Chronic Kidney Disease: Common, Harmful, and Treatable—World Kidney Day 2007

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Thursday, March 8, 2007, is World Kidney Day! World Kidney Day was proposed by the International Society of Nephrology and International Federation of Kidney Foundations in 2006 to broadcast a message about kidney diseases to the public, government health officials, general physicians, allied health professionals, individuals, and families. It was launched on March 9, 2006, and will be fully inaugurated this year (http://www.worldkidneyday.org/).

The message is that kidney disease is common, harmful, and treatable. In this article, we focus on chronic kidney disease (CKD) as a global public health problem and the urgent need for all countries to have a public health policy for CKD. Until recently, decision makers in public health and biomedical science had viewed CKD as uncommon, without consequences, and untreatable until the stage of kidney failure. The care of patients with CKD had been marginalized, relegated to the subspecialty of nephrology, with payment primarily directed at dialysis and transplantation, which are too costly for the vast majority of people who live outside the developed world. At the same time, costs for other chronic diseases have been mounting. In developed countries, hypertension, diabetes, and cardiovascular disease (CVD) consume a large fraction of resources for health care. The epidemic of obesity will magnify these costs, in the young as well as in the elderly. In developing countries, the burden of these noncommunicable diseases is rising even though communicable diseases are not yet under control. We now recognize that CKD is especially common in people with other chronic diseases and multiplies the risk for adverse outcomes and costs. The public health mandate now is clear. No country can afford to overlook the burden of CKD; prevention, early detection, and intervention are the only cost-effective strategies. In the following paragraphs, we outline the rationale for key elements of a public health policy for CKD and for integrating these elements with programs for other chronic diseases.

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The International Society of Nephrology and the International Federation of Kidney Foundations, along with the joint World Kidney Day Steering Committee, strongly endorse this message from the five US renal organizations to focus worldwide attention on World Kidney Day on March 8, 2007. As this paper points out, chronic diseases are now the major cause of premature death worldwide. Chronic Kidney Disease and associated cardiovascular diseases account for a significant portion of the total. There is an urgent need for rational health care policies in both the developed and the developing world that emphasize early detection and prevention of kidney disease. More information on how each of us can participate in World Kidney Day 2007 is available at http://www.worldkidneyday.org/.

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Rationale

Figure 1 shows a conceptual model for CKD as the basis for a public health approach, emphasizing stages of CKD, as well as antecedents, outcomes, and risk factors for development and progression of CKD. CKD is defined as either kidney damage, estimated from markers such as albuminuria, or GFR <60 ml/min per 1.73 m^2 for 3 mo or more (1–3). Albuminuria usually is defined as spot urine protein-to-creatinine ratio >30 mg/g, and GFR usually is estimated from serum creatinine, age, gender, and race. In the United States, recent data from the National Health and Nutrition Examination Survey (NHANES) estimate the prevalence of CKD to be 9.6% in noninstitutionalized adults, corresponding to approximately 19 million people (Table 1) (4,5). The elderly, racial and ethnic minorities, and those with lower socioeconomic status are disproportionately affected. Prevalence estimates in other countries are difficult to interpret because of differences in serum and urine creatinine levels as a result of variability among studies in assays, muscle mass, and diet. Nonetheless, in both developed and developing nations, a consistent picture is emerging of increased risk for CKD among people with CVD risk factors or established CVD.

The most important adverse outcomes of CKD include not only complications of decreased GFR and progression to kidney failure but also increased risk for CVD. Many studies show that albuminuria and decreased estimated GFR each consistently and in a graded manner increase the risk for CVD (6). Indeed, recent studies showed that patients with CKD are 100 times more likely to die, principally from CVD, than to develop kidney failure (7). There now are convincing data for efficacy of

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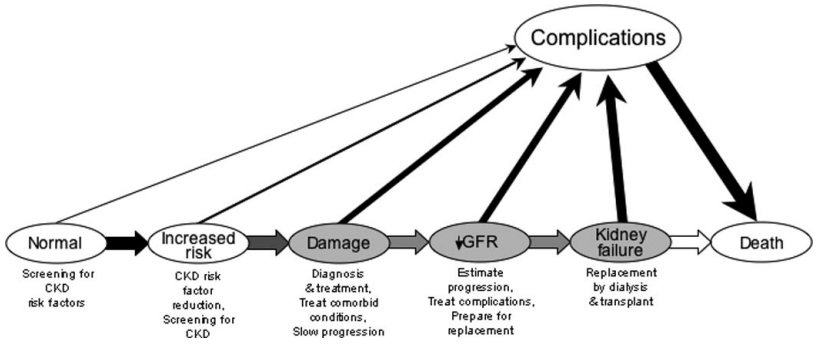

Figure 1. Conceptual model of the course of chronic kidney disease (CKD). Shaded ellipses represent stages of CKD; unshaded ellipses represent potential antecedents or consequences of CKD. Thick arrows between ellipses represent risk factors that are associated with the initiation and progression of disease that can be affected or detected by interventions: Susceptibility factors (black), initiation factors (dark gray), progression factors (medium and light gray), and end-stage factors (white). Interventions for each stage are given beneath the stage. People without CKD should be assessed for CKD risk factors. People who are known to be at increased risk for CKD should be tested for CKD. "Complications" refer to all complications of CKD and its treatment, including complications of decreased GFR (hypertension, anemia, malnutrition, and bone and mineral disease) and cardiovascular disease. Increasing thickness of arrows that connect later stages to complications represents the increased risk for complications as kidney disease progresses. Adapted from references (1–3), with permission.

treatment to prevent complications of decreased GFR, to slow progression of kidney disease, and to reduce CVD risk. Testing for CKD is feasible in clinical practice, and the same methods can be applied in large-scale screening of people who are at increased risk. Therefore, the tools to improve outcomes for CKD are already available. It now is time to establish policies to translate these advances to public health.

Detection

CKD detection programs could focus on people with CVD risk factors, such as older age, hypertension, diabetes, and hyperlipidemia, and people with CVD. The prevalence of CKD is higher in these groups, and many studies have demonstrated that CKD is a "multiplier" for CVD risk (6,8). As with all CVD risk factors, the increase in absolute risk is greater in people with other risk factors. The "CKD subgroup," particularly in the elderly, constitutes an especially high-risk group of patients who need special attention (Table 2). Among the CKD subgroup, CVD risk factor levels are higher and more difficult to control, outcomes are worse, and costs are higher. Many clinical trials of CVD risk reduction or treatment have excluded patients with later stages of CKD (9). However, analyses of trials that included patients with earlier stages of CKD generally revealed that the beneficial effect of treatment in the CKD subgroup is as large or larger than in the group without CKD (10–12). Most guidelines for CVD risk factor conditions and for CVD now recommend testing for CKD and different treatments for people who are found to have CKD compared with treatments for people without CKD (13–15).

Children, adolescents and young adults with obesity, hypertension or diabetes also are at increased risk for adverse outcomes related to CKD. It is anticipated that these younger patients have a higher risk for CKD and a higher life-time risk for CVD as a result of their long exposure to CVD risk factors (16). CVD risk factor detection programs are beginning for this population and could include testing for CKD.

CKD testing can be implemented within the same infrastructure that is used for CVD risk factor testing and should include an assessment for albuminuria and a serum creatinine measurement to estimate GFR (1,3,5). These measures should detect most cases of CKD in adults as a result of hypertension and diabetes. Additional testing for hematuria may be worthwhile in countries with a high prevalence of glomerular diseases. Patients with positive tests for CKD should be evaluated and treated according to established guidelines for CKD (1). In principle, earlier evaluation and treatment would increase the number of patients who have CKD and receive treatment and should increase the effectiveness of treatment by beginning at an earlier stage of the disease. In the United States, the incidence of kidney failure as a result of diabetes now is declining among young white individuals (17), likely as a result of testing for albuminuria and treatment with angiotensin-converting enzyme inhibitors and angiotensin receptor blockers. These improved outcomes need to be extended to young black individuals and to older people.

Surveillance

CKD surveillance programs could focus initially on patients with severe CKD (stages 4 to 5). These patients are at greatest risk for CVD and death; for the occurrence of common and treatable complications of decreased GFR, such as hypertension, anemia, malnutrition, and bone and mineral disease; and for progression to kidney failure. Specific treatments now are available for each of these complications and to slow progression, yet many studies demonstrate suboptimal use of effective therapies (18). In the United States, the average age of people with CKD stage 4 is 75 yr, and more than 95% have two or more complications of decreased GFR (1,5). In one study, 46% died and 18% were treated by

Table 1. Stages of CKD with prevalence in the US (NHANES 1999 to 2000) and stage specific recommendations for detection, evaluation and management (NKF-K/DOQI)[a]

Stage of CKD	Description	GFR (ml/min per 1.73 m^2)	Detection, Evaluation, and Management	US Prevalence in 2000[b] (%; *n* in thousands)
1	Kidney damage with normal or increased GFR	>90	Diagnosis and treatment, treatment of comorbid conditions, slowing progression, CVD risk reduction	2.8; 5600
2	Kidney damage with mild decreased GFR	60 to 89	Estimate progression	2.8; 5700
3	Moderate decreased GFR	30 to 59	Evaluating and treating complications	3.7; 7400
4	Severe decreased GFR	15 to 29	Referral to nephrologist and consideration for kidney replacement therapy	0.1; 300
5	Kidney failure	<15	Kidney replacement therapy (if uremia present)	0.2; 300[c]

[a]CKD, chronic kidney disease; CVD, cardiovascular disease; NHANES, National Health and Nutrition Examination Survey; NKF-K/DOQI, National Kidney Foundation Kidney Disease Outcomes Quality Initiative.
[b]Kidney damage defined as persistent albuminuria on two occasions (5).
[c]Prevalence of stage 5 is from the US Renal Data System for the number of patients who are on dialysis therapy. This is an underestimation because it does not include the additional unknown number individuals who have kidney failure and are not receiving treatment (17).

Table 2. Rationale for CKD detection in people with CVD and CVD risk factor conditions

CVD is the most common cause of death in developed nations
CKD is more common in people with CVD and CVD risk factors, including hypertension, diabetes, and dyslipidemia
CKD multiplies risk for CVD
Patients with CVD and CVD risk factors and CKD are more ill compared with those without CKD
risk factor levels are higher
risk factor control is more difficult
CVD outcomes are worse
Costs of care are higher
CVD risk factor management differs in patients with CKD compared with those without CKD
Treatments are available and effective
to reduce CVD risk
to manage complications of decreased GFR
to slow kidney disease progression

dialysis and transplantation during an average follow-up of 3.1 yr (7). Current guidelines now recommend referral of all patients with CKD stages 4 to 5 to nephrologists for specialized care and for preparation for dialysis and transplantation where these treatments are offered (1). Many countries have surveillance programs for patients who are treated by dialysis and transplantation. However, these programs do not include people who have severe CKD and die before the onset of kidney failure or who are not treated with dialysis and transplantation despite the onset of kidney failure. In principle, a surveillance program for CKD stages 4 to 5 would enable all countries to monitor the magnitude and the care of this high-risk, high-cost population and possibly to reduce the risk for progression to kidney failure and reduce the cost of dialysis and transplantation.

A surveillance program for patients with CKD stage 3 would reach many more people (Table 1) and might be an effective way to lower rates of CVD and death, especially among the elderly with CVD risk factors or CVD. However, a larger surveillance program would require more resources. One possible strategy is first to implement a surveillance program directed at CKD stages 4 to 5, then use the experience gained to implement a program directed at high-risk subgroups of CKD stage 3.

Prevention

It is not too ambitious to consider CKD prevention. Hypertension and diabetes are the major causes of CKD in developed nations. In developing nations, chronic viral infections may contribute substantially to the burden of CKD from glomerular

diseases. Strong, effective public health policies that focus on prevention, detection, and treatment of these common chronic diseases may reduce the risk for development of CKD. Reduction in the incidence and the prevalence of CKD could be a measure of success of public health programs for these other chronic diseases.

Improving and Paying for Patient Care

Detection, surveillance, and prevention programs will bring more patients with CKD and CKD risk factors into the health care delivery system. As for all chronic diseases, commitment and innovation will be necessary to treat more patients, improve quality, and remain within public and employer group health plan budgets. Partnerships with government and payers are necessary to establish appropriate measures, standardized information technology platforms, appropriate incentives for improving quality, responsible analysis of the cost of care, and novel reimbursement methods.

Research

Finally, a health care policy for CKD must include investment in basic and clinical research. Research priorities could include studies of causes of CKD and its progression, complications, and relationship to CVD and aging; new markers of kidney damage and better estimating equations for GFR; new treatments to slow progression, ameliorate complications of decreased GFR, and reduce CVD risk; and more effective strategies to implement existing and new treatments across populations.

What Should Nephrologists Do?

Nephrologists cannot care for all those with CKD, but we must join the effort to focus worldwide attention on CKD. We can educate our colleagues, government officials, and the public that CKD is common and harmful and, most important, that we have treatment. We can participate with professional, public, and governmental groups to develop public health policy for CKD. We can work collaboratively with primary care physicians and other specialists to establish care models, within nephrology and within primary care, including clear recommendations for consultation, co-management, and communication among treating physicians. We can develop estimates for the nephrology workforce to care for CKD, and we can develop strategies to train and maintain the workforce. We can improve the quality of care for patients with CKD stages 4 to 5. Nephrologists will continue to shoulder the burden of care for these severely ill and challenging patients, and we must strive to do so with diligence, technical skill, and compassion. We must recognize that improving the care and outcomes for CKD is a long process. World Kidney Day 2007 is an opportunity to begin this process. Hereafter, each year on World Kidney Day, we should measure our progress.

Disclosures

None.

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