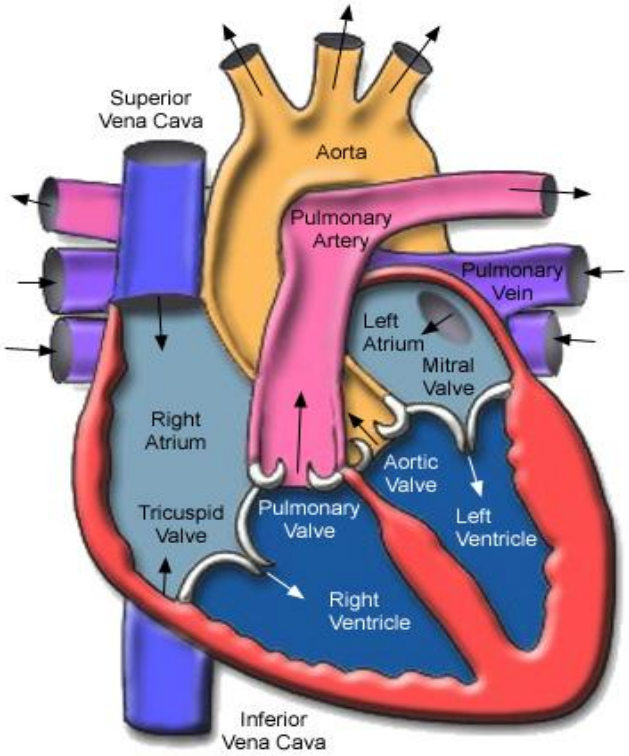
REVIEW OF LITERATURE

PART (I)

Anatomy and Physiology of Cardiovascular System

The cardiovascular system is composed of the heart and blood vessels, its function include pumping blood and transporting gases, nutrients and wastes. **Heart:** Is a vital organ in body that supplies "liquid of life", the blood to all organs of the body. Heart itself gets this "liquid of life" by means of coronary arteries ***(Roads, 2008; Kumar, 2009).***

Fig (1) Anatomy of the heart



Source: ***Health Information, (2013):*** Anatomy of the heart. Available at: http://healthinformation1.4arabs.com/heart/2.html. Accessed on 25/1/2013.

The heart a hollow muscular organ, rests on diaphragm, near the midline of the thoracic cavity in the mediastinum (space between the two lungs). Its mass average is 250g in adult female and 300g in adult male. **Pericardium:** It is the membrane that surrounds and protects the heart. It confines the heart to its position in the mediastinum, while allowing sufficient freedom of movement for vigorous and rapid contraction. It consists of two principle parts the fibrous pericardium and the serous pericardium. **The cardiac tissue layer:** The wall of the heart is composed of three layers: epicardium (the thin, serous outer layer), myocardium (the thick, muscular middle layer) and endocardium (the smooth inner layer that comes into contact with blood) ***(Mark, 2003; Jackson & Chamberlain, 2006).***

Heart chambers*:* The heart contains four chambers (fig, 1). The two upper chambers are the atria and the two lower chambers are ventricle. (a) The right atrium receives systemic venous blood through the superior vena cava, inferior vena cava and coronary sinus. (b) The right ventricle receives blood from the right atrium through the tricuspid valve during ventricular diastole, then ejects deoxygenated blood through the pulmonic valve into the pulmonary artery and into the pulmonary circulation during ventricular systole. (c) The left atrium receives oxygenated blood returning to the heart from the lung through pulmonary veins; and (d) The left ventricle, a high pressure chamber, receives blood from the left atrium through the mitral valve during ventricular diastole, then ejects oxygenated blood through the aortic valve into the aorta and into systemic circulation during ventricular systole ***(Hurst et al., 2005; Timby & Smith, 2007).***

Heart valves: Normally allows blood flows in only one direction. There are two types of heart valves, antriventricular and semilunar valves. The two atrioventricular (AV) valves, which are between the atria and the ventricles, are the mitral valve and the tricuspid valve, (a) the mitral valve, also known as the "bicuspid valve" because it contains two flaps. It allows the blood to flow from the left atrium into the left ventricle. It is on the left side of the heart and has two cusps; (b) the tricuspid valve is the three-flapped valve on the right side of the heart, between the right atrium and the right ventricle which stops the backflow of blood between the two. It has three cusps. The semiluner valves are located between each ventricle and each corresponding artery; the pulmonic valve is located between the right ventricle and pulmonary artery, the aortic valve is located between the left ventricle and aorta ***(AHA, 2013; Wikipedia, 2013).***

Conducting system: It consists of specialized cardiac cells that initiate or propagate electrical impulses throughout the myocardium as a precursor to cardiac muscle contraction. The conducting system comprises the sinuatrial (SA) node, the atrioventricular (AV) node, and the A V bundle, with its two limbs and the subendocardial plexus of Purkinje fibers. The impulse begins at the SA node, activates the atrial musculature, and is thereby conveyed to the A V node ***(Bullock& Henze, 2005; Rahilly et al., 2008)***.

The SA node is located anterolaterally at the junction of the superior vena cava and the right atrium. It acts as pacemaker for the heart. It consists of a network of specialized cardiac muscle fibers, which are continuous with the atrial muscle fibers. The A V node is located beneath the endocardium of the right atrium, in the interatrial septum. It receives

impulses from SA node and relays them to the ventricles ***(Hargrove, 2005).***

The AV bundle is a bundle of specialized muscle fibers in myocardial septum, conducts impulses from the A V node. It divides into right and left branches. The right bundle branch (RBB) conducts impulses down the right side of the septum; the left bundle branch (LBB) conducts impulses into right and left fascicles that fan out into the left ventricular muscle. The RBB and LBB terminate in the Purkinje fibers, which propagate electrical impulses into the endocardium and into myocardium (***Rahilly et al., 2008***).

Blood supply to the heart: The heart is supplied by the right and left coronary arteries, which usually arise from the right and left aortic sinuses. The myocardium is first tissue to be supplied with oxygenated blood with each heart beat. **Physiology of the heart:** Each beat of the heart consists of two phases' diastole and systole; during diastole the ventricles are filling with blood from the atria. The atria are contracting so as much as possible can be moved to the ventricles. It is also during diastole that the coronary arteries become perfused with the blood. During systole, the ventricles contract moving blood forward to either the lung or the rest of the body. While during systole the atria are relaxed and filling with blood, diastole lasts longer so that ventricular and coronary artery filling may take place. This process repeats itself with each heart beat ***(Cardiovascular Consultants, 2006; Jacob, 2013).***

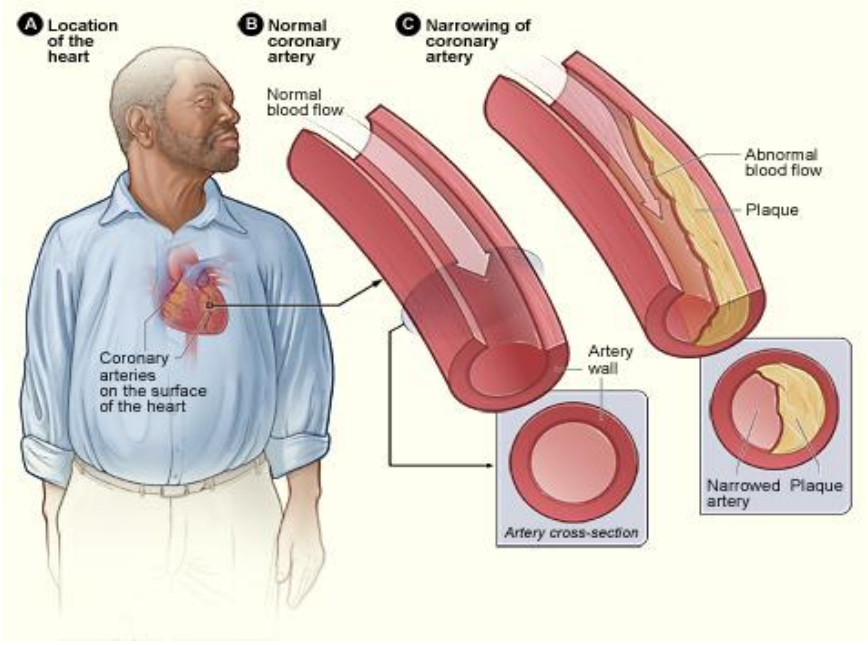
PART (II)

Coronary Artery Disease

Coronary artery disease also called ischemic heart disease (IHD) or coronary heart disease (CHD) is caused by a thickening of the inside walls of the coronary arteries. This thickening is called atherosclerosis. A fatty substance called plaque builds up inside the thickened walls of the arteries, blocking or slowing the flow of blood ***(Family Doctor. org, 2011).***

The CAD develops when a combination of fatty material, calcium, and scar tissue (plaque) builds up in the coronary arteries that supply the heart with blood. Through these arteries the heart muscle (myocardium) gets the oxygen and other nutrients it needs to pump blood. The plaque often narrows the artery so that the heart does not get enough blood. This slowing of blood flow causes chest pain, or angina. If plaque completely blocks blood flow, it may cause a heart attack (myocardial infarction) (Figure 2) ***(e medicine health, 2013).***

Fig(2): CAD pathophysiology

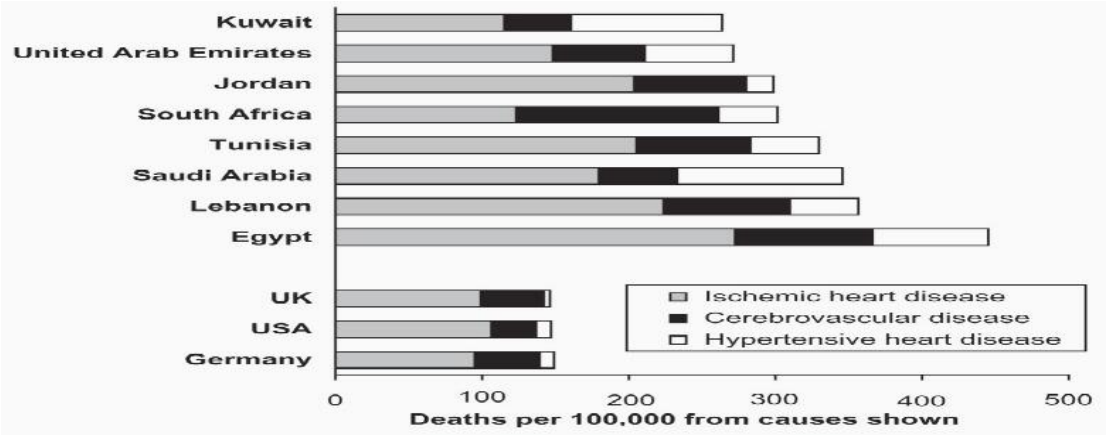


Source: ***Health Information, (2013):*** What is coronary heart disease, Available at: http://www.nhlbi.nih.gov/health/health-topics/topics/cad/ .Accessed on 25/1/2013.

Incidence and Prevalence of Coronary Artery Disease

Almost 18 million people about 7 percent of all Americans have Coronary heart disease. It is the number one killer of both men and women ***(WHO, 2007)***. Half of all deaths in the developed world and a quarter of deaths in the developing world are due cardiovascular disease. It is predicted that by the year 2020 coronary artery disease will have become the leading cause of death in the developing world ***(Boutayeb*** & ***Boutayeb, 2005).***

Fig (3) Death rates from cardiovascular disease in selected countries



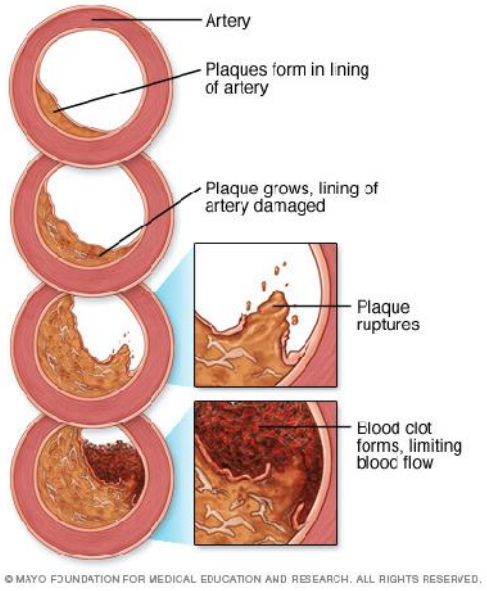
Source: ***World Health Organization, (2013):*** Data and statistics: Mortality and health status. Available at http://www.who.int/research/en/ Accessed on 21/1/2013

In Egypt, ***The National Information Center for Health by Ministry of Health*** (***2008)*** reported that the incidence of death caused by

cardiovascular diseases was 466381 per 100.000 populations per year. As well, the incidence of death caused by acute myocardial infraction was 8041 per 100.000 populations per year (Figure 3).

The CAD develops from a young age, cholesterol-laden plaque can start to deposit in the blood vessel walls. As client gets older, the plaque burden builds up, inflaming the blood vessel walls and raising the risk of blood clots and heart attack. The plaques release chemicals that promote the process of healing but make the inner walls of the blood vessel sticky. Then, other substances, such as inflammatory cells, lipoproteins, and calcium that travel in bloodstream start sticking to the inside of the vessel walls ***(WebMD, 2013a).***

Fig (4) Development of atherosclerosis



Source: ***Mayo Clinic, (2013):*** Available at http://www.mayoclinic.com/health/medical/IM00642. Accessed on 5/1/2013.

Risk Factors for Coronary Artery Disease

There is no single cause for coronary heart disease, but there are 'risk factors' that increase chance of developing it. There are "modifiable" risk factors (ones that can change) such as; tobacco smoking, high blood cholesterol, high blood pressure, diabetes mellitus, physical inactivity, obesity, diet and stress; and "non-modifiable" risk factors (ones that can't change) such as; age, gender, family history and race ***(National Heart, Lung, and Blood Institute, 2011b)***.

Modifiable risk factors include:

Tobacco smoke: Cigarette smoking is a powerful independent risk factor for sudden cardiac death in patients with coronary arteries' disease. Cigarette smoking also acts with other risk factors to greatly increase the risk for coronary heart disease. It triggers a buildup of plaque in arteries. Smoking also increases the risk of blood clots forming in arteries. Blood clots can block plaque-narrowed arteries and cause a heart attack. Some research shows that smoking raises risk of CAD in part by lowering high-density lipoprotein (HDL) cholesterol levels. Smokers' risk of developing coronary artery disease is 2-4 times that of nonsmokers ***(National Heart, Lung and Blood Institute, 2011a).***

High blood cholesterol: Cholesterol is a type of fat (lipid) that the body needs for many important functions, such as producing new cells. High cholesterol increases the risk of developing heart disease and stroke ***(WebMD, 2010)***. It travels through the bloodstream in small packages called lipoproteins. Two major kinds of lipoproteins carry cholesterol throughout body:

- Low-density lipoproteins (LDL): LDL cholesterol sometimes is called "bad" cholesterol. This is because it

carries cholesterol to tissues, including heart arteries. A high LDL cholesterol level raises risk of CAD.

- High-density lipoproteins (HDL): HDL cholesterol sometimes is called "good" cholesterol. This is because it helps remove cholesterol from arteries. A low HDL cholesterol level raises risk of CAD ***(National Heart, Lung and Blood Institute, 2012a).***

High blood pressure (**Hypertension):** High blood pressure, or hypertension, is a condition in which the force of blood against artery walls is too strong, so it increases the heart's workload, causing the heart muscle to thicken and become stiffer. This stiffening of the heart muscle is not normal, and causes the heart not to work properly. Over time, high blood pressure can damage the arteries, heart, and kidneys and can lead to heart disease and stroke, ***(Thompson & Kloner,2011)***

Diabetes mellitus: Diabetes seriously increases risk of developing cardiovascular disease. .CAD is the important cause of death in at least 65% of diabetic patients. Insulin resistance may be responsible for hyperinsulinaemia, secondary disturbance of lipoprotein metabolism, and a high prevalence of non insulin–dependant diabetes. This metabolic pattern might lead to accelerated atherogenesis either through a direct effect of insulin up on the arterial wall or was a result of changes in lipoprotein concentration ***(Carison, 2009).***

Physical inactivity: Exercise has a number of effects that benefit the heart and circulation, including improving cholesterol and lipid levels and maintaining weight control. People who are sedentary are almost twice as likely to suffer heart attacks than people who exercise regularly ***(Simon, 2011).***

Obesity and overweight: Excess body fat, especially around the waist, can increase the risk for heart disease. Excess weight increases the heart's work because often the blood pressure is higher. It also raises blood pressure and blood cholesterol and triglyceride levels, and lowers HDL ("good") cholesterol levels. It can also make diabetes more likely to develop. **Diet and Nutrition**: A healthy diet is one of the best weapons used to fight cardiovascular disease. It plays an important role in the health of the heart, especially in controlling dietary sources of cholesterol and restricting salt intake that contributes to high blood pressure ***(American Heart Association, 2013a).***

Stress: Individual response to stress may be a contributing factor. Some scientists have noted a relationship between CAD risk and stress in a person's life, their health behaviors and socioeconomic status. These factors may affect established risk factors. For example, people under stress may overeat, start smoking or smoke more ***(American Heart Association, 2013b).***

II- Non modifiable risk factors include:

Age: Simply getting old is a risk factor for cardiovascular disease. About 82 % of people who die of coronary heart disease are 65 or older. **Gender:** It is significant factor as a man has a greater risk of heart disease than a pre-menopausal woman. But once past the menopause, a woman's risk is similar to a man's ***(World Heart Federation, 2013).***

Family history: A family history of acute myocardial infarction in a male first degree relative younger than age 45 or a female first degree relative younger than 55 years is identified as a risk factor for CAD. **Race:** African Americans have a higher prevalence of, and a higher death rate from, CAD than European Americans. In part, the difference results

from the higher incidence of hypertension, obesity, metabolic syndrome, and low physical activity among African Americans ***(Watson et al., 2010; Boudi, 2012).***

Diagnosis of Coronary Artery Disease

Rapid assessment and early diagnosis is an important nursing function in treating CAD, so more delay in assessment and management leads to more muscle damage ***(Kasper et al., 2005).*** The clinical presentation of patient is a key component in the overall evaluation of the patient with CAD, many events are either silent or are clinically unrecognized ***(Fenton, 2009).***

One or more of the following tests are recommended,

1-Laboratory studies: A client being evaluated for CAD should be given a number of laboratory tests. Certain tests are especially helpful in assessing a patient's risk of serious heart damage from atherosclerosis. These include blood tests of lipid levels, and the possible presence of cardiac markers, which are indicators of recent heart cell damage ***(Bock, 2011; Boudi, 2012).***

A- Blood lipid

High serum cholesterol levels markedly increase a person's risk for developing atherosclerosis-induced heart injury. The LDL fraction of cholesterol is the specific culprit. The box below shows both healthy and unhealthy fasting blood lipid levels. Patients with CAD often have one or more lipid levels in the unhealthy range ***(Gibbons et al., 2003).***

Lipid Fasting Blood Levels

	Optimal Levels	Unhealthy Levels
Total cholesterol	<200 mg/dl	>240 mg/dl

Lipid Fasting Blood Levels

	Optimal Levels	Unhealthy Levels
HDL cholesterol	≥60 mg/dl	<40 mg/dl for men <50 mg/dl for women
LDL cholesterol	<100 mg/dl	>160 mg/dl
Triglycerides	<150 mg/dl	>200 mg/dl

Source: ***WebMD, (2013):*** Cholesterol testing and the lipid panel**.** Available at: http://www.webmd.com/cholesterol-management/tests-for-high-cholesterol-lipid-panel Accessed on 20/12/2012

B- Cardiac markers: When heart muscle is damaged, intracellular molecules leak into the bloodstream. After a myocardial infarction, specific heart proteins (cardiac markers) can be detected in a patient's blood within hours and then for many days afterward. The standard cardiac markers are the cardiac troponin molecules. Other commonly measured proteins are the creatinekinase molecules. Cardiac markers are used for diagnosing and following emergency cardiac events ***(Michael & Peter, 2012)***

Creatinekinase(CK): It is an enzyme found in high concentration in the heart and skeletal muscle and in smaller concentration in the brain. CK levels rise rapidly within these tissues, appearing in the serum within 4 to 6 hours after acute myocardial infarction, peaking 12 to 24 hours and then declining over the next 48 to 72 hours **(Lemon & Burke, 2008).**

Troponin: Cardiac specific T and I are proteins released during myocardial damage. They are sensitive enough to detect very small infarctions that don't cause significant CK elevation. Its level can be detected soon after an ischemic event, it remains in the blood for 10 to 14 days after MI, making them useful to diagnose MI when medical treatment is delayed ***(Watson et al., 2010).***

2-Electrocardiogram (ECG): Twelve - lead electrocardiography is standard method for identifying arrhythmias and conduction problems. In terms of CAD, the ECG is quick, accurate and non invasive way to recognize severe heart ischemia. Also, ***The National Heart, Lung and Blood Institute, (2012b)*** added that ECG is a simple, painless test that records the heart's electrical activity. The test shows how fast the heart is beating and its rhythm (steady or irregular). An ECG also records the strength and timing of electrical signals as they pass through the heart. An ECG can show signs of heart damage due to CAD and signs of a previous or current heart attack ***(Zevitz, 2006).***

3- ECG stress test: It assesses the ability of a patient's heart to cope with exercise. A stress test is a controlled way to increase the workload of the heart, and stress tests are used to find the threshold beyond which coronary arteries cannot supply sufficient blood to meet the heart's oxygen needs. The lower the threshold (i.e., the smaller the stress) at which symptoms appear, the worse is the patient's coronary artery disease. ECG stress testing is most useful when physicians are trying to make a diagnosis of CAD in an unclear case, or measuring the exercise limitations imposed by a person's with CAD (**Lee, 2005*; National Heart, Lung and Blood Institute, 2011c)*.**

4- Chest X–ray: A chest X-ray shows the size and shape of the heart and the condition of the lungs. Patients with CAD can have normal chest X-rays, and usually chest X-rays do not help to diagnose CAD. Sometimes, however, chest films will show consequences of the disease, such as heart enlargement, aortic aneurysms, aortic dissections, or pulmonary signs of heart failure ***(RadiologyInfo.org, 2011b).***

5- Echocardiography: It uses sound waves to create a moving picture of heart. The picture shows the size and shape of heart and how well heart chambers and valves are working. Echo also can show areas of poor blood flow to the heart, areas of heart muscle that aren't contracting normally, and previous injury to the heart muscle caused by poor blood flow (***National Heart, Lung and Blood Institute, 2011d)*.**

6- Coronary calcium scoring: Computed tomography, also known as CT scanning, is another common imaging tool in CAD. Coronary calcium scoring involves administration of a cardiac CT scan to collect information about the presence, location, and extent of calcified plaque in the coronary arteries. Because calcium is a marker for coronary artery disease, the coronary calcium score — a number reflecting the degree and extent of calcium deposits in the walls of the coronary arteries can be a useful prognostic tool in CAD ***(RadiologyInfo.org, 2011a)***.

7- Coronary angiography and cardiac catheterization: A thin, flexible tube called a catheter is put into a blood vessel in the arm, groin (upper thigh), or neck. The tube is threaded into coronary arteries, and the dye is released into bloodstream. Special x-rays are used to follow dye injected into the heart or the coronary arteries. Coronary angiography gives as definitive a diagnosis of arterial narrowing and blockage as is possible without major surgery (***National Heart, Lung and Blood Institute, 2012c)*.**

Clinical Picture of Coronary Artery Disease

The most common symptoms of CAD are chest pain (angina) and a heart attack**.**

I- Angina pectoris:

Angina is the most clinical presentation of CAD. It's a reversible ischemic process caused when the blood supply to the muscles of the heart is restricted. It usually occurs when the arteries that supply the heart become hardened and narrowed. Angina is also referred to as chest pain. It is also described as chest discomfort, heaviness, tightness, pressure, aching, burning, numbness, fullness, or squeezing. It can be mistaken for indigestion or heartburn. Angina is usually felt in the chest, but may also be felt in the left shoulder, arms, neck, back or jaw ***(O'Rourke et al., 2008; Cleveland Clinic, 2013).***

Approximately 9.8 million Americans are estimated to experience angina annually, with 500,000 new cases of angina occurring every year. In 2009, an estimated 785 000 Americans will have a new coronary attack, and about 470 000 will have a recurrent attack. Only 18% of coronary attacks are preceded by angina. An additional 195,000 silent first myocardial infarctions are estimated to occur each year ***(Alaeddin, 2013)*.**

Types of Angina

The major types of angina are stable, unstable, and variant (Prinzmetal's), knowing how the types differ is important. This is because they have different symptoms and require different treatments. **Stable angina** is the most common type of angina. It occurs when the heart is

working harder than usual. Stable angina has a regular pattern. “Pattern” refers to how often the angina occurs, how severe it is, and what factors trigger it (***National Heart, Lung and Blood Institute, 2012d***).

Gibbons et al., (2002) stated that there are several typical characteristics of stable angina which should increase the likelihood of underlying CAD. These include:

- Type of discomfort – often described as tight, dull or heavy location – often retrosternal or left side of chest and can radiate to left arm, neck, jaw and back.
- Relation to exertion – angina is often brought on with exertion or emotional stress and eased with rest.
- Duration – typically the symptoms last up to several minutes after exertion or emotional stress has stopped.
- Other factors – angina may be precipitated by cold weather or following a meal.

Unstable angina is a progressive worsening of stable angina, with more than 90% coronary occlusion. Chest pain of increased frequency, severity, and duration poorly relieved by rest or oral nitrates. Clients are at risk of MI within 18 months of angina's onset**. Variant angina (Prinzmetal's angina):** It occurs at rest, usually in response to spasm of a major coronary artery. The spasm may occur in the absence of CAD. It is not usually precipitated by increased physical demand. Strong contraction (spasm) of smooth muscle in the coronary artery results from increased intracellular calcium. The pain may be relieved by moderate exercise or it may disappear spontaneously ***(Timby & Smith, 2007; Lewis et al., 2011).***

II- Myocardial infarction

Myocardial infarction (MI) or heart attack is the irreversible necrosis of heart muscle secondary to prolonged ischemia. An infract is an area of tissue that dies (necrosis). An MI or heart attack occurs when there is prolonged total occlusion of coronary arterial blood flow. The larger necrotic area is a coronary thrombosis; it is usually secondary to arteriosclerotic and atherosclerotic changes. Arterial spasm also may cause an MI. Once an area of the myocardium has been damaged and destroyed, the cells in that area lose the special functions automaticity, excitability, conductivity, contractility, and rhythmicity. Thus, dysrhythmias and heart failure are common consequences ***(Timby & Smith, 2007).***

Myocardial infarction symptoms vary but typically include sudden, severe chest pain, which usually is substernal and may radiate to the shoulder, arm, teeth, or throat. The pain lasts longer than anginal pain. Some clients describe it as squeezing or crushing. Rest and sublingual nitrates do not relieve MI pain. Clients may appear pale and diaphoretic, also may experience nausea and vomiting or be hypotensive and faint. Pulse is rapid and weak and may be irregular ***(Zafari, 2013).***

Treatment of CAD

Treatment for coronary artery disease usually involves lifestyle changes and drugs and certain medical procedures. The main goals of treatment are to reduce pain and discomfort and how often it occurs and to prevent or lower risk for heart attack and death by treating underlying heart condition. **Drugs:** Various drugs can be used to treat CAD, including: Cholesterol-modifying medications: By decreasing the amount

of cholesterol in the blood, especially low-density lipoprotein (LDL, or the "bad") cholesterol, these drugs decrease the primary material that deposits on the coronary arteries. Boosting high-density lipoprotein (HDL, or the "good") cholesterol may help, too. Doctor can choose from a range of medications, including statins, niacin, fibrates and bile acid sequestrants ***(Mayo Clinic, 2013).***

Aspirin**:** According to ***Cleveland Clinic (2013a)***, taking a daily aspirin or other blood thinner is very important. This can reduce the tendency of blood to clot, which may help prevent obstruction of coronary arteries. Aspirin can help prevent future attacks. There are some cases where aspirin isn't appropriate, such as if have a bleeding disorder**.**

Beta blockers: they slow heart rate and decrease blood pressure, which decreases heart's demand for oxygen. If client had a heart attack, beta blockers reduce the risk of future attacks. Nitroglycerin: Nitroglycerin tablets, sprays and patches can control chest pain by opening up coronary arteries and reducing heart's demand for blood. Calcium channel blockers: These medications relax the muscles that surround coronary arteries and cause the vessels to open, increasing blood flow to heart. They also control high blood pressure ***(Matthew et al., 2011)*.**

Certain medical procedure for CAD

Procedures to remove plaque from arteries to restore and improve blood flow include:

Angioplasty: Angioplasty, also called percutaneous transluminal coronary angioplasty or PTCA, involves inserting a long flexible tube called a catheter into a blood vessel through a small incision in the skin. The catheter has a deflated balloon on its tip. Once the catheter reaches the

blocked blood vessel, the balloon is inflated and compresses the plaque against the sides of the blood vessel. The balloon may be inflated and deflated several times. Often, the procedure is done in conjunction with a small metal tube called a stent that is left in the artery to serve as a scaffold to keep the artery open and prevent the plaque from springing back toward the center of the vessel ***(Mayo Foundation for Medical Education and Research, 2012).***

Coronary artery bypass surgery: A surgeon creates a graft to bypass blocked coronary arteries using a vessel from another part of body. This allows blood to flow around the blocked or narrowed coronary artery. Because this requires open-heart surgery, it is most often reserved for cases of multiple narrowing ***(Singh, 2013a).***

Prevention of CAD

The same lifestyle habits that can help treat coronary artery disease can also help prevent it from developing in the first place. Leading a healthy lifestyle can help keep arteries strong and clear of plaques. To improve the heart health, do the following: Quit smoking, control conditions such as high blood pressure, high cholesterol and diabetes, be physically active, eat a low-fat, low-salt diet, maintain a healthy weight and reduce and manage stress ***(Mayo Foundation for Medical Education and Research, 2013)***

PART (III)

Orem Self Care Theory

During the last century, there has been an increase in the numbers of people with chronic illness. With this change, the role of the clients also witnessed a trend for changing from passive to active participation in care management. Thus, new trends have emphasized self care, especially in life long diseases, because these types of diseases can lead to various minor and major complications that can affect quality of life ***(Orem et al., 2009).***

Self-care is the practice of activities that individuals initiate and perform on their own behalf in maintaining life, health, and wellbeing. Self care is the ability of individuals, families and communities to promote health, prevent disease, and maintain health and to cope with illness and disability with or without the support of a health-care provider ***(Orem et al., 2009; Webber et al., 2010)***.

It is also defined as the production of actions directed to self or the environment in order to regulate one's functioning in the interest of one's life, integrated functioning and wellbeing ***(Rosdahl, 2007).*** From another perspective, self care has been defined as range of activities associated with health promotion that individuals can do for themselves when they have reached maturity that is enabling for consistent, controlled, effective and purposeful action to maintain health. Activities of daily living such as exercise, nutrition and relaxation are often used to measure self-care ***(Stanhope & Lancaster, 2009)***.

Factors affecting on self-care:

Many factors affect self-care, the contributing factors may be divided into external factors and internal factors: The **external factors** consist of living conditions, different services and social support, while the **internal factors** are those that may be seen as preconditions for self care functional abilities and health as well as coping strategies, motivation and hardiness ***(Twinn et al., 2009).***

The factors affecting on self care were divided by ***Stweart (2008),*** into environmental, biological, or psychological. **Environmental factors** might be educational, economical, cultural, value and beliefs, social and family background, support system and stability of living conditions. **Biological factors** are age, gender, neuromuscular function, muscle strength, energy levels, sensory capabilities, physical characteristics, health condition of the person, health habits, and hormonal changes, in addition to individual differences. The **psychological factors** include motivation, self concept, adaptation process, mental and psychological status **(*Internurse.com, 2013)*.**

Nurses are in key position to teach clients about self-care since nurses are health care providers who have continuous contact with clients are usually the most accessible source of information for the clients. Client education has been suggested as a way to increase compliance by being involved in own care to improve satisfaction, lower cost, reduce morbidity and mortality, enhance quality of life and empower clients or increase autonomy. It is also the primary intervention used by nurses to promote self-care ***(Twinn et al., 2009)***.

Levels of self-care:

Orem described levels of self care in term of three types of requisites that influence people's self care ability. 1) Universal requisites, self care activities required to meet physiological and psychological needs. 2) Developmental requisites, self care activities necessary to help progress developmentally. 3) Health deviation requisites, self care activities needed to help people to deal with optimum level of wellness ***(Ann & Walton, 2005).***

Certain pre-requisites are considered necessary to the performance of self-care and these include knowledge about health, motivation for health and ability to initiate and perform self care behavior. Self care requisites or purposes for which individuals perform self-care are the requirements for physical, mental and emotional health. They are necessary in the regulation of individual's human functioning and development ***(Nies & McEwen, 2009; Orem et al., 2009).***

From another perspective, self-care requisites are the formulated and expressed purposes toward which self-care actions are directed ***(Long, 2010)***. They are the reasons for which self-care is undertaken; they express the intended or desired result (the goals of self-care) ***(Nonsbaum, 2010).***

According to ***Kamel & Korula, (2007); Stanhope & Lancaster (2009)***, the universal self care requisites are found in all human beings. They are associated with life processes and the maintenance of the integrity of human structure and functioning. ***Nonsbaum (2010)***, added that the universal self-care requisites are sufficient intake of air, water, food, satisfactory eliminate function, activity balanced with rest time

spent alone, balance with time spent with others, prevention of danger of self, and being normal.

Development of self care requisites as stated by ***Foley (2009) and Current Nursing (2012),*** are related to the different stages that human beings undergo such as pregnancy. They were separated from universal self care requisites in nursing concepts of practice. They promote processes for life and maturation and prevent conditions deterious to maturation or those that mitigate those effects**.**

Health deviation self care requisites result from the needs produced by disease or illness. The health deviation self care requisites are as follows; seeking and securing appropriate medical assistance, being aware of and attending to effect and result of pathologic condition or state, effectively carrying out medically prescribed diagnostic therapeutic and rehabilitative measures, being aware of an attending or deleterious effects of prescribed medical care ***(Nick et al., 2007; Nies & McEwen, 2009).***

According to ***Allender and Spradley (2010)***, the provider of self-care, whether self or other, is considered a self-care agent. It is the human's ability or power to engage in self-care. However, ***Chadwick and Levitt (2007)*** identified that the individual's ability to engage in self-care is affected by the basic conditioning factors, these factors are; age, gender, developmental state, health status, socio-cultural orientation and health care system factors i.e., diagnostic and treatment modalities, family system factors pattern of living, environmental factors, and resources availability and adequacy.

Components of self care education are; provision of a period for expression of feelings, reinforcement of client self esteem, provision of

open access to information related to health practice of self care skills that can be applied immediately by the client presentation of alternative views on health related issue and critical evaluation of traditional and alternative therapies ***(Hunt & Zurek, 2008).***

Orem's nursing intervention has three nursing systems: wholly compensatory, partly compensatory and supportive educative, which rehabilitation nurse uses to assess and assist clients for independence in self care ***(Nick et al., 2007).***

The wholly compensatory system is represented by a situation in which the individual is unable "to engage in those self care actions requiring self directed and controlled ambulation and manipulative movement or the medical prescription to refrain such activity. **Partially compensatory system** is represented by a situation in which "both nurse and patient perform care measures or other actions involving manipulative tasks or ambulation. **Supportive educative system**, the person is able to perform or can and should learn to perform required measures of externally or internally oriented therapeutic self care but cannot do so without assistance (***Foster & Bennett, 2000***).

Orem Self Care Theory and CAD

According to ***Sakhayi (2005),*** self-care in CAD implies the study and control of disease symptoms, accepting diet therapy, maintaining the healthy lifestyle, the control of disease impact on daily living activity and emotions. The major principle of self-care is participation and responsibility of clients. Since CAD have considerable effect on clients' life, the control of many disease complications is possible by self-care behaviors. ***Gary (2006)*** also added that self-care behaviors reduce the

severe symptoms of the disease and improve its clinical outcomes and reduce readmission.

Self-care maintenance involves medication adherence, following a low-salt diet, limiting alcohol consumption, staying physically active, avoiding tobacco use, and daily monitoring of weight, controlling hypertension, managing diabetes and other signs or symptoms indicative of worsening CAD ***(Jaarsma et al., 2008)***.

PART (IV)

Role of Community Health Nurse According to Orem Self Care Theory

The community health nurse (CHN) play a vital role in preventing and controlling CAD, as nurses carry out diagnostic examinations and risk assessments. The CHN acts as a health counselor and helps in the patient self care process. A community health nurse has an active role in disease prevention through assessment of education level, literacy level, and other demographic data because she as an educator and counselor can transmit information about disease prevention and education. The nurse must be focusing on increasing disease awareness through teaching people essential facts about nature of the disease, its signs and symptoms and risky factors such as cigarette smoking, high blood cholesterol, high blood pressure, uncontrolled diabetes, physical inactivity, over weight and uncontrolled stress ***(Otto, 2008; Walker, 2011).***

Orem's self-care deficit theory provided a theoretical framework to guide assistance of a client with CAD to meet self-management requirements. Ideally, the interpersonal relationship between a nurse and a client contributes to the alleviation of the client's stress, enabling the client to act responsibly in matters of health. This assessment and plan of care utilized Orem's four client-related concepts (self-care, self-care agency, therapeutic self-care demand, and self-care deficit) and two concepts that related to nurses and their roles (nursing agency and nursing system) **(Hamric et al., 2004).**

Sandstrom (2006) defined health assessment as a process of systematically collecting and analyzing data to make judgments about health and life processes of individuals, families, and communities. In addition, the assessment included the integration of theory, diagnosis, intervention, and outcomes into practice and the use of theory to make decisions related to complex practice problems.

The *Cardinal and Stritch University Library (2011)* stated that Orem's nursing process included three steps: **the first step** is diagnosis and prescription, why is nursing needed? Analyze, interpret and make judgments regarding patient care.

- The CHN is collecting data about client's health status, requirements for self care and capacity to perform self care. Firstly, the nurse should assess past health history, and determine history, character, onset and duration of symptoms, dyspnea including its effect on activities of daily living. The nurse determines frequency, severity of previous attacks, hospitalizations and identifies a trigger; assess medication including its use, compliance, and pattern ***(Black, 2009).***

  The very important role of the nurse is to determine client understanding of disease, its management, modifiable risk factors and community resources to assess learning needs. As well, the nurse should assess **environmental factors** such as; eating habits, type of diet, level of exercise, tobacco use, alcohol ingestion, evaluate self activities and evaluate the client's ability to self administer medication to assess competence and need for counseling (***Hanson & Fahy,2007).***

  The nurse should question the client about a family history for heart disease in parents and siblings. Assessing a psychological history is also included to determine recent stressful events, and the

presence of any negative psychological states as anxiety. The nurse must ask about the place of work and type of work (***Britz & Dunn, 2010).***

- Also the CHN focus on health promotion pattern within the context of life style as; the nurse strongly encourages all clients to stop all forms of tobacco use, discuss the effects of smoking on the body and benefits of quitting. The nurse has to inform clients about role of diet in CAD and obesity. The nurse helps client assess food intake and pattern of eating to identify areas that can be improved, encourages client to make dietary changes gradually but progressively, advises to avoid fat diets for weight loss and maintaining a well balanced low fat diet ***(Lewis et al., 2011).***

Morton & Fontaine, (2013) added that stress is a normal part of every person's life, the nurse assists client to identify and develop stress management techniques. The nurse teaches client about administration and side effects of medications. The nurse helps client to recognize symptoms related to ischemia or progressing angina, such as increasing chest pain, decreased exercise tolerance, shortness of breath, fatigue, sweating dizziness and palpitation. The nurse also teaches client to prevent CAD as a priority of nursing care to promote health for all clients. The nurse helps clients learn how to reduce modifiable risk factors, which can improve not only cardiac health but also overall wellbeing as mentioned by ***Burke et al., (2011).***

Table (1) Client teaching guide about decreasing modifiable risk factors for CAD

Risk factor	Health Promoting Behaviors
Hyper tension	• Have regular blood pressure (BP) checkups. • Take prescribed medication for BP control • Stop tobacco use, avoid exposure to environmental tobacco (second hand) smoke • Control or reduce weight • Perform physical activity regularly
Elevated serum lipids	• Reduce total fat intake • Reduce animal (saturated) fat intake • Take prescribed medication for lipid reduction • Adjust total caloric intake to achieve and maintain ideal body weight • Engage in regular physical activity • Increase amount of complex carbohydrates and vegetable proteins in diet
Tobacco use	• Enrolling a smoking cessation program • Change daily routines associated with smoking to reduce desire to smoke • Substitute other activities for smoking • Avoid exposure to environmental tobacco smoke
Physical inactivity	• Develop and maintain at least 30 min of moderate physical activity on most days of the week • Increase activities to fitness level
Obesity	• Change eating pattern and habits • Reduce caloric intake to achieve body mass index

	of 18.5-24.9 Kg/m2 • Increase physical activity • Avoid fad and crash diet • Avoid large and heavy meals
Diabetes	• Follow recommended diet • Control or reduce weight • Take prescribed antidiabetic drugs • Monitor blood glucose level regularly

Source: ***Burke et al. (2011***)

The second step is designing nursing system and plan for delivery of care. Nurses design a system that is wholly compensatory, partly compensatory or supportive-educative. Goals are to promote client's therapeutic self-care demands and compensate or overcome client's self-care deficits ***(Masters, 2011).***

Through nursing system, the nurse assesses the client's self care deficits and plans, implements and evaluates nursing actions directed towards supplementing them. The system proposes that the nurses are required to be well educated and experienced to plan care for the clients. Depending upon the capabilities of the clients the nurses' action could be wholly compensatory, partly compensatory and supportive educative. In the current study the 'supportive educative system' is taken into consideration ***(Kaur et al., 2009)***.

The third step is production and management of nursing systems. The CHN assists the client in self-care needed to attain goals toward positive health and health related outcomes, evaluation of results achieved compared to planned outcomes ***(Nursing Theories, 2011).***

- **Self care required for CAD clients**:

The nursing intervention related physical activity: The nurse has to inform client with CAD about importance of physical activity because it improves the following: The function of the heart and lungs, HDL (good) cholesterol and triglycerides, blood sugar, muscle tone and bone density, self confidence, ability to cope with stress and decrease anxiety and depression. Also, it lowers blood pressure and helps achieve a healthier body weight (***University of Ottawa Heart Institute, 2011).***

Clients with CAD should be advised to take 30 minutes of moderate physical activity on most days of week as brisk walking, hiking, biking, and swimming. A balance of rest and activity should still be maintained to allow for continued healing and to conserve energy. Activity should be increased gradually. Client's recovery is different. The rate at which progress will depend on the severity of cardiac event and previous activity level. After four to six weeks, client should be back to performing regular daily living activities ***(Cork University Hospital, 2012).***

The nurse has to advise client to follow this walking program: In the first and second weeks**:** Walk five to 10 minutes of leisurely walking once or twice daily**.** From third to six weeks**,** begin with 10 minutes of slow walking once or twice daily, then increase by one minute per day until walking 20 to 30 minutes per walk, then increase speed and distance as tolerated, remembering that it is important to avoid shortness of breath and fatigue. Always begin walks at a slow stroll for the first few minutes, and then increase pace. Walking time can be maintained at 30 minutes once or twice daily. The nurse has to inform client about stopping activity and rest if client: Becomes very short of breath, feels weak, tired or dizzy,

has any discomfort, especially chest discomfort, have a fast heart rate or palpitations, and have nausea or excessive sweating (***University of Ottawa Heart Institute, 2011).***

The nursing intervention related heart healthy nutrition: A healthy nutrition is one of the best weapons used to fight CAD. It plays an important role in the health of the heart, especially in controlling dietary sources of cholesterol and restricting salt intake that contributes to high blood pressure. A carefully designed nutrition plan can prevent a heart attack and/or to avoid its recurrence. The key is to eat whole foods and a predominantly vegetarian diet, consisting mostly of fresh vegetables and fruits, whole grains and nuts and seeds ***(American Heart Association, 2013c).***

The CHN should advise clients with the following: **Fruits and vegetables:** A number of studies have demonstrated the health benefits of eating fruits and vegetables. These foods decrease the risk of cardiovascular diseases, including coronary artery disease and stroke; intake of up to six servings a day appears to provide the most benefit. Cruciferous vegetables (broccoli, cabbage, cauliflower, brussels, and sprouts), green leafy vegetables, citrus fruits, and vitamin C-rich fruit and vegetables may lower the risk of cardiovascular disease to the greatest extent. **Fish:** Eat, fish especially oily fish, at least twice a week. It is rich in the very long-chain omega-3 polyunsaturated fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA). The consumption of two servings a week of fish high in EPA and DHA is associated with a reduced risk of both sudden death and death from CAD in adults ***(Lichtenstein &Appel, 2006; Sandra & Martin, 2013).***

Fiber: A high fiber intake is associated with a 40-50% reduction in the risk of CAD and stroke compared with low intake. Cereal fibers in particular are most strongly associated with a decreased risk of heart attack. Eating fiber also protects against type 2 diabetes, and eating soluble fiber (such as that found in vegetables, fruits, and especially legumes) may help people already having diabetes to control blood sugar. The recommended amount of dietary fiber is 20-35g a day (***Cleveland Clinic, 2013b).***

Fat: Limit intake of saturated fat and cholesterol. Blood cholesterol levels have been clearly linked to an increased risk of CAD. The type of fat consumed appears to be more important than the amount of total fat. In particular, saturated fats and trans fats must be avoided. Trans fats are those that are solid at room temperature, and are found in many margarines and in other fats labeled "partially hydrogenated". Another major source is oils that are maintained at high temperature for a long period, such as those in fast food restaurants. Saturated fats come mainly from animal products, such as cheese, butter, and red meat. Limit your intake of saturated fat to less than 7% of energy, trans fat to less than 1% and cholesterol to less than 300mg a day ***(Lichtenstein &Appel, 2006).***

Sugar: Minimize intake of beverages and foods with added sugar. **Salt**: Choose and prepare foods with little or no salt. An achievable recommendation for sodium (salt) is 2-3g a day. **Garlic** lowers cholesterol and triglycerides, prevents thrombus formation and lowers blood pressure. Eat three fresh cloves daily through adding it to salad ***(Jacob, 2013).***

The nursing intervention related to smoking cessation: According to ***The American Cancer Society (2013),*** the CHN should help clients to quit smoking by making decision to quit, picking a quit

day and making a plan and dealing with withdrawal. **There are tips to help clients to stop smoking:**

a- Avoid temptation**:** Stay away from people and places that tempt to smoke.

b- Change habits: Switch to juices or water instead of alcohol or coffee. Choose foods that don't make client want to smoke. Take a different route to work. Take a brisk walk instead of a coffee break.

c- Choose other things for mouth: Use substitutes that can put in mouth such as sugarless gum or hard candy, raw vegetables such as carrot sticks, or sunflower seeds. Some people chew on a coffee stirrer or a straw.

d- Get active with hands: Do something to reduce stress. Exercise or do something that keeps hands busy, such as needlework or woodworking, which can help distract from the urge to smoke. Take a hot bath, go for a walk, or read a book.

e- Breathe deeply: breath deeply as inhaled the smoke. When the urge strikes now, breathe deeply and filling lungs with fresh, clean air. Remind the reasons for quitting and the benefits.

f- Reward self**:** Put the money that have been spent on tobacco in a jar every day and then buy a book or some new music, go out to eat, start a new hobby, or join a gym. Or save the money for a major purchase.

The nursing intervention related control blood pressure: Blood pressure can be controlled by choosing foods that are lower in fat/higher in fiber and lower sodium foods, maintaining a healthy weight, increasing exercise and take medication as recommended ***(The OHIO State University, 2013).***

The nursing intervention related to manage diabetes: CAD is the leading cause of diabetes-related death. People with diabetes are two to four times more likely to develop cardiovascular disease due to a variety of risk factors, including high blood pressure, high cholesterol, smoking, obesity and lack of physical activity. Tight blood sugar control through decreasing fat in diet, maintaining healthy weight, increasing exercise, and taking medication as recommended ***(Mayo Foundation for Medical Education and Research, MFMER, 2013).***

Promote optimum coping strategies and psychological support for stress and anxiety: Increased stress can be a factor in developing heart disease. Tips to reduce or manage the stress in life are eating a healthy diet and exercise regularly. A well-balanced diet and exercise can keep body fit and able to resist disease, and exercise is an excellent way to elevate mood. Talk about stressful situations with someone. Sometimes just talking about problems and concerns can help put them into perspective and give insights into ways to deal with them. Stay organized to help manage time more efficiently. Use relaxation techniques to calm mind and body. Get professional help when need it (***The OHIO State University, 2013).***

Promote knowledge and demonstrate effective pharmacological intervention: The CHN should instruct clients to take all medications as recommended, and shouldn't stop taking medication to feel better. These are lifetime medication in most instances, some medications will need to be adjusted over time, don't let medications' supplies run out because stopping them suddenly can cause serious problems. Clients should take medications at the same time every day ***(Al Mowla, 2012*)**

The CHN should discuss the following points with clients who are prescribed short-acting nitroglycerin: **For sublingual nitroglycerin:** The client should sit down and rest before self administering nitroglycerin because it lower blood pressure and may cause fainting, dissolve tablet under the tongue and don't swallow it, if chest pain is not relieved within 5 minutes, take a second dose. After 5 minutes more, a third dose may be taken, if pain continues, seek medical help immediately, keep NTG tablets in original container and protect them from heat, light and moisture and replace NTG every six months or after any container has been opened six times. For ointment or transdermal forms; wear gloves when applying nitroglycerin ointment to prevent absorption of the drug through skin, measure dose carefully and spread evenly in 2 to 3 inch area ***(Singh, 2013b).***

The CHN should discuss the following points with clients who are prescribed beta blockers and calcium channel blockers; the client should take and record pulse daily, don't take drug and notify doctor if heart rate is below 50 bpm and check Bp frequently. Report a slow or irregular pulse, swelling or weight gain or difficulty breathing to doctor. Don't abruptly stop taking this drug. If client have trouble getting to sleep while taking beta blockers, take them earlier in the evening (at least two hours before bedtime). If client have asthma, make sure physician is aware of it because beta blockers may make asthma worse, **Report these side effects**: Fatigue, difficulty concentrating, insomnia, nightmares, dizziness, slow heart rate (less than 50 beats per minute), wheezing, cold hands and feet ***(The Heart and Stroke Foundation, 2013).***

The nurse has to restore functional ability and enabling the clients to be as independent as possible in their daily living activity:

Plan Ahead and Organize Work: Change storage of items to reduce trips or reaching, delegate when needed and combine motions and activities and simplify details**.** Schedule Rest: Balance periods of rest and work, rest before fatigue and frequent, short rests are beneficial**.** Pace self: Moderate pace is better than rushing through activity, reduce sudden or prolonged strains and alternate sitting and standing**.** Practice Proper Body Mechanics: When sitting, use well-supporting chair, adjust work heights-work without bending over, bend at knees and hips, not at back and carry several smaller loads or use a cart**.** Limit Overhead Work: use long handled tools, store items lower and delegate. Identify Effects of Environment: avoid extremes of temperature, eliminate smoke or noxious fumes, and avoid long, hot showers or baths. Prioritize: decide what activities are important to client, and what could be delegated and use energy on important tasks **(*Palomar Pomerado Health (PPH), 2013).***

Walking/Moving: Wear low-heeled shoes, wear shoes with a shock-absorbent sole or insole, use a wheelchair for long trips, and maintain good posture when retrieving. Washing/Bathing: Wash hair in shower, not over sink, sit and use a terry robe instead of drying off with a towel, use a shower organizer over the shower head to avoid leaning and reaching, use safety strips on the floor of the tub, install a grab rail, use a shower bench or lawn chair to sit while showering, use a handheld shower while sitting, use moderate temperature water rather than hot and use a long-handled sponge or brush to reach feet and back **(*Seton Heart Specialty Care and Transplant Center, 2008).***

Grooming/Hygiene: Sit when grooming, don't lean forward unsupported, rest elbows on counter or dressing table, use long-handled brushes or combs to avoid holding arms overhead and use elevated commode seat. Dressing: Loose fitting clothes allow to breathe more easily, lay out clothes before starting to avoid extra steps, bring foot to knee to apply shoes and socks so won't have to lean over, wear slip-on shoes, use a long-handled shoe horn and sock aid, fasten bra in front and then turn to back, wear button front shirts rather than pullovers, use a dressing stick ***(WebMD, 2013b).***

Preparing meals: Assemble all ingredients before start, use smaller appliances (mixers, toaster, microwave), use electric knife and can opener, transport items on a rolling cart, store frequently used items at chest level to avoid bending and stretching, sit while preparing food, rest elbows on table or counter, let dishes soak rather than scrubbing, let dishes air dry, use a dishwasher if possible, delegate dishwashing, use a jar opener, use a rubber mat or towel under mixing bowls to help steady them when mixing ,use lightweight utensils, prepare double portions and freeze half for later, drag garbage bags instead of lifting and use a hose to add water to pots and pans (don't lift them to add water) ***(Aging & Technology Research Center, 2013).***

Evaluation: Outcomes describe client states that follow and are influenced by an intervention. In structuring a nursing system, it is necessary to identify the health outcomes sought or changes required, to evaluate the effectiveness of nursing intervention, the nurse has to compare client behaviors with those stated in the expected client outcomes. The nurse should evaluate heart rate, energy conservation,

nutritional status, safe home environment; cope effectively with diagnosis, treatment and prognosis. As well, clients attain and maintain adequate nutrition, maintain normal physical activity, performing activity of daily living independently, experience no complications related to the disease or its treatment ***(Johnson & Maas, 2004; Phipps et al., 2007).***