

## SSC5c Elective Report

**Objective 1: Describe the pattern of renal disease in Aboriginal and non-Aboriginal populations in the Northern Territory. How does this compare with the rest of Australia, and with the UK?**

There is a marked geographical variation in the incidence of kidney disease within the NT, not just between ethnic groups but within them too. Several studies have shown that the rates of kidney failure in Aboriginals are about 25 times the rates in non-Aboriginals in the Northern Territory. In some remote communities the rates are up to 60 times higher. Those with the highest rates are the remote regions of Tennant Creek, Aputula, and Jabiru, all in the NT. A similar picture is seen in the rest of Australia, although to a lesser extent than as seen in the NT. The lowest rates are seen in Rockhampton and Brisbane in Queensland, Sydney and Queanbeyan in NSW, and Wangaratta and Hobart (most of Tasmania).

Furthermore, rates within the Aboriginal population vary with urban and rural environments. Alan Cass et al. showed that in urban regions the standardised incidence of end stage renal disease (ESRD) is much lower than in remote regions, with as much as a 20-fold incidence gradient. Within urban regions the incidence varies according to the socioeconomic factors within that urban environment. Poor socioeconomic development is associated with higher rates of ESRD within the Aboriginal population. The same trend can be seen within non-Aboriginal populations but the difference is less marked.

Within the UK, approximately 110 patients per million commence dialysis each year for treatment of chronic kidney disease (CKD). The prevalence of ESRD is about 498 per million in the UK. In the year 2011 in Australia 474 patients per million were on dialysis, with a total of 101 new patients per million. In 2010 there were 353 new patients per million averaged across Australia, but within Aboriginal and Torres Strait Islanders 2151 patients per million were on dialysis. In 2010 in the Northern Territory 1911 patients per million were on dialysis, compared with the next highest rates of 490 per million in NSW. This demonstrates the huge variability of ESRD incidence and need for dialysis across Australia and across ethnic groups.

**Objective 2: How are renal services organised and delivered in Australia, especially dialysis centres? How does it differ from the UK and why?**

Renal services in Australia comprise renal clinics and provision of dialysis when ESRD is reached. Dialysis may be done as haemodialysis or peritoneal dialysis. Transplantation is also an option.

Renal services and dialysis centres are concentrated in large population centres within Australia. For example, within the NT the main dialysis centres are in Darwin, Katherine, and Alice Springs. Because kidney disease rates are highest in Aboriginal populations in Australia, and they often live in extremely remote areas many hundreds of kilometres from the nearest city, there has been an increased drive to develop satellite dialysis centres in more remote areas. In the NT these satellite areas have sprung up in Tennant Creek, Broome, Groote Eylandts, and the Tiwi islands for example. The cost of this remote dialysis is calculated to be about 25% more expensive than providing dialysis in a metropolitan area. However, it is still calculated to be cheaper in the long run. This is because when a patient requires dialysis they must first spend several months in hospital having a shunt or a port created for dialysis and then they must be stabilised on dialysis and taught how it works. For most Aboriginals this means leaving their home and family for many months at a time, which results in high rates of depression. During this time the patients are supported by the government, which incurs high costs, such as for accommodation.

A further aspect to providing care is the provision of care along state lines. This means that in some cases patients who live a few hundred kilometres from a dialysis centre in the NT are required to travel much greater distances to Perth for treatment as the area they live in is not within the NT. Over time an arrangement has been reached where a number of beds are provided at centres within the NT for these patients in order to avoid long distance relocation. However, if the number of patients exceeds the number of beds put aside for them they are still required to travel to Perth.

Factors such as this have made the founding of satellite centres, outreach clinics, and tuition on home dialysis that much more important. For patients who are able to learn home dialysis a machine is provided for them so they can return to their family and community. In most cases this occurs for patients on peritoneal dialysis as it is easier to learn. Unfortunately many patients are not compliant with medication or dialysis, or are unable to learn procedures for home dialysis and are admitted to hospital frequently.

During my elective I went on an outreach visit to Kalkarindji where the renal team at the Royal Darwin Hospital are attempting to establish a regular renal outreach clinic. There are very high rates of kidney disease and dialysis patients within this area. More patients are likely to attend clinic appointments if they are held near where they live, and as a result it is hoped better control of their kidney disease will be achieved, slowing the progression to ESRD and decreasing the need for dialysis. It will also allow better contact with patients so they are more likely to accept dialysis when the time comes.

Within the UK renal services are provided at hospitals within towns and cities. This system works very well as every patient within the UK is within short reach of a hospital. Furthermore, there is not such a division between ethnic groups regarding rates of kidney disease, or cultural aspects to work around as are the case with the Aboriginal population of Australia.

### **Objective 3: Develop an understanding of the risk factors contributing to renal disease.**

Renal disease occurs as the result of a large number of risk factors. There are some risk factors which have been identified for some time and these are:

1. Hypertension
2. Diabetes
3. Smoking
4. Obesity
5. Family history
6. Increasing age

These risk factors are common to patients around the world. Recently other risk factors have been described which have greater significance within the Aboriginal population. These are:

1. Intrauterine growth retardation/malnutrition
2. Repeated skin and throat infections, such as Scabies and Group A Streptococcus
3. Repeated UTIs
4. Lower nephron endowment
5. Ethnicity
6. Alcohol intake

There is an increased incidence of intrauterine malnutrition resulting in low birth weight within the Aboriginal population. Studies by Wendy Hoy et al. have shown that babies born at low birth weight have an increased likelihood of developing renal disease later in life. It has been suggested that this



is because the kidneys do not form properly due to malnutrition and fewer nephrons develop within the kidney. It has been shown that Aboriginals have lower nephron endowment, i.e. a lower glomerular number, than in the Caucasian population. As a result of this, it is thought that the nephrons present undergo compensatory hypertrophy, or glomerulomegaly. In cases of increased stress on the kidney, such as occurs in dehydration for example, this process is accelerated. As the process continues some nephrons become sclerosed and over time are thought to be resorbed by the kidney, thereby decreasing the nephron number further. Although this process occurs with increasing age in all populations, the process is worsened by the decreased nephron endowment in Aboriginals, and further still by intrauterine malnutrition.

In addition, it is relatively common for Aboriginal children to experience repeated skin infections and UTIs as a result of their living conditions and hygiene. This can cause glomerulonephritis and scarring of the kidneys, which increases the likelihood of renal disease later in life.

Many Aboriginals suffer from hypertension and diabetes, and rates are increasing yearly. This is thought to be the result of exposure to Western diets and alcohol, high in calorie content. The top 3 causes of kidney failure in Australia are:

1. Diabetes – 34% of new cases
2. Nephritis – 22% of new patients
3. Hypertension – 15% of new cases

These conditions are often sub optimally managed within the Aboriginal population, either as a result of non-compliance or poor access to health care. 50% of Australians with hypertension do not have BP managed to target levels, 61% of Australians over 18 are overweight or obese, and 1 in 6 over the age of 14 smoke daily. Recent studies suggest that over 4% of the population have diagnosed diabetes with an equally high rate of undiagnosed cases.

#### **Objective 4: Explore renal medicine as a specialty career option.**

Renal physicians within the NT are not only treating renal disease, but also encouraging better health and education within the population in an attempt to decrease the effects of kidney disease. As a result, they are sometimes considered to be general medical physicians as they address other issues too. There is a huge demand for renal care within Australia, especially in the NT, and the Aboriginal population present an interesting and challenging extra dimension to provision of renal care. There is the potential for increasing renal services vastly within Australia, especially in the form of satellite dialysis centres and outreach clinics in remote areas. I found this elective very interesting, and would consider a career in renal medicine in Australia.