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Master's Thesis

RENAL FAILURE AND EFFECT ON LIFE

Master of Science in Nursing

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MASTER THESIS ABSTRACT

Chronic kidney disease or renal failure is an important healthcare problem. Among chronic noncommunicable diseases, renal failure takes a special place, since it is widely spread: according to different studies, it occurs in 6–20% of the population. The progressive growth in numbers of patients with kidney disease is more recently regarded as a pandemic. This disease is associated with a sharp decline in the quality of life, high mortality and in its terminal stage, it leads to the need for costly methods of substitution therapy, such as dialysis and kidney transplantation. The aim of the study: to conduct an investigation and analysis of nursing roles in the process of providing care to patients with renal failure and to investigate the quality of life impact of this disease. Study objectives: to study the main causes, clinical presentation, treatment and prevention of renal failure; to define basic knowledge and skills of the nurse for timely detection of renal failure in the patient; to determine the role of the nurse in management of patients with renal failure; to determine the role of the nurse in detecting the complications of chronic kidney disease and their treatment; to determine the role of the nurse in improving the quality of life of patients with renal failure. The methods of study: general clinical assessments, documentation of patient's complaints, laboratory and imaging tests of kidneys and other organs, as well as functional tests, physical examination, general health assessment, collection of information on main complaints of patients with chronic kidney disease, data comparison methods, scientific methods for analysis of information and statistical methods. The authors have defined and evaluated basic nursing knowledge and skills for timely recognition of renal failure. This work included determination of specific features of work and nursing roles in treatment of patients with renal failure, determined the role of the nurse in detecting complications of chronic kidney disease and their treatment and determined the role of the nurse in improving the quality of life of patients with renal failure.

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INTRODUCTION

The background of the study. Chronic kidney disease [1, 7, 15] or renal failure [9, 45] is an important healthcare problem [2, 12, 24]. Among chronic noncommunicable diseases, renal failure takes a special place, since it is widely spread: according to different studies, it occurs in 6–20% of the population. The progressive growth in numbers of patients with kidney disease is more recently regarded as a pandemic [3, 6, 11, 29]. One in ten people worldwide has signs of chronic kidney disease [8, 16]. This disease is associated with a sharp decline in the quality of life, high mortality and in its terminal stage, it leads to the need for costly methods of substitution therapy, such as dialysis [23, 27, 30, 45] and kidney transplantation [21].

For many years the seriousness of the problem with chronic kidney disease has been underestimated; it remained “in the shadow” of other socially significant diseases [4, 23, 38]. A flurry of interest in the problem of this disease has occurred at the beginning of the XXI century, when data from large epidemiological studies (NHANES etc.) have become available, which have demonstrated a high incidence of renal impairment within the population [13, 32, 33, 37]. At the same time, it has become evident that dialysis services worldwide are not coping with the influx of new patients with terminal renal failure [45], in spite of new dialysis centers being opened [23, 30, 45].

Within the structure of chronic kidney disease, the first place in terms of incidence is occupied by patients with diabetic nephropathy and patients with renal impairment in the context of cardiovascular disease [4, 38] (i. e. hypertension and atherosclerosis). Among the nephrological causes of chronic kidney disease, chronic glomerulonephritis takes the lead. A substantial contribution to the development of CKD is made by chronic pyelonephritis and polycystic kidney disease

The social significance of chronic diseases of the urinary system, including the kidneys is also determined by the large economic losses due to

disability at a young age, incapacitation of children and adults, and significant cost of treatment and rehabilitation of patients [10, 16, 19, 34, 36].

On the one hand, due to the technical progress in medicine and increasingly effective management of terminal and pre-terminal states, the survival of such patients is steadily improving. However, on the other hand, a new range of problems is formed, which are driven by not only by biological but also by the new psychosocial factors. Patients experience social isolation, altered emotional reactivity and problems at work and in the home, which are associated both with the disease per se and with the treatment [2, 7, 9, 38]. CKD brings physical and mental disharmony to patients' lives due to the need for additional organization of high-grade dietary nutrition, limitations in the choices of recreation locations and interpersonal contacts; in other words, the quality of their life is greatly reduced [35]. The aggravation of clinical course of CKD and prolonged duration of the disease bring about the increase in mental health problems, such as aggressiveness and maladaptive attitudes to disease [31, 35, 36].

At the present stage, with the implementation of newer and more advanced dialysis technology [45] and methods of drug therapy [7, 9], as well as the use of new nursing technology and standards [5, 26, 43, 44], the nursing care process has improved substantially [30, 35, 39, 40]. In this respect, the issues of improving health care provided to this patient population and increasing their quality of life are becoming increasingly relevant. The studies in the specific aspects of nursing care, which impact the quality of life of patients with CKD determine the relevance of the selected topic.

The aim of the study: to conduct an investigation and analysis of nursing roles in the process of providing care to patients with renal failure and to investigate the quality of life impact of this disease.

Study objectives.

1. To study the main causes, clinical presentation, treatment and prevention of renal failure.

2. To define basic knowledge and skills of the nurse for timely detection of renal failure in the patient.
3. To determine the role of the nurse in management of patients with renal failure.
4. To determine the role of the nurse in detecting the complications of chronic kidney disease and their treatment.
5. To determine the role of the nurse in improving the quality of life of patients with renal failure.

The object of research. Patients with renal failure of various severity.

The subject of research. The specific aspects and the role of nursing process in care for patients with renal failure and the impact of this disease on the patients' quality of life.

The methods of study: general clinical assessments, documentation of patient's complaints, laboratory and imaging tests of kidneys and other organs, as well as functional tests, physical examination, general health assessment, collection of information on main complaints of patients with chronic kidney disease, data comparison methods, scientific methods for analysis of information and statistical methods.

The scientific and practical value of the study. The practical bearing of this research study lies in investigation of the principal causes and specific clinical presentation characteristics of renal failure, including treatment and prevention. The authors have defined and evaluated basic nursing knowledge and skills for timely recognition of renal failure. This work included determination of specific features of work and nursing roles in treatment of patients with renal failure, determined the role of the nurse in detecting complications of chronic kidney disease and their treatment and determined the role of the nurse in improving the quality of life of patients with renal failure.

CHAPTER 1
RENAL FAILURE: THE MAIN CAUSES, CLINICAL PRESENTATION,
SPECIFIC ASPECTS OF TREATMENT AND PREVENTION
(REVIEW OF LITERATURE)

Renal failure has more recently become an important cause of incapacitation in people of different age groups, including the young populations [10, 41, 45].

The function of kidneys in the body is to ensure elimination of metabolic end products, maintain the equilibrium of water and electrolytes and the acid-base balance in the body. This is achieved owing to renal blood flow and glomerular filtration. If there is any change in renal processes, this does not immediately lead to severe impairment of kidney function. Renal failure develops due to multiple severe impairments of renal function [10]. There are two fundamental types of renal insufficiency, i.e. acute and chronic renal failure.

These disorders are gradually developing due to loss of functional renal parenchyma. Acute renal failure occurs in a sudden fashion due to acute, mostly reversible, kidney disease [6, 11, 35, 37].

The duration of chronic kidney disease is from 2 years to 10 years and longer; a number of stages will pass before an overt disease appears. The course of kidney disease is frequently accompanied by development of renal failure; therefore, there is a number of conventional stages depending on the intensity of this process of development of renal failure:

- the stage with absence of renal process abnormalities: maintaining normal levels of glomerular filtration and tubular reabsorption;
- the stage with apparent renal process abnormalities: glomerular filtration ultimately decelerates below expected normal levels and the capacity to concentrate urine is reduced;
- the stage when medical treatment is required: the numbers of capable nephrons are shrinking, glomerular filtration rate drops below 50 ml/min; as a

result, plasma creatinine and urea levels increase to NLT 0.02 g/l and NLT 0.5 g/l, respectively;

- terminal stage: glomerular filtration rate NMT 10 ml/min, homeostatic disturbances are escalating. At this stage, medical treatments are no longer effective; dialysis is the only available option.

As the disease progresses, homeostasis undergoes substantial changes. As long as urine output is intact, there is normal elimination of water from the body; plasma levels of such substances as sodium, magnesium, chlorine and potassium do not change. Impaired levels of vitamin D contribute to continuous hypocalcemia. The occurrence of humoral disorders is associated with the symptoms of chronic uremia.

The main causes of renal failure are chronic glomerulonephritis and pyelonephritis, diabetic glomerulosclerosis, various urological disease [18, 31, 40]. Constant reduction in functionally capable nephrons is the principal abnormality, which underlies the symptoms of chronic renal failure [10, 45].

The causes of acute renal failure include the following:

- collapse, shock and other disorders of renal hemodynamics;
- systemic exogenous intoxications by household poisonous substances, medicines, bites of poisonous insects, reptiles and animals.
- acute kidney disease;
- arenal status due to injury or compelled/inadvertent surgical removal of a solitary kidney.

Up to 90% cases of acute renal failure are caused by renal hemodynamic disorders and by exogenous intoxications. The triggering factor of such damage is anoxia of renal tubules. Necrosis of tubular epithelium develops, accompanied by edema and cellular infiltration of interstitial tissues.

Special aspects of clinical manifestations [7, 29, 33]. Development of chronic renal failure is accompanied by such symptoms in the patients as wasting, weakness, decreased ability to work and reduced appetite. Patients

develop headache, nausea and vomiting. They may feel an unpleasant taste in the mouth, the skin becomes dry and pallid, muscle tone is reduced and fine muscle twitching appears. The patients may experience anemia, leukocytosis and bleeding. In addition to that, the developments of the next stage include EKG changes, expanded cardiac borders and muffled heart tones.

If glomerular filtration is less 10 ml/min, treatment with medical homeostatic therapy is not possible. At such an acute stage, there are pronounced changes in emotional status, including mood changes (apathy alternating with agitation), sluggish and lethargic behaviors, and sleep disorders with resulting daytime sleepiness. The skin on the patient's face becomes gray to yellow, itching appears and the hair loses its normal strength and luster. Metabolism is disrupted; therefore, there is a development of dystrophy, reduced appetite and an unpleasant oral odor. The voice becomes hoarse; there may be flatulence and diarrhea. Common signs of renal failure include anemia and hemorrhagic syndrome. Muscle twitching are becoming increasingly more frequent and strong. Renal osteodystrophy (adynamic bone disease) and uremic neuropathy cause limb pain and bone aches. Fibrinous pericarditis, pleurisy, encephalopathy and uremic coma are complications of uremic intoxication, whose development is facilitated by chronic renal failure.

At the first stage of the disease course, acute renal failure in children and adults is characterized by shock-induced symptoms (pain shock, bacterial shock, anaphylactic shock, etc.), poisoning, hemolysis and infectious disease. On the first day of the initial period, urine outputs do not exceed 500 ml, which precipitates oliguria/anuria and homeostatic disturbances. Plasma sodium, calcium and chlorine reduce, with concomitant increases in plasma nitrogen, magnesium, potassium and creatinine levels.

The symptoms develop quickly enough: in the first days, there is decreased appetite, nausea and easily precipitated vomiting. Urea levels increase by 0.5 g/l daily; signs and symptoms include muscle twitching, weakness, sluggishness, increasing dyspnea, anemia and fixed urine specific gravity.

Tachycardia, systolic murmurs and expansion of cardiac borders are reported in the patients. In some cases, hypertension is manifested. EKG manifestations of uremia may include a high pointed T wave; the R wave may be reduced. Heart block may lead to ventricular fibrillation and cardiac arrest. The causes of death in this disease may include uremic coma, sepsis and hemodynamic failure. One of the characteristic features of the oliguria/anuria period is leukocytosis.

Depending on the cause for development of acute renal failure [10, 45], urinary levels of protein and the nature of urinary sediment are different. If urine output is more than 500 ml per day, this is interpreted as recovery of urine output. Gradually, after a brief period of polyuria with reduced azotemia levels and with recovery of homeostasis, a clinical improvement is observed. When serum levels of residual (nonprotein) nitrogen become normal, convalescence begins with restoration of homeostasis and renal processes. In some cases, this recovery may take as long as one year or longer; however, in a number of patients renal failure goes into chronic stage. This is usually caused by a concomitantly progressive pyelonephritis.

Specific aspects of diagnosis [3, 8, 22, 31]. Diagnosis includes a review of history of chronic kidney disease, azotemia and other homeostatic disorders and consideration of typical symptoms of uremia. Acute renal failure is diagnosed due to a sharp drop in urine output, escalating azotemia and other homeostatic disturbances. Analysis of medical history data and/or identification of chronic urological disease distinguish acute renal failure from other kidney disease or from end-stage kidney disease. High-grade proteinuria develops in case of acute glomerulonephritis

The specific aspects of treatment in renal failure

The treatment of kidney disease and the treatment of renal failure are carried out inseparably from each other. Different treatment methods depending on the stage of disease [7, 9, 17].

In the stage without impairments of renal processes, the schedule of treatment includes etiological and pathogenetic therapy. This helps prevent the

development of renal failure and slows down the progression of the disease. When renal disturbances are detected, pathogenetic therapy should not be stopped, and symptomatic treatment methods are added, such as use of hypotensive drugs, antibacterials and restricting dietary protein. Following such therapeutic approaches as a system allows slowing down the manifestations of chronic renal failure [45].

Methods of medical treatment are used to regulate homeostasis and to improve general condition of patients with this disease. These include therapeutic measures to restore homeostatic normal and to reduce azotemia and uremia.

Effective treatment of renal failure includes a high-calorie (3000 kcal) diet with renal function-adjusted rates of protein intake:

- glomerular filtration NMT 50 ml/min: dietary protein intake should not exceed 30–40 g per day;
- glomerular filtration NMT 20 ml/min: dietary protein intake should not exceed 20–24 g per day;

The diet should be rich in essential amino acids; sodium should be restricted as much as possible, with total exclusion of table salt in patients with high-grade hypertension.

In cases of osteodystrophy with ongoing changes in calcium metabolism, longer courses of vitamin D and calcium supplementation (i.e calcium gluconate) should be considered. However, in hyperphosphatemia, high doses of vitamin D may cause serious calcifications of internal organs. Continuous monitoring of phosphorus and calcium levels in the blood is heavily recommended.

Methods of pharmacological treatment:

- to reduce excessive phosphate levels, Almagel is taken orally at 1–2 teaspoons 4 times a day;
- reduction of blood pressure is attained by combinations of antihypertensive drugs with diuretics, e.g. furosemide;

- in acidosis, intravenous sodium bicarbonate is indicated as a 5% solution;
- should hematocrit fall below 25%, transfusions of packed RBCs may be required;
- in pericarditis, prednisolone is indicated in small doses; however, dialysis is often more effective in that regard. Dialysis therapy may also be used in case of exacerbated renal insufficiency.

The use of nitrofurantoin derivatives is imperatively recommended against. Special caution should be used when administering chemotherapy drugs and antibiotics in patients with chronic renal failure. Should the patient have concomitant signs of heart failure [4, 38], cardiac glycosides should be dosed in careful small increments, using cautious and conservative approach to dose titration.

Utilization of repeated courses of plasmapheresis contributes to favorable therapeutic outcomes. Regular hemodialysis is prescribed as a treatment modality if medical therapy and other conservative approaches have failed to achieve the expected effects. It is imperative that decisions regarding hemodialysis and renal transplantation are made in a timely manner [3, 23, 27, 30, 45]. Once the timing is correct, this decision may prolong patient's life, potentially achieving years of rehabilitation.

If the patient presents with initial symptoms of acute renal failure, pathogenetic treatment may be initiated immediately. The exact nature of such therapy depends on the causes of acute renal failure. Plasmapheresis (plasma exchange) and anti-shock interventions are recommended.

In addition to shock mitigation methods, antibiotics may be used in septic conditions or other infectious etiologies as indicated. Detoxification therapy is a universal compulsory strategy in renal insufficiency due to any cause. Again, if hematocrit is at or lower than 20%, blood or plasma transfusions should be used. At the initial stages of the disease, 10% mannitol solution is used (the total dose is calculated as 1 g of mannitol per 1 kg of body weight).

A renal diet is used, which prevents high plasma levels of protein and potassium. The daily caloric value of food is increased at the expense of carbohydrates and fats. Daily fluid intake should be approximately 500 ml in excess of urine output and fluid losses with diarrhea and vomiting. If treatment of renal failure is timely and correct, patients usually have high chances of convalescence.

Prophylaxis of acute renal failure comes down to preventing its causative factors [41]. Accurate identification of the causes of the disease, comprehensive diagnosis by an experienced physician [14, 17, 20, 28, 42] and a timely initiated treatment will help avoid serious complications [4, 23, 38] and maintain health and well-being of the patient.

Prophylaxis of chronic renal failure mainly includes management of such conditions as pyelonephritis, glomerulonephritis and urolithiasis.

Chronic kidney disease [22, 24, 25] is accompanied by development of secondary (symptomatic) hypertension, which is often refractory to drug treatment. Chronic renal failure, as a finale of kidney disease, disables the patients and requires immense financial expenditures [11].

In care for and monitoring of patients with renal and urinary system diseases, the role of a nurse can hardly be overestimated [5, 17, 26, 43, 44], both in routine daily care and during provision of emergency care, when prompt and competent actions of the nurse make an indispensable contribution to improvement and the patient's well-being.

CHAPTER 2

THE OBJECT OF RESEARCH AND METHODS OF STUDY

In this research study, in order to review and evaluate the characteristic features of nursing process when providing care to patients with renal failure, we have conducted scientific observation and study of 216 patients diagnosed with chronic kidney disease.

The following methods are used for diagnosis of chronic kidney disease: general clinical assessments, patient complaints documentation, laboratory tests and radiological diagnostic methods, as well as functional tests.

The following complaints are allowing to suspect kidney and urinary tract disease and functional impairments:

- edema of feet, lower legs and face;
- pain and discomfort in lumbar area;
- visual changes of urine (red, brown, cloudy, foamy; containing flakes and sediment);
- increased urge to urinate, urgency (the patient finds it difficult to endure the urge; they must run to a toilet immediately), difficulty urinating (weak stream of urine);
- reduced daily urine output (to less than 500 ml);
- polyuria, impaired concentration of urine by kidneys during the night (regular nocturnal urges);
- constantly feeling thirsty;
- poor appetite, aversion to meat;
- general weakness, malaise;
- shortness of breath, decreased exercise tolerance;
- increased blood pressure, often accompanied by headaches and dizziness;
- chest pain, palpitations or irregular heart beats;
- pruritus.

However, none of these symptoms is specific to renal failure. The particular risk of chronic kidney disease, as well as diabetes and hypertension is that over a long time the disease may cause no complaints that would otherwise cause the patient to seek medical attention and start the treatment.

Therefore, the diagnosis of CKD is based on laboratory and radiological assessments. The organization of regular screening tests is of critical importance.

To identify patients with chronic kidney disease, the available simple diagnostic tests are used, such as urinalysis, serum biochemistry with creatinine (creatinine levels are used to calculate glomerular filtration rate with a special formula) and renal ultrasonography. Patients at risk for CKD and protein-free urinalysis reports may need microalbuminuria test for early detection of CKD.

There are two strategies in detection of chronic kidney disease: the approach based on screening (as part of a population-wide health screening) and preventive measures across the population, and the approach focused on targeted work with high-risk patients.

Renal impairment may be diagnosed based on serum creatinine assessments. However, this method does not accommodate anthropometric, gender-specific and age-specific patient characteristics, which may lead to serious errors. In patients with severe renal impairment, blood creatinine levels provide an overestimated assessment of glomerular filtration rate.

There are computer programs/nomograms, which allow calculating GFR in practical work from the known creatinine level in the patient's blood. Determination of endogenous creatinine clearance (known as Rehberg test) provides for a more precise reflection of filtration function in patients with normal and high GFR.

Identification of microalbuminuria is of special significance in early diagnosis of CKD in patients with diabetes mellitus and hypertension. For an extended time, the renal impairment in these two diseases is not accompanied by a significant loss of protein as detected in urinalysis or using a dip stick

proteinuria test. To date, microalbuminuria is a cardiovascular risk factor with proven sensitivity in this category of patients.

This research study has also used the following scientific methods: analysis of scientific literature, statistical methods and analysis of study results. Excel software package (Microsoft, USA) was used for statistical processing of study results.

CHAPTER 3

BASIC KNOWLEDGE AND SKILLS OF THE NURSE FOR TIMELY DETECTION OF RENAL FAILURE IN THE PATIENT

The nurses that specialize in providing care to patients with renal failure should be proficient in all the necessary skills and knowledge regarding renal failure. Likewise, the nurses who specialize in caring for patients with other diseases should have a basic knowledge of kidney disease in order to be capable of timely identification of emerging renal failure in the patient and of taking all necessary measures for diagnosis and treatment.

Chronic kidney disease (CKD) is a large group of diseases that have different causes, but a common denominator of protracted course (longer than 3 months) and a tendency to progress down to a complete loss of kidney function.

A nurse of any specialty should arrange for a physician's consultation if he/she notices that a patient has any of the potential signs and symptoms of CKD listed below:

- Changes in urination

Healthy kidneys filter blood to form urine. When the kidneys are not functioning well, problems with urination may occur, such as the need to urinate more often or signs of blood in the urine. Foamy urine may also be a sign that protein breaks through the renal barrier due to kidney damage.

- Fatigue

Reduced kidney function may lead to a buildup of toxins in the blood, which makes the patient feel a lack of energy or extreme fatigue. CKD may also cause anemia, which makes patients feel tired or weak due to insufficient red blood cell counts.

- Itching

Dry skin and itching can be a sign that the patient has an imbalance of minerals and nutrients in the blood due to kidney disease. Itching is frequently caused by high levels of phosphorus in the blood.

- Swelling of the arms, legs or feet

If the kidneys are not removing excess fluid and sodium from the body, swelling may appear in the lower extremities.

- Dyspnea

Failure of the kidneys to evacuate fluid adequately may lead to accumulation of excess fluid in the lungs, which may cause dyspnea. The damaged kidneys produce less erythropoietin, a hormone that signals bone marrow to produce red blood cells. The resulting anemia due to lower oxygen-carrying capacity of the blood may also manifest with dyspnea.

- Back pain

The patient may report local pain in the kidney area, which is either unalterable or increases with movement or stretching. The kidneys are located on either side of the spine in a retroperitoneal position, and kidney problems can cause pain in this area. Back pain may also be associated with kidney infection and/or obstruction, potentially leading to kidney damage.

- Decreased appetite

Accumulation of toxins due to renal impairment may lead to loss of appetite, which may manifest as a false sense of satiety, nausea or feeling “too tired to eat”.

- Periorbital edema

Loss of protein due to kidney damage may cause a persistent periorbital edema, which can be an early sign of kidney disease.

- Abnormal levels of phosphorus, calcium, or vitamin D

Renal impairment may cause electrolyte imbalance, such as low calcium level or high phosphorus level, which may lead to muscle spasms.

- Abnormal results of urine test

High levels of protein in urine, referred to as proteinuria, suggest serious kidney disease. Healthy kidneys filter off low molecular weight waste products and excessive fluid, while allowing protein and other higher molecular weight compounds return to the bloodstream. However, when kidneys fail to function properly, the protein gets into urine.

- High blood pressure.

Excess of fluid and sodium due to kidney disease may lead to increased blood pressure. High blood pressure may in turn damage renal vessels and cause the kidney disease to worsen over time.

In this research study, we have conducted an investigation into potential signs and symptoms of CKD in 216 patients. In all the 216 patients that we were observing, potential signs and symptoms of CKD were found quite often and were distributed in the following manner:

- Changes in urination were observed in 132 patients;
- Fatigue was observed in 216 patients;
- Itching was observed in 26 patients;
- Swelling of the arms, legs or feet was observed in 165 patients;
- Dyspnea was observed in 43 patients;
- Back pain was observed in 26 patients;
- Reduced appetite was observed in 153 patients;
- Periorbital edema was observed in 169 patients;
- Abnormal levels of phosphorus, calcium, or vitamin D were observed in 85 patients;
- Abnormal results of urine test were observed in 216 patients;
- High blood pressure was observed in 126 patients.

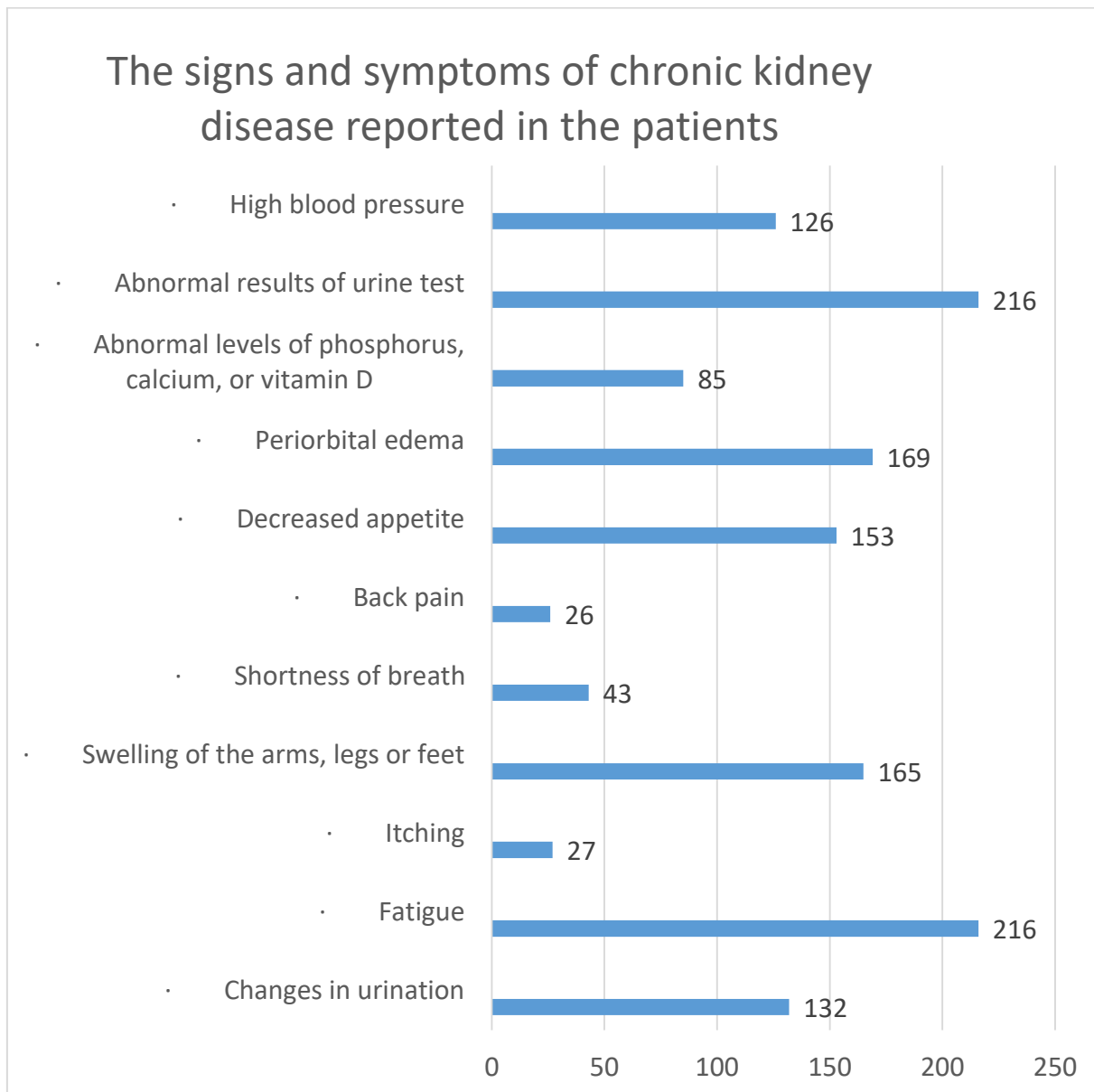


Figure 3.1. The signs and symptoms of chronic kidney disease reported in the patients

The nurse of any professional profile should know the risk factors of renal failure:

- Family history or predisposition
- If anyone in the family has/had kidney disease
- Age above 50 years
- Other health problems
- Diabetes (with high blood sugar levels)

- Hypertension (with blood pressure well above age-related tolerances)
- Cardiovascular disease
- Kidney or ureter obstruction
- Obesity
- Systemic lupus erythematosus
- Ethnicity (African, Hispanic or Native American): certain ethnic groups are more prone to diabetes and high blood pressure, which are the risk factors for CKD.
- Lifestyle
- Excessive use of medications with ibuprofen, naproxen, or acetaminophen.
- Chronic medical use or abuse of narcotic substances.

The following risk factors of renal failure have been seen among the 216 patients in our study.

- Family history or hereditary predisposition has been detected in 132 patients.
- That is, 132 patients had someone in their family with kidney disease.
- Age over 50 years was found in 84 patients;
- Health problems (presence of chronic disease) were detected in 128 patients.
- Diabetes (with high blood sugar levels) was detected in 27 patients.
- Hypertension (with blood pressure well above age-related tolerances) was detected in 126 patients;
- Cardiovascular disease was detected in 159 patients;
- Kidney or ureter obstruction was detected in 14 patients;
- Obesity was detected in 84 patients;
- Systemic lupus erythematosus was detected in 1 patient;

- Excessive use of medications with ibuprofen, naproxen, or acetaminophen was detected in 8 patients;
- Chronic medical use or abuse of narcotic substances was detected in 3 patients.

The detected risk factors of renal failure are reflected in Figure 3.2.

The nurse of any professional profile should know the main causes of renal failure.

There are different causes of renal impairment. Two of the most common causes include diabetes mellitus and high blood pressure.

Diabetes mellitus. There are two types of diabetes: type 1 diabetes and type 2 diabetes. Type 1 diabetes means that the body is not producing sufficient amounts of insulin, a hormone that regulates the level of blood sugar. Type 2 diabetes means that the tissues become insensitive to the effects of the insulin produced in the body.

If diabetes is not adequately controlled, the sugar starts accumulating in the blood. When the level of sugar in the blood becomes too high, it may damage the kidneys and reduce their function, which consists in filtration of metabolic by-products and fluid. In spite of the fact that diabetes treatment has improved, many people may still develop kidney damage 20-30 days from the onset of the disease.

Risk factors of renal failure

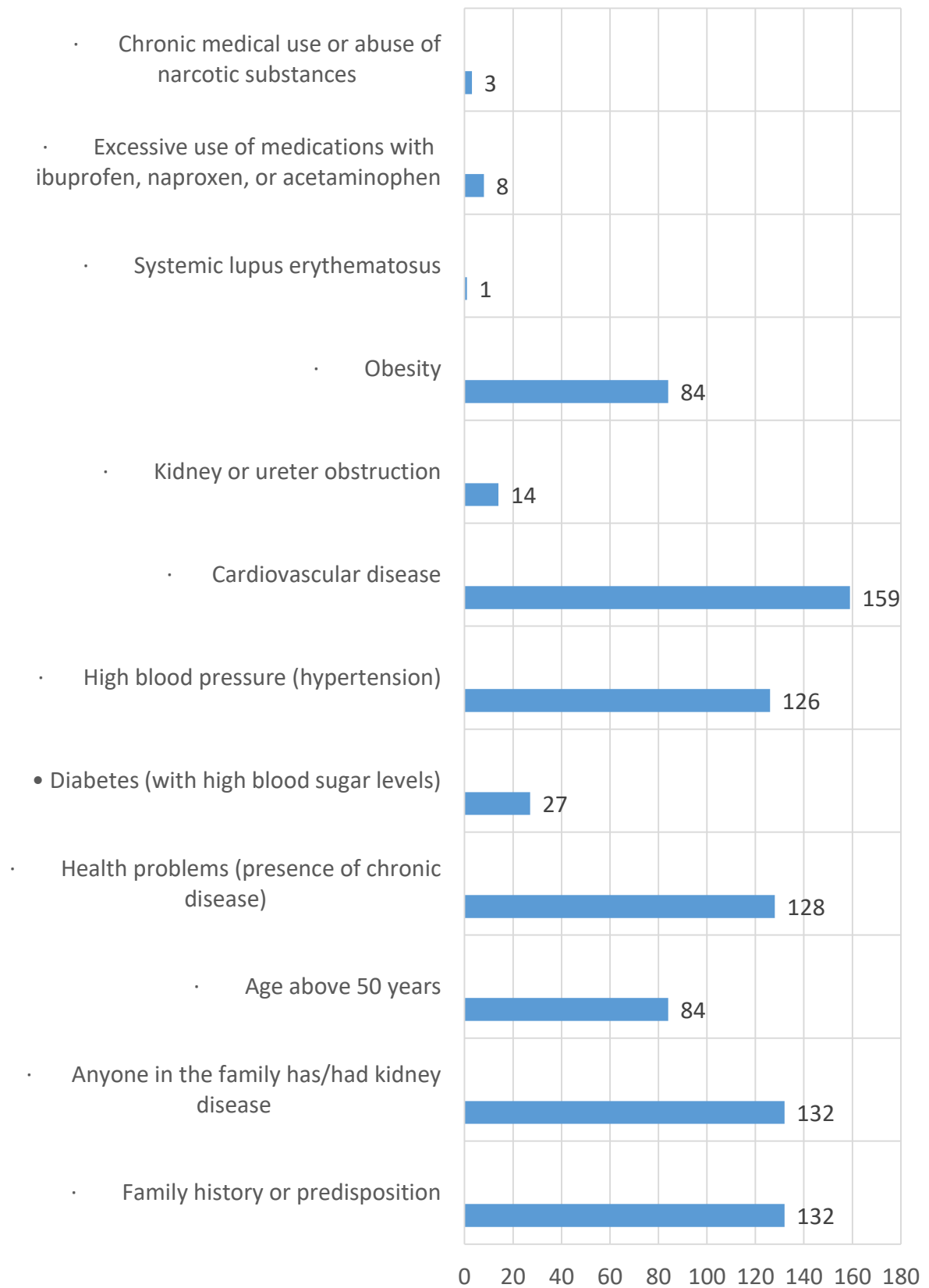


Figure 3.2. Risk factors of renal failure detected in patients with chronic kidney disease

High blood pressure (hypertension). High blood pressure occurs when the pressure of blood on the walls of blood vessels is increased. High blood pressure damages small blood vessels in the kidneys and impedes normal filtration process. In many cases, the causes of high blood pressure are mostly unknown; such situation is referred to as idiopathic hypertension. Nevertheless, in many cases high blood pressure is tentatively associated with general health, lifestyle and nutrition.

Inflammation of the kidneys (glomerulonephritis). Another common type of kidney disease is inflammation of filtrating units of the kidneys. This may cause reduced outflow of urine, penetration of blood and protein into the urine and swelling of periorbital areas, hands and feet (edema).

Other causes of renal failure. Polycystic kidney disease is a hereditary disease, which may cause formation of cysts in the kidneys and lead to renal failure.

Obstructions of urinary outflow may cause a reverse flow of urine to the kidneys, which may damage them. The obstructions may be caused by narrowing of the urethral lumen, which may be caused by the sequelae of trauma, tumors or prostatic hyperplasia in males; strictures may also develop in an obstetrical setting.

Recurrent urinary tract infections may also be causes of renal failure.

Unknown causes. Approximately 20% of dialysis patients do not know the causes of their renal failure. These patients often initially seek treatment when their renal failure is already advanced, and it is often difficult to establish the cause of the disease on this stage.

CHAPTER 4

THE ROLE OF THE NURSE IN MANAGEMENT OF PATIENTS WITH RENAL FAILURE

Taking into account that chronic kidney disease is a slowly progressing condition and that it may initially cause few if any complaints in the patient, its diagnosis and treatment often does not occur at the initial stage. The group of conditions referred to as chronic kidney disease includes a number of renal conditions where renal function is declining over several years to decades.

Since the treatment of patients with chronic renal conditions depends on the severity stage of the disease, these stages need to be considered here. Chronic kidney disease has five stages of severity (see Table 4.1 below). The severity stage of kidney damage depends on the glomerular filtration rate (GFR), which is used as an assessment of renal function. Further therapeutic strategies in chronic kidney disease are determined by the severity stage of chronic kidney disease.

Table 4.1. Severity stages of kidney disease

Severity stage	Description	GFR
1	Evidence of kidney damage (albuminuria or protein in the urine), but at the same time GFR is within normal range.	GFR > 90 ml/min
2	Small reduction in GFR	GFR = 60–89 ml/min
3A	Moderately reduced GFR (early symptoms of renal failure occur)	GFR = 45–59 ml/min
3B		GFR = 30–

		44 ml/min
4	Severely reduced GFR (i.e. the predialysis stage; late symptoms of renal failure occur).	GFR = 15–29 ml/min
5	End-stage, terminal stage renal failure (uremia occurs; the patient requires renal substitution therapy).	GFR < 15 ml/min

The diagnosis of kidney disease should account for the following two simple blood test parameters: glomerular filtration rate (GFR) and serum creatinine level. Creatinine is one of those end products of protein metabolism where level in the blood depends on age, gender, muscle mass, diet, physical activity and the foods eaten prior to obtaining the sample (for example, the results of the test may be confounded by eating a lot of meat before the test), as well as some medications.

Creatinine is eliminated from the body by the kidneys; if kidney function slows down, the plasma levels of creatinine increase. Assessment of creatinine level alone is not enough to diagnose chronic kidney disease, since creatinine does not start exceeding the upper limit of normal before GFR has decreased twice.

GFR is calculated from the expression that includes four parameters, which account for creatinine level, age, gender and race of the patient. GFR shows the level of renal filtration capacity. In case of chronic kidney disease, GFR indicates the severity stage of kidney disease (see Table 1), which will determine the patient's treatment to a large degree.

The patient's treatment also accounts for urinalysis, i.e. levels of albumin in the urine are determined; in addition to that, albumin: creatinine ratio is determined in the urine. Albumin is a urinary protein normally found in minimal quantities in the urine. Even small increases of urinary albumin may be an early sign of incipient kidney disease in some people, especially in those with diabetes and elevated blood pressure. If renal function is normal, the level of albumin in

the urine should not exceed 3 mg/mmol (or 30 mg/g). If albumin is excreted in even larger amounts, this is already an indication of kidney disease. If urinary albumin excretion exceeds 300 mg/g, other proteins are excreted with the urine as well, and this phenomenon is referred to as proteinuria.

If after obtaining a urinalysis report the physician suspects kidney disease, an additional urine test for albumin is ordered. If either albuminuria or proteinuria is found in a repeated test within three months, this suggests a diagnosis of chronic kidney disease.

As noted earlier, the treatment options in chronic kidney disease depend on the severity stage of kidney disease, on comorbidities and on other health problems, and include the following approaches:

- Treatment of the underlying disease
- Feasible restrictions of dietary protein, phosphate and potassium
- Vitamin D supplements
- Treatment of anemia
- Treatment of concomitant disease (e.g., heart failure, diabetes mellitus, nephrolithiasis, benign prostatic hyperplasia)
- Dose adjustments of medications as required
- Dialysis in a significant reduction in glomerular filtration rate (GFR), if these signs and symptoms are insufficiently treatable with drug interventions
- Maintaining sodium bicarbonate levels within a normal range of 23–29 mmol/l

Management of underlying disease and risk factors In particular, controlling hyperglycemia in patients with diabetic nephropathy and controlling hypertension in all patients may substantially delay the deterioration of glomerular filtration.

Treatment may also include:

- Treatment of elevated blood pressure
- Treatment of diabetes

- Reduction of body weight in overweight individuals
- Lifestyle modifications: healthy nutrition, restriction of dietary salt, sufficient physical activity, smoking cessation and limiting alcohol consumption.
- Dialysis treatment and kidney transplantation in case of chronic kidney disease in the last severity stages (severity stage 5).
- Psychological counseling and support.

Treatment of high blood pressure in a setting of chronic kidney disease. If untreated, high blood pressure may cause renal impairment, cardiovascular disease (including stroke) or eye problems. Elevated blood pressure may damage renal arteries and reduce the functional capacity of the kidneys. Kidneys with damaged arteries may no longer be able to effectively excrete metabolic end products or excessive fluid from the body. Due to excessive fluid, the blood pressure begins to rise even more.

It is important to maintain blood pressure within normal range. Regardless of the age, optimal blood pressure should not exceed 140/90 mm Hg.

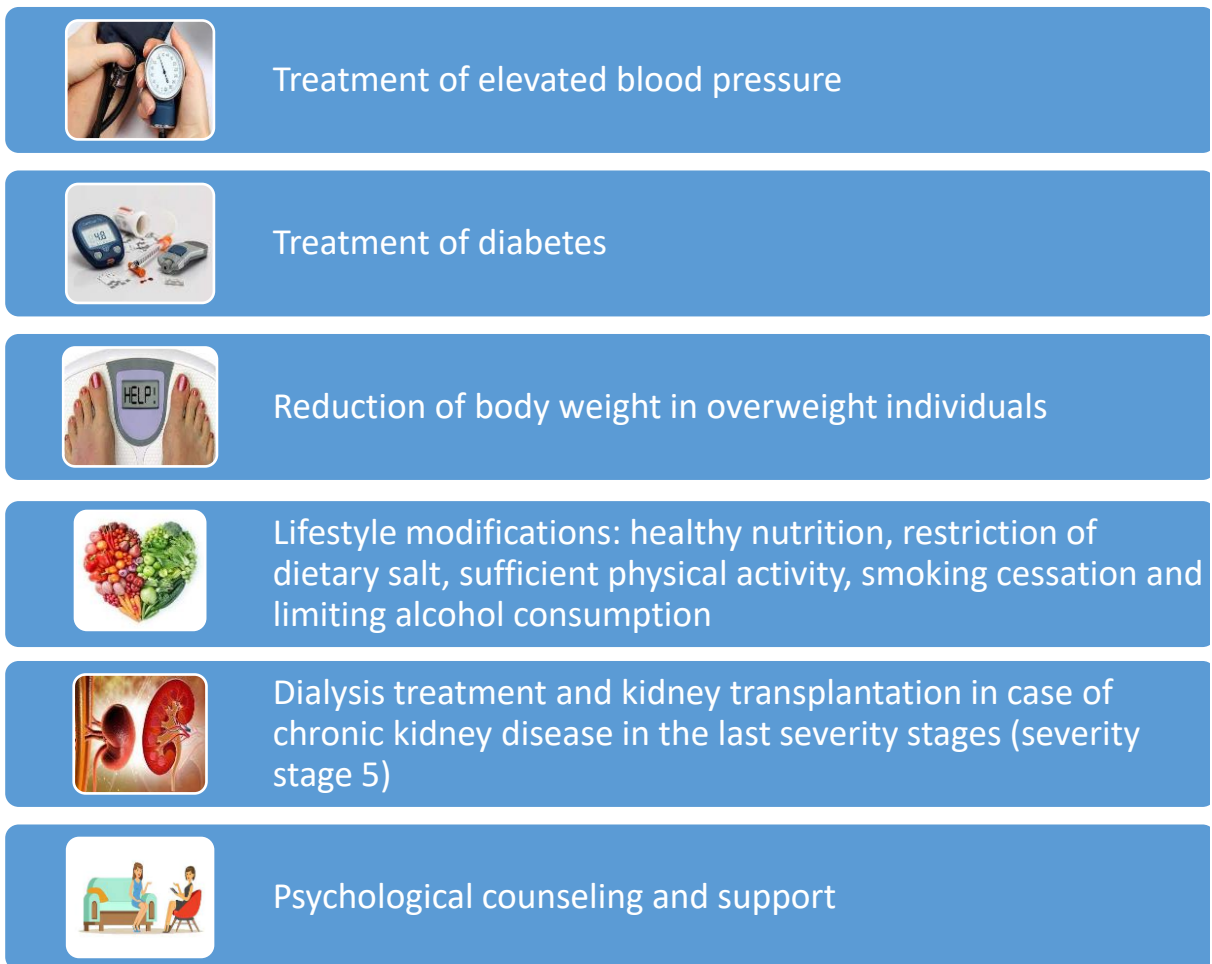


Figure 4.1. Treatment of chronic kidney disease

If the patient has chronic kidney disease and additional risk factors (for example, albuminuria, diabetes and cardiovascular disease), blood pressure should be maintained at 130/80 mm Hg.

The best way to measure blood pressure and maintain it under control is self-monitoring of blood pressure in the home and/or at the pharmacist's using a household-grade blood pressure monitor (sphygmomanometer).

These issues the nurse will need to discuss with the patient and with the patient's treating physician. The doctor may refer the patient to a cardiologist or an ophthalmologist if necessary. Apart from taking oral drugs and monitoring blood pressure, healthy lifestyle is playing a very important role in the treatment program.

In order to prevent kidney damage and/or slow down the progression of disease, it is very important to control blood sugar levels. Plentiful evidence suggests that the glycated hemoglobin (HbA1c) level is a reliable marker of efficiency of blood sugar control (i.e. dietary and drug therapy compliance) in people with diabetes. The target level in diabetic patients is 53 mmol/mol or less than 7%.

Patients may measure their blood glucose levels independently using a portable glucometer. Measuring blood sugar enables the patients to maintain it at target or near target levels. The patient may also request advice and additional information from their family physician, endocrinologist or a diabetes nurse. The best time to measure blood sugar level is on an empty stomach (fasted) or 1.5–2 hours after meals.

If the patient has chronic kidney disease, the nurse will need additional information about the drugs the patient is taking. This includes the following special aspects:

- The special aspects of taking antihypertensive drugs

In order to manage hypertension associated with chronic kidney disease, the physicians commonly prescribe angiotensin-converting enzyme (ACE) inhibitors, colloquially referred to as “-prils”, e.g. enalapril, ramipril, fosinopril, captopril, etc or angiotensin II receptor blockers (ARB, colloquially referred to as “sartans”), e.g. valsartan, telmisartan, losartan, olmesartan, candesartan. Multiple studies have shown that these drugs delay the progression of chronic kidney disease.

At the same time, these drugs increase the risk of hyperkalemia (serum potassium may escalate to dangerous levels). This risk is multiplied once drugs of the two classes are taken simultaneously. The risk of hyperkalemia is increased in connection with reduced renal function (i.e. GFR findings).

It is recommended that all people with chronic kidney disease have regular GFR checkups at their family physician's office or with other treating

physician; the frequency of such checkups depends on kidney function and on any concomitant risks.

- The special aspects of taking anti-diabetes drugs

The drug of initial choice in treatment of type 2 diabetes is metformin. Metformin is used in order to control blood sugar levels and to reduce cholesterol; in addition to that, metformin reduces the risks of cardiovascular disease. In case of chronic kidney disease, there is a substantial risk for drug-induced acidosis due to impaired renal function.

If GFR is from 30 to 45 ml/min/1.73 m² (Stage G3B), the dose of metformin should be reduced; if GFR is less than 30 ml/min/1.73 m² (Stages G4–G5), metformin may need to be discontinued and other drugs may need to be used instead. The treatment plan needs to be discussed with the treating physician.

- The specific aspects of using other drugs commonly used for treatment of various disease:

- The statins are used to prevent cardiovascular disease. The statins reduce cholesterol levels in the blood. The use of statins in patients with chronic kidney disease yields favorable results in prevention of serious cardiovascular sequelae.

- Aspirin is often used as primordial prevention of cardiovascular disease. Aspirin has blood thinning properties; this is why risk for bleeding is increased in people who take aspirin. If the patient has any cardiovascular disease and needs to take aspirin, the nurse and the physician should collaboratively assess the ratio of potential benefit and risk of bleeding. At the same time, the health team should take the patient's general health and comorbidities into account.

- Non-steroidal anti-inflammatory drugs. If the patient is regularly taking non-steroidal anti-inflammatory drugs (NSAIDs), such as ibuprofen, naproxen, diclofenac or celecoxib, it is preferable to check renal function at least once a year. The patient should avoid taking NSAIDs if GFR value is too low (up to 30 ml/min/1.73 m²). NSAIDs should not be taken with aspirin. If a cardiologist has prescribed aspirin, the patient will need to consult with their doctor

regarding the treatments for joint disease and pain that can be safely taken concomitantly.

Digoxin is a medicine widely used to treat heart failure and certain types of irregular cardiac activity. In the case of chronic kidney disease, digoxin should be taken with caution and renal function should be carefully taken into consideration. With a decrease in renal function, serum digoxin levels may increase. Since digoxin has a narrow margin of safety, accumulation of digoxin in the body may quickly lead to serious toxicity.

- Special considerations for antibiotic use. Aminoglycosides are a specific type of antibiotic drugs that are used to treat a variety of bacterial diseases (for example, pneumonia, acute bronchitis, and other inflammatory diseases). The use of aminoglycosides is a common cause of toxic drug-induced kidney damage (i.e. the damage by nephrotoxic drugs). Sometimes administration of aminoglycosides is necessary. Aminoglycosides are prescribed by the physician who may control drug concentration in the blood.

- Vitamin D. Before taking vitamin D, the patient needs to consult their family physician, general practitioner or treating physician. In case of vitamin D deficiency and chronic kidney disease, the intake of vitamin D should be preferably based on assessment of vitamin D (25-OH) levels. When patients take vitamin D, certain side effects are possible, which may depend on the severity stage of chronic kidney disease (excessive calcium in the blood, rapid progression of chronic kidney disease, etc.).

The nurse should provide the patient with chronic kidney disease with the following recommendations:

- Use only the drugs, which have been prescribed or explicitly allowed by the physician. Some drugs may damage the kidneys.
- Know the names and doses of all your drugs. Take them only as prescribed by the physician. Use only such food supplements and vitamins, as recommended by the doctor.

- Thoroughly discuss any questions or concerns related to drugs and/or vitamin or dietary supplements with the treating physician or the nurse.
- When visiting other doctors, the patients should always let them know that they have chronic kidney disease. The patients should also inform their treating physician about any treatments prescribed by another doctor.

The nurse should know the specific aspects of diet in patients with chronic kidney disease.

The treating physician will advise the patient concerning dietary guidelines according to how renal function is changed during the disease. Based on the results of blood tests, the physician will assess whether the patient is receiving the required nutrients and calories in sufficient amounts. Accumulation of certain substances in the body (such as potassium) may begin in progressive chronic kidney disease. In case of chronic kidney disease, it is important to eat properly, making sure the diet is well-balanced and diverse. This will help the kidneys manage their function in a better way. Monitoring the patient's diet with the healthcare provider and its appropriate modifications may help protect the patient's kidneys and prevent progression of chronic kidney disease. In case of mild renal impairment, the so-called nutritional pyramid may be taken as the basis for the dietary regimen, but in case of severe renal impairment, the diet needs to be closely coordinated with the physician.

If the patient is losing too much weight, the physician may recommend special-purpose dietary supplementation. On the other hand, excessive body weight creates an additional burden for the kidneys. In such a case, it is important to discuss with the physician how body weight may be gradually reduced in a safe way. If the patient's body weight is increasing/reducing too rapidly, the patient should notify their physician immediately. A sudden increase in body weight, which is accompanied by edema, problems with respiration and

increased blood pressure may be a sign that the body is accumulating too much fluid.

There is usually no restriction of fluid intake in case of mild to moderate chronic kidney disease. The patient will need to discuss their fluid intake with the doctor. Any signs of fluid retention, such as edema in lower extremities, should be immediately reported to the physician. If kidney disease is progressing with increasing intensity, limiting daily fluid intakes may become necessary.

If the physician advised the patient to limit fluid intake, the nurse's responsibility is to teach the patient to manage his/her fluid intake; in part, the nurse may provide the following recommendations to the patient:

- Have the patient specify the maximum amount of fluid that he/she can take during the day. Start each day by filling a pitcher with the allowed amount of water. If the patient drinks tea, coffee or other drinks during the day, tell them to pour out the corresponding amount of water from the pitcher. If the jar is empty, this means that the patient has already used the prescribed fluid limit.
- It should be kept in mind that many solid foods contain substantial amounts of fluid; the patient will also need to account for the fluid consumed with soups.
- The nurse shall advise the patient to choose healthy beverages. The patient should be taught to monitor the sugar, phosphorus, and calcium content in their beverages.
- If the patient is eating canned foods, the edible fluid from the container should also be taken into account towards the daily limit; otherwise, the patient should drain any excessive fluid from the can before eating its contents.

If the patient with chronic kidney disease is a vegetarian/vegan, they should make sure they inform their doctor. A vegetarian/vegan diet may contain foods that are excessively high in potassium and phosphorus, and at the same time contain less protein. With their daily food, the patient needs to receive a

balanced and properly combined amount of plant proteins, as well as the required amount of calories. At the same time, the levels of potassium and phosphorus in the blood should be carefully controlled. If the diet does not contain a sufficient amount of calories, the body begins to consume proteins in order to produce energy.

The nurse may also provide the patient with chronic kidney disease with the following recommendations:

- If the patients need to limit the consumption of a certain type of food, they need to discuss with their physicians or nurses how to build the diet correctly in order to be still receiving the required nutrients and calories with daily servings of food.
- Advise the patient to make reading food labels their routine practice in order to know how much sodium, protein, potassium, phosphorus and calcium is found in various foods.
- If the patient is overweight, advise them on a suitable weight reduction program. Weight reduction will keep the kidneys working in a relatively normal mode for a longer time.
- If the patient's body weight is changing too fast, the patient should contact their doctor as soon as possible.
- Whenever not contraindicated, the patient should be advised to drink sufficient fluid.
- An important dietary consideration is to limit consumption of salt.

In this series of the research work, we provided all 217 patients with chronic kidney disease with the aforementioned recommendations and explained the specific aspects of treatment of patients diagnosed with chronic kidney disease depending on the severity of renal failure.

CHAPTER 5

THE ROLE OF THE NURSE IN DETECTING THE COMPLICATIONS OF CHRONIC KIDNEY DISEASE AND THEIR TREATMENT

The development of complications of chronic kidney disease directly depends on the severity of renal impairment, which can be detected by determining GFR levels and the quantitative parameters of albuminuria/proteinuria. As GFR declines, the complications become more frequent and severe.

The principal complications:

Malnutrition, i.e. insufficient dietary calories and/or protein.

Metabolic acidosis, an acid-base imbalance caused by impaired kidney function. When the kidneys do not filter sufficient volumes of blood, this results in reduced excretion of acid (hydrogen ions).

The serum levels of potassium begin to exceed normal limits (hyperkalemia) as potassium excretion is also deteriorating due to renal impairment. This may be caused by consumption of high-potassium foods and, to a greater extent, by taking medicines that affect potassium excretion (such as angiotensin-converting enzyme inhibitors, angiotensin II receptor blockers, potassium-sparing diuretics, etc.).

Disorders of the mineral balance (lack of calcium and vitamin D and excessive phosphorus) and diseases of the skeletal system (i.e. renal osteodystrophy) are another extrarenal implication of kidney disease. The risk of skeletal disease is the highest when the severity of chronic kidney disease reaches stage 3a–5. The blood levels of phosphorus, vitamin D and calcium are assessed with a blood test.

Diseases of the skeletal system are frequent complications of chronic kidney disease. Due to kidney damage, excess phosphates are not eliminated from the body through the blood and thus hyperfunction of the parathyroid gland

occurs (i.e., the level of the parathyroid hormone increases). This, in turn, causes intensive loss of calcium from the bones.

If untreated, such imbalances of calcium and phosphorus in the body lead to disruption of ossification, bone pain and fractures. The other aspect of calcium and phosphorus imbalance includes formation of calcifications which may involve internal organs and the walls of blood vessels. This may be the reason for disrupted functioning of these organs.

Anemia may result from impaired erythropoiesis in blood-forming organs and low levels of iron in the blood.

Cardiovascular disease contributes to dyslipidemia, an increase in cholesterol in the blood and changes in its structure.

Chronic kidney disease is frequently accompanied by comorbid heart disease. Due to low exercise levels, unhealthy diet and excessive body weight blood cholesterol levels may increase, which in turn can damage arterial blood vessels in all organs and increase the risk of cardiovascular disease.

Anemia in chronic kidney disease

If kidneys are compromised by injury or disease, they are not producing sufficient amounts of erythropoietin (EPO). The erythropoietin produced by the kidneys is essential for the formation of red blood cells (erythrocytes) in the bone marrow. Red blood cells are involved in the transport of oxygen in the body. If the kidneys fail to produce sufficient amounts of erythropoietin, and the number of red blood cells consequently decreases, anemia begins to develop. Anemia is observed in the majority of people with chronic kidney disease.

Another common cause of anemia is inadequate supply and/or absorption of iron, vitamin B and folate.

Symptoms of anemia include:

- pallor
- fatigue
- lack of energy
- loss of appetite

- sleep disorders
- reduced concentration
- dizziness and headache
- palpitations
- shortness of breath

Anemia is more frequent in the following patients:

- - patients with moderately and severely impaired renal function (chronic kidney disease of severity stage 3 or 4);
- - patients with end-stage renal failure (severity stage 5).

Not all people with chronic kidney disease develop symptoms of anemia. However, if a patient has chronic kidney disease, then a hemoglobin (Hb) blood test for potential anemia is mandatory a minimum once a year. Hemoglobin is a part of red blood cells, which carry oxygen throughout the body. If the hemoglobin level is too low, it is important to find out the cause of the anemia in order to plan the correct treatment regimen.

The treatment of anemia may be diverse depending on the types of causes. The treatment of anemia is of paramount importance since it helps prevent heart disease and many other health problems. If the patient already has an underlying heart disease, successful management of anemia may help reduce the risk of its progression.

The therapeutic options in anemia:

Targeted treatment with erythropoietin-stimulating agents (ESA). The physician will discuss the benefits and risks of ESA with the patient prior to treatment and monitor the effects of ESA during treatment. ESA treatment is not always justified; in some patients, iron supplementation is sufficient.

Iron-containing drugs. Iron-containing drugs are safe in most people. If the patient is allergic to certain drugs, they need to report this to their physician. In some rare cases, side effects of iron supplementation may include low blood pressure, nausea, vomiting, diarrhea, and excess of iron in the body. Some of these reactions may be hazardous and damage the patient's health.

The physician will order a blood test to monitor iron content in the blood and will decide on a safe and appropriate method for taking iron-containing drugs. Iron can be taken either as food supplements, oral tablets or injections.

Vitamin B12 and folic acid. These drugs help balance the treatment program in anemia. In order to help maintain a coordinated and safe treatment, the physician may advise the patient to take vitamin B12 and folic acid supplementation or add/increase the use of foods that are rich in these essential micronutrients.

Blood transfusion. If hemoglobin level in the blood falls too much, the patient may be prescribed blood transfusion (mostly as packed red blood cells). The intravenously administered red blood cells (RBCs) will increase RBC counts in the blood, which in turn will improve the supply of oxygen to the body.

Hemodialysis and hemodiafiltration (HDF) are the methods of renal replacement therapy (RRT), which ensures clearance of the blood from uremic toxins, manages water and electrolyte disturbances in patients with end-stage chronic kidney disease, the typical signs of which include endogenous toxicosis and critically reduced or even absent urine output.

This category of patients is characterized by the presence of severe concomitant and underlying disease (such as hypertension, multifocal atherosclerosis, diabetes mellitus, anemia, disorders of calcium and phosphorus metabolism, etc.) It is also important to mention a number of special aspects of renal replacement therapy associated with the maintenance and functioning of various vascular access types, the required blood flow velocity in the extracorporeal circuit, the volemic and hemodynamic changes in the patients receiving ultrafiltration, maintaining target anticoagulation levels and ensuring both the efficacy of the procedure and the absence of hemorrhagic complications.

Hemodialysis is a procedure which involves purification of the blood outside the patient's body. In this type of treatment, blood is circulating through the filter (dialyzer) connected to a dialysis machine. Each procedure usually takes 4 to 5 hours and should be performed at least three times a week.

The nurse needs to be well versed in how hemodialysis works. The dialyzer is where metabolic waste and excessive fluid are removed from the patient's blood. The key feature of the dialyzer is that it consists of a bundle of thin semi-permeable membranes. The membranes act as a barrier between the blood and the dialysis fluid and allow the selective movement of substances from and into the blood.

This apparently complicated principle is in fact very simple. A sterile plastic tubing is attached to the dialyzer; one tube serves for transporting the blood to the dialyzer, the other serves for returning it into the body. The tubing and the dialyzer (the blood circuit) are attached to the dialysis machine. The machine is safely controlling the blood flow in the blood circuit; blood flow velocity is usually 250-450 ml/min. The total volume of the circuit is 200-300 ml. A typical duration of a full dialysis session is 4-5 hours.

Prior to dialysis treatment, the health care team should ensure vascular access. At the beginning of each session, a small procedure of vascular access preparation should be performed in order to connect to the blood circuit. During the entire dialysis session, the patient should be comfortably placed seating/reclining or lying supine in a chair or in a bed; the patient will be able to read, listen to audio entertainment or sleep. The patient may also be able to use their laptop computer, tablet or smartphone, browse the Internet, etc.

During the procedure, the patient may be administered certain drug products directly into the blood circuit. The nurses will also control the patient's condition and the operation of the dialysis machine. At the end of the dialysis session, another small procedure is used to disconnect the patient from the blood circuit.

After the session, the patient may feel fatigue.

The dialysis procedure is not painful by itself. Nevertheless, the patient may experience some adverse effects. Dialysis-related fatigue is associated with the duration of the procedure. Treatments for this symptom include dietary adjustments and regular exercise. This may boost the patient's overall energy level. Some people may experience nausea, dizziness or muscle twitching during a dialysis session. If the patient has such problems, the health care personnel will do all they can to help the patient manage these problems.

Considering these characteristic features, the nursing work in a hemodialysis department presupposes strict adherence to the following protocols: equipment operation, assessment of patient's baseline condition and its changes during the dialysis treatment, early diagnosis of complications and the plan of action in complication management.

Based on our experience we have developed the following criteria for nursing work, which ensure the safety of the patient when conducting renal replacement therapy:

1. Being able to assess the clinical status of the patient (the concept of "dry weight", interpretation of vital signs monitoring data, etc.
2. Adhering to aseptic and antiseptic precautions when preparing the artificial kidney for operation.
3. Ability to assess the efficiency of functioning and establish vascular access and vascular access care (native AV fistula, synthetic AV prosthesis, tunnelled or permanent catheter).
4. Providing for prevention of communicable infections.
5. Psychological support of the patient. Patient education concerning the proper diet, fluid intake and concomitant pharmacological therapy.

CHAPTER 6

THE ROLE OF THE NURSE IN IMPROVING THE QUALITY OF LIFE OF PATIENTS WITH RENAL FAILURE

The role of the nurse in improving the quality of life of patients with renal failure is difficult to overemphasize, since the life of patients with chronic kidney disease has a number of special aspects and the knowledge of these aspects is very important in view of patients' interests.

If a patient is diagnosed with chronic kidney disease, at first this may cause an array of very negative feelings. The information about the diagnosis may initially cause shock or disbelief; the patient may become anxious due to a specific situation (e.g. an assessment or a procedure) or due to reasons of general nature (loss of control over the patient's life, reduced quality of life, etc.).

A person may get angry/start blaming others and/or deny the reality: these are normal primary emotional responses. In a while, the person will gradually begin to acknowledge the reality of disease and start adjusting to living with it. After the acceptance stage begins to kick in, the patient may be able to cope with the required changes and adjustments to their life that arise from chronic kidney disease. If negative feelings remain strong over time and are the cause of significant problems with daily living, the patient should definitely tell their doctor about them. When in doctor's office, the patient finds it easier to talk about physical discomforts, i.e. fatigue, malaise, dizziness, etc. It is always more difficult to discuss feelings and many patients try to avoid it. The care for the psychological condition is also important; recognition of the person's feelings and the opportunity to "ventilate" them allows the patient to regain control over their life, and the doctor will be able to find the best opportunity to help the patient.

An important source of stress includes the changes that need to be made in the patient's life, such as dietary changes depending on renal function, adjustment to the disease and remembering to take medications. The patient may

simultaneously receive a lot of new information and understanding the information may be difficult. The best way to deal with stress is to admit the existence of the problem and that it has to be dealt with, and that it would take time. Poor well-being and fatigue (both physical and emotional) can be quite common. Patients may feel exhausted and emotionally vulnerable, to the point of being tearful. Several psychoneurological symptoms may be present, such as irritability, personality disorders, apathy and trouble sleeping. Emotional exhaustion is a frequent cause of general fatigue. This condition may develop and progress slowly and almost imperceptibly. If the feeling of sadness has already escalated to being desperate or hopeless, when there is no longer any motivation due to fatigue, and if this condition lasts longer than 2 weeks, then the patient needs to inform their doctor.

Although the patient cannot change the diagnosis, there are many things the nurse can do to improve the patient's coping with the disease, namely:

The nurse should explain the specific aspects of symptoms and treatment of kidney disease to the patient and provide the patient with the following recommendations:

- Pay attention to your emotions; do not deny them. Even if you think these emotions are not related to your illness, talk about them, because trying to suppress the emotions only increases stress. Share them with people you trust, e.g. loved ones/significant others, friends, your doctor/nurse. No one can read your mind, but well-meaning people can always come to your aid.
- Find and read information about chronic kidney disease and its treatment, and be active when making decisions concerning your treatment plan. Don't be afraid or hesitate to ask questions. Before visiting your doctor, write down any questions you may have. Many patients acknowledge that being aware of their illness and treatment helps feel involved in the treatment process. If it seems to you that you cannot remember everything your doctor said, ask your significant other to come with you to the appointment or write down the important information received.

- Make active attempts at changing your lifestyle and adhering to your doctor's recommendations.
- Take care of yourself. Treat yourself to your favorite things to do: listen to soothing music, read your favorite books or magazines, go to the theater and take walks in nature. It is perfectly normal to tell people how you feel and that you do not want to or cannot participate in social activities.
- If you do not feel like discussing your concerns, you may keep a diary. Sometimes recording your thoughts helps you control your feelings better and this may eventually facilitate talking about them.
- If necessary, do not hesitate to seek professional aid. In case of habitual social problems and mood swings, ask your doctor which specialist physician you should consult.
- Accept help when you need it. When other people are offering help, it is very likely they are sincerely willing to help. This may give them confidence that they make a difference in your life and that you may need them. Your significant others and friends can be your main support resource.
- Local associations of patients with chronic kidney disease or support groups are good places to connect with other patients. There you will be able to receive practical advices, training and emotional support.
- Do not give up on your hobbies and favorite things to do. These will help you relax, maintain contact with your friends and distract a little. It is up to you to decide how much you want to discuss your illness. Rest is very important; since this is the time that you may spend with your significant others, away from your daily chores. If you are planning a trip, inform your physician. Check whether you have had all the necessary tests, whether you have a stock of all your essential medicines, and find out which healthcare institutions you may contact in case of need.

For any person, the ability to work is an important source of self-esteem and satisfaction with life. Being diagnosed with chronic kidney disease does not mean that the patient's work capacity is lost until the moment when the disease

begins to affect work-related activities and daily chores (for instance, the limitations during replacement therapy for the kidneys, which become necessary at the last stages of chronic kidney disease). Of course, the patient should discuss with their physician the acceptable duration of working hours and type of work (for instance, avoidance of lifting heavy weights). The treating physician may refer the patient to the rehabilitation physician.

Living with chronic kidney disease places certain demands, one of which is the need to quit smoking. Smoking may have serious long-term effects on renal function. Tobacco smoke damages blood vessels. People with chronic kidney disease are more prone to cardiovascular disease than healthy individuals. In this regard, smoking is playing a role of a concomitant risk factor. A patient with chronic kidney disease should work with their physician to find the best strategy to quit smoking.

The use of alcohol is not completely contraindicated in people with chronic kidney disease. However, taking alcohol is allowed only in very moderate amounts. Excessive use of alcohol may damage the liver, the heart and the lungs and cause serious health problems.

Exercise and sports activities are not contraindicated in chronic kidney disease. On the contrary, a sufficient amount of physical activity helps cope with the disease better.

Moderate exercise is important because:

- it provides the patient with energy
- muscle strength and resilience is improved
- it helps relax
- it helps maintain blood pressure under control
- the levels of cholesterol and triglycerides in the blood are reduced
- it improves sleep, making it more deep
- it helps maintain a healthy weight
- it helps prevent heart disease and diabetes
- self-confidence and general well-being is improved

The patient may exercise for but a relatively short period of time during the day, but the positive influence of exercise may last the whole day. Before starting regular exercise, the patient should discuss the exercise program with their physician. The physician may help select the suitable types of exercise based on the patient's health status. As required, the treating physician may refer the patient to a physical therapist and/or rehabilitation specialist.

Well-suited activities includes aerobic exercise, such as strolls, Nordic walking, hiking, swimming, aquafitness, riding the bicycle (both indoors and in the open air), skiing, aerobic exercise or other activities where large muscle groups are involved. Yoga-style exercise may be well suited for patients where quiet exercise is preferable.

During an exercise session, the patient should be able to talk without shortness of breath; pulse rate should return to baseline within approximately one hour after the session, the well-being should be normal. If these conditions are not met, next time the patient should exercise in a more relaxed mode. The muscles should not be aching as intensely as to be an obstacle to the next workout; the intensity of the exercise should be at the level of a comfortable physical challenge.

Nonetheless, there are certain signs indicating that the patient should interrupt the training program or discontinue it altogether:

- The patient is feeling very fatigued/exhausted
- Shortness of breath occurs during the training
- The patient experiences chest pain; the heart rate is abruptly increased or becomes irregular.
- The patient experiences abdominal pain
- Muscle cramps in the legs
- Dizziness and/or drowsiness during/after the workout

Regular exercise does not grant a "license" to increase the consumption of the foods restricted for medical reasons. Diet and exercise should be working together. If the patient experiences increased appetite along with the increased

physical activity, this issue needs to be discussed with their doctor and a dietician. They will help adjust the dietary patterns in order to provide a balanced caloric supply.

All of that knowledge and recommendations should be used to provide quality care to the patients in spite of irreversible nature of chronic kidney disease and/or renal failure. The nurse is able to do a lot to help the patients better cope with their disease and improve their quality of life.

CONCLUSIONS

1. The authors have studied the main causes, clinical presentation, treatment and prevention of renal failure.
2. The authors have defined and investigated basic knowledge and skills of the nurse for timely detection of renal failure in the patient.
3. The authors have determined the specific aspects of work and nursing roles in management of patients with renal failure.
4. The authors have determined the role of the nurse in detecting the complications of chronic kidney disease and their treatment.
5. The authors have determined the role of the nurse in improving the quality of life of patients with renal failure

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