

**SEVENTH REPORT**  
**OF**  
**THE MALAYSIAN**  
**DIALYSIS AND TRANSPLANT**  
**REGISTRY**  
**1999**

*edited by*

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13	Lions Club of Alor Setar-NKF Dialysis Centre
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36	TDC-NKF Trengganu Dialysis Centre
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6	Bercham Dialysis Centre
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10	Damansara Specialist Hospital
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13	Ipoh Dialysis Centre
14	Ipoh Specialist
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19	Kuantan Specialist Centre
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25	Metro Specialist Hospital
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## INTRODUCTION

The 1999 report of the National Renal Registry marks another step forward in our efforts to provide comprehensive and timely reports to our participating centres. The report is released within the ensuing year. It is the aim of the committee to provide the report as early as possible. The committee is seriously considering plans to go for online reporting which will undoubtedly improve the timeliness of reporting. With electronic data reporting we will be able to provide more services. Apart from its early release the 1999 report also recorded an increase in participation by the private sector providers of dialysis. There has however been a decline in the reporting of transplant results. We hope to improve on this with the employment of more staff.

The data for 1999 showed resumption in the growth of dialysis treatment rate reflecting the nation's recovery from the Asian financial crisis. The dialysis acceptance rate increased to 60 per million population while the new renal transplant rate showed a modest increase to 4 per million population up from 3 the year before. Hemodialysis was still the main form of renal replacement therapy. CAPD constituted 14% of new dialysis patients. Dialysis practices in the government centres remain similar to that in previous years. In this report it was possible to analyse the data from private dialysis centres in a manner similar to data from the government dialysis centres. There were some differences in the practice of dialysis treatment between private and public funded program.

The year 2000 budget announced by the Finance Minister recently offers hope and relieve for many dialysis patients. In the proposal the government will subsidise RM50.00 for the cost of every dialysis the patient undergoes. This applies only to centres run by non-profit non- governmental organisation. Further subsidies will also be given to any NGO developing a new dialysis facility. This generous act by the government will potentially increase significantly the number of new patients on dialysis. It will also increase the work for the registry as one of the conditions proposed for the subsidy is data submission to the registry. The registry will have to take steps to respond to this new demand. I am confident that with the experience gained so far we shall be able to meet this challenge.

Dr. Zaki Morad Mohd Zaher  
Chairman  
Malaysian Organ Sharing System/ National Renal Registry  
Malaysian Society of Nephrology

## REPORT SUMMARY

Malaysia was still suffering from the effects of Asian financial crisis in 1999. Although there was some growth of dialysis treatment rate, it did not reach pre-crisis levels.

Participation from private dialysis centres had increased in 1999 and thus a more detailed report of haemodialysis treatment in the private centres is included in this report.

A new sub-section based on centre survey data rather than individual patient data for the year 2000 is included in chapter two to provide up-to-date information on patient and centre census in Malaysia.

### **1 ALL RENAL REPLACEMENT THERAPIES**

- 1.1 At 31st December 1999, 6224 patients were on renal replacement therapy, comprising 5138 on dialysis and 1086 with functioning transplants. 1355 new dialysis patients were accepted in 1999 compared to 1157 in 1997.
- 1.2 The new renal transplant rate was 4 per million population – a small increase compared to the rate in 1998. The overall dialysis acceptance rate had increased to 60 per million population and dialysis prevalence rate 227 per million population.

### **2 DIALYSIS IN MALAYSIA**

- 2.1 Dialysis acceptance rate by state varied between 111 per million state population for Pulau Pinang to 25 per million per state population in Kelantan.  
  
By age group, dialysis acceptance rate varied between a low of 3 per million child population to a high of 328 per million population for age group 55 to 64 years. Dialysis provision rate for patients older than 65 years was 261 per million population for age. A dramatic increase in dialysis treatment rate was seen in those more than 44 years of age.
- 2.2 Males made up 58% of all new dialysis patients
- 2.3 Haemodialysis (HD) accounted for 86% of new dialysis acceptance in 1999 of which 84% were accepted in centre HD, and 2% in office HD. No new patients had been accepted into home HD programme from 1997. 14% of new dialysis patients were accepted into the CAPD programme.
- 2.4 The proportion of patients with unknown primary disease steadily decreased to 30% in 1999. Diabetic nephropathy continued to account for 40%, chronic glomerulonephritis 11% and obstructive uropathy 4%.
- 2.5 Overall death rate on dialysis was 10%; HD death rate was 9%, and CAPD death rate 18%. 32% of deaths were attributed to cardiovascular causes and 17% to sepsis unrelated to peritonitis. 17% died at home.

2.6 **Centre survey 2000:** In a new dialysis centre survey for year 2000, there were a total of 7355 dialysis patients in Malaysia giving dialysis treatment rate was 316 per million population(pmp). There was a total of 196 dialysis centres with a total of 1989 dialysis machines.

By state, dialysis treatment rate ranged from 78 pmp in Kelantan to 605 pmp in Selangor and Wilayah Persekutuan. Centre HD capacity ranged from 790 pmp for Pulau Pinang to 108 in Sabah. HD capacity to patient ratio ranged from a low of 1.27 in Pahang to 2.37 in Kelantan.

There were 69 private dialysis centres, 60 MOH centres and 55 NGO centres giving HD capacity of 3265, 2430 and 3925 respectively. There were a total of 2569 patients dialysed in MOH centres, 2476 in NGO centres and 2063 in private centres. Centre HD capacity to patient ratio ranged from 1.36 in MOH centres to 2.06 in centres managed by armed forces.

### 3 HAEMODIALYSIS

#### 3.1 Haemodialysis in Government Centres

- 3.1.1 At 31st December 1999, 1869 patients were on HD in government centres - 85% were in centre HD, 4% in home HD and 11% in office HD.
- 3.1.2 94% of new patients were accepted into centre HD. 99% of new patients were financed by the government.
- 3.1.3 Death rate was 11% per year, highest for 10 years. Cardiovascular disorders, infections and deaths at home were the 3 commonest causes of death at 38%, 17% and 21% respectively
- 3.1.4 In 1999, there was a total of 55 government HD centres, 8 run by Ministry of Defence, 3 university hospital centres and the rest under the Ministry of Health.
- 3.1.5 New HD patients in 1999: Modal age-group 45 – 54 years; 64% males, 32% were diabetics, 7% had HBsAg, and 4% had anti-HCV antibodies.
- 3.1.6 Both HD patient and technique survival in government centres at 6 months for 1999 were similar at 91%.
- 3.1.7 Overall, 45% of HD patients were able to work part or full time. 66% had normal quality of life index.
- 3.1.8 **Haemodialysis Practices:** In 1999, 80% were dialysed via wrist AVF, 16% via brachiocephalic fistula. 90% reported no difficulties with their vascular access; only 19% had vascular access complications. 75% had blood flow rates between 200 –299 ml/min. The proportion with blood flow rate >299 ml increased to 22% in 1999. Almost all were on thrice-weekly dialysis, 93% on 4 hours per session. Use of cellulosic membrane dialysers decreased further to 37% and synthetic membrane dialyser usage increased to 40%; 99% reused their dialysers three times or more, 52% reused 6 times. Usage of bicarbonate buffer increased to 76%. Median prescribed KT/V increased to 1.5; and a higher proportion of patients (77%) achieved a KT/V of more than 1.3.
- 3.1.9 **Dyslipidaemia in haemodialysis patients:** In 1999, 69% of HD patients had serum cholesterol concentration < 5.3 mmol/l with median at 4.8 mmol/l. 88% had serum triglyceride concentration <3.5 mmol/l with median at 1.7 mmol/l; 93% had serum LDL concentration <5 mmol/l with median at 3.0 mmol/l; and 95% had serum HDL concentration of < 2 mmol/l with median at 1.1 mmol/l.
- 3.1.10 **Renal bone disease:** In 1999, 91% of HD patients were on oral calcium carbonate, only 10% remained on aluminium hydroxide. Use of vitamin D decreased to 24%. 36% achieved serum phosphate concentration < 1.6 mmol/l; 51% had serum calcium concentration between 2.2 and 2.6 mmol/l, and 18% with iPTH between 100 – 250 ng/l.



- 3.1.11 **Blood pressure control:** In 1999, 67% required anti-hypertensive therapy. Of these, 62% achieved systolic blood pressure(BP) < 160 mmHg, and 55% a diastolic blood pressure (BP)< 90 mmHg. Of the 33% not on anti-hypertensive therapy, 88% had systolic BP < 160 mmHg and 80% diastolic BP < 90 mmHg.
- 3.1.12 **Management of anaemia:** In 1999, 94% of patients were on oral iron supplements, IV iron use was very low at 5%. 48% of HD patients were on recombinant erythropoietin with 60% on 2000-4000 units weekly. 72% of those without erythropoietin and 74% on erythropoietin injections had serum iron > 10 umol/l. 70% of patients without erythropoietin and 77 % of those on erythropoietin supplements had serum ferritin > 100 ng/l. 10% and 8% of patients respectively without and with erythropoietin injections had haemoglobin concentration >12 g/dl.
- 3.1.13 **Nutritional status:** 60% of HD patients had serum albumin > 40 g/l with 61% with body mass index of between 18.5 and 25kg/m<sup>2</sup>. 20% had BMI <18.5 kg/m<sup>2</sup>.
- 3.1.14 **Anti-HCV and HBsAg status:** In 1999, 25% and 6% were positive for anti-HCV antibody and HBsAg respectively

## **3.2 Haemodialysis in Non-Governmental Organisation (NGO) Centres**

- 3.2.1 At 31<sup>st</sup> December 1999, 1579 patients were haemodialysing in centres managed by NGOs. 445 new patients were accepted into the programme.
- 3.2.3 Death rate in NGO HD centres was 7% in 1999. Cardiovascular disorders, infections and deaths at home were the 3 commonest causes of death at 27%, 9% and 13% respectively.
- 3.2.4 In 1999, there was a total of 51 NGO dialysis centres; of which 9 were run by the National Kidney Foundation, 8 by MAA Medicare Charity and 7 by various Rotary Clubs.
- 3.2.5 New HD patients in 1999: Modal age-group 45-54 years; 58% were males, 41% were diabetics, 5% had HBsAg and 6% had anti-HCV antibodies.
- 3.2.6 HD patient and technique survival in NGO centres at 6 months for 1999 were similar at 97%
- 3.2.7 Overall, 33% of HD patients were able to work part or full time, 28% were homemakers. 55% had normal quality of life index.
- 3.2.8 **Haemodialysis Practices:** In 1999, 85% were dialysed via wrist arteriovenous fistulae (AVF). 92% reported no difficulties with their vascular access; only 12% had vascular access complications. 90% had blood flow rates between 200 and 299 ml/min, 98% on thrice-weekly dialysis of 4 hours per session. 56% used cellulosic membrane dialysers; 17% used synthetic membrane dialysers. 99% reused their dialysers at least three times, 61% reported 6 reuse. Usage of bicarbonate buffer was 96%. Median prescribed

KT/V was 1.5; 73% had KT/V more than 1.3.

- 3.2.9 **Dyslipidaemia in haemodialysis patients:** In 1999, 67% of HD patients had serum cholesterol concentration < 5.3 mmol/l with median at 4.9 mmol/l. 88% had serum triglyceride concentration <3.5 mmol/l with median at 1.7 mmol/l.
- 3.2.10 **Renal bone disease:** In 1999, 92% of HD patients were on oral calcium carbonate, only 6% were on aluminium hydroxide and 30% on active vitamin D supplements. 31% achieved serum phosphate concentration <1.6 mmol/l; 57% had serum calcium concentration between 2.2 and 2.6 mmol/l and 19% with iPTH between 100 – 250 ng/l.
- 3.2.11 **Blood pressure control:** In 1999, 69% required anti-hypertensive therapy. Of these, 49% achieved systolic BP < 160 mmHg, and 58% diastolic BP < 90 mmHg. Of the 31% not on any anti-hypertensive therapy, 74% had systolic BP <160 mmHg and 73% diastolic BP < 90 mmHg.
- 3.2.12 **Management of anaemia:** In 1999, 54% were on recombinant erythropoietin with 70% on 2000 units weekly and 24% on 2000 – 4000 units weekly. 81% without erythropoietin and 80% on erythropoietin injections had serum iron > 10 umol/l. 7% of patients without erythropoietin and only 3% of those on erythropoietin had haemoglobin concentration >12 g/dl and 25% and 21% respectively had haemoglobin concentration between 10 and 12 g/dL..
- 3.2.13 **Nutritional status:** Proportion of patients with serum albumin concentration of >40 g/l was 42% in 1999. 60% had body mass index of between 18.5 and 25 kg/m<sup>2</sup> with 15% with BMI <18.5 kg/m<sup>2</sup>.
- 3.2.14 **Anti-HCV and HBsAg status:** In 1999, 18% and 8% were positive for anti-HCV antibody and HBsAg respectively.

### **3.3 Haemodialysis In Private Centres**

- 3.3.1 At 31<sup>st</sup> December 1999, 1118 patients were dialysing in private dialysis centres. 408 new patients were accepted for HD in private centres.
- 3.3.3 Death rate in private centres was 5% in 1999. Cardiovascular disorders, deaths at home and infections were the 3 commonest causes of death at 20%, 28% and 10% each respectively.
- 3.3.5 New HD patients in 1999: Modal age-group > 54 years; 55% were males, 45% were diabetics, 4% had HBsAg, 7% had anti-HCV antibody
- 3.3.6 HD patient and technique survival in private centres at 6 months for 1999 were similar at 97%.
- 3.3.7 In 1999, 45% were able to work full or part time. 54% had a normal quality of life.
- 3.3.8 **Haemodialysis Practices:** In 1999, 81% were dialysed via wrist arteriovenous fistulae (AVF). 94% reported no difficulties with their vascular

access; only 11% had vascular access complications. 90% had blood flow rates between 200 and 299 ml/min. Only 66% were on thrice-weekly dialysis, 33% only had twice weekly dialysis. 74% had 4 hours for session, 13% 4.5 hours. The majority – 80% used cellulosic membrane dialysers; only 14% used synthetic membrane dialysers. 12% did not reuse dialysers, 80% reused their dialysers at least three times. Usage of bicarbonate buffer was 84%. Median prescribed KT/V was 1.5; 68% had KT/V more than 1.3.

- 3.3.9 **Dyslipidaemia in haemodialysis patients:** In 1999, 70% of HD patients had serum cholesterol concentration < 5.3 mmol/l with median at 5.0 mmol/l. 88% had serum triglyceride concentration <3.5 mmol/l with median at 1.7 mmol/l.
- 3.3.10 **Renal bone disease:** In 1999, 80% of HD patients were on oral calcium carbonate, only 6% were on aluminium hydroxide and 27% on active vitamin D supplements. 27% achieved serum phosphate concentration <1.6 mmol/l; 52% had serum calcium concentration between 2.2 and 2.6 mmol/l and 24% with iPTH between 100 – 250 ng/l.
- 3.3.11 **Blood pressure control:** In 1999, 62% required anti-hypertensive therapy. Of these, 51% achieved systolic BP < 160 mmHg, and 54% diastolic BP < 90 mmHg. Of the 38% not on any anti-hypertensive therapy, 69% had systolic BP <160 mmHg and 66% diastolic BP < 90 mmHg.
- 3.3.12 **Management of anaemia:** In 1999, 60% were on recombinant erythropoietin with 28% on 2000 units weekly and 65% on 2000 – 4000 units weekly. 27% of patients without erythropoietin and 34% on erythropoietin had haemoglobin concentration >10 g/dl. 23% still received blood transfusion.
- 3.3.13 **Nutritional status:** Proportion of patients with serum albumin concentration of >40 g/l was 24% in 1999. 60% had body mass index of between 18.5 and 25 kg/m<sup>2</sup> with 15% with BMI <18.5 kg/m<sup>2</sup>.
- 3.3.14 **Anti-HCV and HBsAg status:** In 1999, 16% and 4% were positive for anti-HCV antibody and HBsAg respectively.

#### 4. CONTINUOUS AMBULATORY PERITONEAL DIALYSIS (CAPD)

- 4.1 At 31<sup>st</sup> December 1999, 572 patients were on CAPD. There were 201 new CAPD patients of which 85% were funded by the government.
- 4.3 In 1999, death rate on CAPD was 18%; transfer to HD 7%. Death at home, cardiovascular disorders and sepsis were the main causes of death accounting for 33%, 27% and 15% respectively. The main cause of transfer was peritonitis at 62% followed by membrane failure and patient preference.
- 4.4 There were 12 CAPD centres all within the government sector.
- 4.5 New CAPD patients in 1999: Modal age-group 55-64 years; 53% males, 43% were diabetics, Only 1% had HBsAg, 4% were anti-HCV antibody positive.
- 4.6 CAPD patient and technique survival at 6 months for 1999 were 94% and 89% respectively.
- 4.7 Overall, 28% of CAPD patients were able to work part or full time. 28% were homemakers and 13% full time students. 66% had normal quality of life index.
- 4.8 **CAPD Practices:** In 1999, 96% were on standard CAPD dialysis regime; 58% used the usual Baxter disconnect system; 42% were converted or started on a new disconnect system by Braun. 97% had 4 exchanges per day and 96% were on 2-litre exchanges
- 4.9 **Dyslipidaemia in CAPD patients:** In 1999, 48% of CAPD patients had serum cholesterol concentration < 5.3 mmol/l with median at 5.5 mmol/l. 82% had serum triglyceride concentration <3.5 mmol/l with median at 1.9 mmol/l. 82% had LDL concentration <5 mmol/l with median at 3.4 mmol/l; and 96% had HDL concentration < 2 mmol/l with median at 1.1 mmol/l.
- 4.10 **Renal bone disease:** In 1999, 74% of CAPD patients were on oral calcium carbonate, only 6% were on aluminium hydroxide and 12% on active vitamin D supplements. 51% achieved serum phosphate concentration < 1.6 mmol/l; 55% had serum calcium concentration between 2.2 and 2.6 mmol/l and 17% with iPTH between 100 – 250 ng/l.
- 4.11 **Blood pressure control:** In 1999, 82% required anti-hypertensive therapy. Of these, 72% achieved systolic BP < 160 mmHg, and 51% diastolic blood pressure < 90 mmHg. Of the 18% not on anti-hypertensive therapy, 87% had systolic BP < 160 mmHg and 76% a diastolic BP < 90 mmHg.
- 4.12 **Management of anaemia:** In 1999, 44% were on recombinant erythropoietin with 50% on 2000-4000 units weekly and 35% on 2000 units weekly. 78% of patients without erythropoietin and 81% on erythropoietin injections had serum iron concentration of >10 umol/l. 85% of those without erythropoietin and 85% on erythropoietin had transferrin saturation > 20%. 93% of those with and without erythropoietin had serum ferritin concentration > 100 ng/l. 39% of CAPD patients not on erythropoietin had haemoglobin concentration

>10 g/l and 7% had haemoglobin concentration of >12% compared to 25% and 6% respectively for those on erythropoietin.

- 4.13 **Nutritional status:** 18% of CAPD patients had serum albumin > 40 g/l with 56% with body mass index of between 18.5 and 25 kg/m<sup>2</sup>. 22% had body mass index <18.5 kg/m<sup>2</sup>.
- 4.14 **Anti-HCV and HBsAg status:** In 1999, only 5% of CAPD had anti-HCV antibodies and 2% had HBsAg.

## **5. RENAL TRANSPLANTATION**

- 5.1 At 31<sup>st</sup> December 1999, there were 1086 functioning renal transplants
- 5.2 Of 99 new transplant transplants in 1999, 37 were from living related donors, 10 from cadaveric donors; 3 from commercial living non-related donors; and 46 from commercial cadaveric donors.
- 5.3 In 1999, 2% of transplant recipients died and 4% lost their grafts. Sepsis was the commonest cause of death. Rejection accounted for 65% of graft loss.
- 5.4 91% of transplant recipients were followed up in government centres.
- 5.5 Modal age group for new transplant recipients was 35-44 years; 61% were males, 12% diabetics; 4% were HBsAg positive and 10% had anti-HCV antibodies at the time of transplantation.
- 5.6 Six month patient survival in 1999 was 99% and graft survival was 95%.
- 5.7 Overall, 69% of transplant recipients were able to work part or full time, and 20% were homemakers. 97% had normal quality of life index.

## **METHODS**

### **1. COVERAGE**

There were 198 dialysis centres in Malaysia as at 15th November 2000, of which 173 reported data to the Registry. Thus, centre coverage by the Registry is now 88%. This is largely because the Registry database is now also used to generate the transplant waiting list. We assessed patient ascertainment by comparing the Registry patient database and data obtained from the annual independent centre survey. The survey was primarily intended to update information on dialysis centres in the country for publication in the “Directory of Dialysis Centres in Malaysia” but data on number of patients were also sought to provide an up to date census of patient population in the country. Based on the patient prevalence estimates calculated from these 2 independent sources of data (227 versus 253 patients/million population), we estimated the coverage of patient by the Registry to be 90%.

### **2. STATISTICAL ANALYSIS**

Kaplan Meier method<sup>1</sup> was used to estimate probability of survival and log rank test used to compare survival function. Technique failure is defined as occurrence of death or transfer to another modality of dialysis. Similarly, graft failure is defined as occurrence of death or returned to dialysis.

Annual death rates were calculated by dividing the number of deaths in a year by the estimated mid-year patient population.

For summarising continuous laboratory data, we have moved away from calculating summary statistics like mean, standard deviation and instead plot the cumulative frequency distribution graph. We are following the approach used by the UK Renal Registry<sup>2</sup>. Cumulative distribution plot shows a listing of the sample values of a variable on the X axis and the proportion of the observations less than or greater than each value on the Y axis. An accompanying table gives the Median (50% of values are above or below it), upper quartile (UQ, 25% of values above and 75% below it) and lower quartile (LQ, 75% of values above and 25% below it). Other percentiles can be read directly off the cumulative distribution plot. The table also shows percent of observations above or below a target value, or with an interval of values; the target value or interval obviously vary with the type of laboratory data.. For example, target value for prescribed KT/V is  $\geq 1.3$  and that for haemoglobin is  $\geq 10$  and  $\leq 12$  g/l. The choice of target value is arbitrary. We await guidelines from the dialysis community for appropriate choice of target values to set.

In contrast to other results reported in this report, Tables 2.12 and 2.13 are based on centre survey data rather than individual patient data reported to the Registry. This is to provide an up to date information on patient and centre census in the country and thus overcome the inevitable time lag between processing individual patient data and subsequent reporting of results. The survey was conducted between 20<sup>th</sup> November and

20<sup>th</sup> December 2000. Centre response rate to the survey was 99.5% ( 197/198 responded). Standard error estimates are not reported because no sample was taken. Results on distribution by state are also expressed in per million-population since states obviously vary in their population sizes. State population data are based on 2000 census population projection. It is very difficult to estimate the amount of cross boundary patient flow; this source of error is therefore not accounted for in computing state estimates. However, we minimise the bias by combining states (Selangor and Wilayah Persekutuan, Kedah and Perlis) based on geographical considerations. HD treatment capacity is derived by assuming on average patients underwent 3 HD sessions per week and a centre can maximally operate 2.5 shifts per day. A single HD machine can therefore support 5 patients' treatment. Obviously HD treatment capacity is calculated only for centre HD. The ratio of the number of centre HD capacity to number of centre HD patients is a useful measure of utilisation of available capacity. Only 1 centre did not respond. As the objective of this analysis is to estimate the total amount of dialysis provision in the country, we obviously cannot simply ignore the missing data and confine the analysis to available data. We therefore imputed the missing data based on regression imputation model and guided by the imputation principles described by Little<sup>3</sup>. The imputation model included sector (public, NGO or private), state, year of operation, number of dialysis personnel. These are well known correlates of level of dialysis provision in a centre. The imputations are then drawn by predictive mean matching<sup>3</sup>. Each centre with missing data was match with each respondent on its predicted values. We then use the data of the centre with the closest match to impute the missing data.

**References:**

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