-ما هو مرض القلب الذي يحتاج جراحة القلب؟

أ- صدمة نقص حجم الدم ○

Appendices…….

ب- صدمة تسمم الدم ○

ج- اعتلال عضلة القلب ○

د- أمراض الصمامات ، بما في ذلك قلس الصمام ، وانسداد الصمام وبعض حالات تضيق الصمام. ○

٥- ماهي أسباب جراحة القلب؟

أ- عدم انتظام ضربات القلب ○

ب- زراعة القلب ○

ج- احتشاء عضلة القلب ○

د. كل ما ورد اعلاه ○

٦-ماهي أمراض القلب غير الخلقية التي تحتاج جراحة قلبية؟

أ- عيوب صمامات القلب ○

ب- عيوب جدار القلب ○

ج- فشل الجهاز التنفسي ○

د- عيوب الأوعية الدموية

○

<u>الجزء الثالث: تقييم المعلومات المتعلقة بمضاعفات جراحة القلب</u>

١- ماهي مضاعفات الجراحة القلبية المتعلقة بالقلب؟

أ- كسور الأضلاع ○

ب- نقص حجم الدم ○

ج- تمزق الكبد أو الطحال ○

د- تمزق المعدة ○

٢- ماهي مضاعفات جراحة القلب المتعلقة بالجهاز القلبي؟

أ- استرواح الصدر ○

Appendices…….

ب- الالتهاب الرئوي المنصف ○

ج- التمزق و كدمة الرئة ○

د- فشل القلب ○

٣- ماهي مضاعفات جراحة القلب المتعلقة بالرئة؟

أ- كسور القص ○

ب- تمزق القصبة الهوائية ○

ج- ضعف تبادل الغازات ○

د- استرواح الصدر ○

٤-ماهي مضاعفات جراحة القلب المتعلقة بالجهاز العصبي هي؟

أ- نزف خلف الصفاق ○

ب - الورم الدموي التأموري ○

ج- السكتة الدماغية ○

د- نزف رئوي ○

٥- ماهي مضاعفات جراحة القلب المتعلقة بالجهاز الكلوي هي؟

أ- صدمة نقص حجم الدم ○

ب- صدمة تسمم الدم ○

ج- اعتلال عضلة القلب ○

د- الفشل الكلوي الحاد ○

٦- ماهي مضاعفات جراحة القلب المتعلقة بالشق الجراحي؟

أ- كسور الأضلاع ○

ب- الفشل الكبدي ○

ج- العدوى ○

د- تمزق المعدة ○

Appendices…….

١ الجزء الرابع: تقييم دواعي وموانع جراحة القلب

١-ماهي دواعي جراحة القلب المتعلقة بالصمامات؟

أ- أمراض القلب والصمامات ○

ب- تضيق الصمام التاجي ○

ج- مرض الصمامات المتعددة ○

د. كل ما ورد اعلاه ○

٢-من دواعي جراحة القلب هي ؟

أ- مرض الأوعية الدموية الثلاثية ○

ب- التهاب الجنب ○

ج- الإنتان ○

د- عدوى الرئة غير المسيطر عليه ○

٣-ماهي دواعي جراحة القلب المتعلقة بالشرايين التاجية للقلب؟

أ- مرض الأوعية الدموية الثلاثية ○

ب- مرض الشريان التاجي الرئيسي الأيسر ○

ج- الذبحة الصدرية غير المستقرة ○

د. كل ما ورد اعلاه ○

٤-ماهي موانع جراحة القلب؟

أ- مرض الأوعية الدموية الثلاثية ○

ب- مرض الشريان التاجي الرئيسي الأيسر ○

ج- عدم استقرار المريض ○

د. كل ما ورد اعلاه ○

٥- ماهي موانع جراحة القلب المتعلقة بالقلب؟

Appendices…….

أ- أمراض القلب والصمامات ○

ب- عدوى التهاب الجنب ○

ج- الذبحة الصدرية غير المستقرة ○

د- مريض مخطط له إجراء تطعيم مجرى الشريان التاجي (CABG) وأصيب باحتشاء عضلة القلب ○

٦-ماهي موانع جراحة القلب المتعلقة بالعضلة القلبية؟

أ- مرض الأوعية الثلاثية ○

ب- الذبحة الصدرية غير المستقرة ○

ج- مرض متعدد الصمامات ○

د- استبدال الصمام في حالات التهاب الشغاف ○

<u>الجزء الخامس: تقييم المعلومات المتعلقة بالعناية التمريضية قبل العمل الجراحي لمرضى جراحة القلب</u>

١-ماهو دور الممرضات في مرحلة ما قبل الجراحة؟

أ- تقييم ما قبل الجراحة ○

ب- التثقيف قبل العملية ○

ج- الإعداد الجسدي والنفسي للمريض ○

د. كل ما ورد اعلاه ○

٢-ماهي أهداف إعداد المرضى قبل جراحة القلب داخل المستشفى ؟

أ- استعادة سريعة لوظيفة القلب ○

ب- استعادة الحركة والنشاط البدني ○

ج- تقوية عضلات الظهر والذراعين ○

د- كما ورد في (أ) و (ب) ○

٣- دور الممرضات في تقييم الاحتياجات الجسدية قبل الجراحة ؟

أ- العلامات الحيوية والقدرة على التواصل ○

Appendices…….

ب- مستوى الوعي والادراك والقدرة على أداء التمارين ○

ج- القدرة على الحركة والوزن والطول ○

د. كل ما ورد اعلاه ○

٤- كيف يتم تقييم الاحتياجات النفسية للمرضى قبل العمل الجراحي؟

أ- الحالة العاطفية ○

ب-مستوى فهم العملية الجراحية ○

ج- استراتيجيات التأقلم والتعليمات قبل الجراحة وبعد الجراحة ○

د. كل ما ورد اعلاه ○

٥- تشمل خطة التثقيف قبل الجراحة ما يلي؟

أ- الأدوية قبل الجراحة والتحكم بالألم بعد الجراحة ○

ب- التنفس العميق والسعال وممارسة التنفس التحفيزي ○

ج- كيفية دعم الشق الجراحي لممارسة تمارين التنفس والمشي بعد العمل الجراحي ○

د. كل ما ورد اعلاه ○

٦- اهم ارشادات تقدم للمريض قبل الخروج من المستشفى

أ- ممارسة التمارين في الهواء الطلق مع فترات من الراحة ○

ب- تناول الأطعمة الغنية بالأوميجا ٣ والألياف والفيتامينات مع تناول الكثير من السوائل ○

ج- مراجعة الطبيب بصفة دورية والالتزام بمواعيد الأدوية ○

د. كل ما ورد اعلاه ○

Answer key

Item	Answer key	score		Item	Answer key	Score
1	ب	1		17	د	1

Appendices…….

2	ج	1		18	ج	1
3	أ	1		19	د	1
4	ج	1		20	أ	1
5	د	1		21	د	1
6	ج	1		22	ج	1
7	ب	1		23	ب	1
8	أ	1		24	د	1
9	ج	1		25	د	1
10	د	1		26	د	1
11	د	1		27	د	1
12	د	1		28	د	1
13	ج	1		29	د	1
14	ب	1		30	د	1
15	د	1		31	د	1
16	د	1				

Score of knowledge

No	Score	Percentage	Grade
1	0-10	<33	Inadequate knowledge
2	11-20	36-65	Moderate knowledge
3	21-31	68-100	Adequate knowledge

Appendix E

OBSERVATIONAL PERFORMANCE CHECKLIST

Appendices…….

NO	Check for the following	Apply	Not apply
1	Operative consent signed (surgeon + patient)		
2	Surgery type confirmed for patient		
3	Did you have allergy		
4	Did you have Contagious Disease		
5	The financial costs are clear to the patient		
6	Blood units prepared		
7	NPO (Food, drink and smoking)		
8	Surgical site shaving		
9	Bath given		
10	Surgical Site marked with “x”		
11	IV line checked		
12	Patient voided before OR		
13	Wear\underwear removed		
14	Hospital gown		
15	Drains empty, fully empty		
16	Dentures removed		
17	Glasses \contact Lenses Removed		
18	Auditory prosthesis removed		
19	Makeup ,polish removed		
20	Jewelry \ hair ornaments		
21	ID bracelet available and correct		
22	Pre medication given		
23	Laboratory results available		
24	X-ray results available		
25	X-ray sent to OR		
26	EKG report available		
27	Medication record in chart		
28	Nursing Progress Notes		
29	Cardiac catheterization report		
30	Cardiac Anesthesiologist consultation		
31	Stop Anticoagulants drugs before surgery		
32	Use mupirocin ointment on the place of operation before surgery		

Appendix F

Panel of Experts

استبانة الخبراء

Appendices…….

حضرة الأستاذ الدكتور/ة..... المحترم/ة

تحية طيبة...

امتنانا واعتزازا بخبرتكم العلمية والعملية ونظرا لما تتمتعون به من مكانة علمية مرموقة وخبرة علمية اضع بين ايديكم الاستبانة والبرنامج التعليمي لبحث اطروحة الدكتوراه الموسومة بعنوان

" فعالية البرنامج التعليمي قبل الجراحة على معلومات الممرضين وأدائهم في ردهات جراحة القلب في منطقة الفرات الأوسط "

((The Effectiveness of Pre-Operative Educational Program on Nurses Knowledge and Performance in Cardiac Surgery ward at the Middle Euphrates Region)).

ارجو من حضرتكم الاطلاع عليه وابداء ما ترونه مناسبا من مقترحات وتعديلات لكل فقرة ان امكن بغرض اغناء البحث

مع وافر الشكر والتقدير

طالب الدكتوراه

عمار محمد ثامر عبود

كلية التمريض – جامعة بابل

أسم الخبير:.....

المرتبة العلمية:.....

التخصص العام:.....

التخصص الدقيق:.....

مكان العمل:.....

التوقيع:.....

خبراء تقويم الاستبانة والبرنامج التعليمي

Appendices…….

ت	اسم الخبير	اللقب العلمي	الاختصاص	مكان العمل
١	د. راجحة عبد الحسن حمزة	استاذ	تمريض بالغين	كلية التمريض\ جامعة الكوفة
٢	د. قحطان هادي حسين	استاذ	تمريض صحة مجتمع	كلية التمريض\جامعة بابل
٣	د. منى عبد الوهاب خليل	استاذ	تمريض صحة مجتمع	كلية التمريض\جامعة بابل
٤	د. حليمة يوسف كاظم	استاذ	تمريض بالغين	كلية التمريض\جامعة بغداد
٥	د. حسن علوان حسين بيعي	استاذ	طب مجتمع	كلية التمريض\جامعة بابل
٦	د. ضياء كريم عبد علي	استاذ مساعد	تمريض بالغين	كلية التمريض\جامعة العميد
٧	د. حسين هادي عطيه	استاذ مساعد	تمريض بالغين	كلية التمريض\جامعة بغداد
٨	د. صادق عبد الحسين	استاذ مساعد	تمريض بالغين	كلية التمريض\جامعة بغداد
٩	د. حسين جاسم محمد	استاذ مساعد	تمريض صحة مجتمع	كلية التمريض\جامعة بابل
١٠	د. حسن هادي	مدرس	لغة انكليزية	كلية الآداب\ جامعة الكوفة

Appendix G

البرنامج التعليمي باللغة العربية

Appendices…….

عناوين المحاضرات

الخطوط العريضة للمحاضرات

مخطط موضوعي للبرنامج التعليمي

الموضوع: جراحة القلب.

المجموعة: الممرضات في أجنحة جراحة القلب.

مكان :

- مركز جراحة القلب والقسطرة التداخلية بمدينة النجف الاشرف.

- مركز شهيد المحراب لجراحة القلب بمدينة الحلة.

- مركز جراحة القلب بمستشفى الامام زين العابدين بمدينة كربلاء المقدسة.

طرق تعلم التدريس: عرض تقديمي بوربوينت ، مجموعة إرشادية

مناقشة ، نشرات ، شريط فيديو.

بيئة التعلم:

مفتوحة وآمنة وداعمة وغير مهددة

بيئة التعلم. مناخ الاحترام ،

الثقة والقبول المتبادلين ، السرية.

Appendix H

البرنامج التعليمي

Appendices…….

المحاضرة الأولى:

أهداف البرنامج:

الهدف العام:

الهدف من هذا البرنامج هو تطوير وتثقيف الملاك التمريضي اتجاه الأمراض القلبية مع كل العواقب الفسيولوجية، بالإضافة إلى ذلك التدابير التمريضية لمرضى جراحة القلب قبل العمل الجراحي.

الهدف الخاص

أهداف التعلم للمشارك في الدورة:

في نهاية البرنامج يصبح الممرض قادر على:

١-معرفة التركيب التشريحي للجهاز القلبي الوعائي.

٢-فسلجة الجهاز القلبي الوعائي

٣-تعريف مرض القلب الجراحي

٤-أسباب أمراض القلب

٥-أعراض وعلامات الأمراض القلبية

٦-تشخيص أمراض القلب

٧-مضاعفات أمراض القلب

٨-علاج أمراض القلب

٩-تحضير المريض قبل العمل الجراحي

المحاضرة الثانية:

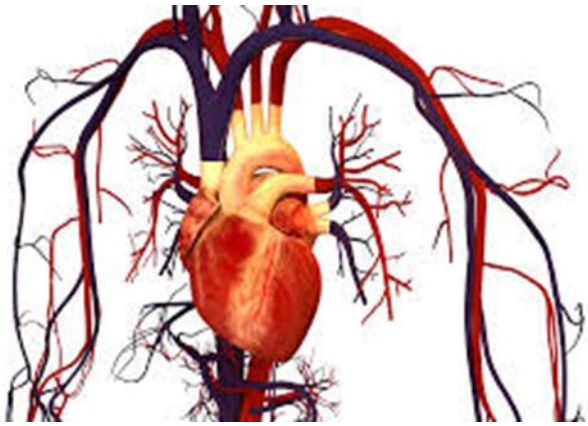
Appendices……

تشريح الجهاز القلبي الوعائي:

تعريف الجهاز القلبي الوعائي:

هو جهاز يتكون من القلب والأوعية الدموية الذي يسمح بتداول ونقل المواد الغذائية مثل السكر والأحماض الأمينية والماء، والأكسجين، وثاني أكسيد الكربون، والهرمونات وخلايا الدم، وغيرها إلى خلايا أعضاء الجسم لأن يصلها الغذاء والماء والأكسجين، وتساعد على مكافحة الأمراض، وتحقيق الاستقرار، وتثبت درجة حرارة الجسم ، والحفاظ على التوازن.

وغالبًا ما يُنظر إلى هذا النظام على انه شبكة توزيع الدم، ولكن البعض ينظر الى أن نظام الدورة الدموية يتكون من نظام القلب والأوعية الدموية الذي يقوم بتوزيع الدم، وكذلك الجهاز اللمفاوي، الذي يساعد في دوران السائل الليمفاوي . الدم هو سائل يتكون من البلازما، والكرات الدموية الحمراء وخلايا الدم البيضاء، والصفائح الدموية .يقوم القلب بضخ الدم في شبكة من الأوعية الدموية حاملًا الأكسجين والماء والمواد المغذية ويوزعها على جميع أعضاء الجسم، مثل الكلى التي تقوم بفصل النفايات التي تذوب في الماء وتعمل على إخراجها من الجسم عن طريق البول.



أقسام الجهاز القلبي الوعائي:

تكون نظام القلب والأوعية الدموية من القلب (مضخة النظام) ، ونظام الأوعية الدموية المحيطية (شبكة من الشرايين والأوردة والشعيرات الدموية) ونظام الدم (مكونات الدم والدم). الجهاز الليمفاوي (الغدد الليمفاوية ، الغدد الليمفاوية ، والطحال) هو نظام أوعية خاصة تساعد في الحفاظ على حجم دم كافٍ في الجهاز القلبي الوعائي عن طريق التقاط سوائل الأنسجة الزائدة وإعادتها إلى مجرى الدم. ينبض القلب ، وهو مضخة عضلية ، بمعدل ٧٠ مرة في الدقيقة ، أو مرة واحدة كل ٠.٨٦ ثانية ، في كل دقيقة من حياة الشخص. ينقل هذا الضخ المستمر الدم عبر الجسم ويغذي خلايا الأنسجة ويزيل الفضلات. يؤثر النقص في بنية القلب أو وظيفته على جميع أنسجة الجسم. قد تؤدي التغييرات في معدل ضربات القلب أو الإيقاع أو النتاج إلى تقييد جميع الوظائف البشرية تقريبًا ، بما في ذلك الرعاية الذاتية ، والتنقل ، والقدرة على الحفاظ على نضح الأنسجة ، وحالة حجم السوائل ، والتنفس والراحة. قد تؤثر التغييرات القلبية أيضًا على مفهوم الذات والجنس وأداء الدور.

Appendices.....

القلب:

القلب عبارة عن عضو مجوف مخروطي الشكل بحجم قبضة الشخص البالغ تقريبًا ، ويزن أقل من ٥٠٠ جرام. يقع في وسط التجويف الصدري ، بين العمود الفقري والقص ويحيط به الرئتان. يقع ثلثا كتلة القلب على يسار القص. تقع القاعدة العلوية أسفل الضلع الثاني ، والقمة المدببة تقريبية مع الفضاء الوربي الخامس ، نقطة المنتصف إلى الترقوة.

القلب مغطى بغشاء التأمور ، وهو طبقة مزدوجة من الغشاء الليفي. يغلف التامور القلب ويثبته على الهياكل المحيطة به ، ويشكل كيس التامور. يمنع التناسب المنظم والمحكم للتامور القلب من الامتلاء بالدم.

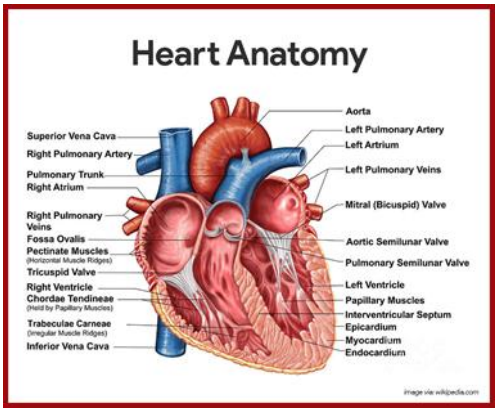
الطبقة الخارجية هي التامور الجداري ، ويلتصق التامور الحشوي (أو النخاب) بسطح القلب. يُطلق على الفراغ الصغير بين الطبقات الحشوية والجدارية للتأمور اسم تجويف التامور والذي يحتوي على سائل التزليق المصلي الذي يتم إنتاجه في هذا الفراغ على تثبيت القلب أثناء خفقانه.

يتكون جدار القلب من ثلاث طبقات من الأنسجة: النخاب ، وعضلة القلب ، والشغاف.

يغطي النخاب القلب بأكمله والأوعية الكبيرة ثم ينثني ليشكل الطبقة الجدارية التي تبطن التامور وتلتصق بسطح القلب.

تتكون عضلة القلب ، وهي الطبقة الوسطى من جدار القلب ، من خلايا عضلات القلب المتخصصة (الليفات العضلية) التي توفر الجزء الأكبر من عضلة القلب المنقبضة.

أما شغاف القلب ، وهو الطبقة الأعمق ، هو غشاء رقيق يتكون من ثلاث طبقات. تتكون الطبقة الداخلية من خلايا بطانية ملساء تبطن غرف القلب والأوعية الكبيرة والصمامات.



حجرات وصمامات القلب:

Appendices……

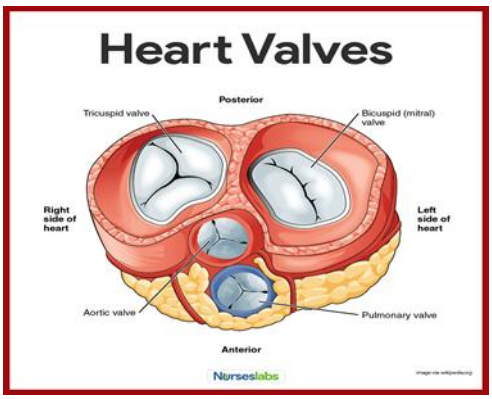
يحتوي القلب على أربع حجرات مجوفة هي أذينين علويين وبطينين سفليين. يتم فصلها طوليًا بواسطة الحاجز بين البطينين.

يتلقى الأذين الأيمن دمًا فقيرًا بالأكسجين من أوردة الجسم، يعيد الوريد الأجوف العلوي الدم من منطقة الجسم فوق الحجاب الحاجز ، ويعيد الوريد الأجوف السفلي الدم من الجسم أسفل الحجاب الحاجز ، والجيب التاجي يعيد الدم من القلب. يستقبل الأذين الأيسر الدم المؤكسج حديثًا من الرئتين عبر الأوردة الرئوية.

يتلقى البطين الأيمن دمًا فقيرًا بالأكسجين من الأذين الأيمن ويضخه عبر الشريان الرئوي إلى السرير الشعري الرئوي للأكسجين. ينتقل الدم المؤكسج حديثًا عبر الأوردة الرئوية إلى الأذين الأيسر. يدخل الدم إلى الأذين الأيسر ويعبر الصمام التاجي (ثنائي الشرف) إلى البطين الأيسر. ثم يُضخ الدم من الشريان الأورطي إلى الدورة الدموية الشريانية.

يتم فصل غرف القلب بواسطة صمامات تسمح بتدفق الدم أحادي الاتجاه إلى الحجرة التالية أو الاوعية الكبيرة. يتم فصل الأذينين عن البطينين بواسطة الصمامين الأذينين البطينيين (AV). يوجد الصمام ثلاثي الشرف على الجانب الأيمن والصمام ثنائي الشرف (أو التاجي) على اليسار. يتم تثبيت اللوحات الخاصة بكل من هذه الصمامات على العضلات الحليمية للبطينين بواسطة أوتار الحبال. تتحكم هذه الهياكل في حركة الصمامات الأذينية البطينية لمنع ارتجاع الدم. البطينان متصلان بأوعيتهما الكبيرة بواسطة الصمامات الهلالية. على اليمين ، يربط الصمام الرئوي البطين الأيمن بالشريان الرئوي. على اليسار ، يربط الصمام الأبهري البطين الأيسر بالشريان الأورطي.

ينتج عن إغلاق الصمامات الأذينية البطينية في بداية الانقباض (الانقباض) أول صوت للقلب ، أو S1 (يتميز بالمقطع "lub") ؛ ينتج عن إغلاق الصمامات الهلالية عند بداية الاسترخاء (الانبساط) صوت القلب الثاني ، أو S2 (يتميز بالمقطع "dub").

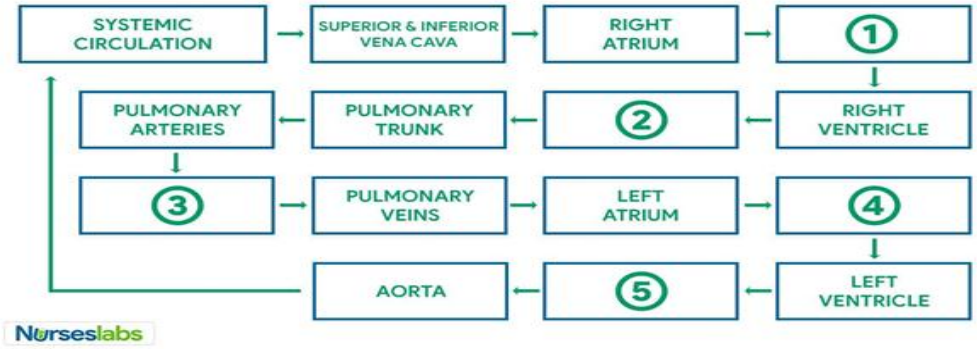


الدورة الدموية الجهازية والرئوية والتاجية

نظرًا لأن كل جانب من القلب يتلقى الدم ويخرجه ، غالبًا ما يوصف القلب بأنه مضخة مزدوجة. يدخل الدم إلى الأذين الأيمن وينتقل إلى السرير الرئوي في نفس الوقت تقريبًا الذي يدخل فيه الدم إلى الأذين الأيسر. يتكون

Appendices……

جهاز الدورة الدموية من جزأين: الدورة الدموية الرئوية (تحريك الدم عبر السرير الشعري المحيط بالرئتين لربطه بنظام تبادل الغازات في الرئتين) والدورة الدموية الجهازية التي تمد الدم إلى جميع أنسجة الجسم الأخرى. بالإضافة إلى ذلك ، يتم إمداد عضلة القلب نفسها بالدم عبر الدورة التاجية.



<u>الدوران الجهازى</u>

يتكون الدوران الجهازي من الجانب الأيسر من القلب ، والشريان الأورطي وفروعه ، والشعيرات الدموية التي تزود الدماغ والأنسجة المحيطية ، والجهاز الوريدي الجهازي ، والوريد الأجوف. النظام الجهازي ، الذي يجب أن ينقل الدم إلى المناطق الطرفية من الجسم ، هو نظام ضغط مرتفع.

<u>الدورة الدموية الرئوية</u>

تتكون الدورة الدموية الرئوية من الجانب الأيمن من القلب والشريان الرئوي والشعيرات الدموية الرئوية والوريد الرئوي. نظرًا لوقوعها في الصدر بالقرب من القلب ، فإن الدورة الدموية الرئوية هي نظام ضغط منخفض. تبدأ الدورة الدموية الرئوية بالجانب الأيمن من القلب. يدخل الدم الفقير بالأكسجين من الجهاز الوريدي الأذين الأيمن من خلال وريدين كبيرين ، الوريد الأجوف العلوي والسفلي ، وينتقل إلى الرئتين عبر الشريان الرئوي وفروعه. بعد تبادل الأكسجين وثاني أكسيد الكربون في الشعيرات الدموية الرئوية ، يعود الدم الغني بالأكسجين إلى الأذين الأيسر عبر عدة أوردة رئوية. ثم يُضخ الدم من البطين الأيسر عبر الشريان الأورطي وفروعه الرئيسية لتزويد جميع أنسجة الجسم. هذه الدائرة الثانية لتدفق الدم تسمى الدورة الدموية الجهازية.

<u>الدورة الدموية التاجية</u>

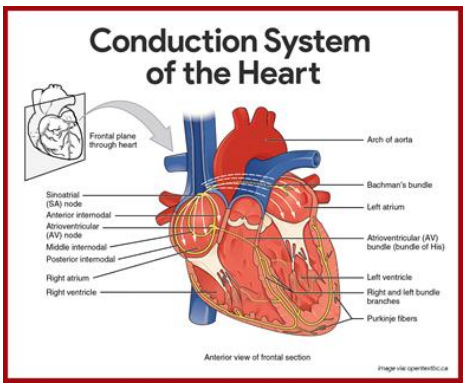
يتم تزويد عضلة القلب نفسها من خلال شبكة الأوعية الخاصة بها من خلال الدورة الدموية التاجية. تنشأ الشرايين التاجية اليمنى واليسرى عند قاعدة الشريان الأورطي وتتفرع لتطويق عضلة القلب ، لتزويد عضلة القلب بالدم والأكسجين والمواد المغذية. ينقسم الشريان التاجي الرئيسي الأيسر ليشكل الشرايين الأمامية النازلة والشرايين الملتوية. تشمل عوامل إمدادات الشريان الأمامي الهابط معدل ضربات القلب (يحدث معظم التدفق أثناء الانبساط ، عندما ترتخي العضلات) ، والنشاط الأيضي للقلب وتوتر الأوعية الدموية (الانقباض).

Appendices……

نظام توصيل القلب

تستمر الدورة القلبية بدائرة كهربائية معقدة تعرف باسم نظام التوصيل الداخلي للقلب. تمتلك خلايا عضلة القلب خاصية متأصلة في الإثارة الذاتية ، والتي تمكنها من بدء ونقل النبضات بشكل مستقل عن المنبه. ومع ذلك ، فإن المناطق المتخصصة من خلايا عضلة القلب عادة ما تمارس تأثيرًا مسيطرًا في هذا المسار الكهربائي. إحدى هذه المناطق المتخصصة هي العقدة الجيبية الأذينية (SA) ، التي تقع عند تقاطع الوريد الأجوف العلوي والأذين الأيمن.

تعمل العقدة الجيبية الأذينية بمثابة "منظم ضربات القلب" الطبيعي للقلب ، وعادة ما تولد نبضة من ٦٠ إلى ١٠٠ مرة في الدقيقة. ينتقل هذا الدافع عبر الأذينين عبر مسارات داخلية إلى العقدة الأذينية البطينية (AV) ، في أرضية الحاجز بين الأذينين. تعمل الألياف الموصلة الصغيرة جدًا للعقدة الأذينية البطينية على إبطاء الدافع ، مما يؤخر قليلاً انتقاله إلى البطينين. ثم يمر عبر حزمة هيس عند التقاطع الأذيني البطيني ويستمر أسفل الحاجز بين البطينين عبر فرعي الحزمة الأيمن والأيسر ويخرج إلى ألياف بوركينج في جدران العضلات البطينية.



٢-فسلجة الجهاز القلبي الوعائي

يشكل تقلص واسترخاء القلب نبضة قلب واحدة وتسمى الدورة القلبية. يتبع الملء البطيني انقباض بطيني ، وهي مرحلة ينقبض خلالها البطينان ويخرجان الدم إلى الدوائر الرئوية والجهازية. يتبع انقباض القلب مرحلة استرخاء تُعرف باسم الانبساط ، يتم خلالها إعادة ملء البطينين ، وعقد الأذينين ، ويتم ترطيب عضلة القلب.

عادة ، تحدث الدورة القلبية الكاملة حوالي ٧٠ إلى ٨٠ مرة في الدقيقة ، تقاس بمعدل ضربات القلب (HR). أثناء الانبساط ، يزداد الحجم في البطينين إلى حوالي ١٢٠ مل (حجم نهاية الانبساط) وفي نهاية الانقباض ، يبقى حوالي ٤٠ مل من الدم في البطينين (حجم نهاية الانقباض). يسمى الفرق بين حجم نهاية الانبساطي وحجم نهاية الانقباض بحجم الضربة (SV) . يتراوح حجم الضربة من ٦٠ إلى ١٠٠ مل / نبضة ويبلغ متوسطها حوالي ٨٠ مل / نبضة في الشخص البالغ.

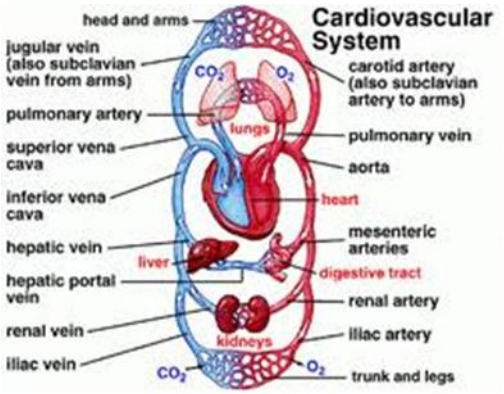
Appendices……

النتاج القلبي (cardiac output (CO) هو كمية الدم التي يضخها البطينان في الدورة الدموية الرئوية والجهازية في دقيقة واحدة. يؤدي ضرب حجم الضربة (SV) في معدل ضربات القلب (HR) إلى تحديد النتاج القلبي: CO = HR × SV. الكسر القذفي هو حجم الضربة مقسومًا على الحجم الانبساطي النهائي ويمثل الجزء أو النسبة المئوية من الحجم الانبساطي الذي يتم إخراجه من القلب أثناء الانقباض. على سبيل المثال ، حجم نهاية الانبساط ١٢٠ مل مقسومًا على حجم الضربة ٨٠ مل يساوي الكسر القذفي بنسبة ٦٦٪. يتراوح الكسر المقذوف الطبيعي من ٥٠٪ إلى ٧٠٪.

يتراوح متوسط النتاج القلبي للبالغين من ٤ إلى ٨ لترات / دقيقة.

النتاج القلبي هو مؤشر على مدى جودة عمل القلب كمضخة. إذا لم يتمكن القلب من الضخ بشكل فعال ، ينخفض النتاج القلبي وتروية الأنسجة. تصبح أنسجة الجسم التي لا تتلقى ما يكفي من الدم والأكسجين إقفارية (محرومة من الأكسجين). إذا لم تتلقى الأنسجة ما يكفي من تدفق الدم للحفاظ على وظائف الخلايا ، تموت الخلايا. (يؤدي الموت الخلوي إلى نخر أو احتشاء).

يؤثر مستوى النشاط ومعدل الأيض واستجابات الإجهاد الفسيولوجي والنفسي والعمر وحجم الجسم على النتاج القلبي. بالإضافة إلى ذلك ، يتم تحديد النتاج القلبي من خلال التفاعل بين أربعة عوامل رئيسية: معدل ضربات القلب ، والحمل المسبق ، والحمل اللاحق ، والانقباض. تؤثر التغييرات في كل من هذه المتغيرات على النتاج القلبي جوهريًا ويمكن أيضًا معالجة كل منها للتأثير على النتاج القلبي. تسمى قدرة القلب على الاستجابة لحاجة الجسم المتغيرة للناتج القلبي باحتياطي القلب.



<u>معدل ضربات القلب</u>

يتأثر معدل ضربات القلب بالتحفيز المباشر وغير المباشر للجهاز العصبي اللاإرادي. يتم التحفيز المباشر من خلال تعصيب عضلة القلب بواسطة (sympathetic and parasympathetic nerves) الأعصاب السمبثاوي والباراسمبثاوي . يزيد الجهاز العصبي السمبثاوي من معدل ضربات القلب ، بينما يبطئ الجهاز العصبي الباراسمبثاوي من معدل ضربات القلب. يحدث التنظيم الانعكاسي لمعدل ضربات القلب استجابةً لضغط

الدم الجهازي أيضًا من خلال تنشيط المستقبلات الحسية المعروفة باسم مستقبلات الضغط الموجودة في الجيوب السباتية والقوس الأبهري والوريد الأجوف والأوردة الرئوية.

إذا زاد معدل ضربات القلب ، يزداد النتاج القلبي (حتى نقطة معينة) حتى لو لم يكن هناك تغيير في حجم الضربة. ومع ذلك ، تقلل معدلات ضربات القلب السريعة من مقدار الوقت المتاح للبطين أثناء الانبساط. ثم ينخفض النتاج القلبي لأن تقليل وقت الملء يقلل من حجم الضربة. يتناقص نضح الشريان التاجي أيضًا لأن الشرايين التاجية تملأ بشكل أساسي أثناء الانبساط. ينخفض النتاج القلبي أثناء بطء القلب إذا ظل حجم الضربة كما هو بسبب انخفاض عدد الدورات القلبية.

الانقباض(Contractility)

الانقباض هو القدرة الكامنة في ألياف عضلة القلب على التقصير(تصبح اقصر). يقلل ضعف انقباض عضلة القلب من تدفق الدم إلى الامام من القلب ، ويزيد من ضغوط البطين من تراكم حجم الدم ويقلل من النتاج القلبي. قد تؤدي زيادة الانقباض إلى إجهاد القلب.

التحميل المسبق(Preload)

التحميل المسبق هو مقدار توتر أو تمدد ألياف عضلة القلب الموجود في نهاية الانبساط ، قبل تقلص البطينين مباشرة. يتأثر التحميل المسبق بالعود الوريدي ومطاوعة البطينين. إنه مرتبط بالحجم الكلي للدم في البطينين: فكلما زاد الحجم ، زاد امتداد ألياف عضلة القلب وزادت القوة التي تتقلص بها الألياف لإنجاز التفريغ. هذا المبدأ يسمى قانون ستارلينج للقلب. هذه الآلية لها حدود فسيولوجية. تمامًا كما يؤدي التمدد المفرط المستمر للشريط المطاطي إلى استرخاء الشريط وفقدان قدرته على الارتداد ، فإن التمدد المفرط لألياف عضلة القلب يؤدي في النهاية إلى تقلص غير فعال.

تؤدي الاضطرابات مثل أمراض الكلى وفشل القلب الاحتقاني إلى احتباس الصوديوم والماء وزيادة التحميل المسبق. يزيد تضيق الأوعية أيضًا من العائد الوريدي والحمل المسبق. ينتج عن قلة حجم الدم في الدورة الدموية انخفاض العائد الوريدي وبالتالي انخفاض التحميل المسبق. يقلل التحميل المسبق المنخفض من حجم الضربة وبالتالي النتاج القلبي. قد ينتج انخفاض التحميل المسبق عن نزيف أو سوء توزيع حجم الدم.

التحميل اللاحق(Afterload)

الحمل اللاحق هو القوة التي يجب على البطينين التغلب عليها لإخراج حجم الدم. إنه الضغط في نظام الشرايين قبل البطينين. يجب أن يولد البطين الأيمن توترًا كافيًا لفتح الصمام الرئوي وإخراج حجمه في الشرايين الرئوية ذات الضغط المنخفض. يتم قياس الحمل اللاحق للبطين الأيمن على أنه مقاومة الأوعية الدموية الطرفية (PVR). في المقابل ، يخرج البطين الأيسر حمله بالتغلب على الضغط خلف الصمام الأبهري. يتم قياس الحمل

Appendices…….

اللاحق للبطين الأيسر كمقاومة الأوعية الدموية الجهازية (SVR). الضغط الشرياني أعلى بكثير من الضغوط الرئوية. وبالتالي ، يجب أن يعمل البطين الأيسر بجهد أكبر بكثير من البطين الأيمن.

تؤثر التغيرات في توتر الأوعية الدموية على الحمل اللاحق والعمل البطيني. مع زيادة ضغط الدم الرئوي أو الشرياني (على سبيل المثال من خلال تضيق الأوعية) ، يزداد PVR و / أو SVR ويزداد عمل البطينين. مع زيادة عبء العمل ، يزداد أيضًا استهلاك أكسجين عضلة القلب. لا يمكن للقلب تلبية هذا الطلب المتزايد على الأكسجين بشكل فعال ، وتتبع ذلك حلقة مفرغة. على النقيض من ذلك ، فإن الحمل اللاحق المنخفض للغاية يقلل من التدفق الأمامي للدم إلى الدورة الدموية والشرايين التاجية.

المحاضرة الثالثة:

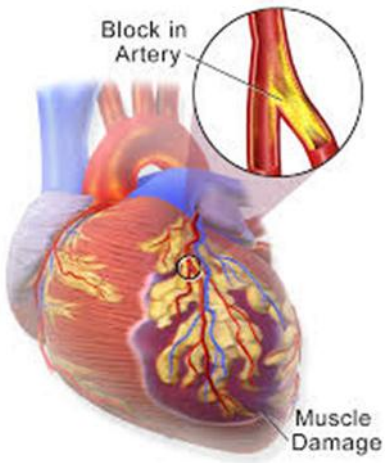
٣-تعريف أمرض القلب

بصرف النظر عن السبب الأساسي ، فإن ضعف وظائف القلب يؤثر على قدرة الشخص على المشاركة في التمارين وأنشطة الحياة اليومية. عندما يتأثر عمل الأجهزة الأخرى بمشاكل مثل ضعف تدفق الدم إلى عضلة القلب ، والتغيرات في توصيل النبضات الكهربائية عبر القلب أو التغيرات الهيكلية في القلب نفسه ، يصبح غير قادر على ضخ الدم الكافي لتلبية احتياجات الجسم من الأكسجين والمغذيات وقد يؤدي الى الموت.

مرض القلب والأوعية الدموية ((Cardiovascular Disease (CVD) هو مصطلح عام لاضطرابات القلب والأوعية الدموية. الأمراض القلبية الوعائية هي السبب الرئيسي الأول للوفاة والعجز في العديد من دول العالم وتؤثر على أكثر من ٣.٤ مليون من السكان. من المرجح أن يعاني السكان الأكبر سنًا من أمراض القلب والأوعية الدموية بنسبة ٦٢ ٪ من الأشخاص الذين تزيد أعمارهم عن ٧٥ عامًا ، ومع ذلك فإن ٥ ٪ فقط من الأشخاص الذين تقل أعمارهم عن ٤٥ عامًا يعانون من أمراض القلب والأوعية الدموية. في أستراليا ، تقتل أمراض القلب والأوعية الدموية شخصًا واحدًا كل ١١ دقيقة حيث يتم إنفاق ما يقرب من ٨ مليارات دولار على الأمراض القلبية الوعائية سنويًا.

يشير مرض القلب التاجي ((Coronary Heart Disease (CHD بشكل أكثر تحديدًا إلى الأمراض الإقفارية المتعلق بأمراض الأوعية الدموية ، مما يسبب مشاكل في أكسجة عضلة القلب. الذبحة الصدرية واحتشاء عضلة القلب هما الشكلان السريريان الرئيسيان لهذا المرض. أصبحت أمراض القلب والأوعية الدموية الآن أولوية صحية ومن خلال زيادة التمويل والبحث وحملات التثقيف العام ، انخفضت الوفيات الناجمة عن أمراض القلب والأوعية الدموية بشكل مطرد منذ السبعينيات. على الرغم من أن السمنة لا تزال مصدر قلق كبير ، إلا أن التثقيف الذي يتضمن الحد من تناول الدهون وزيادة التمارين وخفض مستويات الكوليسترول جعل السكان أكثر وعيًا بعوامل الخطر المرتبطة بأمراض الشرايين التاجية.

Appendices…….



Heart Attack

الفيزيولوجيا المرضية:

يعد تصلب الشرايين التاجية السبب الأكثر شيوعًا لانخفاض تدفق الدم التاجي.

تصلب الشرايين:

تصلب الشرايين هو مرض تدريجي يتميز بتكوين تصلب في الشرايين (plaque) ، والذي يؤثر على الطبقات الداخلية والوسطى للشرايين الكبيرة والمتوسطة الحجم.

يبدأ تصلب الشرايين بسبب عوامل غير معروفة تؤدي إلى تراكم البروتينات الدهنية والأنسجة الليفية في جدار الشرايين. على الرغم من أن الآليات الدقيقة غير معروفة ، يبدو أن التمثيل الغذائي غير الطبيعي للدهون والإصابة أو التهاب الخلايا البطانية المبطنة للشريان هي مفتاح تطوره.

في مجرى الدم ، يتم نقل الدهون المرتبطة ببروتينات تسمى البروتينات الصماء. تزيد المستويات المرتفعة من بعض البروتينات الدهنية ، وهي نوع من البروتينات الدهنية ، من خطر الإصابة بتصلب الشرايين. تحمل البروتينات الدهنية منخفضة الكثافة ،(التي تحتوي على نسبة عالية من الكوليسترول) ، الكوليسترول إلى الأنسجة المحيطية حيث يتم إطلاق بعض منه ليتم امتصاصه ودمجه في الخلايا لاستخدامه في إنتاج الطاقة. تحمل البروتينات الدهنية منخفضة الكثافة ، والجزيئات الكبيرة المكونة أساسًا من الدهون الثلاثية والكوليسترول ، الدهون الثلاثية إلى خلايا العضلات والدهون. عندما يتم إطلاق الدهون الثلاثية في هذه الأنسجة ، فإن الجزء المتبقي من الجزيء هو بروتين دهني منخفض الكثافة. وعلى النقيض من ذلك ، فإن البروتينات الدهنية عالية الكثافة تجذب الكوليسترول وتعيده من الأنسجة المحيطية إلى الكبد.

Appendices.....

قد يؤدي فرط شحوم الدم نفسه إلى تلف بطانة الشرايين. تشمل الأسباب الأخرى لإصابة الأوعية الدموية الضغوط المفرطة داخل الجهاز الشرياني (ارتفاع ضغط الدم) ، والخلل البطاني ، والتشوهات الوعائية العصبية ، ومقاومة الأنسولين ، والآثار المزمنة للإفراط في تناول الكحول.

يعزز التلف البطاني التصاق الصفائح الدموية وتجمعها ويجذب الكريات البيض إلى المنطقة. في موقع الإصابة ، تتجمع البروتينات الدهنية المسببة للتصلب العصيدي (المعزز لتصلب الشرايين) في البطانة الداخلية للشريان.

يبدو أن هذه البروتينات الدهنية ترتبط فعليًا بالجزء خارج الخلية من بطانة الأوعية الدموية. تهاجر البلاعم إلى الموقع المصاب كجزء من عملية الالتهاب. يؤدي التلامس مع الصفائح الدموية والكوليسترول ومكونات الدم الأخرى إلى تحفيز خلايا العضلات الملساء والنسيج الضام داخل جدار الوعاء الدموي على التكاثر بشكل غير طبيعي. على الرغم من أن تدفق الدم لا يتأثر في هذه المرحلة ، إلا أن هذه الآفة المبكرة تظهر على شكل خط دهني مصفر على البطانة الداخلية للشريان. تتطور اللويحة الليفية مع تضخم خلايا العضلات الملساء ، وتتكاثر ألياف الكولاجين وتتراكم الدهون في الدم. تبرز الآفة في تجويف الشرايين وتثبت على الجدار الداخلي للبطانة. قد تغزو طبقة الوسائط العضلية للشرايين أيضًا. لا تعمل اللويحة النامية على سد تجويف الوعاء بشكل تدريجي فحسب ، بل تُضعف أيضًا قدرة الوعاء على التمدد استجابةً لمتطلبات الأكسجين المتزايدة. غالبًا ما تتطور آفات اللويحات الليفية عند التشعبات الشريانية أو المنحنيات أو في مناطق الضيق. مع توسع اللويحة ، يمكن أن يؤدي إلى تضيق شديد أو انسداد كامل للشريان.

المرحلة الأخيرة من العملية هي تطور تصلب الشرايين ، وهي آفات معقدة تتكون من الدهون والأنسجة الليفية والكولاجين والكالسيوم والحطام الخلوي والشعيرات الدموية. يمكن لهذه الآفات المتكلسة أن تتقرح أو تتمزق ، مما يحفز تجلط الدم. قد تسد الخثرة تجويف الوعاء بسرعة أو قد يصطدم ليغلق وعاءًا بعيدًا. قد يكون تكوين الخثرة في منطقة محددة غير متماثلة من جدار الوعاء الدموي ، أو متحدة المركز ، تتضمن محيط الوعاء بأكمله. عادة لا تظهر مظاهر العملية إلا بعد انسداد ٧٥٪ من تجويف الشرايين.

يميل تصلب الشرايين إلى التطور حيث تنقسم الشرايين أو تتفرع. تزداد احتمالية إصابة بعض الأوعية الدموية ، بما في ذلك الشرايين التاجية (الشريان الأمامي الأيسر النازل على وجه الخصوص) ، والشرايين الكلوية ، وتشعب الشرايين السباتية ، والأقسام المتفرعة من الشرايين الطرفية. بالإضافة إلى إعاقة أو انسداد تدفق الدم ، يؤدي تصلب الشرايين إلى إضعاف جدران الشرايين وهو سبب رئيسي لتمدد الأوعية الدموية في الأوعية الدموية مثل الشرايين الأبهري والحرقفي.

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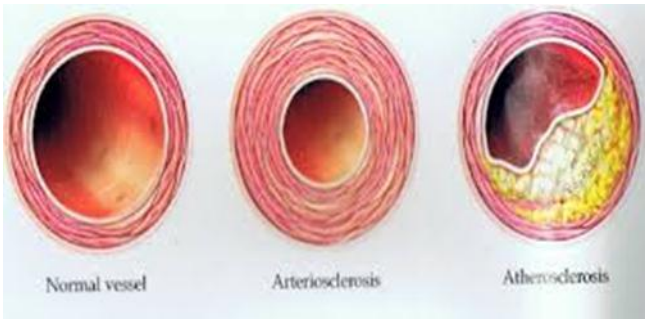

المحاضرة الرابعة:

٤-أسباب أمراض القلب:

سباب تصلب الشرايين غير معروفة ، ولكن تم ربط عوامل خطر معينة بتطور لويحات تصلب الشرايين. قدمت دراسة فرامنغهام للقلب بحثًا حيويًا في العلاقة بين عوامل الخطر وتطور أمراض القلب. البحث في أمراض الشرايين التاجية مستمر ، يبحث في العوامل المسببة والمظاهر والتدابير الوقائية للعديد من السكان. غالبًا ما يتم تصنيف عوامل خطر الإصابة بأمراض القلب التاجية على أنها عوامل غير قابلة للتعديل ، وهي عوامل لا يمكن تغييرها وقابلة للتعديل ، وهي تلك العوامل التي يمكن تعديلها.

عوامل الخطر غير القابلة للتعديل

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العمر عامل خطر غير قابل للتعديل. تحدث أكثر من ٥٪ من الوفيات التي تُعزى إلى أمراض الشرايين التاجية لدى الأفراد دون سن ٥٥. وعلى النقيض من ذلك ، يمكن أن تُعزى أكثر من ٧٥٪ من الوفيات إلى أمراض القلب التاجية لدى الأفراد الذين يبلغون من العمر ٧٥ عامًا أو أكثر. الجنس والعوامل الوراثية هي أيضًا عوامل خطر غير قابلة للتعديل لأمراض الشرايين التاجية.

يتأثر الرجال بأمراض القلب التاجية في سن مبكرة أكثر من النساء.

يعتبر التاريخ العائلي للإصابة بأمراض القلب التاجية أحد عوامل الخطر لتطور مرض الشريان التاجي.

عوامل الخطر القابلة للتعديل

تشمل عوامل الخطر القابلة للتعديل عوامل نمط الحياة والحالات المرضية التي تهيئ الشخص للإصابة بأمراض القلب التاجية. تشمل الحالات المرضية التي تساهم في الإصابة بأمراض القلب التاجية ارتفاع ضغط الدم والسكري وفرط شحميات الدم. على الرغم من أن هذه الحالات ليست مسألة اختيار ، إلا أنها عوامل خطر قابلة للتعديل يمكن السيطرة عليها غالبًا من خلال الأدوية والتحكم في الوزن والنظام الغذائي والتمارين الرياضية. يمكن السيطرة على العوامل السلوكية أو المتعلقة بنمط الحياة أو القضاء عليها تمامًا. تتطلب التغييرات في نمط الحياة التزامًا كبيرًا من قبل الشخص ؛ الدعم المستمر من فريق الرعاية الصحية أمر حيوي للنجاح.

ارتفاع ضغط الدم

ارتفاع ضغط الدم هو قراءات ضغط دم ثابتة أكبر من ١٤٠ ملم زئبقي أو ٩٠ ملم زئبقي انبساطي. يصيب ارتفاع ضغط الدم حوالي ٣٠٪ من الناس. تحفز الاستجابات الالتهابية على تطور الترسبات العصيدية. يمكن للأفراد تقليل ارتفاع ضغط الدم من خلال تغييرات نمط الحياة.

داء السكري

يساهم داء السكري في الإصابة بأمراض الشرايين التاجية بعدة طرق. يرتبط مرض السكري بالعديد من عوامل الخطر ، بما في ذلك فرط شحميات الدم وارتفاع معدل الإصابة بارتفاع ضغط الدم والسمنة. بالإضافة إلى ذلك ،

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يؤثر مرض السكري على بطانة الأوعية الدموية ، مما يساهم في تطور تصلب الشرايين. يُعتقد أيضًا أن فرط سكر الدم وفرط أنسولين الدم وتغير وظيفة الصفائح الدموية وارتفاع مستويات الفيبرينوجين والالتهابات تلعب دورًا في تطور تصلب الشرايين لدى مرضى السكري.

شحوم الدم غير الطبيعي

فرط شحميات الدم هو ارتفاع غير طبيعي في نسبة الدهون في الدم والبروتينات الدهنية. تحمل البروتينات الدهنية الكوليسترول في الدم. البروتينات الدهنية منخفضة الكثافة (LDLs) هي الناقلات الأولية للكوليسترول. تؤدي المستويات العالية من LDL إلى الإصابة بتصلب الشرايين لأن LDLs تودع الكوليسترول على جدران الشرايين. على النقيض من ذلك ، تساعد البروتينات الدهنية عالية الكثافة (HDLs) على إزالة الكوليسترول من الشرايين عن طريق نقله إلى الكبد لإفرازه. مستويات HDL التي تزيد عن ٠.٤ ملي مول / لتر لها تأثير وقائي ، مما يقلل من خطر الإصابة بأمراض القلب التاجية ؛ على النقيض من ذلك ، ترتبط مستويات HDL الأقل من ٠.٤ ملي مول / لتر بزيادة خطر الإصابة بأمراض القلب التاجية. الدهون الثلاثية هي مركبات من الأحماض الدهنية المرتبطة بالجلسرين. يتم استخدامها لتخزين الدهون من قبل الجسم ويتم حملها على جزيئات البروتين الدهني منخفض الكثافة (VLDL). تساهم الدهون الثلاثية المرتفعة أيضًا في خطر الإصابة بأمراض القلب التاجية.

تدخين السجائر

تدخين السجائر هو عامل خطر مستقل لأمراض الشرايين التاجية. تؤثر تأثيرات النيكوتين والسموم الأخرى الناتجة عن دخان السجائر سلبًا على نظام القلب والأوعية الدموية. الأفراد الذين يدخنون هم أكثر عرضة للإصابة بأمراض القلب التاجية من غير المدخنين. تشير الأبحاث إلى أن الإقلاع عن التدخين بحلول سن الثلاثين يزيل تقريبًا جميع مخاطر الوفيات المرتبطة بالتدخين. يؤدي تدخين السجائر إلى تعزيز أمراض الشرايين التاجية بعدة طرق. يتلف أول أكسيد الكربون البطانة الوعائية ، مما يعزز ترسب الكوليسترول. يحفز النيكوتين إفراز الكاتيكولامين ، ويزيد من ضغط الدم ومعدل ضربات القلب والأكسجين في عضلة القلب. يتسبب النيكوتين أيضًا في تضيق الأوعية الشريانية ، مما يقلل من نضح الأنسجة. يقلل النيكوتين أيضًا من مستويات HDL ، ويزيد من تراكم الصفائح الدموية ويزيد من خطر تكوين الجلطة.

البدانة

تُعرَّف السمنة (الأنسجة الدهنية الزائدة) عمومًا على أنها مؤشر كتلة الجسم (BMI) البالغ ٣٠ كجم / م ٢ أو أكثر. يعاني الأشخاص البدينون من معدلات أعلى من ارتفاع ضغط الدم والسكري وفرط شحميات الدم. الرجال الذين يعانون من السمنة المفرطة فوق سن الخمسين لديهم ضعف معدل الإصابة بأمراض القلب التاجية واحتشاء عضلة القلب الحاد (MI) لأولئك الذين كانوا في حدود ١٠ ٪ من وزنهم المثالي. ترتبط السمنة المركزية أو الدهون داخل البطن بزيادة خطر الإصابة بأمراض القلب التاجية. أفضل مؤشر للسمنة المركزية

هو محيط الخصر. تزيد نسبة الخصر إلى الورك التي تزيد عن ٠.٨ (للنساء) أو ٠.٩ (للرجال) من خطر الإصابة بأمراض القلب التاجية.

الخمول الجسدي

يرتبط الخمول البدني بزيادة مخاطر الإصابة بأمراض القلب التاجية. تشير بيانات البحث إلى أن الأشخاص الذين يحافظون على برنامج منتظم للنشاط البدني هم أقل عرضة للإصابة بأمراض القلب التاجية من الأشخاص المستقرين. تشمل فوائد التمارين القلبية الوعائية زيادة توافر الأكسجين لعضلة القلب ، وانخفاض الطلب على الأكسجين وعبء العمل القلبي ، وزيادة وظيفة عضلة القلب والاستقرار الكهربائي. تشمل الآثار الإيجابية الأخرى للنشاط البدني المنتظم انخفاض ضغط الدم والدهون في الدم ، وانخفاض مقاومة الأنسولين وتراكم الصفائح الدموية والوزن.

حمية غذائية

النظام الغذائي هو عامل خطر للإصابة بأمراض القلب التاجية ، بغض النظر عن تناول الدهون والكوليسترول. يبدو أن الأنظمة الغذائية الغنية بالفواكه والخضروات والحبوب الكاملة والأحماض الدهنية غير المشبعة لها تأثير وقائي. العوامل الأساسية غير واضحة ، ولكنها ربما تتعلق بالعناصر الغذائية مثل مضادات الأكسدة وحمض الفوليك وفيتامينات ب الأخرى وأحماض أوميغا ٣ الدهنية وغيرها من العناصر الغذائية الدقيقة غير المحددة.

المحاضرة الخامسة:

٥-أعراض وعلامات وتشخيص الأمراض القلبية

ترتبط العلامات والأعراض التي يعاني منها الأشخاص المصابين بالأمراض القلبية بمشاكل مرتبطة بخلل النظم (Dysrhythmias) والتوصيل(Conduction) ؛الامراض القلبية الوعائية (CAD)، الاضطرابات المعدية والتهابات القلب وكذلك مضاعفات الامراض القلبية الوعائية مثل فشل القلب والصدمة القلبية. هذه الاضطرابات لديها العديد من العلامات والأعراض المشتركة.

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فيما يلي علامات وأعراض الامراض القلبية الوعائية الجراحية الأكثر شيوعا،

١-ألم في الصدر أو عدم الراحة تحت القص أو فوق الصدر (عبر جدار الصدر بالكامل)و قد ينتشر إلى الرقبة أو الفك أو الكتفين أو الذراع اليسرى (الذبحة الصدرية، متلازمة الشريان التاجي الحادة (ACS)، خلل النظم، أمراض القلب الصمامية)

٢- تسرع التنفس(tachypnea) أو ضيق في التنفس(dyspnea) (متلازمة الشريان التاجي الحادة ، صدمة القلب، فشل القلب(HF)، أمراض القلب الصمامية)

٣-استفراغ و غثيان

٤-القلق والشعور بالموت الوشيك

٥-جلد بارد ومرقش تناقص النبضات المحيطية

٦-انخفاض ضغط الدم أو ارتفاع ضغط الدم

٧- الوذمة الطرفية، زيادة الوزن، انتفاخ البطن بسبب الطحال الموسع والكبد أو الاستسقاء (فشل القلبHF)

٨- الخفقان (عدم انتظام دقات القلب من مجموعة متنوعة من الأسباب، بما في ذلك متلازمة الشريان التاجي الحادة أو الكافيين أو المنشطات الأخرى، الإجهاد، أمراض القلب الصمامية، تمدد الأوعية الدموية البطينية)

٩- التعب يشار إليها أحيانا باسم الإنهاك (وهي أعراض تحذير مبكر عن متلازمة الشريان التاجي الحادة أو فشل القلب أو أمراض القلب الصمامية، والتي تتميز بالشعور بالتعب أو الإرهاق بشكل غير عادي وسرعة الانفعال والاكتئاب)

١٠- دوخة، إغماء، أو تغييرات في مستوى الوعي (صدمة القلب، اضطرابات الأوعية الدموية الدماغية، خلل النظم، انخفاض ضغط الدم، انخفاض ضغط الدم الوضعي).

<u>التشخيص:</u>

يستخدم الاختبارات المختبرية لتقييم عوامل الخطر مثل مستوى الدهون غير الطبيعية في الدم (مستويات الدهون الثلاثية المرتفعة ومستويات الدهون منخفضة الكثافة(LDL) وعالية الكثافة (HDL)).

<u>إجمالي الكوليسترول في الدم:</u>

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ترتفع نسبة الكوليسترول في الدم مع فرط شحوم الدم (Hyperlipidaemia). يشتمل ملف مستوى الدهون على مستويات الدهون الثلاثية، وعالية الكثافة ومنخفضة الكثافة. يتم إجراء الحسابات من نسبة الشحوم العالية الكثافة إلى الكوليسترول الكلي. يجب أن تكون النسبة ١: ٥ على الأقل، ولكن ١: ٣ تكون النسبة مثالية. ترتبط مستويات الدهون المرتفعة بزيادة خطر تصلب الشرايين. في الأشخاص الذين يعانون من تاريخ عائلي من فرط شحوم الدم.

البروتين سي التفاعلي: هو بروتين مصل يرتبط بالعمليات الالتهابية. تشير الدلائل الحديثة إلى أن مستويات المرتفعة من هذا البروتين في الدم قد تكون علامة تنبؤيه لأمراض القلب المزمنة.

ضغط الدم من الكاحل العظمي (ABI) وهو اختبارا غير مكلف وغير غازي مؤشر لأمراض الأوعية الدموية الطرفية التي قد تكون علامة تنبؤيه لأمراض القلب المزمنة. يتم قياس ضغط الدم الانقباضي في الشرايين العضدية ، الظنبوبية الخلفية والشرايين الظهرية (Bractial، Dossibial ,Dorsalis Pedis) بواسطة دوبلر. اذا كان ضغط الدم في الكاحل اقل من <٠.٩ في الساق فإنه يشير إلى وجود مرض شرياني محيطي وخطر كبير للامراض القلبية المزمنة.

اختبار تخطيط القلب اثناء التمرين: يستخدم تخطيط القلب لتقييم الاستجابة لزيادة عبء العمل على القلب الناجم عن التمرين. يعتبر الاختبار "إيجابيا" لأمراض القلب المزمنة إذا تم اكتشاف نقص التروية القلبية في عضلة القلب على جهاز تخطيط القلب (انخفاض في موجة ST بأكبر من ٣ مم). يتم ايقاف الاختبار عندما يتطور لدى المريض آلام في الصدر أو بسبب التعب الزائد أو عدم انتظام ضربات القلب أو الأعراض الأخرى قبل أن يتم تحقيق معدل ضربات القلب الأقصى المتوقعة.

التصوير المقطعي بحزم الإلكترون (EBCT) يخلق صورة ثلاثية الأبعاد للقلب والشرايين التاجية التي يمكن أن تكشف الخثرات وغيرها من التشوهات. لا يتطلب هذا الاختبار غير الغازي أي تحضير خاص ويمكنه تحديد الأفراد المعرضين لخطر تطور نقص تروية في عضلة القلب.

تصوير نضح عضلة القلب (الومضان): لتقييم تدفق الدم في عضلة القلب والتروية سواء في راحة وأثناء اختبار الإجهاد (التمرين أو الإجهاد العقلي).

المحاضرة السادسة:

٧-مضاعفات أمراض القلب:

Appendices…….

مضاعفات الجهاز العصبي:

- ارتباك
- وضعف الذاكر
- القلق وعدم الراحة
- الأرق

مضاعفات الجهاز التنفسي

- ضيق التنفس عند الجهد
- ضيق في التنفس
- سرعة التنفس
- سعال جاف
- خشخشة او فرقعة في قواعد الرئة
- وذمة رئوية
- التهاب رئوي
- الربو القلبي
- الانصباب الجنبي
- تنفس شاين ستوكس
- الحماض التنفسي

مضاعفات الجهاز الهضمي

- فقدان الشهية والغثيان
- انتفاخ في البطن
- تضخم الكبد
- ألم الربع العلوي الأيمن
- سوء التغذية
- الاستسقاء
- ضعف الكبد

مضاعفات الجهاز القلبي والأوعية الدموية

- عدم تحمل النشاط
- عدم انتظام دقات القلب
- الخفقان
- أصوات القلب S3، S4
- ارتفاع الضغط الوريدي المركزي
- انتفاخ وريد العنق
- الارتجاع الكبدي الوداجي
- تضخم الطحال
- الخناق الصدري
- الموت القلبي المفاجئ
- الصدمة القلبية

مضاعفات الجهاز العضلي الهيكلي

Appendices…….

- إعياء
- ضعف

مضاعفات الجهاز البولي التناسلي

- قلة التبول
- التبول الليلي

مضاعفات الجلد

- شحوب أو زرقة
- جلد بارد ورطب
- التعرق
- زيادة خطر انهيار الأنسجة

مضاعفات عمليات التمثيل الغذائي

- الوذمة المحيطية
- زيادة الوزن
- الحماض الأيضي

Appendices…….

المحاضرة السابعة:

٨-علاج أمراض القلب

العلاج الدوائي:

Medication	Therapeutic Effects	Key Nursing Considerations
Angiotensin-Converting Enzyme (ACE) Inhibitors: **-Captopril (Capoten)** **-Quinapril (Accupril)** **-Ramipril (Altace)**	**-decrease BP and afterload** **-Relieves signs and symptoms of HF** **- Prevents progression of HF**	**Observe for symptomatic hypotension, increased serum K, cough, and worsening renal function**
Angiotensin Receptor Blockers (ARBs) **-Valsartan (Diovan)** **-Losartan (Cozaar)**	**-decrease BP and afterload** **-Relieves signs and symptoms of HF** **- Prevents progression of HF**	**Observe for symptomatic hypotension, increased serum K, cough, and worsening renal function**
Beta-adrenergic Blocking Agents (beta-blockers) **Metoprolol** **Atenolol**	**Dilates blood vessels, reduce afterload and signs and symptoms of HF and Improves exercise capacity**	**Observe for decreased heart rate, symptomatic hypotension, and fatigue**
Diuretics **-Furosemide (Lasix)** **-Spironolactone (Aldactone)**	**reduce fluid volume overload and signs and symptoms of HF**	**Observe for electrolyte abnormalities, renal dysfunction, diuretic resistance, and decreased BP. Carefully monitor I&O and daily weight**
Digitalis **-Digoxin (Lanoxin)**	**Improves contractility reduce signs and symptoms of HF**	**Observe for bradycardia and digitalis toxicity**
Calcium Channel Blockers **Amlodipine (Norvasc)** **Felodipine (Plendil)**	**Vasodilation and reduction of systemic and vascular resistance or dizziness.**	**Observe for symptomatic hypotension, drowsiness, dizziness.**

Appendices…….

العلاج الجراحي لأمراض القلب:

تنقسم تصنيف أو أنواع جراحة القلب إلى عدة فئات:

١- أمراض القلب الصمامية

٢-أمراض الشرايين التاجية

٣. جراحة قصور القلب

٤- أمراض الشريان الأورطي الصدري

5. الزرع

6. أورام القلب

١- أمراض القلب الصمامية:

هنالك العديد من الأمراض القلبية المتعلقة بالصمامات القلبية والتي تحتاج الى علاج جراحي مثل:

-إصلاح الصمام التاجي

-إصلاح الصمام التاجي بسبب قلس الصمام التاجي

-إصلاح الصمام ثلاثي الشرفات

-استبدال الصمام الرئوي

-استبدال الصمام الأورطي

٢-أمراض الشرايين التاجية

تطعيم مجازة الشريان التاجي باستخدام المجازة القلبية الرئوية

Appendices…….

٣. جراحة قصور القلب

-إعادة بناء البطين الأيسر

-جراحة مضاعفات احتشاء عضلة القلب

-جراحة تمزق جدار البطين

-عيب الحاجز البطيني الحاد (VSD)

-قلس الصمام التاجي الإقفاري الحاد

٤- أمراض الشريان الأورطي الصدري

-تسلخ الأبهر

6. أورام القلب

Appendices…….

المحاضرة الثامنة:


٩-تحضير المريض قبل العمل الجراحي

التمريض قبل الجراحة هو مصطلح يصف مجموعة متنوعة من وظائف التمريض المرتبطة بالعمل الجراحي ، ويتضمن ثلاث مراحل قبل وأثناء وبعد الجراحة. تبدأ كل مرحلة من هذه المراحل وتنتهي عند نقطة معينة لبدء المرحلة الأخرى ، وتتضمن كل مرحلة مجموعة من الأنشطة التمريضية التي تؤديها الممرضة باستخدام عملية التمريض (NP).

جميع مراحل رعاية المريض قبل وأثناء وبعد الجراحة مهمة ، لكن مرحلة ما قبل الجراحة تعتبر من أهم هذه المراحل لأن المرضى في هذه المرحلة غير قادرين على تلبية احتياجاتهم الجسدية أو النفسية ، مما يؤدي إلى اختلال التوازن لدى المرضى سواء كانت عاطفية أو نفسية. في هذه المرحلة يأتي دور التمريض الحيوي من خلال الدعم النفسي وتثقيف المريض وتهيئته للجراحة ومعرفة المشاكل وإعطاء معلومات عن الجراحة مما يساعد على تقليل مخاوف المرضى من الجراحة.

الهدف الأساسي لطاقم التمريض في هذه المرحلة هو رفاهية المرضى قبل العملية ، من خلال العناية بهم ، وإعدادهم للجراحة ، وتقديم الرعاية التمريضية حسب الإجراء الجراحي. تشمل الرعاية التمريضية التقييم والإرشاد والاستعداد البدني والنفسي لتعزيز التعافي وتقليل مضاعفات ما بعد الجراحة.

تبدأ عملية تنظيم الرعاية التمريضية قبل الجراحة بزيارة تمريضية للمرضى في جناحهم الخاص ، والتي تشمل الرعاية من دخول المريض إلى الخروج بعد الجراحة. تقوم الممرضة بجمع معلومات المريض وتحديد الاحتياجات الجسدية والنفسية والعاطفية وتقديم الرعاية التمريضية بشكل فعال لتوفير الشفاء الفعال.

الجراحة هي عملية فنية يقوم بها مجموعة من المتخصصين حسب المشكلة الصحية وهي غير معروفة للمرضى ، لذلك قد يكون لدى المرضى مشاعر مختلفة قبل الجراحة مثل القلق والخوف وعدم الراحة والضغط

Appendices.....

النفسي والجسدي ، لذلك يجب إجراء رعاية تمريضية مخططة مسبقًا لتقليل هذه المشاعر ، وبالتالي تقليل مضاعفات ما بعد الجراحة.

من المهم أن يكون هناك تعاون بين الفريق الجراحي وطاقم التمريض قبل العملية. يجب أن يثق المريض الذي سيخضع لعملية القلب المفتوح في الممرضة التي ستوفر له الرعاية التمريضية اللازمة بكفاءة عالية ، وهذه الثقة تبنيها الممرضة من خلال الإعداد المناسب للمريض والمعلومات الشاملة عن المريض والتقنية الجراحية. إلى جانب الكفاءة والمهارة العالية التي تزيد من معدل تحقيق نتيجة إيجابية للمريض بعد الجراحة.

يعد تحضير المريض قبل الجراحة أمرًا مهمًا للغاية وهو بروتوكول معتمد في معظم المؤسسات الصحية. أكدت الأبحاث أن توعية المريض قبل الجراحة تساعد على التعافي السريع وتقليل المضاعفات بعد الجراحة. نظرًا لأن جراحة القلب المفتوح لها خصوصية كبيرة واهتمام كبير لمعظم المرضى ، فمن الضروري أن تعرف الممرضة الوقت المناسب لإعداد المريض ولتقييم الحاجة إلى التعلم وتقديم المعلومات في الوقت المناسب لتقليل مستوى القلق.

هنالك قائمة بأهم المهام التي على الممرض\ة اتباعها عند تحضير المريض للعمل الجراحي وهي:

١- يجب على الممرضة قبل كل شيء ان تتأكد من اسم المريض بالتفصيل.
٢- يجب ان تتأكد الممرضة بأن المريض بكامل وعيه وصحته العقلية من أجل أخذ موافقته على العمل الجراحي وفي حال كان المريض غير قادر على إعطاء الموافقة فلا بد من وجود موافقة أحد الأقارب مثل الأب أو الأم أو الأخ أو الأخت.
٣- يجب على الممرضة أن تشرح للمريض أن مكان الشق الجراحي سوف يكون في الصدر.
٤- يجب على الممرضة أن تتأكد بأن المريض ليس لديه حساسية اتجاه الأدوية وفي حال ووجود ذلك يجب عليها توثيق ذلك وإخبار فريق الجراحة بذلك.
٥- يجب على الممرضة أن تسأل المريض اذا كان لديه أمراض وراثية
٦- يجب على الممرضة أن تسأل المريض اذا كان يعرف ماهي تكلفة العمل الجراحي وفي حال عدم معرفته فيجب عليها شرح الموضوع للمريض واقاربه
٧- على الممرضة أن تتأكد من تحضير أكياس الدم احتياطيا في حال احتاج المريض الى نقل دم قبل أو اثناء أو بعد العمل الجراحي وأن تسجل ارقام اكياس الدم المحضرة وعددها في ملف المريض
٨- من المهم أن تتأكد الممرضة بأن المريض صائم تماما قبل العمل الجراحي وفي حال عدم التزام المريض بذلك فعليها اخبار الفريق الجراحي بذلك
٩- مكان العمل الجراحي في الصدر غالبا ما يحتوي على شعر عند الرجال ولذلك على الممرضة أن تجهز مكان الشق الجراحي من خلال حلاقة المكان وتنظيفه
١٠- يجب تنظيف جسم المريض قبل العمل الجراحي من خلال عمل حمام للمريض
١١- يجب على الممرضة ان تضع علامة على مكان العمل الجراحي
١٢-من المهم أن تتأكد الممرضة بأن المريض لديه أكثر من خط وريدي وبـأن هذه الخطوط تعمل

Appendices…….

١٣-يجب على الممرضة اخبار المريض بان يتبول قبل العمل الجراحي في حال كان المريض ليس لديه قسطرة بولية

١٤- قبل العمل الجراحي يجب على المريض نزع ملابسه كلها بما فيها الملابس الداخلية لأنها غير عقيمة

١٥- بعد أن ينزع المريض ملابسه يجب على الممرضة الباسه ثوب جراحي معقم

١٦-في حال كان لدى المريض مسرب (drain) أو قسطرة بولية فيجب على الممرضة افراغها وتوثيق الكمية في ملف المريض

١٧- يجب على الممرضة سؤال المريض اذا كان لديه طقم اسنان وفي حال وجوده يجب عليها نزعه قبل العمل الجراحي

١٨- يجب على الممرضة سؤال المريض اذا كان يستعمل عدسات لاصقة للعينين وفي حال وجودها يجب عليها نزعها

١٩-كذلك يجب على الممرضة سؤال المريض اذا كان يستعمل اجهزه للسمع وفي حال وجودها يجب عليها نزعها

٢٠- يجب على الممرضة ازالة اي مكياج لدى المريض قبل العمل الجراحي

٢١- كذلك على الممرضة نزع اي مجوهرات لدى المريض وحفظها في الأمانات وتوثيق ذلك بوجود أكثر من ممرضة تفاديا لوقوع اي مشاكل

٢٢-يجب على الممرضة ان تلبس المريض سوارا مكتوب عليه اسمه ورقم ملفه

٢٣- في حال كان المريض لديه ادوية قبل العمل الجراحي فيجب على الممرضة اعطائها للمريض وتسجيل ذلك في ملف المريض

٢٤- كذلك على الممرضة ان تتأكد بان كل النتائج المخبرية موجودة في ملف المريض

٢٥- يجب على الممرضة التأكد من وجود نتائج التحاليل الشعاعية من صور للصدر او مرنان او مفراس في ملف المريض

٢٦- من المهم ان تتأكد الممرضة بانه يوجد تخطيط قلب حديث لدى المريض وتتأكد من وجوده في ملف المريض قبل العمل الجراحي

٢٧-يجب على الممرضة ان تضع في ملف المريض ورقة الادوية الخاصة بالمريض وتاريخ ووقت اعطاء هذه الادوية

٢٨- يجب على الممرضة ان تتأكد من وجود ورقة خاصة بالتوثيق التمريضي في ملف المريض

٢٩- في حال كان المريض لديه قسطرة قلبية قبل العمل الجراحي ف على الممرضة ان تتأكد بان تقرير القسطرة والقرص موجود في ملف المريض

٣٠- يجب على الممرضة ان تتأكد من وجود استشارة تخديريه للمريض قبل العمل الجراحي

٣١- في حال كان هنالك اوامر طبية بإيقاف الادوية المميعة للدم ف على الممرضة التأكد من ايقافها قبل العمل الجراحي وفي حال عدم ايقافها فعليها اخبار الفريق الجراحي بذلك

Appendices…….

٣٢- اخيرا على الممرضة استخدام مرهم الصاد الحيوي (mupirocin) على مكان العمل الجراحي وذلك لمنع نمو وتكاثر الجراثيم على الجلد والمساعدة على تقليل حدوث الالتهابات في مكان الشق الجراحي بعد العمل الجراحي.

جمهورية العراق
وزارة التعليم العالي والبحث العلمي
جامعة بابل
كلية التمريض

فعالية البرنامج التعليمي قبل الجراحة على معلومات الممرضين وأدائهم في ردهات جراحة القلب في منطقة الفرات الأوسط

اطروحة مقدمة

الى

مجلس كلية التمريض\جامعة بابل

كجزء من متطلبات نيل درجة

الدكتوراه فلسفة علوم في التمريض

من قبل

عمار محمد ثامر عبود

بإشراف

الأستاذ الدكتورة فخرية جبر محيبس

الأستاذ الدكتور أمين عجيل الياسري

1443 H.A. /جمادى الآخر 2021 A.D. / حزيران

الخلاصة

امراض القلب او اعتلال القلب هو مصطلح شامل يشير الى مجموعة مختلفة ومتنوعة من الامراض التي تصيب القلب والتي يحتاج بعضها الى اجراء التداخل الجراحي واحيانا الاكتفاء بالعلاج المحافظ. تعد امراض القلب السبب الاول للوفيات في كل من الولايات المتحدة وانجلترا، بالإضافة الى ان 25.4% من اجمالي الوفيات في الولايات المتحدة تعود الى هذه الامراض

يتم قبول مرضى جراحة القلب بشكل عام في قسم جراحة القلب أو في حالة حرجة في وحدات العناية المركزة (ICU). يعاني معظم هؤلاء المرضى عادةً من أمراض خطيرة مثل احتشاء عضلة القلب أو قصور القلب أو مرض الشريان التاجي حيث يتم إجراء التداخل الجراحي على القلب بشكل طارئ أو انتقائي حسب حالة المريض.

التمريض قبل الجراحة هو مصطلح يصف مجموعة متنوعة من وظائف التمريض المرتبطة بالعمل الجراحي ، ويتضمن ثلاث مراحل قبل وأثناء وبعد الجراحة. تبدأ كل مرحلة من هذه المراحل وتنتهي عند نقطة معينة لبدء المرحلة الأخرى ، وتتضمن كل مرحلة مجموعة من الأنشطة التمريضية التي تؤديها الممرضة باستخدام عملية التمريض (NP) . جميع مراحل رعاية المريض قبل وأثناء وبعد الجراحة مهمة ولكن تعتبر مرحلة ما قبل الجراحة من أهم هذه المراحل لأن المرضى في هذه المرحلة غير قادرين على تلبية احتياجاتهم الجسدية أو النفسية مما يؤدي إلى اختلال التوازن لدى المرضى سواء كانت عاطفية أو نفسية.

تلعب الممرضات دورًا أساسيًا في تقييم المرضى قبل الجراحة القلبية من خلال تحديد احتياجات المريض ، ليس فقط لجراحة القلب ولكن أيضًا للرعاية التمريضية الكاملة لكل عملية جراحية (قبل وأثناء وبعد الجراحة). التقييم قبل الجراحة هو عملية تفاعلية لتوفير المعلومات والدعم النفسي والاجتماعي والعاطفي والتثقيف الصحي للمرضى مما يساعد على تعزيز تعافي المريض بعد الجراحة. تلعب الممرضة أيضًا دور المنسق بين أعضاء الفريق من خلال جمع معلومات المرضى وحمايتها لتوفير أفضل رعاية صحية وتلبية احتياجات المريض قبل الجراحة وبعدها. استشارة التمريض قبل الجراحة مفيدة من وجهة نظر المرضى، حيث يتم تزويدهم بالمعلومات الأساسية حول الإجراء الجراحي وشرح عملية الرعاية قبل الجراحة وبعدها.

الهدف من هذه الأطروحة هو تقييم فعالية برنامج تعليمي حول معرفة الممرضين وأدائهم فيما يتعلق بجراحة القلب وإعداد المرضى قبل جراحة القلب للمرضى البالغين الذين يحتاجون إلى جراحة القلب.

صممت دراسة شبه تجريبية لمجموعة واحدة للاختبار القبلي والبعدي لإجراء هذه الدراسة. تم اعتما د تقنية أ خذ العينات الملائمة واختيار ٤٨ من الممرضين والممرضات اللذين يعملون في ردهات جراحة القلب في مستشفيين حكوميين ومستشفى أهلي.

تم استخدام استمارة استبيان عن معلومات الممرضين وادائهم في ردهات جراحة القلب، حيث تم اعداد هذه الاستمارة بواسطة الباحث والمشرفين وتم عرضها على نخبة من الخبراء وتم اجراء التعديلات المناسبة عليها حسب راي الخبراء. وتتكون هذه الاستمارة من ثلاثة اجزاء وهي: أولا: البيانات الاجتماعية والديموغرافية للممرضين المشاركين في الدراسة، ثانيا: استمارة استبيان عن معلومات الممرضين فيما يتعلق بأمراض وجراحة القلب (٣١ سؤال)، ثالثا: قائمة بمجموعة مراقبة لأداء الممرضين فيما يتعلق بتحضير المرضى قبل العمل الجراحي (٣٢ اجراء).

اظهرت نتائج الدراسة ان اكثر من نصف العينة كانوا ذكورا 54.2% وكانت اعمارهم بين 29-25 سنة، وانهم حاصلون على شهادة بكالوريوس في التمريض ولديهم 5-1 سنوات خبرة وكذلك معظمهم ليس لديه دورات تدريبية سابقة في مجال جراحة القلب داخل او خارج العراق.

فيما يتعلق بمعلومات الممرضين، اظهرت الدراسة بان اكثر من نصف العينة (54.2%) 13 كان لديهم معلومات متوسطة عن امراض وجراحة القلب قبل تنفيذ البرنامج التعليمي وانه بعد تنفيذ البرنامج التعليمي اصبح معظمهم (87.5%)21 لديهم معلومات كافية عن امراض وجراحة القلب.

فيما يتعلق بممارسات الممرضين وتحضير المريض قبل العمل الجراحي، فلقد اظهرت الدراسة بان اكثر من نصف العينة (70.9%)17 لم يكونوا يقومون بتحضير المريض بالطريقة الصحيحة قبل تنفيذ البرنامج التعليمي وانه بعد تنفيذ البرنامج اصبحت الغالبية العظمى (87.5%)21 من الممرضين يقومون بتحضير المريض بالشكل الصحيح قبل العمل الجراحي.

كما اظهرت الدراسة بانه ليس هنالك علاقة بين معلومات الممرضين وادائهم وبين العمر والجنس ومستوى التعليم وعدد سنوات الخبرة قبل تنفيذ البرنامج التعليمي بنسبة (0.808, 0.163, 0.392, 0.126, 0.347 على التوالي).

اخيرا اظهرت نتائج الدراسة بان هنالك علاقة بين معلومات الممرضين وادائهم والمعلومات الديموغرافية للمشاركين بالدراسة بعد تنفيذ البرنامج التعليمي بنسبة (0.001 and 0.001 على التوالي) وبمتوسط عالي بعد تنفيذ البرنامج التعليمي بنسبة (M=0.73 versus M=0.29 بالنسبة لمعلومات الممرضين) اما بالنسبة لأدائهم بعد تنفيذ البرنامج فكانت ايضا بمتوسط عالي (M=2.38 versus M=2.01 بالنسبة لأداء الممرضين المشاركين بالدراسة.

وبناء على ما توصلت إليه هذه الدراسة فان من اهم توصياتها

- عمل برامج تعليم وتدريب بشكل مستمر لكل الممرضين مرة واحدة بالسنة على الاقل

- على المستشفيات الحكومية والاهلية القيام وبشكل مستمر بإقامة برامج تعليمية وتدريبية للممرضين اللذين يعملون في ردهات جراحة القلب لتجاوز جميع العقبات التي تمنع تطور الممرضين لمعلوماتهم وادائهم

- تشجيع الممرضين على حضور المؤتمرات المحلية والعالمية والقيام بورشات عمل للممرضين اللذين يعملون في ردهات جراحة القلب لزيادة معلوماتهم ومهاراتهم العملية والنظرية.

- تزويد الممرضين في ردهات جراحة القلب بكتيب يحتوي معلومات وصور مبسطة عن امراض القلب وطرق علاجها والتحضير الامثل للمريض قبل العمل الجراحي.

- اخيرا هنالك حاجة ماسة الى مزيد من البحوث التي تركز على معلومات الممرضين وادائهم ودور الممرضين وتأثيرهم على رعاية المرضى وتقليل خطر مضاعفات العمل الجراحي قبل وبعد تنفيذ العمل الجراحي.