

Tikrit University

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Adult Nursing

Urinary Disorders

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End-stage renal disease

End-stage renal disease (ESRD), also called end-stage kidney disease or kidney failure, is the **final and permanent stage of chronic kidney disease**. In this stage, **kidneys can no longer function on their own** and the patient must receive **dialysis or kidney transplantation** to survive.

Stages of Chronic Kidney Disease

Chronic kidney disease is divided into five stages based on the eGFR (estimated glomerular filtration rate), a blood test that measures the kidney's filtering ability.

- **Stage 1** presents as an eGFR of 90 ml/min or higher. This is considered a normal eGFR, and the patient will likely be asymptomatic.
- **Stage 2** CKD is an eGFR of 60-89 ml/min. This is mild CKD, and the patient may not notice symptoms, but protein in the urine or other damage will be observable.
- **Stage 3a** is an eGFR of 45-59 ml/min. Kidney damage is mild to moderate.
- **Stage 3b** is an eGFR of 30-44 ml/min. Kidney damage is moderate to severe, and symptoms such as fatigue, edema, muscle cramps, and changes in urination occur.
- **Stage 4** CKD is an eGFR of 15-29 ml/min. This is the final stage before kidney failure.
- **Stage 5** CKD is **end-stage renal disease** with an eGFR of less than 15 ml/min. Kidneys may not work at all anymore.

Nursing Process

End-stage renal disease is irreversible and has no cure. Nursing care priorities for patients with end-stage renal disease include:

- Prevent and treat complications
- Assist in kidney transplantation or dialysis
- Instruct on the management of chronic conditions
- Implement fluid restrictions and diet recommendations
- Promote physical and psychosocial well-being
- Enhance the patient's overall quality of life
- Instruct on lifestyle modifications
- Provide support to the patient and family
- Collaborate with the nephrologist and other team members

Nursing Assessment

The first step of nursing care is the nursing assessment, during which the nurse will gather physical, psychosocial, emotional, and diagnostic data. In this section, we will cover subjective and objective data related to end-stage renal disease.

Review of Health History

1. Assess the patient's general symptoms.

As ESRD progresses, the patient may present with the following signs and symptoms:

- **CNS:** headaches, altered mentation, insomnia
- **Respiratory:** dyspnea, chest pain
- **GI:** nausea, vomiting, loss of appetite, metallic taste in the mouth
- **Musculoskeletal:** fatigue, muscle weakness, twitches, cramps
- **Genitourinary:** changes urine amount and characteristics
- **Integumentary:** swelling of the feet and ankles, persistent itching

2. Identify the patient's risk factors.

The following factors increase the likelihood that chronic kidney disease will progress to end-stage renal disease faster, including:

- Age (60 years or older)
- Family history of kidney failure
- Race that includes Asian, Pacific Islander, American Indian, Black, or Hispanic heritage
- Obesity
- Tobacco use

3. Record the patient's medical history.

Kidney damage develops over months or years due to various causes. These conditions include:

- Diabetes with poor glucose control
- Hypertension

- Glomerulonephritis
- Polycystic kidney disease
- Interstitial nephritis
- Urinary tract obstruction (such as kidney stones)
- Vesicoureteral reflux (a condition when urine flows back to the kidneys)
- Pyelonephritis
- Congenital kidney defects

4. Assess for factors that may influence the development of ESRD.

The presence of certain conditions may further damage the kidneys, which can lead to ESRD. These conditions include:

- Systemic hypertension
- Hyperlipidemia
- Uncontrolled diabetes

5. Review the patient's medication list.

The kidneys process and filter both prescription and over-the-counter drugs. The following medications can further damage the kidneys:

- Cholesterol medications
- Pain medications (NSAIDs)
- Antibiotics
- Antiretrovirals
- Antidiabetic medications

Physical Assessment

1. Assess for ESRD complications.

Complications that occur due to kidney damage include:

- Volume overload resistant to diuretics
- Poorly controlled hypertension
- Anemia

- Electrolyte abnormalities
- Bone deficiencies
- Metabolic abnormalities
- Decreased immune response

2. Assess for the presence of uremic toxicity.

Fluid, electrolyte, hormone, and metabolic abnormalities are characteristics of uremia (waste products in the blood). This is a serious condition that occurs when the kidneys are unable to filter toxins and can cause cognitive impairment, acidosis, and blood vessel calcification.

3. Perform a physical assessment.

ESRD can have detrimental effects on all organ systems. Physical manifestations of ESRD may include:

- **General:** malnutrition (weight loss, fatigue, muscle weakness)
- **CNS:** encephalopathy (confusion, irritability, drowsiness)
- **Cardiovascular:** pericarditis (fever, dyspnea, abnormal heart sounds)
- **Gastrointestinal:** vomiting, diarrhea
- **Genitourinary:** erectile dysfunction, amenorrhea, infertility, oliguria or anuria
- **Musculoskeletal:** peripheral neuropathy, muscle cramps or weakness
- **Integumentary:** dry skin, pruritus, ecchymosis, edema
- **Hematological:** platelet dysfunction, anemia

4. Strictly monitor the fluid intake and output.

With ESRD, remain cautious about intake and output. Patients may not tolerate excessive intake due to the kidney's inability to excrete fluid. Patients may have little to no urine output.

Diagnostic Procedures

1. Determine the eGFR.

The estimated glomerular filtration rate (eGFR) gauges the kidneys' capacity to filter waste products and classifies chronic kidney disease into five stages. An eGFR below 15 ml/min is stage 5 CKD, also known as ESRD. The kidneys will no longer function at all.

2. Send samples for blood testing.

Perform blood tests to identify the presence of the following:

- Complete blood count: anemia
- Basic metabolic panel (BMP):
 - High serum creatinine and blood urea nitrogen (BUN) levels
 - High potassium levels (hyperkalemia)
 - Low bicarbonate levels
 - Low serum albumin levels (malnutrition)
 - Serum phosphate
 - Vitamin D
 - Lipid profile

3. Examine urine samples.

Urinalysis determines the solutes in the urine, which can describe the filtering capability of the kidneys.

- **Urine protein/creatinine ratio:** albumin in the urine (albuminuria); severe renal impairment = greater than 300 mg/g
- **24-hour urine protein:** greater than 3.5 g = nephrotic range proteinuria

4. Prepare the patient for imaging scans.

Imaging scans visualize the status of the kidneys and surrounding organs. The healthcare provider may choose from the following:

- **Kidney ultrasound:** checks for the presence of swelling of the kidneys (hydronephrosis) or structural abnormalities
- **Retrograde pyelogram:** diagnoses obstruction or renal stones
- **Computed tomography (CT) scan:** visualizes kidney masses, cysts, and stones
- **Magnetic resonance angiography (MRA):** used to diagnose renal artery stenosis

1. Consider kidney biopsy.

When renal impairment and/or proteinuria approaching the nephrotic range are present, but the diagnosis is unclear after regular workup, a biopsy is indicated.

Nursing Interventions

Nursing interventions and care are essential for the patients recovery. In the following section, you will learn more about possible nursing interventions for a patient with end-stage renal disease.

Delay Progression of Kidney Disease

1. Manage blood pressure.

A blood pressure of 130/80 mmHg or less is recommended. If the patient is not receiving dialysis, a target goal of less than 120 mmHg systolic is advised.

2. Control the blood glucose level.

Control of blood sugar is essential. Advise the patient to maintain a hemoglobin A1C level under 7% to avoid or delay complications. In people with type 2

3. Correct metabolic acidosis.

Bicarbonate supplementation used to treat chronic metabolic acidosis may also decrease the progression to ESRD.

4. Manage dyslipidemia.

Lipid panels should be monitored early in the disease, and cholesterol-lowering medications such as HMG-CoA reductase inhibitors (statins) should be started for adults over age 50 with an eGFR of less than 60 mL/min/1.73 m². Patients receiving dialysis should discontinue statin therapy.

5. Control the fluid volume.

Loop diuretics or ultrafiltration should be used to treat volume overload or pulmonary edema.

6. Manage complications of ESRD.

ESRD affects fluid and electrolyte balance as well as the production of red blood cells. It is essential to treat the following complications of kidney disease:

- **Anemia:** Administer erythropoiesis-stimulating agents (ESAs) when hemoglobin levels drop below 10 g/dL.
- **Hyperphosphatemia:** Give phosphate binders (such as calcium acetate, sevelamer carbonate, or lanthanum carbonate) and restrict phosphate in the diet.
- **Hypocalcemia:** Administer calcium supplements with calcitriol.
- **Hyperparathyroidism:** Give calcitriol, vitamin D analogs, or calcimimetics

7. Assist the patient in creating their meal plan.

Promote adherence to a renal diet (avoiding foods high in phosphorus and potassium), low salt intake (less than 2 g/day), and a daily protein limit of 0.8 g per kg body weight.

8. Encourage lifestyle modifications.

Promote physical activities and smoking cessation. Advise the patient to maintain an ideal weight. Aerobic exercise has been shown to have the greatest benefit in improving strength, fitness, and quality of life in patients receiving dialysis.

9. Restrict fluids.

Kidneys that are no longer functioning cannot excrete fluids adequately, causing fluid overload. Each patient may have a different fluid restriction. Patients receiving dialysis are restricted to 32 ounces per day.