

Chronic Kidney Disease

By Rick Nevins, MD

Chronic Kidney Disease (CKD) is a progressive and usually permanent loss of kidney function over a period of months or years. The National Kidney Foundation estimates that one in nine adult Americans has CKD and another 20 million people are at an increased risk of developing it because they have diabetes, hypertension, or other risk factors.¹ The prevalence of this serious disease increased between 1988-1994 and 1999-2004 from 10 percent to 13.1 percent, in part because of the rise in diabetes, hypertension and obesity.²

Hispanics, African Americans, Asian / Pacific Islanders and Native Americans are among the most at-risk for CKD. The overall U.S. medical and economic cost of CKD was approximately \$82.9 billion in 2007.³

CKD is diagnosed by blood and urine testing and is divided into five stages of increasing severity. In the table below, the “GFR level,” or glomerular filtration rate, is a measure of how well the kidneys are cleaning the blood.

As the GFR drops, the patient’s CKD becomes increasingly more severe – reaching the need in stage 5 for dialysis or kidney transplantation due to End Stage Renal Disease (ERSD.) Early detection and treatment can often keep chronic kidney disease from progressing through these stages.

In addition to removing waste products and excess fluid, the kidneys also regulate chemicals in the blood, produce hormones that control blood pressure and keep blood cells and

bones healthy. If the kidneys become damaged, they may continue to produce urine, but can become less and less efficient at removing wastes, producing hormones and regulating blood chemicals. Instead, these waste products continue to circulate and build up in the blood. Without the hormones that healthy kidneys make, the bone marrow can become less able to produce red cells and anemia develops.

Risk factors and causes of CKD

Several underlying diseases can cause CKD. The two most important are diabetes and hypertension.⁴ Diabetes is the leading cause of kidney failure, and hypertension (high blood pressure) is second.

Diabetes

Approximately 43 percent of new dialysis patients have diabetes, making it the fastest growing risk factor for kidney disease (given the increase in diabetes). If blood glucose levels remain high over time, the flow of blood to the kidneys can be decreased, damaging them and affecting important functions. High blood glucose levels also can decrease the ability to empty the bladder, causing a build-up of pressure in the urinary system that may injure the kidneys.⁵ People with diabetes who do not control their blood glucose and A1C have a much higher risk of all complications of diabetes, including CKD.

Table 1: U.S. Prevalence of Chronic Kidney Disease (CKD) by Stage

Stage	Description	GFR (ml/min/m ²)	Prevalence in US
1	Healthy Kidneys	≥90	5.9 million
2	Mild decrease in kidney function	60-89	5.3 million
3	Moderate decrease in kidney function	30-59	7.6 million
4	Severe decrease in kidney function	15-29 (predialysis)	400,000
5	Kidney failure requiring dialysis or transplantation	<15 (ESRD-dialysis)	300,000

Source: NKF-K/DOQI Clinical Practice Guidelines

Hypertension (High Blood Pressure)

Hypertension is the number two cause of chronic kidney disease, accounting for 26 percent of new cases.⁴ Hypertension can cause CKD and CKD can cause hypertension.⁶ Hypertension causes the heart to work harder, which can damage blood vessels throughout the body. If the blood

vessels in the kidneys are damaged, they stop removing wastes and extra fluid from the body. This extra fluid in the blood vessels can raise blood pressure even more creating a vicious cycle.⁷

Good blood pressure control is the cornerstone of CKD prevention in people with hypertension. Frequently monitoring blood pressure levels and treating them to the desired range are very important. Using the correct medicine(s) – the doctor's responsibility – and taking the medication(s) as prescribed – the patient's responsibility – are crucial factors in blood pressure management. Weight control and exercise – the patient's responsibility – may prevent or slow the progress of kidney damage. Certain classes of blood pressure medications, such as ACE inhibitors, angiotensin receptor blockers (ARBs), and beta blockers may help protect the kidneys in some cases.⁷ These medicines are used to increase the blood supply to the kidneys and help manage high blood pressure.

Symptoms of CKD

The kidneys have a great ability to compensate for a loss of function. That is why chronic kidney disease may progress without symptoms for a long time until much of the kidney function is lost. Because the kidneys perform many functions for the body, symptoms of CKD can vary. Most patients have no decrease in urine output even with advanced chronic kidney disease.⁵

- Tiredness and lack of energy
- Difficulty concentrating
- Poor appetite
- Insomnia
- Muscle cramping at night
- Swollen feet and ankles
- Puffiness around eyes, especially in the morning
- Dry, itchy skin
- Need to urinate more often, especially at night
- Pale skin from anemia
- Bruising
- Shortness of breath
- Bone pain

Smoking

Smoking can lead to atherosclerosis (hardening of the arteries), which reduces blood flow to the kidneys and increases blood pressure.⁵ Smoking cessation is important to reduce the risk of atherosclerosis, elevated blood pressure and chronic kidney disease.

Other causes of CKD include glomerulonephritis and polycystic kidney disease. Long-term use of certain medications, including some over-the-counter pain medications, can increase the risk of developing CKD.⁸ Individuals with high cholesterol, heart disease, kidney stones, certain cancers, and chronic kidney infections also are at risk of developing CKD.

Preventing Chronic Kidney Disease

Chronic kidney disease may sometimes be prevented by controlling the other diseases or factors that can contribute to it. Because approximately 70 percent of cases of chronic kidney disease are caused by high blood pressure and diabetes, keeping blood pressure and blood glucose levels near normal can help prevent kidney damage. Tight control can have big

CKD SCREENING SURVEY

I am between 50 and 59 years of age	if yes, score 2 points
I am between 60 and 69 years of age	if yes, score 3 points
I am 70 years old or older	if yes, score 4 points
I am a woman	if yes, score 1 point
I had/have anemia (low blood count)	if yes, score 1 point
I have high blood pressure	if yes, score 1 point
I have diabetes	if yes, score 1 point
I have a history of heart attack or stroke	if yes, score 1 point
I have a history of heart failure	if yes, score 1 point
I have circulation disease in my legs	if yes, score 1 point
I have protein in my urine	if yes, score 1 point
TOTAL SCORE _____ Points	

payoffs in reducing the risk for kidney disease.⁷ CKD can be detected early by having annual check-ups with a physician.

Treatment of Chronic Kidney Disease

There is no cure for chronic kidney disease. The goals of therapy are to slow progression of the disease, treat underlying causes and contributing factors (such as diabetes and hypertension), manage complications, and replace lost kidney function with dialysis or transplantation. Dietary control using a low-protein diet is essential to slowing progression of CKD and should be begun only after consultation with a physician and a dietitian. Fluid retention can be treated with diuretic medications, which remove excess water from the body. Anemia with CKD can be treated with drugs, such as iron, that replace the deficiency of erythropoietin, which is normally produced by healthy kidneys and stimulates red blood cell development.

Often, patients treated with such drugs require either iron by mouth or intravenously. Bone disease can develop in patients with CKD due to an inability to excrete phosphorus and a failure to form Vitamin D. Patients may be prescribed drugs that bind phosphorus in the gut, as well as vitamin D supplements.⁵

Dialysis and kidney transplantation are the two ultimate methods of treatment for people with end state renal disease. The rates of illness, disability, and death experienced by individuals treated for kidney failure are substantially higher than those of the general population.⁴

Blood testing for calcium, phosphorus and parathyroid

hormone should be done to monitor bone health. Other tests should include total blood count (so that anemia can be identified and treated early), as well as blood lipid (cholesterol types) levels. Following dietary, exercise and total weight recommendations also is very important.⁵

CKD Costs

CKD care is expensive. In 2007, costs for Medicare patients with CKD reached \$57.5 billion — a 10.1 percent increase from the previous year, and 5.1 times greater than costs in 1993. Overall Medicare costs, in contrast, grew just 98 percent in the same period. Expenditures for patients with CKD now account for nearly 28 percent of Medicare spending.³ Treatment costs roughly double as CKD progresses from one stage to the next, and at stage 5, ESRD, costs can exceed \$70,000 annually per patient.⁹

An indirect cost of CKD may be “presenteeism,” defined as the impact of chronic health conditions on work place performance in the individual who is at work in spite of illness.¹⁰ A growing body of studies has shown the impact of presenteeism secondary to several health conditions, including hypertension, depression, migraines, diabetes, seasonal allergies and musculoskeletal pain. While the literature is silent on this relationship, it is reasonable to assume that future studies will establish a presenteeism factor in the total indirect health and productivity costs of CKD.

Tips for Patients

Since early CKD has no symptoms, the only way to find out if you have it is through simple medical tests. Have regular check-ups with your doctor. Several organizations offer free screenings for kidney disease. You may be able to have your kidney function measured at a local health fair. The National Kidney Foundation’s KEEP (Kidney Early Evaluation Program) (<http://www.kidney.org/news/keep/index.cfm>) initiative offers blood and urine testing, onsite consultation with a physician, and referral and follow-up services for people whose test results are outside the normal range.

The American Kidney Fund’s MIKE (Minority Intervention and Kidney Education) Program (<http://www.kidneyfund.org/get-tested/find-a-screening/>) offers educational sessions and medical screenings. The American Association of Kidney Patients’ Finding Your Strength (<http://www.aakp.org/aakp-library/focus-healthy-living/>) program offers education about your kidneys, tests to expect, and ways to stay healthy with CKD.⁶

Tips for physicians

Unfortunately, chronic kidney disease often is overlooked in its earliest, most treatable stages. Physicians have an important role in detecting CKD early and instituting measures to slow its progression. Screening patients at risk for CKD includes detection of functional abnormalities using everyday, accessible, inexpensive laboratory tests. Serum creatinine

levels (blood test) are commonly used to calculate the estimated glomerular filtration rate (GFR). Screening for proteinuria (abnormal amounts of protein in the urine) often alerts physicians to the presence of CKD before changes in the GFR become apparent.¹⁰

Current guidelines recommend screening for kidney disease with a serum creatinine measurement for use in GFR estimation and analysis of a random urine sample for albuminuria. Significant kidney disease can present with decreased GFR or proteinuria, or both. An analysis of data from the third National Health and Nutrition Examination Survey (NHANES III) showed that 20 percent of persons with diabetes, and 43 percent of persons with hypertension and a GFR below 30 mL per minute per 1.73 m², had no proteinuria. Therefore, an estimate of the GFR and a screening method for proteinuria are required.¹⁰

Primary care strategies for chronic kidney disease should include the following¹¹:

- Identify risk
- Delay Onset
- Diagnose CKD
- Reduce CKD risk
- Slow CKD progression

Summary

Employees, employers, health plans and physicians may be unaware of or not focusing on the prevalence and total workplace costs of CKD. As a result of our experience, IHPM recommends that plans, employers, and providers consider CKD to be a co-morbidity and potential outcome of diabetes, hypertension, obesity and cholesterol problems. In short, when

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the health plan, provider or employer focuses on ANY of these four diseases, there should be an additional focus on CKD. Optimizing management to include all the co-morbidities will reduce cardio-vascular and renal complications.

The CKD screening survey (previous page) identifies people who may be at risk for, or already have, CKD. The survey should be completed and taken to a physician for further evaluation if the score is four or more. The survey was created by the Weill Cornell Medical College and the University of North Carolina at Chapel Hill.

Check each statement that is true for you. If a statement is not true for you or you are not sure, put a zero. Then add up all the points for your total score.

If you score four or more points, you have a one-in-five chance of having chronic kidney disease. Only a professional healthcare provider can determine for sure if you have kidney disease.

If you scored between zero and three points, you probably do not have kidney disease now, but at least once a year, you should take this survey or be screened by your physician. **IHPM**

Richard L. Nevins, MD, is Chief Clinical Officer & VP Research & Development, Institute for Health and Productivity Management (IHPM).



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