Challenges of chronic kidney disease prevention

The growing global health burden of chronic kidney disease is best tackled through effective prevention

> He who cures a disease may be the skillfullest, but he who prevents it is the safest physician
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> — *Thomas Fuller (1654–1734)*

The prevalence of chronic kidney disease (CKD) has been increasing at an alarming rate over the past two decades as a result of the ageing population and the growing prevalence of diabetes, hypertension and obesity. In Australia, there are about 1.7 million adults over the age of 18 years who have indicators of CKD, such as reduced glomerular filtration rate (GFR) or proteinuria.[1-4] A small proportion of these patients will progress to end-stage kidney disease (ESKD), requiring renal replacement therapy. Over the past decade, the number of Australians with ESKD has doubled and is currently over 20 000.[5] Providing renal replacement therapy is costly and accounts for 3% of total health expenditure; a significant portion is spent on dialysis.[5] It is estimated that the cumulative cost of providing treatment to new and existing patients with ESKD in Australia from 2009 to 2020 will reach $12 billion.[5] This places a great burden on society. Although there has been considerable effort to expand the use of less expensive home-based dialysis treatment as well as transplantation, the optimal and most cost-effective treatments for ESKD[6], there are substantial barriers to applying these strategies to meet increasing demand. Therefore, a shift in focus is needed from treating CKD to more purposeful prevention.

The burden of CKD not only relates to the health care requirements of patients with ESKD; it also relates to broader public health through its close association with cardiovascular disease. CKD is regarded as an independent risk factor for cardiovascular disease within the general population and among patients at high cardiovascular risk. Therefore, prevention of CKD not only diminishes the burden of ESKD but also reduces the associated cardiovascular morbidity and mortality.

Implementing a successful CKD prevention program poses challenges, some of which may be confronted directly by health care professionals. Other challenges may require the joint effort of other entities such as government bodies, not-for-profit organisations and industry.

"A shift in focus is needed from treating CKD to more purposeful prevention"

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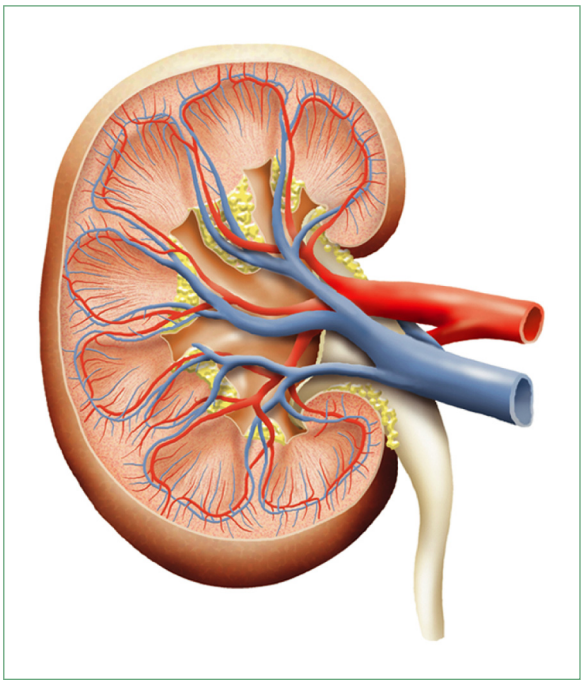

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Awareness of CKD

The first challenge in implementing a successful CKD prevention program is the low awareness of CKD in the general public and among primary health care professionals.

CKD is a silent disease that can remain asymptomatic until it reaches an advanced stage, therefore most people with CKD are unaware they have the condition.[2] Among the 1.7 million adults over the age of 18 years who have indicators of CKD, 1.5 million are unaware that they have the disease.[1-3] Among patients who reach ESKD requiring dialysis, a quarter present to nephrologists late and require dialysis within 90 days,[2,7] thereby having missed opportunities for timely intervention and prevention of further disease progression.

Primary care professionals are not always fully aware of the guidelines for the screening and management of CKD. The proportion of people with CKD remaining undiagnosed by primary care physicians has been reported to be as high as 50%, despite the use of automated reporting of estimated GFR, which was introduced to improve early detection of CKD.[8] According to the AusHEART study, only 18% of patients with abnormal kidney function were correctly identified as having CKD by primary care physicians, and proteinuria screening was performed in less than 60% of patients with reduced GFR.[9] There is also considerable deficiency in the management of CKD. In a study involving 1312 patients with reduced GFR, more than half were not receiving antihypertensive medication when indicated, and blood pressure targets were achieved in only 60% of those receiving treatment.[9] Given that most patients with early-stage CKD are managed by primary care physicians, education and training to improve physicians' awareness and knowledge of CKD is of vital importance if prevention programs are to be successful.

In recognising these issues, there has been considerable effort by organisations such as Kidney Health Australia in

recent years to educate and raise awareness of the public and health care providers about CKD. Kidney Health Australia has implemented initiatives such as its health professional education program, developed guidelines for CKD management in general practice, and launched awareness campaigns such as Kidney Health Week, all of which have been well received.[10] However, there is still a long way to go and success in this area requires joint effort between health care professionals, not-for-profit organisations and government bodies.

Current screening programs

The second challenge in CKD prevention relates to the imperfections of current screening methods. Current CKD screening programs are based on measurement of both proteinuria and GFR. Proteinuria can be affected by factors such as physical activity, posture and timing of urine collection. There can also be sizable variation in laboratory measurements of creatinine and urinary protein. GFR is estimated from creatinine-based formulas, which can lead to significant variability in estimated values. The CKD Epidemiology Collaboration formula is currently used widely in Australia to estimate GFR. Compared with the Modification of Diet in Renal Disease formula, the CKD Epidemiology Collaboration formula has less bias at higher GFRs and is superior with regard to prognostic classification in the Australian population.[3] However, neither of these equations takes into account ethnicities other than black and white, risking misclassification within other populations. The Kidney Disease: Improving Global Outcomes guidelines recommend also that serum cystatin C concentration be used to estimate GFR in patients with reduced estimated GFR but without albuminuria, to reduce diagnostic inaccuracy.[11] However, cystatin C measurement is much more expensive and less available than creatinine testing. Given the inaccuracy of current screening methods and the expensive nature of the more accurate markers, research needs to focus on development of new biomarkers and equations that provide accurate results across all levels of GFR and in all populations. Novel markers are needed to better identify individuals at risk of developing CKD and predict the propensity for progression.

Indigenous Australians

The third challenge in prevention of CKD stems from the fact that among Indigenous Australians, the burden of CKD is much higher and prevention is more difficult because of socioeconomic disadvantage. For example, the prevalence of CKD and ESKD and the hospitalisation and mortality rates from CKD are much higher among Indigenous Australians compared with non-Indigenous Australians.[12] In 2012–13, Indigenous Australians were twice as likely to have signs of CKD and more than four times as likely to have advanced disease (ie, Stage 4–5).[13]

In this context, it is important to consider that Indigenous Australians have higher rates of traditional risk factors associated with CKD such as hypertension, diabetes and obesity.[11] In addition, the higher risk of developing CKD also stems from other risk factors such as low birth weight, streptococcal infections and recurrent urinary tract infections, all of which are more common in Indigenous Australians.[14] Many of these risk factors are attributable to socioeconomic disadvantage, leading to domestic crowding, inadequate sanitation, poor diet, low levels of education and income, and limited access to medical care.[14] Addressing these is a fundamental component of CKD prevention programs in Indigenous populations and requires substantial government resources.

The difficulties of CKD prevention in Indigenous populations are compounded by the fact that screening may need to commence much earlier to effectively prevent progression of CKD. In a study comparing Indigenous adults with the participants in the AusDiab study, it was found that Indigenous adults aged 25–34 years were three times as likely to have one of proteinuria, diabetes or hypertension, and ten times more likely to have more than one of these conditions.[15] Reflecting this, guidelines have suggested screening for CKD risk factors in Indigenous populations from the age of 18 years.[16] However, earlier screening will be limited by resource availability.

Conclusions

Given the huge and increasing burden of CKD and associated cardiovascular disease on the already stressed public health system and society in general, it is necessary to refocus CKD management from treatment to purposeful prevention. Preventing CKD is challenging. Although raising awareness levels and developing accurate screening methods may allow more timely diagnosis, the relevant programs and necessary research are constrained by limited resources. It is therefore imperative that existing resources are used efficiently and that the benefit of the investment is apparent to resource providers. In addition, as prevention is especially challenging and pressing in Indigenous populations, largely owing to socioeconomic disadvantage, it is likely that in some instances, resources may be better used in overcoming socioeconomic disadvantage and other identifiable factors that lead to CKD and associated cardiovascular disease risk. The success of such a shift in focus will require health care professionals to show leadership by driving these initiatives, managing patients with CKD holistically and lobbying providers for adequate resources.

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References are available online at www.mja.com.au.

1 Chadban SJ, Briganti EM, Kerr PG, et al. Prevalence of kidney damage in Australian adults: the AusDiab kidney study. *J Am Soc Nephrol* 2003; 14(7 Suppl 2): S131-S138.

2 White SL, Polkinghorne KR, Cass A, et al. Limited knowledge of kidney disease in a survey of AusDiab study participants. *Med J Aust* 2008; 188: 204-208. https://www.mja.com.au/journal/2008/188/4/limited-knowledge-kidney-disease-survey-ausdiab-study-participants

3 White SL, Polkinghorne KR, Atkins RC, Chadban SJ. Comparison of the prevalence and mortality risk of CKD in Australia using the CKD Epidemiology Collaboration (CKD-EPI) and Modification of Diet in Renal Disease (MDRD) Study GFR estimating equations: the AusDiab (Australian Diabetes, Obesity and Lifestyle) Study. *Am J Kidney Dis* 2010; 55: 660-670.

4 Kidney Health Australia. State of the nation. 2015 Kidney Health Week. Chronic kidney disease in Australia. http://www.kidney.org.au/LinkClick.aspx?fileticket=wCrYByDnxxg%3d&tabid=635&mid=1590 (accessed Jul 2015).

5 Australian Institute of Health and Welfare. Projections of the prevalence of treated end-stage kidney disease in Australia 2012–2020. Canberra: AIHW, 2014. (AIHW Cat. No. PHE 176.) http://www.aihw.gov.au/publication-detail/?id=60129547202 (accessed Jul 2015).

6 Howard K, Salkeld G, White S, et al. The cost-effectiveness of increasing kidney transplantation and home-based dialysis. *Nephrology (Carlton)* 2009; 14: 123-132.

7 McDonald S, Clayton P, Hurst K, editors. Thirty fifth annual report 2012. Adelaide: Australia and New Zealand Dialysis and Transplant Registry; 2012. http://www.anzdata.org.au/anzdata/AnzdataReport/35thReport/2012_annual_report.pdf (accessed Feb 2015).

8 Plantinga LC, Tuot DS, Powe NR. Awareness of chronic kidney disease among patients and providers. *Adv Chronic Kidney Dis* 2010; 17: 225-236.

9 Razavian M, Heeley EL, Perkovic V, et al. Cardiovascular risk management in chronic kidney disease in general practice (the AusHEART study). *Nephrol Dial Transplant* 2012; 27: 1396-1402.

10 Kidney Health Australia. Annual report 2014. http://www.kidney.org.au/LinkClick.aspx?fileticket=KKvWuUp4bcc%3d&tabid=595&mid=457 (accessed Mar 2015).

11 Kidney Disease: Improving Global Outcomes (KDIGO) CKD Work Group. KDIGO 2012 clinical practice guideline for the evaluation and management of chronic kidney disease. *Kidney Int Suppl* 2013; 3: 1-150. http://www.kdigo.org/clinical_practice_guidelines/pdf/CKD/KDIGO_2012_CKD_GL.pdf (accessed Jul 2015).

12 Australian Institute of Health and Welfare. Chronic kidney disease in Aboriginal and Torres Strait Islander people 2011. Canberra: AIHW, 2011. (AIHW Cat. No. PHE 151.) http://www.aihw.gov.au/WorkArea/DownloadAsset.aspx?id=10737420068 (accessed Jul 2015).

13 Australian Bureau of Statistics. Australian Aboriginal and Torres Strait Islander Health Survey: biomedical results, 2012-13. (ABS Cat. No. 4727.0.55.003.) http://www.abs.gov.au/ausstats/abs@.nsf/mf/4727.0.55.003 (accessed Apr 2015).

14 Stumpers S, Thomson N. Review of kidney disease and urologic disorders among Indigenous people. Australian Indigenous Health InfoNet, 2013. http://www.healthinfonet.ecu.edu.au/kidney_review (accessed Apr 2015).

15 Hoy WE, Kondalsamy-Chennakesavan S, Wang Z, et al. Quantifying the excess risk for proteinuria, hypertension and diabetes in Australian Aborigines: comparison of profiles in three remote communities in the Northern Territory with those in the AusDiab study. *Aust N Z J Public Health* 2007; 31: 177-183.

16 National Aboriginal Community Controlled Health Organisation; Royal Australian College of General Practitioners. National guide to a preventive health assessment for Aboriginal and Torres Strait Islander people. 2nd ed. Melbourne: RACGP, 2012. http://www.racgp.org.au/your-practice/guidelines/national-guide (accessed Jul 2015). ■