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The epidemic of pediatric chronic kidney disease: the danger of skepticism

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Globally, the prevalence of chronic kidney disease (CKD) stage 2 or lower reported to be approximately 18.5 and 58.3 per million children. Pediatric CKD imposes a large burden on society that is increasing despite ongoing efforts to control the disease. The burden is unevenly distributed by race and economic status. Whereas evidence suggests that preventive strategies could substantially reduce the burden.

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Editorial

Chronic kidney disease (CKD) is a serious, common and costly public health problem and its incidence is on the rise across the globe (1-3). Globally, the prevalence of CKD stage 2 or lower reported to be approximately 18.5 and 58.3 per million children (3).

CKD is also a risk factor for cardiovascular disease (CVD), stroke, and heat failure (4). Children with CKD mainly die of cardiovascular cases and infections rather than that from renal failure.

Pediatric CKD imposes a large burden on society that is increasing despite ongoing efforts to control the disease. The burden is unevenly distributed by race and economic status. Whereas evidence suggests that preventive strategies could substantially reduce the burden. There are indications that such strategies are not yet in place.

The disease largely contributing to the CKD populations are type 2 diabetes, hypertension and focal segmental glomerulonephritis (FSGS) (2, 5). Children at risk of CKD include those from congenital anomalies of the kidney and urinary tract (CAKUT), hereditary disorders such as polycystic kidney disease and medullary cystic disease, premature and low birth weights or family history of CKD (3,6).

Early detection and treatment are cost effective and neglecting these problems can be very

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expensive. We do have treatment regimens that are safe, relatively simple, and if not perfect, quite effective. Unfortunately, CKD is usually asymptomatic early in the course of disease until kidney function is severely compromised. Therefore, it seems that the best approach to the problem of the under-diagnosis of CKD is to ensure that all health care professionals, both generalists and specialists, understand the importance of the early detection of kidney disease. In our opinion, nephrologists can play significant role in the education of health professionals, particularly primary care providers. This will help to call attention to CKD, a pathology whose impact on public health is enormous and is rapidly rising.

Primary care physicians are at the forefront of detection and management of early CKD. The primary care physicians should be made especially aware that every patient at increased risk of CKD should be systematically screened for the presence of CKD. The primary care physician is responsible for coordinating care with the various specialists (nephrologists, cardiologists and diabetologists) involved in managing CKD. Awareness and communications between the health professionals and nephrologists may be the single most effective step in achieving better outcome in CKD. Increased patient awareness and understanding of CKD would also improve compliance with CKD management and avoidance of medications that can further affect renal function.

The primary care interventions that can slow the progression of CKD include treating hypertension to normal blood pressure levels using ACE inhibitors and ARB in both diabetics and non-diabetic patients, maintaining careful glycemic control in those with diabetes, following a low-protein diet, and monitoring patients for the development of microalbuminuria. Treating dyslipidemia, losing weight, stop smoking, and managing anemia also help delay progression of early CKD (7-10). In a recent study, Amin AP and his colleagues reported that among adult patients with established CKD, the risk for progression to end-stage renal disease begins to rise with systolic blood pressure above 140 mmHg (11). Only patients who had a systolic blood pressure of 150 mmHg or greater remained at a statistically significantly higher risk for CKD compared with those who had a systolic blood pressure lower than 130 mmHg. These data suggest that systolic blood pressure reduction below the target goal could increase the risk for heart attack or stroke. In addition, guidelines recommending that blood pressure should be measured in both arms. A difference in systolic blood pressure of 10-15 mmHg or more between arms could identify patients at high risk of symptomatic peripheral vascular disease and mortality who might benefit from further assessment (12, 13).

Many patients with CKD still receive suboptimal care. The problem is both lack of diagnosis and inadequate treatment. Screening with urinary microalbumin measurement has not been widely used in high risk population for CKD (14). Estimation of the glomerular filtration rate (eGFR) is not properly utilized. More distressing are the data that patients who have had these tests are often not prescribed the cardinal components of the accepted therapeutic regimen.

Most widely used eGFR based on serum creatinine are the Modification of Diet in Renal Disease (MDRD) study for adults (15) and the Schwartz equation for children (16). These equations can be calculated at the bedside or issued by the laboratory provide accurate GFR estimates from 20 to 60 mL/min/1.73 m2 with good accuracy but poor bias and precision as well as the lack of calibration material. Furthermore, the Schwartz equation currently overestimates GFR due to a change in the methods used to measure creatinine (17). Lately cystatin C was introduced as a GFR estimate superior to creatinine that can detect mild GFR reduction between 60-90 mL/min/1.73m2. However, no reference method and

no uniform calibration material exist for cystatin C either. Further, limitations are the effect of thyroid dysfunction, use of glulcocorticoids and potentially the presence of CVD on cystatin C levels. In a more recent study Schwartz GJ and his associates proposed new equations to estimate GFR in children with CKD, which is based not only on height, gender, and patients' age and anthropomorphic characteristics, but also on serum creatinin, cystatin C, and blood urea nitrogen (18). These equations are useful in the range of GFR between 15 to 75 ml/min/1.73 m2. Further study of children with higher GFR values will improve the use of these equations for children with CKD. Therefore, supplementing GFR estimates with urinary microalbumin screening seems to be necessary for early detection of CKD.

Proposed strategies plan

The first initiative is to develop and improve public and professional outreach campaigns in the area of CKD. The second initiative is to improve prioritization of education programs that are science-driven and meet the needs of patient care. Additional initiatives is to improve standardization of tools and procedures for education design, data capture, data sharing, and administrative functions to minimize duplication of efforts, and to facilitate development of a shared infrastructure to support an integrated national kidney disease education network. Another major initiative includes improving operational efficiency by increasing the rate of public accrual and reducing operational barriers so that education can be executed in a timely, cost-effective manner.

To achieve these goals, three working groups are to be organized to address components of the strategic plan to achieve these goals. First, a group composed of experts in nephrology, primary care, and laboratory medicine will develop simple goal for blood pressure therapy and laboratory screening for kidney disease using guideline and evidence-based published reports available in the literature. The second working group, comprising people in organizations engaged in health education to lay out a pilot program for public awareness. The third working group is charged with evaluating the efficiency of these pilot programs.

A comprehensive effort should include not only the patient and professional education but also the involvement insurance agencies and members of community and government on the seriousness and costs of CKD and opportunities for prevention. As the messages for the public and providers develop, and brought forward and evaluated, ever broader national application will follow.

Primary care providers can play significant roles in increasing awareness about CKD, providing tools for prevention, and stressing the link between life style changes (diet, exercise, weight reduction) and hypertension or diabetes mellitus (19).

For the primary health care providers, we need to improve their understanding about the value of CKD early detection and treatment, its risk factors and its relationship to comorbid conditions. We need to educate our colleagues how to identify people at risk and to encourage them screening and detecting people at high risk for CKD through routine surveillance including the measurement of urine microalbumin and eGFR while we await more cost-effectiveness studies. We need to educate our primary care takers to be more aggressive to maintaining serum albumin goal of >3.5 g/dL in all CKD patients and encourage them that many CKD patients may need more than one or two drugs for adequate blood pressure control. Primary care takers also need to be much more aggressive to use ACE inhibitors or ARB to slow the progression of CKD, particularly in patients with type 2 diabetes.

For population at risk we need to provide aggressive public health education to increase awareness of the seriousness of CKD, its risk factors, and strategies to prevent it through targeting to improve nutrition, increase level of physical activity and minimize harm caused by smoking, alcohol, illicit, and other drug use. We need to encourage them about the dietary restriction of salt, fat, and protein to delay the progression of CKD (20).

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