

# Prevalence and Management of Chronic Kidney Disease

Andrew Miller, MD, MPH

The following interview conducted by a representative of Healthcare Quality Strategies, Inc. (HQSI), the federally designated Quality Improvement Organization (QIO) for New Jersey, with three renal experts from Trans Atlantic Renal Council (TARC\*) highlights the epidemic of chronic kidney disease (CKD) occurring in the United States, as well as what healthcare professionals can do to better manage the condition. Interviewees were Toros Kapoian, MD, President of the Board of Trustees, TARC, and Associate Professor of Medicine, UMDNJ-Robert Wood Johnson Medical School; Joan Solanchick, RN, MSW, Executive Director; and Beverly Hoek, RN, CNN, Quality Improvement Administrator.

## The Epidemic of CKD in the United States

CKD is a growing problem in our country. The US Department of Health and Human Services has stated that, between 1990 and 2000, the number of people with kidney failure requiring dialysis or transplantation virtually doubled to 380,000. If this trend continues, the number of people with kidney failure will approach 700,000 by 2010.<sup>1</sup> The annual cost of treating kidney failure in the United States surpassed \$30 billion in 2005.<sup>2</sup> For the Medicare population alone in 2005, costs per year reached over

\$21 billion. Medicare spending per ESRD patient per year was approx-

imately \$70,000 for hemodialysis, \$50,000 for peritoneal dialysis, and \$25,000 for transplant.<sup>2</sup>

According to TARC, people with end-stage failure (stage 5) comprise only the tip of the iceberg. While approximately 400,000 individuals in the United States are in stage 5, 300,000 are in stage 4; 7.4 million are at stage 3; 5.7 million at stage 2; and 5.6 million at stage 1.<sup>2,3</sup>

## Interview

**HQSI:** Why is there an epidemic of CKD in the United States?

*Dr. Kapoian:* The reason is twofold. First of all, we're doing a bet-

**Table 1. Potential Risk Factors for Susceptibility to and Initiation of Chronic Kidney Disease**

### Clinical Factors

- Diabetes
- Hypertension
- Autoimmune diseases
- Systemic infections
- Urinary tract infection
- Urinary stones
- Lower urinary tract obstruction
- Neoplasia
- Family history of CKD
- Recovery from acute kidney failure
- Reduction in kidney mass
- Exposure to certain drugs
- Low birth weight

### Sociodemographic Factors

- Older age
- Ethnic minority status: African American, American Indian, Hispanic, Asian, or Pacific Islander
- Exposure to certain chemical and environmental conditions
- Low income/education

National Kidney Foundation. *K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification*. Available at: [www.kidney.org/professionals/kdoqi/guidelines\\_ckd/p4\\_class\\_g1.htm](http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p4_class_g1.htm). Accessed February 11, 2008.

\*TARC is a nonprofit, federally designated End-Stage Renal Disease (ESRD) Network established to maximize the quality of care consumers of ESRD services receive in New Jersey, Puerto Rico, and the U.S. Virgin Islands.

ter job of diagnosing the disease. Second, there is a rise in the prevalence of hypertension and diabetes, which are the leading causes of CKD in the United States. Another factor is that critical care medicine has gotten so much better. In the past, patients hospitalized in the intensive care unit with a major catastrophic event would have died. Now they are surviving with kidney damage.

*Solanchick:* In addition, undiagnosed and undetected diabetes are risk factors for CKD. This is a serious problem for some minority groups in our country. Untreated diabetes contributes significantly to CKD. Also, obesity is a growing problem in our country that leads to diabetes, which impacts incidence of CKD.

### HQSI: How is CKD defined?

*Dr. Kapoian:* The National Kidney Foundation recently issued a position paper that discusses the stages of kidney disease. The Foundation defines CKD based on evidence of either structural or functional changes in the kidney or a glomerular filtration rate (GFR) of less than 60. Both changes need to persist over a 3-month or greater period.

### HQSI: How is CKD diagnosed?

*Dr. Kapoian:* It may be diagnosed based on a blood test indicating that a patient's serum creatinine level is elevated. The clinician or the lab can use a calculation formula to arrive at an estimated GFR. The GFR can identify a patient who has a reduced level of kidney function at the time of testing. A clinician can also identify a kidney problem based on a urinal-

**Table 2. Definition of Chronic Kidney Disease**

#### Criteria

- Kidney damage for  $\geq 3$  mo, as defined by structural or functional abnormalities of the kidney, with or without decreased glomerular filtration rate (GFR), manifest by either pathological abnormalities or markers of kidney damage, including abnormalities in the composition of the blood or urine, or abnormalities in imaging tests
- GFR  $< 60$  mL/min/1.73 m<sup>2</sup> for  $\geq 3$  mo, with or without kidney damage

Source: National Kidney Foundation. *K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification*. Available at: [www.kidney.org/professionals/kdoqi/guidelines\\_ckd/p4\\_class\\_g1.htm](http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p4_class_g1.htm). Accessed February 11, 2008.

**Table 3. Stages of Chronic Kidney Disease and Clinical Action Plan**

Stage	Description	Glomerular filtration rate (GFR) (mL/min/1.73 m <sup>2</sup> )	Action <sup>a</sup>
1	Kidney damage with normal or $\uparrow$ GFR	$\geq 90$	Diagnosis and treatment, treatment of comorbid conditions, slowing progression, cardiovascular disease risk reduction
2	Kidney damage with mild $\downarrow$ GFR	60-89	Estimating progression
3	Moderate $\downarrow$ GFR	30-59	Evaluating and treating complications
4	Severe $\downarrow$ GFR	15-29	Preparation for kidney replacement therapy
5	Kidney failure	$< 15$ (or dialysis)	Replacement (if uremia is present)

<sup>a</sup> Includes actions from preceding stages

National Kidney Foundation. *K/DOQI clinical practice guidelines for chronic kidney disease: evaluation, classification, and stratification*. Available at: [www.kidney.org/professionals/kdoqi/guidelines\\_ckd/p4\\_class\\_g1.htm](http://www.kidney.org/professionals/kdoqi/guidelines_ckd/p4_class_g1.htm). Accessed February 11, 2008.

ysis for the presence of either blood or protein in the urine.

### HQSI: Is there any one test that is the best to use for diagnosing CKD?

*Dr. Kapoian:* The MDRD (Modification of Diet in Renal Disease) Study equation, for example, provides a useful estimate of GFR and is considered better than serum

creatinine. The only caveat is that you need to make sure that the reduction in GFR persists over a 3-month period and that you are not dealing with a transient change. Typically, a patient's GFR of less than 60 indicates stage 3 CKD. Patients whose GFR is greater than 60, but in whom you see a reduction in GFR and some other finding—either the presence of a

pathological abnormality or a change identified in imaging studies—can be diagnosed with CKD.

**HQSI:** Tell me about CKD staging and how it is used to manage the condition.

*Hoek:* The National Kidney Foundation has categorized 5 stages of CKD. They have clearly defined what the GFR is in each of these stages. In addition, the Foundation has also suggested clinical actions that should be taken in every stage. They have published clinical practice guidelines, called the K/DOQI (Kidney Disease Outcomes Quality Initiatives) guidelines, that address when referrals to a nephrologist should be made and at what point the nephrologist should become primary in a patient's care. Primary care physicians should understand and follow these guidelines to control the progression of CKD and help patients better understand their disease. The K/DOQI guidelines state that when a patient reaches stage 4, the primary care physician should refer the patient to a nephrologist. Prior to that, the primary care physician should consult with the nephrologist to make sure the correct course of action is being taken and that the patient is being managed properly.

*Solanchick:* The K/DOQI guidelines are a monumental endeavor. However, it's not clear how many PCPs, intensive care nurses, intensivists, and other healthcare professionals are fully aware of them. Since the guidelines address what should be done at each stage of the disease, as well as medication and testing, medical professionals should visit the website at [www.kidney.org/](http://www.kidney.org/)

**P**Primary care  
physicians should  
understand and follow  
the K/DOQI guidelines  
to control the  
progression of CKD  
and help patients  
better understand  
their disease. If you  
really want to change  
the outcome, you have  
to identify CKD at  
stages 2 or 3.

PROFESSIONALS/[kdoqi/guidelines.cfm](http://kdoqi/guidelines.cfm).

**HQSI:** What can physicians do to manage their patients with CKD more effectively?

*Dr. Kapoian:* If you want to modulate the outcome of CKD, you have to diagnose it early. Once the patient is in stages 4 or 5, all you can do is make preparation for renal replacement therapy. If you really want to change the outcome, you have to identify CKD at stages 2 or 3. Let's use an example. I am seeing a 70-year-old woman with a serum creatinine level of 1. On most lab testing, a creatinine level of 1 falls within the normal range. So if I'm a general practitioner reviewing the labs with this patient

who came in for her annual physical exam and some blood work, I may tell her that her lab values are all normal. However, if I take the creatinine lab result and put it in the MDRD equation to calculate the estimated GFR, I get a GFR of 58.3. If this level is consistent over time, this patient would have stage 3 CKD. Therefore, if I'm not aware of the implications and the relationship between age, gender, race, and serum creatinine, I may have the patient go home thinking that everything is fine when, in fact, she has advanced kidney disease.

Now, let's say the same woman comes back and her creatinine is 2. This converts to a GFR of 26.2. She's now at stage 4. The upper range of normal for creatinine is about 1.2 or 1.3, so the clinician looking at the creatinine level alone may say to the patient, "Your creatinine is a little elevated, but you're 70 years old and we expect creatinine to go up as you age." The clinician may not recognize that the patient has fairly severe kidney disease. If the creatinine goes up to 3, the GFR is 16.9. She's almost in stage 5 and may be showing symptoms that the clinician may misinterpret as not being related to CKD. Historically, most clinicians were trained that creatinine and the need for dialysis or renal replacement therapy occurs in the 8 to 10 range. Here's a woman who has a creatinine level of 3 and is almost on the verge of having to start dialysis.

**HQSI:** Can clinicians request that their labs run GFRs?

*Dr. Kapoian:* Clinicians may have no control over this. Labs either run

GFRs or they don't. However, if physicians are aware that the ranges of creatinine are very different from GFR levels, they will recognize that slightly elevated creatinine levels in patients with potential risk factors may mean advanced kidney disease and, in those cases, may calculate the GFR themselves.

Physician education, community education, and advocacy can play important roles in making the recording of GFR standard. Initiatives occurring on a federal level can also have an impact.

*Solanchick:* Some states, such as New Jersey, have passed legislation requiring laboratories to record GRFs for all patients as part of screening. Implementing this test is inexpensive since it involves only a calculation.

*Dr. Kapoian:* If a lab allows clinicians to choose a calculated GFR on the lab slip and a doctor checks the box, he or she gets the calculation. It's all computer programmed so there's no additional effort on the part of the lab to provide it for everyone.

**HQSI: Are there additional steps that should be taken to diagnose and manage CKD when a patient has diabetes?**

*Dr. Kapoian:* People with diabetes are at a higher risk for developing CKD, and those who develop CKD typically have protein in the urine. The American Diabetes Association recommends that patients with diabetes be screened for microalbuminuria, which is one of the earliest detectors of protein in the urine. By identifying those patients with diabetes who have protein in the urine, clinicians are also identifying a patient

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who is a high risk for CKD. This opens up a whole algorithm for what you should be doing to minimize the development and progression of kidney disease. Good screening and treatment for diabetes, as well as hypertension, help the practitioner in both managing the CKD epidemic and changing its course.

**HQSI: If hypertension, for example, is controlled, will progression of kidney damage be halted?**

*Dr. Kapoian:* Maybe, but what you have to remember is that the definition of control for the general population is different than what it is for individuals with CKD. We typically define hypertension in the general population as a blood pressure greater than 140/90. In patients with CKD, there is some debate over how much lower the reading should be. Some people say 130/80; others say 125/75. Blood pressures for people with CKD should be much lower than the targets set for the general population.

**HQSI: How important is patient education for individuals with kidney disease?**

*Dr. Kapoian:* It is very important. Kidney disease education should start as early as possible in the dis-

ease and continue through all stages.

*Hoek:* There are many sources for educational materials. The National Kidney Foundation Web site provides not only the K/DOQI guidelines, but a wealth of educational information for patients. While the Web site has information that can be downloaded, materials for the office can also be ordered.

*Dr. Kapoian:* We recognize that when you hand information to patients, there is only a subset who will read it. Education has to be done using a variety of methods so that specific learning styles of patients are met. For some, this may be reading material. For others, one-on-one interaction is needed, including conversations with a counselor.

*Hoek:* CKD clinics are becoming prevalent and provide great educational opportunities. The programs offered by these clinics are ongoing and provide patients with continuous education.

*Solanchick:* The progressive nature of the disease has to be recognized and education started early and provided in small doses. What you don't want to occur is that a patient is diagnosed at stage 5 and told that he or she will start dialysis next month. That's an awful lot to put on a patient at a stage in kidney failure where he or she is uremic and unable to absorb the information.

*Hoek:* Unfortunately, in the United States, we're still seeing that most patients start dialysis without even seeing a nephrologist prior to initiation of treatment. There is a huge gap in the educational process and the referral process.

**HQSI: How does a PCP emphasize the importance of treatment to a patient with CKD?**

*Dr. Kapoian:* Discussing the course of untreated disease with the patient is important. When I see CKD patients, we talk about what their future holds. Based on published research, I explain that there is a risk for decreased kidney function each year and provide patients with an estimate of when they may need dialysis. Then we talk about how we can change this outcome, such as by controlling their diabetes or blood pressure. We discuss the use of certain antihypertensive agents, such as ACE inhibitors and ARBs, that may slow the progression of CKD. We talk about the use of toxic medications, including over-the-counter nonsteroidal anti-inflammatory drugs, Cox-2 inhibitors, and aminoglycosides, that can damage the kidneys and worsen GFR decline. I go through these strategies so that patients have realistic expectations. I temper these discussions by explaining that the rate of progression is an estimate and the only way to really know is by monitoring the condition over the next several years. I've had patients with GFRs in the 20 to 25 range who have remained stable for the last 10 years. I've had others who just rapidly progress.

**HQSI: When should a primary care physician refer a patient to a nephrologist?**

*Solanchick:* The K/DOQI guidelines are specific about the referral for nephrologist consultation in the early stages of the disease. However, the rate of CKD pro-

gression is not constant and varies by individual. Once the patient is identified, the practitioner has to be aware of how rapidly the disease progresses. With rapid progression, the physician will have to act more quickly. In addition, primary care physicians need to identify their hypertensive and diabetic patients for frequent GFR testing.

**HQSI: What can hospitals do to manage CKD?**

*Hoek:* They need to have methods in place to identify patients at risk by screening for CKD. Identification of the stage is imperative, followed by appropriate management according to K/DOQI guidelines. Elements that are part of a comprehensive CKD program include evaluation of other lab parameters; prescription of appropriate medications; development of a vessel preservation program, including avoidance of peripherally inserted central catheter lines; discharge

planning that includes a vascular access plan; vascular access evaluation performed at stage 4, including vascular mapping and referral to a vascular surgeon; and system-wide education on CKD.

**HQSI: In conclusion, what facts about CKD need to be emphasized?**

*Solanchick:* Between 10% and 15% of the population has CKD.

*Hoek:* The mortality rate of CKD is twice that of breast cancer.

*Dr. Kapoian:* When I look at the K/DOQI staging paralleled with the numbers of people at each stage, I note the dramatic difference in how many patients are on dialysis at stage 5 compared with patients at stage 3. While there are 300,000 individuals on dialysis, approximately 7.6 million are at stage 3. The disparity is that many stage 3 patients don't survive to dialysis. Therefore, the mortality associated with CKD is

*(continued on page 41)*

## PROVIDER ACTION

### Impact to You

CKD is a growing problem in the United States. DHHS has stated that, between 1990 and 2000, the number of people with kidney failure requiring dialysis or transplantation virtually doubled to 380,000. If this trend continues, the number of people with kidney failure will approach 700,000 by 2010.<sup>1</sup>

### What You Need to Know

There is a rise in the prevalence of hypertension and diabetes, the leading causes of CKD in the United States. Minority groups in the US are particularly at risk. Untreated diabetes contributes significantly to CKD. Obesity also leads to diabetes, impacting the incidence of CKD.

### What You Need to Do

The Centers for Medicare and Medicaid Services (CMS) recommends taking the following steps to improve outcomes for CKD patients:

- Intervening as early as possible in individuals with diabetes to recognize signs of CKD
- Treating hypertensive individuals who have diabetes and stages 1 to 4 CKD with ACE inhibitors and/or ARBs
- Placing an arteriovenous (AV) fistulas in time for use at the first dialysis treatment

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enormous. There is a tremendous opportunity to make things better.

### Author Comments

As part of its 9<sup>th</sup> Scope of Work, which will begin in August 2008, the Centers for Medicare and Medicaid Services (CMS) is planning to fund 13 QIOs to engage in activities to prevent the progression of CKD. The selected QIOs will work with ESRD Networks, Medicare beneficiaries, physicians and other healthcare provider groups, kidney disease advocates, community organizations, and additional groups to increase:

- Early recognition of CKD in individuals with diabetes
- Treatment of hypertensive individuals who have diabetes and stages 1 to 4 CKD with ACE inhibitors and/or ARBs
- Placement of arteriovenous (AV) fistulas in time for use at the first dialysis treatment

Additionally, some QIOs may be funded to:

- Increase reporting of CKD-related measures through CMS' Physician Quality Reporting Initiative (PQRI)
- Encourage adoption of health information technology in physician practices
- Reduce disparities in CKD care received by underserved racial and ethnic minorities

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Andrew Miller, MD, MPH, is the Director of Physician Services at Healthcare Quality Strategies, Inc. (HQSI). HQSI is an independent, nonprofit company committed to accelerating improvement in healthcare quality through a collaborative and interactive process with the healthcare community. This material was prepared by HQSI, the Medicare Quality Improvement Organization for New Jersey, under contract with the Centers for Medicare & Medicaid Services, an agency of the U.S. Department of Health and Human Services. 8SOW-NJ-GEN-08-01

### References

1. National Institutes of Health. *Chronic kidney disease: a family affair*. Washington, DC: US Department of Health and Human Services, National Institutes of Health. 2004 Dec. NIH Publication No. 05-5391.
2. United States Renal Data System. *2007 Annual Data Report Volume I: Atlas of Chronic Kidney Disease and End-stage Renal Disease in the United States*. Bethesda, MD: National Institutes of Health; 2007.
3. Coresh J, Byrd-Holt D, Astor BC, Briggs JP, Eggers PW, Lacher DA, Hostetter TH. Chronic kidney disease awareness, prevalence, and trends among US Adults, 1999 to 2000. *J Am Soc Nephrol*. 2005;16(1):180-188.