Kidney health for everyone everywhere – from prevention to detection and equitable access to care

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Abstract

The global burden of chronic kidney disease (CKD) is rapidly increasing with a projection of becoming the 5th most common cause of years of life lost globally by 2040. Aggravatingly, CKD is a major cause of catastrophic health expenditure. The costs of dialysis and transplantation consume up to 3% of the annual health-care budget in high-income countries. Crucially, however, the onset and progression of CKD is often preventable. In 2020, the World Kidney Day campaign highlights the importance of preventive interventions – be it primary, secondary, or tertiary. This complementing article focuses on outlining and analyzing measures that can be implemented in every country to promote and advance CKD prevention. Primary prevention of kidney disease should focus on the modification of risk factors and addressing structural abnormalities of the kidney and urinary tracts, as well as exposure to environmental risk factors and nephrotoxins. In persons with preexisting kidney disease, secondary prevention, including blood pressure optimization and glycemic control, should be the main goal of education and clinical interventions. In patients with advanced CKD, management of comorbidities such as uremia and cardiovascular disease is a highly recommended preventative intervention to avoid or delay dialysis or kidney transplantation. Political efforts are needed to proliferate the preventive approach. While national policies and strategies for non-communicable diseases might be present in a country, specific policies directed toward education and awareness of CKD screening, management, and treatment are often lacking. Hence, there is an urgent need to increase the awareness of the importance of preventive measures throughout populations, professionals, and policy-makers.

Key words: Kidney diseases. Prevention. Detection. Awareness.

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Salud renal para todos en todas partes – desde la prevención hasta la detección y el acceso equitativo a la atención

Resumen

La carga global de enfermedad renal crónica (ERC) se encuentra en un rápido crecimiento, estimándose que para el 2040 se convierta en la quinta causa más común de años de vida perdidos en todo el mundo. Asimismo, la ERC constituye una causa importante de gastos catastróficos para la salud, siendo que los costos de diálisis y trasplante consumen hasta el 3% del presupuesto anual de atención médica en países de altos ingresos. Sin embargo, una acción adecuada y oportuna pueden prevenir el inicio y la progresión de la ERC. En 2020, la campaña del Día Mundial del Riñón destaca la importancia de las intervenciones preventivas, ya sean primarias, secundarias o terciarias. Este artículo complementario se centra en delinear y analizar las medidas que se pueden implementar en todos los países para promover y avanzar en la prevención de la ERC. La prevención primaria de la enfermedad renal debe centrarse en la modificación de los factores de riesgo y abordar las anomalías estructurales del riñón y las vías urinarias, así como la exposición a factores de riesgo ambientales y nefrotoxinas. En personas con enfermedad renal preexistente, la prevención secundaria, incluida la optimización de la presión arterial y el control glucémico, debe ser el objetivo principal de la educación y las intervenciones clínicas. En pacientes con ERC avanzada, el manejo de comorbilidades asociadas a la uremia y la enfermedad cardiovascular, constituye una intervención preventiva altamente recomendada para evitar o retrasar la diálisis o el trasplante de riñón. Es necesario llevar a cabo políticas con enfoque preventivo. Si bien las políticas y estrategias nacionales para las enfermedades no transmisibles pueden estar presentes en un país, a menudo faltan políticas específicas dirigidas a la educación y la conciencia sobre la detección, el manejo y el tratamiento de la ERC. Por lo tanto, existe una necesidad urgente de aumentar la conciencia de la importancia de las medidas preventivas en las poblaciones, los profesionales y los responsables políticos.

Palabras clave: Enfermedades renales. Prevención. Detección. Conciencia.

Introduction

Around 850 million people currently are affected by different types of kidney disorders¹. Up to 1 in 10 adults worldwide has chronic kidney disease (CKD), which is invariably irreversible and mostly progressive. The global burden of CKD is increasing, and CKD is projected to become the 5th most common cause of years of life lost globally by 2040². If CKD remains uncontrolled and if the affected person survives the ravages of cardiovascular and other complications of the disease, CKD progresses to end-stage renal disease (ESRD), where life cannot be sustained without dialysis therapy or kidney transplantation. Hence, CKD is a major cause of catastrophic health expenditure³. The costs of dialysis and transplantation consume 2-3% of the annual health-care budget in high-income countries, spent on < 0.03% of the total population of these countries⁴.

Importantly, however, kidney disease can be prevented and progression to ESRD can be delayed with appropriate access to basic diagnostics and early treatment including lifestyle modifications and nutritional interventions⁴⁻⁸. Despite this, access to effective and sustainable kidney care remains highly inequitable across the world and kidney disease a low health priority in many countries. Kidney disease is crucially

missing from the international agenda for global health. Notably absent from the impact indicators for the Sustainable Development Goals (SDG): Goal 3. Target 3.4: by 2030 (By 2030, reduce by one-third premature mortality from non-communicable diseases (NCDs) through prevention and treatment and promote mental health and well-being) and the latest iteration of the United Nations Political Declaration on NCDs, kidney diseases urgently need to be given political attention, priority, and consideration⁹. The current global political commitments on NCDs focus largely on four main diseases: cardiovascular disease (CVD), cancer, diabetes, and chronic respiratory diseases. Yet, it is estimated that 55% of the global NCD burden is attributed to diseases outside of this group¹⁰. Furthermore, kidney disease frequently coexists with the “big” four NCDs, which leads to worse health outcomes. CKD is a major risk factor for heart disease and cardiac death, as well as for infections such as tuberculosis, and is a major complication of other preventable and treatable conditions including diabetes, hypertension, HIV, and hepatitis⁴⁻⁷. As the SDG and universal health coverage (UHC) agendas progress and provide a platform for raising awareness of NCD health care and monitoring needs, targeted action on kidney disease prevention should become integral to the global policy response¹. The global kidney health community calls for the recognition

Figure 1. Overview of the preventive measures in chronic kidney disease (CKD) to highlight the similarities and distinctions pertaining to primary, secondary, and tertiary preventive measures and their intended goals.

of kidney disease and effective identification and management of its risk factors as a key contributor to the global NCD burden and the implementation of an integrated and people's centered approach to care.

Definition and classification of CKD prevention

According to the expert definitions including the Center for Disease Control and Prevention¹¹, the term "prevention" refers to activities that are typically categorized by the following three definitions: (1) primary prevention implies intervening before health effects occur in an effort to prevent the onset of illness or injury before the disease process begins, (2) secondary prevention suggests preventive measures that lead to early diagnosis and prompt treatment of a disease to prevent more severe problems developing and includes screening to identify diseases in the earliest stages, and (3) tertiary prevention indicates managing disease after it is well established to control disease progression and the emergence of more severe complications, which is often by means of targeted measures such as pharmacotherapy, rehabilitation, and screening for and management of complications. These definitions have an important bearing in the prevention and management

of the CKD, and accurate identification of risk factors that cause CKD or lead to faster progression to renal failure, as shown in figure 1, is relevant in health policy decisions and health education and awareness related to CKD¹².

Primary prevention of CKD

The incidence (new cases) and prevalence (cumulative preexisting cases) of CKD has been rising worldwide¹³. This primary level of prevention requires awareness of modifiable CKD risk factors and efforts to focus health-care resources on those patients who are at the highest risk of developing new-onset or *de novo* CKD.

Measures to achieve effective primary prevention should focus on the two leading risk factors for CKD, including diabetes mellitus and hypertension. Evidence suggests that an initial mechanism of injury is renal hyperfiltration with seemingly elevated glomerular filtration rate (GFR), above normal ranges. This is often the result of glomerular hypertension that is often seen in patients with obesity or diabetes mellitus, but it can also occur after a high dietary protein intake⁸. Other CKD risk factors include polycystic kidneys or other congenital or acquired structural anomalies of the kidney and

Table 1. Risk factors for *de novo* CKD and preexisting CKD progression

*Risk factor	Contribution to <i>de novo</i> CKD	Contribution to CKD progression
Diabetes mellitus	~50% of all CKDs	
Hypertension	~25% of all CKDs	
Obesity	10-20%	
Age	Seen with advancing age, especially in the setting of comorbid conditions	Some suggests that older CKD patients may have slower progression
Race, genetics, and other hereditary factors: – APOL1 gene – Hereditary nephritis (Alport's)	Common among those with African-American ancestors	
Acute glomerulonephritis: – Post-infectious GN – Rapidly progressive GN	<10%	Recurrent GN or exacerbation of proteinuria
Polycystic kidney disorders	<10%, family history of cystic kidney disorders	
Acute kidney injury – ATN – AIN	Repeated AKI bouts can cause CKD	Repeated AKI bouts can accelerate CKD progression
Autoimmune disorders – Lupus erythematosus – Other connective tissue disorders		
Pharmacologic: – Medications causing interstitial nephritides (NSAIDs, CNI, chemotherapy, PPI, etc.) or ATN (aminoglycosides) – Herbs and herbal medication	Variable, for example, in Taiwan, Chinese herb nephropathy may be an important contributor	
Environmental: – Heavy metal exposure	Rare	
Acquired or congenital solitary kidney – Cancer, donor, or traumatic nephrectomy – Congenital solitary kidney, unilateral atrophic kidney		
Acquired urinary tract disorders and obstructive nephropathy	BPH in men Gynecological cancers in women	
Congenital anomalies of the kidney and urinary tract	Mostly in children and young adults	
Inadequate fluid intake – Mesoamerican nephropathy – Others	Unknown risk, but high prevalence is suspected in Central America	Whereas in earlier CKD stages, adequate hydration is important to avoid pre-renal AKI bouts, higher fluid intake in more advanced CKD may increase the risk of hyponatremia
High-protein intake	Unknown risk, recent data suggest higher CKD risk or faster CKD progression with high-protein diet, in particular, from animal sources	Higher protein intake can accelerate the rate of CKD progression
Cardiovascular diseases (cardiorenal)	Ischemic nephropathy	
Liver disease (hepatorenal)	NASH cirrhosis, viral hepatitis	

*Many of these risk factors contribute to both *de novo* CKD and its faster progression and hence are relevant to both primary and secondary prevention. APOL1: apolipoprotein 1; CKD: chronic kidney disease; AKI: acute kidney injury; ATN: acute tubular necrosis; AIN: acute interstitial nephritis.

urinary tracts, primary glomerulonephritis, exposure to nephrotoxic substances or medications (such as non-steroidal anti-inflammatory drugs), having one single kidney, for example, solitary kidney after cancer nephrectomy, high dietary salt intake, inadequate hydration with recurrent volume depletion, heat stress, exposure to pesticides, and heavy metals (as has been speculated as the main cause of Mesoamerican nephropathy), and possibly high-protein intake in those at higher risk of CKD⁸. Among non-modifiable risk factors are advancing age and genetic factors such as apolipoprotein 1 gene that is mostly encountered in those with sub-Saharan African ethnicity, especially among African Americans. Certain disease states may cause *de novo* CKD such as cardiovascular and atheroembolic diseases (also known as secondary cardiorenal syndrome) and liver diseases (hepatorenal syndrome). **Table 1** shows some of the risk factors of CKD.

Among measures to prevent the emergence of *de novo* CKD are screening efforts to identify and manage persons at high risk of CKD, especially those with diabetes mellitus and hypertension. Hence, targeting primordial risk factors of these two conditions including metabolic syndrome and overnutrition are relevant to primary CKD prevention as is correcting obesity¹⁴. Promoting healthier lifestyle is an important means to that end including physical activity and healthier diet. The latter should be based on more plant-based foods with less meat, less sodium intake, more complex carbohydrates with higher fiber intake, and less saturated fat. In those with hypertension and diabetes, optimizing blood pressure and glycemic control have shown to be effective in preventing diabetic and hypertensive nephropathies. A recent expert panel suggested that persons with solitary kidney should avoid high-protein intake above 1 g/kg body weight per day^{15,16}. Obesity should be avoided, and weight reduction strategies should be considered¹⁴.

Secondary prevention in CKD

Evidence suggests that among those with CKD, the vast majority have early stage of the disease, i.e., CKD Stages 1 and 2 with microalbuminuria (30-300 mg/day) or CKD Stage 3B (eGFR between 45 and 60 ml/min/1.73 m²)¹⁶. In these persons with preexisting disease, the “secondary prevention” of CKD has the highest priority. For these earlier stages of CKD, the main goal of kidney health education and clinical interventions is how to slow disease progression. Uncontrolled or poorly controlled hypertension is one of the

most established risk factors for faster CKD progression. The underlying pathophysiology of faster CKD progression relates to ongoing damage to the kidney structure and loss of nephrons with worsening interstitial fibrosis as it happens with sustained hypertension.

The cornerstone of the pharmacotherapy in secondary prevention is the use of angiotensin pathway modulators, also known as renin–angiotensin–aldosterone system inhibitors (RAASi). These drugs reduce both systemic blood pressure and intraglomerular pressure by opening efferent arterioles of the glomeruli, hence, leading to longevity of the remaining nephrons. Low-protein diet appears to have a synergistic effect on RAASi therapy¹⁷. In terms of the potential effect of controlling glycemic status and correcting obesity on the rate of CKD progression, there are mixed data. However, recent data suggest that a new class of antidiabetic medications known as sodium-glucose cotransporter-2 Inhibitors can slow CKD progression, but this effect may not be related to glycemic modulation of the medication. Whereas acute kidney injury (AKI) may or may not cause *de novo* CKD, AKI events that are superimposed on preexisting CKD may accelerate disease progression¹⁸. A relatively recent case of successful secondary prevention that highlights the significance of implementing preventive strategies in CKD is the use of a vasopressin V(2) receptor antagonists in adult polycystic kidney disease¹⁹.

Tertiary prevention in CKD

In patients with advanced CKD, management of uremia and related comorbid conditions such as anemia, mineral and bone disorders, and CVD is of high priority so that these patients can continue to achieve the highest longevity. These measures can be collectively referred to as “tertiary prevention” of CKD. In these individuals, CVD burden is exceptionally high, especially if they have underlying diabetes or hypertension, while they often do not follow other traditional profile of cardiovascular risk such as obesity or hyperlipidemia. Indeed, in these patients, a so-called “reverse epidemiology” exists in that hyperlipidemia and obesity appear to be protective at this advanced stage of CKD. This could be due to the overshadowing impact of the “protein-energy wasting” (PEW) that happens more frequently with worsening uremia which is associated with weight loss and poor outcomes including CVD and death. Whereas many of these patients, if they survive ravages of PEW and CVD, will eventually receive renal replacement therapy in the form of dialysis therapy or kidney

transplantation, a new trend is emerging to maintain them longer without dialysis by implementing conservative management of CKD. However, in some with additional comorbidities such as metastatic cancers, palliative measures with supportive care can be considered.

Approaches to the identification of CKD

The lack of awareness of CKD around the world is one of the reasons for late presentation of CKD in both developed and developing economies²⁰⁻²². The overall CKD awareness among the general population and even high cardiovascular risk groups across 12 low-income and middle-income countries was < 10%²².

Given its asymptomatic nature, screening of CKD plays an important role in early detection. Consensus and Positional Statements have been published by the International Society of Nephrology²³, National Kidney Foundation²⁴, Kidney Disease Improving Global Outcomes (KDIGO)²⁵, NICE Guidelines²⁶, and Asian Forum for CKD Initiatives²⁷. There was lack of trials to evaluate screening and monitoring of CKD²⁸. At present, most will promote a targeted screening approach to early detection of CKD. Some of the major groups at risk for targeted screening includes patients with diabetes, hypertension, those with a family history of CKD, individuals receiving potentially nephrotoxic drugs, herbs or substances or taking indigenous medicine, patients with a history of AKI, and individuals older than 65 years^{27,29}. CKD can be detected with two simple tests: a urine test for the detection of proteinuria and a blood test to estimate the GFR^{24,27}.

Given that currently, a population screening for CKD is not recommended and it was claimed that it might add unintended harm to the general population being screened²⁸, there is no specialty society or preventive services group which recommends general screening³⁰. Low-income to middle-income countries are ill-equipped to deal with the devastating consequences of CKD, particularly the late stages of the disease. There are suggestions that screening should primarily include high-risk individuals but also extend to those with sub-optimal levels of risk, for example, prediabetes and prehypertension³¹.

Cost-effectiveness of early detection programs

Universal screening of the general population would be time consuming, expensive and has been shown to be not cost effective. Unless selectively directed toward

high-risk groups, such as the case of CKD of unknown etiology in disadvantaged populations³², according to a cost-effectiveness analysis using a Markov decision-analytic model, population-based dipstick screening for proteinuria has an unfavorable cost-effectiveness ratio³³. A more recent Korean study confirmed that their National Health Screening Program for CKD is more cost effective for patients with diabetes or hypertension than the general population³⁴. From an economic perspective, screening CKD by detection of proteinuria was shown to be cost effective in patients with hypertension or diabetes in a systematic review³⁵. The incidence of CKD, rate of progression, and effectiveness of drug therapy were major drivers of cost-effectiveness and thus CKD screening may be more cost effective in populations with higher incidences of CKD, rapid rates of progression, and more effective drug therapy.

A rational approach to CKD early detection

The approach toward CKD early detection will include the decision for the frequency of screening, which should perform the screening and intervention after screening²¹. Screening frequency for targeted individuals should be yearly if no abnormality is detected on initial evaluation. This is in line with the KDIGO resolution that the frequency of testing should be according to the target group to be tested and generally needs not to be more frequent than once per year²⁵. Who should perform the screening is always a question, especially when the health-care professional availability is a challenge in lower-income economies. Physicians, nurses, paramedical staff, and other trained health-care professionals are eligible to do the screening tests. Intervention after screening is also important and patients detected to have CKD should be referred to primary care and general physicians with experience in the management of kidney disease for follow-up. A management protocol should be provided to the primary care and general physicians. Further, referral to nephrologists for management will be based on the well-defined protocols^{22,25,27}.

Integration of CKD prevention into national NCD programs

Given the close links between CKD and other NCDs, it is critical that CKD advocacy efforts be aligned with existing initiatives concerning diabetes, hypertension, and CVD, particularly in LMIC. Some countries and

regions have successfully introduced CKD prevention strategies as part of their NCD programs. As an example, in 2003, a kidney health promotion program was introduced in Taiwan, with its key components including a ban on herbs containing aristolochic acid, public awareness campaigns, patient education, funding for CKD research, and the setting up of teams to provide integrated care³⁶. In Cuba, the Ministry of Public Health has implemented a National Program for the Prevention of CKD. Since 1996, the program has followed several steps: (1) the analysis of the resources and health situation in the country; (2) epidemiological research to define the burden of CKD; and (3) continuing education for nephrologists, family doctors, and other health professionals. The main goal has been to bring nephrology care closer to the community through a regional redistribution of nephrology services and joint management of CKD patients by primary health-care physicians and nephrologists³⁷. The integration of CKD prevention into NCDs program has resulted in the reduction of renal and cardiovascular risks in the general population. The main outcomes have been the reduction in the prevalence of risk factors, such as low birth weight, smoking, and infectious diseases. There has been an increased rate of the diagnosis of diabetes and of glycemic control, as well as an increased diagnosis of patients with hypertension, higher prescription use of renoprotective treatment with ACEI, and higher rates of blood pressure control³⁸. Recently, the US Department of Health and Human Services has introduced an ambitious program to reduce the number of Americans developing ESRD by 25% by 2030. The program, known as the Advancing American Kidney Health Initiative, has set goals with metrics to measure its success, among them is to put more efforts to prevent, detect, and slow the progression of kidney disease, in part by addressing traditional risk factors such as diabetes and hypertension. To reduce the risk of kidney failure, the program contemplates advancing public health surveillance and research to identify populations at risk and those in early stages of kidney disease and to encourage adoption of evidence-based interventions to delay or stop progression to kidney failure³⁹. Ongoing programs, like the Special Diabetes Program for Indians, represent an important part of this approach by providing team-based care and care management. Since its implementation, the incidence of diabetes-related kidney failure among American Native populations decreased by over 40% between 2000 and 2015⁴⁰.

Involvement of primary care physicians and other health professionals

Detection and prevention of CKD programs require considerable resources both in terms of workforce and funds. Availability of such resources will depend primarily on the leadership of nephrologists⁴¹. However, the number of nephrologists is not sufficient to provide renal care to the growing number of CKD patients worldwide. It has been suggested that most cases of non-progressive CKD can be managed without referral to a nephrologist, and specialist referral can be reserved for patients with an estimated GFR < 30 mL min per 1.73 per m², rapidly declining kidney function, persistent proteinuria, or uncontrolled hypertension or diabetes⁴². It has been demonstrated that with an educational intervention, the clinical competence of family physicians increases, resulting in preserved renal function in diabetic patients with early renal disease⁴³. The practitioners who received the educational intervention used significantly more angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, and statins than did practitioners who did not receive it. The results were similar to those found in patients treated by nephrologists⁴⁴. The role of primary health-care professionals in the implementation of CKD prevention strategies in LMIC countries has been recently illustrated⁴⁵.

The e-Learning has become an increasingly popular approach to medical education. Online learning programs for NCD prevention and treatment, including CKD, have been successfully implemented in Mexico. By 2015, over 5000 health professionals (including non-nephrologists) had been trained using an electronic health education platform⁴⁶.

Shortage of nephrology workforce – implication on prevention

The resources for nephrology care remain at critical levels in many parts of the world.

Even in Western developed countries, nephrologists are frequently in short supply. In a selection of European countries with similar, predominantly public, health-care systems, there was a substantial variation in the nephrology workforce. Countries such as Italy, Greece, and Spain reported the highest ratios, while countries such as Ireland, Turkey, and the UK had the lowest ones⁴⁷. In the USA, the number of nephrologists per 1000 ESRD patients has declined over the years, from 18 in 1997 to 14 in 2010⁴⁸. The situation in the

developing world is even worse. With the exception of Nigeria, Sudan, Kenya, and South Africa, in many countries of sub-Saharan Africa, there are fewer than 10 nephrologists. The number of nephrology nurses and dialysis technicians is also insufficient⁴⁹. In Latin America, the average number of nephrologists is 13.4 pmp. However, there is unequal distribution between countries; those with <10 nephrologists pmp (Honduras, 2.1 pmp; Guatemala, 3.3 pmp; and Nicaragua, 4.6 pmp) and those exceeding 25 pmp (Cuba, 45.2 pmp; Uruguay, 44.2 pmp; and Argentina, 26.8 pmp)⁵⁰.

The causes of this shortage are multiple. Potential contributors to this variation include the increasing burden of CKD, erosion of nephrology practice scope by other specialists, lack of workforce planning in some countries relative to others, and the development of new care delivery models⁴⁸. A novel strategy has been the successful ISNs Fellowship Program. Since its implementation in 1985, over 600 fellows from > 83 LMIC have been trained. A significant number of fellowships were undertaken in selected developed centers within the fellow's own region. In a recent survey, 85% of responding fellows were reemployed by their home institutions^{51,52}.

The interdisciplinary prevention approach

Since 1994, a National Institute of Health Consensus advocated for early medical intervention in pre-dialysis patients. Due to the complexity of care of CKD, it was recommended that patients should be referred to a multidisciplinary team consisting of nephrologist, dietitian, nurse, social worker, and health psychologist, with the aim to reduce pre-dialysis and dialysis morbidity and mortality⁵³. In Mexico, a nurse-led, protocol-driven, multidisciplinary program reported better preservation in eGFR and a trend in the improvement of quality of care of CKD patients similar to those reported by other multidisciplinary clinic programs in the developed world. In addition, more patients started dialysis non-emergently, and some obtained a pre-emptive kidney transplant. For those unable to obtain dialysis or who choose not to, a palliative care program is now being implemented⁵⁴. Care models supporting primary care providers or allied health workers achieved better effectiveness in slowing kidney function decline when compared to those providing specialty care. Future models should address region-specific causes of CKD, increase the quality of diagnostic capabilities, establish referral pathways, and provide better assessments of clinical effectiveness and cost-effectiveness⁵⁵.

Online educational programs for CKD prevention and treatment

Whereas it is important to enhance the promotion and implementation of "Prevention" of kidney disease and kidney failure among health-care professionals, it is equally important to promote "Prevention" with education programs for those at risk of kidney disease and kidney failure and with the general population at large. It is a stepwise process, from awareness, engagement, participation, empowerment, and to partnership. As highlighted above, in general, the health literacy of the general population is low. Awareness and understanding of kidney disease are inadequate. Education is a key to engaging patients with kidney disease. It is the path to self-management and patient-centered care. Narva found that patient education is associated with better patient outcomes⁵⁶. Obstacles include the complex nature of kidney disease information, low baseline awareness, limited health literacy and numeracy, limited availability of CKD information, and lack of readiness to learn. New education approaches should be developed through research and quality improvement efforts. Schatell found that web-based kidney education is helpful in supporting patient self-management⁵⁷. The internet offers a wealth of resources on education. Understanding the types of internet sources that CKD patients use today can help renal professionals to point patients in the right direction. It is important that reputable health-care organizations, preferably at a national level, facilitate users to have easier access to health information on their websites ([Appendix 1](#)). The mode of communication currently used by patients and the population at large is through the internet – websites, portals, and other social media, such as Facebook and Twitter. There are also free apps on popular mobile devices providing education on kidney disease. There is no shortage of information on the internet. The challenge is how to effectively "push" important health-care information in a targeted manner and to facilitate users seeking information in their efforts to "pull" relevant and reliable information from the internet. It is important that the "pushing" of health information is targeted and specific, relevant for the condition (primary, secondary, or tertiary prevention), and is offered at the right time to the right recipient. It is possible with the use of information technology and informatics to provide relevant and targeted information for patients at high risk, coupling the information based on diagnosis and drugs prescribed. Engagement of professional society resources and patient groups is a crucial step to promote

community partnership and patient empowerment on prevention. Additional resources may be available from charitable and philanthropic organizations.

Renewed focus on prevention and awareness raising and education

Given the pressing urgency pertaining to the need for increasing education and awareness of the importance of the preventive measures, we suggest the following goals to redirect the focus on plans and actions:

1. Empowerment through health literacy to develop and support national campaigns that bring public awareness to the prevention of kidney disease.
2. Population-based approaches to manage key known risks for kidney disease, such as blood pressure control and effective management of obesity and diabetes.
3. Implementation of the World Health Organization "Best Buys" approach, including screening of at-risk populations for CKD, universal access to essential diagnostics of early CKD, availability of affordable basic technologies and essential medicines, and task shifting from doctors to front-line healthcare workers to more effectively target progression of CKD and other secondary preventative approaches.

To that end, the motto "Kidney Health for Everyone, Everywhere" is more than a tagline or wishful thinking. It is a policy imperative which can be successfully achieved if policy-makers, nephrologists, and healthcare professionals place prevention and primary care for kidney disease within the context of their UHC programs.

Appendix

Members of the World Kidney Day Steering Committee are Philip Kam Tao Li, Guillermo Garcia-Garcia, Sharon Andreoli, Kamyar Kalantar-Zadeh, Latha Kumaraswami, Vassilios Liakopoulos, Siu-Fai Lui, Gamal Saadi, Luisa Strani, and Ifeoma Ulasi.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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Appendix

Appendix 1. Selected websites with information on CKD patient education

World Kidney Day International Federation of Kidney Foundations. International Society of Nephrology USA: American Nephrology Nurse Association American Association of Kidney Patients American Renal Associates (Kidneyman: Patient Education Videos) Kidney School by Medical Education Institute, INC. National Kidney Disease Education Program National Kidney Disease Education Program of National Institute of Diabetes and Digestive and Kidney Diseases The National Kidney Disease Education Program National Kidney Foundation
Canada: The Kidney Foundation of Canada
United Kingdom: Kidney Care UK National Kidney Foundation NHS England
Australia: Kidney Health Australia The Australian Kidney Foundation
Others National Kidney Foundation India National Kidney Foundation Malaysia National Kidney Foundation Singapore New Mexico Kidney Foundation