Preface


Introduction

Kidney disease is a significant health problem that can affect all Australians. Kidney disease shares many of the same risk factors as some other chronic diseases including:

- diabetes
- hypertension (high blood pressure)
- other cardiovascular diseases

and often occurs at the same time as these other chronic diseases.

People with chronic kidney disease (CKD) require extensive hospital services such as dialysis. Diseases of the kidneys and urinary system are in the top ten leading causes of death for all Australians [9].

This review provides an overview of the burden of kidney disease among Indigenous Australians and the factors contributing to the high rates of kidney disease.

Kidney diseases

‘Kidney disease’, ‘renal disease’ and ‘renal disorder’ are all terms that refer to diseases that involve damage to the kidneys [1]. The kidneys have a variety of functions including:

- the removal of waste from the body

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More detailed information about kidney health in Indigenous people can be found at:
http://www.healthinfonet.ecu.edu.au/kidney_review
• production of some hormones and vitamins
• blood pressure regulation.

Chronic kidney disease

Chronic kidney disease (CKD) is defined as kidney damage or reduced kidney function that lasts for three months or more [1, 2, 16]. The most common causes of CKD are:

• diabetes
• hypertension.

Other causes include:

• glomerular disease (reduction in the kidney’s ability to filter blood)
• inherited disorders such as polycystic kidney disease (cysts grow on the kidneys resulting in damage, which can also spread to other organs)
• hypertensive renal disease (damage caused by high blood pressure).

The most severe form of CKD is known as end-stage kidney disease (ESKD). It occurs when kidney function has decreased to the point where kidney replacement therapy (KRT) is necessary to avoid death. KRT involves either dialysis or transplantation (see Box 1). CKD is expensive to treat and has a marked impact on the quality of life of those who suffer from the disease as well as those who care for them [2, 16].

What is known about the kidney health of Indigenous people?

Kidney disease is a significant health problem for all Australians, but severe kidney disease is more common among Indigenous people than among non-Indigenous people [3, 19]. In particular, CKD [3, 20-23] and ESKD are consistently reported at significantly higher levels among Indigenous people than among other Australians [2, 21].

In 2004-2005, kidney disease:

• was reported by 2% of Indigenous people overall [3, 19]
• was ten times more common among Indigenous people than among non-Indigenous people [3, 19, 24]
• increased with age among Indigenous people, from less than 1% in the 0-14 age group to 7% for aged 55 years and over (Figure 1) [19]
• was much more common among Indigenous people than among non-Indigenous people across all age groups (except for the 0-14 years age group).

Figure 1. Prevalence (%) of kidney disease, by Indigenous status and age, Australia 2004-2005

Box 1: Dialysis and transplantation [1]

Dialysis is the mechanical filtering of the blood to help maintain functions normally performed by the kidneys. There are two types of dialysis:

• haemodialysis (HD): blood passes through tubes from the body to a dialysis machine where it is filtered (cleaned) before being returned to the body. Haemodialysis is usually performed at a hospital or medical centre
• peritoneal dialysis (PD): the dialysis solution (a fluid containing a type of sugar that draws waste products and extra fluid out of the blood) is pumped into the patient’s abdomen. After a couple of hours the fluid is drained out, taking the wastes with it. Peritoneal dialysis can be performed by patients in their own homes.

Transplantation: a healthy kidney from either a living or recently deceased donor is implanted in a patient. The diseased kidneys are usually left in place. Living donors are often relatives of the patient.

What do we know about hospitalisation of Indigenous people for CKD?

Indigenous people are admitted to hospital much more frequently for CKD and ESKD than are non-Indigenous people [25]. In 2009-10, care involving dialysis was the most common reason for hospitalisation for kidney disease among the whole Australian population. Indigenous people were hospitalised 11 times more often than were non-Indigenous people [26].

The more detailed information available for 2007-08 show that hospitalisations of people for CKD:

• were 12 times higher for Indigenous people than for non-Indigenous people for the procedure of dialysis [27]
• were eight times higher for Indigenous males than for non-Indigenous males for dialysis
• were 15 times higher for Indigenous females than non-Indigenous females for dialysis [25]
• were five times higher for Indigenous people than for non-Indigenous people for principal or additional CKD diagnoses other than care for dialysis [25]
• were between five and seven times higher for Indigenous females than for non-Indigenous females for both principal diagnosis and for additional diagnoses.

What do we know about deaths of Indigenous people with CKD?

In 2004-2008, death rates from CKD were five times higher among Indigenous people than among non-Indigenous people [28]. Deaths from CKD among Indigenous people increased by 102% over the eight-year period 2001-2008, compared with a 23% increase for deaths from CKD among non-Indigenous people [22]. More detailed information for the four-year period January 2001 to December 2005 show that deaths from CKD among Indigenous people were:

- especially high after the age of 25 years for both Indigenous males and females compared with the rates for their non-Indigenous equivalents [24]
- 31 times higher among Indigenous males than among non-Indigenous males in the 45-54 years age group
- 51 times higher among Indigenous females than among non-Indigenous females in the 45-54 years age group.

Individuals with CKD often have other chronic diseases as well (comorbidities), particularly diabetes and cardiovascular disease (CVD). Chronic kidney disease may be recorded as an underlying or associated cause of death1, however it may not be recorded as a cause of death if it does not fit into the criteria for either of these categories - this can underestimate the contribution of CKD to the number of deaths for Indigenous people [2, 29]. Between 2003 and 2007 the most frequent underlying causes of death where CKD was an associated cause of death were:

- cardiovascular diseases (30% Indigenous cases, 44% non-Indigenous cases)
- diabetes (30% Indigenous cases, 8% non-Indigenous cases)
- neoplasms (tumours) (10% Indigenous cases, 20% non-Indigenous cases)
- respiratory diseases (8% Indigenous cases, 8% non-Indigenous cases) [2].

What is known about other kidney health conditions among Indigenous people?

Glomerulonephritis

Recent information on morbidity (illness) and mortality (deaths) associated with glomerulonephritis is not available, but it is known that the condition may occasionally cause acute kidney failure and that high blood pressure is the most frequent major complication [12].

Box 2: Glomerulonephritis

Glomerulonephritis occurs when there has been inflammation of the glomerulus (a network of tiny blood vessels in the kidney that help filter blood), and subsequent damage to the filtration process of the kidney [6, 7]. Acute post-streptococcal glomerulonephritis (APSGN) is the most important contributor to high levels of CKD and continues to pose a major problem in developing countries and among Indigenous populations of the developed world [6, 11].

The symptoms of APSGN are generally mild, with complete recovery within days or weeks [12-15]. The long-term outlook is regarded as excellent [14]. Despite this, APSGN has also been associated with significant morbidity (illness), hospitalisation and occasional mortality (death) [17, 18].

Earlier research investigating the morbidity associated with APSGN in Far North Queensland reported that of 100 people identified with the condition (of which 96 were Indigenous):

- 75% were admitted to hospital where they remained an average of 8.5 days [17, 18]
- 40% developed severe hypertension
- 18% developed acute kidney failure
- 12% developed pulmonary oedema (the build-up of fluid in the air spaces of the lungs)
- 6% developed bacteraemia (bacteria in the blood)
- one child died
- one child developed pneumococcal pericarditis and a purulent effusion (a localised infection of the space in the fluid sac surrounding the heart) which required surgery
- one young pregnant woman underwent dialysis to manage acute kidney failure [18].

1 The underlying cause of death is the disease or condition that triggered the death. An associated cause of death can be what caused the underlying cause, or it can be something that contributed to the death but was unrelated to the disease or condition that caused the death.
Disorders of the urinary tract

Urinary tract infections (UTIs) are generally caused by bacteria, but fungi, parasites and some viruses may also cause infection [8]. UTIs are one of the most common reasons for people visiting a doctor about an infection [8]. Risk factors include:

- being female
- age
- sexual activity [6, 30].

**Box 3: Disorders of the urinary tract**

Disorders of the urinary tract include those of the bladder (the organ that collects urine), ureters (the tubes that carry urine from the kidney to the bladder) and the urethra (tube that connects the bladder to the outside of the body). The disorders generally present as mild cases, but they can cause severe illnesses, and may even lead to kidney damage and kidney disease [6, 8].

In Australia, about one in three women and one in twenty men will have a UTI at some time in their life. Women tend to be more susceptible to UTIs for several reasons:

- the urethra (tube that carries urine from the bladder to the outside) is much shorter in females than in males, making it easier for microorganisms to travel to the bladder
- changes in hormonal levels – women are more likely to get an infection during certain times in their menstrual cycle, particularly just before a period and are also more susceptible during pregnancy
- the tissues of the urethra and bladder become thinner and drier with age, as well as after menopause or after a hysterectomy [8, 31].

The health impact of diseases of the urinary tract upon Indigenous people has received very little attention in recent years, but information from the 1980s suggests that the pattern of UTI among Indigenous people tends to differ from that among non-Indigenous people [30]. A hospital-based study in Darwin found that:

- Indigenous men and women had higher rates overall of UTI than did their non-Indigenous counterparts (except for those aged 60 years or older) [30]
- levels of UTIs were higher among Indigenous females than among non-Indigenous females, with consistently high rates of infection until around 60 years of age
- Indigenous males were at greatest risk of developing a UTI in infancy (the earliest stage of childhood).

Easily treated UTIs were often not detected, particularly in Indigenous children, which increased the individual’s risk of developing more serious kidney disease [32]. Poor living conditions and environmental settings are thought to contribute to the high levels of UTI observed in some Indigenous communities [6, 32].

For pregnant Indigenous women, it has been shown that:

- they are more than twice as likely as non-Indigenous women to have a UTI during pregnancy [33, 34]
- almost 30% had a UTI
- three-quarters (75%) had at least one abnormal urine sample during pregnancy (620 episodes were recorded overall) [33]
- just over one-in-ten (11%) had an infection at the time of delivery [35].

These studies suggest that the screening, treatment and follow-up of UTIs among Indigenous people was often inadequate [32-35]. The occurrence of acute pyelonephritis (a severe infection of the kidneys) in women during pregnancies (who showed no symptoms and were undiagnosed) highlights the importance of screening, particularly for women living in rural and remote Indigenous communities.

**Urolithiasis (kidney stones)**

Very little attention has been spent on urolithiasis among Indigenous people since the 1990s, but the presence of a pattern among Indigenous children that is different to that of non-Indigenous children has been confirmed recently [36].

**Box 4: Urolithiasis**

The formation of one or more small pebble-like objects (usually referred to as stones or calculi) in the kidney or urinary tract [4, 5].

Evidence from 2003 [36] is consistent with the reports from the 1980s and 1990s that Indigenous children with urolithiasis:

- tend to come from desert regions of Australia
- are more likely to be male
- are frequently less than 3 years of age [37-41]
- do not usually live in urban areas [36]
- have a history of failure to thrive, UTI, and/or recurrent infectious disease, particularly diarrhoea [36-41].

This pattern contrasts with that reported among non-Indigenous people and other populations of the developed world, where the incidence is much higher among adults than children [36, 37, 41].

A review of patient records collected between 1972 and 1986 from the major children’s hospital in Western Australia (WA) reported that the number of Indigenous children presenting with urolithiasis was more than double that of non-Indigenous children [37].
The high rates of urolithiasis seen among some Indigenous children [36] have been attributed to:

- dietary factors
- dehydration (loss of a large amount of body water)
- diarrhoea
- repeated episodes of infectious disease [36-42]
- hot, dry environmental conditions [37, 38]
- poor water quality [42].

What do we know about the factors contributing to CKD in Indigenous people?

Many factors contribute to the high levels of CKD among Indigenous people. These are complex and reflect a combination of broad historical, social, cultural, and economic factors including:

- colonisation and displacement by European settlers - this led to a reduction in activity levels and nutritional status of Indigenous people, which have carried through the generations and are often still occurring [7]
- poverty [2, 44]
- lack of government policies
- limited access to primary and other medical care [43, 44]
- sub-standard living conditions
- inadequate environmental sanitation.

In many Indigenous communities, the prevention, control and management of kidney disorders will depend not only on effective, culturally appropriate treatment, but also on action to address the poor socioeconomic conditions that contribute to these disorders [45-49].

As well as the broad factors, the following behavioural (those based on an individual’s behaviour) and biomedical (those based on genetics and lifestyle) risk factors, individually or in combination, can contribute to kidney disease among Indigenous people:

- repeated infections
- hypertension
- obesity [2, 28]
- low birth weight [50, 51]
- infant malnutrition [52-54]
- engagement in high risk behaviours that can adversely affect health (e.g. poor diet, low activity levels, alcohol and tobacco use) [3, 19, 44]
- diabetes [3, 21].

Efforts (by health care providers as well as patients) to reduce these risk factors can help to reduce the level of kidney disease and its impacts.

What do we know about the care received by Indigenous people with CKD?

Kidney disease is expensive to treat and has a huge impact on the quality of life of those who suffer from the disease and of those who care for them [16, 24]. Medical intervention is necessary to prevent deaths among individuals with CKD and ESKD.

Box 5: Treatment for CKD

Treatment for CKD (before it progresses to ESKD) is only able to delay progression of the disease – it cannot be cured. If CKD progresses to ESKD, KRT becomes necessary [1]. KRT cannot cure failing kidneys, but dialysis, which filters the blood using a machine, helps maintain the functions normally performed by the kidneys [1-3]. Most dialysis occurs in hospitals or special clinics, but can be conducted from home and by the patient themselves [2, 10].

Dialysis

The following statistics show that Indigenous people suffer a greater burden from CKD than non-Indigenous people:

- from 2007-2009 the level of dialysis for Indigenous people was nearly five times that for non-Indigenous people [Derived from 21]
- in 2007-08:
  - ‘care involving dialysis’ was most common for Indigenous people living in very remote areas [27]
  - hospital separations relating to renal failure revealed that the ‘most disadvantaged’ people had the highest separation rates for dialysis.

When dialysis facilities are not available near to where the Indigenous patient lives, they are forced to move to regional centres or major cities to undertake dialysis. The lack of treatment available in remote areas and the limited availability of transplant facilities create geographical barriers to treatment. From 1999-2001 relocation was necessary for:

- 78% of patients in remote areas
- 39% of those who live in rural areas
- 15% of urban Indigenous ESKD patients [23].

2 When a patient leaves hospital it is called a separation. Hospital separations can be because of discharge (going back home or into the community), transfer to another health facility or death.
There are significant biological, psychological, social and economic consequences to the forced relocation of Indigenous patients for KRT [56, 57], including:

- social and cultural separation [58]
- loneliness
- removal from family and land
- a sense of loss and disempowerment (considered worse than the illness)
- geographical isolation.

In an attempt to avoid relocation, efforts have been made to deliver self-care peritoneal dialysis and haemodialysis (HD) services close to, or in, the home [59]. This means that Indigenous people remain in their own communities, with their own family and social supports, and the costs of re-housing and supporting relocated dialysis patients are avoided. However, challenges facing home HD in remote communities include:

- being able to retain suitable dialysis partners/carers due to their requirements for attendance at cultural duties
- suitable housing
- changing social circumstances
- communication problems (such as language barriers) [60, 61].

HD is the most common form of dialysis treatment for Indigenous people with ESKD [21, 24, 49, 61, 62]:
- in 2009, 81% of the new cases of Indigenous people commencing dialysis were undergoing HD [21, 63]
- in 2007-08:
  - Indigenous people were undergoing HD at 12.1 times the rate of non-Indigenous people [27]
  - one-in-three hospital procedures for Indigenous peoples were for HD with recorded hospital separations higher in more remote areas.

Miscommunication between Indigenous patients and health care workers can occur because of differences in cultural and social beliefs on health, and in the understanding of the patient’s situation and ongoing treatment [7, 64, 65]. Appropriate information and the understanding of the patient and their family are key for the patient – and their family and community – to make the important decisions about treatment choice [58, 64, 66].

Transplantation

Transplantation is the ideal form of treatment for most ESKD patients, but there is a noticeable difference in transplantation rates between Indigenous people and non-Indigenous people for this treatment [10]. At the end of 2008:

- only 12% of Indigenous people with ESKD were living with a functioning kidney transplant compared with 45% of other Australians [22]
- Indigenous patients are both less likely than other Australians to receive a transplant and less likely to be wait-listed for a transplant [10, 21, 67]
- Indigenous people receive transplants at approximately one-third the rate of other patients and those who do receive transplants wait longer for them [21].

In the four-year period 2006-2009:

- 2.1% of Indigenous people needing KRT received a transplant, compared with almost 11% of non-Indigenous people [21]
- 4% of all people on the waiting list were identified as Indigenous
- 100 new transplant operations involved Indigenous recipients.

There are many reasons why Indigenous ESKD patients do not receive the same level of opportunity for transplants as non-Indigenous ESKD patients [10]. Indigenous ESKD patients:

- are less likely to be referred for transplant evaluation
- are less likely to complete the wide-ranging set of investigations required in the transplant evaluation
- are more likely to experience communication difficulties and have education limitations
- have a greater likelihood of human leucocyte antigen (HLA) incompatibility (the transplant is rejected by the patient’s body)
- may refuse to leave land and community
- have higher rates of co-morbidities (one or more diseases in addition to the main disease) which affects their acceptability for transplantation
- are less likely to follow the recommended medical treatment (usually as a result of communication problems and misunderstandings).

What are the main problems faced by Indigenous people living with CKD?

There has been much research in recent years into the causes, consequences and management of ESKD in the Indigenous population [23, 48, 49, 52, 53, 64, 68-73].

The following measures will also go a long way towards reducing the incidence of kidney disease, and improving the outcomes of those with kidney disease:

- continued improvements in living and environmental conditions, education, infrastructure and health services [44, 52, 54]
• implementation of integrated, effective and well-resourced primary health care programs [29, 52, 68]
• primary health care measures to improve diet, control blood pressure and infections, maintain healthy adult weight, and to increase birth weight [44, 52, 54, 74]
• screening for early and established kidney disease [44, 53, 54, 74-76]
• programs to slow disease development [6, 53].

Reduction in the inequalities in treatment will require changes within the healthcare system and by healthcare providers [64, 74, 77, 78] such as:
• adequate funding for primary care
• an adequate Indigenous health workforce
• development of shared understandings about CKD
• use of high-quality and culturally appropriate educational resources
• improvements in collaborations between primary care and specialist services.

The advantage of wide-ranging action is that it will reduce not just kidney disease, but also other chronic and communicable conditions [74, 76, 79].

Key developments

In 2006 the Australian Government released the National Chronic Disease Strategy (NCDS) [80]. The NCDS includes kidney health but is not specific to kidney health, taking an overarching approach to chronic diseases as these conditions often occur at the same time and share many of the same risk factors.

In the same year, Kidney Health Australia released the National Chronic Kidney Disease Strategy (NCKDS) [29]. These two policies are complementary in their recommended action areas:
• risk reduction
• health promotion and illness prevention
• early detection
• early treatment and management
• management and self-management of advanced CKD
• priorities for dialysis, organ donation and transplantation.

As a response to these policies, the National Centre for Monitoring Chronic Kidney Disease was established at the Australian Institute of Health and Welfare (AIHW) in 2007 [81].

In 2010 the National Consumer Council of Kidney Health Australia released a position statement calling for the Australian Government to take action on the lack of services for CKD [82]. The main components of the position statement include:
• recognition of the extent of CKD as a major chronic condition
• development of a national program to increase awareness and early detection of CKD
• the funding and resourcing of the development and delivery of high quality information and education services in CKD
• patient support programs and the training and support of these programs in the community.

The Renal Division of the George Institute for Global Health, based in Sydney, has been conducting studies aimed at improving kidney health:
• the Central Australia renal study – aimed to gather and provide information to enable governments to make policy decisions that would meet the needs of Aboriginal dialysis patients in central Australia [83]
• the economic burden of kidney disease in Australia - aimed to explore the cost-effectiveness of screening and intervention to prevent progression of CKD [84]
• Improving access to kidney transplants project (IMPAKT) [10].

The Australian Government has funded specific initiatives to reduce the incidence and spread of kidney diseases including:
• grants into kidney disease research via the National Health and Medical Research Council (NHMRC)
• construction of a renal dialysis unit at the North Lakes Health Precinct in Queensland
• funding towards improving the access of dialysis services in the Kimberley region of WA and for remote communities in the Northern Territory (NT)
• development of the Chronic Disease Monitoring Centre [85].
Summary

Disorders of the kidneys and urologic system are a major and frequently serious threat for many Indigenous people [2, 23, 55]. ESKD, which accounts for much of the sickness and death from kidney disease seen in Indigenous communities, is a clear priority for the health system. Continuing high rates of ESKD, the negative social consequences that accompany treatment, and the high cost of medical care are all factors that highlight the need for a health care approach that addresses not only the medical but also the social and economic factors underlying this major problem [64, 74, 78].

Poverty, poor living conditions, limited access to medical care, and inadequate environmental sanitation contribute to high rates of kidney health disorders in many Indigenous communities [2, 43, 44]. The prevention, management and control of renal-urologic disorders will depend not only on effective, acceptable medical and surgical treatment, but, importantly, on preventive action to address the poor socioeconomic circumstances that underlie these conditions. Forward planning must take into consideration service needs, service availability, and workforce projections [21, 86]. A comprehensive approach that addresses both the medical and socioeconomic features of these health conditions is an immediate priority.

References

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The Australian Indigenous HealthInfoNet is an innovative Internet resource that contributes to ‘closing the gap’ in health between Indigenous and other Australians by informing practice and policy in Indigenous health.

Two concepts underpin the HealthInfoNet’s work. The first is evidence-informed decision-making, whereby practitioners and policy-makers have access to the best available research and other information. This concept is linked with that of translational research (TR), which involves making research and other information available in a form that has immediate, practical utility. Implementation of these two concepts involves synthesis, exchange and ethical application of knowledge through ongoing interaction with key stakeholders.

The HealthInfoNet’s work in TR at a population-health level, in which it is at the forefront internationally, addresses the knowledge needs of a wide range of potential users, including policy-makers, health service providers, program managers, clinicians, Indigenous health workers, and other health professionals. The HealthInfoNet also provides easy-to-read and summarised material for students and the general community.

The HealthInfoNet encourages and supports information-sharing among practitioners, policy-makers and others working to improve Indigenous health – its free on line yarning places enable people across the country to share information, knowledge and experience. The HealthInfoNet is funded mainly by the Australian Department of Health. Its award-winning web resource (www.healthinfonet.ecu.edu.au) is free and available to everyone.