



# Kidney Wise

Publication of the National Kidney Foundation of Kentucky

Supported by a grant from **genzyme**

## The Challenge of Kidney Disease: Primary Care Physician's Role in Early Detection

Patients with chronic kidney disease (CKD) are represented in every primary care practice. The CKD population is growing as the causes of kidney disease continue to escalate, primarily diabetes and hypertension. These diseases are very prevalent in the state of Kentucky and CKD has become a serious public health problem. One in nine Kentuckians has CKD. It is imperative that CKD is diagnosed early as it is treatable and progression to Stage 5 may be delayed or avoided completely. There are many benefits to patients when nephrologists and primary care physicians work as a team to treat CKD and the associated co-morbidities.

Patients with Chronic Kidney Disease (CKD) are represented in every primary care practice. It is a common condition especially in patients with diabetes and hypertension. CKD is increasing in prevalence in the following categories: aging, diabetic, obese, and minority populations. Treatment of kidney failure (End Stage Renal Disease (ESRD)/Stage 5) is a serious economic burden to the Medicare program. Seven percent of Medicare expenditures are for treatment of those with ESRD, but ESRD patients comprise only 6% of Medicare insured. ESRD is projected to cost Medicare \$28 billion in 2010. It is vital that early detection of CKD be a priority from a patient and economic standpoint. In the US in 2000, 99,000 people died from kidney failure, second only to lung cancer and more deaths than colon cancer, breast cancer, and prostate cancer. The average life expectancy of a patient (age 50-54) receiving dialysis treatment is five years.

Chronic kidney disease is defined as kidney damage for greater than or equal to 3 months with structural or functional abnormalities with or without decreased glomerular filtration rate (GFR), pathological abnormalities, abnormal blood or urine tests, abnormal imaging or a GFR less than 60mL/1.73m<sup>2</sup> for 3 months or greater.

See page 5 for Stages of CKD.

**The prevalence of CKD in the US:** Twenty million Americans have CKD and another 20 million are at risk. 1 in 9 Americans have CKD.

Stage 1	5.9 million patients
Stage 2	5.3 million patients
Stage 3	7.6 million patients
Stage 4	.4 million patients
Stage 5	.3 million patients

# The Challenge of Kidney Disease (cont.)

## Risk Factors for CKD:

- ▶ Diabetes
- ▶ Hypertension
- ▶ Older age
- ▶ Family history of kidney disease, hypertension, or diabetes
- ▶ Male gender
- ▶ Racial/Ethnic background
  - African American
  - Native American
  - Asian-American
  - Pacific Islander
  - Latin American
- ▶ Tobacco use

## The risk factors for CKD progression:

- ▶ Poorly controlled diabetes mellitus
- ▶ Poorly controlled blood pressure
- ▶ Anemia
- ▶ Hyperlipidemia
- ▶ High protein diet
- ▶ Atherosclerosis
- ▶ Obesity
- ▶ Exposure to nephrotoxic drugs
  - NSAIDS
  - Contrast dye

Screening patients for CKD risk factors begins a complex management process. The recommended screening tests for CKD are:

- ▶ Serum creatinine
- ▶ Blood pressure
- ▶ Glucose
- ▶ Urinalysis
- ▶ Microalbuminuria/proteinuria

**Serum Creatinine and BUN are not sufficient to measure renal function.** Physicians are suggested to order a 24 hour creatinine clearance, calculate glomerular filtration rate (GFR) by the Cockcroft-Gault estimation or Levey modification of MDRD equation, and measure microalbuminuria.

The increase of the CKD population and the predicted shortage of Nephrologists place primary care physicians in the position to provide care for CKD patients in growing numbers. The Stage 3 population alone would contribute to 2000 new patients per nephrologists or 7 new patients per day. A team approach by primary care physicians and nephrologists in the care of CKD patients is quickly becoming a necessity.

## Roles for Team Approach

Primary Care Physician	Nephrologist
<ul style="list-style-type: none"> <li>✓ Screen and identify risk factors of CKD, including:                             <ul style="list-style-type: none"> <li>- Diabetes</li> <li>- CVD</li> <li>- Anemia</li> </ul> </li> <li>✓ Provide ongoing management of patients with CKD.</li> <li>✓ Provide role-specific patient education</li> </ul>	<ul style="list-style-type: none"> <li>✓ Assist in development of care strategy</li> <li>✓ Aid in recommendation and implementation of patient care</li> <li>✓ Provide role-specific patient education</li> </ul>

The complications associated with CKD contribute to the complex management of this disease. Many complications are related to cardiovascular disease (CVD). Anemia, hypertension, diabetes, and dyslipidemia contribute to CKD progression and cardiovascular disease. Other complications include cardiovascular disease and mortality, osteodystrophy, malnutrition, and metabolic acidosis.

Chronic kidney disease is common and treatable. Delayed detection of CKD leads to lack of interventions to treat hypertension, anemia, cardiovascular disease, diabetes, and malnutrition. There is great potential for early referral for consultations with nephrologists, cardiovascular specialists, dietitians, and social workers skilled in working with those with chronic kidney disease. Delayed detection and referrals impact the patient's ability to receive vital education regarding the course of CKD and vascular access consultation. The same interventions that slow the progression of CKD also decrease cardiovascular risk and mortality. These interventions include treatment of hypertension, normalization of glycohemoglobin, treatment of anemia and hyperlipidemia.

The benefits of early intervention in the management of CKD by primary care physicians in consultation with nephrologists results in delayed progression of CKD, improved teamwork between physicians which greatly benefits patient care, decreased risk of cardiovascular complications, improved dialysis outcomes, and a better educated and prepared patient.

Patients with CKD are a rapidly increasing population. It is possible to apply specific interventions to slow the progression of CKD. It is imperative to manage co-morbidities and initiate with the patient a plan for End Stage Renal Disease.

Information from this article was obtained from the Midwest CKD Coalition Chronic Kidney Disease: Improving Outcomes and Planning for ESRD Speakers Notes

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### Additional Resources

- [www.kidney.org/www.nkfk.org](http://www.kidney.org/www.nkfk.org): Kidney Disease Quality Outcomes Initiative (KDOQI) clinical guidelines and GFR calculator
- [www.therenalnetwork.org](http://www.therenalnetwork.org): ESRD statistics for the Kentuckiana region
- [www.nkdep.nih.gov](http://www.nkdep.nih.gov): professional tools to improve patient outcomes
- [www.epocrates.com](http://www.epocrates.com): medical related tools and options for treating ESRD

**KENTUCKY MEDICAL ASSOCIATION RESOLUTION:**  
**“Measurement of Glomerular Filtration Rate in Chronic Kidney Disease”**

**Subject:** Measurement of Glomerular Filtration Rate in Chronic Kidney Disease

**Submitted by:** R. Scott Cornell, MD

**Referred to:** Reference Committee B

**WHEREAS**, twenty million Americans have chronic kidney disease today and twenty million more are at risk; and

**WHEREAS**, the number of Kentuckians requiring dialysis is likely to double by the year 2010, creating a strain on current health care resources in the Commonwealth; and

**WHEREAS**, chronic kidney disease has been identified as a focus area by the United States Surgeon General in the Healthy People 2010 Initiative; and

**WHEREAS**, early identification of chronic kidney disease and treatment of associated comorbidities in early stages can delay the onset of end stage kidney failure, dramatically reduce the number of patients that require dialysis, reduce health care costs, and improve overall patient quality of life; and

**WHEREAS**, calculation of the glomerular filtration rate is an inexpensive method of determining kidney health and of staging kidney disease in populations at risk (especially in patients with diabetes mellitus, hypertension, advanced age, malnutrition, or patients with family members with kidney disease), allowing for early identification of patients with chronic kidney disease; now therefore be it

**RESOLVED**, that the Kentucky Medical Association urges physicians to consider ordering a glomerular filtration rate calculation when a serum creatinine is ordered on patients at highest risk for kidney disease; and be it further

**RESOLVED**, that physicians in the Commonwealth be urged to become familiar with five stages of chronic kidney disease to promote detection and treatment.

KMA House of Delegates  
September 2006- Passed

# Progression and Prevalence of CKD by Stage of Disease

CKD Stage	GFR Range (mL/min/1.73 m <sup>2</sup> )	Number of Patients (Millions)
1 Kidney damage with normal or increased kidney function	≥90	5.9
2 Kidney damage with mild decrease in kidney function	60-89	5.3
3 Moderate decrease in kidney function	30-59	7.6
4 Severe decrease in kidney function	15-29	.4
5 Kidney failure	<15 (or dialysis)	.3

GFR = glomerular filtration rate

National Kidney Foundation. K/DOQI clinical practice guidelines for bone metabolism and disease in chronic kidney disease. *Am J Kidney Dis.* 2003;42(suppl 3):S1-S201. Coresh J et al. *Am J Kidney Dis.* 2003;41:1-12. U.S. Renal Data System, USRDS 1998 Annual Data Report. National Institutes of Health, Institute of Diabetes and Digestive and Kidney Diseases, Bethesda, MD, 1998. Cited by: National Kidney Foundation. K/DOQI Clinical Practice Guidelines for Chronic Kidney Disease: Evaluation, Classification, and Stratification—Quick Reference Clinical Handbook. New York, NY: National Kidney Foundation; 2002.

## Factors Driving CKD Growth

### Modifiable Risk Factors

**Overweight**

**U.S. Prevalence: 127 Million Adults**  
**Prevalence rate: 65%**

**Hypertension**

**U.S. Prevalence: 50 Million Adults**  
**Prevalence rate: 18%**

**Diabetes**

**U.S. Prevalence: 18 Million**  
**Prevalence rate: 8%**

## The CKD Paradigm:

### Cardiovascular Disease, Kidney Disease, and Diabetes

#### The Facts:

- Diabetes and CVD are big public health problems in the US and around the world.
- CKD is common to both diseases
- CVD is the number one killer of people with CKD
- For every CVD risk factor, (diabetes, hypertension, Dyslipidemia, Anemia), a test for CKD must be performed.
- CKD is the multiplier disease
  1. The patients are sicker
  2. Risk factor levels are higher
  3. Control is worse and treatment is more complex
  4. Outcomes are worse
  5. Costs are higher
- Individuals with CKD are far more likely to die before reaching kidney failure
- The largest group with CKD is treated by primary care physicians, endocrinologists, or cardiologists.



# WHAT IS CHRONIC KIDNEY DISEASE – MINERAL AND BONE DISORDER?

Act as Early as STAGE 3 To Improve Patient Outcomes in Adults

## CKD-MBD

- A new term describing a syndrome of biochemical, bone and extraskeletal calcification abnormalities that occur in patients with CKD
- Manifested by either one or a combination of the following:
  - Abnormalities of calcium, phosphorus, PTH, or vitamin D metabolism
  - Abnormalities in bone turnover, mineralization, volume (termed **renal osteodystrophy**), linear growth, or bone strength
  - Vascular or other soft tissue calcification

### Renal Osteodystrophy (RO)

- Term used exclusively to define the alterations of bone morphology associated with CKD.
- Definitive diagnosis of renal osteodystrophy requires a bone biopsy
- Classification is based on 3 histologic descriptors
  - Bone turnover
  - Mineralization
  - Volume

## TARGET RANGES AND MONITORING FREQUENCY FOR PTH, CALCIUM AND PHOSPHORUS

CKD STAGE 3	CKD STAGE 4	CKD STAGE 5
GFR Range: 30–59 mL/min/1.73 m <sup>2</sup>	GFR Range: 15–29 mL/min/1.73 m <sup>2</sup>	GFR Range: <15 mL/min/1.73 m <sup>2</sup>
Monitoring Frequency: Yearly	Monitoring Frequency: Quarterly	Monitoring Frequency: Ca, P Monthly; PTH Quarterly
<b>Total Corrected Plasma Calcium</b> Normal range for laboratory	<b>Total Corrected Plasma Calcium</b> Normal range for laboratory	<b>Total Corrected Plasma Calcium</b> 8.4–9.5 mg/dL (2.10–2.37 mmol/L)
<b>Plasma Phosphorus:</b> 2.7–4.6 mg/dL (0.87–1.49 mmol/L)	<b>Plasma Phosphorus</b> 2.7–4.6 mg/dL (0.87–1.49 mmol/L)	<b>Plasma Phosphorus</b> 3.5–5.5 mg/dL (1.13–1.78 mmol/L)
<b>Calcium x Phosphorus</b> <55 mg <sup>2</sup> /dL <sup>2</sup> (4.44 mmol <sup>2</sup> /L <sup>2</sup> )	<b>Calcium x Phosphorus</b> <55 mg <sup>2</sup> /dL <sup>2</sup> (4.44 mmol <sup>2</sup> /L <sup>2</sup> )	<b>Calcium x Phosphorus</b> <55 mg <sup>2</sup> /dL <sup>2</sup> (4.44 mmol <sup>2</sup> /L <sup>2</sup> )
<b>Intact PTH</b> 35–70 pg/mL (3.85–7.7 pmol/L)	<b>Intact PTH</b> 70–110 pg/mL (7.7–12.1 pmol/L)	<b>Intact PTH</b> 150–300 pg/mL (16.5–33 pmol/L)

Measurements should be made more frequently if the patient is receiving concomitant therapy for the abnormalities in the plasma levels of PTH, calcium or phosphorus. Adjustments in target PTH ranges may be needed based on the laboratory assay method used to measure PTH.  
ABBREVIATIONS: CKD, chronic kidney disease; GFR, glomerular filtration rate; Ca, calcium; P, phosphorus; PTH, parathyroid hormone.

## EVALUATION

Initial evaluation of adult patients with a GFR < 60 mL/min/1.73 m<sup>2</sup> (stages 3-5) should include:

- Blood biochemical levels
  - PTH
  - Calcium (either ionized or total corrected for albumin)
  - Phosphorus
  - Alkaline phosphatases (total or bone specific)
  - Bicarbonate
- Imaging Techniques
  - Lateral abdominal radiography provides simple, cost effective screening for vascular calcification in adults
  - Computed tomography provides for quantitative evaluation of vascular calcification, however it's use is not justified as a screening tool due to cost and accessibility issues

## TREATMENT GOALS for CKD-MBD

- Normalize phosphorus and calcium levels
- Optimize PTH levels
- Improve bone remodeling strength
- Minimize extraskeletal complications

## CHRONIC KIDNEY DISEASE—MINERAL AND BONE DISORDER



Endorsed by:  
National Kidney Foundation, KDIGO Clinical Practice Guidelines for Bone Metabolism and Disease in Chronic Kidney Disease. Am J Kidney Dis. 42:31-60, 2003 (suppl 3).  
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This newsletter is supported by a grant from 

## The Facts on Chronic Kidney Disease

- ◆ 20 Million Americans have Chronic Kidney Disease (CKD); 20 million more are at risk for developing CKD.
- ◆ There are more than 360,000 patients in the United States who have kidney failure; more than 4,120 live in Kentucky.\*
- ◆ 1 in 9 American adults has CKD; 449,000 Kentuckians may have CKD.
- ◆ Diabetes and high blood pressure are the leading causes of CKD.
- ◆ Available treatments, such as angiotensin-converting enzyme inhibitors (ACEs) and angiotensin-receptor blockers (ARBs), may significantly improve outcomes for individuals with CKD and cardiovascular disease.
- ◆ Anemia is frequently associated with CKD. Effective treatment of anemia can have a major impact on improved quality of life and cardiovascular outcomes.
- ◆ Problems with calcium and phosphorous metabolism begin early in CKD and can lead to weakening of the bones and calcium deposits in blood vessels and the heart. Treatment with diet and medications can improve these problems.
- ◆ Cardiovascular problems, such as abnormal cholesterol, occur frequently in CKD. Treating high cholesterol may improve outcomes of treatment and enhance the health of individuals with CKD.

\* data from US Renal Network