

# Updated guidelines for managing chronic kidney disease

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## ABSTRACT

Chronic kidney disease (CKD) is the most costly disease covered by Medicare, and two common causes of CKD, diabetes and hypertension, are increasing worldwide.<sup>1</sup> More than 60% of Americans will develop CKD in their lifetimes.<sup>2</sup> This article reviews updated guidelines for managing CKD in primary care.

**Keywords:** chronic kidney disease, guidelines, albuminuria, staging, glomerular filtration rate, spot urine

## Learning objectives

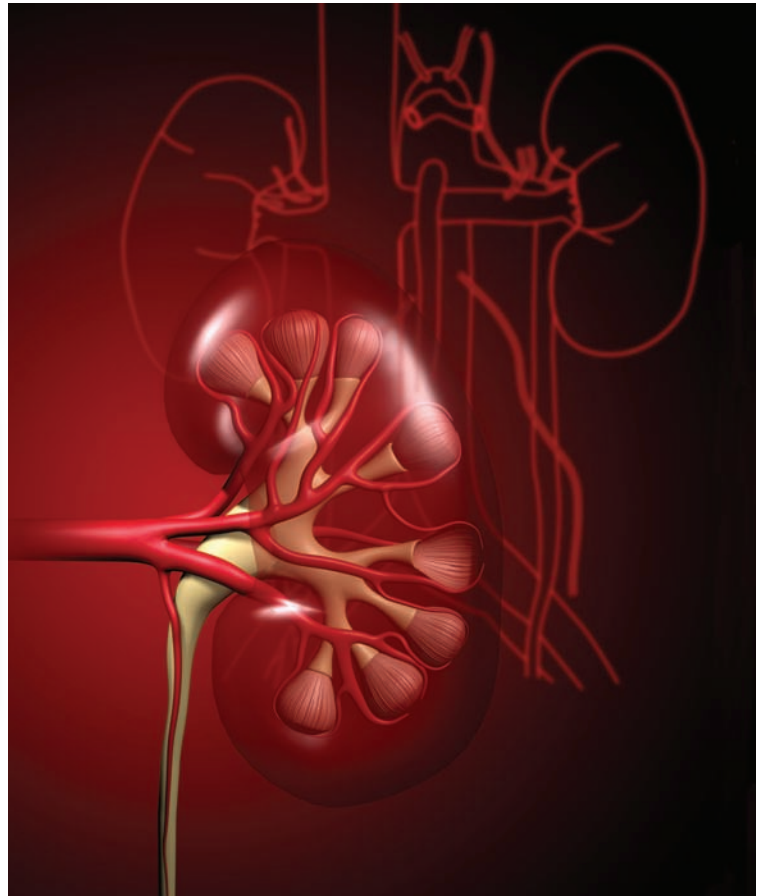
- Discuss key updates in Kidney Disease: Improving Global Outcomes (KDIGO) guidelines for the evaluation and management of CKD.
- Identify the most common causes and complications of CKD among adults in the United States.
- Recognize easily obtainable parameters for staging CKD.
- Apply knowledge of staging to customize education, treatment, and surveillance recommendations for patients with CKD.

“CKD is a worldwide public health problem,” was the opening salvo of the 2002 Kidney Disease guidelines published by the National Kidney Foundation Kidney Disease Outcomes Quality Initiative (KDOQI) workgroup.<sup>3</sup> These guidelines defined and quantified kidney disease in the hopes of bringing needed attention to the disease. Before 2002, *kidney disease* had 23 separate designations in medical literature, including “mildly elevated serum creatinine,” “low clearance,” and “renal insufficiency.”<sup>4</sup>

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By defining kidney disease with strict numbers, using a standardized formula, and convincing the large national laboratories to report kidney function as part of the standard chemistry results, the nephrology community hoped to promote public awareness of kidney disease. The word *kidney* was chosen as a term likely to be immediately understood by patients and providers alike.<sup>3</sup>

The success of the 2002 guidelines for CKD cannot be understated. The number of articles listed in PubMed with the keyword *CKD* increased from 0 in 2001 to 1,600 in 2011.<sup>5</sup> Reducing the incidence, morbidity, mortality, and healthcare costs of CKD was listed as a goal of Healthy People 2010 after being omitted from the 2000 edition.<sup>6</sup> CKD coding by Medicare and the ICD-9 coding system

**Key points**

- Diabetes and hypertension, the most common causes of CKD, are increasing dramatically worldwide.
- Updated international CKD guidelines incorporate albuminuria, the most predictive factor in progression to kidney failure, as part of CKD staging.
- Once identified, patients with CKD should be reassessed annually. Patients with strong risk factors for accelerated progression of CKD should have GFR and albuminuria screenings more often.
- Patients should be referred to a kidney specialist early in management.

allowed data tracking to define and monitor populations with CKD by disease stage.<sup>7</sup> The World Health Organization added kidney disease to its noncommunicable disease agenda.<sup>7</sup> Research studies used CKD staging to discuss survival, comorbidities, and medication effectiveness.<sup>8</sup> The FDA began requiring drug companies to develop and test their medications for different levels of kidney function.<sup>9</sup> In primary care, however, the guidelines did not have much effect.<sup>10</sup> CKD is the most costly of all chronic diseases covered by Medicare, and 60% of adults in the United States will develop CKD in their lifetime.<sup>2,11</sup> Yet CKD is underrecognized in the primary care population.<sup>12</sup> Neither the American Board of Internal Medicine nor the American

Board of Family Medicine has a maintenance of certification program for primary care providers to learn about CKD.<sup>10</sup> The newest standards of accreditation for PA programs specify women’s health, surgical care, diversity, and mental health as separate health issues but combine CKD with medical care across the life span.<sup>13</sup> Nephrology rotations are rarely offered in PA programs due to elective courses being cut, along with the view that nephrology is “hard, with really sick patients and complicated.”<sup>14</sup>

**IMPROVING THE GUIDELINES**

Although CKD is often overlooked in primary care, diabetes and hypertension, the most common causes of CKD, are reaching epidemic proportions worldwide. To address this, KDIGO updated the international CKD guidelines.<sup>15</sup> The most dramatic change is that Stage 3 is now split into Stage 3a and Stage 3b (Figure 1), because the original Stage 3 was too large for general medication dosing suggestions. Albuminuria, the most predictive factor in progression to kidney failure, is now part of CKD staging. Using a color-coded chart, the 2012 guidelines provide a quick reference point for staging CKD with two easily obtainable parameters: glomerular filtration rate (GFR) derived from serum chemistry, and albuminuria as based on spot urine testing. Once obtained, the results can be quickly crossmatched to quantify CKD burden and stage. The significance of albuminuria cannot be overemphasized, as its detection is often the first indicator of progressive kidney disease and often

Composite ranking for relative risks by GFR and albuminuria (KDIGO 2009)				Albuminuria stages, description and range (mg/g)				
				A1		A2		A3
				Optimal and high-normal		High		Very high and nephrotic
				<10	10-29	30-299	300-1999	≥2000
GFR stages, description and range (mL/min per 1.73 m <sup>2</sup> )	G1	High and optimal	>105					
			90-104					
	G2	Mild	75-89					
			60-74					
	G3a	Mild-moderate	45-59					
	G3b	Moderate severe	30-44					
	G4	Severe	15-29					
G5	Kidney failure	<15						

FIGURE 1.

## Conceptual Model of CKD

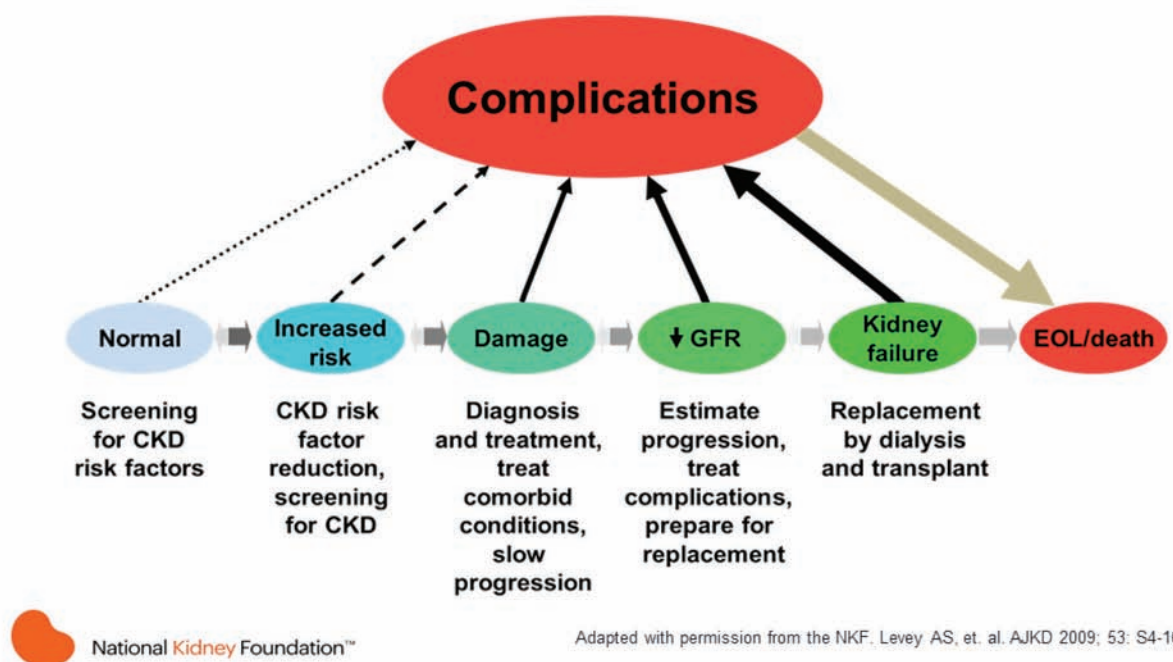


FIGURE 2.

precedes a reduction in GFR. Assessment of classification of CKD by GFR, albuminuria, and underlying cause (such as hypertension or diabetes) will guide PAs toward further intervention or specialist referral (Figure 2). A detailed history and physical is always needed to identify additional factors associated with possible disease progression, including age, sex, race/ethnicity, family history, elevated BP, hyperglycemia, dyslipidemia, smoking, obesity, cardiovascular disease, and exposure to nephrotoxic agents.

Although trace levels of urine albumin can be normal, persistently elevated levels of albumin are pathognomonic for kidney dysfunction. The nomenclature *proteinuria* is rapidly being replaced by *albuminuria* as large concentrations of albumin are the earliest marker for glomerular disease preceding a reduction in GFR. Measurement of urine albumin provides a more accurate indication of changes in glomerular permeability than urinary total protein. Untimed or spot urine samples can be used in the initial screening for albuminuria. Dipstick tests performed in many medical offices are sufficient in identifying the presence or absence of albumin and are helpful in screening. KDIGO recommends that patients with a positive dipstick test (indicated as 1+ or greater) undergo further quantitative testing to measure the urine albumin to creatinine ratio (ACR). ACR evaluation following a positive dipstick test can be untimed or random; however, first morning

spot specimens are preferred.<sup>16</sup> Patients with confirmatory quantitative tests should then undergo a second spot quantitative test within a 2-month period using a timed early morning sample. If the second spot quantitative test is also positive, the patient is then defined as having persistent albuminuria (Figure 3). Patients falling within this class should have a full workup and evaluation for CKD. Monitor all patients with albuminuria using spot quantitative measurement testing.

Once identified, patients with CKD should be reassessed annually. Patients with strong risk factors for accelerated progression of CKD should have GFR and albuminuria screenings more often. Evidence of CKD progression, as defined by KDIGO, is a 25% or greater drop of GFR from baseline. Accelerated progression is defined as a *sustained* decline in GFR of more than 5 mL/min/1.73 m<sup>2</sup>/year.

Patients who fall within the Stages 1 to 2 category (GFR greater than 60 mL/min/1.73 m<sup>2</sup>), should have a focused exam identifying factors driving CKD. Treatment should be individually directed at the primary cause of CKD to minimize its progression. Hypertension and diabetes, the two most common causes of CKD, are the most treatable. Evaluation and treatment of hypertension includes a target BP goal of 140/90 mm Hg or less when albuminuria is minimal. This goal applies to patients with and without diabetes. In patients with more-pronounced albuminuria (greater than 30 mg/g

### Evaluation of albuminuria

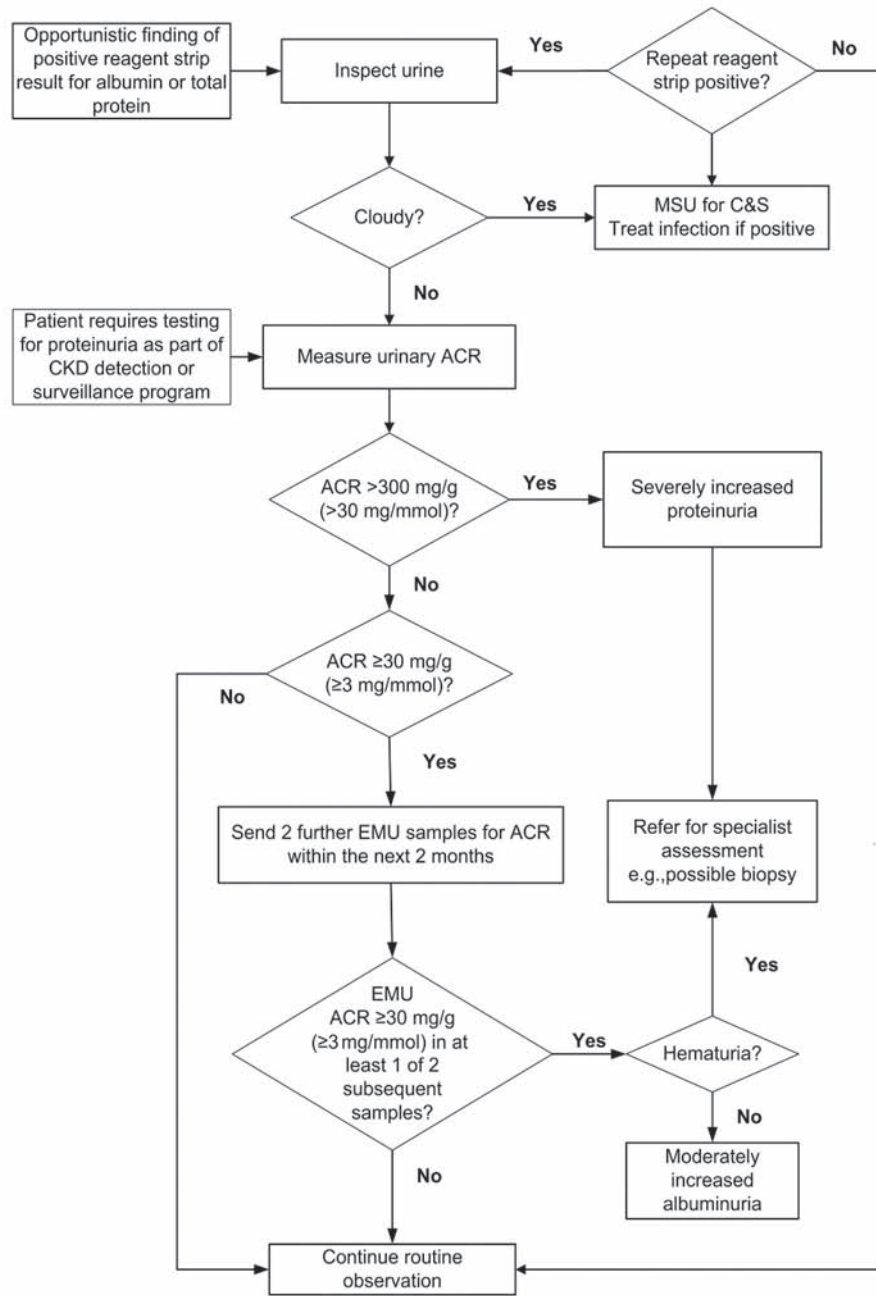


FIGURE 3.

on ACR), a target BP of 130/80 mm Hg or less is recommended. For patients with diabetes, CKD, and albuminuria (30 to 300 mg/g on ACR), the addition of an angiotensin-converting enzyme (ACE) inhibitor or angiotensin receptor blocker (ARB) is warranted. For patients without evidence of a primary cause, but positive albuminuria, an ACE inhibitor or ARB is recommended once albuminuria exceeds 300 mg/g on ACR.

All patients with hypertension should be encouraged to adhere to a low-sodium diet (less than 2 g/day). For

patients with diabetes, good glycemic control, defined as a hemoglobin A1C of 7% or less, will slow or prevent the microvascular complications of diabetes, including diabetes-induced CKD.<sup>17</sup> Positive lifestyle changes should also be encouraged to promote increased physical activity and cardiovascular health.

Patients in Stages 3 to 5 (GFR less than 60 mL/min/1.73 m<sup>2</sup>) require additional monitoring and treatment and adjusted medication dosages. Because many patients with CKD have comorbid conditions, healthcare providers

must renally dose many commonly prescribed medications, including renin-angiotensin-aldosterone system blockers (ACE inhibitors, ARBs, aldosterone inhibitors, and direct renin inhibitors), diuretics, nonsteroidal anti-inflammatory drugs, lithium, metformin, and digoxin. PAs also must educate patients about the hidden dangers of over-the-counter medicines and nutritional protein supplements (see *Medication dosing in patients with chronic kidney disease* in the October 2013 issue of *JAAPA*.) Advise patients to contact their healthcare provider or pharmacist before using these products.

Once the GFR has declined to less than 45 mL/min/1.73 m<sup>2</sup>, patients are at increased risk for developing anemia, acidosis, and metabolic bone disease. KDIGO lists specific recommendations for screening and treatment of these complications. Acidosis treatment with bicarbonate has been specifically effective in slowing progression of kidney disease, so patients with a serum bicarbonate less than 22 mEq/L should be started on oral bicarbonate.<sup>18</sup>

Lastly, referral to kidney specialists should occur sooner rather than later. Great strides have been made in the management of kidney disease, but these treatments require prompt recognition and patient referral. In 2013, hopes are again pinned on the belief that primary care providers will discover kidney disease as the public health problem that it is. **JAAPA**

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