

## Twenty-five Facts about Kidney Disease in Singapore: In Remembrance of World Kidney Day

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World Kidney Day is a joint initiative of the International Society of Nephrology and other nephrology organisations, which will be observed annually on the second Thursday of March throughout the world. Initiated in 2006, its purpose is to increase awareness of chronic kidney disease (CKD), its associated cardiovascular morbidity and mortality, and to draw attention to the urgent global need for its early detection and prevention. On top of causing end stage kidney failure requiring renal replacement therapy with dialysis or transplantation, CKD is now known as a “disease multiplier,” because it contributes to cardiovascular deaths in patients with diabetes and hypertension.<sup>1</sup> Table 1 has been put together, in remembrance of World Kidney Day 2007, to recognise the tremendous impact of kidney disease on healthcare in Singapore.

As shown (Table 1), kidney disease and kidney failure are reaching pandemic proportions in Singapore. The increasing prevalence of diabetes and an ageing population with their increasing risk for hypertension are some factors that contribute to the increasing incidence of kidney disease. Indeed, the effects of these factors are only likely to increase. By the year 2030, it is estimated that 14% to 15% of the adult Singaporean population will be diabetic.<sup>19</sup> Whereas in the year 2000, 10.2% of the Singaporean population were age 65 and older, by 2030, this proportion will be 18%.<sup>20,21</sup> These trends are not unique to Singapore; the number of diabetics in the world is estimated to increase from 171 million in 2000 to 366 million by 2030, while worldwide the estimated number of persons age  $\geq 65$  years will grow from 420 million to 973 million.<sup>22,23</sup>

What measures can be adopted to halt this pandemic of kidney disease? One of the goals of World Kidney Day is to increase public awareness of this silent disease. It is hoped that prefacing this article with the stark facts of kidney disease in Singapore will stimulate healthcare professionals to adopt best practices to reduce the incidence of kidney failure and minimise its morbidity and mortality. However, the efforts must not be restricted to the individual healthcare professional or patient. National healthcare systems must be involved in altering the course of this pandemic. There are several examples of nationwide kidney disease screening and treatment programmes that have taken off elsewhere over the last few years, many of which are already reducing kidney disease.<sup>24,25</sup> Key features of these programmes include: (1) screening for conditions

that are risk factors for kidney disease, (2) treating these conditions optimally, (3) screening for kidney disease in those with risk factors, and (4) treating those with early kidney disease.

Singapore’s national mission on healthcare has been to promote good health and reduce illness, ensure access to good and affordable healthcare, and pursue medical excellence. For kidney disease in particular, Singapore’s policies in the past have focused on the treatment of end stage kidney failure by promoting legislation for transplantation and allowing access to Medisave and Medishield for dialysis and transplantation costs.

A specific strategy that could prevent kidney failure has only recently begun, in the form of a structured chronic disease management programme for diabetes and hypertension. The Ministry of Health’s Diabetes Management Programme was initiated in 2006, and was followed soon after by the programmes for hypertension, hyperlipidaemia and stroke in January 2007.<sup>19</sup> This chronic disease management programme allows the use of Medisave, the national medical savings scheme that was originally meant primarily for hospitalisation costs and expensive outpatient therapies, to be used in the outpatient setting for treatment of chronic diseases.

Under this scheme, patients can authorise their community physicians to help them in deducting from their Medisave accounts for treatment of their chronic disease. Data on cost and health outcomes will be monitored by the Ministry of Health to assess best practices. Thus, the scheme incorporates 3 features essential to the success of a chronic disease management strategy: continuity of care, access to funds and monitoring of outcomes. Since Medisave funds can be accessed, the scheme may incentivise both patient and physician to optimise the treatment of the chronic disease.

By allowing family physicians to authorise the deduction of Medisave, the programme has recruited a large base of primary care providers to manage these chronic diseases. More importantly, it represents a fundamental shift in national policy from treatment to prevention. Time will tell if this programme reduces the complications of diabetes and hypertension and turns the tide of kidney disease due to these conditions in the coming years in Singapore.

Can more be done in Singapore, in terms of screening, at a national level to prevent kidney disease?<sup>26</sup> The clinical

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Table 1. Twenty-five Facts about Kidney Disease in Singapore

Facts about kidney disease in Singapore	Strategies for clinical practice
<p>1. There were 3,401 patients on dialysis in Singapore by December 2004; 2,700 (79%) were on haemodialysis and 701 were on peritoneal dialysis. This number represented a 54% increase since end 1998, when there were 2,209 patients on dialysis.<sup>2,3</sup></p> <p>2. Every year, there are more and more new patients with kidney failure requiring dialysis. Whereas, in 1998 there were 564 new cases of kidney failure; in 2003, there were 675 new cases, a 20% increase over a 5-year period.<sup>3</sup></p>	<p>Concerted efforts will prevent a further increase in patients requiring dialysis. These include:</p> <ul style="list-style-type: none"> <li>• Identifying the risk factors for kidney disease</li> <li>• Treating these risk factors</li> <li>• Detecting kidney disease early in patients with risk factors, and</li> <li>• Preventing progression of kidney disease.</li> </ul>
<p>3. Kidney diseases, urinary tract infections and complications of diabetes are respectively the 10<sup>th</sup>, 9<sup>th</sup> and 8<sup>th</sup> most common causes of death.<sup>4</sup> Patients with kidney disease are at higher risk for cardiovascular complications and are far more likely to die a premature cardiovascular death than to develop kidney failure.<sup>1</sup> In Singapore, coronary heart disease and cerebrovascular disease are the 3<sup>rd</sup> and 4<sup>th</sup> most common causes of death.<sup>4</sup></p> <p>4. In 1998, the death rate of patients on dialysis in Singapore was 9.4%,<sup>5</sup> representing a 22-fold higher risk of death over the crude death rate of 0.43% for the Singaporean population at large.<sup>6</sup></p> <p>5. In 1998, cardiac causes and infections accounted for 29.4% and 16.7% of deaths, respectively, in dialysis patients.<sup>5</sup></p>	<p>Kidney disease in general, and dialysis in particular, is associated with high morbidity and mortality. Efforts to reduce kidney disease will decrease cardiovascular morbidity and mortality.</p>
<p>6. The costs of unsubsidised haemodialysis and peritoneal dialysis are about \$80/day (\$2,390/month) and \$58/day (\$1,730/month), respectively.<sup>2</sup></p>	<p>Reducing kidney failure will reduce the economic burden of renal care on the individual and the nation.</p>
<p>7. Diabetes is a leading cause of kidney failure and the numbers of new cases of kidney failure due to diabetes is increasing. Whereas in 1998, diabetes caused 47% of cases of new kidney failure; in 2003, diabetes caused 56%, representing a 20% increase in 5 years.<sup>3</sup></p> <p>8. The number of dialysis patients with diabetes-induced kidney failure has doubled in 5 years. Whereas in 1998 there were 571 patients with diabetes on dialysis, by end-2003 there were 1,147 such patients on dialysis.<sup>3</sup></p>	<p>Reducing diabetic kidney disease will reduce the incidence of kidney failure in Singapore.</p>
<p>9. In the 1998 National Health Survey, 9% of the surveyed Singaporean population were diagnosed to be diabetic; this proportion had fallen to 8.2% in 2004.<sup>7,8</sup> Thus, 9% of the population contributed to 47% of kidney failure patients in 1998.<sup>5,7</sup></p> <p>10. Sixty-two per cent of those identified as diabetic from the National Health Survey in 1998 had been undiagnosed prior to the survey; among those with known diabetes, 53% had uncontrolled diabetes.<sup>7</sup></p>	<p>Individuals over 40 years of age (earlier in the obese, and in those with history of gestational diabetes or family history of diabetes etc) should be screened for diabetes to detect it early and minimise complications.<sup>9</sup></p>
<p>11. Good control of diabetes is associated with fewer diabetes-related complications.<sup>10</sup></p> <p>12. Reduction of HbA1C from 7.9% to 7% with intensive therapy reduced the incidence of albuminuria (overt diabetic nephropathy) by 33% at 12 years in Type 2 diabetics.<sup>10</sup></p>	<p>Diabetes should be controlled well to achieve target HbA1C under 7%, so as to minimise its complications, including diabetic nephropathy.<sup>11</sup></p>
<p>13. In a cross-sectional, epidemiological study of consecutive hypertensive Asian Type 2 diabetics including those from Singapore, 59% had diabetic nephropathy in various stages.<sup>12</sup></p>	<p>Type 2 diabetics should be screened for diabetic nephropathy at diagnosis as diabetic nephropathy is a common complication.<sup>11</sup></p>
<p>14. Treatment with angiotensin converting enzyme inhibitors (ACEIs) and/or angiotensin receptor blockers (ARBs) or both, retards diabetic nephropathy progression.<sup>13,14</sup> Studies have shown that compared with placebo, ARBs reduce the doubling of serum creatinine or end stage kidney failure by 2.9 fold.<sup>14</sup></p>	<p>Patients with diabetic nephropathy should receive ACEI or ARB or both to reduce progression to kidney failure.</p>

Table 1. cont'd

Facts about Kidney Disease in Singapore	Strategies for Clinical Practice
15. Glomerulonephritis is the second leading cause of kidney failure in Singapore. In 1998, 29% of new patients with kidney failure had underlying glomerulonephritis. <sup>5</sup>	Haematuria and proteinuria are hallmarks of glomerular disease and opportunistic screening, and screening of individuals at risk should be done to diagnose glomerulonephritis at its earliest stages.
16. Hypertension <i>per se</i> causes 6% of kidney failure in Singapore; <sup>5</sup> hypertension is also an important risk factor for progression of all kidney diseases. Further, hypertension is a risk factor for cardiovascular disease and contributes to the high rate of cardiovascular deaths in dialysis patients. <sup>15</sup>	Blood pressure (BP) should be controlled to target BP <130/80 mm Hg to retard progression of kidney failure. BP control also reduces morbidity and mortality from cardiovascular disease.
17. In addition to those with diabetes or hypertension, individuals aged over 50 years, those with autoimmune disease, kidney stones, systemic infections or cancer and those with a family history of kidney disease are at risk for kidney disease. <sup>9</sup>	Individuals with risk factors for kidney disease should be screened for haematuria, proteinuria and decreased kidney function. Those identified with kidney disease should be evaluated further to establish aetiology, start specific treatment and retard progression of kidney disease.
18. In 2003, although there were 675 new patients with end stage kidney failure in Singapore, only 34 patients underwent a kidney transplant. Only 5% to 10% of kidney failure patients receive a kidney transplant annually in Singapore. <sup>3</sup>	Although kidney transplantation is the best treatment for kidney failure, only a small proportion receive a kidney transplant in Singapore. Live-donor kidney transplantation is the best treatment for kidney failure. More can be done to promote live-donor kidney transplantation, by reassuring potential donors and recipients of the safety of the procedure and its benefits.
19. In 2005, 26 live-donor and 43 deceased-donor kidney transplants were performed for Singaporeans. <sup>16</sup> This represents a live-donor kidney transplant rate of only 7.5 per million population (pmp), and a total kidney transplant rate of 20.3 pmp, much lower than the rates of 22.2 pmp (live-donor) and 57.6 pmp (total) in the USA. <sup>17</sup>	
20. After censoring for graft loss, 5-year actuarial patient survival rates for live-donor and deceased-donor transplants performed between 1984 and 1998 at the Singapore General Hospital were 97% and 92%, respectively, representing crude annual death rates of 0.6% and 1.6%, respectively. <sup>18</sup>	
21. One year after kidney transplantation, 98% of live-donor kidneys and 87% of deceased-donor kidneys were functioning well. At 5 years after transplantation, 92% of live-donor and 79% of deceased-donor kidney transplants were still functioning well. <sup>18</sup>	
22. For live-donor kidney transplantation, potential donors are screened thoroughly to ensure that they are fit to donate. Acceptable live kidney donors are adults of age 21 and above with no kidney disease, no medical conditions that predispose them to kidney disease, no cancers, and no infections that can be transmitted through transplantation. Donors can be biologically or emotionally related to the recipient or be unrelated. <sup>16</sup> All live-donor transplantations must be approved by a Transplant Ethics Committee, which ensures that the donation is ethical, follows informed consent, and occurs without coercion or commercial incentives. <sup>16</sup>	
23. Both 'Opting in' (Medical Therapy, Education and Research Act, MTERA) and 'Opting out' (Human Organ Transplant Act, HOTA) legislation allow kidney donation after death in Singapore. <sup>16</sup>	Deceased-donor kidney transplantation is the second best form of treatment for kidney failure. Much has been done to promote deceased-donor kidney transplantation in Singapore. However, the numbers of such transplants are not enough to meet the growing numbers of kidney failure patients. More individuals can be encouraged to donate their kidneys as a Gift of Life to those with end stage kidney failure.
24. Those suffering brain death after accidents or strokes may be considered for donation, if they were organ pledgers under the MTERA, or were not objectors under the HOTA. <sup>16</sup>	
25. By end 2005, there were 625 dialysis patients waiting for a deceased-donor kidney transplant in Singapore. <sup>16</sup> The average waiting time for a deceased-donor kidney transplant in Singapore is 7 years. <sup>16</sup>	

practice guidelines for Health Screening in Singapore, 2003, recommended screening for diabetes from the age of 40 years (at an earlier age if risk factors are present), and for hypertension from the age of 21 years.<sup>9</sup> After a negative screen, the recommended intervals for repeat screening for diabetes and hypertension are 3 years and 2 years,

respectively. Despite the presence of these screening guidelines to detect diabetes and hypertension since 2003; a year later, in the National Health Survey conducted in 2004, 49% of diabetics and 38% of hypertensives had been undiagnosed before their participation in the Survey.<sup>8</sup>

Of note is that the peak incidence of diabetic kidney

failure in Singapore is in the age group between 45 and 64 years.<sup>3</sup> Therefore, and if we are to prevent diabetic kidney disease and failure, more effective methods are needed to ensure that screening for diabetes starts for individuals in their 40s.

Can the national screening programme to detect diabetes and hypertension become more effective? Judging from the number of Medisave claims made in Singapore since the implementation of the Diabetes Management Programme in October 2006 (6,600/month from October to December 2006) and since the extension of the programme to hypertension, hyperlipidaemia and stroke (11,800/month from January to February 2007), the provision of Medisave funds is an excellent incentive to encourage participation in disease management programmes.<sup>26</sup>

This editorial proposes the expansion of the nation's disease management programmes in 2 subsequent phases. Liberalising the use of Medisave for basic health screening packages for diabetes and hypertension would encourage and ensure that more individuals over the age of 40 undergo screening for these conditions on a regular basis and should be the next phase in our nation's approach to chronic disease management. A further enhancement of the Medisave-funded chronic disease management programme should include tests for kidney function and microalbuminuria in diabetics and hypertensives, aiming to identify those with kidney involvement early. Early treatment of kidney disease can then prevent the progression of kidney disease. The call to action for preventive nephrology should not be ignored.<sup>27</sup>

Although the use of Medisave had been intended historically for hospitalisations and costly outpatient treatments, it is timely to recognise that its use even for low cost services such as screening for diabetes and hypertension may potentially result in savings of thousands of dollars in healthcare costs. It may prove the old adage that an ounce of prevention is better than a pound of cure. Imposing annual withdrawal limits for screening packages, regulating screening packages, incorporating deductibles and co-payment measures, and monitoring key performance indicators for the newly proposed screening packages should prevent over-servicing and depletion of Medisave funds.

In concluding, the 25 facts about kidney disease shown in Table 1 serve as a remembrance of World Kidney Day; it is hoped that they will serve as an impetus to take bold action. It is further hoped that individual and national efforts, when implemented, will effectively prevent the ravages of kidney disease.

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