

INTRODUCTION

The National Renal Registry celebrated its 10th anniversary without any fanfare last year. The apprehension that was felt in the initial years regarding long-term viability of the registry gave way to a sense of confidence that we can meet the challenge and manage a registry successfully. The Registry continues to develop, thanks to all the Nephrologists in the country as well as their staff who undertook the arduous task of collecting and sending data. The NRR committee decided last year that in the interest of greater efficiency and lower operational costs the running of the registry be placed under the National Disease and Registry Units of the Clinical Research Centre of the Ministry of Health. The unit which also manages five other registries has a good IT infrastructure and state of the art data security system. The pooling of human and IT resources not only lower operational costs but also optimizes the use of expensive technology.

The Registry must continue to be sensitive to the needs of its subscribers and look into providing information on any new interests that its data can generate. With the imminent introduction of National Health Financing System more detailed data on the financing of dialysis treatment may be required.

The tenth report for the year 2002 saw a drop in the dialysis acceptance rate to 71 per million population. This was due to the decrease in the intake of hemodialysis patients in all the three sectors. The economic climate must have affected the growth in the private and NGO sectors. The Ministry of Health has an ongoing program of opening new centers in the smaller district hospitals. However operational delays may have affected patient intake. In general the dialysis and transplant activities in the country has remained stable and parameters looking at standards of care have shown improvements in general.

There is a need to develop CAPD further. Hemodialysis units are finding it difficult to recruit staff. In the MOH hospitals there are space constraints in developing Hemodialysis units. An expanded CAPD program may address some of these constraints. Current limitations in the use of CAPD include the cost of the treatment.

Finally a concerted effort by primary care physicians, Public Health Departments and other interested parties including NGOs must be made to address the “epidemic” of Diabetes Mellitus. Forty seven percent of all new patients taken in for RRT in 2002 had ESRD due to diabetes. There has to be better control of diabetes and hypertension if any headway is to be made in this direction.

I once again thank all the data contributors and hope we have thus far met the expectations of all parties who use the report from the registry.

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REPORT SUMMARY

1 ALL RENAL REPLACEMENT THERAPIES

- 1.1 At 31st December 2002, 9812 patients were on renal replacement therapy, comprising 8418 on dialysis and 1394 with functioning transplants. 1734 new dialysis patients were accepted in 2002.
- 1.2 The new renal transplant rate was 5 per million population. The overall dialysis acceptance rate decreased to 71 per million population. This reduction was contributed by the decrease in intake of new hemodialysis patients into all three sectors which is not compensated by an increase in CAPD intake. Dialysis prevalence rate however increased to 343 per million population.

2 DIALYSIS IN MALAYSIA

- 2.1 Dialysis acceptance rate by state ranged from 120 per million state population for Johor to 33 per million per state population in Sabah.

By age group, dialysis acceptance rate ranged between a stable rate of 4 per million child population to 387 per million population for age group 55 to 64 years. Dialysis provision rate for patients older than 65 years was 356 per million population for age.

- 2.2 Males made up 55% of all new dialysis patients
- 2.3 Centre Haemodialysis (HD) accounted for 81% of new dialysis acceptance in 2002, 1% in office and very few into home HD. Acceptance into the CAPD programme continued to show increasing trend at 18%.
- 2.4 One third of new dialysis patients had unknown primary disease. Nearly half of new dialysis patients (47%) had ESRD due to diabetic nephropathy. Chronic glomerulonephritis was only found in 7% of the new dialysis patients.
- 2.5 Overall death rate on dialysis was 10%; HD death rate was 9%, and CAPD death rate was at 14%. 39% of deaths on dialysis were attributed to cardiovascular causes and 15% to sepsis unrelated to peritonitis. 22% died at home.
- 2.6 **Centre survey 2002:** *This survey was again conducted at the end of 2002 to provide up-to-date information on dialysis-patient and centre census in Malaysia. Note that the total number of dialysis patients in this survey differs from that reported to the registry which depends on individual patient reporting from all centres.*

There were a total of 8708 dialysis patients in Malaysia giving a dialysis treatment rate of 360 per million population (pmp). Dialysis treatment rate

from individual patient reporting had given a rate of 343 pmp.

There were a total of 223 centres, an increase of 4 centres from the previous year with a total of 2680 dialysis machines.

By state, dialysis treatment rate ranged from 95 per million state population in Sabah to 675 pmp in Melaka. HD capacity to patient ratio ranged from 1.44 in Sabah to 1.91 in Penang.

Private dialysis centres remained at 74 centers. There were 72 NGO centers - an increase of 11 centres from the previous year and 65 MOH centers. HD capacity for NGO, private and MOH centres were 5035, 4195 and 3725 respectively. There were a total of 3069 patients dialysing in NGO centers, 2596 in private centers and 2873 in MOH centers. Centre HD capacity to patient ratio ranged from 1.51 in MOH centers to 1.98 in centres managed by the armed forces.

3 HAEMODIALYSIS

3.1 Haemodialysis in Government Centres

- 3.1.1 At 31st December 2002, 450 new patients were accepted into government HD centers. There were 2602 prevalent patients dialysing in government centres.
- 3.1.2 96% of new patients were accepted into centre HD, 1% into home HD and 2% into office HD. 99% of new patients were funded by the government.
- 3.1.3 Death rate stood at 10% per year. Cardiovascular disorders, infections and deaths at home were the 3 commonest causes of death at 35%, 21% and 21% respectively
- 3.1.4 In 2002, there were a total of 77 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 2002: Modal age-group 55 – 64 years; 58% males, 39% were diabetics, 4% had HBsAg, and 3% had anti-HCV antibodies.
- 3.1.6 HD patient and technique survival in government centres at 6 months for 2002 were 92% and 89% respectively.
- 3.1.7 Overall, 42% of HD patients were able to work part or full time. 67% had normal quality of life index.
- 3.1.8 **Haemodialysis Practices:** In 2002, 75% were dialysed via wrist AVF, 20% via brachiocephalic fistula. 93% reported no difficulties with their vascular access; only 14% had vascular access complications. Proportion of patients with higher blood flow rates of 300-349 increased from 20% in 1999 to 41% in 2002. Almost all were on thrice-weekly dialysis, 98% on 4 hours per session. Use of cellulosic membrane dialysers decreased further to 14% and synthetic membrane dialyser usage increased to 79%. 99% reuse dialysers - 51% reused their dialysers 12 times or more. Usage of bicarbonate buffer increased to 97%. Median prescribed KT/V decreased to 1.4; and 67% achieved a KT/V of more than 1.3.
- 3.1.9 **Dyslipidaemia in haemodialysis patients:** This has remained mostly unchanged over the years. In 2002, 68% 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; 96% had serum LDL concentration <5 mmol/l with median at 2.9 mmol/l; and 93% had serum HDL concentration of < 2 mmol/l with median at 1.1 mmol/l.
- 3.1.10 **Renal bone disease:** In 2002, 92% of patients were on oral calcium carbonate, only 5% were on aluminium hydroxide. Use of vitamin D remained at 24%. 34% achieved serum phosphate concentration <1.6 mmol/l; 55% had serum calcium concentration between 2.2-2.6 mmol/l, and 24% with iPTH

between 100–250 ng/l. Median PTH concentration increased to 125 ng/L.

- 3.1.11 **Blood pressure control:** This too has remained fairly constant over the years. In 2002, 67% required anti-hypertensive therapy. Of these, 61% achieved systolic blood pressure (BP) < 160 mmHg, and 64% a diastolic BP < 90 mmHg. Of the 33% not on anti-hypertensive therapy, 83% had systolic BP < 160 mmHg and 80% diastolic BP < 90 mmHg.
- 3.1.12 **Management of anaemia:** In 2002, 89% of patients were on oral iron supplements. Intravenous iron usage has increased to 11%. 66% of HD patients were on recombinant erythropoietin with 56% on 2000-4000 units weekly. 80% of those without erythropoietin and 77% on erythropoietin injections had transferrin saturation > 20%. 80% of patients without erythropoietin and 90% of those on erythropoietin supplements had serum ferritin > 100 ng/l. 10% of patients on erythropoietin injections had haemoglobin concentration >12 g/dL, 33% with haemoglobin concentration between 10 and 12g/dL. 51% of those not on erythropoietin therapy had haemoglobin concentration <10 g/dL.
- 3.1.13 **Nutritional status:** 57% of HD patients had serum albumin > 40 g/l with 59% with body mass index of between 18.5 and 25kg/m².
- 3.1.14 **Anti-HCV and HBsAg status:** In 2002, proportion of patients with anti-HCV antibodies decreased to 23%. Proportion with HbsAg was 5%.

3.2 Haemodialysis in Non-Governmental Organisation (NGO) Centres

- 3.2.1 At 31st December 2002, 2932 patients were on HD in centres managed by NGOs. 516 new patients were accepted for HD in 2002 compared to 695 in 2001.
- 3.2.3 Death rate in NGO HD centres was 8% in 2002. Cardiovascular disorders, deaths at home, and infections were the 3 commonest causes of death at 41%, 17% and 14% respectively.
- 3.2.4 In 2002, there were a total of 69 NGO dialysis centres.
- 3.2.5 New HD patients in 2002: Modal age-group 55-64 years; 51% were males, more than half (54%) were diabetics, 3% had HBsAg and 2% had anti-HCV antibodies.
- 3.2.6 HD patient and technique survival in NGO centres at 6 months for 2002 were similar at 97%
- 3.2.7 Overall, 28% of HD patients were able to work part or full time, 27% were homemakers and 8% pensioners. 55% had normal quality of life index.
- 3.2.8 **Haemodialysis Practices:** In 2002, 83% were dialysed via wrist AVF, 14% via brachiocephalic fistulae. 93% reported no difficulties with their vascular access; only 10% had vascular access complications. 58% had blood flow rates between 250 and 299 ml/min, 97% were on thrice-weekly and 3% on

twice weekly HD. 99% had HD for 4 hours per session. Synthetic membrane usage increased to 52% in 2002. 95% reused dialysers - 76% reused their dialysers at least six times, and 13% more than 11 times. Usage of bicarbonate buffer was 100%. Median prescribed Kt/V was 1.5; 79% had Kt/V more than 1.3.

- 3.2.9 **Dyslipidaemia in haemodialysis patients:** In 2002, 67% of HD patients had serum cholesterol concentration < 5.3 mmol/l with median at 4.9 mmol/l. 85% had serum triglyceride concentration <3.5 mmol/l with median at 1.7 mmol/l. 96% had serum LDL < 5 mmol/L.
- 3.2.10 **Renal bone disease:** In 2002, 93% of HD patients were on oral calcium carbonate, only 1% were on aluminium hydroxide. Proportion on active vitamin D supplements was 22%. 33% achieved serum phosphate concentration <1.6 mmol/l; 58% had serum calcium concentration between 2.2 and 2.6 mmol/l and only 13% with iPTH between 100 – 250 ng/l. Median PTH concentration was 28.6 ng/L.
- 3.2.11 **Blood pressure control:** In 2002, 66% required anti-hypertensive therapy. Of these, 57% achieved systolic BP < 160 mmHg, and 68% diastolic BP < 90 mmHg. Of the 34% not on any anti-hypertensive therapy, 78% had systolic BP <160 mmHg and 81% diastolic BP < 90 mmHg.
- 3.2.12 **Management of anaemia:** In 2002, 68% were on recombinant erythropoietin with 48% on 2000 units weekly and 44% on 2000 – 4000 units weekly. 66% on erythropoietin injections had transferrin saturation >20%. 90% of those on erythropoietin had serum ferritin of > 100 ug/l. 38% of patients on erythropoietin had haemoglobin concentration >10 g/dL with 8% with haemoglobin concentration >12 g/dL.
- 3.2.13 **Nutritional status:** The proportion of patients with serum albumin concentration of >40 g/l was 40% in 2002. 60% had body mass index of between 18.5 and 25 kg/m².
- 3.2.14 **Anti-HCV and HBsAg status:** In 2002, a lower proportion (16%) of patients had anti-HCV antibodies, 6% were positive for HBsAg.

3.3 Haemodialysis In Private Centres

- 3.3.1 At 31st December 2002, 1990 patients were dialysing in private dialysis centres. 470 new patients were accepted for HD in private centers compared to 515 in 2000 and 500 in 2001.
- 3.3.3 Death rate in private centres was 9% in 2002. Cardiovascular disorders, deaths at home and sepsis were the 3 commonest causes of death at 47%, 28% and 7% each respectively.
- 3.3.5 New HD patients in 2002: Modal age-group \geq 55 years; 57% were males, 54% were diabetics, 3% had HBsAg, and 3% had anti-HCV antibody
- 3.3.6 HD patient survival and technique survival in private centres at 6 months for

2002 were similar at 97%.

- 3.3.7 In 2002, 25% were able to work full or part time, 23% were homemakers. 15% were retirees and 18% were older than 65 years. 56% had a normal quality of life.
- 3.3.8 **Haemodialysis Practices:** In 2002, 75% were dialysed via wrist AVF, 18% via brachiocephalic fistula. 88% reported no difficulties with their vascular access; only 14% had vascular access complications. 76% had blood flow rates between 200 and 299 ml/min. Only 74% were on thrice-weekly dialysis, 25% had twice weekly dialysis. 93% had 4 hours per HD session, 7% 4.5-5 hours. Use of synthetic membranes increased to 42%. 6% did not reuse dialysers, 57% reused their dialysers at least six times. Usage of bicarbonate buffer was 94%. Median prescribed KT/V was 1.5; 72% had KT/V more than 1.3.
- 3.3.9 **Dyslipidaemia in haemodialysis patients:** In 2002, 71% of HD patients had serum cholesterol concentration < 5.3 mmol/l with median at 4.8 mmol/l. 89% had serum triglyceride concentration <3.5 mmol/l with median at 1.9mmol/l. 98% had serum LDL < 5 mmol/L
- 3.3.10 **Renal bone disease:** In 2002, 89% of HD patients were on oral calcium carbonate, only 2% were on aluminium hydroxide and 23% on active vitamin D supplements. 32% achieved serum phosphate concentration <1.6 mmol/l; 57% had serum calcium concentration between 2.2 and 2.6 mmol/l and 17% with iPTH between 100 – 250 ng/l with median at 66.3 ng/L.
- 3.3.11 **Blood pressure control:** In 2002, 67% required anti-hypertensive therapy. Of these, 52% achieved systolic BP < 160 mmHg, and 62% diastolic BP < 90 mmHg.
- 3.3.12 **Management of anaemia:** In 2002, 68% were on recombinant erythropoietin with 33% on 2000 units weekly and 56% on 2000 – 4000 units weekly. 45% of patients on erythropoietin had haemoglobin concentration >10 g/dL with 10% with haemoglobin concentration \geq 12 g/dL. 17% still received blood transfusion.
- 3.3.13 **Nutritional status:** Proportion of patients with serum albumin concentration of >40 g/l was 35% in 2002. 61% had body mass index of between 18.5 and 25 kg/m².
- 3.3.14 **Anti-HCV and HBsAg status:** More HD patients were anti-HCV positive over the years unlike those dialysed in NGO and government centres. In 2002, 26% of patients had anti-HCV antibodies, 3% were positive for HbsAg.

4. CONTINUOUS AMBULATORY PERITONEAL DIALYSIS (CAPD)

- 4.1 At 31st December 2002, 894 patients were on CAPD. Intake of new CAPD patients was highest at 298 of which 84% were funded by the government.
- 4.3 In 2002, death rate on CAPD was 14%; transfer to HD 10%. Cardiovascular disorders, death at home and sepsis were the main causes of death accounting for 35%, 28% and 17% respectively. CAPD peritonitis accounted for 8% of deaths. The main cause of transfer was peritonitis at 36%.
- 4.4 There were 16 government CAPD centers, one NGO and two private CAPD centers.
- 4.5 New CAPD patients in 2002: Modal age-group 45-54 years; 52% males, 40% were diabetics, 3% had HBsAg, 1% were anti-HCV antibody positive.
- 4.6 CAPD patient survival was 94% and technique survival was 91% at 6 months for year 2002.
- 4.7 Overall, 22% of CAPD patients were able to work part or full time. 33% were homemakers and 14% full time students. 71% had normal quality of life index.
- 4.8 **CAPD Practices:** In 2002, 99% were on standard CAPD dialysis regime; 86% used the Baxter disconnect system; 11% on a disconnect system by Braun. 95% had 4 exchanges per day and 94% were on 2-litre exchanges
- 4.9 **Dyslipidaemia in CAPD patients:** In 2002, 50% of CAPD patients had serum cholesterol concentration < 5.3 mmol/l with median at 5.5 mmol/l. 80% had serum triglyceride concentration <3.5 mmol/l with median at 1.9 mmol/l. 91% had serum LDL concentration of < 5 mmol/L.
- 4.10 **Renal bone disease:** In 2002, 80% of CAPD patients were on oral calcium carbonate, only 1% were on aluminium hydroxide and 15% on active vitamin D supplements. 58% achieved serum phosphate concentration <1.6 mmol/l; 58% had serum calcium concentration between 2.2 and 2.6 mmol/l and 23% with iPTH between 100 – 250 ng/l. Median PTH values had increased to 82 ng/L.
- 4.11 **Blood pressure control:** In 2002, 81% of CAPD patients required anti-hypertensive therapy. Of these, 76% achieved systolic BP <160 mmHg, and 59% diastolic blood pressure <90 mmHg. Of the 29% not on anti-hypertensive therapy, 91% had systolic BP < 160 mmHg and 79% a diastolic BP <90 mmHg.
- 4.12 **Management of anaemia:** In 2002, 49% of patients on CAPD were on recombinant erythropoietin with 52% on 2000-4000 units weekly and 30% on 2000 units weekly. 11% still received blood transfusions. Only 2% received parenteral iron therapy. 88% of patients on erythropoietin injections had transferrin saturation >20%. 92% of all CAPD patients had serum ferritin concentration > 100 ng/l. 53% of CAPD patients not on erythropoietin had

haemoglobin concentration <10 g/l. Of those on erythropoietin therapy, 38% had haemoglobin concentration >10 g/dL with 10% > 12 g/dL.

- 4.13 **Nutritional status:** Only 16% of CAPD patients had serum albumin >40 g/l compared to 58% of government HD patients. 48% had body mass index of between 18.5 and 25 kg/m². 31% had body mass index >25 kg/m².
- 4.14 **Anti-HCV and HBsAg status:** The HbsAg and anti-HCV status of CAPD patients were constant over the years at 2-3% and 3-5% respectively.

5. RENAL TRANSPLANTATION

- 5.1 At 31st December 2002, there were 1394 functioning renal transplants, and 132 new renal transplant recipients.
- 5.2 There were 35 renal transplantations done locally in Malaysia in 2002. There were 76 renal transplantation from so-called cadaveric donors and 10 from commercial live donors done overseas.
- 5.3 In 2002, 19 (1%) of transplant recipients died and 32 (3%) lost their grafts. Cardiovascular diseases and sepsis and were the commonest causes of death accounting for 26% and 16% respectively. Rejection accounted for 59% of graft loss.
- 5.4 There were 46 centres of follow-up for renal transplant recipients.
- 5.5 Modal age group for new transplant recipients in 2002 was 35-44 years; 45% were males, 16% diabetics; 6% were HBsAg positive and none had anti-HCV antibodies at the time of transplantation.
- 5.6 Six month patient survival in 2002 was 96% and graft survival was 95%.
- 5.7 Overall, 67% of transplant recipients were able to work part or full time, and 17% were homemakers. 95% had normal quality of life index.

METHODS

1. COVERAGE

There were 223 haemodialysis centers and 20 centres with active CAPD services in Malaysia as of December 2002, of which 230 reported data to the Registry. Thus, centre coverage is now to 94.6%. We assessed completeness of patient ascertainment by comparing the number of patients registered on the Registry patient database at end of year 2002 and patient census data obtained independently from the annual centre survey in December 2002. Based on the patient prevalence estimates calculated from these 2 independent sources of data (343 versus 374 patients/million population), we estimated the patient ascertainment rate by the Registry to be 91%.

2. STATISTICAL ANALYSIS

Kaplan Meier method¹ 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 summarizing 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 Registry². 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 ≥ 1.3 and that for haemoglobin is ≥ 10 and ≤ 12 g/l. The choice of target value is guided by published clinical practice guidelines, for example, the DOQI guideline; or otherwise they represent consensus of the local dialysis community.

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 a 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 in the month of December 2002. Centre response rate to the survey was 100% 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 2002 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.

References:

1. Kaplan EL, Meier P. Non-parametric estimation from incomplete observations. *J Am Stat Assoc* 1958; 53:457-81
2. UKRENALREG 1999 UK Renal Registry, Bristol, UK.

GLOSSARY

CAPD	Continuous Ambulatory Peritoneal Dialysis
CPD	Continuous Peritoneal Dialysis
ESRD	End Stage Renal Disease
HD	Haemodialysis
LQ	Lower Quartile
MOH	Ministry of Health
NGO	Non-Government Organisation
pmp	per million population
QOL	Quality of Life
rHuEpo	Recombinant Human Erythropoietin
RRT	Renal Replacement Therapy
UQ	Upper Quartile