Nurses' knowledge Regarding Care of Pregnant Women with heart disease in Khartoum Teaching Hospital

Khartoum State, Sudan

Hamdi Mohammed Ibrahim Mohammed

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Nurses' Knowledge Regarding Care of pregnant Women with heart disease in Khartoum teaching hospital. Khartoum State, Sudan

Hamdi Mohammed Ibrahim Mohammed

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<td>Dr. Ietimad Ibrahim AbdElrahman Kambal</td>
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Date: 25 March 2014
Nurses' Knowledge Regarding Care of pregnant Women with heart disease in Khartoum teaching hospital. Khartoum State, Sudan

Hamdi Mohammed Ibrahim Mohammed

Examination Committee

Name                  Position

Dr. Bothyna Bassyonie Elssayed Etewa   Chair Person   ---------
                                          ----

Dr. Nahid Abd Alazeem Abed Alsalam Fath Alla   External
                                          Examiner   ---------

Dr. Sayeda Idris Abd Alrahman Fadol Alla   Internal
                                          Examiner   ---------

Date of Examination:  25 / 3 / 2014
Dedication

Dedicated to

My beloved family members

Colleges

And Teachers

HAMDI
Acknowledgement

Firstly I wish to thank God for affording me the time and the ability needed to stand in front of difficulty.

I am deeply indebted to and grateful for my first supervisor: Dr. Bothyna Bassyunie Essayed and my Co-supervisor Dr. Ietimad Ibrahim Abd-Elrhman Kambal for Their helpful advices and valuable suggestions to me at the various stages of the research and their ultimate consultation.

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My deepest thanks to the NURSES who shared in this study.

I express my gratefulness to my FAMILY for her encouragement which gave me moral support and self confidence.
Nurses' Knowledge Regarding Care of pregnant Women with heart disease in Khartoum teaching hospital. Khartoum State, Sudan

Hamdi Mohammed Ibrahim Mohammed

Abstract

Pregnancy of women with heart disease is still associated with considerable mortality rates. Strict prenatal care is fundamental measures to improve the prognosis of pregnancy in women with heart disease. A descriptiveHospital based study was conducted aimed at assessing Nurses' knowledge regarding Care of pregnant Women with heart disease in Khartoum Teaching HospitalKhartoum state, Sudan2013. The sample size consisted of (70) nurses working in obstetrical words and intensive care unit during the period from (June2012 to October 2013). Data were collected by using a questionnaire designed for the study. Data analysis was performed by statistical package for social sciences (SPSS). The results revealed that (38%) of nurses responded with correct and complete answers regarding the definition of heart disease with pregnancy. (41.1%). Of the study sample responded with correct answers regarding Diagnosis of heart disease During Pregnancy, while (18.5%) of them know nursing management of heart disease During Pregnancy. (27%) of the study sample responded correctly regarding nursing care of women with heart disease during antenatal period and (12.8%) of them responded correctly regarding nursing care during postpartum period. The study concluded that the nurses' knowledge regarding care of women with heart disease during pregnancy were in adequate. The study recommended that nurses needs continues training programs
about nursing care of women with heart disease during pregnancy, continues monitoring and supervision for nurse's performance as a method of quality assurance.
ملخص الدراسة

الحمل في السيدات المصابات بأمراض القلب لا يزال يتسبب في نسبة كبيرة من الوفيات خلال فترة الحمل وبعد الولادة. الرعاية في فترة الحمل مهمة لتحسين أحوال الحمل في السيدات المصابات بأمراض القلب. أجريت هذه الدراسة الوصفية بمستشفى الخرطوم التعليمي، ولاية الخرطوم، السودان (2013). تكونت العينة من 70 ممرضة وممرضاً بقسم النساء والتوليد وقسم العناية المكثفة. تم جمع البيانات باستخدام استمارة استبيان صممت تدريبيًا. تم تحميل البيانات باستخدام برنامج الحزمة الإحصائية للعلوم الاجتماعية (SPSS)، وأظهرت النتائج أن (38 %) من أفراد العينة كانت إجاباتهم صحيحة عن تعريف مرض القلب مع الحمل. (11.4 %) من عينة الدراسة كانت إجاباتهم صحيحة وكاملة عن تشخيص أمراض القلب أثناء الحمل، بينما (18.5 %) منهم إجاباتهم صحيحة وكاملة عن الرعاية التمريضية لمرضي القلب أثناء الحمل. (27 %) من عينة الدراسة كانت إجاباتهم صحيحة عن الرعاية التمريضية خلال الحمل و(21.8 %) منهم كانت إجاباتهم صحيحة عن الرعاية التمريضية أثناء فترة النفاس. خلصت الدراسة إلى أن معرفة الممرضين والممرضات بالرعاية التمريضية للمصابات بأمراض القلب أثناء الحمل لم تكن كافية. أوصت الدراسة بضرورة عمل برامج تدريبية ستمرّ للمرضى والممرضين والممرضات عن الرعاية التمريضية للسيدات المصابات بأمراض القلب أثناء فترة الحمل. و ملاحظة عمل الممرضين والممرضات لضبط الجودة.
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<td>Heart disease</td>
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<td>IUGR</td>
<td>intrauterine growth restriction</td>
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<td>USA</td>
<td>United State of America</td>
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<td>CVS</td>
<td>Chorionic Villous Sampling</td>
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<td>WHO</td>
<td>World Health Organization</td>
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<td>NYHA</td>
<td>New York Heart Association</td>
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<td>ASD</td>
<td>atrial septal defect</td>
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<td>VSD</td>
<td>ventricular septal defect</td>
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<tr>
<td>PDA</td>
<td>Patent ductusarteriosus</td>
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<tr>
<td>ACE</td>
<td>Angiotensin-converting enzyme</td>
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<td>MPS</td>
<td>maternal placental syndrome</td>
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<tr>
<td>HCG</td>
<td>Human Chorionic Gonadotropin</td>
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<td>PPCM</td>
<td>Peripartum cardiomyopathy</td>
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<td>AMI</td>
<td>Acute myocardial infarction</td>
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<td>SVT</td>
<td>Supraventricular tachyarrhythmia</td>
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<td>DVT</td>
<td>deep vein thrombosis</td>
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<td>UFH</td>
<td>unfractionated heparin</td>
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<tr>
<td>Abbreviation</td>
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<td>LMWH</td>
<td>low-molecular-weight heparin</td>
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<td>IVC</td>
<td>Increased Venous stasis and Compression</td>
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<td>GFR</td>
<td>Glomerular Filtration Rate</td>
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1. Introduction

1.1 Background

Cardiac disease in pregnancy is becoming more common. The report of confidential enquiries into maternal and neonatal deaths in the UK 2006-2008 reported a total of 53 deaths due to heart disease in pregnancy (Am J Cardio, 2003). The number in the previous triennium was 48. The rate for indirect maternal deaths was 6.72/100,000 pregnancies and, within that, the rate for cardiac disease was 2.31 per 100,000 maternities. Therefore, cardiac disease is the most common cause of indirect maternal death and the most common overall cause of death. Sudden arrhythmic death syndrome (SADS) was the most common cause of maternal cardiac death in 2006-2008 (10 deaths), closely followed by cardiomyopathy (9 deaths). Other leading causes were aortic dissection, ischemic heart disease and myocardial infarction. Deaths from pulmonary hypertension and from congenital heart disease continue to decrease. The last 50 years have seen a dramatic reduction in rheumatic heart disease but it is still seen in immigrant communities and in developing countries. The causes of heart diseases: 49% of cases caused by pressure worldwide (WHO World Health Report, 2002) 3.3% of diabetic adults attending specialist diabetes services had a heart attack in Australia 2002. Developing countries bear a major share of the global burden of cardiovascular disease remains one of the leading causes of death in these countries.. (Australia’s Health 2004, AIHW)
1.2 Problem statement:

**Worldwide** although the incidence of heart disease during pregnancy in the UK has remained constant at 0.9% over several decades, recent UK Confidential Enquiries into Maternal and Child Health have identified cardiac disease as an increasingly important cause of maternal death. It has now become the commonest cause overall, with a maternal mortality rate in the triennium 2003–2005 of 22.7 per million maternities (up from 7.6 per million in the triennium ending in 1990). Care was considered substandard in nearly half of these cases. Pregnancy is associated with substantial physiological Changes in the cardiovascular system. The key elements – a fall in systemic vascular resistance (SVR) and rises of up reported, with pregnancy itself increasing the risk three to four times. Cardiac disease is also associated with increased fetal and neonatal complications, including fetal loss, intrauterine growth restriction (IUGR), preterm birth and intracranial hemorrhage. This risk is highest in women with poor functional class [New York Heart Association (NYHA) functional class IIIandIV], cyanosis or leftheartobstruction (which restricts cardiac output and therefore placental perfusion) [Chest, 2004]

**Developing countries** bear a major share of the global burden of cardiovascular disease remains one of the leading causes of death in these countries. The chance of fetal and perinatal mortality is increased on average four times, and even more in women with conditions such as Eisenmenger syndrome. For women with congenital heart disease, the risk of structural heart defects in the fetus varies from 3 to 12% compared with a background risk of 0.8% in the general population.

**In Sudan** incidence of ventricular arrhythmias, Brady-arrhythmias and sudden cardiac death following acute myocardial infarction were significantly high. The increased incidence is even in all age groups. DM, smoking and past history of IHD are the commonest associated risk factors. Maternal and neonatal complication rates are increased in pregnant women with heart disease. Cardiac risk assessment may be improved by defining low and high-risk groups. The nurses must consider the two aspects of practice directly related to prevention and control of heart disease. Great concern should be paid for, the hemodynamic strain associated with pregnancy may mask a pre-existing condition (e.g. rheumatic heart disease) or a pregnancy-associated cardiac complication may develop (e.g. cardiomyopathy). Most patients will present
for the first time to obstetricians or GPs, not to cardiologists. Early diagnosis is important but can be challenging because symptoms and signs (e.g. fatigue, shortness of breath, edema and systolic ejection murmurs) can mimic the physiological changes of pregnancy. A low threshold of referral to a cardiologist should therefore be maintained.

3 Learning is an active process in which learner is definitively involved educational program will enable nurses to work at their own pace, allow evaluation and encourage the nurses to participate actively in the learning process by constructing their own response. (WHO, 2005).

1.3 Justification and Rationale:

Pregnancy in women with heart disease is still associated with considerable morbidity and mortality rates, which strongly correlate to maternal underlying disease. Strict prenatal care and early risk stratification during gestation are fundamental measures to improve the prognosis of pregnancy in women with heart disease. Cardiac disease in pregnancy is of growing importance both in terms of numbers of women affected and mortality. Improvements in care have occurred particularly in relation to ischemic heart disease and pulmonary hypotension. The major increased incidence of acute myocardial infarction during pregnancy has been attributed to an increasing proportion of older women having babies (risk 30-fold greater for women over 40 years compared with women under 20 years of age). The obesity epidemic is associated with increases in diabetes and hypertension. Percutaneous coronary intervention with stenting is the treatment of choice. Although aortopathies, cardiomyopathy and valvular heart disease present continuing problems, improvements in the management of pulmonary vascular disease (in particular, the use of sildenafil) have reduced mortality from this condition. Prophylaxis against endocarditis has been abandoned except for the highest risk cases. (Jams J, etal, 2008).

The World Health Organization (WHO) recently reported that the percent contribution of the heart diseases factors to the overall burden of disease in developing countries was as follows: smoking (12%), hypertension (9%), obesity (7%), diabetes, and dyslipidemia (7%). Together, these risk factors accounted for 75% of the cardiac disease burden, implying that 75% of patients with cardiac disease have at least one of these risk factors. Socioeconomic factors such as a shorter education and lower income (particularly in women), and unmarried cohabitation may also
contribute to the risk of the disease. Many of these risk factors are modifiable, so many heart diseases can be prevented and became under controlling by maintaining a healthier lifestyle. Physical activity. In pregnancy, The hemodynamic strain associated with pregnancy may mask a pre-existing condition (e.g. rheumatic heart disease) or a pregnancy-associated cardiac complication may develop (e.g. cardiomyopathy). Most patients will present for the first time to obstetricians or GPs, not to cardiologists. Early diagnosis is important but can be challenging because symptoms and signs (e.g. fatigue, shortness of breath, edema and systolic ejection murmurs) can mimic the physiological changes of pregnancy. A low threshold of referral to a cardiologist should therefore be maintained. The nurse in key position to disseminate knowledge and practices nursing care for pregnant women with heart disease, thus, a primary objective of this study to assess the impact of designed training program on nurses’ knowledge and practices regarding nursing management of pregnant women with heart disease.(WHO,2005).
1-4 Objectives:

1-4-1 General Objectives:

Assess nurses' knowledge regarding care of pregnant women with heart diseases.

1-4-2 Specific Objectives:

- Assess nurses' knowledge regarding various aspects of care of pregnant woman with heart diseases
- To identify nurses' knowledge needed for care of pregnant women with heart disease.
Literature Review

2.1 Pregnancy and Heart Disease

Cardiac diseases complicate 1% to 4% of pregnancies in women without preexisting cardiac abnormalities. A working knowledge of the normal physiology of pregnancy is often helpful in the management of patients with heart disease. Patients with preexisting cardiac lesions should be counseled in advance about the risk of pregnancy. Familiarity with the treatment of commonly encountered cardiac diseases during pregnancy is becoming increasingly important for internists and cardiologists as they join the team of obstetricians and anesthesiologists in the care of these complicated patients. (Jams J, et al., 2006).

2.2 Normal physiologic changes during pregnancy

Major hemodynamic alterations occur during pregnancy, labor, and delivery and the postpartum period. These changes begin to take place during the first 5 to 8 weeks of pregnancy and reach their peak late in the second trimester. In patients with preexisting cardiac disease, cardiac decompensation often coincides with this peak. Blood volume increases 40% to 50% during normal pregnancy. The increase in blood volume is greater than the increase in red blood cell mass, contributing to the fall in hemoglobin concentration (i.e., the “anemia of pregnancy”). Similarly, cardiac output rises 30% to 50% above baseline, peaking by the end of the second trimester and reaching a plateau until delivery. The increase in cardiac output is achieved by three factors: an increase in preload because of greater blood volume; reduced afterload because of a decrease in systemic vascular resistance; and a rise in the maternal heart rate by 10 to 15 beats/min. Stroke volume increases during the first and second trimesters, but declines in the third trimester because of inferior vena cava compression by the uterus. (N Engl J, Med. 2001). Blood pressure typically falls about 10 mm Hg below baseline by the end of the second trimester because of reduction in systemic vascular resistance and the addition of new blood vessels in the uterus and placenta. During labor and delivery, hemodynamic fluctuations can be profound. Each uterine contraction displaces 300 to 500 mL of blood into the general circulation. Stroke volume increases, with a resultant rise in cardiac output by an additional 50% with each contraction. Thus, it is possible for the cardiac output during labor and delivery to be 75% above baseline. Mean arterial pressure also rises, in part because of maternal pain and anxiety. Blood loss during delivery (300 to 400 mL for a vaginal
delivery and 500 to 800 mL for a cesarean section) can contribute to hemodynamic stress. Hemodynamic changes during the postpartum state are equally dramatic. Relief of inferior vena cava compression results in an increase in venous return, which augments cardiac output and causes a brisk diuresis. (Am J Obstet Gynecol. 2004).

The hemodynamic changes return to the prepregnant baseline within 2 to 4 weeks following vaginal delivery and within 4 to 6 weeks after cesarean section. These marked hemodynamic changes during pregnancy account for the development of several signs and symptoms during normal pregnancy that can mimic the signs and symptoms of heart disease. Normal pregnancy is typically associated with fatigue, dyspnea, and decreased exercise capacity. Pregnant women usually have mild peripheral edema and jugular venous distention. Most pregnant women have audible physiologic systolic murmurs, created by augmented blood flow. A physiologic third heart sound (S3), reflecting the increased blood volume, can sometimes be auscultated. Noninvasive testing of the heart may include an electrocardiogram (ECG), chest radiograph, and echocardiogram. The ECG may reveal a leftward shift of the electrical axis, especially during the third trimester, when the diaphragm is pushed upward by the uterus. Routine chest radiography should be avoided, especially in the first trimester. Echocardiography is an invaluable tool for the diagnosis and evaluation of suspected cardiac disease in the pregnant patient. Normal changes attributable to pregnancy include increased left ventricular mass and dimensions. (Am J Obstet Gynecol. 2004).

2.3 Assessment of risk in patients with preexisting cardiac disease

2.3.1 Maternal and Fetal Outcomes

Ideally, women with preexisting cardiac lesions should discuss the impact of their heart condition on pregnancy well in advance of becoming pregnant. They should discuss contraception, maternal and fetal risks of pregnancy, and potential long-term maternal morbidity and mortality with their physician. Combined input from maternal fetal medicine specialists, the patient's obstetrician, and a cardiologist may be a great asset in managing the pregnancy. Certain preexisting cardiac conditions carry an extremely high maternal risk. Pregnancy in these patients is not advised; it is important for women with these conditions to understand the implications of pregnancy on their health. For example, women with a NYHA functional Class III or
IV heart condition face a mortality rate of 7% or higher and morbidity rate higher than 30% during pregnancy. A validated cardiac risk score has been shown to predict a woman's chance of having adverse cardiac complications during pregnancy. Each risk factor was given a value of 1 point. The maternal cardiac event rates for 0, 1, and higher than 1 point are 5%, 27%, and 75%, respectively. (Am J Cardiol. 2006).

2.3.2 Specific Congenital or Acquired Cardiac Lesions

Specific congenital or acquired cardiac lesions can be classified as low, intermediate, or high risk during pregnancy.

2.3.2.1 Low Risk:

Large left to right shunt
- Coarctation of the aorta
- Marfan syndrome with a normal aortic root
- Moderate or severe MS
- Mild or moderate AS
- Severe PS

2.3.2.3 High Risk

- Eisenmenger's syndrome
- Severe pulmonary hypertension
- Complex cyanotic heart disease (TOF, Ebstein's anomaly, TA, TGA, tricuspid atresia)
- Marfan syndrome with aortic root or valve involvement

Severe AS with or without symptoms
- Aortic or mitral valve disease, or both (stenosis or regurgitation), with moderate or severe LV dysfunction (EF < 40%)
-NYHA Class III or IV symptoms associated with any valvular disease or with cardiomyopathy of any cause History of prior prepartum cardiomyopathy

- AR, aortic regurgitation; AS, aortic stenosis; EF, ejection fraction; LV, left ventricular; MVP, mitral valve prolapse; MS, mitral stenosis; MVA, mitral valve area; NYHA, New York Heart Association; PS, pulmonary stenosis; TOF, tetralogy of Falot; TA, truncus arteriosus; TGA, transposition of the great arteries. (Am J Cardiol. 2003)

2.3.3 Low-Risk Lesions:

Young women with uncomplicated secundum-type atrial septal defect (ASD) or isolated ventricular septal defect (VSD) usually tolerate pregnancy well. Patent ductus arteriosus (PDA) is not associated with an additional maternal risk for cardiac complications if the shunt is small to moderate and if pulmonary artery pressures are normal. Once these shunts are repaired, the risk during pregnancy is minimal. It is unusual for women with such left to right shunts to develop pulmonary hypertension during the childbearing years; however, the presence of pulmonary hypertension with a left to right shunt substantially increases the risk of complications during pregnancy. (Am J Cardiol. 2003)

2.3.3.1 Mitral Regurgitation:

Chronic mitral regurgitation most commonly is the result of myxomatous degeneration or rheumatic heart disease and usually is well tolerated during pregnancy. However, new-onset atrial fibrillation or severe hypertension can precipitate hemodynamic deterioration. Acute mitral regurgitation (e.g., from rupture of chordae tendineae) may produce flash pulmonary edema and life-threatening cardiac decompensation. Women with severe mitral regurgitation and signs of cardiac decompensation before pregnancy are advised to undergo operative repair before conception. Mitral valve prolapse in isolation rarely causes any difficulties during pregnancy. (Am J Obstet Gynecol. 2004)
2.3.3.2 Aortic Regurgitation.

Aortic regurgitation may be encountered in women with rheumatic heart disease, a congenitally bicuspid or deformed aortic valve, infective endocarditis, or connective tissue disease. Aortic regurgitation generally is well tolerated during pregnancy. Ideally, women with severe aortic regurgitation and signs of cardiac decompensation should undergo operative repair before conception. Women with bicuspid aortic valves, with or without aortic regurgitation, are at increased risk for aortic dissection and should be followed carefully for signs and symptoms of this complication. Congestive heart failure from mitral or aortic regurgitation can be treated with digoxin, diuretics, and vasodilators, such as hydralazine. Angiotensin-converting enzyme (ACE) inhibitors are teratogenic and therefore contraindicated. Beta blockers are generally safe during pregnancy, although fetal bradycardia and growth retardation have been reported. (Am J Obstet Gynecol 2004)

2.3.4 Moderate-Risk Lesions

2.3.4.1 Mitral Stenosis:

Mitral stenosis in women of childbearing age is most often rheumatic in origin. Patients with moderate to severe mitral stenosis often experience hemodynamic deterioration during the third trimester or during labor and delivery. The physiologic increase in blood volume and rise in heart rate lead to an elevation of left atrial pressure, resulting in pulmonary edema formation. Additional displacement of blood volume into the systemic circulation during contractions makes labor particularly hazardous. The development of atrial fibrillation in the pregnant patient with mitral stenosis may result in rapid decompensation. Digoxin and beta blockers can be used to reduce heart rate, and diuretics can be used to reduce the blood volume and left atrial pressure gently. With atrial fibrillation and hemodynamic deterioration, electrocardioversion can be performed safely. The development of atrial fibrillation increases the risk of stroke, necessitating the initiation of anticoagulation. Mild mitral stenosis can often be managed with careful medical therapy during pregnancy. In contrast, patients with moderate to severe mitral stenosis should be referred to a cardiologist. Severe mitral stenosis is associated with a high likelihood of maternal complications (including pulmonary edema and arrhythmias) or fetal complications.
(including premature birth, low birth weight, respiratory distress, and fetal or neonatal death), approaching 80% of pregnancies. These women may require correction via operative repair or replacement or percutaneous mitral balloon valvotomy before conception or during pregnancy. During pregnancy, percutaneous valvotomy is usually deferred to the second or third trimesters to avoid fetal radiation exposure during the first trimester. Most patients with mitral stenosis can undergo vaginal delivery. However, patients with symptoms of congestive heart failure or moderate to severe mitral stenosis may need close hemodynamic monitoring during labor, delivery, and for several hours into the postpartum period. In these patients, epidural anesthesia is usually better tolerated thermodynamically than general anesthesia during labor and delivery. (Am J, cardiol.2003).

2.3.4.2 Aortic Stenosis:

The most common cause of aortic stenosis in women of childbearing age is a congenitally bicuspid valve. Mild to moderate aortic stenosis with preserved left ventricular function usually is well tolerated during pregnancy. Severe aortic stenosis (aortic valve area less than 1.0 cm², mean gradient more than 50 mm Hg), in contrast, is associated with a 10% risk of maternal morbidity, although maternal mortality is rare. Symptoms such as dyspnea, angina pectoris, or syncope usually become apparent late in the second trimester or early in the third trimester. Cardiac surgery is needed in approximately 40% of patients with severe aortic stenosis within 2.5 years of pregnancy. Women with known severe aortic stenosis should be referred to a cardiologist. Ideally, they should undergo correction of the valvular abnormality before conception. Treatment options include surgical repair, surgical valve replacement, and percutaneous balloon valvotomy. The choice of an appropriate treatment for severe aortic stenosis before pregnancy is complicated and will likely require a number of discussions. When severe symptomatic aortic stenosis is diagnosed during pregnancy, maximal medical therapy is preferred over any intervention. However, if a patient has refractory symptoms and hemodynamic deterioration, despite maximal medical therapy, percutaneous balloon valvotomy may be performed. Spinal and epidural anesthesia are discouraged during labor and delivery because of their vasodilatory effects. As with mitral stenosis, hemodynamic monitoring is recommended during labor and delivery. (Am J, cardiol.2003)
2.3.5 High-Risk Lesions

The high-risk conditions are associated with increased maternal and fetal mortality. Pregnancy is not advised. If pregnancy should occur, the risks of maternal mortality and morbidity must be assessed on an individual case basis. If these risks are extremely high, consideration of medical termination of the pregnancy is advised to safeguard maternal health. If the pregnancy is continued, these patients are best managed with the assistance of a cardiologist and maternal-fetal medicine specialist at a center with high-risk obstetric facilities and a level 3 neonatal unit. (Am J, Cardio, 2003)

2.4 Pre-pregnancy Cardiovascular Risk Factors

Over the past decade, birth rates for older women (age 25 to 44 years) have increased. Older women have a higher prevalence of traditional cardiovascular risk factors, such as diabetes and chronic hypertension, and of preexistent cardiovascular disease than younger women. The impact of preexisting cardiovascular risk factors on the mother and fetus are profound. Traditional risk factors, such as smoking, diabetes, hypertension, hyperlipidemia, and thrombophilia, are associated with increased risks of spontaneous abortion, maternal placental syndromes (see next section), preterm labor or premature rupture of membranes, and acute arterial or venous thromboses during pregnancy. Furthermore, the presence of such risk factors also predicts the future development of coronary artery disease, chronic hypertension, stroke, and peripheral arterial disease in the mother. Emerging risk factors for future cardiovascular disease in women include maternal obesity and gestational diabetes. Maternal obesity and morbid obesity are associated with increased risks for gestational hypertension, preeclampsia, gestational diabetes, and fetal birth weight of more than 4000 g.5 Gestational diabetes can progress to the development of type 2 diabetes. Although the reported incidence of type 2 diabetes in women with gestational diabetes varies widely, the cumulative incidence of type 2 diabetes appears to increase markedly in the first 5 years after pregnancy. (Am J, Diabetes care, 2002)
2.5 Acquired cardiovascular disorders during pregnancy

2.5.1 Maternal Placental Syndromes

A group of disorders, known collectively as maternal placental syndromes, have been associated with an increased maternal risk of premature cardiovascular disease. In the CHAMPS study, a maternal placental syndrome (MPS) was defined as the presence of preeclampsia, gestational hypertension, placental abruption, or placental infarction during pregnancy. MPS occurred in 7% of the 1.03 million women who were free from cardiovascular disease before pregnancy. Interestingly, traditional cardiovascular risk factors were more prevalent in women with MPS than in women without MPS. Women with MPS were twice as likely to experience a hospital admission or revascularization procedure for coronary, cerebrovascular, or peripheral vascular disease compared with women without MPS. The growing body of evidence linking cardiovascular risk factors, MPS, and future cardiovascular disease may indicate an underlying abnormal vascular health that predates pregnancy and can manifest as MPS during pregnancy or as chronic cardiovascular disease later in life. (chest, 2004)

2.5.2 Hypertension in Pregnancy

Hypertension during pregnancy is defined as a systolic pressure of 140 mm Hg or higher, a diastolic pressure of 90 mm Hg or higher, or both. Hypertension during pregnancy can be classified into three main categories—chronic hypertension, gestational hypertension, and preeclampsia, with or without preexisting hypertension. In general, hypertensive disorders can complicate 12% to 22% of pregnancies and are a major cause of maternal morbidity and mortality. Chronic hypertension is defined as blood pressure of 140/90 mm Hg or higher that was present before pregnancy, before the 20th week of gestation, or persisting beyond the 42nd postpartum day. Frequently, women with chronic hypertension must change their medical regimens when they anticipate pregnancy to maximize the safety of the growing fetus. Women of childbearing age who take chronic antihypertensive medications should be counseled about the safety of these medications in the event of pregnancy well in advance of a potential pregnancy.
2.5.2.1 Drug Therapy of Hypertension in Pregnancy

First line

- Alpha methylldopa (PO).
- Labetolol (PO).
- **Second Line**
- Hydralazine (PO).
- Nifedipine (PO).
- Beta blockers (PO).

**Contraindicated**

- Angiotensin-converting enzyme inhibitors (PO).
- Angiotensin receptor blockers (PO).
- Aldosterone antagonists (PO).

**Avoid**

1. Thiazide diuretics.

**Severe Hypertensive Urgency or Emergency First Line**

1. Labetolol (IV).
2. Hydralazine (IV).
3. Beta blockers (IV).
4. Nifedipine (PO)
5. PO = oral administration; IV = intravenous administration.

(1) develops in the latter part of pregnancy,

(2) is not associated with proteinuria or other features of preeclampsia, and

(3) resolves by 12 weeks postpartum. This condition is also known as pregnancy-induced hypertension. Although it resolves postpartum, women with this condition may be at risk for the development of hypertension or cardiovascular disease, or both,
in the future. They should undergo an annual physical examination and screening for traditional risk factors for cardiovascular disease after their pregnancy. Preeclampsia, also known as toxemia, occurs in 3% to 8% of pregnancies in the United States. The classic clinical triad involves accelerating hypertension, proteinuria (higher than 300 mg/24 hours), and edema. Symptoms usually begin in the third trimester. Although definitive treatment includes delivery of the baby, most women with preeclampsia will require treatment with antihypertensive medications before delivery and for some time postpartum. Hypertensive urgency caused by preeclampsia can be treated with intravenous labetolol or hydralazine. The cause of preeclampsia is still unclear. Eclampsia is the development of grand mal seizures in a woman with preeclampsia. Preeclampsia and eclampsia have been linked to the future development of cardiovascular disease. As with pregnancy-induced hypertension, women with preeclampsia or eclampsia should undergo an annual physical examination and screening for traditional risk factors for cardiovascular disease after their pregnancy. (Am J Cardiol. 2003)

2.5.3 Peripartum Cardiomyopathy

Peripartum cardiomyopathy (PPCM) is defined as the development of idiopathic left ventricular systolic dysfunction (demonstrated by echocardiography) in the interval between the last month of pregnancy up to the first 5 postpartum months in women without preexisting cardiac dysfunction. The incidence of PPCM in the United States is estimated to be 1 in 3000 to 4000 live births. The exact cause of PPCM is unknown, although viral myocarditis, autoimmune phenomena, and specific genetic mutations that ultimately affect the formation of prolactin have been proposed as possible causes. Although it was believed that women who develop PPCM rarely have symptoms before 36 weeks' gestation, Elkayam and colleagues have recently described an earlier presentation, with symptoms occurring as early as the 17th week of gestation. The clinical presentation and outcome of women who developed the early presentation pregnancy-associated cardiomyopathy were similar to those of women with traditional PPCM. Women with preexisting cardiac dysfunction usually experience cardiac deterioration during the end of the second trimester. Typical signs and symptoms include fatigue, dyspnea on exertion, orthopnea, nonspecific chest pain, peripheral edema, and abdominal discomfort and distention. Medical therapy for
PPCM may be initiated during pregnancy and continue postpartum. Attention to the safety profiles of drug therapies during pregnancy, the postpartum period, and breastfeeding is important. Digoxin, diuretics, and hydralazine may be used safely during pregnancy and while breastfeeding. Beta blockers may improve left ventricular function in patients with cardiomyopathy. Beta blockers are considered safe during pregnancy, although there have been case reports of fetal bradycardia and growth retardation. ACE inhibitors, angiotensin receptor blockers, and aldosterone antagonists are contraindicated during pregnancy. (Jams J, et al, 2008).

Most ACE inhibitors can be initiated during the postpartum period, even in women who breast-feed. Anticoagulation can be considered for select patients with severe left ventricular dilation and dysfunction. As with other causes of dilated cardiomyopathy, when conventional medical therapy is unsuccessful, women with PPCM may require intensive intravenous therapy, mechanical assist devices, or even cardiac transplantation. Cardiac transplantation is required for about 4% of women with PPCM. More than half of women with PPCM completely recover normal heart size and function, usually within 6 months of delivery. Complete recovery is more likely in women with a left ventricular ejection fraction of more than 30% at diagnosis. The remainder experience persistent stable left ventricular dysfunction or continue to experience clinical deterioration. Maternal mortality is approximately 9%. Women with PPCM and persistent left ventricular dysfunction who attempt subsequent pregnancy face a high risk of maternal morbidity and mortality. These women should be counseled against subsequent pregnancies. (Jams J, et al, 2008).

2.5.4 Coronary Artery Disease

Acute myocardial infarction (AMI) during pregnancy is rare, occurring in 1 in 35,000 pregnancies. Independent predictors of AMI during pregnancy include chronic hypertension, maternal age, diabetes, and preeclampsia. Most myocardial infarctions occur during the third trimester in women older than 33 years who have had multiple prior pregnancies. Coronary spasm, in situ coronary thrombosis, and coronary dissection occur more frequently than classic obstructive atherosclerosis. Maternal mortality is highest in the antepartum and intrapartum periods. Recent studies have found a 5% to 7% case-fatality rate in women with pregnancy-associated AMI, which may reflect improvements in diagnosis and therapy over the past decade. Medical
therapy for acute myocardial infarction must be modified in the pregnant patient. Although thrombolytic agents increase the risk of maternal hemorrhage substantially (8%), their use is permitted for situations in which cardiac catheterization facilities are not available. Low-dose aspirin and nitrates are considered safe. Beta blockers are generally safe. Short-term heparin administration has not been associated with increased maternal or fetal adverse effects. ACE inhibitors and statins are contraindicated during pregnancy. Hydralazine and nitrates may be used as substitutes for ACE inhibitors. Clopidogrel and glycoprotein IIb/IIIa receptor inhibitors have been used safely in individual pregnant patients. Percutaneous coronary intervention using both balloon angioplasty and stenting has been successfully performed in pregnant patients with AMI, with the use of lead shielding to protect the fetus. (Jams J, et al, 2008).

2.5.5 Arrhythmias in Pregnancy

Premature atrial or ventricular complexes, or both, are the most common arrhythmias during pregnancy. They are not associated with adverse maternal or fetal outcomes and do not require antiarrhythmic therapy. Supraventricular tachyarrhythmia (SVT) is also common. Patients with SVT should be instructed about the performance of vagal maneuvers. In addition, the use of beta blockers or digoxin, or both, can be useful for controlling the ventricular rate. Adenosine and direct current cardioversion are both safe during pregnancy and can be used to treat SVT. De novo atrial fibrillation and atrial flutter are rare during pregnancy. However, women with a history of prepregnancy tachyarrhythmias have a high likelihood of recurrence during pregnancy. Furthermore, recurrent tachyarrhythmias during pregnancy are associated with an increased risk of adverse fetal complications, including premature birth, low birth weight, respiratory distress syndrome, and death. Rate control of atrial fibrillation and flutter is similar to that for the treatment of SVT. Direct current cardioversion can be performed safely during any stage of pregnancy. Other arrhythmias should be managed with the assistance of a cardiologist. (Am J Cardio, 2003)
2.6 Medication guidelines during pregnancy

2.6.1 Cardiovascular Drugs

Commonly used cardiovascular drug classes and their potential adverse effects during pregnancy. For drugs used to treat hypertension.

Table No (1) Cardiovascular Drugs Used During Pregnancy

<table>
<thead>
<tr>
<th>Drug</th>
<th>Use</th>
<th>Potential Effects</th>
<th>Safe During Pregnancy</th>
<th>Safe During Breast-Feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adenosine</td>
<td>Arrhythmia</td>
<td>None reported</td>
<td>Yes</td>
<td>No data</td>
</tr>
<tr>
<td>Beta blockers</td>
<td>Hypertension arrhythmias, MI, ischemia, HCM, hyperthyroidism, mitral stenosis, Marfan syndrome, cardiomyopathy</td>
<td>Fetal bradycardia, low birth weight, hypoglycemia, respiratory depression, prolonged labor</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Digoxin</td>
<td>Arrhythmia, CHF</td>
<td>Low birth weight, prematurity</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Diuretics</td>
<td>Hypertension, CHF</td>
<td>Reduced uteroplacental perfusion</td>
<td>Unclear</td>
<td>Yes</td>
</tr>
<tr>
<td>Lidocaine</td>
<td>Arrhythmia, anesthesia</td>
<td>Neonatal CNS depression</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Low-molecular-weight heparin</td>
<td>Mechanical valve, hypercoagulable state, DVT, AF, Eisenmenger's syndrome</td>
<td>Hemorrhage, unclear effects on maternal bone mineral density</td>
<td>Limited data</td>
<td>Limited data</td>
</tr>
<tr>
<td>Nitrates</td>
<td>Hypertension</td>
<td>Fetal distress with maternal hypotension</td>
<td>Yes</td>
<td>No data</td>
</tr>
<tr>
<td>Procainamide</td>
<td>Arrhythmia</td>
<td>None reported</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Unfractionated heparin</td>
<td>Mechanical valve, hypercoagulable state, DVT, AF, Eisenmenger's syndrome</td>
<td>Maternal osteoporosis, hemorrhage, thrombocytopenia, thrombosis, Warfarin embryopathy, fetal CNS abnormalities, hemorrhage</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Warfarin</td>
<td>Mechanical valve, hypercoagulable state, DVT, AF, Eisenmenger's syndrome</td>
<td>Warfarin embryopathy, fetal CNS abnormalities, hemorrhage</td>
<td>Yes, after week 12 of gestation</td>
<td>Yes</td>
</tr>
</tbody>
</table>
AF, atrial fibrillation; CHF, congestive heart failure; CNS, central nervous system; DVT, deep vein thrombosis; HCM, hypertrophic cardiomyopathy; MI, myocardial infarction. (Philadelphia, Saunders. 2005).

2.6.2 Antibiotic Prophylaxis:

The American Heart Association no longer recommends antibiotic prophylaxis for the prevention of bacterial endocarditis during genitourinary procedures, such as vaginal delivery and cesarean section, including high-risk patients.

2.6.3 Anticoagulants:

Several conditions require the initiation or maintenance of anticoagulation during pregnancy, including mechanical valves, certain prothrombotic conditions, prior episode of venous thromboembolism, acute deep vein thrombosis or thromboembolism during pregnancy, antiphospholipid antibody syndrome, and atrial fibrillation. The three most common agents considered for use during pregnancy are unfractionated heparin (UFH), low-molecular-weight heparin (LMWH), and warfarin. The Seventh American College of Chest Physicians (ACCP) Consensus Conference on Antithrombotic Therapy has recommended three potential strategies for anticoagulation during pregnancy. In women with venous thromboembolism, LMWH has become the anticoagulant of choice. In women with mechanical heart valves, data are more limited and there has been some concern regarding the efficacy of heparins with respect to the prevention of valve thrombosis. In these patients, the maternal and fetal risks and benefits must be carefully explained before choosing one of the aforementioned three strategies. When an UFH or LMWH strategy is selected, careful dose monitoring and adjustment are recommended. Warfarin freely crosses the placental barrier and can harm the fetus, but it is safe during breast-feeding. The incidence of warfarin embryopathy (abnormalities of fetal bone and cartilage formation) has been estimated at 4% to 10%; the risk is highest when warfarin is administered during weeks 6 through 12 of gestation. When administered during the second and third trimesters, warfarin has been associated with fetal central nervous system abnormalities. The risk of warfarin embryopathy may be low in patients who take 5 mg or less of warfarin per day. UFH does not cross the placenta and is considered safer for the fetus. Its use, however, has been associated with maternal
osteoporosis, hemorrhage, thrombocytopenia or thrombosis (HITT syndrome), and a high incidence of thromboembolic events with older generation mechanical valves. UFH may be administered parenterally or subcutaneously throughout pregnancy; when used subcutaneously for the anticoagulation of mechanical heart valves, the recommended starting dose is 17,500 to 20,000 U twice daily. The appropriate dose adjustment of UFH is based on an activated partial thromboplastin time (aPTT) of 2.0 to 3.0 times the control level. High doses of UFH are often required to achieve the goal aPTT because of the hypercoagulable state associated with pregnancy. Lower doses of UFH may be appropriate for anticoagulation in certain cases, such as the prevention of venous thromboembolism during pregnancy. (Philadelphia, Saunders. 2005).

Parenteral infusions should be stopped 4 hours before cesarean sections. UFH can be reversed with protamine sulfate. Low-molecular-weight heparin (LMWH) produces a more predictable anticoagulant response than UFH and is less likely to cause HITT. Its effect on maternal bone mineral density appears to be minimal. LMWH can be administered subcutaneously and dosed to achieve an anti-factor Xa level of 1.0 to 1.2 U/mL 4 to 6 hours after injection. Although there are data to support the use of LMWH in pregnant women with deep vein thrombosis, data on the safety and efficacy of LMWH in pregnant patients with mechanical valve prostheses are limited. Experience with these agents is accruing. In summary, anticoagulation in the pregnant patient can be difficult because of the risk profile associated with each drug regimen. In planned pregnancies, a careful discussion about the risks and benefits of warfarin, UFH, and LMWH will help the patient and physician involved to choose an anticoagulation strategy. Unplanned pregnancies are often diagnosed partway through the first trimester. It is advisable to stop warfarin when the pregnancy is discovered and to use UFH or LMWH, at least until after the 12th week. Dosing regimens for warfarin, UFH, and LMWH may vary by diagnosis. (Philadelphia, Saunders. 2005)

2.7 Nursing role:

The nurses must consider the two aspects of practice directly related to prevention and control of heart disease. Great concern should be paid for, The haemodynamic strain associated with pregnancy may mask a pre-existing condition (e.g. rheumatic heart disease) or a pregnancy-associated cardiac complication may develop (e.g.
cardiomyopathy). Most patients will present for the first time to obstetricians or GPs, not to cardiologists. Early diagnosis is important but can be challenging because symptoms and signs (e.g. fatigue, shortness of breath, edema and systolic ejection murmurs) can mimic the physiological changes of pregnancy. A low threshold of referral to a cardiologist should therefore be maintained. (Am J cardiol.2003)

*The nurse must know, and perform the following:

1-Etiology :

the main cardiac disease occurring with pregnancy are:
Rheumatic heart disease , Congenital heart disease , Coronary heart disease & Cardiomyopathies are rare during pregnancy.

2-Diagnosis:


3- Investigations:

-ECG, Echo cardiology ,and Chest x-ray .

4-Classification :

the classification of HD is based on function not diagnosis According to new York heart association classification :

- class I Asymptomatic on ordinary physical activity.
- class II symptomatic with ordinary physical activity
- class III symptomatic with less than ordinary physical activity.
- class IV symptomatic are present at rest (de-compensated)

5-Homodynamic changes during pregnancy :

Cardiac output increases by as much as 30% ,40% (HR BY 10 TO 15 b/m blood volume increase by as much as 50% , peripheral resistance decrease due

6-Effect of heart disease on pregnant women:
*Mother:
  - abortion the incidence of maternal motility.
  - preterm labor.
*Fetus:
  - Fetal death (due to hypoxia).
  - fetus small for gestational age.

7-Effect of pregnancy on heart disease:
The critical periods during which HF is liable to occur are:
At the 32nd week, as the cardiac output & blood volume are at their maximum
In the 2nd stage of labor as straining leads to stress on heart
Immediately after labor as contraction & retraction of the uterus lead to over load on the heart If ineffective endocarditis occur (Am J, cardiol. 2003)

* Medical management:
The aim of management:
  - Prevent of HF.
  - Prevention of infected endocarditis.

1) AntiPartum.
  - more frequent antenatal visits to the obstetrician & cardiologist.
  - Rest in bed, 10hrs each night & half an hour after each meal.
  - Diet: Moderate salt restriction in needed (2-4 gm/day).
  - Prevention of infection: dental & Pulmonary infections.
  - TTT of anemia.
  - Placental insufficiency tests to detect fetal hypoxia.
  - Hospitalization: At 32 weeks & again at 38 week till the patient is delivered.
    At any time if there is HF.
(2) Intrapartum.
- Position: semi-recumbent.
- O2.
- Pain relief.
- Ampicillin to prevent infective endocarditis.
- Shorting of the 2nd stage by forceps under anesthesia.

(3) Post partum.
- Breast feeding is contraindicated if heart failure develops.
- Hospitalization 3-4 weeks if heart failure develops.
- Antibiotics to avoid infective endocarditis.

(4) Special Cases.
- PTs with prosthetic valves: Heparin is given to prevent clots on artificial valves.
- Avoid oral anticoagulation as they are teratogenic.

(5) Therapeutic abortion:
In the 1st trimester for:
- Class IV.
- HF in previous pregnancy.
- Severe mitral stenosis.
- Nursing management of the heart disease during pregnancy.

[1] Nursing assessment:
* History
- History of dyspnea, palpation, easily
  Fatigability.
- Identify other factor that would increase strain on heart e.g. anemia,
  infection, anxiety
- Family history of heart disease
- Determine the function capacity of the heart by talking the woman's
  Pulse or respiration and blood pressure.
nursing Care during Antenatal Period:

* Monitor of the cardiac status:
  - assess cardiac status.
  - assess if symptoms of cardiac de compensation occur.
  - teach signs and symptoms of deteriorating cardiac status such as (dyspnea, orthopnea, cough and hemoptyis) and how to report them.

* protection from infection:
  - inform the woman about the importance of the protection from infection especially upper respiratory infection.
  - teach patient to report signs and symptoms of infection.

* Decrease exertion reduces fatigue and promotes:
  - Adequate ventilation.

* promotion of adequate nutrition:
  - Adiet should be rich in Iron, Protein and essential nutrition.
  - Low In sodium.

* Promotion of rest:
  - Rest is necessary to reduce the work load on heart.
  - 8-10 hrs of sleep are essential with daily rest period.
  - the patient should be instructed to rest on the left Side.
  - lateral recumbent position to facilitate blood flow to the fetus.

* The woman should understand her condition:
  - Sings of de compensation.
  - any medication she is taking and how to use it.
  - Reason for the need to decrease activity if symptoms occur.

* When therapy is being initiated the nurse must assist the patient by:
  - Providing oxygenation.
  - Providing skin care.
  - Ensuring that constipation is avoided.
• Promoting good nutrition.
  * Implementation of supportive therapy:
    • Use of prophylactic antibiotic on doctors order.
    • Oxygen by mask if dyspnea occur.

  *Administration of:

  • Diuretics to reduce the venous return to the heart and there by decrease the pulmonary and left atrial blood pressure so reducing pulmonary congestion.
  • Sedative to help to alleviate anxiety and decrease the voluntary muscles activity during the second stage of Labor
  
    [3] nursing management during labor and delivery:
    • Encourage relaxation and sleep between Contractions.
    • Support the woman emotionally to be less anxious.
    • The nurse guards the woman against over exertion during Pushing by coaching her to use shorter more Moderate open glottis pushes with complete relaxation between pushes.
    • Monitor vital signs closely every 10 minutes during the second stage.
    • Oxytocin is contraindicated for heart disease in first and second stage.
    • Blood loss during 3rd and 4rd stage of labor is kept to a minimum by promote delivery of the placenta and Oxytocin administration bimanual compression.

  [4] nursing care during post partum period:
  *promotion of recovery:
  • Monitor vital signs regularly.
  • Maintain the woman in semi- fowler's positions.
  • Facilitate bowel elimination by controlling the diet.
  • The woman resumes activity gradually and Progressively.

  * promotion of physiological support:
  • Encourage maternal and fetal attachment.
  • Continous monitoring of maternal status after Delivery scince cardiac work load is great.
• Prevent post partum hemorrhage, infection and Thromboembolism that can cause crisis.
• Education and assistance in new born care:
  # the woman can breast feed her infant.
# the nurse can assist the woman to comfortable Side lying position with her head moderately elevated or to semi-reclining position.

*Preparation for discharge:
• Realistic home care plans should be communicated with patient.
• Plan with the woman an activity schedule that is gradual progressive and appropriate to her needs and home environment.
• Give appropriate information counseling regarding sexual relations and contraception.(N Engl J, Med.2001)
2.8 Previous studies

**Worldwide** although the incidence of heart disease during pregnancy in the UK has remained constant at 0.9% over several decades, recent UK Confidential Enquiries into Maternal and Child Health have identified cardiac disease as an increasingly important cause of maternal death. It has now become the commonest cause overall, with a maternal mortality rate in the triennium 2003–2005 of 22.7 per million maternities (up from 7.6 per million in the triennium ending in 1990). Care was considered substandard in nearly half of these cases. Pregnancy is associated with substantial physiological Changes in the cardiovascular system. The key elements – a fall in systemic vascular resistance (SVR) and rises of up reported, with pregnancy itself increasing the risk three to four times. Cardiac disease is also associated with increased fetal and neonatal complications, including fetal loss, intrauterine growth restriction (IUGR), preterm birth and intracranial hemorrhage. This risk is highest in women with poor functional class [New York Heart Association (NYHA) functional class IIIandIV], cyanosis or left heart obstruction (which restricts cardiac output and therefore placental perfusion) \(^1\)Chest,2004\(^1\)

**Developed countries** In 2007, the European Registry on Pregnancy and Heart disease was initiated by the European Society of Cardiology. Consecutive patients with valvular heart disease, congenital heart disease, ischaemic heart disease (IHD), or cardiomyopathy (CMP) presenting with pregnancy were enrolled. Data for the normal population were derived from the literature. Sixty hospitals in 28 countries enrolled 1321 pregnant women between 2007 and 2011. Median maternal age was 30 years (range 16–53). Most patients were in NYHA class I (72%). Congenital heart disease (66%) was most prevalent, followed by valvular heart disease 25%, CMP 7%, and IHD in 2%. Maternal death occurred in 1%, compared with 0.007% in the normal population. Highest maternal mortality was found in patients with CMP. During pregnancy, 338 patients (26%) were hospitalized, 133 for heart failure. Caesarean section was performed in 41%. Foetal mortality occurred in 1.7% and neonatal mortality in 0.6%, both higher than in the normal population. Median duration of pregnancy was 38 weeks (range 24–42) and median birth weight 3010 g (range 300–4850). In centres of developing countries, maternal and foetal mortality was higher than in centres of developed countries (3.9 vs. 0.6%, \(P< 0.001\) and 6.5 vs. 0.9% \(P< 0.001\)).
Conclusion: The vast majority of patients can go safely through pregnancy and delivery as long as adequate pre-pregnancy evaluation and specialized high-quality care during pregnancy and delivery are available. Pregnancy outcomes were markedly worse in patients with CMP and in developing countries. (Euro Heart J (2013))

**Developing countries** bear a major share of the global burden of cardiovascular disease remains one of the leading causes of death in these countries. The chance of foetal and prenatal mortality is increased on average four times, and even more in women with conditions such as Eisenmenger syndrome. For women with congenital heart disease, the risk of structural heart defects in the fetus varies from 3 to 12% compared with a background risk of 0.8% in the general population.

**In Sudan** incidence of ventricular arrhythmias, Brady-arrhythmias and sudden cardiac death following acute myocardial infarction were significantly high. The increased incidence is even in all age groups. DM, smoking and past history of IHD are the commonest associated risk factors. Maternal and neonatal complication rates are increased in pregnant women with heart disease. Cardiac risk assessment may be improved by defining low and high-risk groups. The nurses must consider the two aspects of practice directly related to prevention and control of heart disease. Great concern should be paid for, the hemodynamic strain associated with pregnancy may mask a pre-existing condition (e.g. rheumatic heart disease) or a pregnancy-associated cardiac complication may develop (e.g. cardiomyopathy). Most patients will present for the first time to obstetricians or GPs, not to cardiologists. Early diagnosis is important but can be challenging because symptoms and signs (e.g. fatigue, shortness of breath, edema and systolic ejection murmurs) can mimic the physiological changes of pregnancy. A low threshold of referral to a cardiologist should therefore be maintained.

Learning is an active process in which learner is definitively involved educational program will enable nurses to work at their own pace, allow evaluation and encourage the nurses to participate actively in the learning process by constructing their own response. (WHO, 2005).
3. Material and Methods

3-1 Study design:

A descriptive hospital based study was conducted at Khartoum teaching hospital aimed at assessing nurses, knowledge regarding care of women with heart disease during pregnancy during the period from (June 2012 to October 2013).

3-2 Study area:

The study was carried out in general special unites at Khartoum teaching hospital in Khartoum State, capital city of Sudan. The hospitals was consisted of (700) beds which are almost fully occupied throughout the year, and divided in many departments, intensive care unit (ICU), renal unites, medicine & sugary word, Ultra Sound (US) and X-ray department, Emergency Unit, big Theater, Blood bank. Hospital is the one of the well-established health care centre in Sudan with large catchment's area, where all patients came from Khartoum state, nearest states and nearest country.

Table (3.1): Distribution of Manpower in Khartoum teaching Hospital

<table>
<thead>
<tr>
<th>Position</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Consultants</td>
<td>91</td>
</tr>
<tr>
<td>Registrars</td>
<td>182</td>
</tr>
<tr>
<td>Medical officers</td>
<td>122</td>
</tr>
<tr>
<td>House officers</td>
<td>220</td>
</tr>
<tr>
<td>Sisters (bachelor, diploma)</td>
<td>203</td>
</tr>
<tr>
<td>Nurses (certified nurse)</td>
<td>284</td>
</tr>
<tr>
<td>Pharmacists</td>
<td>32</td>
</tr>
<tr>
<td>Assistant pharmacist</td>
<td>11</td>
</tr>
<tr>
<td>Nutritionists</td>
<td>28</td>
</tr>
<tr>
<td>Assistant Nutritionists</td>
<td>50</td>
</tr>
<tr>
<td>Total</td>
<td>1223</td>
</tr>
</tbody>
</table>

Source: Statistical Department of Khartoum teaching Hospital, 2013.
3.3 Study Population:

The population of the present study includes all nurses who have work in obstetrical words and intensive care units direct contact with patients (70) nurses.

- **3-3-1 Inclusion criteria:**
  - All qualified nurses who have direct contact with pregnant woman with heart disease in Khartoum teaching Hospital.
  - All nurses with one year experience and more in obstetrical words and intensive care units

- **3-3-2 Exclusion criteria:**
  - Under training nurses were not involved in this study.
  - Nurses have experience less than 1 year.

3-4 Sample size:

All qualified nurses (70) who work in the obstetrical words and intensive units and were responsible for caring of patients at the hospital were included in the study during the period from June 2012 to October 2013.

3-5 Data collection tools:

**Interview questionnaire:**

Structured questionnaire was designed by the researcher and utilized for two purposes as follows:

First: To find out the general characteristics of the study sample. It contained the basic data related to their general characteristics such as age, education, and years of experience.

Second: To assess nurse’s knowledge regarding variables of heart disease during pregnancy. It includes questions about definition of heart disease during pregnancy, types, causes, management, complications, and nursing (role & intervention)
3-6 Sample Technique:

- Official letters for the head manager and matron of Khartoum teaching hospital at June 2012 for approval to collect the data.

All qualified nurses with one year experience and more were collected from the available staff included 70 nurses who are responsible for caring of pregnant woman with heart disease at time of this research execution.
- Explanation for the selected nurses about the study questionnaire.

- Questionnaire was distributed for each available nurse to fill within 25-30 minutes under the researcher guidance.
4.1 Results

Table (4.1) Distribution of the sample according to their age

(\(n=70\))

<table>
<thead>
<tr>
<th>Age</th>
<th>NO</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>(20-25)years</td>
<td>24</td>
<td>34%</td>
</tr>
<tr>
<td>(26-30)years</td>
<td>26</td>
<td>34.2%</td>
</tr>
<tr>
<td>above30years</td>
<td>20</td>
<td>31.6%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>70</td>
<td>70</td>
</tr>
</tbody>
</table>

**Figure No (4.1) ages of nurses:**

Distribution of the sample according to their ages show that (34%) of nurses at age of (20-25) years, (34.2%) at age of (30-26) years and (31.6%) are above 30 years.
Figure (4.1): Gender of all nurses

Distribution of the sample according to their gender show that female was 76% and male was 24%.
Level of Education

The Figure (4.2) showed that (63%) have bachelor degree, (26%) have diploma degree, (5%) master degree and (6%) certified nurse.

Figure (4.2): Distribution of the sample according to their educational level.
Figure (4.3):

Distribution of the study sample according to their knowledge regarding Definition of heart disease during pregnancy.

This figure showed that 37% of the study sample responded with correct answer regarding definition.
Table (4.2): Distribution of the study sample according to their knowledge regarding Etiology, sign and symptoms of pregnant women with heart disease:

(n=70)

<table>
<thead>
<tr>
<th>Nurses knowledge</th>
<th>Correct complete</th>
<th>Correct incomplete</th>
<th>incorrect</th>
<th>Total</th>
<th>%</th>
<th>NO</th>
<th>%</th>
<th>NO</th>
<th>%</th>
<th>NO</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etiology of the heart disease during pregnancy</td>
<td>21</td>
<td>30</td>
<td>19</td>
<td>27.2</td>
<td>30</td>
<td>42.8</td>
<td>70</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>sign and symptoms of the heart disease during pregnancy</td>
<td>26</td>
<td>37.1</td>
<td>14</td>
<td>20</td>
<td>30</td>
<td>42.8</td>
<td>70</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investigation</td>
<td>17</td>
<td>21.4</td>
<td>21</td>
<td>30</td>
<td>32</td>
<td>45.7</td>
<td>70</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diagnosis</td>
<td>29</td>
<td>41.4</td>
<td>22</td>
<td>31.5</td>
<td>19</td>
<td>27.2</td>
<td>70</td>
<td>100</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table (4.2): illustrate that 30% of the study sample responded with correct complete answers regarding Etiology of the heart disease during pregnancy.
Table (4.3): Distribution of the study sample according to their knowledge regarding, Investigation and diagnosis, homodynamic changes of pregnant women with heart disease:

(n=70)

<table>
<thead>
<tr>
<th>Nurses knowledge</th>
<th>Correct complete</th>
<th>Correct incomplete</th>
<th>incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>%</td>
<td>NO</td>
<td>%</td>
</tr>
<tr>
<td>Investigation</td>
<td>17</td>
<td>21.4</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>Diagnosis</td>
<td>29</td>
<td>41.4</td>
<td>22</td>
<td>31.5</td>
</tr>
<tr>
<td>Homodynamic changes during pregnancy</td>
<td>33</td>
<td>47.1</td>
<td>23</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Table (4.3): illustrate that 21.4% of the study sample responded with correct complete answers regarding Investigation of the heart disease during pregnancy.
Table (4.4): Distribution of the study sample according to their knowledge regarding Effect of the heart disease on pregnant women: (Mother, fetus) and Effect of pregnancy on heart disease:

\[ \text{(n=70)} \]

<table>
<thead>
<tr>
<th>Nurses knowledge</th>
<th>Correct complete</th>
<th>Correct incomplete</th>
<th>incorrect</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>NO</td>
<td>%</td>
<td>NO</td>
</tr>
<tr>
<td>Effect of HD on pregnant women:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>_Mother</td>
<td>16 22.8</td>
<td>30 42.8</td>
<td>24 34.2</td>
<td>70 100</td>
</tr>
<tr>
<td>_fetus</td>
<td>17 24.2</td>
<td>24 34.2</td>
<td>29 41.2</td>
<td>70 100</td>
</tr>
<tr>
<td>Effect of pregnancy on HD</td>
<td>13 18.5</td>
<td>15 21.4</td>
<td>42 60</td>
<td>70 100</td>
</tr>
</tbody>
</table>

Table (4.4) showed that only 22.8\% of the study sample responded with correct complete answers regarding effect of heart disease on pregnant woman.
Table (4.5): Distribution of the study sample according to their knowledge regarding Medical management the aim of management : (Ante-Partum, Intra-partum, Post-partum) of pregnant women with heart disease:

(n=70)

<table>
<thead>
<tr>
<th>Nurses knowledge</th>
<th>Correct complete</th>
<th>Correct incomplete</th>
<th>Incorrect</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>%</td>
<td>NO</td>
<td>%</td>
</tr>
<tr>
<td>Medical management the aim of management:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ante-Partum</td>
<td>12</td>
<td>17</td>
<td>14</td>
<td>20</td>
</tr>
<tr>
<td>Intra-partum</td>
<td>10</td>
<td>14</td>
<td>15</td>
<td>21.4</td>
</tr>
<tr>
<td>Post-partum</td>
<td>12</td>
<td>17</td>
<td>16</td>
<td>22.8</td>
</tr>
<tr>
<td>Nursing care during postpartum period</td>
<td>9</td>
<td>12.8</td>
<td>13</td>
<td>18.5</td>
</tr>
</tbody>
</table>

Table (4.5) these tables mention that the correct answers regarding Medical management the aim of management : (Ante-Partum (17%), Intra-partum (14%), Post-partum (17%) ). The correct answers regarding Nursing management of the heart disease: during pregnancy (history) : (18.5%), nursing Care during Antenatal Period (27%), and only (12.8%) regarding nursing care during postpartum period.
Table (4.6): Distribution of the study sample according to their knowledge regarding, Nursing management of the heart disease: (during pregnancy (history), nursing Care during Antenatal Period, When therapy is being initiated the nurse must assist the patient by and nursing care during postpartum period) of pregnant women with heart disease:

<table>
<thead>
<tr>
<th>Nurses knowledge</th>
<th>Correct complete</th>
<th>Correct incomplete</th>
<th>incorrect</th>
<th>total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NO</td>
<td>%</td>
<td>NO</td>
<td>%</td>
</tr>
<tr>
<td>Nursing management of the heart disease: - during pregnancy (history)</td>
<td>13</td>
<td>18.5</td>
<td>17</td>
<td>24.2</td>
</tr>
<tr>
<td>Nursing Care during Antenatal Period</td>
<td>19</td>
<td>27</td>
<td>21</td>
<td>30</td>
</tr>
<tr>
<td>When therapy is being initiated the nurse must assist the patient.</td>
<td>22</td>
<td>31</td>
<td>30</td>
<td>42.8</td>
</tr>
</tbody>
</table>

Table (4.6) these tables mention that the correct answers regarding Nursing management of the heart disease during pregnancy: (history): (18.5%), nursing Care during Antenatal Period (27%), and only (12.8%) regarding nursing care during postpartum period.
4.2 Discussion:

Cardiac disease in pregnancy is becoming more common. The report of confidential enquiries into maternal and neonatal deaths in the UK 2006-2008 reported a total of 53 deaths due to heart disease in pregnancy (Am J Cardio, 2003). Majority of maternal deaths and complication during pregnancy with heart disease are considered preventable, as are new born there is timely access to appropriate interventions when obstetric complications occurs and healthy problem in pregnancy. It is important for all nursing staff to attend the educational program in their hospital to help the pregnant women with heart disease. The study was conducted in Khartoum teaching hospital, obstetrical words and Intensive care unit in Khartoum State, From June 2012 to October 2013.

Figure (4): almost of them tow third (63%) holding BSc degree, sample according to their education (63%) have bachelor degree, (26%) have diploma degree, (5%) master degree and (6%) certified nurse. The majority of them were qualified nurses. Figure (2): the study show that (34%) of nurses at age of (20-25) years, (34.2%) at age of (30-26) years and (31.6%) are above 30 years.

Figure no (1): this figure shows that tow third (63%) of the study sample responses with correct answers regarding Definitions of heart disease during pregnancy.

Figure no (3): this figure show that the sample according to their gender shows that female was 76% and male was 24%.

Table (4.1) mentioned the study sample according to their knowledge regarding Etiology (30%) have correct answers, while (37%) answered correctly regarding sign and symptoms, and only (41%) have correct answers regarding diagnosis of pregnant women with heart disease.

Table (4.2) this table shows that (47.1%) of the study sample responses with correct answers regarding Homodynamic changes during pregnancy, (22.8%) only have correct answers regarding Effect of heart disease on pregnant women, (24%) regarding Effect of heart disease on fetus.
Table (4.3) this table mention that the correct answers regarding Medical management the aim of management : (Ante-Partum (17%), Intra-partum (14%), Post-partum (17%).

The correct answers regarding Nursing management of the heart disease: during pregnancy (history): (18.5%), nursing Care during Antenatal Period (27%), and only (12.8%) regarding nursing care during postpartum period.

At the last I comment the nurse’s poor knowledge about it.

The current study mentioned that, knowledge of nursing management of pregnant woman with heart disease among nurses not suffusion in some variable.
5.1. Conclusion:

- Care of pregnant woman with heart disease is important health services.
- We had a highest response rate (47.1%) among all groups of the nurses regarding Homodynamic changes during pregnancy.
- The knowledge of the nurses is lower (12, 8%) regarding nursing care during postpartum period in Nursing management of the heart disease.
- The nursing staff knowledge is very low rate (18.5%) about Effect of pregnancy on heart diseases.
- Based on the result of this study it concluded that: the nurses were inadequate knowledge especially regarding care of pregnancy women with heart diseases.
5.2. Recommendation:

The study recommended that:

- Periodic training program for all nurses working in Khartoum teaching hospital regarding care of pregnancy women with heart diseases.

- Research priorities include developing standardized approaches to reporting of outcomes, and information on clinical outcomes relevant to the experiences of pregnant women.

- Log book for nurses must be designed and must be available at hospital.
References:


Questioner to Assess Nurses Knowledge Regarding Care of Women with heart disease During Pregnancy in Khartoum Teaching Hospital in Khartoum, State-Sudan

Personal data:
1. Age:
   a. 20----25 years
   b. 26-----30 years
   C. above 30 years
2. Gender:
   a. male
   b. female
3. Level of education:
   a. secondary school
   b. technical diploma
   c. bachelor
   d. post graduate
4. Years of experience:
   a. less than one year
   b. 1-----5 years
   c. 6----10 years
   d. more
5. Are you receive educational program about mi:
   A. yes
   B. no

Definition:-
1. Cardiac diseases in pregnancies is diseases due to cardiac abnormalities.
2. is symptoms of cardiac de compensation (Dyspnea, orthopnea, fatigability, syncope, and dizzy spells) with pregnancy.
3. cardiac disease occurring with pregnancy mainly: Rheumatic heart disease
   Congenital heart disease, Coronary heart disease & Cardiomyopathies re rare during pregnancy

Etiology:

the main cardiac disease occurring with pregnancy are:-

a. Rheumatic heart disease.

b. Congenital heart disease.

c. Coronary heart disease
d. Cardiomyopathies.

e. All of the above.

**Diagnosis :-**

a. History :- history of Rheumatic fever or Congenital heart disease.

b. S&\(s\) :- manifestation of RHD :- (HF ,R/L dysfunction).

   Hyperventilation & dyspnea & Orthopnea , Cough (pul – congestive symptom).

c. functional systolic murmurs during physical examination.

d. lower limb edema.

e. All of the above

**S &s :-**

a. manifestation of RHD :- (HF ,R/L dysfunction).

b. Hyperventilation

c. dyspnea.

d. Orthopnea

e. Cough (pul – congestive symptom).

f. All of the above.

**Investigations:-**

a. ECG.

b. Echo cardiology.

c. Chest x-ray.

d. others.

e. all of the above.
Classification :-

the classification of HD is based on function not diagnosis.

a - class I Asymptomatic on ordinary physical activity.

b - class II symptomatic with ordinary physical activity.

c - class III symptomatic with less than ordinary physical activity.

d - class IV symptomatic are present at rest (de-compensated)

e – all of the above.

f- others

Homodynamic changes during pregnancy :-

a - Cardiac output increases by as much as 30%, 40% (HR BY 10 TO 15 b/m)

b - blood volume increase by as much as 50%

c- peripheral resistance decrease due to progesterone vasodilatation effect.

d- blood pressure in the half of pregnancy

e- HB & hematocrit in relation to plasma volume

f- all of the above.

Effect of HD on pregnant women :-

Mother :-

a - abortion the incidence of maternal motility.

b - preterm labor

Fetus :-

a - Fetal death (due to hypoxia).
b - fetus small for gestational age.

Effect of pregnancy on HD :-

- the critical periods during which HF is liable to occur are;

a. At the 32nd week, as the cardiac output & blood volume are at their maximum
b. In the 2nd stage of labor as straining leads to stress on heart
c. Immediately after labor as contraction & retraction of the uterus lead to over load on the heart.

If ineffective endocarditis occur.

Medical management:-

The aim of management :-

a. Prevent of HF.
b. Prevention of infected endocarditis.

(1) Ante-Partum.

a. more frequent antenatal visits to the obstetrician & cardiologist
b. Rest in bed, 10hrs each night & half an hour after each meal
c. Diet :- Moderate salt restriction in needed (2-4 gm/day)
d. Prevention of infection :- dental & Pulmonary infections.
e. TTT of anemia.
f. Placental insufficiency tests to detect fetal hypoxia.
g. Hospitalization:- At 32 weeks & again at 38 week till the patient is delivered.
   At any time if there is HF.
h. all of the above.
i. others.

(2) Intra-partum.

b. O2.
c. Pain relief.
d. Ampicillin to prevent infective endocarditis.
e. Shorting of the 2nd stage by forceps under anesthesia.

f. all of the above.

(3) Post partum.

- Breast feeding is contraindicated if heart failure develops.
- Hospitalization 3-4 weeks if heart failure develops.
- Antibiotics to avoid infective endocarditis.

(4) Special Cases.

PTs with prosthetic valves:

a. Heparin is given to prevent clots on artificial valves
b. Avoid oral anticoagulation as they are teratogenic

Therapeutic abortion:

in the 1st trimester for:

a. class IV.

b. HF in previous pregnancy.

c. severe mitral stenosis.

d. all of the above.

Nursing management of the heart disease during pregnancy.

[1] Nursing assessment:

*History

(1) history of dyspnea, palpation, easily fatigability.

(2) Identify other factor that would increase strain on heart e.g. anemia, infection, anxiety.

(3) Family history of heart disease.

(4) Determine the function capacity of the heart by talking the woman's Pulse or respiration and blood pressure.
[2] Nursing Care during Antenatal Period:

* Monitor of the cardiac status:*

1. Assess cardiac status.
2. Assess if symptoms of cardiac decompensation occur.
3. Teach signs and symptoms of deteriorating cardiac status such as (dyspnea, orthopnea, cough and hemoptysis) and how to report them.

* Protection from infection:*

1. Inform the woman about the importance of protection from infection especially upper respiratory infection.
2. Teach the patient to report signs and symptoms of infection.

* Decrease exertion reduces fatigue and promotes adequate ventilation.*

* Promotion of adequate nutrition:*

1. Diet should be rich in iron, protein and essential nutrition.
2. Low in sodium.

* Promotion of rest:*

1. Rest is necessary to reduce the workload on the heart.
2. 8-10 hours of sleep are essential with daily rest periods.
3. The patient should be instructed to rest on the left side.
4. Lateral recumbent position to facilitate blood flow to the fetus.

* The woman should understand her condition:*

1. Signs of decompensation.
(2) any medication she is taking and how to use it.

(3) Reason for the need to decrease activity if symptoms occur.

**When therapy is being initiated the nurse must assist the patient by:**

1. Providing oxygenation.
2. Providing skin care.
3. Ensuring that constipation is avoided.
4. Promoting good nutrition.

*Implementation of supportive therapy*:

1. Use of prophylactic antibiotic on doctors order.
2. Oxygen by mask if dyspnea occur.

(3) Administration of:

- **Diuretics** to reduce the venous return to the heart and thereby decrease the pulmonary and left atrial blood pressure so reducing pulmonary congestion.

- **Sedative** to help to alleviate anxiety and decrease the voluntary muscles activity during the second stage of Labor.

**[3] Nursing management during labor and delivery**:

1. Encourage relaxation and sleep between Contractions.
2. Support the woman emotionally to be less anxious.
3. The nurse guards the woman against over exertion during Pushing by coaching her to use shorter more Moderate open glottis pushes with complete relaxation between pushes.
4. Monitor vital signs closely every 10 minutes during the second stage.
5. Oxytocin is contraindicated for heart disease in first and second stage.
(6) Blood loss during 3rd and 4rd stage of labor is kept to a minimum by promote delivery of the placenta and Oxytocin administration bimanual compression.

[3] nursing care during post partum period

*promotion of recovery :-
(1) Monitor vital signs regularly.
(2) Maintain the woman in semi- fowler's positions.
(3) Facilitate bowel elimination by controlling the diet.
(4) The woman resumes activity gradually and Progressively.

* promotion of physiological support :-
(1) Encourage maternal and fetal attachment.
(2) Continuous monitoring of maternal status after Delivery since cardiac work load is great.
(3) Prevent post partum hemorrhage, infection and Thrombo–embolism that can cause crisis.
(4) Education and assistance in new born care :-

# The woman can breast feed her infant.
# The nurse can assist the woman to comfortable side lying position with her head moderately elevated or to semi-fowler's position.

Preparation for discharge :-
(1) Realistic home care plans should be communicated With patient. 
(2) Plan with the woman an activity schedule that is gradual progressive and appropriate to her needs and home environment.
(3) Give appropriate information counseling regarding sexual relations and contraception.