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Master's Thesis

# THE CHARACTERISTIC FEATURES OF NURSING PROCESS IN CARE FOR CARDIAC PATIENTS

Master of Science in Nursing

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# INTRODUCTION

**The background of the study.** Cardiovascular disease remains the leading cause of death in many countries of the world [2, 16, 36]. The annual death rate due to cardiovascular disease is 17 million people worldwide. As reported by disease statistics centers, which are responsible for monitoring the incidence of disease and organizing preventive measures (such as Centers for Disease Control and Prevention in the US) [2, 8, 36, 39, 41], the average life expectancy could have been 10 years longer in the absence of such a high prevalence of cardiovascular disease (CVD), involving countries on all continents [2, 5, 6, 14, 15, 39]. CVD leads to long-term incapacitation of the adult population and has an immense economical cost. The predictions by the World Health Organization (WHO) are far from being optimistic: diseases of the heart and blood vessels will remain the leading causes of death [2, 22, 23, 32, 44].

The life of a patient with cardiovascular disease [6, 20, 21], including such condition as MI [32, 33, 36, 37, 38, 44] is at times under threat, and saving the life greatly depends on the quality and timeliness of medical care. The heart is an organ with intricate structure and its involvement may have quite unexpected manifestations [19, 20, 22]. Therefore, providing medical care to an acute cardiac patient involves admission to an intensive care unit. This has proven to be a very successful practice. In such cardiological units, there should be provisions for surveillance of such patients; each bed should be equipped with monitors to track the patient's condition. The diagnosis and treatment of MI tolerate no delays [21, 23, 29, 32 37, 38, 39]. The cardiac unit admits patients with urgent cardiac conditions, such as myocardial infarction (MI) [2, 8, 16], pulmonary embolism, life-threatening disorders of heart rhythm and conductivity, cardiac decompensation [2, 10, 16, 17, 34] and hypertensive emergencies. All of these conditions require early diagnosis and timely, often emergency treatment [16, 2331, 34]. The fight for these patients' lives is made

possible by treatment in specialized units, where high-tech equipment and sophisticated therapeutic methods (intensive care) are used [23, 29]. Nonetheless, it is sometimes preferable to resort to cardiac surgery without delay [37, 39].

The nurse should pay special attention [1, 41] to assessment of risk factors [8, 9, 23], prevention [12, 13, 24-27, 30, 31, 45] and treatment [23] of cardiac disease, as well as to rehabilitative interventions [3, 18, 38, 44].

**The aim of the study:** investigation and analysis of nursing process in Cardiology, the specific aspects in management of cardiac patients, assessment of risk factors, treatment and prevention.

**Study objectives.**

1. To study the important aspects of care for cardiac patients and risk factors of cardiovascular disease.
2. To study the specific aspects of continuing nursing education in Cardiology and the work of a cardiac nurse.
3. To define nursing roles in management of patients with emergency cardiac problems.
4. To investigate the specific aspects of nursing work in issues of diagnosis and treatment of cardiac disease.
5. To define the specific aspects of prevention in cardiac disease.

**The object of the study**. Patients with various cardiovascular disease and complications.

**The subject of research**. The specific aspects and the role of nursing process in diagnosis, risk assessment, treatment and prevention of cardiovascular disease.

**The methods of study:** clinical methods, objective examination, general health assessment, collection of information on the main complaints of cardiac patients; data comparison, laboratory and imaging tests; analysis and statistical methods.

**The scientific and practical value of the study.** The practical bearings of this research study include assessment of important aspects of care for cardiac patients and risk factors of cardiovascular disease; assessment of the specific aspects of continuing nursing education in Cardiology and the work of a cardiac nurse; definition of nursing roles in management of patients with emergency cardiac problems; investigation of the specific aspects of nursing work in issues of diagnosis and treatment of cardiac disease; and definition of specific aspects of prevention in cardiac disease.

# CHAPTER 1
# CARE FOR CARDIAC PATIENTS AND RISK FACTORS OF CARDIOVASCULAR DISEASE
# (REVIEW OF LITERATURE)

Cardiovascular disease (CVD) is one of the leading causes of death in modern world [2, 16]. In 2018, 17.9 million people died of these diseases worldwide (according to the World Health Organization), which accounted to approximately 30% of all deaths. This included 7.4 million people who died of coronary artery disease (CAD) and 6.7 million people who died as a result of stroke, with hypertension (HT) being one of the causes of stroke [2, 6, 22, 23].

The most dangerous manifestation of CAD is myocardial infarction (necrosis of heart muscle), which results from thrombotic occlusion of blood vessels supplying the heart [32, 36, 38, 44]. The thrombus is formed on the surface of an atherosclerotic plaque, which narrows the lumen of the blood vessel and consists of cholesterol and other lipid compounds, calcium and fibers of connective tissue.

If the atherosclerotic plaque is formed in the vessels supplying the brain, there is a risk of thrombosis of cerebral vessels and death of a part of brain tissue (ischemic stroke).

The improvement of the situation with the high cardiovascular morbidity has recruited all the resources of modern medical and fundamental science. Timely diagnosis and prevention is the most effective way to fight disease. It is diagnosis and prevention that allowed for dramatic reductions in risks for cardiovascular disease (CVD) [8, 9, 16, 27, 30] and to increase human life expectancy by 10–15 years.

Historically, many patients believe the nation’s level of health services to be chiefly responsible for their health status, forgetting that at least 50% of health is lifestyle-dependent. Unfortunately, adverse social habits are widely prevalent [8, 43] in the population; they do not follow a balanced diet [7, 8, 11],

and neglect the importance physical activity []. The lifestyles of such individuals are detrimental for their health, and global experience suggests that health-targeting lifestyle modifications reduce mortality and morbidity and increase life expectancy. Many cardiovascular diseases have become “younger” [8, 19, 23], and their course often assumes a pernicious character.

The escalating indicators of mortality among males of productive age is an especially alarming trend. Few working males at the age of 30-50 years care about prevention [5, 12, 14, 31] and timely treatment of cardiovascular conditions, although this age range is presently viewed as a risk factor for sudden-onset heart attack and stroke [32, 33, 37].

An example to emulate in terms of reducing CVD-related mortality is the large scale CVD campaign in Finland. In the 1960s, Finland led industrialized countries in CVD-related mortality rates, which was attributable to genetic abnormalities and to certain peculiarities of fat metabolism in natives of this country, especially in the region of North Karelia. The country’s population had remarkably high cholesterol levels; even the children’s average cholesterol levels were above 300 mg/dL, that is, one and a half times the adult normal.

The nationwide extensive measures of primordial prevention, the thoroughly developed programs, and what is more important, active participation and engagement of the population and dramatic changes in lifestyle [6, 22, 23] and alimentary traditions [8, 11], contributed to an impressive 60% reduction in CVD-related mortality in Finland over 20 years and to an increase in average life expectancy.

The effectiveness of this campaign had surpassed all expectations. Similar success was achieved in other European countries, such as the United Kingdom, Germany (see Figure 1.1 and Table 1.1.), as well as on other continents, i. e. in Australia and in the United States.

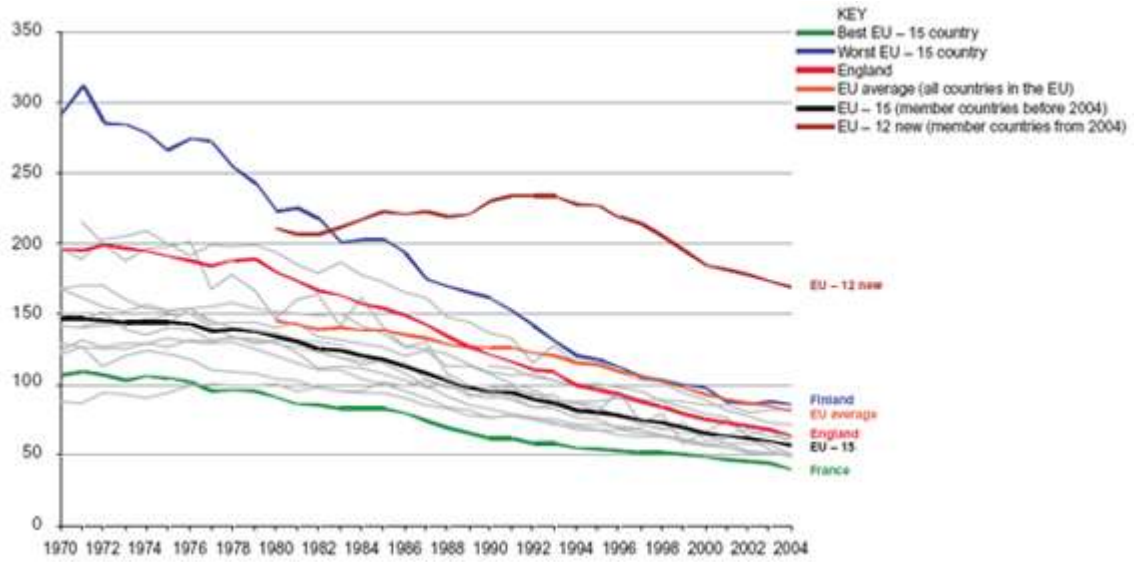


Figure 1.1. Premature cardiovascular mortality in European countries (per 100,000 of the population in the age group under 65 years). Data by the NHS of the UK; WHO, 2007.

| | 1987 / 1988 | | 2005 | |
|---|---|---|---|---|
| | males | females | males | females |
| France | 72.6 | 81.1 | 76.8 | 83.9 |
| Finland | 70.7 | 78.9 | 75.7 | 82.4 |
| Germany | 72.3 | 79.1 | 76.5 | 82.0 |
| Greece | 74.1 | 78.9 | 76.9 | 82.1 |
| Japan | 75.8 | 81.9 | 78.7 | 85.5 |
| United Kingdom | 72.5 | 78.2 | 76.6 | 81.1 |
| USA | 71.6 | 78.6 | 75.3 | 80.4 |

Table 1.1. Average life expectancy in selected countries of the world (WHO, 2006).

It is obvious that no efforts of the national/local authorities and healthcare workforce to reduce CVD mortality can be successful without the engagement and involvement of the population. In collaboration with the patients, healthcare professionals may achieve success measured as the health of the nation, which is key to its prosperity. As the great French philosopher René Descartes has aptly

put it, "Conquer yourself rather than the world". By changing themselves and their desires, people have the power to radically change life for the better.

One of the key links in CVD control is organizing educational and preventive campaigns [15, 20, 24, 25, 30, 31], more of which is needed. Many "hypertension schools" have been created and function to meet the health needs of hypertensive patients. However, there is a deficit or a lack of similar "health schools" for patients with comorbid disease, i. e. CAD, diabetes, obesity, heart surgery (after coronary artery bypass grafting, valve replacement, stent implantation, cardiac pacemaker placement, etc.) [10, 17, 23].

None of the following steps is unimportant for successful control of CVD and associated complications: primordial prevention [24, 27, 31], early diagnosis, adequate outpatient treatment [2, 16, 23], prompt identification of acute cardiac conditions, timely inpatient treatment and postoperative follow-up [23].

The essential steps for prevention of CVD [5, 21, 25] with associated exacerbations and complications include:

– Early identification of risk factors (hereditary predisposition, increased blood pressure, obesity, etc.) in otherwise heathy people and their management.

– Mandatory medical observation of patients already having CVD.

– Treatment of CVD only with the methods and drug products, whose efficacy and safety have been demonstrated in large multi-center randomized studies.

The major risk factors of cardiovascular disease [8, 9, 19, 22, 23] include the following:

- increased lipids in the blood (cholesterol and triglycerides), dyslipidemia;
- hypertension;
- smoking;
- lack of physical activity;
- excessive body weight, obesity, unhealthy nutrition;

- diabetes;
- genetic predisposition;
- hypodynamia (low physical activity);
- chronic stress.

As for genetic predisposition, hereditary factors are currently known to be involved in development of most diseases.

In this regard, cardiovascular disease is no exception. Many cardiovascular conditions (coronary artery disease, atherosclerosis, hypertension, etc.) are multi-factorial. This implies that environmental factors (environmental pollution), lifestyle factors (eating habits and physical activity) [8, 11, 22, 23] and genetic (hereditary) factors make comparable contributions to development and progression of cardiovascular disease.

However, in children [40] the more important conditions include the so called monogenic disorders, where a mutation (breakage) in a singular gene is sufficient for a disease to develop. Examples of such disorders include several genetically determined cardiac arrhythmias, such as long QT syndrome (Romano-Ward syndrome, Jervell and Lange-Nielsen syndrome) or short QT syndrome, etc. Monogenic cardiac disorders also include hypertrophic cardiomyopathies.

Dyslipidemia and increased lipids in the blood (cholesterol and triglycerides) constitute another very significant risk factor [7, 8, 11].

Numerous studies have identified disorders of fat or lipid metabolism, namely increased cholesterol (CS) in the blood, as one of the principal causes of vascular atherosclerosis [7]. In a US long-term study where subject follow-up continued for many years, subjects with CS levels from 6.2 to 6.8 mmol/L were found to have a two-fold risk for CAD compared to subjects with CS levels below 5.2 mmol/L. If CS levels were above 6.8 mmol/L, the increase in risk was 3-fold.

The methods for management of abnormal blood lipid profiles include the following: low fat diet, body weight reduction, increased physical activity [3, 8, 15, 21] and taking special medications when necessary [23, 29].

Another important risk factor of CVD is unhealthy nutrition [8, 11].

Several decades of scientific research have clearly demonstrated that the modern dietary habits, ingrained from early childhood, are a cause of epidemic prevalence of obesity and atherosclerosis-related disease. This high fat and high calorie diet may increase levels of blood pressure and serum cholesterol. According to available data, this type of diet is also associated with a higher prevalence of type 2 diabetes mellitus.

Populations in many countries have adopted previously uncommon dietary habits [8, 11, 22, 23]. Such habits include excessive consumption of: a) fat and cholesterol; b) refined and processed carbohydrates and other low fiber foods; c) food with high caloric value in comparison with essential nutrients; d) caloric intake in excess of energy expenditures; e) table salt and other sodium-rich ingredients.

Hypodynamia (reduced physical activity) causes a progressive reduction in adaptive capacity of cardiovascular system [3, 8, 15, 21], contributes to an increase in body weight and reduces stress resilience of human body. People with higher levels of physical activity were found to have generally lower body weights (at the same height) than people with low levels of physical activity [15, 22, 23]. Therefore, increasing physical activity may be one of the tools for prevention of CVD.

Excessive body weight and obesity are also risk factors of CVD.

A combination of high BMI and HT increases risks of subsequent stroke and sudden death. The likelihood of childhood obesity persisting into adulthood depends on the age when the person became overweight and on the presence of obesity in either of the parents [8, 11]. Excessive body weight in children under three years of age is not a predictor of obesity, unless hereditary predisposition is involved. If the child is overweight at 3 to 6 years of age, the likelihood that

obesity will appear and retain increases to 50% with age. Approximately 80% of obese adolescents are very likely to remain obese throughout their lives if no adequate measures are taken.

The development of obesity is influenced by high calorie foods [7, 8, 11] and insufficient levels of physical activity [3, 15, 21].

The weight-height Quetelet's index is used to identify overweight people; it is obtained from the following expression: Body weight in kilograms, divided by height in meters squared, i. e. Body weight (kg) / Height $(m)^2$

It should be kept in mind that if the patient's Quetelet's index is:

- less than 18.5, the subject has a weight deficit;
- from 18.5 to 24.9, the subject's weight is normal;
- from 25.0 to 29.9, the subject is overweight;
- 30.0 and above, the subject has obesity.

The main two methods for prevention of excessive body weight and obesity include dietary management (with reduced calorie intake) and increased physical activity [15, 21].

Smoking is currently recognized as one of the most widespread and aggressive risk factors [9, 19, 22, 23] for development and progression of cardiovascular disease [2, 16].

According to research studies conducted in order to assess CAD in the male population aged 40-64 years, the risk of CAD and heart attacks among those smoking 1 pack of cigarettes or more per day was 2.5 times higher than that in non-smokers [8, 43]. As for males of younger age groups, smoking also was associated with an elevated risk of CAD. The adverse cardiovascular effects of smoking are to a greater extent attributable to the two main components in tobacco smoke, i. e. nicotine and carbon monoxide. Nicotine has a multifaceted negative effect on the cardiovascular system, associated with increased heart rate, increased blood pressure, increased cardiac oxygen requirements, and a decrease in oxygen available for consumption by body tissues. This explains

generally lower exercise tolerances in smokers vs. age-matched non-smokers [8, 43].

The biological effect of nicotine in the body is subject to inter- and intra-subject variability and depends on the actual dose of nicotine. However, even low concentrations of nicotine may cause multiple changes in cardiovascular system as well as in other systems in the body.

A different direction of adverse effects of smoking is associated with carbon monoxide, which stimulates formation of atherosclerotic plaques in blood vessels [43]. Heavy smokers are often found to have high cholesterol levels in the blood [7, 8]. This partially explains the more frequent detection of atherosclerosis in this population, including atherosclerosis of coronary arteries.

Thus, the sum of the above data supports the need to abandon smoking as one of the main risk factors of not only cancer (as previously shown due to high risk of lung cancer in smokers), but also cardiovascular disease [2, 16].

In conclusion, it is difficult to overemphasize the role of the family and its related traditions in maintaining health and preventing cardiovascular disease [16]. In all these aspects, the nursing roles [4, 35] in organization of quality education activities for prevention and identification of risk factors are very significant [16, 17, 28]. Another important consideration to be kept in mind is the health of personnel in cardiac units [26, 35], since in these units the healthcare workers are exposed to intense stress-related risks [1, 22, 23, 44].

# CHAPTER 2
# THE OBJECT OF RESEARCH AND METHODS OF STUDY

In order to assess and review the characteristic features of nursing process in Cardiology, as well as the specific aspects in management of cardiac patients and associated treatment, prevention and rehabilitation, we have conducted scientific observation and a study in 358 cardiac unit patients with various cardiac diseases.

The diagnosis of cardiac disease involves certain steps.

Step 1: Visit to the doctor.

Already at this step, during a simple examination and conversation with the patient, the physician may suspect problems with the heart and blood vessels. The physician and the nurse may ask “What seems to be the problem”? And the very first responses by the patient may suggest the direction of further assessment. Such complaints as palpitations, dyspnea, sweating, retrosternal pain, swollen legs and feet, fatigue, etc. may already suggest cardiac problems (by the way of reminder, each individual symptom may speak little by itself, but this is what differential diagnosis is for, i. e. to tell one disease from the other by the symptoms).

In addition to asking about the complaints, the physician and the nurse will ask the patient about the hereditary factors, i. e. if family members, especially parents and grandparents had any heart problems.

This is followed by physical examination, where the physician will assess the skin (cyanosis/blue discoloration may suggest insufficient oxygen supply), will check the patient’s pulse and inspect the neck area (jugular veins may provide some important information), will auscultate the heart and measure blood pressure. Physical assessment includes percussion of the chest to detect any pericardial fluid. Even the patient’s mood and the way they respond to questions may attract the physician’s attention, since the depressed state of

consciousness may be a symptom of heart disease to the same degree as a depressed mood.

Stage 2 Investigations (Laboratory tests and imaging).

Diagnosis of cardiac disease involves laboratory tests, electrocardiography and imaging of cardiovascular conditions. The use of cutting-edge cardiological equipment allows for a detailed assessment of the heart and blood vessels and for detection of disease at early stages.

Laboratory diagnosis. The package of laboratory tests used for assessment of patients with cardiovascular disease includes a kit of the following specific blood tests:

- hematology and biochemical tests;
- blood tests for acute markers of myocardial infarction;
- genetic tests, e. t. c.

The results of blood tests provide complete information on the status of the heart, the blood vessels and internal organs, allow ruling out acute heart damage and comorbidities, assess the likelihood of coronary artery disease, heart failure, risks for cardiovascular complications, and select effective medications.

Diagnostic imaging and electrocardiography.

When physical examination is complete, the experienced physician may well already have their opinion. However, only a comprehensive assessment may provide an accurate diagnosis. What other assessments the physician may need?

ECG. Electrocardiography a cost-effective and readily available method to find out how the patient’s heart is working. Office ECG is a routine constituent of out-patient follow-up programs. However, more complex ECG variants exist. These include stress test and Holter monitoring.

During a stress test, an electrocardiogram is captured during physical activity. The usual procedure uses a treadmill with gradually increasing speed: first brisk walk, then running. Hence, the alternative name for this method, the treadmill test.

A Holter monitor is a small battery-operated electrocardiography device. It allows for a continuous 24-hour ECG recording. The device is worn concealed under clothes and does not interfere with activities of daily living.

If the above data is insufficient, the physicians may use more serious tests, such as chest X-ray in two planes, computer-assisted tomography of blood vessels, cardiac magnetic resonance imaging and even coronary angiography, when a catheter is inserted into coronary arteries of the heart under fluoroscopic guidance. Such tests are needed for a precise diagnosis of coronary artery disease or traces of asymptomatic heart attacks.

The diagnosis of cardiovascular disease may take a long time and involve complex steps. However, its importance can hardly be overestimated because the patient's life may depend on it.

In this research study, the following methods have been used: clinical methods, objective examination, general health assessment, collection of information on the main complaints of cardiac patients; data comparison, laboratory and imaging tests; analysis, and Excel software (Microsoft, USA) for statistical methods.

# CHAPTER 3
# THE SPECIFIC ASPECTS OF CONTINUING NURSING EDUCATION IN CARDIOLOGY AND THE WORK OF A CARDIAC NURSE

The nurses specialized in various cardiovascular procedures are known as cardiac nurses. These nurses are specifically working with the patients who have various cardiovascular conditions.

Some of the typical duties of cardiac nurses include:

- Assessment and treatment of patients
- Providing postoperative care
- Monitoring stress test assessments
- Monitoring of cardiac and vascular indices
- Education of patients and their families
- Supporting and motivating patients to make lifestyle modifications

Cardiac nurses are playing very diverse roles in the health industry. If they are sufficiently advanced and trained in various prophylactic approaches, they often conduct tests and educate patients in prophylactic methods. Nurses also treat patients in a clinical setting, keep their medical records and perform diagnostic procedures.

Cardiac nurses may work in a variety of healthcare institutions or hospital units, such as:

- Coronary care units (CCU)
- Cardiac catheterization (CC)
- Intensive care units (ICU)
- Operating theaters (OT)
- Cardiac rehabilitation centers (CRC)
- Clinical research (CR)
- Cardiac surgery wards (CSW)
- Cardiovascular intensive care units (CVICU)

- Cardiac medical wards (CMW)

To become a cardiac nurse, the nurse should have a minimum of Associate Degree in Nursing (ADN); however, the degree of Bachelor of Science in Nursing (BSN) is the best way to secure a career of a cardiac nurse. In some countries, clinical practice is a mandatory requirement. For instance, in the US, potential nurses should have at least 2000 hours of clinical practice before they are issued the ANCC certificate (American Nurses Credentialing Center). American Nurses Credentialing Center (ANCC), an affiliate of American Nurses Association (ANA), is a nursing credentialing organization and the largest body for certification of advanced practice nurses. As of 2011, more than 75,000 nurses have obtained this certification in the US, including nurse practitioners and specialist nurses.

The ANCC certification program is one of the oldest in the United States; many of its certificates were established before 1980, when nurse credentialing was yet at early stages of development.

Cardiac Nursing is a nursing specialty, which deals with patients who have various diseases of the cardiovascular system. Under cardiologist's supervision, cardiac nurses help managing such conditions as unstable angina pectoris, cardiomyopathy, coronary artery disease, congestive heart failure, myocardial infarction and cardiac arrhythmia.

Cardiac nurses are responsible for postoperative care in surgical units, conduct stress testing, perform cardiac monitoring, vascular monitoring and assessment of health status. It is mandatory for cardiac nurses to hold Basic Life Support and Advanced Cardiac Life Support certificates. In addition to that, cardiac nurses should possess special skills, including electrocardiographic monitoring, defibrillation and administration of drugs via continuous intravenous drip infusion.

As for outpatient care, the main objectives of the cardiology consultation nurse (the job description of the cardiology consultation nurse) include fulfillment of therapeutic and diagnostic orders of the cardiologist and assisting

the cardiologist with organization of cardiac services for the population living in the polyclinic's area of responsibility and for the blue- and white-collar employees of the industrial enterprises assigned to the polyclinic.

The cardiology consultation nurse is hired and discharged by the medical director of the clinic.

The cardiology consultation nurse works under the guidance of the cardiologist and collaborates with other nurses of the polyclinic or cardiological department.

When performing his/her functions, the cardiology consultation nurse is guided by his/her job description, as well as by the industry guidelines for improving the work of nursing personnel in outpatient clinics.

In order to perform his/her functions, the cardiology consultation nurse should do the following:

1. Prepare the workplaces prior to outpatient reception hours of the cardiologist; make sure the necessary medical documentation/forms and equipment/supplies are available; check the operability of medical equipment and office automation equipment.

2. Prepare and transfer information on the number of patients scheduled to visit the physician during the week.

3. Prior to visit hours, make patient information and records readily available.

4. Keep track of timely availability of test results and input the data into the electronic patient database.

5. Manage the flow of visitors by assigning appropriate visit times and informing the patients about these visit times.

6. Help the patients prepare for examination by the cardiologist and by other specialist physicians as required.

8. Keep a record of patients and give them timely notifications of their appointments to see the doctor.

9. Inform the patients on the ways and procedures to prepare for laboratory, imaging and functional tests.

10. Participate in patient education activities.

11. Consistently upgrade his/her nursing skills by studying professional literature and attending conferences and seminars.

12. Fill out medical records under physician's supervision, such as referrals to consultations and additional assessments, information cards of outpatient follow-up, statistical data, sanatorium and health resort card forms, extracts from outpatient medical records, nursing personnel shift logs, etc.

The cardiology consultation nurse has the right to:

- make demands on the Director or management of the clinic that necessary conditions be created in the workplace, which enable him/her to deliver quality services within his/her job description/scope of responsibilities;

- participate in staff meetings to discuss the work of the cardiological consultation;

- expect that the cardiologist, nursing supervisor of the unit (responsible for the consultation) and nursing manager will provide him/her with the information required for fulfillment of his/her job functions;

- demand adherence to regulations of the polyclinic from patients and visitors;

- acquire essential new skills in his/her specialty;

- issue orders to and manage nursing assistants/nursing aides of the cardiological consultation;

- upgrade his/her qualifications using on-the-job training and continuing nursing education courses.

The performance review of cardiology consultation nurse is done by the physician of the cardiological consultation and by the nursing supervisor/nursing manager. This evaluation is informed by performance of his/her job functions, adherence to in-house policies, workplace discipline, ethical and moral standards and contributions to the community.

The cardiology consultation nurse is responsible for exact and timely fulfillment of his/her job functions.

# CHAPTER 4
# NURSING ROLES IN MANAGEMENT OF PATIENTS WITH EMERGENCY CARDIAC PROBLEMS

This section deals with care in patients with cardiovascular disease in an intensive cardiac unit.

MI is one of the most formidable and frequent conditions in patients in the intensive cardiac unit; in many countries, more than a quarter of all deaths is caused by MI.

The term “myocardial infarction” was coined in 1896. Back in early 20th century, MI was viewed as a fatal, unsurvivable condition. However, medical advances have greatly expanded the options for effective treatment of patients with previously hopeless prognosis.

Endovascular interventions, i. e. minimally invasive procedures, are the most advanced methods of treatment used in MI; they may be used in a wide variety of diseases associated with vascular damage. Cardiology centers employ 24/7 specialist teams ready to provide care to patients with all types of acute coronary syndrome. In the Emergency Cardiology Department, a choice is made concerning the method to restore vascular patency: mechanical (stenting) or pharmacological (thrombolytic therapy, TLT).

The selection of treatment strategy depends on how much time has passed from the onset of anginal episode to hospital admission. TLT is used in patients with certain types of IM when not contraindicated and when it is not possible to perform a percutaneous coronary intervention (PCI) within the first 2 hours from hospital admission.

The essence of TLT is dissolution of a fresh thrombus; however, this technique cannot eliminate the cause of thrombosis, i. e. the atherosclerotic plaque. This is why the patient’s condition cannot be stabilized in many cases.

In many situations, balloon angioplasty and stenting are the preferred methods, since these procedures allow for a mechanical restoration of patency in

the narrowed or clogged blood vessels. Coronary angiography is performed at the stage of diagnosis; this procedure determines the nature, the location and the degree of narrowing in coronary blood vessels. Using a special catheter, a contrast dye is injected through the femoral artery, which is carried to coronary arteries with blood flow, allowing for their visualization.

The X-ray images are obtained at different angles; the results can be viewed on a display and saved in a digital format. The procedure is performed in a specially equipped operating room under fluoroscopic guidance and using a high technology equipment (angiography device) with continuous ECG recording. This procedure needs no incisions; moreover, it is performed under local anesthesia. The patient may talk, tell how they feel, and make deep breaths and hold their breath at the surgeon's request. Through a blood vessel on the thigh or an arm, a special catheter is introduced into the ostium of the narrowed coronary artery. Then a thin metallic guide wire with a balloon is passed; the size of the balloon is selected by reference to the specific parameters of the narrowed segment. A compressed stent is mounted on the balloon; the stent is flexible, resilient and adaptable to the state of the blood vessel. The stent is a thin metallic tube consisting of wire mesh. This instrument is introduced into the compromised blood vessel and, when dilating, it squeezes into the vascular walls, thereby dilating the lumen. This is the technique to restore cardiac blood supply. In order to verify correct stent placement and restoration of blood flow through the vessel, a control coronary angiography is performed. Then the balloon is deflated and removed from the artery along with the guide wire and the catheter.

The stent remains in place and maintains the vascular lumen. Depending on the size of the compromised blood vessel, one stent or several stents may be used. The efficacy rate of PCI is 70–90%.

The main objective of physicians in the intensive cardiac unit is to dissolve the "fresh" thrombus, to dilate the blood vessel(s) and to restore natural blood supply; while the main objective of nurses is to be continuously vigilant

with MI patients during the acute phase of the disease, when grave complications are likely, as well as proactive prevention and detection of these complications. This is why vital bodily functions are under continuous monitoring using special equipment that registers heart rate and rhythm, blood pressure, respiratory rate and body temperature. The primary intervention performed before or during admission to intensive care unit is the “keep vein open” (KVO) (i. e. establishing access and starting normal saline prior to any diagnosis and treatment), which saves precious time when performing emergency interventions and simplifies prolonged administration of parenteral drugs.

Other emergency cardiac conditions require different therapeutic and diagnostic approaches and, respectively, other nursing algorithms. However, all actions by the personnel in the unit (physicians and nurses alike) are characterized by coherence and speed.

Intensive cardiac units are equipped with modern instrumentation for diagnostic testing, monitoring and support of vital bodily functions. The unit also has infusion pumps allowing to dose medications precisely; electrocardiographs for diagnosis of myocardial ischemia and disturbances of heart rhythm and conductivity; external cardiac pacemakers for temporary endocardial cardiac pacing in severe bradycardia, as well as respiratory equipment essential in development of acute respiratory or cardiac failure.

The nurse of the intensive cardiac unit is expected to have a responsible attitude to his/her work and to be able to act independently. The nurses in the cardiac unit have special training in diagnosis and treatment of cardiac arrhythmias and in working with systems of hemodynamic monitoring.

In no other unit in a healthcare institution the life and health of the patient depend on the nurse to such a degree. And accurate fulfillment of physician’s orders is but one piece to the puzzle.

The nurse should know and correctly assess each patient’s individual clinical situation; he/she should not only be able to perform numerous

interventions and procedures, but to have a thorough understanding why they are performed and what potential complications may arise. The nurse of the intensive cardiac unit is not merely a helper to the doctor; he/she is an important treatment provider. The nurse is usually the first person to notice changes in the frequency and shape of ECG complexes on the screen of a cardiac monitor and to report these changes to the physician. In addition to that, he/she is an immediate assistant of the physician when resuscitating a patient.

All nurses in an intensive cardiac unit know how to take an ECG and are skillful in cardiopulmonary resuscitation (CPR). In addition, they are confident users of defibrillator machines, respiratory equipment, infusion pumps and cardiac monitors and know how to perform certain lab tests. When a patient with suspected MI or pulmonary embolism is being admitted, every minute counts. Therefore, some laboratory tests may be done at the patient's bedside to save precious time. And that's not all. Having such a complex and wide scope of responsibilities, the intensive cardiac unit nurse should be a well-trained, highly qualified and versatile specialist; he/she should have the qualifications of a general ward nurse, an anesthesia nurse and an IV nurse.

In the cardiac unit, the nurse should be know many procedures, even if he/she does not act independently but only precisely fulfilling physician's orders.

Overall atmosphere in the cardiac unit is very important. The psychological environment in the intensive cardiac unit should always be calm, trusting and serious; it depends on the entire staff (the physicians, the nurses and the assistants/aides).

The nurse's demeanor should instill trust and strengthen the patients' confidence in his/her knowledge and skills. It is therapeutic for the patients to feel their health and life rests safe in the hands of such a nurse.

The patient needs empathy, emotional support and kindness as much as their medicines. It is not by chance that in relatively recent history nurses were

referred to as “sisters of mercy”. It reflected not merely professional, but also ethical dimension to their work.

The role of a nurse in patient’s treatment can hardly be overemphasized. The quality of treatment and the very life of the patients depend on timely, diligent and sound fulfillment of physician’s orders, as well as on adherence to regulations and guidelines that govern the work of healthcare staff.

High demands are placed on the cardiac unit nurses. This applies not only to their professional knowledge and skills, but also to their moral character and the ability to interact well both within the team and with the patients and their significant others.

Not everyone is capable of working in an intensive cardiac unit, and physical health, although important, is not a number one factor. Attentiveness, endurance, kindness and tidiness along with high level of professionalism must be inherent qualities of a nurse.

The specific aspects of daytime shift work of a cardiac nurse (in a unit without intensive care).

The report of a cardiac nurse on cardiac patients. The cardiac nurse should obtain and check reports on 4–6 patients. He/she should promptly check vital signs, laboratory results and telemetry to make sure there are no indications to emergency interventions.

Cardiac monitoring. The cardiac nurse should monitor cardiac status, which is often done with telemetry or continuous cardiac monitoring. This is a wearable device attached to the patient's chest, which transmits data on electrical activity of the heart (mostly using a wireless network) to the monitor. The nurse may view this data at the nursing station.

The nurse's function is to monitor the indices, interpret them and document monitoring at least every shift and with any changes in rhythm. The nurse should know how to interpret these findings; recognition of normal and abnormal ECG patterns is an important part of nursing education. Continuing nursing education programs offer classes in ECG to help active nurses refresh their knowledge in this area.

After the nurse reviews the reports, he/she should make sure that vital signs and critical lab values are stable and that there is no emergency, either actual or potential. Then he/she may resume their routine duties.

Cardiological assessments and drugs. Patients in a cardiac unit may have more than one comorbid cardiac disease. Some of these may include:

- Myocardial infarction
- Pleural effusion
- Recuperation after serious cardiac procedures, such as replacement/repair of cardiac valve, coronary artery bypass grafting, aneurysm repair, e. t. c.
- Pneumothorax and/or hemothorax
- Exacerbation of heart failure
- Problems with heart rhythm, e. g. atrial fibrillation

- Blood clots (thrombi)

The work of the cardiac nurse consists in implementing the plan of treatment established by the cardiologist team, monitoring the patient's condition and communicating any changes in patient's status to the cardiologist team.

The cardiac nurse is doing this by first assessing the patient. At the beginning of each shift, the nurses are checking various body systems on a routine basis. They make sure the status they observe is not very different from that observed by the previous shift. The nurses auscultate the heart and the lungs, check the skin and mucous membranes, review the results of cardiac monitoring, vital signs and laboratory results, and perform a basic neurological examination, during which they may ask the patients to do basic things to check for symptoms (for example, clenching hands, wiggling toes, etc.). This is referred to as basic assessment of patient's condition. Throughout the entire shift, the nurses monitor the patients for deterioration or for minimal changes that may suggest a problem in patient's health status.

It is quite expected that these cardiac patients will be given the medicines used for treatment of heart disease. The cardiac nurse should not merely review the list of medications and tell the patients how they will be taken/administered; the cardiac nurse should make sure the drug(s) is(are) still effective and tolerated by the patient. This is referred to as critical thinking. The health status of the patients is subject to continuous changes and the objective of the cardiac nurse is to identify these changes and to make necessary adjustments.

For instance, a cardiac patient may have been prescribed a blood pressure-lowering drug, which he is usually taking at home every morning. His last blood pressure was low, at 96/44 mm Hg. The role of the nurse is to notice that the blood pressure is low and to ponder if the patient should be given the hypotensive drug, which will reduce the blood pressure even more. In this case, the nurse will usually need to call the physician to clarify further course of action. This example is quite simple, while situations may be very complicated. However, the work of the cardiac nurse includes ongoing critical thinking and

decision-making throughout the entire shift, with continuous assessment whether what the nurse is doing at the moment is safe for the patient.

Another aspect of the work is collaboration with cardiologists or other members of the cardiac team.

Cardiac nurses have to collaborate with different cardiologists. Some people may think that a cardiologist's scope of work covers everything heart-related; however, in reality, there are many highly specialized cardiologists.

Some examples include:

- Cardiothoracic surgeon
- Cardiovascular surgeon
- Electrophysiologist
- Echocardiologist
- Interventional cardiologist
- Specialists in heart failure and cardiac transplantation

The goal of the cardiac nurse is to effectively collaborate with other nurses to implement the developed treatment plan. The cardiac nurse should notify other specialists of changes in patient's conditions or of new patient needs and talk to these specialists on the patient's behalf when problems arise.

Performing bedside cardiac procedures is a very important responsibility of the cardiac nurse. (The bedside procedure is a nursing procedure or intervention performed in patient's room, which is not a part of routine patient care). The cardiac nurse may be the only health professional performing the procedure or he/she may assist the physician or healthcare provider.

Examples of bedside procedures include:

- Synchronized electrical cardioversion
- Emergency insertion of a drainage tube
- Removal of a thoracic tube
- Emergency administration of medications into a central vein
- Thoracentesis

- Pleurodesis
- Peritoneal dialysis
- Changing central line dressings

Those working in cardiac intensive care units are involved in many other bedtime procedures and emergency interventions.

The cardiac nurse should guarantee effective management of cardiac emergencies. Things not always go as planned. Sometimes the patients may feel worse or develop unexpected complications. The work of the cardiac nurse as a bedside nurse in a cardiac unit consists in noticing such changes as early as possible and in collaboration with the medical team to change treatment strategy in a timely manner.

Sometimes the cardiac nurse in a postoperative ward may need to make a decision to promptly send the patient back to the operating room after noticing an abrupt deterioration in laboratory results and a marked BP reduction (the patient may have an internal bleeding).

The cardiac nurse may need to promptly transfer the patient to a cardiac intensive care unit, since the patient may need many vasoactive interventions in order to maintain blood pressure and to manage heart rate and/or rhythm.

After the cardiac nurse helps stabilize the patient's condition, he/she will need to notify the family and to answer questions that they might have. The cardiac nurse should properly document all interventions, so that any member of the cardiac team who will provide subsequent patient care would know what exactly has taken place.

The cardiac nurse should also work to ensure cardiac education. Throughout the entire shift he/she may need to tell the patient what he/she is doing and why. As the cardiac nurse acquires more experience in this field of healthcare, he/she will inevitably see that many hospitalizations could have been averted. It is very important to explain to the patients and their significant others what the nurse is doing and to provide rationales (this may be initially difficult,

since the cardiac nurse cannot be completely confident whether such elaborations are appropriate).

The cardiac nurse should tell the patient about their disease, what medications they will have to take and why, what procedures they need and why, how to manage pain and what steps will continue in the home.

The cardiac nurse will review reports on cardiac patients and will make sure there are no emergencies or accidents.

The cardiac nurse will assess the patient's status, dispense medications as ordered, make rounds with the medical team, communicate with the team on the patient's behalf, clarify orders, continue monitoring the patient and perform nursing interventions throughout the entire shift.

Discharge or transfer of patients. The cardiac nurse admits new patients, constantly informs the patients and their significant others on the care plan and on any required changes; also, everything should be thoroughly documented.

As part of continuous education, a cardiac nurse may take a condensed course in cardiac nursing; this is a universal resource and an online course specially designed for novice cardiac nurses.

# CHAPTER 5
# THE SPECIFIC ASPECTS OF NURSING WORK IN DIAGNOSIS AND TREATMENT OF HEART DISEASE

The cardiac nurse should know the existing types of cardiac disease.

Cardiac disease may be traced by the anatomical structure of the heart. The heart consists of a large muscle whose constant contractions push blood through blood vessels and the heart's own vascular network for supply of this muscle and heart valves that prevent reverse blood flow, and the conducting system, which transmits impulses for contraction of specialized muscle cells in the heart.

Therefore, all and any of these components may be involved in a disease, namely:

Heart failure (cardiac insufficiency), when cardiac activity is insufficient to meet body requirements.

Coronary artery disease (CAD) or atherosclerosis of cardiac blood vessels accounts for the lion's share of cardiovascular disease. CAD and its associated complications continue to lead among the causes of death in industrially developed countries, despite significant progress in risk factor control and treatment, including the widespread methods of surgical and endovascular revascularization.

Coronary artery disease (coronary blood vessels of the heart, Latin "corona" = "crown", "garland"), a disease developing when circulation in the own blood vessels of the heart is impaired.

Valvular disease means that one of the four heart valves cannot open or close as it should.

Cardiac arrhythmias occur in types of damage that impede transmission of impulses.

In addition to that, there are congenital heart defects and infectious cardiac diseases.

According to the statistics, cardiovascular disease is one of the most prevalent causes of death worldwide. In Europe, coronary artery disease leads the list. In the so-called developed countries, cardiovascular disease is becoming in the broadest sense more important compared to infectious disease.

The complaints due to heart disease can be very diverse. General symptoms include:

- Chest pain (retrosternal pain), which may irradiate to the arm, to the neck, to the jaw and to upper abdomen.
- Gripping pain
- Dyspnea
- Reduced exercise tolerance
- Swollen lower extremities
- Extrasystoles (premature ventricular contractions, PVCs)
- Loss of consciousness

However, these may occur in other disease and may differ depending on their cause.

The heart is very sensitive to disturbances, but especially to problems with coronary blood vessels. If blood supply is impaired, the usual cause is the atherosclerosis of these vessels. The well-known risk factors include increased level of cholesterol in the blood, smoking, high blood pressure, diabetes, obesity and lack of exercise.

The above mentioned disorders are also usually interrelated, as they are partially derived from each other. For example, coronary artery disease may result from myocardial infarction, heart failure, or cardiac arrhythmias.

All of the 358 patients of cardiac units whom we observed had laboratory, electrocardiographic and imaging corroborations of some of these diseases of the cardiovascular system.

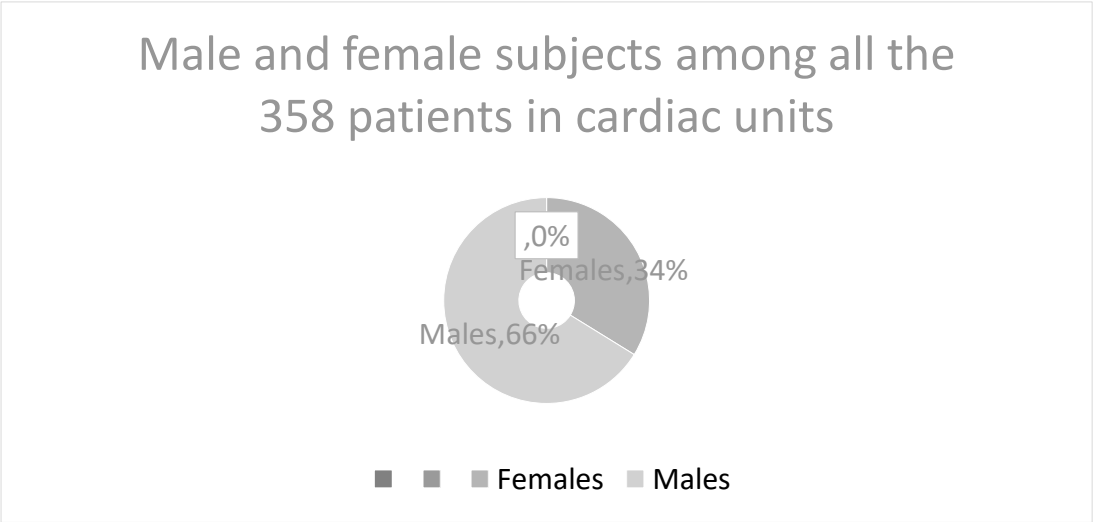


Fig. 5.1. Relative number of females and males among all the 358 patients in cardiac units.

This analysis suggests that there were 121 females (33.8%) and 237 males (66.2%).

In our study, we assessed patients with the following cardiac disorders:

- heart defects (congenital and acquired) were detected in 87 patients;
- CAD (coronary artery disease) was found in 132 patients;
- unstable angina pectoris was found in 53 patients;
- cases of myocarditis, endocarditis and pericarditis were found in 69 patients;
- heart failure of various etiology was found in 264 patients;
- cardiac arrhythmias (bradycardia, tachycardia, incomplete heart block) were found in 242 patients;
- hypertension was found in 184 patients;
- cardiomyopathy was found in 59 patients;
- thrombosis and thrombophlebitis were found in 173 patients.

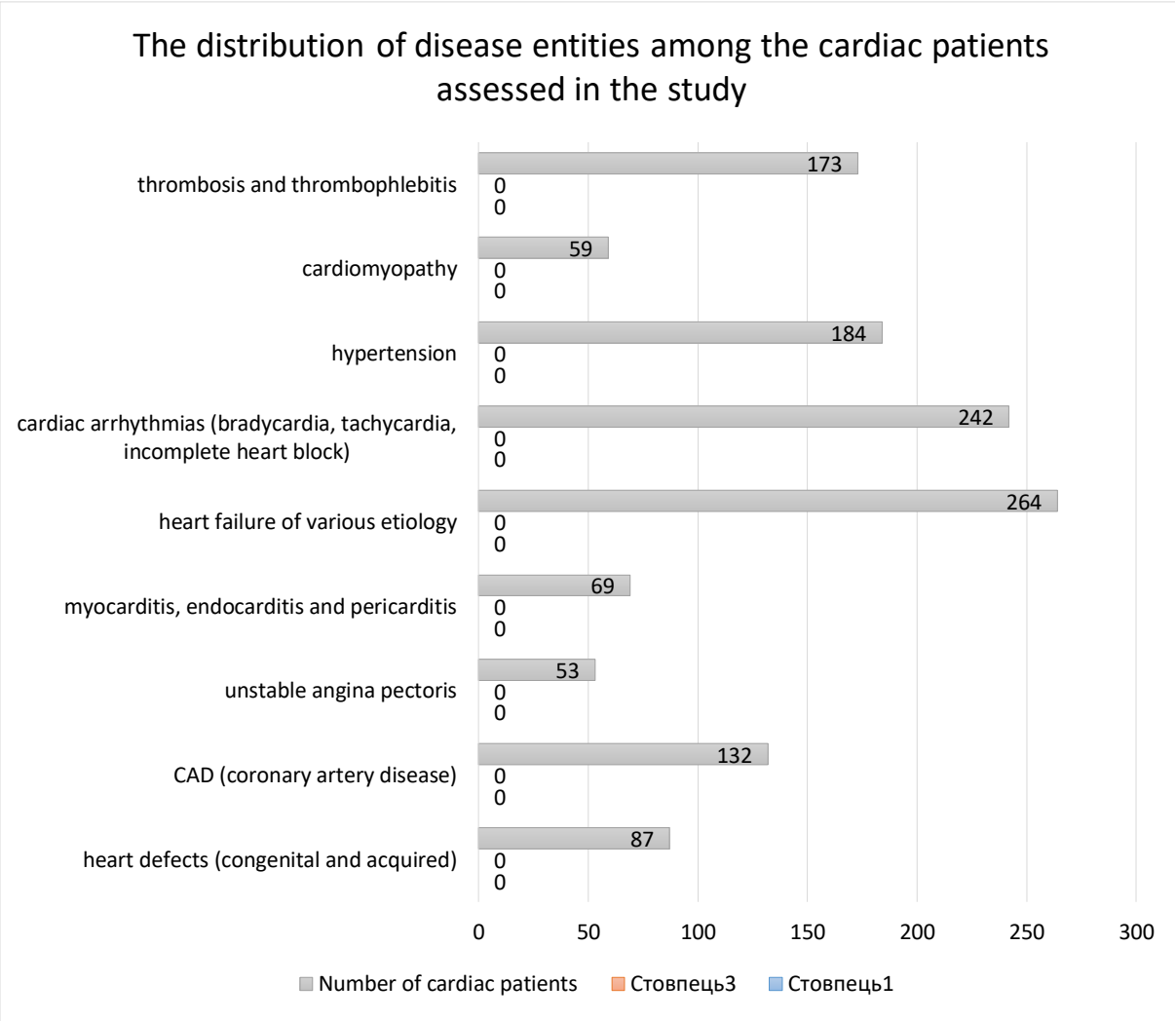


Fig. 5.2. The distribution of disease entities among the 358 cardiac patients assessed in the study.

All patients had a 24h ECG monitoring.

A 24h ECG monitoring or Holter monitoring is used to detect disturbances of heart rhythm. Based on the captured data, the nurses/clinicians assess heart rhythm and pulse rate (in different situations), the presence of individual extrasystoles and sequential extrasystoles, intermittences and signs of myocardial hypoxia manifested during the monitoring.

This assessment helps determine the mechanism of development, duration and clinical significance of arrhythmia. The 24h ECG monitoring allows for clarification whether the arrhythmia is atrial or ventricular. It may also be

helpful to establish the cause for loss of consciousness of unknown etiology and to obtain data on myocardial hypoxia.

The 24h ECG may also help in diagnosis of coronary artery disease; for example, in cases with alarming nighttime symptoms.

The 24h ECG monitoring is performed in a fashion similar to ECG registration. Five to seven ECG electrodes are attached to the patient's chest, with electrocardiogram captured within the space of 24 or 48 hours. In course of the monitoring, the patient records their sensations associated with rhythm disturbances, as well as other symptoms of heart disease in the patient's diary, and after the procedure is complete, the physician matches the electrocardiogram with the description of symptoms.

During this test, the patient is encouraged to lead a normal life and to engage in activities that may precipitate an episode of arrhythmia. Throughout the entire time of the assessment, the heart rhythm (approximately 100,000 beats per day) is recorded in the memory of the device and later uploaded for analysis.

In some people, rhythm disturbances appear only on rare occasions. When the test is performed to detect symptoms, the patient remains under surveillance for several weeks and activates ECG registration himself/herself when symptoms appear.

Treatment of cardiac disease.

Etiotropic therapy is not always possible. Nevertheless, attempts are usually made to eliminate the cause of the disturbance. The interventions for CAD include acute symptomatic, long-term pharmacological and surgical interventions. Acute interventions consist in reducing the oxygen needs of the heart. Additionally and over the longer term, cholesterol levels and heart rate should be reduced, and oxygen supply should be improved.

If drug therapy is insufficient, an attempt is made to dilate the narrowing using a cardiac catheter; a vascular stent is used in many cases. An open surgical procedure is the bypass procedure performed to replace damaged blood vessels

with an autograft, for instance, with an autovein from the lower extremity or with a thoracic artery.

Treatment of hypertension (HT) Hypertension may have various origins. However, similar drugs are used, with allowances made for comorbid conditions where certain drugs are not recommended, while certain other drugs are more preferable. Currently, there is a large number of BP-lowering drugs. In terms of mechanism of action, they are united into classes. The selection of drugs is performed by the physician, who is taking into account individual profiles of risk factors, gender, age, duration and severity of hypertension, and comorbid conditions. Quite frequently, there is a need to combine various hypotensive drugs in order to increase treatment efficacy.

Currently, many finished pharmaceutical products (FFPs) are manufactured as various combinations containing several drugs. The fundamental principle of hypertension management is lifelong therapy; i. e. the patient will need to take their drug(s) continuously and in the very dose/combination, which keeps the BP at or below 130/80 mm Hg. The latter values are referred to as target BP. The level of 140/90 mm Hg is considered elevated and is the basis to diagnose hypertension. Two documented occasions of elevated BP constitutes grounds for diagnosis of hypertension.

Coronary artery disease. Risk factors of coronary artery disease include the following:

- the first group includes non-modifiable factors. These are male gender, heredity and ageing.

- the second group includes modifiable factors, which can be changed and are lifestyle-dependent. These factors include increased levels of cholesterol and triglycerides in the blood, smoking, hypertension, excessive body weight, stress and low physical activity.

The fundamental cause of coronary artery disease is the narrowing and clogging of the main coronary arteries with atherosclerotic plaques. As a result, there is an imbalance between oxygen delivery to and the requirement of the

heart muscle in oxygen. Most frequently, the disease manifests in the setting of exercise or emotional stress. The principal manifestations of CAD include angina pectoris and myocardial infarction. The main signs of angina pectoris include pain, heaviness, tightness and burning (retrosternally or in the heart region). The pain usually irradiates to the neck, to the shoulder(s) and to the arm (mostly the left arm). The pain lasts for 3–5 minutes and usually subsides after stopping the physical activity or after a dose of nitroglycerin (in 2–3 minutes). If the pain is becoming more intense and lasts for longer than 20–30 minutes, and follows a wave-like pattern of reemergence at rest; if there is an abrupt weakness, apprehension/sensation of impending doom, rapid pulse and abrupt fluctuations of blood pressure, it is mandatory to secure prompt medical attention or call the ambulance immediately. The reasonably likeliest culprit in this situation is an acute myocardial infarction.

Treatment of CAD. The drugs used for the treatment of angina pectoris can be conventionally divided into the following 2 groups. One group includes the medicines used for prevention of anginal attacks, and the other group includes the medicines used to control (reverse) the attacks, which have already occurred. The pharmacological agents used to control coronary episodes primarily include the so called short-acting nitrates: nitroglycerin formulated as tablets and as a spray (aerosol; e. g. Isoket spray, Nitromint spray, e. t. c.). These drugs are rapidly absorbed into circulation and relieve the anginal attack by increasing the amount of blood flowing to the heart and by reducing the cardiac load. The drugs for prevention of anginal attacks include: long-acting nitrates, beta adrenergic blockers (the latter decrease the frequency and the force of cardiac contractions, reduce blood pressure and respectively reduce the oxygen requirement of the myocardium and have an antiarrhythmic effect); calcium channel blockers (they reduce cardiac oxygen requirements and, respectively, reduce blood supply requirements). They relax the smooth muscles in arterial walls, leading to expansion of their lumen, and thereby reducing blood pressure.

Aspirin contributes to prevention of anginal episodes by impeding the formation of thrombi (blood clots) and their attachment to atherosclerotic plaques.

If cholesterol levels are increased, cholesterol-lowering therapy is mandatory. The basic drugs in this category include statins. Cholesterol levels should be lower than 5.2 mmol/L in healthy individuals; below 4.0 mmol/L in healthy individuals with two risk factors and below 3.1 mmol/L in patients with CAD, cerebrovascular disease and hypertension.

In order to improve nutrition of the myocardium, metabolic drugs are used, such as Preductal (trimetazidine), Meldonium (mildronate), ATP, cocarboxylase (thiamine diphosphate) and Neoton (phosphocreatine).

In frequent and prolonged anginal attacks, the patient's exercise tolerance is decreased and coronary angiography may be required. Coronary angiography is a method to assess the patency of coronary arteries by injecting contrast medium through a catheter in femoral artery or in an upper extremity artery. The X-ray image shows an exact representation of the situation in cardiac vessels. The physician may assess the seriousness of arterial involvement, the possible prognosis and the course of action (whether to limit intervention to pharmacotherapy or to use surgical methods of treatment). Coronary angiography is performed in an in-patient setting.

There is also an attractive, promising and potentially universally applicable method of treatment of cardiovascular disease with cellular transplants (i. e. the successful use of stem cells in treatment of myocardial infarction, albeit still experimental).

Since there have been people with heart defects among our patients, we need to review this type of cardiac conditions.

A heart defect is a structural abnormality of cardiac valves, cardiac septa, major vessels and the myocardium, which leads to impaired cardiac function and to congestion of blood in the veins, tissues and organs.

Heart defects are classified as congenital and acquired heart defects.

Acquired heart defects include anomalies and malformations of cardiac valves, cardiac foramina and septa, and of the vessels originating in the heart. These defects lead to impaired intracardiac and systemic hemodynamics and, as a consequence, to acute or chronic circulatory failure.

There is no consensus classification of acquired heart defects. Therefore, in regards to individual heart defects, it is advisable to use the most prevalent and well-supported classifications, which take into account the special characteristics of the clinical condition, the degree of hemodynamic disorders and the indications for surgical treatment.

Classification of acquired heart defects:

– etiology: rheumatic; non-rheumatic (with clarification);

– location of the damaged valve (type of defect): bicuspid (mitral), aortic, tricuspid, pulmonary;

– pattern of valvular lesion (form of defect): stenosis, insufficiency, combined lesion;

- stage: I, II, III, IV and V.

There is a distinction between combined and concomitant heart defects: combined defects involve simultaneous stenosis and insufficiency in one valve; concomitant defects include simultaneous involvement of several cardiac valves.

The diagnosis of heart defects is informed by the results of standard assessment.

Mandatory assessments:

1. History and physical examination findings.

2. Laboratory results – complete blood count (erythrocyte sedimentation rate [ESR], white blood cells, hemoglobin), biochemistry and serology (proteins and protein fractions, C-reactive protein, fibrinogen, titers of anti-streptococcal and complement-binding antibodies).

3. ECG (myocardial hypertrophy, disorders of heart rhythm and conductivity).

4. Echo-CG and Doppler study.

5. Chest X-ray in two planes.

6. Consultation of a cardiac surgeon.

Additional assessments:

1. Immunological blood tests (B- and T-cells, circulating immune complexes [CIC]).

2. 24h ECG monitoring.

3. Coagulation test.

4. Cardiac catheterization.

5. Coronary angiography.

In most cases, surgical treatment of cardiac defects is recommended, i. e. performing surgical procedures. Traditional (pharmacological) therapy is playing a role of an accessory method, with the use of drugs for prevention and treatment of heart failure and other complications.

Pharmacological treatment of congenital heart defects (CHD) is pathogenetic and aimed at activation of compensatory mechanisms and at achievement of optimal condition of the patient's body by the time of surgery. Medical therapy of acquired heart defects (AHD) consists in medical management of heart failure and rheumatic heart disease; surgical treatment may be indicated in cases of decompensation.

Treatment of acquired heart defects involves a multifaceted approach involving pharmacological treatments, special diet and lifestyle modifications. If medical treatment is insufficient, surgical treatment should be considered.

Many hospitals have a medical cardiology unit, where patients are under constant surveillance of specialist personnel. If after assessment the patient was found to require surgical repair, the patient will be referred to a cardiac surgeon's consultation, who will determine if and what type of surgery is needed for the patient.

Methods of surgical interventions for heart defects:

- Catheter balloon valvuloplasty is a dilatation of a narrowed lumen by introducing a balloon catheter. As a result of the procedure, the

adhesions between the cusps of the valve are separated and the impediment to blood flow is removed.

- Valvulotomy (commissurotomy) is the dissection of fused valves;
- Valve replacement is a replacement of the damaged valve with an implant. Open heart surgery using an apparatus temporarily replacing the work of the heart;
- Percutaneous aortic valve replacement (PAVR).

Unlike congenital defects, acquired defects develop later in life and may become manifest at a mature age.

Cardiomyopathies are primary diseases of the heart muscle. They should be differentiated from structural heart disease, such as coronary heart disease, abnormalities of the valvular apparatus and congenital heart defects. Based on pathomorphological signs, cardiomyopathies are divided into 3 major types:

- Dilated cardiomyopathy (DCM)
- Hypertrophic cardiomyopathy (HCM)
- Restrictive cardiomyopathy (RCM)

The term “ischemic cardiomyopathy” refers to a condition with dilatation and reduced myocardial contractility; this type of cardiomyopathy is seen in patients with severe CAD (with or without foci of infarction). This type of cardiomyopathy is not usually included among the above three types, since it does not describe a primary myocardial disease.

Cardiomyopathies usually present with clinical signs of heart failure, which may vary depending on the predominance of systolic dysfunction and/or diastolic dysfunction. Some cardiomyopathies may also cause chest pain, syncope, arrhythmias or sudden death.

The diagnosis usually involves a family history review, blood tests, ECG, chest X-ray, echocardiography and cardiac MRI. Some of these patients may require endomyocardial biopsy (EMB). Other tests may be performed as required to establish the cause. The treatment depends on the specific type and the cause of the cardiomyopathy.

Symptoms of dilated cardiomyopathy include:

- Escalating heart failure.
- Shortness of breath with exercise.
- Fatigue.
- Edema of lower extremities.
- Skin paleness.
- Blue discoloration of toes, later fingers.

Symptoms of hypertrophic cardiomyopathy include:

- Dyspnea.
- Chest pain.
- Propensity to syncope and palpitations.

Symptoms of restrictive cardiomyopathy include:

- Edema.
- Dyspnea.

The principal imaging method for diagnosis of all types of cardiomyopathy is cardiac ultrasound.

The 24 hour Holter monitoring of ECG parameters allows for an assessment of the frequency and severity of cardiac arrhythmias and intracardiac blocks, as well as the efficacy of treatment. Laboratory diagnosis is important to monitor the efficacy of treatment in terms of fluid and electrolyte balance, to rule out certain adverse effects of the drugs and to identify secondary reasons for cardiac damage.

Treatment schedules for cardiomyopathy include the drugs that suppress rhythm disorders, slow down the progression of disease and prevent the development of cardiac insufficiency. If heart failure is present, the physician may prescribe drugs to reduce the severity of its symptoms and to improve the patient’s quality of life.

When life-threatening rhythm disturbances are present, the surgeon may implant an implantable cardioverter defibrillator (ICD), a small device capable

of generating an electric discharge when ventricular tachycardia or ventricular fibrillation is detected (i. e. rhythm disturbances, which are potential causes of sudden cardiac death).

In severe heart failure, when synchronicity of myocardial contractions is disrupted, an implantable device might be used to resynchronize cardiac activity, on which background the pumping function of the heart is improved. Quite frequently, this device may have an additional ICD capability.

Taking into consideration the complex tasks faced by the specialist personnel of cardiac centers/units, it should be emphasized that these special work characteristics impose important and unique duties and suggest high responsibility for the care provided to patients.

# CHAPTER 6

# THE SPECIFIC ASPECTS OF PREVENTION IN CARDIAC DISEASE

We have developed preventive practices for prophylaxis or early detection of cardiac disease.

Although prevention is what we need to do before the onset of disease, the so-called “secondary prevention” is an integral part of treatment plans in existing coronary artery disease, and it also has proven efficacy. This includes reduction of risk factors, treatment of comorbid conditions, and prevention of intolerable physical activity. The success of these interventions is also determined by socio-cultural aspects of life.

At first, the patient needs to acknowledge whether they have a cardiac disease.

The presence of a problem may be suggested by shortness of breath, dizziness, increased sweating and edema. However, symptoms of cardiovascular disease take some time to appear. Therefore, timely assessment is a key factor, especially if the patient has any of the following risk factors:

- diabetes;
- family history of cardiovascular disease;
- smoking;
- sedentary lifestyle;
- high cholesterol levels;
- high blood pressure.

To check the patient’s heart, the physician or the cardiac nurse may refer the patient to such tests as electrocardiography (ECG), echocardiography (Echo-CG) or cardiac ultrasound, and cardiac magnetic resonance imaging (MRI). However, these methods may be insufficient for a full diagnosis. It is quite likely that the patient may need to have cardiophonography, X-ray imaging, electrophysiological testing or radioisotope study.

The patient should know how to check heart function themselves.

By performing some simple tests, the patient may know if it is time to visit the doctor. Here's two ways how to do it:

- Martinet test

This test gives an idea of the overall condition of the cardiovascular system. Prior to the test, baseline BP and pulse rate (PR) values are obtained when seated. PR values are counted over 10-second intervals until three identical consecutive figures are obtained (e. g., 12-12-12). Then, with the deflated BP cuff on, the subject is suggested to perform 20 squats over 30 seconds (the arms should be extended forward). After the squats, the subject is asked to sit down. In the first minute of the recovery period, during its first 10 seconds, pulse rate is counted, and BP is measured during the next 40 seconds of the first minute.

During the last 10 seconds of the first recovery minute and during the second and the third recovery minutes, the 10-second pulse rates are taken again. The measurements are repeated until the subject's pulse rate returns to baseline; the return to baseline is considered valid if baseline PR is repeated three consecutive times. The recommended duration of measurements is 2.5 to 3 minutes, since there is a possibility of "negative pulse phase" (i. e. when pulse rate goes below baseline during the recovery period). This may result from an excessive increase in parasympathetic tone or from autonomic dysfunction. In a satisfactory test result, the pulse rate should return to baseline within 3 minutes (maximum normal duration of the recovery period) Otherwise, the result of Martinet test is considered unsatisfactory and further ten-second PR counts are discontinued after 3 minutes. After the test is complete, the follow-up BP measurement is performed. In case of an unsatisfactory test, the patient needs to see their cardiologist.

- Timed inspiratory capacity test

This simple test will help determine how well the cardiovascular and the respiratory systems are working. The patient will need to inhale deeply and exhale 2–3 times. Then take a deep breath and hold their breath. If the patient

can hold their breath for 40 to 50 seconds, this suggests good cardiovascular health. If it's less than 40 seconds, the patient needs to see their cardiologist.

The cardiac nurse should know how to prevent heart disease and vascular disease.

In some countries, there is a tradition: shortly after the funeral of a relative who died of a heart attack, the entire family schedules their cardiovascular examinations. Timely detection of disease is a half to a successful treatment. In addition to testing and cliched advice to quit smoking and avoid overeating, the researchers advise the following:

- do sport 4-5 times a week.

The Journal of Physiology has published a study demonstrating that doing sport three times a week was insufficient. To maintain optimal cardiac health, people should train four to five times a week. The authors observed a hundred of senior citizens and found that those ones who exercised two to three times a week had rigid major vessels. The vessels in those who exercised four to five times a week were healthy and elastic. The state of blood vessels is directly related to cardiac health.

- practice yoga-style exercise

Researchers from Holland advice this system of exercise with ancient roots. Meta-analysis of 37 studies has shown yoga-style exercise to reduce blood pressure and cholesterol levels;

- watch one's hair

Early hair loss and gray hair may suggest predisposition to cardiac disease. Researchers have assessed more than 2000 young men and found higher rates of cardiac disease among those losing their hair. Alun Hughes, Professor of Cardiovascular Physiology and Pharmacology at University College London, notes that hair loss might be a sign of genetic malfunction, which affects the process of ageing;

- taking it easy

Scientists have long ago discovered a connection between stress and the development of heart disease. A recent Harvard study has demonstrated the important role of the amygdaloid complex, an area in the brain responsible for processing of such signals as fear and rage. This structure is sending signals to the bone marrow to enhance production of white blood cells. This in turn causes inflammation in the arteries and may lead to heart attack, angina pectoris or stroke.

Population studies have demonstrated CAD-associated mortality and blood lipid levels to be lower in the populations whose diet was rich in complex carbohydrates and contained little fat. The diet is the principal factor of daily life that influences the development of hypertension. Sodium (found in table salt), excess of energy and alcohol are the main diet-related factors associated with development of hypertension and with a number of other diseases. At the same time, populations with low daily consumption of table salt and with low hypertension rates are simultaneously noted for their high potassium consumption.

We have conducted a survey of patients with cardiovascular disease concerning the presence of main risk factors of cardiovascular disease, such as increased lipids in the blood (cholesterol and triglycerides); dyslipidemia, hypertension and smoking; lack of physical activity; excessive body weight, obesity, unhealthy nutrition, diabetes, hereditary predisposition, hypodynamia and stress.

The results of the survey in 358 patients in cardiac units who had various cardiac diseases have shown the presence of the following risk factors:

- increased lipids in the blood (cholesterol and triglycerides) in 146 patients, which accounted for 40.7% of the total number of cardiac patients;
- dyslipidemia in 75 patients, which accounted for 20.9% of the total number of cardiac patients;

- hypertension in 194 patients, which accounted for 54.1% of the total number of cardiac patients;
- smoking in 83 patients, which accounted for 23.2% of the total number of cardiac patients;
- lack of or significantly reduced physical activity (hypodynamia) in 312 patients, which accounted for 87.0% of the total number of cardiac patients;
- excessive body weight or obesity in 81 patients, which accounted for 22.6% of the total number of cardiac patients;
- unhealthy nutrition in 127 patients, which accounted for 35.4% of the total number of cardiac patients;
- diabetes in 48 patients, which accounted for 13.4% of the total number of cardiac patients;
- genetic predisposition in 171 patients, which accounted for 47.7% of the total number of cardiac patients;
- stress in 335 patients, which accounted for 93.5% of the total number of cardiac patients.

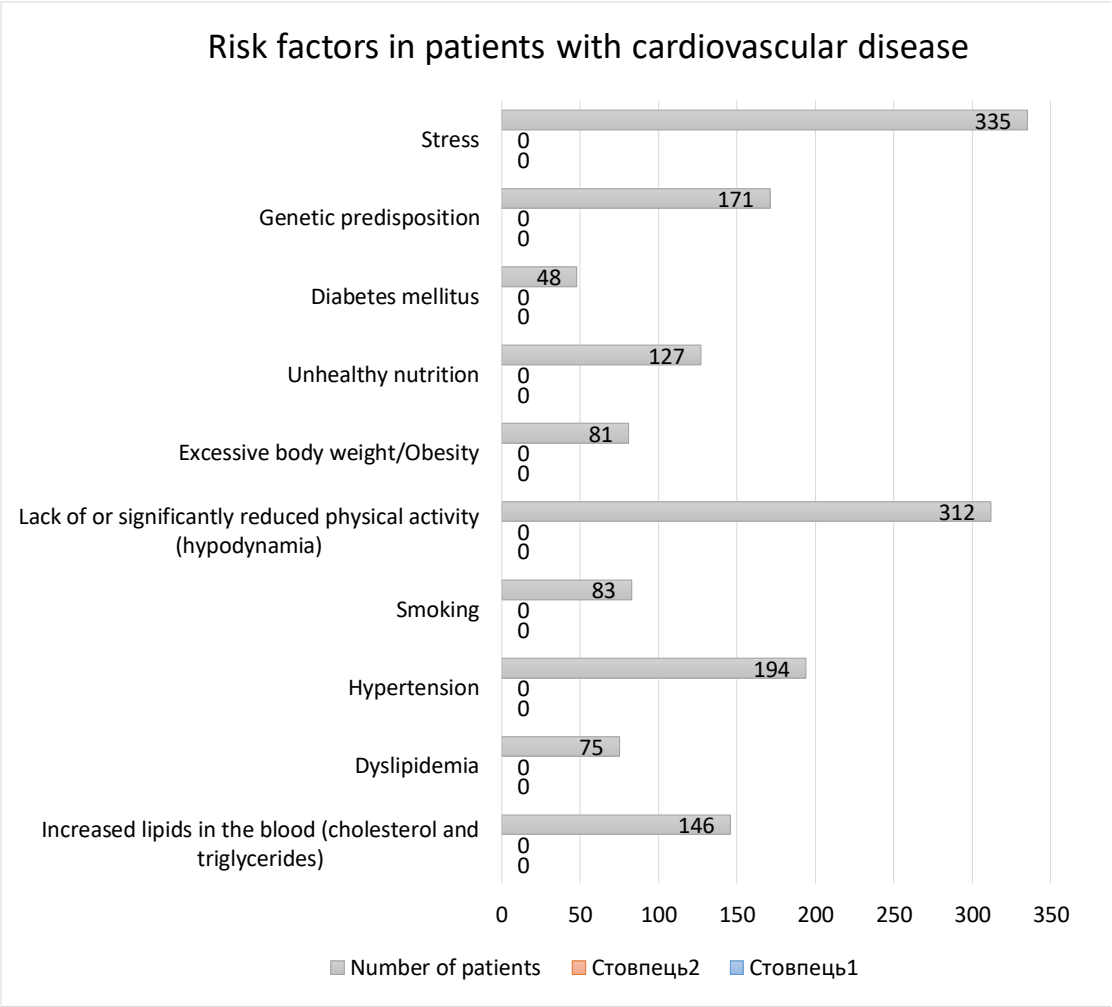


Fig. 6.1. Risk factors in patients with cardiovascular disease

We gave the following dietary guidance to patients in cardiac units who had various cardiac diseases:

- The dietary regimen should include 4 meals a day, with the following distribution of daily caloric intake: breakfast 30%, lunch 40%, afternoon snack 5–19% and dinner 25%.
- The use of easily digested carbohydrates (cakes, pastries, confectionery, sweet drinks, etc.) should be restricted to a bare minimum.
- Consumption of fiber should be increased (“gray” cereals, fruits and vegetables > 400 g/day)
- Limiting consumption of table salt to <5 g/day

- The main direction in management of obesity includes efforts to prevent overeating.

The most effective approach is when the entire family switches to a healthy diet.

It is extremely important to maintain physical activity at a level no less than 150 minutes per week. This includes both attending fitness centers in one's free time and daily physical activity (household chores, gardening, walking or cycling to school or to work, e. t. c.).

We gave the following daily physical activity guidance to patients in cardiac units who had various cardiac diseases:

- use stairs rather than elevator;
- walk to and from the nearest public transit stop;
- walking during the lunch break;
- using a restroom on another floor;
- whenever possible, walk or cycle rather than use public transit or a car;
- clean up and do other household and garden chores (vacuum cleaning, wiping the windows, mowing the lawn);
- deliberately leaving jogging shoes in a well visible place;
- washing the car using a self-service carwash or by hand;
- trying to walk with wider strides and faster than usual.

In this research study, we have conducted educational work in 358 patients of cardiac units with various cardiac diseases and provided them with recommendations on prevention of CVD, told them about the harm of smoking and inactive lifestyle; we also provided guidance on nutrition and on daily physical activity.

# CONCLUSIONS

1. The authors have studied the important aspects of care for cardiac patients and risk factors of cardiovascular disease.
2. The authors have studied the specific aspects of continuing nursing education in cardiology and the work of a cardiac nurse.
3. The authors have defined nursing roles in management of patients with emergency cardiac problems.
4. The authors have investigated the specific aspects of nursing work in issues of diagnosis and treatment of cardiac disease.
5. The authors have determined the specific aspects of prevention in cardiac disease.

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