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Comprehensive Nursing Care in Coronary Heart Disease: Biochemical Markers, Strategies, Challenges, and Evidence-Based Approaches for Effective Patient Management and Outcomes.

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Abstract

Background: Coronary heart disease (CHD) is a leading cause of morbidity and mortality globally, posing significant challenges for patient care across diverse populations. Nurses play a critical role in the prevention, management, and rehabilitation of patients with CHD, contributing to improved clinical outcomes and quality of life. This review explores evidence-based approaches and strategies for effective nursing care in CHD management, emphasizing the unique considerations for pediatric and elderly patients.

Aim: The aim of this review is to critically examine the role of nurses in managing CHD, focusing on the prevention of risk factors, patient education, and care strategies across the lifespan, with particular attention to the pediatric and elderly populations.

Methods: This review synthesizes findings from current literature on the role of nursing care in CHD management, including the impact of interventions aimed at change in behavioral, mental health support, and clinical outcomes. A particular focus is given to nursing interventions in the management of obesity, cardiovascular risk factors, and the distinctive challenges faced by pediatric and elderly populations with CHD.

Results: Evidence shows that nursing interventions, including patient education, lifestyle modification support, and continuity of care, significantly improve self-care capacity, disease knowledge, and self-efficacy in patients with CHD. For pediatric and elderly populations, tailored care strategies are essential due to their unique physiological and psychological needs. In pediatric cases, nurses play a crucial role in early detection and family support, while in elderly patients, comprehensive care addressing polypharmacy, cognitive decline, and comorbidities is vital. Additionally, nurses have been shown to contribute to improved clinical parameters such as blood pressure, cholesterol levels, and physical activity adherence, along with better mental health outcomes.

Conclusion: Nurses are central to the management and treatment of CHD, with evidence supporting the positive impact of their interventions on patient outcomes. Effective nursing care, particularly in the pediatric and elderly populations, requires a tailored, patient-centered approach that considers age-specific needs, comorbidities, and psychosocial factors. Continued research into nursing strategies and interventions is essential for optimizing care and improving long-term outcomes for patients with CHD.

Keywords: Coronary Heart Disease, Nursing Care, Patient Management, Pediatric Patients, Elderly Patients, Risk Factors, Lifestyle Modifications, Evidence-Based Practice, Clinical Outcomes, Mental Health.

1. Introduction

Coronary artery disease (CAD) remains the leading cause of mortality globally, accounting for 27% of all deaths in Europe [1]. The primary goal of treatment is to address the associated cardiovascular risk factors, including hypertension, smoking, diabetes mellitus, and dyslipidemia [2]. In recent years, advancements in treatment modalities, such as surgical and percutaneous revascularization, alongside pharmacological interventions, have significantly reduced the incidence of complications and mortality rates [3]. Despite positive recovery outcomes

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following surgery, the post-discharge phase can present considerable challenges for patients [4]. It is crucial for patients to be adequately prepared for the recovery process and follow-up care, as their quality of life may deteriorate, not only in terms of physical health but also in psychological well-being, with up to 25% of patients experiencing anxiety and depressive symptoms [5,6,7]. The discharge phase is particularly critical, as patients must adapt to a new lifestyle that includes medication regimens and the need for social and emotional support [8]. These individuals are at heightened risk of additional cardiac events, underscoring the importance of secondary prevention [4]. Secondary prevention strategies focus on patient education, recognition of alarming symptoms, adherence to pharmacological therapies, and management of risk factors [9]. Although patients are often informed about post-discharge guidelines and lifestyle modifications, many do not receive adequate follow-up care from healthcare professionals [10,11,12]. Therefore, continuity of care during and after discharge is essential, ensuring that care is tailored to the patients' needs and available resources [4,13,14]. Effective continuity of care interventions for CAD patients emphasize high-quality care, utilization of community resources, and active patient participation in self-care [4]. The objective is to enhance adherence to pharmacological treatments, improve disease knowledge, prevent complications, and close the care gap that may arise after discharge, ultimately reducing the likelihood of readmission [15]. Previous research has examined the impact of physical re-education programs on improving physical parameters and overall well-being recovery [16,17,18]. Other studies have explored the efficacy of combined pharmacological and non-pharmacological interventions [19,20], while additional research has assessed the effects of patient education and telephone counseling on quality of life [21,22].

Coronary Heart Disease:

An imbalance between oxygen demand and supply results from coronary artery disease (CAD), a disorder marked by an inadequate flow of blood and oxygen to the myocardium as a result of coronary artery blockage. Plaques that obstruct blood flow in the coronary arteries are usually the condition's hallmark. Despite being relatively uncommon in the early 20th century, CAD is the biggest cause of death worldwide. Mortality peaked in the 1960s and has since decreased. However, it continues to be the leading cause of death globally [23]. Since CAD is a complex illness, risk factors can be broadly divided into two categories: modifiable and non-modifiable. While smoking, obesity, dyslipidemia, and psychosocial variables are modifiable risk factors, age, gender, family history, and genetic predisposition are non-modifiable factors. Ischemic heart disease is becoming more common in Western nations as a result of bad eating habits brought on by fast-paced lifestyles. Better primary care in the US has caused CAD to develop later in life among higher socioeconomic groups. However, with a prevalence of 15.5% among adults in the United States in 2016 [24], smoking continues to be the leading cause of cardiovascular illnesses.

Hypercholesterolemia is a major modifiable risk factor for CAD, and males are more likely than women to develop it. High-density lipoproteins (HDL) provide protection against CAD, but elevated low-density lipoproteins (LDL) dramatically raise the risk. The ASCVD risk calculator on the American Heart Association's website can be used to determine the ten-year risk of atherosclerotic cardiovascular disease. Although there is ongoing discussion on their usefulness in clinical settings, inflammatory markers including high-sensitivity C-reactive protein (hsCRP) are also thought to be significant risk factors for CAD [25]. Globally, CAD is common in both developed and underdeveloped countries. According to a study, CAD costs the US healthcare system more than $200 billion a year and accounts for 2.2% of the world's disease burden and 32.7% of cardiovascular diseases. There were 15.5 million Americans with CAD between 2009 and 2012, with an estimated 7.6% of males and 5.0% of women living with the condition [26][27]. Regardless of gender, the ONACI registry in France shows that the incidence of CAD rises with age, rising from 1% in people aged 45-65 to 4% in those aged 75-84 [28].

The formation of atherosclerotic plaques is the main factor influencing the pathophysiology of CAD. Lipid deposits that restrict the artery lumen and impede blood flow make up these plaques. The process starts with the development of a "fatty streak," which is caused by lipid-rich macrophages called foam cells depositing themselves beneath the epithelium. The intima layer breaks down after vascular damage, enabling monocytes to go into the subendothelial region and develop into macrophages. These macrophages create foam cells by consuming oxidized LDL particles. Smooth muscle cells are activated as a result of the degenerative process being made worse by T cell activation and cytokine release. In addition to producing collagen and absorbing oxidized LDL particles, these cells aid in the formation of subendothelial plaques and the buildup of foam cells. The plaque may settle as it ages, eventually calcifying into a fibrous cap, or it may continue to enlarge. A stable plaque can cause angina symptoms, which usually go away during rest, by obstructing blood flow during times when myocardial oxygen demand is elevated. For angina to occur at rest, a plaque needs to be 90% stenosed. Plaques may occasionally burst, revealing tissue factor and causing thrombosis. Depending on the severity of the insult, this can cause partial or total blockage of the coronary artery, which can result in the development of acute coronary syndrome (ACS), which can present as unstable

angina, non-ST elevation myocardial infarction (NSTEMI), or ST elevation myocardial infarction (STEMI) [29].

CAD is commonly classified into the following categories:

- Stable ischemic heart disease (SIHD)
- Acute coronary syndrome (ACS)
  - ST-elevation myocardial infarction (STEMI)
  - Non-ST elevation myocardial infarction (NSTEMI)
  - Unstable angina

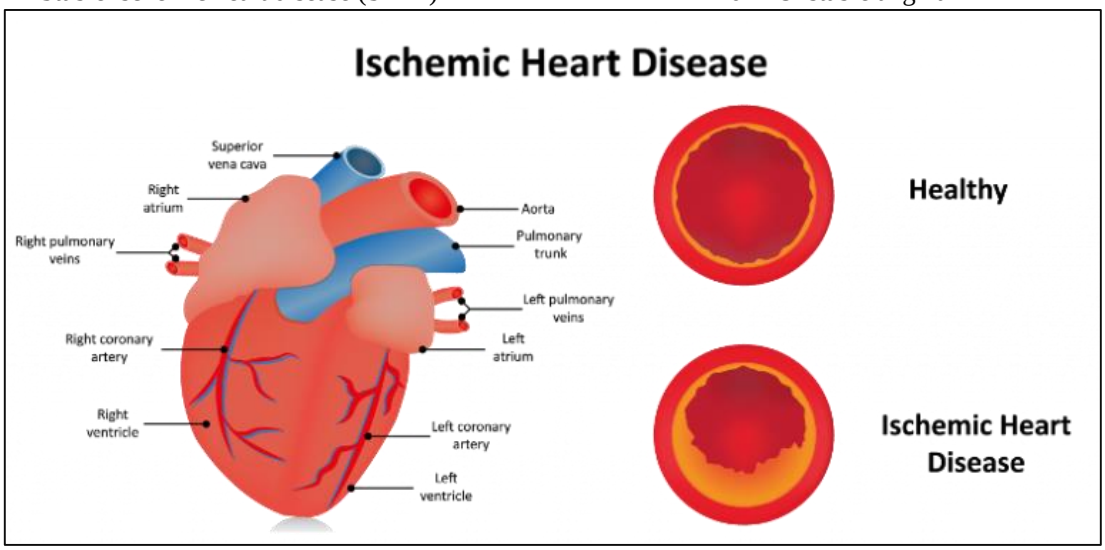

Figure 1: Coronary Heart Disease.

History and Physical Symptoms:

A thorough history and physical examination are essential before proceeding with further diagnostic workup in patients suspected of having coronary artery disease (CAD). CAD can present as stable ischemic heart disease (SIHD) or acute coronary syndrome (ACS) and, if left untreated, may progress to congestive heart failure (CHF). A detailed history should include inquiries about chest pain, its relationship to physical activity, and any radiation of the pain to the jaw, neck, left arm, or back. Additionally, the presence of dyspnea should be evaluated both at rest and with exertion. The patient should also be questioned about symptoms such as syncope, palpitations, tachypnea, lower extremity edema, orthopnea, and their overall exercise tolerance. Gathering a family history of ischemic heart diseases, along with information on dietary habits, smoking, and lifestyle, is also crucial for assessing risk factors. The physical examination should be comprehensive, involving inspection, palpation, and auscultation. Inspection should focus on signs of acute distress, jugular venous distention, and peripheral edema. During palpation, assessment should include checking for a fluid thrill or heave, and the extent of peripheral edema, if present, should be evaluated. Additionally, the distension of the jugular vein should be measured. Auscultation should include careful examination of the heart sounds in all four locations, as well as lung auscultation, with particular attention to the lower lung zones for signs of fluid accumulation. These steps are critical in identifying potential complications and guiding further diagnostic and therapeutic interventions.

Evaluation and Diagnosis:

The evaluation of coronary artery disease (CAD) involves several diagnostic modalities, each with its own role depending on the clinical presentation of the patient. Below are details on the commonly used tests:

1. Electrocardiogram (EKG)

One essential and very useful test for CAD diagnosis is an EKG. Ten leads that are affixed to the skin at certain points are used to measure the electrical activity of the heart. This non-invasive test gives details about the anatomy and functioning of the heart. The EKG can identify both acute and long-term pathological alterations by tracking heart rate, rhythm, and axis. The EKG may exhibit T wave abnormalities, arrhythmias, and elevation or depression of the ST-segment in cases of acute coronary syndrome (ACS). The EKG can be used to detect ventricular hypertrophy, bundle branch blockages, and axis deviation in chronic CAD. It is an inexpensive, easily accessible, and user-independent test that can be completed rapidly in the majority of situations.

2. Echocardiography

A non-invasive ultrasound method called echocardiography is used to see the anatomy and function of the heart. It is useful for assessing chamber diameters, pericardial cavity, valvular regurgitation and stenosis, and wall motion in both acute and chronic conditions. It can be used to check for autoimmune or infectious lesions and identify pulmonary embolism in acute situations. It can be used for outpatient stress testing and offers information on how well a patient is responding to therapy in chronic settings. Echocardiography is used therapeutically to guide treatments such as pericardiocentesis.

Echocardiography is typically more expensive than EKG, despite being user-dependent [8].

3. Stress Test

In individuals with suspected angina or angina equivalents, a stress test is done to assess CAD. In order to elicit symptoms or EKG abnormalities suggestive of ischemia, this test artificially stresses the heart, usually by exercise or medication. Patients are asked to run on a treadmill until their heart rate reaches 85% of their age-predicted maximal heart rate as part of an exercise stress test. The test is stopped to confirm the diagnosis of CAD if anomalies such as angina, arrhythmias, exertional hypotension, or ST-segment alterations occur. EKG monitoring is commonly used to conduct stress assessments before to, during, and following the surgery [30].

4. Chest X-ray

An essential first imaging method for evaluating heart conditions is a chest X-ray. Standing posteroanterior (PA) and left lateral decubitus views are included in standard imaging films. Though there is limited interpretation of AP films, anteroposterior (AP) projection is occasionally acquired, particularly when the patient is lying down in an inpatient situation. When PA and AP images are properly analyzed, valuable and reasonably priced information regarding the heart, lungs, and vasculature can be obtained. To make sure that important details are not missed, interpretation is typically carried out step-by-step.

5. Blood Work

Blood tests aid in both diagnosis and therapy response tracking. Complete blood counts, metabolic panels, cardiac enzymes and B-type natriuretic peptides (BNP) are often ordered in acute conditions. Although BNP has limits, such as being deceptively low in obesity or increased in kidney illness, it can suggest cardiogenic volume overload. Troponin and CK are important indicators of an acute ischemic episode. A lipid panel offers predictive data for chronic CAD. Conditions like acute pericarditis are evaluated using additional tests, such as erythrocyte sedimentation rate (ESR) and C-reactive protein (CRP). In order to check for disorders like hemochromatosis or high right heart pressure in chronic CAD that may impact both the liver and the heart, liver function tests (LFTs) may also be conducted.

6. Cardiac Catheterization

The gold standard for diagnosing ischemic coronary heart disease is cardiac catheterization. But there is a chance of difficulties because it is an intrusive operation. This technique is not appropriate for every patient. Patients with an intermediate pretest probability for CAD are usually the best candidates in non-ACS settings. Emergent cardiac catheterization is performed on all STEMI patients and a subset of NSTEMI patients in the event of ACS. Expertise is needed for this treatment, which is carried out in a catheterization lab while under mild anesthesia. The technique involves the use of contrast dye, which carries hazards like renal damage and allergic reactions.

Treatment and Management:

Coronary artery disease (CAD) can present as either stable ischemic heart disease (SIHD) or acute coronary syndrome (ACS). The former is typically presented in a chronic setting, while the latter is more commonly observed in an acute setting. Management varies according to the subtype of the disease. Below is a discussion on the management of each subtype:

Stable Ischemic Heart Disease (SIHD)

Stable angina, which is characterized by substernal chest discomfort or pressure that gets worse with effort or emotional stress and is eased by rest or nitroglycerin, is a common symptom of stable ischemic heart disease. Usually, this discomfort persists for two months or longer. It's crucial to remember that some individuals, especially women, the elderly, and diabetics, may have atypical symptoms such exertional dyspnea in addition to the absence of traditional anginal symptoms. Both pharmacologic and non-pharmacologic therapies are used to treat SIHD. Lifestyle changes including quitting smoking, exercising frequently, losing weight, controlling diabetes and hypertension, and eating a heart-healthy diet are examples of non-pharmacologic interventions. Cardioprotective and antianginal drugs are examples of pharmacologic therapies. Guideline-directed medical therapy (GDMT) should be administered to all patients. This comprises moderate to high-intensity statin medication, beta-blockers, as-needed nitroglycerin, and low-dose aspirin. Beta-blocker medication should be titrated up to heart rates of 55–60 bpm, and the addition of calcium channel blockers and long-acting nitrates should be considered if symptoms are not sufficiently controlled with these methods. To treat the symptoms of refractory angina, ranolazine may also be added. If maximal GDMT is unable to alleviate symptoms, a cardiac catheterization should be carried out to evaluate the coronary anatomy. Based on the patient's profile, a choice should be taken regarding either coronary artery bypass graft (CABG) or percutaneous coronary intervention (PCI) [31][32].

Acute Coronary Syndrome (ACS)

ACS can be accompanied by dyspnea, palpitations, dizziness, syncope, cardiac arrest, or new-onset congestive heart failure. It manifests as abrupt-onset substernal chest discomfort or pressure that frequently radiates to the neck and left arm. All ACS patients must have a timely EKG to screen for STEMI; this is usually done by emergency medical services (EMS) prior to hospitalization. ST-segment elevation in continuous leads and at least 1 mm elevation in limb leads or precordial leads (apart from V2 and V3) are characteristics of STEMI.

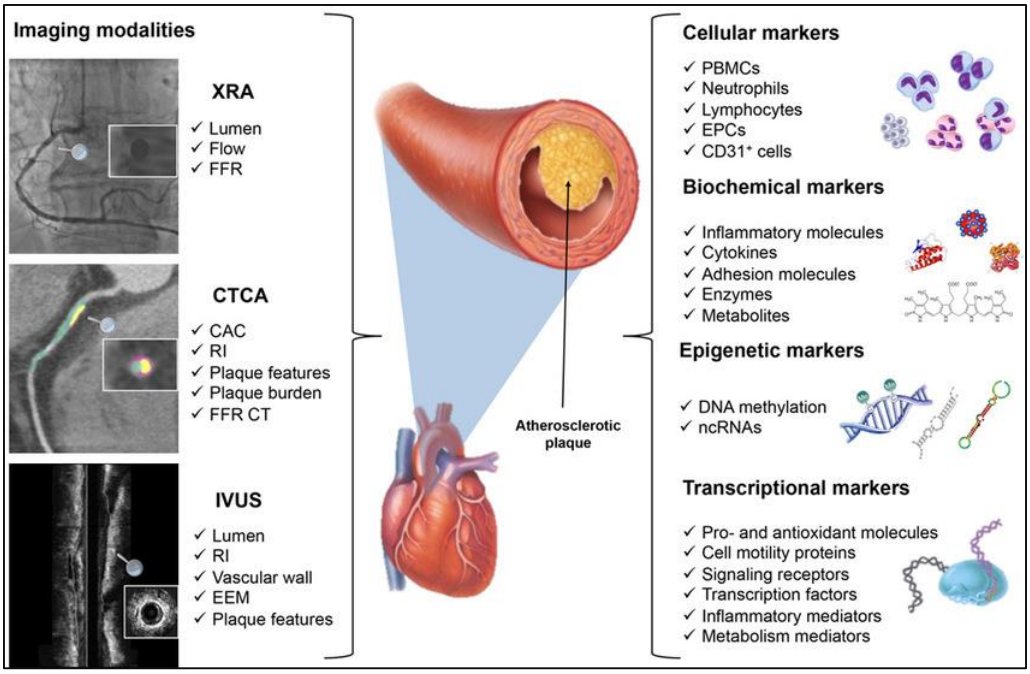

Figure 2: Coronary Herat Disease Diagnosis.

For a STEMI diagnosis, women need a 1.5 mm elevation in leads V2 and V3, while men need a 2 mm elevation. Another condition that is seen as a STEMI comparable is new-onset left bundle branch block (LBBB). Emergency PCI for STEMI cases should be done at a facility that can perform PCI, or within two hours if one is accessible. If there are no contraindications, intravenous thrombolytic treatment is recommended if the PCI-capable facility is more than two hours away. True STEMI must be distinguished from other disorders that can appear on an EKG as STEMI, including as acute pericarditis, Brugada syndrome, early repolarization abnormalities, and changes linked to left ventricular hypertrophy (LVH). Every patient should be given a whole dosage of sublingual aspirin (324 mg) at the time of presentation. If there are no contraindications, such as hypotension, right ventricular failure, or recent use of phosphodiesterase inhibitors, nitrates should be given to relieve pain. Beta-blockers and high-dose statin medication should also be started as soon as possible. Furthermore, the patient's profile should be taken into consideration while prescribing P2Y12 inhibitors, such as ticagrelor, clopidogrel, or prazogrel. Anticoagulation treatment (heparin or enoxaparin) should be given to patients with NSTE ACS. Patients with intermediate to high TIMI values (>2) for NSTEMI are advised to get early invasive therapy within 24 hours [33][34].

Long-term Management

Regular follow-up visits with cardiologists and family physicians are essential for the long-term management of coronary artery disease. Ensuring medication adherence and promoting lifestyle modifications are crucial to managing the condition effectively.

Differential Diagnosis and Management of Ischemic Heart Disease

Coronary artery disease (CAD) presents a broad spectrum of differential diagnoses due to the proximity of the heart to adjacent organs such as the lungs, stomach, major blood vessels, and musculoskeletal structures. Acute anginal chest pain can be mistaken for conditions like acute pericarditis, myocarditis, Prinzmetal's angina, pericardial effusion, acute bronchitis, pneumonia, pleuritis, pleural effusion, aortic dissection, gastroesophageal reflux disease (GERD), peptic ulcer disease, esophageal motility disorders, and costochondritis. Stable ischemic heart disease (SIHD) may also resemble GERD, peptic ulcer disease, costochondritis, and pleuritis. A comprehensive history, thorough physical examination, and appropriate diagnostic investigations are crucial in narrowing down the differential diagnoses and establishing an accurate clinical diagnosis. The medical and surgical management of ischemic heart disease is not without risks, as both treatment modalities are associated with potential side effects and complications. These adverse effects can be minimized through careful medication selection, physician expertise, and patient education. Aspirin therapy is linked to an increased risk of bleeding and may provoke idiosyncratic and allergic drug reactions [35]. Statin therapy can cause side effects such as myalgias, diarrhea, and arthralgias [36]. Beta-blockers may result in bradycardia and hypotension, while angiotensin-converting enzyme inhibitors (ACEIs) can lead to hypotension, dizziness, elevated creatinine levels, cough, and allergic reactions, including angioedema [37]. Percutaneous coronary intervention (PCI) carries risks such as coronary artery perforation, stent thrombosis in acute settings, and in-stent restenosis over the long term

[38]. Coronary artery bypass grafting (CABG) is associated with complications such as arrhythmias, cardiac tamponade, postoperative bleeding, infection, renal impairment, and phrenic nerve injury. The prognosis of coronary artery disease is influenced by multiple factors, some of which are modifiable and others non-modifiable. Key prognostic elements include the patient's age, gender, family history, genetic predisposition, ethnicity, dietary and smoking habits, adherence to prescribed medications, healthcare access, financial status, and the extent of coronary artery involvement. Additionally, comorbid conditions such as diabetes mellitus, hypertension, dyslipidemia, and chronic kidney disease significantly impact the overall prognosis [39]. Complications of coronary artery disease include arrhythmias, acute coronary syndrome, congestive heart failure, mitral regurgitation, ventricular free wall rupture, pericarditis, aneurysm formation, and mural thrombi [40][41][42-43].

Obesity and Coronary Heart Disease:

Risk Factors for Cardiovascular Disease (CVD)

The development of atherosclerotic vascular disease, and by extension coronary heart disease (CHD), is influenced by a multitude of genetic, physiological, and biochemical mechanisms [44-63]. Traditional risk factors for CVD associated with overweight (OW) and obesity include type 2 diabetes mellitus (DM), hypertension, and various dyslipidemias, such as elevated serum triglyceride levels, reduced levels of high-density lipoprotein (HDL), and increased levels of small dense low-density lipoprotein (LDL) and apolipoprotein B [44-63]. In addition to these traditional factors, nontraditional or novel risk factors associated with OW and obesity encompass insulin resistance, hyperinsulinemia, endothelial dysfunction, various inflammatory markers, and pro-thrombotic factors, such as increased serum fibrinogen levels, von Willebrand's factor, plasminogen activator inhibitor-1, and clotting factors VII and VIII [59-63]. Central obesity is a key feature of the metabolic syndrome (MetS), which itself serves as a significant risk factor for CVD, including CHD [52-63]. The 27th Bethesda Conference formally classified obesity as an independent risk factor for CVD [63]. The association between obesity and CVD has been extensively examined through numerous epidemiological studies, most of which have aimed to elucidate the relationship between obesity and the risk of CVD or CHD, with some also assessing the risk for cerebrovascular disease.

Obesity and CVD Risk: General Body Weight Indices

The Framingham Heart Study has provided invaluable data regarding the relationship between OW, obesity, and the risk of CVD, including CHD. The earliest study by Hubert et al, involving 2,252 men and 2,818 women (aged 28-62 years, follow-up: 26 years), revealed that minimum relative weight was an independent risk factor for CHD and stroke, irrespective of other factors such as age, cholesterol levels, systolic blood pressure, left ventricular hypertrophy, and glucose intolerance [64]. Harris et al, in a study of 597 men and 1,126 women (aged 55-65 years, follow-up: 23 years), identified a "U"-shaped mortality curve for body mass index (BMI) [65]. A subsequent study by Kannel et al, involving 2,039 men and 2,871 women (aged 35-70 years, follow-up: 24 years), demonstrated that the risk of CVD was observed in individuals with both abdominal and general obesity in a linear fashion [66]. In an update of this study, Kannel et al found that each standard deviation increase in relative weight over 26 years of follow-up predicted an increased risk of CHD and stroke of 15% in men and 22% in women [67]. The optimal BMI for minimizing CVD risk was determined to be 22.6 kg/m² for men and 21.1 kg/m² for women. Wilson et al showed that both OW and obesity, defined by BMI, were linked to an increased incidence of CVD among men and women aged 35-75 years over a follow-up period of up to 44 years [68].

Another influential study, the Nurses' Health Study, further elucidated the connection between body weight and CVD, particularly CHD. Manson et al studied 115,886 women (aged 30-56 years, follow-up: 8 years) and identified a significant relationship between obesity and the risk of CHD [69]. A subsequent analysis demonstrated that CHD mortality among these women was lower than that reported for women in the general U.S. population [70]. Willett et al, in a study of middle-aged women followed for 14 years, showed that the highest BMI within the range of weight gain after 18 years of age predicted an elevated risk of CHD [71]. Rexrode et al, in a study of 44,702 women followed for 12 years, reported that nonsmoking women with a BMI ≥32 kg/m² had a relative risk of CVD mortality of 4.1 compared to women with a BMI <19 kg/m² [72]. Furthermore, Cho et al found that weight gain prior to the onset of DM was associated with an increased risk of CHD in a cohort of 5,897 women followed for 12 years, after adjusting for BMI and selected CVD risk factors [73]. Baik et al, in the Health Professionals Follow-up Study, studied 39,756 men (aged 40-75 years, follow-up: 10 years) and found that the risk of CVD mortality increased progressively with BMI in men aged <65 years [74]. In a previous study, these investigators observed no significant association between BMI and CVD mortality in men aged ≥65 years [74]. Additionally, Field et al conducted a combined analysis of subgroups from the Nurses' Health Study and the Health Professionals Follow-up Study, encompassing 77,690 women and 40,060 men (follow-up: 10 years). This study demonstrated that the risk of CHD or stroke rose with increasing severity of OW or obesity. The National Health and Nutrition Examination Survey (NHANES I) Epidemiologic

Follow-up Study assessed the relationship between body weight and the risk of CHD in two separate reports. A study of 1,259 women (aged 65-74 years, follow-up: 14 years) found that a BMI ≥29 kg/m² was an independent risk factor for CHD [75, 76]. In another study, Harris et al examined 620 men and 960 women (mean age: 77 years, follow-up: 13 years) and reported that excess weight in late middle age was a risk factor for CHD later in life, even after adjusting for weight loss [77].

An increased BMI, defined as >26.5 kg/m² for males and >25.0 kg/m² for women, was found to be a predictor of cardiovascular disease (CVD) in both sexes in a study by Calle et al. that involved over 1,000,000 participants over a 14-year follow-up period [78]. The relative risks for CVD were 2.7 for males and 1.9 for women for those with a BMI over 40 kg/m². Adams-Campbell et al. examined the association between BMI and coronary artery disease (CAD) established by invasive coronary angiography in a retrospective investigation that involved 866 African-American men and women over a seven-year period [79]. According to this study, people who were overweight had a higher prevalence of CAD than people who were either normal weight or obese. In a sample of 1,974 men and women aged 30–59 years, followed for 9 years, Zhou et al. showed that being overweight was an independent predictor of coronary heart disease (CHD) [80]. Similarly, after 16 years of follow-up, the Manitoba Heart Study, which tracked 3,983 men (mean age: 30.8 years) for 26 years, discovered a significant correlation between elevated BMI and coronary insufficiency, myocardial infarction (MI), and sudden death [81]. Interestingly, after 20 years of observation, the most reliable predictor of MI was shown to be overweight or obesity. On the other hand, among male cohorts, the Pooling Project found no significant age-adjusted or age-associated associations between obesity and CHD.

A meta-analysis of eight studies with 61,386 people (follow-up: >10 years) was carried out by Kramer et al., who reported about 4,000 unfavorable CVD events [82]. The risk of cardiovascular disease (CVD) events was 24% greater in those with obesity but no metabolic syndrome (MetS) than in people of normal weight without MetS. Those with MetS who were overweight or obese had a higher risk of MI (hazard ratios [HR] of 1.26, 95% CI: 1.0-1.6 in overweight patients and 1.88, 95% CI: 1.3-2.6 in obese patients), according to the Copenhagen General Population Study, which followed 71,527 adults for an average of 3.6 years [83]. According to a 15-year study by Jousilahti et al., which involved 16,113 Finnish men and women (ages 30 to 59), obesity is an independent risk factor for CHD mortality in men, with a smaller contribution to risk in women [84]. All adiposity indices, with the exception of triceps skinfold thickness, were substantially linked to CHD mortality after 15 years, according to the Chicago Western Electric Study, which followed 1,707 men (ages 40–55) for 22 years [85]. The Charleston Heart Study, on the other hand, discovered that over a 25–28 year follow-up period, BMI and fat distribution did not predict CHD mortality in African-American women [86].

12,576 women (ages 30-74, follow-up: 26 years) participated in the Adventist Mortality Study, which found a "U-shaped" association between BMI and the risk of death from CHD, hypertension, and stroke, especially during the fifth and seventh decades of life [87]. Shaper et al. discovered that the lowest risk of CVD mortality was linked to a BMI of 22 kg/m² in a prospective analysis of 7,735 males (ages 40–59, mean follow-up: 14.8 years) [88]. According to the Women's Health Australia Project, which involved 13,431 women aged 45–49, a BMI of 19–24 kg/m² was ideal for reducing the risk of CVD [89]. Benedetto et al. examined the association between BMI categories and early and late mortality following first-time isolated coronary artery bypass grafting (CABG) in a retrospective analysis of data from 3,269 normal-weight subjects, 6,660 overweight individuals, 3,821 obese subjects, and 211 morbidly obese patients [90]. Their results demonstrated that BMI category had no effect on early mortality, and that, in contrast to those of normal weight, overweight people did not exhibit any protection against late death. A significantly higher risk of late death was linked to obesity (HR: 1.22, 95% CI: 1.07-2.66, P<0.006), and there was a trend toward higher late mortality for morbid obesity as well (HR: 1.36, 95% CI: 0.24-2.49)

According to epidemiologic research, central obesity is a more accurate indicator of the morbidity and mortality of cardiovascular disease (CVD) and coronary heart disease (CHD) than general body weight indices like BMI. After controlling for other CVD risk variables, Yusuf et al.'s study, which involved 27,098 people from 52 countries, found a weak correlation between BMI and myocardial infarction (MI) (odds ratio [OR] of 1.12, 95% CI: 1.03-1.22) [91]. Nonetheless, the OR for WHR as a MI predictor was significantly higher, particularly in the top quintiles (1.90 and 2.52) [92]. WHR was found to be the best predictor of MI in the INTERHEART Study [93]. High WHR and high BMI are both independent risk factors for CHD mortality, according to a review by Rao et al. [94]. Hamer et al. discovered in the Health Study of England that obese people with fewer metabolic risk factors did not have a higher risk of CVD, indicating that metabolic health may have an impact on the relationship between obesity and CVD [95]. In the Nurse's Health Study, which involved 44,702 women, Rexrode et al. found that waist circumference (WC) and WHR were both independently linked to the risk of CHD [96, 97]. Central obesity is more harmful than general obesity, as demonstrated by Coutinho et al., who found that those with normal BMI and high WHR had a greater mortality rate than people with both normal BMI and

WHR [98]. According to research by Sharma et al., older persons with central obesity but a normal BMI were more likely to die, and WHR was found to be a better predictor than WC [99]. Even after controlling for BMI and other risk variables, Zhang et al.'s analysis revealed that higher WC quintiles were associated with a greater relative risk of CVD mortality [100]. The notion that WHR is a better indicator of CVD risk than BMI, particularly in people 65 years of age or older, is further supported by Baik et al. and Rimm et al. [31] [101]. However, anthropometric measurements (such as BMI and WC) did not independently correlate with CAD mortality, according to studies like that of Fontela et al [102]. Even after controlling for conventional CVD risk variables, the Paris Prospective Study demonstrated that a greater ratio of truncal to mid-thigh skinfold thickness was predictive of CHD [103]. Furthermore, WHR was the most significant predictor of stroke and ischemic heart disease, according to the Study of Men Born in 1913 [104]. The significance of abdominal fat distribution in CVD risk was further supported by Prineas et al.'s study, which showed that increased WHR was an independent risk factor for CAD-related death in women aged 55–69 [105].

Role of Nurses in CAD:

Effects on Self-Care Capacity, Disease Knowledge, and Self-Efficacy:

Various studies have demonstrated that educational interventions grounded in Orem's self-care theory [107], coupled with follow-up telenursing programs [106, 119] or structured home visits [109], significantly enhanced self-care capacity in individuals with coronary artery disease. Following the intervention, participants showed improvements in performing basic daily activities and exhibited increased motivation toward self-care [107]. In terms of knowledge of disease, a notable positive improvement was observed in the intervention group 12 months post-hospital discharge [116]. Dimensions related to understanding and personal control [110], as well as attitudes and beliefs about the disease, showed significant progress throughout the follow-up period [39]. The continuity of care program, led by nurses, resulted in enhanced self-efficacy concerning health promotion behaviors, higher levels of satisfaction with treatment and nursing care, and an overall improvement in quality of life [119].

Effects on Habit Change and Prevention of Risk Factors:

Post-intervention, adherence to healthy lifestyle behaviors improved. Patients receiving continuity of nursing care through educational-cognitive programs with emotional support, evaluation, guidance, and monitoring [110, 113], or via tele-nursing follow-up [106], demonstrated a positive impact on adherence to pharmacological treatment [118, 119]. However, some studies found that nursing interventions had no significant effect on treatment adherence [110, 111] or did not provide relevant data on this aspect [117]. Regarding physical activity, aftercare programs yielded benefits, with participation in physical activity increasing from 14% to 86% [117]. Although no significant differences were observed in physical performance improvements [113], some studies reported gains in muscle strength and functional status [119]. Moreover, substantial improvements were seen in nutritional habits, with a reduced risk of malnutrition in patients after discharge [106, 107]. For overweight or obese patients, significant reductions in body mass index were noted [117], while tobacco consumption was reduced by 47% [117].

Effects on Mental Health and Social Relationships:

After nurse-led continuity of care, a reduction in stress and anxiety was observed [118]. Additionally, improvements were noted in psychological and spiritual well-being [109, 110, 111] as well as interpersonal relationships [109].

Effects on Clinical Parameters:

Several studies indicated that nursing case management improved various clinical parameters. Levels of low-density lipoprotein and total cholesterol were reduced, while high-density lipoprotein levels increased [117, 118]. However, the proportion of patients who successfully controlled their lipid levels over an 18-month period remained low [112]. Regarding blood pressure, patients receiving continuity of care showed reductions in blood pressure levels [117, 119], although other studies did not report significant changes [119].

Effects on Hospital Readmission:

In terms of readmission rates, no significant differences were found between the continuity of care group and the control group [113, 115]. Only one study reported a lower proportion of readmissions in the intervention group compared to the control group (8% vs. 16%, $p = 0.048$) [119]. Moreover, patients in nurse-led intervention groups exhibited increased cardiac stability [109], required fewer medical consultations [114], and had less frequent contact with general practitioners (29% vs. 42%, $p = 0.020$) [119].

The Role of Nurses in Coronary Heart Disease Management: Special Considerations for Pediatric and Elderly Patients

Coronary heart disease (CHD) remains one of the leading causes of morbidity and mortality worldwide, affecting millions of individuals across diverse demographic groups. Nurses play a pivotal role in the prevention, management, and rehabilitation of patients with CHD, contributing significantly to improving patient outcomes and enhancing quality of life. This comprehensive role spans various domains, including clinical care, education, emotional support, and patient advocacy. Notably, special patient populations, such as pediatric and elderly patients, require tailored nursing interventions that consider the

unique physiological, psychological, and social factors inherent to these groups.

1. General Role of Nurses in Coronary Heart Disease Management

Nurses are integral members of the healthcare team in managing coronary heart disease. Their role is multifaceted, encompassing the prevention of the disease, patient education, clinical monitoring, and post-discharge care. Nurses are involved in conducting thorough assessments of patients' health status, including taking medical histories, performing physical examinations, and evaluating risk factors such as hypertension, diabetes, smoking, and family history. They provide continuous monitoring of vital signs, including blood pressure, heart rate, and oxygen saturation, to detect any changes that may signal acute complications such as myocardial infarction or heart failure. In addition to clinical care, nurses are responsible for educating patients about their condition, helping them understand the significance of their disease, and guiding them in managing symptoms and adhering to prescribed treatments. This includes educating patients on lifestyle changes such as dietary modifications, smoking cessation, exercise, and medication adherence. Furthermore, nurses assist in the management of psychosocial aspects of the disease, addressing emotional concerns such as anxiety, depression, and stress, which are often associated with CHD. Nurses also collaborate with physicians and other healthcare professionals to develop personalized care plans that align with the patient's health needs and preferences.

2. Nurses' Role in the Pediatric Population with Coronary Heart Disease

Although coronary heart disease is relatively rare in pediatric populations, it can occur, particularly in children with congenital heart defects or those with familial hypercholesterolemia, a genetic disorder characterized by high cholesterol levels. In such cases, nurses play a crucial role in the early detection, management, and long-term care of pediatric patients with CHD.

Early Detection and Assessment:

Nurses working in pediatric cardiology units are often the first healthcare providers to recognize early signs of CHD, such as chest pain, dizziness, or abnormal heart rhythms. They assess children's physical development, including the presence of any congenital anomalies, and monitor for any symptoms indicative of heart disease. Nurses are also instrumental in educating parents and caregivers about the risk factors for pediatric CHD, which may include a family history of cardiovascular disease, obesity, or poor dietary habits.

Patient and Family Education:

Given the rare nature of CHD in children, one of the most important roles of pediatric nurses is in providing education to the family. They guide parents in understanding their child's diagnosis and help them navigate the medical complexities of pediatric heart disease, such as surgical interventions or long-term management plans. Nurses ensure that parents understand the importance of regular follow-up appointments, adherence to medications, and lifestyle changes, such as healthy eating and physical activity, to prevent further complications.

Psychosocial Support:

The diagnosis of coronary heart disease in a child can be emotionally distressing for families. Pediatric nurses are trained to provide emotional and psychological support, helping families cope with the stress of managing a chronic illness. They offer counseling to help parents and children process the diagnosis and treatment options, addressing any fears or concerns that may arise.

Monitoring and Post-Discharge Care:

Nurses also monitor pediatric patients for any complications following cardiac procedures or surgeries, ensuring that the child's recovery progresses without complications. They are responsible for educating parents about how to recognize signs of complications, such as fever or unusual fatigue, and when to seek immediate medical attention. Nurses provide continued support and ensure that children with chronic conditions, like familial hypercholesterolemia, adhere to long-term treatment plans to reduce the risk of developing heart disease as they grow older.

3. Nurses' Role in the Elderly Population with Coronary Heart Disease

The elderly population is disproportionately affected by coronary heart disease, with aging being a significant risk factor for the development and progression of the disease. In older adults, the management of CHD is complicated by the presence of comorbidities, polypharmacy, frailty, and age-related physiological changes. Nurses working with elderly patients with CHD must adopt a comprehensive, patient-centered approach to care that accounts for these factors.

Comprehensive Assessment:

Elderly patients often present with atypical symptoms of coronary heart disease, which may differ from the classic symptoms seen in younger populations. For example, they may not experience the typical chest pain associated with a myocardial infarction, but instead they may report shortness of breath, fatigue, or dizziness. Nurses must be vigilant in assessing these subtler signs and conducting comprehensive cardiovascular evaluations. In addition, they assess other geriatric-specific concerns, including cognitive function, mobility, and the risk of falls, as these factors can significantly impact disease management.

Medication Management and Polypharmacy:

Older adults with CHD are often prescribed multiple medications to manage their condition, including antihypertensives, antiplatelet agents, and statins. Nurses are key in ensuring that patients

understand their medication regimen and the importance of adherence. They monitor potential drug interactions, side effects, and complications, and they work closely with the healthcare team to adjust medications as needed. Nurses also educate elderly patients about the risks and benefits of their treatments, empowering them to make informed decisions about their care.

Chronic Disease Management and Lifestyle Modifications:

Managing CHD in the elderly requires ongoing attention to chronic disease management. Nurses educate older patients on modifying their lifestyle to manage their cardiovascular risk factors. This includes promoting physical activity tailored to the patient's capabilities, encouraging a heart-healthy diet, and assisting with smoking cessation efforts if applicable. Given the potential cognitive decline in elderly patients, nurses may need to use more repetitive and simplified educational methods to reinforce these messages. Nurses are also instrumental in coordinating care to ensure that elderly patients with CHD receive regular monitoring, including blood pressure checks, cholesterol tests, and routine cardiac assessments.

Psychosocial and Emotional Support:

Elderly patients with CHD often face significant psychosocial challenges, such as depression, anxiety, and social isolation, which can negatively impact their overall well-being and disease management. Nurses provide emotional and psychological support by addressing these concerns and helping patients maintain social connections. They facilitate the involvement of family members and caregivers in the care process and ensure that elderly patients feel supported both emotionally and physically throughout their treatment journey.

End-of-Life Care:

In some cases, elderly patients with advanced coronary heart disease may require palliative or end-of-life care. Nurses play a central role in providing compassionate care, managing symptoms such as pain and dyspnea, and helping families navigate the difficult decisions associated with end-of-life care. They ensure that the patient's wishes are respected and provide support during this challenging time. The role of nurses in the management of coronary heart disease is critical to improving patient outcomes across the lifespan. For pediatric patients, nurses must focus on early detection, family education, and psychosocial support, while ensuring that children receive the necessary interventions to manage their disease effectively. In the elderly population, nurses face unique challenges related to polypharmacy, atypical disease presentation, and comorbidities. By offering comprehensive care that includes medication management, lifestyle modifications, psychosocial support, and end-of-life care, nurses ensure that elderly patients with CHD receive the highest quality of care. As key members of the healthcare team, nurses play an indispensable role in the holistic management of coronary heart disease, improving both the physical and emotional well-being of patients across all age groups.

Conclusion:

Coronary heart disease (CHD) is a multifaceted condition that requires comprehensive, patient-centered care to achieve optimal outcomes. Nurses play an essential role in the management of CHD, not only through direct clinical care but also in facilitating lifestyle modifications, providing education, and offering emotional support. Evidence-based approaches, including interventions aimed at reducing cardiovascular risk factors, improving disease knowledge, and fostering self-efficacy, are crucial for managing CHD and preventing its progression. Nurses contribute significantly to improving clinical outcomes by enhancing adherence to treatment regimens, promoting physical activity, and supporting smoking cessation, all of which are critical in managing CHD. Special populations, such as pediatric and elderly patients, present unique challenges in CHD care that require specific nursing strategies. In pediatric cases, the rarity of CHD necessitates an early focus on detection and family education. Nurses are instrumental in guiding families through the complexities of pediatric heart disease, helping to ensure that children receive appropriate interventions and long-term care. For elderly patients, the management of CHD becomes more complicated due to age-related changes such as polypharmacy, frailty, and comorbid conditions. Nurses must address these issues by tailoring care plans to the specific needs of elderly patients, ensuring that their treatment regimen is both effective and manageable. The role of nurses extends beyond physical care, encompassing psychological and emotional support. The mental health aspects of CHD management, including addressing anxiety, depression, and stress, are often overlooked but are critical to patient outcomes. Nurses are uniquely positioned to support patients in these areas, offering counseling and facilitating access to mental health resources. Ultimately, the success of nursing interventions in CHD care depends on a holistic approach that considers not only the physiological aspects of the disease but also the psychological, social, and emotional factors that influence patient health. By providing personalized, compassionate care and supporting patients in making lasting lifestyle changes, nurses play a pivotal role in improving the quality of life for individuals with CHD. Ongoing research into nursing interventions will continue to shape best practices and further enhance the outcomes for this patient population.

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