

Dietary interventions for cardiovascular disease patients

Nursing application

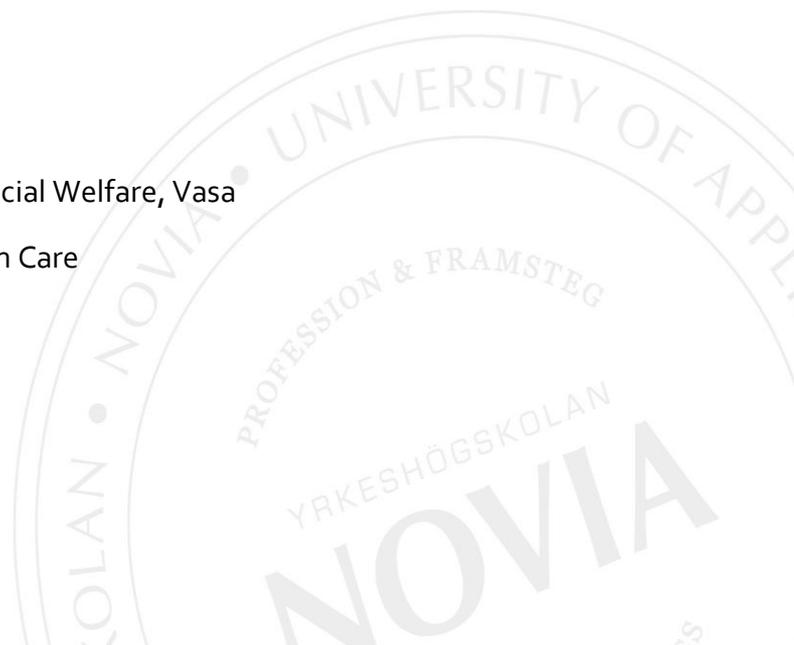
A systematic literature review

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Degree Thesis in Health Care and Social Welfare, Vaasa

Education: Nurse, Bachelor of Health Care

Vaasa 10/05/2019



BACHELOR'S THESIS

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Title: Dietary interventions for cardiovascular disease patients

Date 10/05/2019 Number of pages 59

Appendices 3

Summary

The aim of this thesis was to give a detailed insight about nurses' contributions in caring for nutritional needs of hospitalized cardiac patients. The study method used was deductive content analyses, as illustrated by Elo and Kungas (2007). After careful consideration of the articles used, three main themes were brought up: assessment of nutritional status, methods of intervention and nursing challenges in nutrition. The theoretical background was supported by guidelines from the American Heart Association, World Health Organization, ASPEN (American Society for Parenteral and Enteral Nutrition), BAPEN (British Association of Parenteral and Enteral Nutrition) and Terveystietäminen Finnish Health Portal. The theoretic framework of the study was provided by Pender's theory of promotion and Johnson's behavioral system model.

The findings of this study indicate that nurses nutritional responsibilities are related to assessing the nutritional status using screening tools and documentation. Methods of intervention are described through: education, and multidisciplinary teamwork. Lifestyle barriers, insufficient personnel, knowledge gap and inadequate assessment are among the nursing challenges. This study attempts to encourage new opportunities for nursing research in the field of nutrition. Future studies in understanding nutrition's role in heart patients is necessary.

Language: English Key words: Cardiovascular, nursing interventions, nutrition, diet, cardiac, nutritional support, nurse.

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1. Introduction

Poor nutrition is associated with many premature deaths that could be avoided. Diet, among other lifestyle habits, has been blamed for most disabilities and early deaths worldwide. Cardiovascular diseases (CVDs) in particular, are related to diseases of the heart and of the blood vessels; they are associated with the malfunction of organs that rely on blood supply. Abnormalities of the heart and of the circulatory system kills approximately 17 million people every year (WHO, 2017), which makes heart disease the number one cause of death, over a period of 100 years (Braunwald, 1997). Coronary heart disease, also known as ischaemic heart disease, is the main cause of death worldwide (WHO, 2018).

Comprehensive nutritional studies conducted by scientists such as Campbell Thomas, Campbell Colin, and Ornish Dean, provide in-depth knowledge about CVDs and risk prevention methods. Their findings demonstrate that healthy diet has the capacity to prevent and even reverse heart diseases (Esselstyn, Gendy et al., 2014), (Ornish et al., 1990), (Campbell, 2006). Physicians and nurses alike, are encouraged to provide best care for their patients, by cooperating and involving them in the healing process. In caring for the sick, one must always question why diseases appear, and if the risk could have been hindered. There is plenty of convincing evidence for nutritional interventions in blood pressure and lipid control (Eilat-Adar, Sinai, et al., 2013), (Ravera, Carubelli, et al. 2016), (Mirzaei, Di Biase, Longo, 2016). The most common cause of cardiovascular diseases is atherosclerosis, which is deposits of abnormal fats, cholesterol and other substances that are stored on the inner layer of the arteries (Hever, Cronise, 2017). The behavioral risk factors involved leads to major metabolic changes such as: hyperlipidemia, increased blood pressure, weight gain and hyperglycemia. According to the World Health Organization (2017), the modifiable behavioral risk factors that increase heart disease include: unhealthy diet, tobacco use and physical inactivity.

From a nursing perspective, it is necessary to have a good knowledge of the development of cardiovascular diseases, in order to be able to assess, care and encourage patients to implement dietary changes. Fundamental concepts and background concerning nutrition for patients with cardiovascular diseases will be discussed. Although the circulatory system is affected by different modifiable environmental factors such as: nutrition, stress, drugs, lack of exercise, pollution and chemical exposure, this study focuses solely on the importance of nutrition. Also,

the genetic predisposition will be explored, in order to provide a better understanding of the close relationship between genetic expression and nutrition.

The choice for this subject, came from personal observation of cardiac patients, and the challenges nurses face when caring for these patients. All these increased my interest in studying the evidence-based practices used in caring for the nutritional needs of cardiac patients. The sources for data collection used in research are scientific articles, and the method employed in the evaluation of results, was qualitative content analysis. Basic information about the chosen topic was discussed, and research related to nutritional needs of CV patients analyzed. Main concepts and guidelines were included, in order to lay the foundation for the study. For a more comprehensive insight, a brief description of main cardiovascular diseases and the nutritional risk factors is necessary. Also, international recommendations as determined by competent health organizations was considered.

The purpose of this thesis is to present and describe nurses' role in the nutritional care of cardiovascular patients, and the challenges they face in reaching desired outcomes. The subject will be discussed from a broader perspective, looking more into the international general guidelines, rather than for a certain region. Due to the novelty of the subject, I decided to conduct the research using articles from several countries, which were relevant to the topic. Thus, key elements in treating CVDs from a nutritional approach was identified, which can be applied practically for diagnosed cardiac patients.

2. Aim of study

The aim of this study is to identify and describe nurses' contributions in caring for nutritional needs of hospitalized patients, with a special focus on cardiovascular patients.

What are the nurses' roles and challenges when caring for nutritional needs of cardiac patients?

3. Background

Nurses play an essential part in changing lifestyle behaviors, especially when caring for cardiovascular patients. A powerful tool nurses can use, is related to the education of cardiovascular diseases and the prevention thereof. An introduction of how cardiovascular system works and the types of cardiac diseases is necessary, for a better understanding of the nursing process. In order to distinguish specific roles nurses must fill in, foundational concepts of nutritional assessment and interventions, including recommended diets for cardiac patients is vital.

Usually the impact of nutritional care is disregarded when assessing and diagnosing patients (Glanz, 1997). Physicians rarely refer patients to dietitians for counselling and usually it's the nurses that must fulfill this auxiliary teaching role. Also Karen Glanz, writes about the lack of nutrition education in medical schools, reporting that doctors and nurses alike are inadequately prepared for applying nutrition management or counselling methods (Glanz, 1997). More attention is given on pharmacological treatments and complex medical procedures than on diet (Vetter, 2008). The principles of a holistic caring approach, can be put into practice by knowledgeable, professional and skilled nurses. In the pursuit of providing best evidence-based practices, nurses play an important role in assessing and planning the treatment methods. Educating patients towards healthier choices, improves quality of life for individuals, and their families.

3.1. Overview of cardiovascular diseases

Cardiovascular pathology is a complex scientific area that explores mechanisms of damage to cells and tissues of the heart, or the blood vessels. It also analyses the way the body responds to such damages by repairing injured tissues (Vultagione, Forester, 2012). The pathology of heart disease is an elaborated process that emerges from the interaction between genes and the environment (Talmud, Philippa J., 2007).

According to WHO statistics in 2016 approximately 17.9 million people died from CVDs, which represents 31% of total global deaths (WHO, 2017). Most of these deaths are caused by either stroke or heart attack. In Finland, premature deaths due to cardiovascular disease makes a total of 36% based on WHO statistics in 2016 (WHO, Statistics Finland 2016).

The cardiovascular system involves the heart and the blood vessels. Blood circulates in the system through the blood vessels, which extends to the peripheral tissues and the heart (Li, 2015). The blood vessels are connected to the pulmonary circuit making it possible to transport oxygenated blood to and from the heart (Li, 2015). This process starts and ends in the heart, therefore the blood vessels and the heart are part of the cardiovascular system. When we consider cardiovascular diseases, we take into account the heart and the blood vessels, considering quality of blood and vascular supply through the body. The same author, Robert Li defines that decline in vascular supply leads to three categories: diseases of the heart, cerebrovascular diseases (of the brain) or other diseases in the blood vessels. Consequently, cardiovascular diseases normal activity of the whole organism, not only for the heart or blood vessels (Li, 2015).

It is known that most types of non-communicable diseases including CVD can be avoided by lifestyle modifications, and this is a cost-effective way of treatment (Campbell, 2006). A lot of research has been assigned to identify the risk factors and interventions that could reverse the deadly circulatory blockages. As mentioned already, the main reason for most cardiac diseases is atherosclerosis, which is basically plaque build-up inside the arteries. It is a slow pathological process that develops over the years and can disrupt the circulatory system. A more detailed overview of the risk factors that lead to CVD will be discussed in the next chapter. Cardiovascular diseases have been divided into two main categories: diseases of the heart and diseases of the blood vessels. In his book *'Cardiovascular Diseases'* Robert Li mentions heart diseases including heart failure, congenital heart disease, pericardial disease, valvular heart disease, cardiomyopathy, myocarditis, tumors, arrhythmias, heart attack and cardiogenic shock. While diseases of the blood vessels include: atherosclerosis, lipoprotein metabolism disorder, coronary heart disease (stable angina, acute coronary syndrome), hypertension, cerebrovascular diseases (transient ischemic attacks, stroke, cerebrovascular deformities) and conditions of the aorta, or vascular diseases (Li, 2015).

For a greater understanding, a short description of the most common CVDs is necessary. Main cardiovascular diseases are: coronary heart disease, stroke, heart failure and peripheral vascular disease.

Coronary heart disease

Also known as Coronary artery disease (CAD), is a disease of the heart vessels. It represents the incapacity of the blood vessels to ensure constant transport of oxygen necessary for heart's

function. The deposits on the arterial walls that restrain blood flow are called 'arterial clots'. These clots shrink the arterial walls, they can break and migrate through the body which might lead to partial or complete blood blockages to the heart. This disease progresses slowly over the course of many years and is considered the leading cause of death globally (NIH, 2018). The coronary arteries are filled with plaque build-up which restricts the oxygen supply needed to pump the heart muscle. These built-up clots can completely block the circulation of the heart and heart attacks can occur anytime (NIH, 2018).

Stroke

Cerebrovascular accident (CVA), is produced when there's a decrease in blood flow for few seconds or minutes to the brain, which leads to loss of cells (NIH, 2018). If this blockage takes more than a few minutes there's death of the cerebral tissue. There are two types of CVA: ischemic, due to restriction of blood flow, and hemorrhagic due to intracranial bleeding. Blood clots are usually blocking the arteries causing ischemic strokes, while in hemorrhagic stroke the arteries burst, affecting brain cells. The main risk of cerebral stroke is high blood pressure, due to increased levels of cholesterol in the blood stream. Common signs of a stroke are sudden weakness, numbness or paralysis of the face or limbs, visual or hearing problems and if there is no intervention, there can be considerable brain damage, permanent disability or death (NIH, 2018).

Heart failure (HF)

Commonly known as Congestive heart failure (CHF), occurs when the heart muscle is unable to pump enough blood to supply it's main functions. Preconditions such as narrowed arteries in the heart or high blood pressure, progressively weakens hearts muscles which results in insufficient blood supply. The heart ventricles may become too stiff and unable to dilate when refilled with blood, thus insufficient blood supply occurs (NIH, 2018). The condition evolves over time and can appear in one side of the heart, or both sides simultaneously. Main causes of CHF include coronary heart disease, diabetes and hypertension (NIH, 2018).

Peripheral vascular disease (PVD)

PVD is a disorder of the blood circulation that causes the peripheral blood vessels, arteries and veins to narrow and block, affecting the oxygen supply. Main cause for this can be atherosclerosis (NIH, 2018). These deposits affect mostly the arteries in legs and limit blood

circulation, which increases the risk of heart attack or stroke. The process of atherosclerosis narrows down the arteries, hardens their texture and can even block circulation over time. Infections can appear in the affected limbs because of poor circulation, and in serious cases as gangrene, the leg must be surgically removed. Patients suffering of this condition are often diabetic, which predisposes them to this condition (NIH, 2018).

3.2. Importance of nutrition in CVD

Once with modernization strategies in agriculture, the introduction of food processing and food engineering, most high-income countries have been highly affected by nutrient deficiencies. Right after, followed a global ‘epidemic of chronic diseases’ (Mozaffarian, 2016). Too much saturated fats, high cholesterol, becomes often the cause for cardiovascular diseases. It is estimated that nutrients alone do not influence cardiometabolic diseases to a great effect, but rather the general dietary patterns (Mozaffarian, 2016).

Aside from the prescribed medication treatment an essential aspect in managing and reversing CVDs is lifestyle modification and dietary intake, which alone can reduce most risk factors (Campbell TC, Campbell TM, p. 120, 2006). The medication used to treat heart disease aims to maintain a low cholesterol level, which is known to reduce risk of heart disease (Blesso, Fernandez, 2018). Patients undergoing cardiovascular procedures are at risk for infections and inflammations throughout the body, because complex surgical interventions normally damage vital organs and tissues (Campbell, T.C., Campbell, T.M., p.123, 2006) .

Patients with heart disease have particular nutritional requirements, which must be addressed by healthcare professionals. Dietary nutrients play a vital role in controlling calcium balance in the blood, the metabolic rates and oxidative stress that damages the arterial walls (Cervantes, Llanas-Cornejo & Husi, 2017). WHO’s Global Strategy on Diet, Physical Activity and Health initiated in 2002, states that dietary changes must be advised strictly and specifically and should be addressed at all stages of prevention: primary, secondary and tertiary (WHO, 2002). Switching to a healthy diet will help patients more effectively to manage disease and prevent complications.

3.3 Nurses’ roles in nutritional support

Nurses represent the largest sector in healthcare and are ranked as the most trusted professionals. They interact with patients from different socio-economic backgrounds and have a great influence within those groups. Today, nurses are called to have a vital role in identifying

biological, environmental, and behavioral causes for different diseases and chronic conditions. Since there aren't enough dietitians or licensed nutritionists, nurses must fill the gap to assess and educate patients (Nurse.org, 2017).

The importance of nutrition competency is vital for nurses and patients alike, in order to understand risks and predispositions to diseases related to poor diet. Although nurses are taught basic nutrition courses, it is often not enough when it comes to educating patients about dietary needs according to specific conditions. In today's healthcare system nurses are expected to understand the nutritional needs of patients, and to explain it in a way which is easily understood by patients. As genetic risks and predispositions grow due to poor diet, affecting the individual's health, nurses need a comprehensive understanding of how nutrients work. They must be aware of current theories and research made in this field, as they play an important part in counselling patients about nutrition and lifestyle in general. Discoveries in nutrition reveal mechanisms that supports lifestyle education within the nursing practice by adopting specific therapeutic nutritional interventions. Nurses can raise awareness of CVDs and find ways to reduce incidences through different nutritional interventions and motivational interviews (Perry, Hamilton, et al, 2013). Treatment with statins may show benefits, yet to reduce further complications of heart diseases, dietary interventions are necessary at any stage of prevention (Walker, 2013).

Nurses play a vital role in supporting cardiovascular health, especially in primary prevention (Michalkova et al., 2016). The development of CVD, as mentioned before, is very much influenced by behaviors that can trigger disease, thus nurses can recommend healthy lifestyle before the signs of cardiac disease appear. Healthy lifestyle modification includes: cessation of smoking and drinking, balanced diet made mostly of vegetables, fruits, legumes, nuts and seeds, followed by rigorous exercise routine and avoidance of stress factors (Michalkova et al., 2016). In the process of prevention, nurses educate patients about the risk factors and cooperate with the individuals to motivate them towards healthier options, by providing relevant and updated clinical information. Same source shows a significant long-term lifestyle change, when nurses intervene by assessing current lifestyle and propose actual treatment plans. Thus, interventions planned by nurses were significant even 5 years after the study, compared to the group that did not received any lifestyle education. Compelling evidence provided in the same study made by Michalkova, Sedova, Tothova and Olisarova, suggests that educational interventions provided by nurses, were just as effective in reaching their goals as those performed by medical doctors.

More thorough counselling, in primary and secondary prevention of cardiovascular diseases, is possible with nurses rather than with doctors. Motivational interviewing is encouraged by nurses, as this will create a feeling of comfort and strength towards adherence to medications and nutritional guidelines. Nurses must identify signs of depression as this condition has been linked to development of CVDs (Michalkova, H., 2016) especially in women. About 49% of nurses affirm that nutritional education is a major challenge, as they need to find ways to motivate their patients first. Usually, people with a lower socioeconomic status will disregard risks due to unhealthy behaviors and show great lack of knowledge about health in general (Michalkova, H., et al, 2016).

Although nutritional care in nursing has not been delimited as a specific role, this element is fundamental for recovery and rehabilitation of cardiac patients. The patient's motivation depends greatly on the healthcare professionals' own attitude towards healthy lifestyle.

3.3.1. Assessment of risk factors

Some individuals have a higher risk of developing CVDs than others and this process is dictated by various factors. Modifiable risk factors for heart disease, according to World Heart Federation (2017) include: high saturated and trans fats diet, physical inactivity, tobacco and alcohol use, hypertension, obesity and diabetes mellitus.

Diet affects the way nutrients interact in the body, and the research done about its impact on cardiac disease is alarming. When assessing patients all risks must be observed and documented before starting any treatment or procedure. Analyzing the risk factors is important as it will determine the way the disease will develop and may be possible to prevent future complications (WHO, 2017).

As discussed, atherosclerosis is the cause for many cardiovascular diseases and it can be tackled from a nutritional perspective (Campbell, T.C., Campbell, T.M., 2006). Atherosclerosis can be determined by two ways: first, in the preclinical level where the lesion site can be observed with high resolution imaging, and second when the disease has already developed symptoms of angina pectoris, thrombosis, or sudden death (Getz & Reardon, 2007). The inflammation affects the blood flow in arteries and is defined by build-up of cholesterol, fats and other substances on the inner layer of the arterial walls. High levels of cholesterol has proved to develop atherosclerosis in human bodies (Linton et al. 2015). The main source for high levels of cholesterol is saturated

fats which are not fully digested and are absorbed by the intestinal tract (Campbell, T.C., Campbell, T.M., p.119, 2006).

Obesity is another risk for atherosclerosis, that is defined as a diet disorder due to high fluctuations between energy gain over energy consumption, and is often associated with disabilities, heart diseases and morbidity. Studies conducted suggest that if the Body Mass Index exceeds 30kg/m², the person is at high risk of suffering from cardiovascular diseases (Asnawi, Fauzi, et al. 2014).

Hypertension presents another risk that influences several diseases including atherosclerosis, coronary heart disease or stroke. While risks increase in obese individuals, in those of normal weight the severity of hypertension is less serious. According to studies approximatively 25% of the adult population in the whole world is suffering hypertension (Getz & Reardon, 2007).

3.3.2. Assessment of genetic & genomic information

There are two decisive elements that lead to diseases and they are genetic and/or environmental factors (Tripathy et al., 2011). Genetics is an interdisciplinary area that studies heredity, while genomics studies the structure, function and evolution of genomes (WHO, 2018). The genome is the DNA content present in any cell of the body. Researchers agree that the area of genomics bears no evidence that the genetic sequence alone can regulate development and function of cells in healthy or diseased organisms (Párrizas, 2012). This paradigm reveals the co-dependence between genes and lifestyle. Recently, the interest in the additional information that wraps the human deoxyribonucleic acid (DNA) has increased dramatically, and the main focus now is *epigenetics* which analyses the way external factors affect genes (Charbel, 2014). The study of epigenetics has revealed a number of mechanisms by which the DNA functions, such as *DNA methylation* (Weinhold, 2006) which causes durable, continued transformations in gene expression. In other words, epigenetics acknowledges the environment and determines gene expression (Hatzimichael, Lagos, et al., 2014).

It is commonly accepted and recognized nowadays, that the effects of a healthy lifestyle can influence the genetic mechanisms to diminish occurrence of cardiovascular disease (Alegría-Torres, Baccarelli, & Bollati, 2011). It is astonishing to know that the choices we make and the lifestyle we live can impact gene expression. Some gene expressions in an individual may be acquired, while others may be lost over the life span, and some may be passed on from generation

to generation, depending if the condition is stimulated by the environment. The area of epigenetics changes the perception of how environment, diet and other external factors coordinate gene expression (Alegría-Torres, Baccarelli, & Bollati, 2011).

The innovations in the field of environmental genetics, gives the nursing practice a new understanding of the way genomes and environment impacts human health care (Clark, et al., 2013). Applying this knowledge into practice will open new ways of treatment, and more accurate disease prevention methods. The same author Ashley Clark states that nurses already use epigenetics in research practice in pregnancy and fetal development, brain injury, cardiovascular diseases, metabolic syndrome and is mostly applied in cancer patients. For instance, only 5% of cancers are genetically inherited, meaning only 5% is written in the DNA, the rest of 95% of cancers are activated during lifetime through epigenetics (Bassel & Arock, 2015).

Combining biology, genomics and health has opened the possibility of applying genomic technology to nutrition (Murgia & Adamski, 2017). Since the Human genome project was completed in 2003, research reveals strong associations between nutrients and genes, especially when dealing with major chronic diseases, such as CVDs (HGP, 2018), (Murgia & Adamski, 2017). The mechanism at cellular and molecular level emphasizes that diet and diseases are interconnected. Practicing genetics science into nutrition is needed, in order to increase programs that support prevention and management of chronic diseases through nutritional interventions.

In the 21 century, technology started taking over healthcare and new scientific discoveries about nutrition proved beneficial outcomes through environmental factors, also known as *epigenetics*. The definition of *epigenetics* involves regulation of all inherited gene expression including those independent of DNA sequences (Charbel, 2014). In other words, gene expression depends on the environment and nutrition has a strong impact in this relationship.

The potential of manipulating epigenetic gene regulation using environmental factors as diet is increasing, and nursing knowledge must be updated with the new existing technologies in order to understand the mechanisms of diseases (Clark, Adamian, Taylor, 2013). Nurses must educate patients and their families about the science of epigenetics, the treatment choices and the evolution of dietary behaviors in the development of cardiac diseases (Clark, Adamian, Taylor, 2013). The nursing knowledge is strongly related to other disciplines, thus nurses are assigned different roles and one of them is to integrate epigenetics into clinical care. Nurses are considered

to be the most effective personnel to translate the epigenetic research in caring for their patients by explaining the risk factors and the necessity of different tests, screenings in addition to the treatment choices. In improving the patient's outcomes nurses must promote healthy options, educate and empower patients to manage diseases using evidence-based knowledge (Clark, Adamian, Taylor, 2013).

The nutritional approach is relevant to nursing science, as it shows a close connection with the individual and seeks to transform factors that affect wellbeing (Getz & Reardon, 2007). Long before the study of human genome started, nurses always had a tendency to incorporate social and environmental components in their caring plan that would benefit the wellbeing of the individual. A good example is Florence Nightingale's work on the usefulness of a healthy environment when treating patients (Berman & Kozier, 2008).

Old practices in health care underestimates the importance of the dietary factors when addressing complex chronic diseases. In the past, the genome was considered to be an unchangeable pattern for the phenotype. Today, we know that the environment plays a vital role in 'twisting' genes by stimulating *epigenetic modifications* (Fatimah, Jackson, Niculescu, Jackson, 2013). The same authors have concluded that signs of chronic cardiovascular diseases begin earlier in life being influenced greatly by environment interaction. Considered to be part of the holistic approach that requires interdisciplinary collaboration, nutrition is a growing discipline that strives to provide individualized patient-centered care and elaborate prevention strategies (Laur, Valaitis, Bell, & Keller, 2017).

3.3.3. Nutritional assessment by nurses

A person can eat plenty of foods but may still lack important nutrients necessary for daily optimal function. A diet rich in nutrients includes vitamins, proteins and minerals. People might be unaware of their risk condition, and healthcare professionals must advise screenings to detect factors leading to CVDs, such as: high blood pressure, abnormal blood lipids and high glucose level in the blood. Often nurses must assess the patients themselves and must document important facts about habits and food preferences. Healthcare professionals, including nurses, must educate patients about lifestyle and dietary changes, rather than just medical interventions or drug use (Perry, Hamilton, et al, 2013).

Nutritional assessment is a continuous process of gathering data and interpreting them, in order to develop appropriate care plans for each individual, whether inpatient or outpatient. In a clinical setting, nutritional assessment also consists of physical examinations, which are more adequate than the serum markers, showing the protein consumption (VanBlarcom, McCoy, 2018).

The American Society of Parenteral and Enteral Nutrition (ASPEN), developed a nutrition bundle tool to support health care professionals in administering adequate nutrition for hospitalized patients. The nutritional therapy involves: maintaining body mass, supporting the immune system and avoiding major metabolic complications. The nurses doing the assessment must acknowledge the medical history of the patient and report any gastrointestinal diseases, drug or alcohol abuse or increased metabolic rate, that means more nutrients are necessary to heal (ASPEN, 2018).

Similar to the one in the United States, the British Association for Parenteral and Enteral Nutrition (BAPEN), defines the nutritional assessment process as having the following components: *anthropometry* (body mass of bones, water and fat); *biochemistry* (blood tests that measures the function of vital organs such as kidneys or liver); *clinical* (e.g. heart failure raises the chance of malnutrition due to high energy requirements and low energy intake); *dietary* (establishing the energy requirements needed, including water intake and estimation of calorie intake); and *environment* (capacity to shop/cook/swallow) (BAPEN, 2016).

A nutritional assessment includes:

Physical examination and medical history – necessary in identification of any nutritional problems or other diseases, drug abuse, and establishment of the metabolic rate. All these helps set the protein and caloric needs (BAPEN, 2016).

Anthropometric measures – measurement of height, weight, waist and mid-upper arm circumference, skin fold thickness and body mass index (BMI) [Kg/m]. Usually this can be observed by seeing loose clothing, poor fitted dentures or bony features (BAPEN, 2016).

Eating habits – questioning or interviewing the patient about the eating patterns to determine the amount and quality of food and fluid intake. Minimum fluid intake for proper functioning required under 60 years is 30ml/kg of body weight, while over 60 years 35ml/kg body weight (BAPEN, 2016). Studies suggest that drinking enough water reduces blood coagulation resulting in less chest pains (Jang, Cheon, et al., 2016).

Biochemical essays – blood samples are taken for glucose plasma concentration, total cholesterol levels including HDL/LDL. Biochemistry tests will indicate any abnormal function of kidneys or liver. Tests taken include: haemoglobin, albumin, CRP, WCC, HbA1c, Na, Ur, Ca, Mg, micronutrients (BAPEN, 2016).

Malnutrition is often overlooked in the hospital setting, and is left untreated which poses cardiac patients at a great risk (Bonilla-Palomas, et al., 2016). A new nutritional guideline proposed by VanBlarcom and McCoy in 2018, underlines the association between malnourished patients and infections, pressure injuries, prolonged mechanical ventilation, anemia, depressed cardiac and respiratory function and increased risk of mortality. All these increase the hospitalization time and the healthcare costs. Nutritional support in hospitals includes two aspects: nutritional assessment and intervention. The intention of these guidelines is to assess malnutrition early and initiate intervention, with parenteral nutrition preferred over the nasogastric tube. Implementing a specialized nutritional plan will help provide proper nutrition for hospitalized patients and prevent cardiac complications (VanBlarcom & McCoy, 2018). According to the same study, more than half 40-60% of patients that were admitted into the emergency unit have some sort of malnutrition. Usually, it is the nurses' duty to assess patients and identify nutritional risks involved, in order to prevent long-term complications.

These nutritional screening tools help nurses detect which patients are most vulnerable to inadequate diet, and could benefit from nutritional interventions. Once the problem is identified the nurse can refer patients to dietitians and other healthcare members. Malnutrition for hospitalized patients is assumed when 2 or more conditions are observed: weight loss, inadequate calorie intake, loss of muscle mass and subcutaneous fat, and weak handgrip (VanBlarcom & McCoy, 2018), (Ettema, R., Schuurmans et al., 2015). Thus, nurses have a key role in identifying patients at risk for complications and implement interventions prescribed by specialized healthcare personnel.

3.3.4. Nursing education and referral

Patient education concerns: knowledge of risk factors including hypertension, diabetes mellitus, obesity, dyslipidemia, also prevention measures such as: balanced diet with reduced fats and salts, regular blood pressure monitoring and routine check-ups for those with a high risk of developing diabetes. Cardiac arrhythmias or palpitations, appear commonly as signs of caffeine abuse, thus nurses must identify and educate towards reducing caffeine products. When nurses

monitor the vital signs of cardiac patients, they also keep an evidence of the liquids consumed and those eliminated, in order to prevent constipation (Vacariu, 2012). Also, daily weighting of the patient is recommended. The general diet must be low in sodium, hypocaloric, liquids ingested in 24 h must be between 1.5-2l, with 4-5 meals/day, the last meal being served at least 3 hours before bedtime (Vacariu, 2012).

Nursing practice develops not only through nursing research, but also from integrating borrowed knowledge from cellular, biological, molecular, and other medical sciences and technologies used in clinical medicine (Anderson & Monsen, 2014). Professional nurses need to use nutritional knowledge in patient care, as part of nursing interventions. Common effort is needed on the part of different experts such as: nurse educators, dietitians, public health nutritionists and physicians in order to improve the caring process and the health outcomes for patients (IOM, 2000). A study assessed the nutritional knowledge level of medical staff, including nurses (Abdollahi, Houshiarrad et al., 2013). Evidences showed that nurses lack clinical nutritional knowledge, and that continued education should be encouraged. Although there is a lack of academic nutrition education in medical schools, nursing included (Glanz, 1997), it is important to understand current nutrition research and apply it in nursing practice for the benefit of patients.

Among several teaching methods used, motivational interviewing has been recognized as an effective tool employed by nurses, and not only. Motivational interviewing was defined as a 'directive, client-centered counseling style for eliciting behavior change by helping clients to explore and resolve ambivalence' (Holli, Beto, p.140, 2018). In other words, it's a self-motivating technique that helps change behaviors that affect well-being. Originally, this type of education was used to change addictive behaviors, but now is applied to different behaviors. Clinical results of patients suffering from heart disease and diabetes, have shown improvements in reducing cholesterol, blood pressure, and weight loss, by applying motivational interviewing (Holli, Beto, p.141, 2018). This is an effective method to change conflicting thoughts that may be seen as obstacles, and increase motivation towards achieving goals.

Some cardiac patients, may be referred to cardiac rehabilitation programs, which are special medically supervised programs intended to improve health outcomes after heart attack, heart failure, open heart surgery, or angioplasty. The plan of cardiac rehabilitation proposed, requires 3 components: exercise, education for healthy lifestyle, including: alcohol, smoking cessation, healthy eating, and at last -counselling to reduce stress and anxiety (American Heart Association,

2019). Studies recommend that more patients should be referred to these programs, in order to improve quality of life and even prolong life (Kweon, Sohn et al., 2017), (Sumner, Harrison, Doherty, 2017).

Nurses working in cardiac rehabilitation programs, whether hospitals, or in specialized centers, have nutritional counselling as one of their responsibilities. This is done to help patients understand the health risks of food choices, in relation with recovery from illness, or surgeries. Although, this role is often entrusted to dietitians or specialized nutritional counselors, nurses many times contribute in the exchange of information and making sure patients understand the information (Mampuya, 2012).

3.4. Recommended dietary guidelines

Diet is the most important environmental factor that has a major effect on hypertension (Getz & Reardon, 2007). Dietary changes may seem to be most difficult to implement for heart patients, as it is deeply entrenched in culture and is part of a persons' self-identity (Holli, Beto, p.5, 2018). Implementation of nutritional therapy must be shaped according to the current guidelines, which usually come from randomized controlled trials with high level of evidence. Dietary assessments are objective elements that provide critical information about certain behaviors (Hu, Satija, et al., 2016).

Authorities have entrusted the development of nutritional guidelines to healthcare professionals, yet most of these guidelines are directed to the overall healthy population, and does not necessarily target specifically CV patients. Patients with cardiac diseases have specific nutritional deficiencies that must be supplemented. For instance, vitamin B (thiamine) is essential in daily gastrointestinal absorption, but in patients with heart failure there is an obvious thiamine deficiency which negatively affects the immune system. Thus, proper myocardial nutrition can prevent heart failure (Allard, Jeejeebhoy, et al., 2006), (ESC, 2016).

Due to the high incidence of non-communicable diseases and malnutrition, including overweight, the European Food and Nutrition Action Plan was introduced to help citizens have healthier diets. The plan is designed for all WHO European Region for the time period 2015-2020, and it influences governmental and health policies. The intention of the WHO's Regional Committee for Europe, is to make changes in promoting healthy foods and making them available to all people, thus reducing existing health inequalities. This is an important European

strategy to prevent diseases by providing a motivating environment that supports healthy diets. Among the measures taken into account is limiting advertisement of high energy foods, trans-fats, saturated fats, sugar, salt, and promoting instead healthier foods. Also, governmental collaboration is encouraged to facilitate healthy foods in hospitals, schools, kindergartens, workplaces and other institutions. Improving patient nutritional skills is a necessary component, which will enable individuals towards dietary adherence. The European Food and Nutrition Action Plan has a great impact in the prevention of cardiac disease and extends to hospital services (WHO, 2014).

Costs for cardiovascular procedures are exorbitant and patients undergoing these interventions do not benefit on a long-term. In fact, according to a randomized controlled trial, stents and angioplasties in patients with stable coronary artery disease, do not increase lifespan nor prevent future heart attacks (Booden, O'Rourke, Teo, et al. 2007).

Dietary interventions can reduce the risk of CVDs, but there are not many recommendations by healthcare professionals in this direction (Glanz, 1997). A healthy diet is recommended for all cardiovascular patients in order to maintain and control cholesterol levels, body weight, blood pressure and avoid future complications. The recommended intake of food should be lower than normal and dietary fats should be decreased or even eliminated. Fats affect the blood lipid levels, the blood pressure, thrombosis, and the inflammation in the body, putting the patient at a higher risk of developing cardiovascular diseases (Campbell TC, Campbell TM, p.117, 2006).

Scientific data proves that certain diets can diminish the risk of cardiovascular disease, such as fruits, vegetables, legumes, whole grains, nuts and seeds, while other diets high in sodium, saturated, trans and solid fats, sugars and refined grains can increase it enormously (Freeman, Morris, Barnard, et al. 2017) (see Figure 1.).

Evidence for Cardiovascular Health Impact of Foods Reviewed		
Summary of heart-harmful and heart-healthy foods/diets		
Evidence of harm Limit or avoid	Inconclusive evidence for harm or benefit	Evidence of benefit Recommended
Coconut oil & palm oil are high in saturated fats and increase	Sunflower oils or other vegetable liquid oils	Extra-virgin olive oil consumed in moderation reduces CVDs
Eggs have a serum that raises cholesterol level	High-dose of antioxidant supplements	Strawberries and blueberries (3times/week) increases the protective antioxidants
Diets including fats, oils, eggs, fried foods, meats and organ consumption, sweetened beverages	Gluten products	Nuts consumption (30 g/day) Green leafy vegetables daily reduce heart disease Plant-based proteins are preferred over animal-based proteins

Figure 1. (Source: Freeman, Morris, Barnard et al., 2017)

Evidences show that certain foods contribute greatly to the development of cardiovascular diseases. Adequate daily amount of protein is a necessity for cardiac patients as the American nutritional guidelines suggests 1.2 to 2.0 g/kg/day (VanBlarcom & McCoy, 2018). It is important to identify good sources of protein, without increasing the risks. Meat protein has been identified as a major risk factor for heart disease, while plant-based protein from nuts, has been associated with a significant decrease in cardiac events (Bernstein, Sun, et al., 2010), (Micha, Shulkin, et al., 2017).

The national recommendations in United States and in the European Association of Cardiology approves and promotes following diets: 1. the American Heart Association diet; 2. the Mediterranean diet; and 3. the healthy vegetarian diet. Nurses ought to be informed about these recommended eating patterns and promote them to patients at risk (Freeman, Morris et al., 2017), (ESC, p.2348, 2016).

1. *The American Heart Association diet*

This recommended diet is advised for people already suffering from cardiovascular diseases. This diet was developed by the American Heart Association and is based on vegetables, fruits, whole grains, fish, foods low in trans and saturated fat, legumes, low-fat dairy products, limiting salt intake to 1,500 mg a day and limiting sugar products (AHA, 2015).

2. *Mediterranean diet*

This diet comes from a region bordering the Mediterranean Sea and it includes dairy products, fish, poultry, fruits, vegetables, grains, legumes, nuts and seeds, olive oils and wine in moderate amounts. This diet is very similar to the American Heart Association diet with a less amount of red meat (Freeman, Morris et al., 2017).

3. *The healthy vegetarian diet or Plant-based diet*

This diet involves eating whole plant-based foods and is well-known for its outstanding health benefits. Unlike other diets, plant-based diets exclude the use of any animal products. The protein quality found in whole plant-based foods like vegetables and legumes is superior to the protein contained in meats, eggs or dairy products. The benefits are derived without containing harmful fats and sodium (Freeman, 2017). All fruits, legumes, vegetables, whole grains, nuts and seeds contains essential amino acids, which are later converted into proteins, minerals, vitamins. All these nutrients are vital for healthy heart function. For better recommendations, a study of comparison was made in 2017 analyzing the health outcomes of AHA diet and a plant-based diet (Shah, Ganguzza, et al. 2017). This study aimed to compare the two diets by taking into account the inflammatory and glucometabolic profiles of patients with coronary artery disease. Results showed improvement of patients' outcomes, and CRP levels in those following a plant-based diet were 20% lower than in patients following AHA diet (Shah, Ganguzza et al. 2017).

3.4.1. Nutritional guidelines in Finland

According to the Finnish Cardiac Society (2016) the number of cardiac procedures have increased greatly from previous years. The main interventions are: coronary angiographies (29.126), percutaneous coronary interventions PCIs (12.911) and primary pacemaker implantations (4.859).

Using the evidence based guidelines from Finland, the author obtained useful findings about treating heart diseases. The results found recommends multidisciplinary cooperation when managing heart diseases through: nutrition, patient counselling and education. Clinical evidences show that addressing dietary interventions, proved to greatly decrease hospital readmissions. However, the most efficient methods were the ones using follow-up plans (Terveysportti, 2007).

Common for northern countries is the insufficiency of vitamin D and prophylactic use of supplements, which must be added to the diet. Strong association has been found between vitamin D deficiency and CVD including, ischemic heart disease, heart failure and hypertension (Judd & Tangpricha, 2009). The risk for sudden cardiac death is significantly increased in patients already diagnosed with some cardiac diseases. Studies made in the UK by Grimes, Hindle and Dyer (1996) also investigated the connection of the latitude influence over heart diseases. They have concluded that indoor activities increase the blood cholesterol while in southern countries, where outdoors activities can be made, decreases the cholesterol. The same study suggests that incidences of ischemic heart disease proved to be inversely proportional to the days of sunlight. Another study from Scotland considered the effects of lack of sunlight in coronary heart disease, and found a consistent pattern showing high rates of CHD in wintertime when vitamin D levels are minimal (Douglas, Dunnigan, et al. 1995). Therefore, epidemiologic findings suggest that there's a strong link between CVD and vitamin D deficiency. Thus Finnish national guidelines recommends the supplementation of vitamin D, especially for children, immigrants, elderly people and patients with systemic diseases, as a protective factor for lowering risk of cardiac complications (Terveysportti, 2018).

In patients with pre-established CVD, having serious deficiencies of Vitamin D who went for coronary angiographies, had a 5 times higher risk to die of heart failure or sudden cardiac death within the next 7 years (Pilz, März, Wellnitz, 2008).

3.4.2. Implementation of dietary guidelines by nursing practice

After discussing all the scientific evidences of having a healthy diet for patients suffering from cardiovascular diseases, it is interesting to know whether nurses apply this information in their everyday practice. Depending on the policy of the institutions nurses work in, their practice is highly influenced too. Knowledge about the long-term effects of certain foods, supported by evidence-based practice, increases the motivation to make healthy dietary choices.

Although, clinical evidences for following special diets for cardiac patients are indisputable, yet in order to gain acceptance in healthcare, many other regulations must fall into place (Mozafarian, 2016). Macrolevel changes have to be made such as: changes in the governmental policies that control the healthcare system, unity of clinical support promoting the beneficial outcomes, efforts for behavioral change encouraged by authorities in schools, workplaces, and the food system to target prevention (Mozafarian, 2016). Due to the multitude of changes that must be implemented, in order for a healthy diet to be recognized and promoted in hospitals and medical centers, the process is delayed. Only private institutions: such as rehabilitation centers for CVDs have a faster decisional process, and most of them do recommend eating a vegetarian /plant-based diet for their patients. Most patients that are hospitalized, still continue to eat unhealthy foods even at the ward, and carry on this lifestyle in spite all recommendations. Dietary adherence for heart patients, occurs usually to patients that are referred to specialized cardiac rehabilitation clinics. The health expenses from cardiovascular diseases rises alarmingly every year due to poor nutrition, yet no decisive steps towards solving this issue are made. Despite the fact that nutrition science has progressed amazingly, the healthcare system still lacks support in implementing required changes (Mozaffarian, 2016).

Evidence-based medicine (EBM) as the name also implies, means making clinical decisions after carefully considering the evidences (Burns, Rohrich, Chung, 2011). In everyday practice, physicians and nurses alike, are encouraged to examine evidences when taking clinical decisions. In regard to nutrition, it seems there are no real boundaries and no consensus towards following a certain, established pattern.

5. Theoretical Frameworks

'The systematic accumulation of knowledge is essential to progress in any profession... however theory and practice must be constantly interactive. Theory without practice is empty and practice without theory is blind' (Cross, 1981, p.110).

A theory contains complex hypothetical components derived from real situations to communicate about a pattern (Reed, Shearer, et al., p.29, 2011). Nursing theory is a process that entails several activities and consists of four different sequential phases applied to practice: examining concepts, constructing, testing and validating relationships. The nursing theory is also known to be a product providing concepts that may be connected to define, characterize and

portray an idea of concern. All these informational concepts and relationships are applied in the nursing practice system (Kenney, 2013).

The nursing theory behaves involuntarily to educate nurses' practice and research (Reed, Shearer et al., p.28, 2011). The nursing knowledge came into being as a result of science, philosophies, practices and theories that shaped the nursing practices (Reed, Shearer et al., p, xvi, 2011).

5.1. Theory of promotion

"I committed myself to the proactive stance of health promotion and disease prevention with the conviction that it is much better to experience exuberant well-being and prevent disease than let disease happen when it is avoidable and then try and cope with it" (Pender Nola, 2008).

The main goals of nursing is to help people in acute situations and guide them to care for themselves. The health promotion model theory by Nola Pender (Alligood, p.329, 2018), sees health knowledge greatly influencing the quality of life, from birth until death. Although not appreciated enough, health has much to do with how people relate to it and the thoughts that motivates certain behaviors. The theory stands for preventive health behaviors as individuals make decisions regarding their own health, and the way this impacts the nursing practice.

The health-promoting behavior is the end outcome, where the patient is guided towards well-being, and overall healthy living, and this could be attained by 'healthy eating, exercise regularly, managing stress, gaining adequate rest and spiritual growth, and building positive relationships' (Alligood, p. 327, 2018). People tend to create conditions of living that *'expresses their unique human health potential'* (Alligood, p.329, 2018).

Nola Pender proposes fourteen theoretical assertions: 1) prior behavior usually dictates present and future health-related outcomes; 2) the individual recognizes the need for change and engages in behaviors that personally benefit him/her; 3) identifying the factors that are perceived as barriers in improving behaviors; 4) commitment to certain beneficial behaviors are achieved by individuals who acknowledge their competences; 5) the greater the acknowledgement of competencies are the less barriers a person perceives; 6) a positive effect of a behavior means more confidence towards specific health behaviors, that increases positive effect; 7) relating positive emotions to behaviors results in commitment through actions; 8) individuals are willing to adapt to change if their actions are assisted and encouraged; 9) when promoting healthy behaviors the individual is influenced by family members, friends and healthcare professionals; 10) the commitment in the health promoting behavior is affected greatly by situational factors;

11) deep interest in commitment to healthy behaviors ensures a long-term behavioral pattern; 12) in order to benefit health-promoting behaviors one must identify the barriers over which the individual has no control; 13) commitment to the initiated plan must not be overshadowed by other more desirable actions, that have a different behavioral result; 14) the individual feels motivated enough to change the physical environment and adjust psychological factors in order to generate solid actions towards reaching the goal (Alligood, p.403, 2018). All these beliefs are comprised in the human nature, considering also the environmental interactions, all necessary to achieve health.

As nurses it is important to educate patients how to care for themselves and even assist in improving their long-term health. Aside from caring for immediate needs of the patient, a nurse must look beyond the present situation and direct individuals as to how they can benefit by changing their attitudes and behaviors in order to maximize the human potential (Alligood, p.403, 2018). This theory is a great mechanism for nurses to understand health behaviors and promote healthy lifestyles.

5.2. The behavioral system model

The behavioral model theory was developed by Dorothy E. Johnson and it brings a great contribution to the nursing practice. The major goal of this model is to bring stability and help individuals gain optimal health outcomes by improving certain behaviors (Alligood, p.337, 2018). According to this theory, nurses are the main forces that can direct patient's behavior towards better health options. The behavioral system entails repetitive patterns that reveal a certain way of behaving. It is important to define the behavioral patterns as these can contribute as barriers limiting the interaction between the person and the environment (Alligood, p.334, 2018). Usually, a person develops a certain behavior because it gives a certain stability by adjusting and adapting to different behavioral patterns, yet it can still be vulnerable and flexible to accommodate new influences (Alligood, p.334, 2018). The theorist was influenced greatly by Florence Nightingale's notes on nursing and distinguished the role of the nursing profession from other medical professions as focusing on the person and not on the disease. The approach led Dorothy to bring into light the need not only for caring for the person, but also prevent them from becoming sick. Prevention of illness, according to this theory, is vital not only for healthy individuals but also during and after being diagnosed with disease. The behavioral model empowers the individuals 1) to behave in an way acceptable by society; 2) can modify behaviors in order to aid the biological needs; 3) to benefit from the skills and knowledge of the healthcare

professionals during illness; and 4) to behave in a way that will not worsen the disease by further complications (Parker, p, 24, 1990).

Dorothy's basic behavioral system is composed of 4 distinct components: first is the individual's drive- meaning the desire to do certain actions; second is referred to the predispositions to act in particular ways. The third component is made of the amount of choices available to the individual at that particular time. The fourth and last component consists of individual's observed actions that reveal a patterned behavior (Parker, p. 27, 1990).

The utility of the Johnson's theory proved to be beneficial in different clinical settings whether inpatient, outpatient, community settings or in nursing administration (Alligood, p.340, 2018).

When integrating the behavioral model into practice is taken into consideration the person's behavioral system seven different subsystems: the achievement, attachment-affiliative, aggressive-protective, eliminative, ingestive, dependency, and sexual subsystems. Achievement subsystem- tries to change the environment to benefit the person. The achievement behavior involves creativity, physical strength, social and intellectual abilities (Alligood, p.335, 2018). Attachment-affiliative subsystem- represents the foundation for all social organizations and gives a sense of security and survival. The outcomes are social inclusion, social bonding and intimacy (Alligood, p.334, 2018). Aggressive-protective subsystem – the role of this subsystem is self-protection and preservation of one's property. The primary thought of anger is harming others, thus the aggressive behaviors entitles the society to enable the individuals in developing protecting mechanisms (Alligood, p.335, 2018). Eliminative subsystem – evaluates the output considering how often and the circumstances of elimination. The behaviors of eliminative and ingestive subsystems are both strongly related to the social, psychological and biological status (Alligood, p.335, 2018). Ingestive subsystem – a special concern must be paid to the input of the food taken into the body. It should be considered what foods are ingested, how much, what quality and the frequency of meals. Johnson correlates the behavior with the psychological, social and biological status of the person (Alligood, p.335, 2018). Dependency subsystem – this subsystem develops a 'helping behavior that calls for a nurturing response'. The expected results are acceptance of need, attention and physical support. The dependency behavior progresses from total dependency on others to self-dependency. Interdependence is an important link in maintaining healthy social relationships (Alligood, p.334, 2018). Sexual subsystem – this last component of the behavioral system has the role to procreate and mate and has an impact on the

individual's identity (Alligood, p.335, 2018). All these subsystems are interrelated and entail many behavioral aspects in themselves. The motivational desires are strongly dependent on the psychological, social and biological factors and can modify depending on experiences or outward requirements (Alligood, p.334, 2018).

6. Research methodology

The Research Methodology section of this study describes the characteristics of a systematic literature review and the content analyses method of research. Different methods of using content analyses are discussed. However, for the current study the deductive content analyses mechanism was applied.

Qualitative research has increasing interest in nursing, because it has proven to synthesize large amounts of information into smaller bodies and aims to respond to certain research questions (Sandelowski, Barroso, p.1, 2007). The data collection and analysis of this study was done by using a literature review study method, where the respondent presents examples of nurses roles and challenges to improve nutritional outcomes. The principles of article selection, included nutritional interventions for patients at risk, control of disease and probability of reversal. Specific exemplifications are provided that reveal how nurses can successfully prevent disease, or lessen symptoms, by careful consideration of patient's diet.

6.1. Systematic literature review

The respondent used systematic literature review method to collect and to critically analyze data. A systematic review is considered to be a research study method that assembles and analyses multiple studies, articles and other relevant papers. Usually, researchers will use methods that are predetermined before they structure the questions. Often used in health interventions, this method plans to provide a complete summary of present relevant literature to the research proposed. It is an essential method of research in evidence-based practices. Some systematic reviews analyze quantitative or qualitative studies. Using the systematic literature review, the respondent will summarize information in the field of clinical nutrition to answer the study's aim (Polit & Beck, p.674, 2012).

Systematic literature review method is significant for research as it identifies previous written research about the topic concerned, also it reveals existing research patterns by collecting observational findings linked to a precise research question that is sustained by evidence-based

practice, thus creating new theories and frameworks. The process of collecting relevant findings helps provide a solid knowledge foundation for practitioners that need guidance in decision-making practice, recognizing also subjects that require further examination (Pare, Trudel, Jaana & Kitsiou, 2015).

The problem definition proposed will be discussed by analyzing 10 relevant, up to date research articles. The methodological process of the systematic literature review study has a qualitative approach. Qualitative research in general, represents a social inquiry and its main purpose is to grasp, explain and interpret the way people understand social phenomena in ways of behaviors, feelings, and experiences (Holloway, p.3-4, 2017). The literature review is defined as an exhaustive study of research and scientific papers according to the study question inquired in the beginning, by analyzing and interpreting relevant findings. When engaging in a literature review it is vital to utilize primary sources of the articles and avoid secondary sources that are considered to be opinion articles, or case reports (Polit & Beck, 171-172, 2010).

6.2. Content analysis

An important method used in describing qualitative material is by textual analyses, known as content analysis. Content analysis method classifies the material into ‘a coding frame’ that is accessible for examination (Schreier, p.1, 2012). This means the researcher sets main categories, and then counts instances that fit into each proposed category. The condition is that categories must be accurate, in order to allow several coders to fall into the same results when the text is analyzed (Silverman, p.123, 2001).

Using content analysis ensures validity and reliability of the research made, as other researchers also employ the same method. While this approach is very useful in organizing data, some flaws are observed where the created ‘conceptual grid’ can leave out important aspects that do not fall into the main specified categories (Silverman, p.123, 2001).

Qualitative content analysis is used to describe and interpret material that does not provide an obvious answer and further analysis is needed, requiring some degree of interpretation from the researcher’s side (Schreier, p.3, 2012). The text is examined according to the research question presented and aspects unrelated to the topic will not be considered. The content analysis will always take into account the following stages: setting a research question, gathering material, deciding a coding frame, also known as dimensions, that contains main aspects of the text and is

relevant to the question proposed, and unto each dimension other subcategories are assigned to describe the less visible aspects (Schreier, p.5, 2012).

Another plausible definition for describing content analysis is ‘method of analyzing written, verbal or visual communication messages’ followed by interpretation of the given results (Elo & Kyngas, p.107, 2007). Simply known as a method to analyze documents, content analysis has been originally applied to analyze advertisements, hymns and political speeches, and is now being used widely in the area of research, nursing including. This method, gathers data and then narrows down the relevancy of the results into condensed information, and resumes large documents into few ideas that are classified by categories. These categories consist of similar phrases, words and ideas (Elo & Kyngas, p.109, 2007).

The main goal of using content analysis is to provide a condensed description of a phenomenon in order to improve knowledge and everyday practice. The process of gathering concepts and categories is vital when sorting for relevant information. Opinions on content analysis are shared and critics will either consider this method deficient and simplistic, without having elaborated guidelines to the unskilled analyzer, while others complain about its complexity. The reality is that the researcher usually decides how complex or simple the analysing process will be. In nursing research, the content analysis method is considered to be a reliable way to identify and describe ‘meanings, intentions, consequences and context’ (Elo & Kyngas, p.109, 2007).

Content analysis method can employ qualitative or quantitative data, which can be analyzed inductively or deductively, depending on the direction of the study. For example, if there’s a lack of knowledge about a specific phenomenon then an inductive way is advised, while if there’s a solid foundation of previous studies, then a deductive method is applied. The deductive approach has a specific tendency to narrow down the focus of the study, while on the opposite -the inductive way has the capacity to generalize information, without getting into details (Elo & Kyngas, p.109, 2007).

The deductive analysis process has three important phases: preparation, organizing and reporting. The preparation phase starts with selecting the units to be analyzed and deciding what should be considered, and this can be achieved by setting a word or a theme. Organizing data must be made clear by using coding with special attention to manifest content and latent content. The purpose of latent content is to identify those silent themes that are less visible, to bring new ideas or even explain certain phenomenon. In this phase, the researcher seeks to make sense out

of all information gathered and arrange it by themes and then grasp the big picture of the puzzle. A 'categorization matrix' can be established to make the process easier for review and for coding relevant data. The content of the articles was broken down into smaller units and organized according to the matrix stated above. This phase helps develop a dataset that can be easily organized into codes and thus, main categories are identified. The content of these categories is further divided in sub-categories by simplifying the text information. The reporting phase consists of identifying the concluding remarks that shape an idea. Credibility of results found are strongly related to how well the data has been divided into categories and subcategories (Elo & Kyngas, p.112, 2007).

The respondent has read through the articles several time to get a good grasp of the database and then analyse the findings. It is vital for the author to focus on the aim of the study when analyzing data, as this will prevent consideration of unnecessary details (Graneheim & Lundman, 2004).

7. Conduction of the Study

Data considered for this study was collected by the selection of certain criteria discussed in the coming chapter. After the data collection, the articles were analyzed according to the themes introduced originally in the theoretical framework.

7.1. Retrieval of studies and data collection

Evidence-based research is achievable if relevant data is available for collection. Depending on the type of the data needed and the feasibility of sources, various methods can be used in the collection of data. There are two distinct ways of data collection known as qualitative and quantitative research. This study will apply the qualitative research method, using both qualitative and quantitative studies. Also, different types of data collection in qualitative research exist, yet this study will employ collecting the required data through literature search.

EBSCO (Academic Elite) and CINAHL databases were used as aid tools to search and identify relevant studies. In order to answer the aim proposed, qualitative data approach using deductive content analysis was applied. For our problem definition '*What are nurses roles and challenges when caring for nutritional needs of cardiac patients?*', both databases were used to search for relevant articles about the concerned topic. The search criteria was narrowed to published articles from scientific journals within the date range 2013-2018. A literature review was applied as methodology containing at least one of the following key words: Cardiovascular, Cardiovascular

Disease, Heart Disease, Heart, Nutrition, Nutritional Interventions, Nutritional Support, Diet, Dietary Intervention, Cardiac Patients, Cardiac* and Dietary Support.

For every search the acquired results were examined and analyzed for relevant studies. The entire dataset was reviewed and all search results were checked for relevancy. Complete data of relevant articles were classified into folders by key words used in the search. Articles that appeared repeatedly in the search results were excluded from the findings. An accurate overview of the search findings is stated in attachments as ‘Appendices II’ and a search history as ‘Appendices III’ is found in the end.

The respondent read the titles and the abstracts of articles given in the results: a total of 1006 of articles, of which 996 were eliminated as they were not relevant to answer the study’s aim, eventually 10 articles were used for the actual study. Articles that consisted on meta analysis method or just theoretical studies were excluded. The author selected both qualitative and quantitative studies. This exhaustive step of the selection required an analytic eye to grasp the meaning and relevancy to the research question proposed. In order to focus solely on the latest research in nutritional care, the author has considered articles published between 2013 to 2018. The articles used for analysis were found in journals such as: *International Journal of Caring Sciences*, *Journal of Nursing*, *BMC Health Services Research*, *British Journal of Community Nursing*, *Academy of Medical-Surgical Nurses*, *Nursing Praxis in New Zealand*, *American Association of Critical Care Nurses* and *BMC Nursing*. The selected studies applied different methods as: questionnaires, surveys and interviews (see Appendice II Conduction of Study).

7.2. Inclusion criteria

Studies were included if the following criteria were met: adult patients that are hospitalized, and studies that are related to nutritional interventions. The search was narrowed to full text available only, published between years 2013 to 2018 and written in the English language.

7.3. Exclusion criteria

Findings about the pediatric/ neonatal nutrition were excluded. The search took into account only those articles relevant to answer our problem definition.

To clarify better the inclusion and exclusion criteria used during this study, Table 1 was added bellow.

Table 1. Criteria used in the data selection process:

INCLUSION CRITERIA	EXCLUSION CRITERIA
Studies published between years 2013-2018	Studies published before 2013
Studies written in English	Studies in other languages than English
Free and full text available studies	Studies that required payment
Articles that are related to ‘cardiovascular disease’, ‘nutritional intervention’, ‘nutrition’, ‘diet’, ‘nursing’, ‘lifestyle’.	Articles not containing one of the keywords: Cardiovascular, Cardiovascular Disease, Heart Disease, Heart, Nutrition*, Nutritional Interventions, Nutritional Support, Diet*, Dietary Intervention, Cardiac Patients, Cardiac*, Dietary Support, Diet*, Lifestyle.
Articles concerning nutrition for adults.	Articles about pediatric nutrition.

7.4. Data analysis

The chosen articles were evaluated by applying the deductive approach according to the content analysis method discussed previously. A category matrix was established to be able to arrange the main themes generated from the theoretical background data. Quotations or units of texts that emphasize the themes in the study were included in the matrix.

7.5. Themes

1. Assessment of the nutritional status.
2. Methods of interventions.
3. Nursing challenges in nutrition.

Assessment or nutritional screening is defined as the analysis of anthropometric, clinical, biochemical, and dietary information to identify if a person is getting enough nutrients in order to maintain health (BAPEN, 2016). Nurses usually have the role of assessing patients’ nutritional status as they are the first professionals to meet at the ward. Also, this first evaluation consists of physical examinations, which many times are found to be more efficient than laboratory tests (VanBlarcom & McCoy, 2008). Nutritional assessment reveals health outcomes and nurses have the capacity to influence and improve lifestyle behaviors (Alligood, p.337, 2018). The *assessment of the nutritional status* is explained and classified in the following categories: Screening Tools, Documentation/ Medical history.

Methods of intervention are developed more thoroughly by the categories: Education, Multidisciplinary Teamwork.

The categories detected in the theme '*Nursing challenges in nutrition*' are described by: Lifestyle barrier, Inadequate assessment, Knowledge gap, Insufficient Personnel.

7.5.1. Assessment of nutritional status

7.5.1.1. Screening tools

Screening tools in assessing the nutritional status of a patient is referred to anthropometric measures, physical examination, laboratory values that measures protein serum and functional assessment, most commonly used being hand grip (Guenter & DiMaria-Ghalili, 2013).

In the study: 'Nutritional screenings: a user-friendly tool adapted from Sweden', Smith and Westergren have emphasized the importance of nutrition as a factor that prevents morbidity and mortality. The study concerns the use of Mini Nutritional Assessment and the Malnutrition Universal Screening Tool, to support healthcare workers, nurses in particular to assess patients correctly (Smith, Westergren, Saunders, Hagell, 2016). The nutritional assessment 'is primarily a nursing responsibility' to detect malnutrition for patients admitted at the ward, and especially for cardiovascular patients (Smith, Westergren, Saunders, Hagell, 2016).

7.5.1.2. Documentation/ Medical history

Information on patient's ability to chew and swallow, or weight loss must be documented accurately in the medical records so that individualized care is given to every individual. Often nurses must document functional assessments including hand grip strength whether by hand dynamometer or by holding examiner's hands (Guenter & DiMaria-Ghalili, 2013).

A study from Norway finds that documentation on nutritional care for elderly is often inadequate on hospital admission and during hospital stay as well, with a limited communication between different institutions (Halvorsen et al, 2016). Patient's medical record is the 'most important tool to ensure that they receive the right treatment, care, and continuity of treatment' and therefore nutritional information must be prioritized by healthcare personnel (Halvorsten at al., 2016).

7.5.2. Methods of intervention

7.5.2.1. Education

One of nurses responsibilities is to educate patients towards healthy behaviors. Studies suggest that decreased vegetable intake is linked to increased frequency of cardiac diseases, and ‘an effective guidance and education program to prevent heart disease must be developed’ (Lee, 2014). Another study from Turkey applied Pender’s health promotion model into practice for post-myocard infarction patients to prove the efficiency of future outcomes and it has been proven that this method could be successfully implemented into practice by cardiologic nurses. The goal of the HPM (health promotion model) is that cardiac patients should get back in their communities and begin to live active lives (Sevink & Argon, 2018). This process motives healthcare personnel to ‘provide positive resources to achieve behavior specific changes’ (Sevink & Argon, 2018).

Comprehensive educational programs proved to manage symptoms in heart-failure patients and improve significantly the quality of life, when compared to the basic medical treatment (Kinugasa, Kato et al., 2014).

Similar finding are in the article ‘Nurses and heart failure education in medical wards’, where authors describe the contribution of nurses in patients education in order to clarify misunderstandings or gaps patients might have. As stated: ‘nurses have a professional responsibility to promote health, providing information about the condition and self-management strategies, are all part of providing health education’(Gilmour, Strong et al., 2013). The nurses’ interaction with the patients must be focused on providing appropriate and updated education necessary for cardiac patients that is meant to improve quality of life and decrease hospitalizations (Gilmour, Strong et al., 2013).

7.5.2.2. Multidisciplinary Teamwork

Although nurses usually assume the role of assessing patients upon admission, the healthcare team behind is much wider and is composed of ‘physicians, food service workers, dieticians and hospital management’, each playing their role in providing nutritional care for patients in the hospital setting (Laur, Valaitis et al., 2017). Dietitians can promote nutrition comprehension among other healthcare staff and by close collaboration can make beneficial changes for their patients (Laur, Valaitis, 2017).

Interprofessional collaboration is of great importance and a proof of that is a Japanese study that shows ‘intensive education conducted by a nurse, pharmacist, and a dietician particularly played an important role in improving the post-discharge outcome of Japanese heart-failure patients... during hospitalization’ (Kinugasa, Kato et al., 2014).

7.5.3. Nursing challenges

7.5.3.1. Lifestyle barrier

A study from Korea underlines the main factors that radically affect health management when dealing with cardiovascular patients, and these are: smoking, diabetes mellitus and abdominal obesity. Thus the findings help healthcare professionals to focus more on the educational program to prevent complications of cardiovascular diseases (Lee, 2014).

A British article ‘Practitioner and patient experiences of giving healthy eating advice’ talks about the challenges nurses face when promoting healthier lifestyle for patients with chronic diseases such as: diabetes, cardiovascular disease and cancer. Although knowledge about different conditions has increased, nurses today still face many limitations as individuals’ own will has a strong say. It is important to discuss about psychology, as all dietary habits are patterned in the brain and many times are affected by negative emotions, that motivate people to crave unhealthy foods (McClinchy, Dickinson et al., 2013).

7.5.3.2. Inadequate assessment

Another study from Norway shows that often times nurses do not weigh patients but patients ‘are asked to estimate their weight instead’ which is not always the actual weight (Halvorsen et al., 2016). Although the documentation of treatment and care is stipulated in several health legislations, findings indicate that there’s inadequate documentation for nutritional treatment and care (Halvorsen et al, 2016). This can lead to longer hospital stay, increased health complications, increased costs and decreased quality of life (Halvorsen, 2016).

Although nurses declare using nutrition screening tools upon admission, as it’s an institutional requirement, very few admit using evidence-based practice methods to assess the nutritional status of a patient (Guenter & DiMaria-Ghalili, 2013).

7.5.3.3. Knowledge gaps

A Norwegian study shows that ‘only a few of the nurses reported having heard about nutritional risk screening tools and/or the national professional guidelines on prevention and treatment of undernutrition’ (Halvorsen et al, 2016).

Complications in nursing practice can arise from poorly defined nutritional guidelines. For instance, a study from Jordan by Al Kalalkeh, Watson and Heyter discusses nursing implication in nutritional care in acute situations. The findings reveal that nurses can implement successful nutritional care when using evidence-based practices having ‘well-defined protocols and guidelines pertaining to clinical nutrition’. Such guidelines reduce the ‘discrepancies in practice and eradicate poor nursing care that is based on rituals and personal opinions’(Al Kalalkeh, Watson, Heyter, 2014).

7.5.3.4. Insufficient personnel

Another barrier, as reported by nurses, in assessing the nutritional status effectively is ‘insufficient personnel’. Also, in the same study nurses report that few of them use the evidence based-practices when assessing patient’s nutritional status (Guenter & DiMaria-Ghalili, 2013).

8. Discussion

Discussion related to the findings and the theoretical background

Nutritional care and interventions in cardiovascular disease is a controversial topic, and dietary guidelines tends to ‘respond to interest groups and political contention’ (Oppenheimer & Benrubi, 2014), rather than scientific evidences provided by the epidemiological and nutritional societies. Defining nutritional guidelines is rather difficult as this process is not only comprised of clinical evidences, but also negotiations of different interests at stake. Also, general cardiovascular dietary guidelines do not always fit the patient’s needs, thus physicians must recommend nutritional patterns that seem most appropriate for the individual. Debating health policies is a complicated and tedious process due to lack of complete scientific knowledge and diverging internal policies (Oppenheimer, Benrubi, 2014).

Due to low metabolic rates and malabsorption of nutrients after cardiac surgery it is important to support the nutritional needs of patients, and to provide relevant information on how to avoid complications. When diagnosed with CVDs, behavioral goals are easier to be accomplished then

biochemical ones, because patients' choices can be influenced and monitored by different tools (Sabzmakan, Morowatisharifabad, et al., 2014).

In the search of answering the aim of the study of describing the nurses' roles and challenges when caring for nutritional needs of cardiovascular patients, the chosen articles were carefully analyzed, and the following themes were brought up: 1) assessment of nutritional status, 2) methods of intervention, and 3) nursing challenges related to nutrition. After discussing the categories and sub-categories for each theme, main concepts were drawn to answer the research question.

When tackling nutritional interventions in cardiac diseases, the author noticed that education to prevent further complications has a solid foundation at all stages of disease development: primary, secondary and even tertiary.

This study provides useful evidence-based dietary assessments for hospitalized cardiovascular patients. The initial phase in the management of cardiovascular diseases is assessment. Assessing the patient's health status, type of disease, illness perception, helps healthcare members draw individualized nutritional interventions that have a restorative purpose.

As studies suggest, having a healthy diet reduces all-cause mortality, improves cardiac function and can be used as an intervention tool in patients with pre-established heart diseases. For dietary adherence, patients must possess good knowledge about disease development and be motivated to change dietary patterns. Social support from family and friends, play a vital role in dietary adherence and disease management. Health promoting factors such as: education about heart diseases, family history, fruit and vegetable intake, abdominal obesity, BMI, stress level, must be considered (Greiner, Croff et al., 2018).

As part of the education and prevention plan, it is important to follow-up the illness progression in order to avoid future cardiovascular complications. Nurses often use this tool to monitor and improve dietary behaviors through medical and lifestyle recommendations. A similar method encountered, points out that multidisciplinary education including nurse-patient led education, pharmacist teaching, dietician's guidance, is a key strategy to improve health outcomes for hospitalized heart failure patients. Collaboration between different healthcare professionals significantly improves cardiac function for diagnosed patients, decreases risks and prevents re-hospitalization (Kinugasa, Kato, et al., 2014).

Extensive educational programs must be considered, to inform and encourage CVD patients to take control over the disease by adopting a healthy nutrition. Nurses are more than executors, they are patients' advocates and must ensure a holistic approach of healing. Pender's model of health promotion is necessary to anticipate how behavioral choices influence disease development on a long-term. Nurses possess knowledge that can be used to influence the lifestyle choices of their patients by promoting healthy eating, managing stress, exercising, encouraging spiritual growth and positive relationships (Alligood, p.329, 2018). Regardless the advancement of disease, the health promotion model elaborated by Nola Pender can be used successfully at any stage, in order to prevent future cardiac complications.

The behavioral system model, by Dorothy Johnson gives a deeper insight of the behavioral pattern and reveals that certain repetitive actions are results of the environmental factors (Alligood, p.334, 2018). As a nurse, it is vital to understand the patient's limitations and address these issues in order to improve wellbeing. The emphasize, is not that much on the disease itself, but on the person and the struggle is directed towards adjusting behaviors that promote health and prevent further illness. The patient, having the right information about his/her condition and receiving counselling about risks and ways of prevention, has the ultimate power of healing, through lifestyle changes, which have proven to be more effective on a long-term than only medical treatment (Alligood, p.334, 2018).

This study suggests that nurses have important nutritional responsibilities towards their patients, and that special consideration must be given to those suffering from CVD diseases. With the right information about their condition, and about the ways of managing disease, patients can experience the benefits of a healthy diet while in hospital and must be encouraged to continue after discharge from hospital.

9. Conclusion

In the 21st century cardiovascular diseases became a global challenge, for the whole society, and for the healthcare system in particular. The frequency of diagnoses has increased dramatically, urging authorities to take actions towards new changes in policies and standards in clinical care that prioritize nutrition. Findings report that, the diet that minimizes the risk for CVD includes: fruits, vegetables, whole grains, nuts, seeds, vegetable oils and avoidance of processed foods, meats, dairy, sugar and sodium (Campbell T.C., Campbell, T. M., p.132).

The outcome of this study identified and described current nutritional assessment methods and interventions for cardiovascular patients, in relation to nurses' roles of applying these principles into practice. According to the study made, the role of nurses in caring for nutritional needs of cardiovascular patients is divided between: assessment, interventions and challenges. Together with other healthcare members, nurses have an active role in the management of cardiovascular diseases and can greatly influence the diseases' outcome. Nurse's role cannot be diminished, and as promoters of health, it is necessary that they themselves act as role models in their lifestyle choices, constantly educating themselves about latest research in the field of nutrition and cardiac diseases. The result of this study is consistent with those of previous studies, that affirm that proper nutritional assessment and interventions, are the key elements towards cardiac health.

In summary, although application of nutritional care in cardiovascular diseases is quite recent, there's ongoing promising research that reveals the effectiveness of diet in management and even reversal of certain cardiac diseases. Thus, nurses should keep updated about latest scientific discoveries and apply these principles in everyday practice.

9.1. Strengths, challenges and limitations

One of the strengths of this study is the usefulness of the results found, that provides a guide for nurses and nursing students alike, to understand better the importance of adequate nutrition for cardiac patients and provide practical evidence-based methods regarding nutrition science. The author was capable to synthesize 10 articles discussing nutritional assessment and interventions for hospitalized patients and found the topic interesting and innovative for the nursing practice. Some of the challenges encountered while doing this study was the extensive amount of research found tackling the topic of nutrition for CVDs, yet through the analyzing process most articles talked about nutrition as a preventive factor, not necessarily related to established diagnoses or relevant for nursing. Also, as this study was not financially sponsored, there might be the possibility of bias in article selection, as the articles considered were those having free-text available, ignoring thus valuable articles that required payment. Due to the novelty of this subject to the nursing practice, it was challenging to distinguish nurses' roles in the management of cardiac diseases through nutrition, and logical reasoning had to be applied. While the study has achieved answering the problem definition proposed, as nutritional science advances and new research is brought up, the author wishes to highlight the importance of further studies in this field and the application thereof to the nursing profession.

As a soon to be newly qualified nurse, the author found this topic interesting for research, as it has improved greatly my knowledge on the subject and enhance my future patient care. After writing this study the respondent felt that the intended outcomes were met, and hopes this study will help provide useful information for identifying patients at risk and promote healthy living.

8. Ethical Consideration

Ethics in health care plays a vital role in guiding professionals to maintain and protect the dignity and well-being of individuals, whether clients or patients. The regulations provide balance between ethical principles and rules of the research process. Ethics presents a broad understanding of moral life principles (Hollaway, 2017, 53-54) such as: rules, virtues, rights, and ethical ideals.

The author presented the existing work of researchers accurately and limiting the study to information in the scientific public domain. The author did not include in the research findings of material that seemed to be compromising the ethical principles. Avoiding redundant publications and plagiarism was highly considered. Also, to ensure the transparency of the study, all sources of support used were accurately declared. The articles used were read and synthesized using the deductive content analysis.

Reference List

1. AHA American Heart Association (2015), The American Heart Association's Diet and Lifestyle Recommendations. Available at: <https://www.heart.org/en/healthy-living/healthy-eating/eat-smart/nutrition-basics/aha-diet-and-lifestyle-recommendations> (retrieved: 11.11.2018).
2. AHA American Heart Association (2015). What is cardiac rehabilitation. Available at: <https://www.heart.org/en/health-topics/cardiac-rehab/what-is-cardiac-rehabilitation> (retrieved: 17.02.2019).
3. Al Kalaldeh, M, Watson, R & Hayter, M. (2014) 'Jordanian intensive care nurses' perspectives on evidence-based practice in nutritional care', *British Journal of Nursing*, vol. 23, no. 19, pp. 1023–1029 (retrieved: 30.04.2019).
4. Alegría-Torres, J. A., Baccarelli, A., & Bollati, V. (2011). Epigenetics and lifestyle. *Epigenomics*, 3(3), 267-77. *Nurs Clin North Am.* 2013 Dec; 48(4): 10.1016/j.cnur.2013.08.004. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3752894/> (retrieved: 27.11.2018).
5. Allard, ML., Jeejeebhoy, JN., Sole, MJ., (2006). The management of conditioned nutritional requirements in heart failure. *Heart fail rev.* 11:75-82 Available at: <https://doi.org/10.1007/s10741-006-9195-3> (retrieved: 19.12.2018).
6. Alligood, M. R. (2018). *Nursing Theorists and Their Work*. 9th edition. USA: Elsevier.
7. Anderson, G., Monsen, R.B., (2014). Genetic nursing: Reflections on the 20th century. *Journal of Nursing Education and Practice*, 2014, Vol.4, No5. Available at: <http://www.sciedu.ca/journal/index.php/jnep/article/viewFile/3869/2602> (retrieved: 25.11.2018).
8. Asnawi A., Fauzi A., Stoelwinder, J., Tanamas, S.K., Wolfe, R., Barendregt, J., Peeters, A., (2014). Estimating the risk of cardiovascular disease using an obese-years metric. *BMJ open*, 4(9), e005629. Available at: [doi:10.1136/bmjopen-2014-005629](https://doi.org/10.1136/bmjopen-2014-005629) (retrieved: 20.11.2018).
9. ASPEN (American Society for Parenteral and Enteral Nutrition), (2018). Available at: http://www.nutritioncare.org/about_aspen/membership/sections/international_clinical_ethics_section/objectives/ (retrieved: 04.10.2018).

10. Bassel, C., Arock M., (2015). The increasing roles of epigenetics in breast cancer: Implications for pathogenicity, biomarkers, prevention and treatment, *International Journal of Cancer*;137(12):2785-94. Available at: doi: 10.1002/ijc.29347 (retrieved: 12.11.2018).
11. Berman, A., Koziar, B., (2008). *Koziar & Erb's fundamentals of nursing: concepts, process, and practice* Upper Saddle River, N.J.: Pearson Prentice Hall.
12. Bernstein, AM., Sun, Q., Hu, FB., Stampfer, MJ., Manson, JE., Willett, WC., (2010). Major dietary protein sources and the risk of coronary heart disease in women. *Vol.122(9)*, 876-83. Available at: www.ncbi.nlm.nih.gov/pmc/articles/PMC2946797/ (retrieved: 19.12.2018).
13. Blesso, C. N., & Fernandez, M. L. (2018). Dietary Cholesterol, Serum Lipids, and Heart Disease: Are Eggs Working for or Against You? *Nutrients*, 10(4), 426. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5946211/> (retrieved: 30.10.2018)
14. Bonilla-Palomas, J. L., Gámez-López, A. L., Castillo-Domínguez, J. C., Moreno-Conde, M., López Ibáñez, M. C., Alhambra Expósito, R., Villar-Ráez, A. (2016). Nutritional Intervention in Malnourished Hospitalized Patients with Heart Failure. *Archives of Medical Research*, 47(7), 535–540. <https://doi.org/10.1016/j.arcmed.2016.11.005> (retrieved: 28.11.2018).
15. Booden, W.E, O'Rourke R.A, Teo, K.K. (2007). Optimal medical therapy with or without PCI for stable coronary disease. *N. Engl J Med* 2007; 356:1-14.
16. Braunwald, E. (1997). 'Shattuck lecture-cardiovascular medicine at the turn of the millennium: triumphs, concerns and opportunities.' *New Engl. J. Med.* 337: 1360-1369.
17. Burns, P. B., Rohrich, R. J., Chung, K. C. (2011). The levels of evidence and their role in evidence-based medicine. *Plastic and reconstructive surgery*, 128(1), 305-10. Available: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3124652/> (retrieved:15.02.2019).
18. Campbell, T.C., Campbell, T.M. (2006). *The China study* p.111-134, Benbella Books pub., Texas, USA.
19. Cervantes, G., Llanas-Cornejo, D., Husi, H. (2017). CVD and Oxidative Stress. *Journal of clinical medicine*, 6(2), 22. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5332926/> (retrieved: 27.11.2018).
20. Charbel A. K., (2014). The emerging role of epigenetics in cardiovascular disease. *Therapeutic advances in chronic disease*, 5(4), 178-87.

21. Clark, A. E., Adamian, M., Taylor, J. Y. (2013). An overview of epigenetics in nursing. *The Nursing clinics of North America*, 48(4), 649-59.
22. Douglas, A. S., Dunnigan, M. G., Allan, T. M., & Rawles, J. M. (1995). Seasonal variation in coronary heart disease in Scotland. *Journal of epidemiology and community health*, 49(6), 575-82. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1060171/> (retrieved: 29.11.2018).
23. Eilat-Adar, S., Sinai, T., Yosefy, C., Henkin, Y. (2013). Nutritional recommendations for cardiovascular disease prevention. *Nutrients*, 5(9), 3646-83. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3798927/> (retrieved: 25.03.2019).
24. Elo, S., Kyngas, H. (2007). The qualitative content analysis process. *Journal of advanced nursing* 62 (1). 107-115.
25. ESC European Society of Cardiology (2016). European Guidelines on cardiovascular disease prevention in clinical practice. *European Heart Journal* 37, 2315-2381. Available at: doi:10.1093/eurheartj/ehw106 (retrieved: 27.11.2018).
26. Esselstyn Jr., C. B., Gendy, G., Doyle, J., Golubic, M., & Roizen, M. F. (2014). A way to reverse CAD? *Journal of Family Practice*, 63(7), 356–364. from Available at: <http://ezproxy.novia.fi:2052/login.aspx?direct=true&db=afh&AN=97191965&site=ehost-live> (retrieved: 17.03.2019).
27. Ettema, R., Schuurmans, M. J., Schutijser, B., Baar, M. van, Kamphof, N., & Kalkman, C. J. (2015). Feasibility of a nursing intervention to prepare frail older patients for cardiac surgery: A mixed-methods study. *European Journal of Cardiovascular Nursing*, 14(4), 342–351. <https://doi.org/10.1177/1474515114535511> (retrieved: 25.11.2018).
28. Fatimah L.C., D. Niculescu, and T. Jackson, (2013). ‘Conceptual Shifts Needed to Understand the Dynamic Interactions of Genes, Environment, Epigenetics, Social Processes, and Behavioral Choices’ Supplement 1, Vol 103, No. S1, *American Journal of Public Health*.
29. Freeman, A.M., Morris, P.B., Barnard, N., Esselstyn, C.B., Ros, E., Agatston, A., Devries, S., O’Keefe, J., Miller, M., Ornish, D., Williams, K., Kris-Etherton, P., (2017). *Journal of the American College of Cardiology*, March, 69 (9) 1172-1187; Available at: DOI: 10.1016/j.jacc.2016.10.086 (retrieved: 11.11.2018).
30. Getz, S.G., Reardon A.C., (2007). Nutrition and Cardiovascular Disease. *Arteriosclerosis, Thrombosis, and Vascular Biology*, 2007; 27: 2499-2506. Available

- at: <https://www.ahajournals.org/doi/abs/10.1161/atvbaha.107.155853> (retrieved: 07.11.2018).
31. Gilmour, J., Strong, A., Hawkins, M., Broadbent, R., Huntington, A., (2013). 'Nurses and heart failure education in medical ward', *Nursing Praxis in New Zealand*, 29 (3), 5-17.
 32. Glanz, K., (1997). Review of nutritional attitudes and counseling practices of primary care physicians, *The American Journal of Clinical Nutrition*, Volume 65, Issue 6, 1 June 1997, Pages 2016S–2019S. Available at: <https://doi.org/10.1093/ajcn/65.6.2016S> (retrieved: 14.11.2018).
 33. Graneheim, U.H., Lundman, B., (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. *Nurse Education Today* (24) 105-275.
 34. Greiner, BH, Croff, J, Wheeler, D., Miller, B., (2018). 'Mediterranean Diet Adherence in Cardiac Patients: A Cross-sectional Study', *American Journal of Health Behavior*, vol. 42, no. 6, pp. 3–10, Available: <http://ezproxy.novia.fi:2052/login.aspx?direct=true&db=afh&AN=131270275&site=ehost-live> (retrieved:28.11.2018).
 35. Grimes, D.S., Hindle E, Dyer T., (1996). Sunlight, cholesterol and coronary heart disease. *QJM : monthly journal of the Association of Physicians*, 89(8), p. 579.
 36. Guenter, P., DiMaria-Ghalili, R.A., (2013). 'Survey of nurses' nutrition screening and assessment practices in hospitalized patients', *Academy of Medical-Surgical Nurses*, Vol.22, No.5.
 37. Halvorsen, K., Kjollesdal, E. H., Sortland, K., Almendingen, K. (2016). 'Documentation and communication of nutritional care for elderly hospitalized patients: perspectives of nurses and undergraduate nurses in hospitals and nursing homes', *BioMed Central Nursing*, 15:70.
 38. Hatzimichael, E., Lagos, K., Sim, V. R., Briasoulis, E., Crook, T. (2014). Epigenetics in diagnosis, prognostic assessment and treatment of cancer: an update. *EXCLI Journal*, 13, 954–976.
 39. Hever, J., Cronise, R. J. (2017). Plant-based nutrition for healthcare professionals: implementing diet as a primary modality in the prevention and treatment of chronic disease. *Journal of geriatric cardiology : JGC*, 14(5), 355-368. Available at: <http://doi.org/10.11909/j.issn.1671-5411.2017.05.012> (retrieved: 30.12.2018).

40. HGP: The Human Genome Project official website (2018).
<https://www.genome.gov/12011238/an-overview-of-the-human-genome-project/>
(retrieved: 23.04.2018)
41. Holli, B.B., Beto, J.A., (2018). Nutrition Counseling and Education Skills: A guide for professionals. Philadelphia: Wolters Kluwer Health pub.
42. Holloway, H., Galvin, K., (2017). Qualitative Research in Nursing Health Care. Fourth Edition. West Sussex, UK : John Wiley & Sons, Ltd.
43. Hu, F.B., Satija, A., Rimm, E. B., Spiegelman, D., Sampson, L., Rosner, B., Camargo, C.A., Stampfet, M., Willett, W. C. (2016). Diet Assessment Methods in the nurses' health studies and contribution to evidence-based nutritional policies and guidelines. *American Journal of Public Health Methods*, September, Vol 106, n.9, pp. 1567-1572.
44. IOM Institute of Medicine (US) Committee on Nutrition Services for Medicare Beneficiaries. The Role of Nutrition in Maintaining Health in the Nation's Elderly: Evaluating Coverage of Nutrition Services for the Medicare Population. Washington (DC): National Academies Press (US), (2000). 13, Providers of Nutrition Services.
45. Jang, S., Cheon, C., Jang, B. H., Park, S., Oh, S. M., Shin, Y. C., Ko, S. G. (2016). Relationship Between Water Intake and Metabolic/Heart Diseases: Based on Korean National Health and Nutrition Examination Survey. *Osong public health and research perspectives*, 7(5), 289-295. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5079212/> (retrieved: 20.12.2018).
46. Judd, S. E., & Tangpricha, V. (2009). Vitamin D deficiency and risk for cardiovascular disease. *The American journal of the medical sciences*, 338(1), 40-4. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2851242/> (retrieved: 29.11.2018).
47. Kenney, J., W., (2013). Theory-based advanced nursing practice. Philosophical and theoretical perspectives. 333-352.
48. Kinugasa, Y., Kato, M., Sugihara, S., Yanagihara, K., Yamada, K., Hirai, M., Yamamoto, K., (2014). Multidisciplinary intensive education in the hospital improves outcomes for hospitalized heart failure patients in a Japanese rural setting. *BMC Health Services Research*, 14, 351. Available at: [doi:http://dx.doi.org/10.1186/1472-6963-14-351](http://dx.doi.org/10.1186/1472-6963-14-351) (retrieved: 17.02.2019).
49. Kweon, S., Sohn, M. K., Jeong, J. O., Kim, S., Jeon, H., Lee, H., Ahn, S. C., Park, S. H., Jee, S. (2017). Quality of Life and Awareness of Cardiac Rehabilitation Program in People with Cardiovascular Diseases. *Annals of rehabilitation medicine*, 41(2), 248-256.

- Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5426264/> (retrieved at:17.02.2019).
50. Laur, C., Valaitis, R., Bell, J., & Keller, H. (2017). Changing nutrition care practices in hospital: a thematic analysis of hospital staff perspectives. *BMC health services research*, 17(1), 498. Available at: doi:10.1186/s12913-017-2409-7 (retrieved: 02.04.2019).
 51. Lee, S.R., (2014). Predictors associated with an efficient health information management in patients with cardiac surgery. *Technology & Health Care*. 22(3):317-323. doi:10.3233/THC-140786 (retrieved: 05.12.2019).
 52. Li, Y. R., (2015). *Cardiovascular Diseases: From Molecular Pharmacology to Evidence-Based Therapeutics*, John Wiley & Sons, Incorporated. ProQuest Ebook Central. Available at: <https://ezproxy.novia.fi:2268/lib/novia-ebooks/detail.action?docID=1895710>. (retrieved: 26.11.2018)
 53. Linton, M.F., Yancey, P.G., Davies, S.S., Gray, J.J., Linton, E.F., Vickers, K.C., (2015). *The Role of Lipids and Lipoproteins in Atherosclerosis*. Available at: <https://www.ncbi.nlm.nih.gov/books/NBK343489/> (retrieved: 27.11.2018).
 - Mampuya, W. M., (2012). Cardiac rehabilitation past, present and future: an overview. *Cardiovascular diagnosis and therapy*, 2(1), 38-49. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3839175/> (retrieved: 17.02.2019).
 54. McClinchy, J., Dickinson, A., Barron, D., Thomas, H., (2013). 'Practitioner and patient experiences of giving and receiving healthy eating advice'. *British Journal of Community Nursing*, Vol.18, No.10.
 55. Micha, R., Shulkin, M. L., Peñalvo, J. L., Khatibzadeh, S., Singh, G. M., Rao, M., Mozaffarian, D. (2017). Etiologic effects and optimal intakes of foods and nutrients for risk of cardiovascular diseases and diabetes: Systematic reviews and meta-analyses from the Nutrition and Chronic Diseases Expert Group (NutriCoDE). *PLoS ONE*, 12(4), 1–25. Available at: <https://doi.org/10.1371/journal.pone.0175149> (retrieved: 26.11.2018).
 56. Michalkova, H., Sedova, L., Tothova, V., Olisarova, V., (2016). The role of nurses in the prevention of cardiovascular diseases. *Journal of Nursing, Social studies, Public Health and Rehabilitation* 3-4, pp.134-140.
 57. Mirzaei, H., Di Biase, S., Longo, V.D., (2016). Dietary interventions, cardiovascular aging, and disease. *Circulation research*, 2016, 118:1612-1625. Available at:

- <https://www.ahajournals.org/doi/full/10.1161/CIRCRESAHA.116.307473> (retrieved: 25.03.2019).
58. Mozaffarian, D., (2016). Dietary and Policy Priorities for Cardiovascular Disease, Diabetes, and Obesity. A comprehensive review. *Circulation Jour.*, Vol.133, No.2. 187-225. Available at: <https://www.ahajournals.org/doi/full/10.1161/CIRCULATIONAHA.115.018585> (retrieved:15.02.2019).
59. Murgia, C., Adamski, M. M. (2017). Translation of Nutritional Genomics into Nutrition Practice: The Next Step. *Nutrients*, 9(4), 366. doi:10.3390/nu9040366 Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5409705/> (retrieved: 27.11.2018).
60. NIH, National Heart, Lung, and Blood Institute (2018). Available at: <https://www.nhlbi.nih.gov/health-topics/coronary-heart-disease> (retrieved: 25.11.2018).
61. Nola Pender: official website (2018). Available at: <https://nolapender.weebly.com> (retrieved: 13.03.2018).
62. Nurse.org Available at: <https://nurse.org/articles/gallup-ethical-standards-poll-nurses-rank-highest/> (retrieved: 13.04.2018).
63. Oppenheimer, G. M., Benrubi, I. D. (2014). McGovern’s Senate Select Committee on nutrition and human needs versus the meat industry on the diet--heart question (1976-1977). *American Journal of Public Health*, 104(1), 59–69. Available at: <https://doi.org/10.2105/AJPH.2013.301464> (retrieved: 17.03.2019).
64. Ornish DM, Brown SE, Scherwitz LW, et al. (1990) Can lifestyle changes reverse coronary atherosclerosis? The Lifestyle Heart Trial. *Lancet* 1990; 336: 129–33.
65. Ornish, D., Scherwitz LW., et al (1998). Intensive lifestyle changes for reversal of coronary heart disease. *JAMA*. Vol.280 (23): 2001-2007. Available at: doi:10.1001/jama.280.23.2001 (retrieved: 19.12.2018).
66. Paré G., Trudel M.-C., Jaana M., Kitsiou S. (2015). Synthesizing information systems knowledge: A typology of literature reviews. *Information & Management*. 2015;52(2):183–199. Available at: http://www.academia.edu/8209991/Synthesizing_Information_Systems_Knowledge_A_Typology_of_Literature_Reviews (retrieved: 04.12.2018).
67. Parker, M. E., (1990). *Nursing theories in practice*. New York: National League for Nursing.

68. Párrizas, M, Gasa, R, Kaliman, P., (2012), Epigenetics of Lifestyle, Bentham Science Publishers, SAIF Zone. Available from: ProQuest Ebook Central.
69. Perry, L, Hamilton, S, Williams, J, Jones, S. (2013). Nursing Interventions for Improving Nutritional Status and Outcomes of Stroke Patients: Descriptive Reviews of Processes and Outcomes. *WVN* 2013; xx: 1– 24. Available at: <https://sigmapubs.onlinelibrary.wiley.com/doi/full/10.1111/j.1741-6787.2012.00255.x> (retrieved: 25.03.2019).
70. Pilz S, März W, Wellnitz B, (2008). Association of vitamin D deficiency with heart failure and sudden cardiac death in a large cross-sectional study of patients referred for coronary angiography. *J Clin Endocrinol Metab.* 2008;93:3927–35. Available at: <https://academic.oup.com/jcem/article/93/10/3927/2627359> (retrieved: 29.11.2018).
71. Polit, D. F., Beck, C. T., (2012). Nursing research, generating and assessing evidence for nursing practice. Ninth ed.
72. Polit, D.F., Beck, C. T. (2010). Essentials of Nursing Research: Appraising Evidence for Nursing Practice. Seventh Edition. Walnut Street, Philadelphia: Lippincott Williams & Wilkins
73. Ravera, A., Carubelli, V., Sciatti, E., Bonadei, I., Gorga, E., Cani, D., Vizzardì, E., Metra, M., Lombardi, C. (2016). Nutrition and Cardiovascular Disease: Finding the Perfect Recipe for Cardiovascular Health. *Nutrients*, 8(6), 363. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4924204/> (retrieved: 25.03.2019).
74. Reed, P, & Shearer, N., (2011). Nursing Knowledge and Theory Innovation : Advancing the Science of Practice, Springer Publishing Company, New York.
75. Sabzmakan, L., Morowatisharifabad, M. A., Mohammadi, E., Mazloomi-Mahmoodabad, S. S., Rabiei, K., Naseri, M. H., Shakibazadeh, E., Mirzaei, M. (2014). Behavioral determinants of cardiovascular diseases risk factors: A qualitative directed content analysis. *ARYA atherosclerosis*, 10(2), 71-81. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4144369/> (retrieved: 25.03.2019).
76. Sandelowski, M., Barroso, K., (2007). Handbook for synthesizing qualitative research. Springer publishing Ltd., USA.
77. Schreier, M., (2012). Qualitative Content Analysis in practice. SAGE publications Ltd, USA.

78. Sevinc, S., Gulumser, A. (2018). 'Application of Pender's health promotion model to post-myocard infarction patients in Turkey'. *International Journal of Caring Sciences*, Vol.11, No.1.
79. Shah, B., Ganguzza, L., Slater, J., Newman, J. D., Allen, N., Fisher, E., Larigakis, J., Ujueta, F., Gianos, E., Guo, Y., Woolf, K. (2017). The effect of a vegan versus aha diet in coronary artery disease (evade cad) trial: study design and rationale. *Contemporary clinical trials communications*, 8, 90-98.
80. Silverman, D., (2001). *Interpreting qualitative data. Methods for analyzing talk, text and interaction*. 2nd edition. SAGE publications, London.
81. Smith, S., Westergren, A., Saunders, J., Hagell, P. (2016). 'Nutritional screening: a user-friendly tool adapted from Sweden' *British Journal of Nursing*, Vol.25, No.4.
82. Sumner, J., Harrison, A., & Doherty, P. (2017). The effectiveness of modern cardiac rehabilitation: A systematic review of recent observational studies in non-attenders versus attenders. *PloS one*, 12(5). Available at: doi:10.1371/journal.pone.0177658 (retrieved at: 17.02.2019).
83. Talmud, Philippa J., (2007). Gene–environment interaction and its impact on coronary heart disease risk' *Nutrition, Metabolism and Cardiovascular Diseases*, Volume 17, Issue 2, 148 – 152.
84. Terveysportti (2018). *Vitamins. EBM guidelines*. Duodecim Medical Pub. Available at: <http://www.terveysportti.fi/dtk/ebmg/koti> (retrieved: 29.11.2018).
85. Terveysportti.fi (2007). 'Multidisciplinary treatment programs for congestive heart failure' Duodecim Medical Pub. Available at: <http://www.terveysportti.fi/dtk/ebmg/koti> (retrieved: 29.11.2018).
86. The British Association of Parenteral and Enteral Nutrition (BAPEN), (2016) *Nutritional Assessment*. Available at: <https://www.bapen.org.uk/nutrition-support/assessment-and-planning/nutritional-assessment?showall=&start=0> (retrieved:04.10.2018).
87. The Finnish Cardiac Society (Suomen Kardiologien Seura), (2016). *Cardiac procedures 2016*. Availavle at: <https://www.fincardio.fi/in-english/facts-about-cardiology-in-finland/> (retrieved: 29.11.2018).
88. Tripathy K., Nanda, T., Sudharani O.V. (2011). The influence of environmental and genetic factors on various disorders and diseases. *Journal of Genetic Syndromes & Gene Therapy*. S11:001. doi:10.4172/2157-7412.S11-001 Available at: <https://www.omicsonline.org/the-influence-of-environmental-and-genetic-factors-on->

- various-disorders-and-diseases-2157-7412.S11-001.php?aid=3593 (retrieved: 27.11.2018).
89. Vacariu, V., (2012). Ghid de Nursing. Ed. Victor Babes, Timisoara. Available at: http://www.umft.ro/data_files/documente-atasate-sectiuni/419/ghid_20de_20nursing.pdf (retrieved: 17.02.2019).
 90. VanBlarcom, A., McCoy, M.A., (2018). New Nutrition Guidelines: Promoting Enteral Nutrition via a Nutrition Bundle. *Journal of Critical Care Nursing*, 2018 Jun;38(3):46-52. Available at: doi: 10.4037/ccn2018617 (retrieved: 03.11.2018).
 91. Vetter, M. L., Herring, S. J., Sood, M., Shah, N. R., & Kalet, A. L. (2008). What Do Resident Physicians Know about Nutrition? An Evaluation of Attitudes, Self-Perceived Proficiency and Knowledge. *Journal of the American College of Nutrition*, 27(2), 287–298.
 92. Vultagione, JM, & Forester, KN (2012). *Pathology: New Research*, Nova Science Publishers, Incorporated, Hauppauge. Available from: ProQuest Ebook Central. (retrieved: 25.11.2018).
 93. Walker, J. (2013). ‘Reducing cardiovascular disease risk: cholesterol and diet. (Cover story)’, *Nursing Standard*, 28(2), pp. 48–55. Available at: <http://ezproxy.novia.fi:2052/login.aspx?direct=true&db=afh&AN=90326069&site=ehost-live> (retrieved: 28.11.2018).
 94. Weinhold, B. (2006). Epigenetics: The Science of Change. *Environmental Health Perspectives*, 114(3), A160–A167.
 95. WHO (2017) Cardiovascular diseases 2017 Available at: [http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)) (retrieved:18.09.2018).
 96. WHO (2017) Fact sheet about cardiovascular diseases. Available at: [http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-\(cvds\)](http://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)) (retrieved: 19.12.2018).
 97. WHO (2018) Top 10 causes of death 2016. Available at: <http://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death> (retrieved: 13.04.2018).
 98. WHO European Food and Nutrition Action Plan 2015-2020 (2014). 64th session. Copenhagen, Denmark, 15-18 September 2014. Available at: http://www.euro.who.int/__data/assets/pdf_file/0008/253727/64wd14e_FoodNutAP_140426.pdf (retrieved: 11.12.2018).

99. WHO Global Strategy on Diet, Physical Activity and Health (2002). Available at: <https://www.who.int/dietphysicalactivity/publications/trs916/summary/en/> (retrieved: 27.11.2018).
100. WHO World Health Organization (2018). Human genomics in global health. Available at: <http://www.who.int/genomics/geneticsVSgenomics/en/> (retrieved: 27.11.2018).
101. World Heart Federation (2017) Risk factors. Available at: <https://www.world-heart-federation.org/resources/risk-factors/> (retrieved: 30.10.2018).

APPENDICES I Abbreviations

ASPEN American society of parenteral and enteral nutrition

BAPEN British association of parenteral and enteral nutrition

CAD Coronary artery disease

CHD Coronary heart disease

CVA Cerebrovascular accident

CVD/CVDs Cardiovascular disease/ cardiovascular diseases

EN Enteral nutrition

HPM Health promotion model

PN Parenteral nutrition

WHO World health organization

APPENDICES II Conduction of Study

Author	Title	Location/ year	Aim	Method	Results
1. Al Kalaldehy, M., Watson, R., Hayter, M.	Jordanian intensive care nurses' perspective on evidence-based practice in nutritional care	Jordan 2014	To analyze the nurses' perspectives on implementation of evidence-based practice in enteral nutrition.	Descriptive study	Nurses adhere to certain protocols related to clinical nutrition and use evidence-based practices in their everyday work. A multidisciplinary team is essential to determine proper feeding for patients in ICU. For nurses, the importance of multidisciplinary involvement is essential for professional collaboration.
2. Smith, S., Westergren, A., Saunders, J., Hagell, P.	Nutritional screening: a user-friendly tool adapted from Sweden	UK 2016	To evaluate patients' nutritional status by using a tool known as 'the Minimal Eating Observation and Nutrition FormVersion II'	MEONF assessment tool and questioners.	Findings of this study show that nutritional assessment can be successfully analysed by nurses through similar tools, and they can ensure good nutritional care for their patients.
3. Halvorsen, K., Kjollesdal, E. H., Sortland, K., Almendingen, K.	Documentation and communication of nutritional care for elderly hospitalized patients: perspectives of nurses and undergraduate nurses in	Norway 2016	To investigate the role of nurses in documenting the nutritional status for patients when transferring to different wards or nursing homes.	Qualitative study using data from interviewing nurses.	Results shows that there is inadequate documentation of the nutritional status on hospital admission, and also a limited communication between different health institutions. The study points out the importance of systematic assessment and documentation of nutritional status by nurses.

	hospitals and nursing homes				
4. Lee, S.R.	Predictors associated with an efficient health information management in patients with cardiac surgery.	South Korea 2014	To identify the predictors related to effective health information to patients in hospitals and to provide data for developing interventional programs for cardiac patients.	Quantitative study by using interviews and questionnaires for surgical cardiac patients in hospital setting.	Findings of this study show that men had a higher response rate, than women, meaning men are more likely to adopt changes. Major risk factors for cardiac patients are hypertension, obesity, drinking and smoking. Initial dietary patterns of cardiac patients indicated very low intake of vegetables and the stress rate quite high. The results point out that efficient health information is vital when managing cardiovascular diseases.
5. Kinugasa, Y., Kato, M., Sugihara, S., Yanagihara, K., Yamada, K., Hirai, M., & Yamamoto, K.	Multidisciplinary intensive education in the hospital improves outcomes for hospitalized heart failure patients in a Japanese rural setting	Japan 2014	The aim of the study was to evaluate the benefits of intensive inpatient education for patients with heart failure in Japanese rural setting.	A program for managing inpatient heart failure (HF) build on multidisciplinary team intervention was applied in hospitalized patients in a Japanese area. The two groups were analyzed and mortality rate compared	Compared with individuals in the usual care group, patients in the intervention group got regular several interventions such as use of β -blockers upon discharge, cardiac rehabilitation programs, pre-discharge diagnostic tests, and multidisciplinary intensive education consisting of nurse-led patient education, pharmacist's medication teaching, and dietitian's guidance on nutrition. The incidence of heart failure was reduced after following the program. Multidisciplinary intensive education was proven to be an efficient intervention tool in hospitalized HF patients in rural areas from Japan.

6. Gilmour, J., Strong, A., Hawkins, M., Broadbent, R., Huntington, A.	Nurses and heart failure education in medical ward	New Zealand 2013	To describe medical nurses' education activities with heart failure patients in terms of the time spent with them, the topics discussed and the educational resources used.	Descriptive cross sectional survey design by using questionnaires.	Nursing interventions involve educational activities. They also have an advocating role to enhance health literacy regarding, symptoms, lifestyle choices and ongoing treatment.
7. Guenter, P., DiMaria-Ghalili, R.A.	Survey of nurses' nutrition screening and assessment practices in hospitalized patients	USA 2013	The aim of the survey was to collect information on the process and structure associated to nutrition screening, assessment, communication and malnutrition in hospitals.	Survey via Internet using SurveyMonkey	Nurses involved in the survey reported completion of nutritional screenings of patients in the first 24 hours of hospital admission. These screenings are vital for an effective patient centered care.
8. McClinchy, J., Dickinson, A., Barron, D., Thomas, H.	Practitioner and patient experiences of giving and receiving healthy eating advice	England 2013	To examine the content of discussion between patients and practitioners when tackling nutrition.	Interviewing	Diet and prevention of heart disease were among the topics that patients showed increased interest. Nurses were seen as reliable sources of information for their patients when giving dietary advice, although they have not always considered the holistic care of their patients and often times the psychological factor was left out.
9. Laur, C., Valaitis, R.,	Changing nutrition care practices in	Canada 2017	The purpose of this study was to understand how the	Interviewing	The findings of this study suggests that most medical staff (nurses included) do not initiate changes in nutrition, unless recommended so by a specialized dietician. A strong

Bell, J., Keller, H.	hospital: a thematic analysis of hospital staff perspectives		staff members perceived and described current practices and their efforts made to improve hospital nutrition.		collaboration among healthcare staff members is vital to improve nutrition care.
10. Sevinc, S., Gulumser, A.	Application of Pender's health promotion model to post-myocard infarction patients in Turkey	Turkey 2018	To analyze if a theoretical training program based on the health promotion model (HPM), and patient individual counselling is effective.	Prospective, pretest-post-test quasi-experimental study design / survey	Results show significant improvements in dietary status, cholesterol level, waste circumference and overall better functional capacity after applying Pender's Health Promotion Model into practice.

APPENDICES III. Data search history

Database	Keyword	Found Material	Used
EBSCO (Academic Search Elite) & CINAHL with full text	Diet AND cardiac patient*	35	2
EBSCO (Academic Search Elite) & CINAHL with full text	Dietary intervention AND heart OR cardiac	43	1
EBSCO (Academic Search Elite) & CINAHL with full text)	Nurse AND nutrition	835	5
EBSCO (Academic Search Elite) & CINAHL with full text	nursing AND nutritional care	93	2

