KIDNEY DIALYSIS FOUNDATION

ANNUAL REPORT

MEDICAL

2004

Prepared by

Dr Choong Hui Lin
Medical Director

With input from:

Theresa Soh
Manager, Patient Services

Lay Kwee Chin
Sr Executive, Patient Services

Aton Din
Nurse Educator

Janice Soon
Welfare Executive

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The Kidney Dialysis Foundation runs 3 dialysis centres at Alexandra Hospital from 1996, Bishan 1997 and Kreta Ayer Road – San Wang Wu Ti centre, September 2003.

Two dialysis providers, Asia Renalcare and Fresenius, have been contracted to provide dialysis care. Medical care is provided by private sector as well as public sector nephrologists. Majority of the patients originate from SGH. In 2003. There were 19 new entrants.

Eleven patients exited the programme (3 transplants, 6 deaths, 2 transfers). In the prevalent population, the number of patients with chronic glomerulonephritis as the etiology of renal failure was 56.6%, diabetic nephropathy 14.8%. Mean age of prevalent patients was 48.7 $\pm$ 9.3 years whilst the average age on entry was 46.6 $\pm$ 8.8 years. Overall first year survival of patients was 95.2% and five year survival 83.3%. 5 year survival in diabetics was 71.6% compared with 84.6% in non diabetics.

All patients are using high flux dialysers. Average blood flow was 278 $\pm$ 33 ml/min. 78.6% of patients dialysis 4 hours or more. Eighty-seven (84.5)% of patients use a native arteriovenous fistula. Dialysis adequacy as measured by single pool KT/V is >1.2 in 98.9% of patients.

Mean hemoglobin is now 11.0 g/dl. About 80.0% of all patients are on EPO. Only 2% of the patients who require EPO are not on. Less than 10% of patients (6.6%) are considered Fe deficient.

Nutrition with respect to protein intake needs to be improved. 81.8% of patients have S Albumin of <40 g/l. Hyperparathyroidism and hyper-phosphatemia remains a problem. More patients are on intravenous Vitamin D.

There was no significant changes in virology status. Hep B positivity was 7.5%, HCV 11.5%, HepB and HCV 1.7%.

57.5% of the prevalent population are on antihypertensive medication and 17.6% were diabetic.

The proportion of patients registered on the National Transplant waiting list was 46%

INTRODUCTION

The Kidney Dialysis Foundation started operations in 1996 with only one centre at Alexandra Hospital. This was a centre originally managed jointly by the Renal Department at the SGH providing medical cover and nursing staff from Alexandra Hospital under the Ministry of Health (MOH). On 17 April 96 when the center was taken over from MOH, the care of twenty-eight (28) patients was transferred to the KDF. Bishan Dialysis Centre commenced operation on November/December 1997 with forty-three (43) patients from the former Tan Tock Seng Dialysis Centre.

Originally Renalcare Holdings Pte Ltd provided the dialysis service by contract. They also won the first tender to supply haemodialysis services in 1997 for a period of three years. In 2000, the tender was opened with an option to quote for three and five years. After much deliberation, the tender committee comprising Prof Woo Keng Thye, Prof Evan Lee and Dr Yong Nen Khiong decided to award Alexandra Hospital Centre to Fresenius Medicare and Bishan Centre to Asia Renal Care (the company which had absorbed Renalcare Holdings).

KDF started operations in its third centre called the San Wang Wu Ti - KDF Centre on 1 Sept 03. It was built from funds donated from Sang Wan Wu Ti Religious Society. The idea was first mooted in 2000. Numerous site visits were made to assess suitability, as the location is an old HDB block with many physical constraints. Tenders were called in the second half of 2001. Fresenius Medical Care was awarded the tender for supply of dialysis machines and Baxter Healthcare the dialysis chairs. A local company, Memiontec, was awarded the tender for the RO water treatment system. Renovation works were started in October 2002 after all the necessary approvals were obtained. Eight patients were transferred from Alexandra Hospital Centre. The center continued to take new patients and as at 31 Dec 04 there were 25 patients. Emergency medical cover was arranged with three general practitioners around the vinicity.

Dialysis medical care is provided by a team of 18 doctors who are all practising nephrologists from SGH, NUH and the private sector.

Paramedical support for the past year was from Ms Theresa Soh (Manager of Patient Services), Ms Lay Kwee Chin (Nurse Educator) and Ms Aton Din. The volunteer pharmacists were unable to continue their services because of other commitments. Dietetic counseling was provided for under the contract with the dialysis providers. The dieticians assigned were Ms Pauline Chan and Emily by Asia Renalcare and Ms Liow Min Choo by Fresenius Medical Care.

This report covers medical data collated at the end of 2004.

THE DIALYSIS CENTRES

.

All three dialysis centres operate 6 days a week, while the older centres, Alexandra and Bishan had 3 shifts a day from Monday to Saturday. The Kreta Ayer centre started with two shifts.

ALEXANDRA

Two isolation stations were built and operational by 1998 to cater to cases with MRSA positive status or other infections such as chicken pox which require isolation. There is now a total of 22 stations.

The dialysis provider elected to practise a single use dialyser policy for hepatitis B positive patients reducing the need for running costs for an additional Renatron machine as mandated by the Dialysis Guidelines issued by the Licencing and Accreditation Unit of MOH.

We received news that Alexandra Hospital would no longer be able to house the dialysis centre and patients from these centres will have migrate to either Bishan or Kreta Ayer SWWT centres until a new centre can be built for KDF. This will be effective from June 2005. The planned move would be in April 2005.

BISHAN

This centre operated on three shifts from July 1998. Initially built with 15 stations, there is now a total of 20 dialysis stations after renovations were completed in early 2003. The centre was inspected by the Licencing and Accreditation Unit of the Ministry of Health on 15 January 2003.

KRETA AYER

The third haemodialysis centre is situated at Block 333 Kreta Ayer Road #03-33. The funds were donated from Sang Wan Wu Ti Religious Society. The centre was made operational in April 2003 to accomodate outpatients from the Singapore General Hospital who dialysed there for 3 months (29 April to 28 July 2003) during the SARS crisis.

KDF and Fresenius Medical Care started taking patients from 1st September 2003. Eight patients were transferred from Alexandra centre. By 31 December 2004, there were 25 patients. Emergency medical cover was arranged with three general practitioners around the vinicity.

EQUIPMENT

DIALYSIS MACHINES

There are in total 36 Baxter 1550 dialysis machines, 5 Gambro AK90 machines and 24 Fresenius 4008S machines. These were located as follows:

	Baxter 1550	Gambro AK90	Fresenius 4008S
Alexandra	19	5	1
Bishan	17	0	6
Kreta Ayer	0	0	17

WATER TREATMENT SYSTEM

The water treatment systems in Alexandra and Bishan Centres are serviced by Waterman Pte Ltd while that in Kreta Ayer SWWT center was by Memiontec

REUSE EQUIPMENT

Reuse is practised using the Renatron Reprocessing machines. Dialysers from hepatitis positive patients are not mixed with those from serologically negative patients during washing. Patients positive for hepatitis were excluded from Kreta Ayer for the time being.

STAFFING

Medical

The medical staff comprises a pool of 18 nephrologists from both the restructured hospitals as well as the private sector. They are rostered to do rounds in the centre as well as screen new patients for medical suitability for entry into the dialysis programme if there has been no assessment performed at the restructured hospitals. Routinely, dialysis patients are seen once every month.

The nephrologists include:

1. Dr Chan Choong Meng
2. Dr Beatrice Chen
3. Dr Stephen Chew
4. Dr Lina Choong
5. Dr Marjorie Foo
6. Dr Ho Chee Khun
7. Dr Fred Lam
8. Dr Titus Lau
9. Dr Grace Lee
10. Dr Leong see Odd until June 04
11. Dr Gloria Loke until December 04
12. Dr Pary Sivarama
13. Dr Pwee Hock Swee
14. Dr Tan Han Khim
15. Dr Tan Seng Hoe
16. Dr Wei Serh Sherng until June 04
17. Dr Yeoh Lee Ying from August 04
18. Dr A. Vathsala

In the event of any need for urgent medical attention, the medical staff at the Accident and Emergency department at Alexandra Hospital could be called upon for assistance for patients at Alexandra Hospital. Urgent medical cover for the patients at Bishan and Kreta Ayer has been arranged with general practioners working in the respective areas. The doctors and their clinics are as follows:

Bishan Centre:

1. Dr Goh Ming Kiong – Lifeline Medical Group
2. Dr Woo Kim Fatt – Agape Clinic

Kreta Ayer Centre

1. Dr Chua Thiam Eng – Cambridge Clinic
2. Dr Lai Li Cheng – Chinatown Clinic
3. Dr Chong Foong Chong – Grace Clinic

Nursing

The overall standard of nursing is overseen by Ms Theresa Soh as Patient Services Manager and assisted by Ms Lay Kwee Chin. Routine audits are performed on the provider to maintain standards. The Dialysis Providers are:

- Fresenius Medicare at Alexandra Hospital Centre (AH) and San Wang Wu Ti (Kreta Ayer) Centre
- Asia Renalcare Pte Ltd at Bishan Centre

The current contract was effective from 1st March 2001 and is to run for five years.

The Dialysis Provider is responsible for rostering of the nursing personnel as at 31 Dec 2004 is listed as follows:

Centre	Renal trained	SN	AN	DT	Total
AH	2	5	5	3	15
Bishan	2	8	1	5	16
SWWT	1	4	2	1	8
Grand total					39

Dietetics

One of the provisions in the latest tender for dialysis provider was that of a dietetic service to our patients. Patients are seen at least once in 3 months at the centre. The dieticians assigned by the providers were Ms Pauline Chan at Bishan Dialysis Centre and Ms Liow Min Choo by Fresenius Medical Care at Alexandra Hospital Dialysis Centre.

Training & Education

The Nurse Educator together with the Patient Services Manager and Senior Nursing Sisters are responsible for Training & Education for the Nursing staff. This is discussed in the Nursing report.

PATIENT CARE

Social Welfare

Patients continue to receive subsidies for dialysis fees and erythropoietin on a case by case basis.

Eighty one patients (46.6%) of the prevalent population received Medifund aid. Two receive civil service benefits.

Dialysis Reviews

Apart from the rounds which are carried out on a monthly basis by the doctors, a yearly dialysis review performed for every patient with the Medical Director, Patient Services Manager or designee and Staff Nurse in charge of the patient.

THE PATIENT POPULATION

As at 31 December 2004, we had 182 patients dialysing in 3 centres – 80 patients at Alexandra Hospital (AH) and 81 patients at Bishan Centre (BS) and 25 patients at Kreta Ayer (SWWT). There was no change in the total number of patients.

INTAKE AND EXITS

The following table shows the intake and exit of patients by year.

Table 1 – Patient Stock & Flow

ENTRY	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
New Cases	32	51	25	18	27	16	10	5	19[+]
Transfers in from SDDU	28	43	1	0	0	0	0	0	0
Re-enter KDF	0	1	1	0	2	1	0	3	0
Total Entries	**60**	**96**	**27**	**18**	**29**	**17**	**10**	**8**	**19**
EXIT									
Transfer Out to Other Programs	1	1	2	7	3	5	2	2	2[#]
Transplant	0	0	4	7	7	2	2	2	3*
Withdraw from Dialysis/Default	0	1	3	1	0	1	1	0	0
Deaths	2	8	3	2	9	4	5	4	6
Total Exits	**3**	**10**	**12**	**17**	**19**	**11**	**10**	**8**	**11**
Total No of Pt	**57**	**143**	**158**	**159**	**169**	**174**	**174**	**174**	**182**

[+] Includes one patient transferred from chronic haemodialysis at SGH, another after failed peritoneal dialysis (peritonitis), a third patient with a failed allograft

[#] Two patients went to CAPD – one after she developed a subarachnoid haemorrhage rendering her non ambulant and the other was an interim patient originally intended for CAPD.

* Two cadaveric transplants and one living related.

.

Table 2 – Source of Referral

	1996	1997	1998	1999	2000	2001	2002	2003	2004
SDDU	28	43	1	0	0	0	0	0	0
SGH	26	45	26	17	25	15	6	5	19
NUH	5	2	0	1	4	2	3	3	0
Private	1	5	0	0	0	0	1	0	0
Total Entries	**60**	**95**	**27**	**18**	**29**	**17**	**10**	**8**	**19**

Priority was given to patients seeking living related transplant. We also supported interim patients meant for the peritoneal dialysis program if they were suitable for satellite dialysis

Nineteen (19) patients were admitted to the programme in 2004. One patient transferred from chronic haemodialysis at SGH, another after failed peritoneal dialysis (peritonitis) another had a had a failed allograft. The rest initiatied dialysis only recently. Of the latter group, three were accepted while awaiting transplant workup for living related transplant. This is a new initiative beginning in 2003 to give low cost dialysis to patients while awaiting a renal transplant. They were accepted for only three months after which they have to be re-considered for extension if the transplant workup was not yet complete or seek permanent placement.

DEMOGRAPHIC & PATIENT CHARACTERISTICS

Etiology of Renal Failure

The etiology of renal failure in new and prevalent patients was as follows:

Table 3 – Etiology of Renal Failure in New Patients

	2000		2001		2002		2003		2004	
Etiology	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***
Chronic glomerulonephritis	16	*55.2*	8	*47.1*	3	*30.0*	5	*62.5*	6	*31.6*
Diabetic nephropathy	5	*17.2*	2	*11.8*	2	*20.0*	0	*0*	7	*36.8*
Lupus nephritis	3	*10.3*	0	*0*	0	*0*	0	*0*	1	*5.3*
Obstructive uropathy	1	*3.5*	0	*0*	1	*10.0*	0	*0*	0	*0*
PCKD	1	*3.5*	1	*5.9*	0	*0*	0	*0*	1	*5.3*
TB kidney	1	*3.5*	0	*0*	0	*0*	1	*12.5*	0	*0*
Others			3	*17.6*	2	*20.0*	2	*25.0*	0	*0*
Unknown Etiology	2	*6.9*	3	*17.6*	2	*20.0*	0	*0.0*	4	*21.1*
Total	29	*100.0*	17	*100.0*	10	*100.0*	8	*100.0*		*100.0*

Table 4 – Etiology of Renal Failure in Prevalent Patients

	2000		2001		2002		2003		2004	
Etiology	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***
Chronic glomerulonephritis	101	*59.8*	102	*58.3*	102	*58.6*	105	*60.3*	103	*56.6*
Diabetic nephropathy	20	*11.8*	21	*12.0*	22	*12.6*	21	*12.1*	27	*14.8*
Lupus nephritis	10	*5.9*	10	*5.7*	10	*5.7*	10	*5.7*	10	*5.5*
Obstructive uropathy	3	*1.8*	3	*1.7*	3	*1.7*	1	*0.6*	1	*0.5*
PCKD	7	*4.1*	8	*4.6*	7	*4.0*	5	*2.9*	5	*2.7*
TB kidney	2	*1.2*	2	*1.1*	1	*0.6*	2	*1.1*	2	*1.1*
VUR	0	*0.0*	2	*1.1*	3	*1.7*	5	*2.9*	5	*2.7*
Others	5	*3.0*	4	*2.3*	5	*2.9*	5	*2.9*	5	*2.7*
Unknown Etiology	21	*12.4*	22	*13.1*	21	*12.1*	20	*11.5*	24	*13.2*
Total	169	*100.0*	174	*100.0*	174	*100*	174	*100*	182	*100*

More patients with diabetes mellitus were taken in (36.8%). This shows the increasing number of ESRD patients caused by diabetic nephropathy.

Majority of patients (56.6%) have chronic glomerulonephritis as the primary etiology of renal failure. Patients with diabetic nephropathy has increased to 14.8% with more diabetics being taken in

Gender

Table 5 – Gender of New Patients

	2000		2001		2002		2003		2004	
Gender	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***	**n**	***%***
Males	18	*62.1*	10	*58.8*	6	*60.0*	4	*50.0*	4	*21.1*
Females	11	*37.9*	7	*41.2*	4	*40.0*	4	*50.0*	15	*78.9*
Total	29	*100.0*	17	*100.0*	10	*100.0*	8	*100.0*	19	*100.0*

Table 6 – Gender of Prevalent Patients

	2000		2001		2002		2003		2004	
Gender	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Males	91	*54.1*	94	*54.3*	92	*52.9*	89	*51.1*	88	48.4
Females	78	*45.9*	80	*45.7*	82	*47.1*	85	*48.9*	94	51.6
Total	169	*100.0*	174	*100.0*	174	*100.0*	174	*100.0*	182	100.0

At the end of 2004, the ratio of male to female patients was 88:94. Males now number less than females.

Ethnic Distribution

Table 7 – Ethnic Distribution of New Patients

	2000		2001		2002		2003		2004	
Race	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Chinese	24	82.8	15	88.2	9	90.0	4	50.0	17	89.5
Malay	1	3.4	2	11.8	1	10.0	4	50.0	1	5.3
Indian	4	13.8	0	0	0	0	0	0	1	5.3
Others	0	0	0	0	0	0	0	0	0	0
Total	29	100.0	17	100.0	10	100.0	8	100.0	19	100.0

Table 8 – Ethnic Distribution of Prevalent Patients

	2000		2001		2002		2003		2004	
Race	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**	**n**	**%**
Chinese	130	76.9	138	79.4	139	79.9	137	78.7	144	79.1
Malay	27	16.0	25	14.3	24	13.8	27	15.5	27	14.8
Indian	12	7.1	11	6.3	11	6.3	10	5.7	11	6.0
Others	0	0	0	0	0	0.0	0	0.0	0	0
Total	169	100.0	174	100.0	174	100.0	174	100.0	182	100.0

The ethnic distribution of our prevalent patients was 79.1% Chinese, 14.8% Malays and 6.0% Indians.

Age

Table 9: Average age of entry into the Programme

The mean age at entry in 2004 was 46.6 $\pm$ 8.8 years.

Year	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Mean Age (years)	43	47.9	37.3	42.3	42.1	43.1	43.4	41.5	46.6
SD	8.2	6.7	9.2	10.0	11	10.6	12.1	7.3	8.8

Table 10: Average age of Prevalent patients on the Programme

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004
Mean Age (years)	44.2	42.8	45.1	46.0	47.2	46.7	47.3	48.1	48.7
SD	7.7	8.2	8.5	8.7	9.5	9.3	9.4	9.3	9.3

Age of the prevalent dialysis population at the end of 2003 was 48.7 $\pm$ 9.3 years. The mean prevalent age continues to rise as the existing population ages with a low turnover.

COMORBIDITY

There were 32 (17.6%) diabetics in the prevalent dialysis population in 2004 compared with 14.4% the previous year.

DEATHS AND WITHDRAWALS

Six patients died. Two were diabetic. Four died from septic complications, one from cerebrovascular accident while one was from a cardiac cause.

Three patients left the programme after transplantation (two cadaveric and one living related).

SURVIVAL

Patient survival was analysed by the Kaplan Meier method. There was a total of 265 entries (including 8 re-entries) into the programme.

Overall first year survival was 95.2% and 5 year survival 83.3%.

Table 11 – Survival of entire program as analysed in years 1997 - 2004

Survival Yr of analysis	1997	1998	1999	2000	2001	2002	2003	2004
1 yr	89%	91%	95%	94.4%	94.9%	94.8%	94.9%	95.2%
2 yr	NA	88%	92%	90.6%	91.5%	91.6%	91.9%	92.3%
3 yr	NA	NA	91%	88.6%	89.7%	90.0%	89.8%	90.4%
4 yr	NA	NA	NA	88.6%	88.9%	87.2%	87.9%	87.6%
5 yr	NA	NA	NA	NA	83.4%	82.5%	83.0%	83.3%

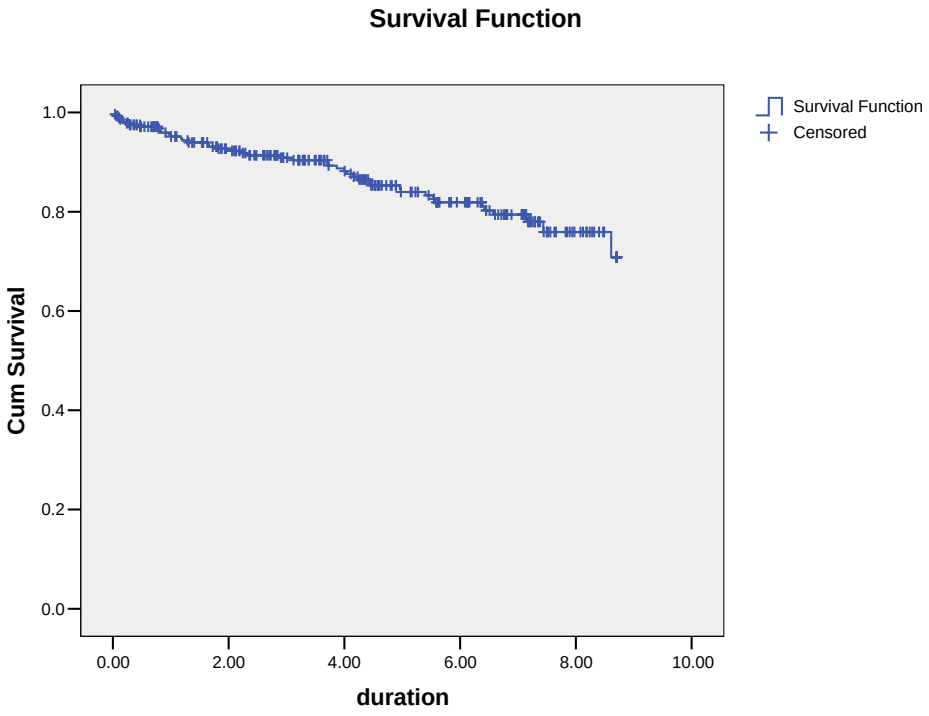
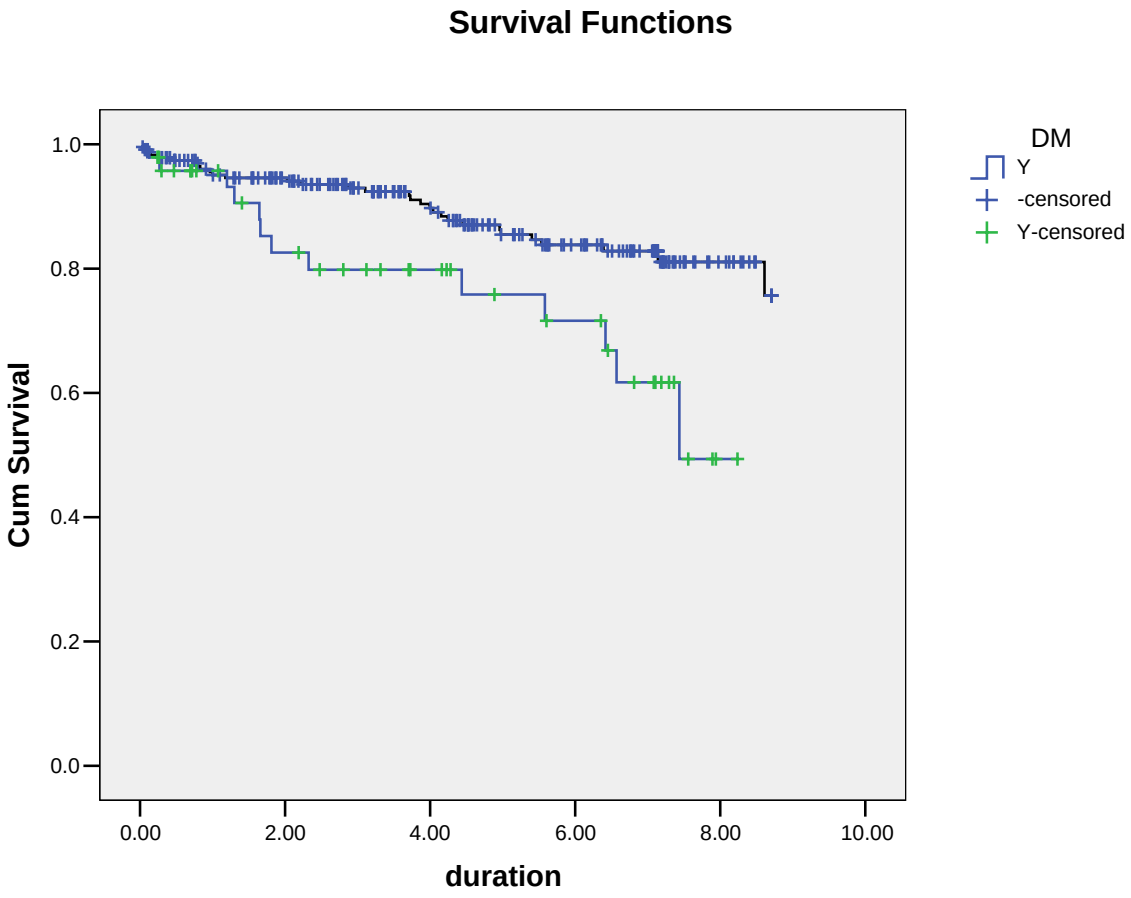


Fig 1: Patient Survival

Table 12 - **Survival Difference between Diabetics and Non diabetics 1996- 2004**

Survival	Non-DM	DM
1 yr	95.1%	93.2%
2 yr	94.1%	79.8%
3 yr	92.4%	75.8%
4 yr	89.1%	75.8%
5 yr	84.6%	71.6%



As expected, Diabetics have worse survival than non diabetics.

DIALYSIS PARAMETERS

All patients are on high flux dialyzers, majority being made up of Fresenius Polysulfone membrane unless a larger dialyzer size is required. Maximum reuse is 15 times. There are separate reuse facilities for Hepatitis B and HCV positive dialyzers in Bishan while in AH, dialysers used by HepB positive patients are not reused.

Table 13: Types of Dialyzers used

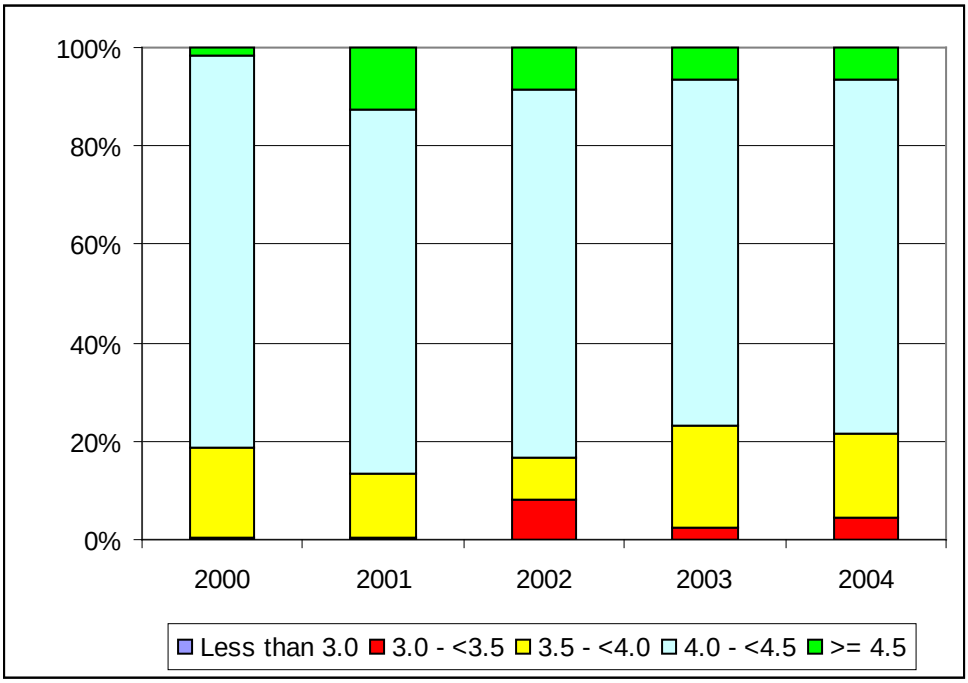
	2001		2002		2003		2003		2004	
	n	**%**	**n**	**%**	**N**	**%**	**n**	**%**	**n**	**%**
F6	2	1.20%	0	0	2	1.20%	0	0		
F7	1	0.60%	1	0.6	1	0.60%	1	0.6	0	0.0%
HF50	14	8.10%	17	9.8	14	8.10%	17	9.8	10	5.5%
HF60	96	55.50%	92	53.2	96	55.50%	92	53.2	54	29.7%
HF80	49	28.30%	47	27.2	49	28.30%	47	27.2	30	16.5%
HF100	2	1.20%	7	4	2	1.20%	7	4	7	3.8%
POLYFLUX11									7	3.8%
POLYFLUX14									39	21.4%
POLYFLUX17									23	12.6%
POLYFLUX21	7	5.20%	9	5.2	7	5.20%	9	5.2	11	6.0%
FB210U									1	0.6%
TOTAL	171		173		171		173		182	

Table 14: Average Blood flow Used (ml/min)

ml/min	**2000**	**2001**	**2002**	**2003**	**2004**
Mean	264	274	281	280	278
Std Dev	29	30	33	35	33
Min	133	200	200	208	208
Max	323	350	353	364	364

Blood flow is set at a minimum of 200 ml/min averaging 280 ± 35 ml/min range (190-380).

Figure 2: Dialysis Time Per Session



Most patients (78.6%) dialyze for 4 hours or more.

DIALYZER REUSE

Maximum reuse is 15 times. All three centres use the Renatron System. There are separate reuse facilities for washing of dialyzers used by Hepatitis B and HCV positive patients in Bishan while in AH, dialysers used by HepB positive patients are not reused. There are no hepatitis positive patients in SWWT centre.

DIALYSIS ADEQUACY

This assessment is performed every 2 months using a pre and post blood urea performed on a midweek dialysis session to calculate the single pool KT/V as follows:

$$KT/V = -\ln (R - 0.03) + (4 - 3.5 \times R) \times UF/W$$

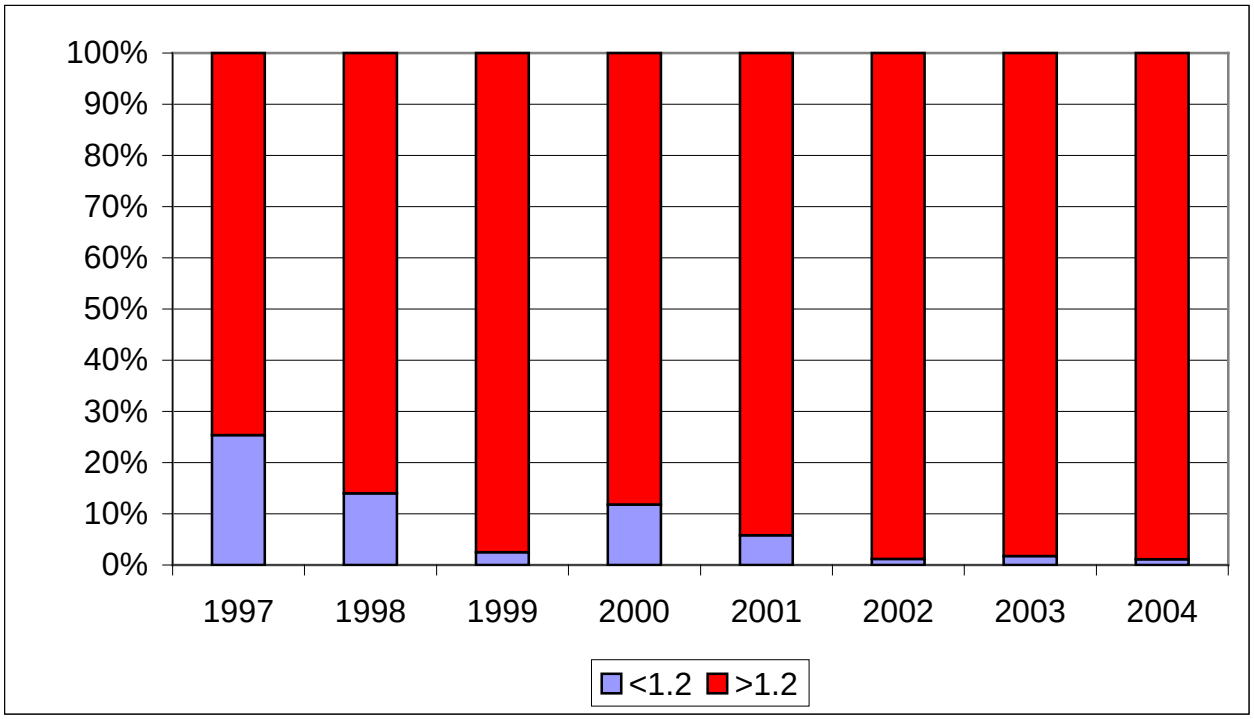
where R = post/pre urea
UF = ultrafiltration in litres
W = post dialysis weight

The formula used is that adapted from “Handbook of Dialysis” Ed JT Daugirdas & TS Ing.

Our patients weighed 57.5 ± 14.3 kg (range 30.0 – 113.0 kg).

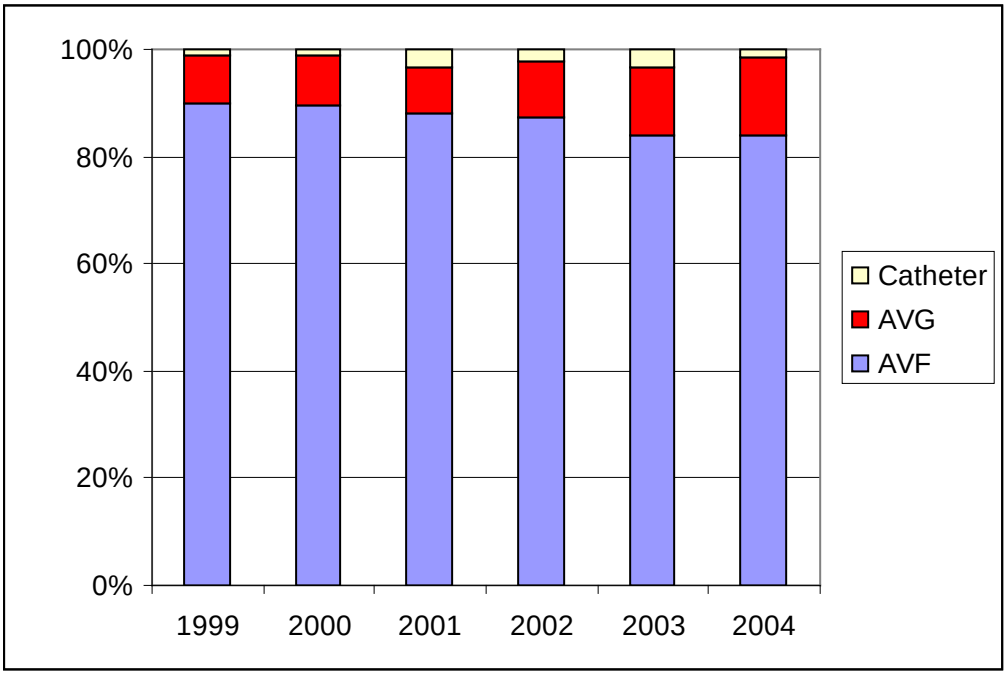
Majority of our patients (98.9 %) had a KT/V of 1.2 or greater in November / December 2004.

Fig 4: Percentage with KT/V index > 1.2



VASCULAR ACCESS

Fig 3: Vascular Access



Twenty six patients or 14.4 % (26/182) were using grafts for vascular access. 1.7% were on catheters. The rest were using AV fistulae (84.5%).

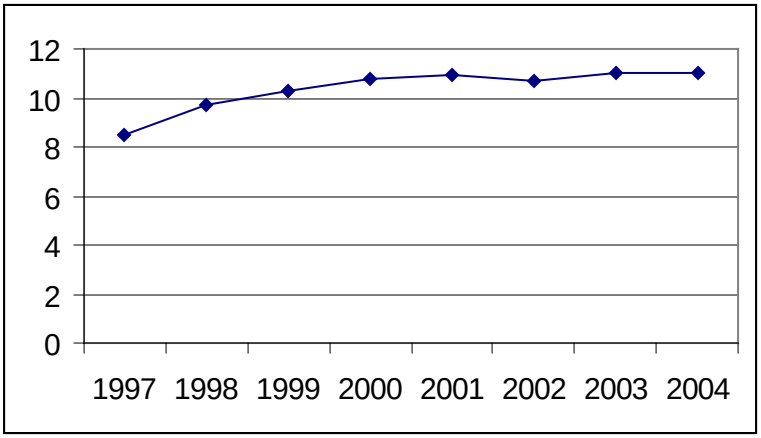
We continue to use the Transonic machine for monitoring the access flows and recirculation in the vascular access. This performed every 6 months unless the flows are below 600 ml/min. Very few of our patients had significant recirculation.

Any recirculation above 10% or persistently low access flow with reduction of 25% below the previous reading was referred back to the surgeon.

ANAEMIA

The mean Hb was calculated to be 11.0 ± 1.9 g/dl same as the previous year. This has been stable over the past few years. The percentage of patients with a haemoglobin count of less than 10 g/dl has dropped to 28.2%.

Fig: 5: Average Hemoglobin



ERYTHROPOIETIN

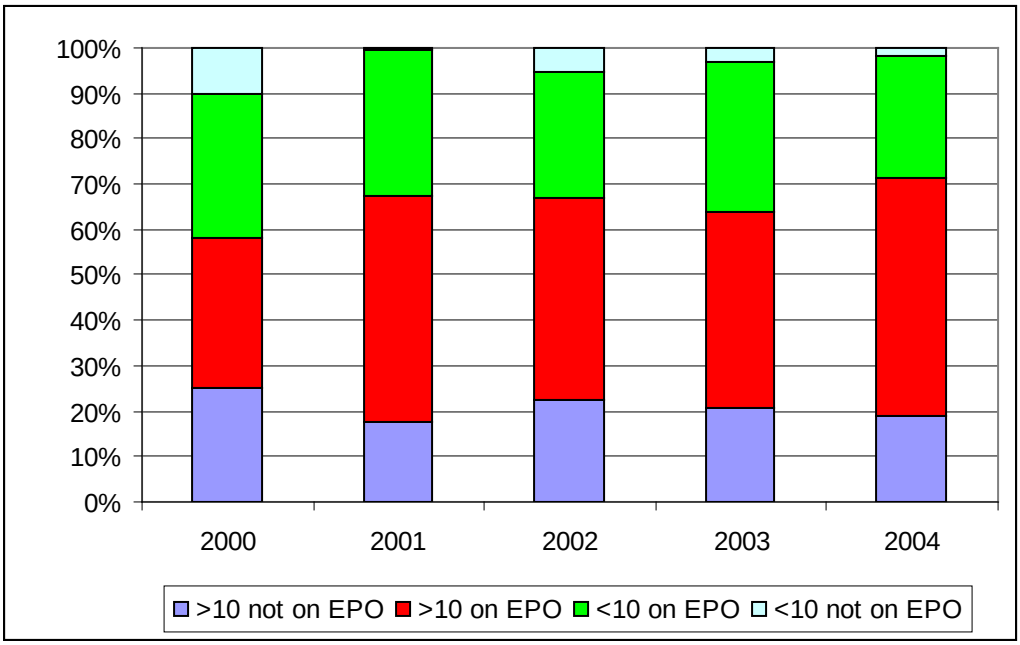
Patients are advised to start erythropoietin when their Hb falls below 10 g/dl. Target Hb while on erythropoietin is 12 g/dl. Eighty percent (80) % of patients are on erythropoietin up from 76% from the previous year. The cost of erythropoietin is Medishield claimable if the patient is eligible. In addition, patients are also eligible to apply for the Foundation's subsidy programme. There is no cap on the erythropoietin subsidy. Of the remaining patients not on EPO, 19% have a Hb of > 10 g/dl

Patients on EPO used on the average 86 ± 63 units/kg body weight per week

Because of the possibility of pure red cell aplasia from erythropoietin administration, all erythropoetin is now administered by the intravenous route.

Alexandra Centre and Kreta Ayer Centre use Eprex while Bishan Centre uses Recormon.

Fig 6: Use of Erythropoietin



IRON STATUS

Fig 7: Transferrin Saturation

	1999	2000	2001	2002	2003	2004
Mean (%)	NA	37.4	37.3	40.3	39.0	37.4
SD	NA	16.2	16.3	15.9	13.9	14.8
% TFSat <20%	15.1	8.8	9.2	7.5	6.5	6.6
Average HB when TFSat<20%	9.5	10.7	10.5	10.4	10.2	11.2
% TFSat >20%	84.9	91.2	90.8	92.5	93.5	93.4
Average HB when TFSat>20%	10.4	10.8	11.0	10.7	11.0	11

As at the end of 2004, mean transferrin saturation was 37.4 $\pm$ 14.8 % (range 5 – 91.2). The proportion of patients with transferrin saturation of less than 20% is not stable at 6-7%, latest 6.6%. Only 2 out of 12 patients (16.7%) in this iron deficient group had a Hb of less than 10 g/dl. Their average Hb was 11.2 g/dl as opposed to 11.0 g/dl for those whose transferrin saturation was greater or equal to 20%.

Fourteen patients used intravenous iron (Venofer) in 2004.

NUTRITION

Mean S Albumin was 36.9 ± 3.5 g/l. The number of patients with Serum albumin less than 40 g/dl increased to 81.8% from 80.6%.

This could be related to the number of new patient taken in who have poor albumin values.

Table 15: Normalised Protein Catabolic Rate and S Albumin

	1999	2000	2001	2002	2003	2004
NPCR (g/kgBW)						
• Mean ± SD	1.1 ± 0.2	1.12 ± 0.23	1.14 ± 0.24	1.13 ± 0.23	1.14 ± 0.23	1.13 ± 0.23
• % < 1.2	70.0	62.9	63.6	63.6	62.6	63.5
S Albumin (g/l)						
• Mean ± SD	37.8 ± 3.3	37.5 ± 3.6	35.7 ± 3.5	36.9 ± 3.1	36.9 ± 3.1	36.9 ± 3.5
• % <40	71.7	73.5	87.9	81.5	80.6	81.8
• % <35	9.0	14.1	31.6	19.7	22.9	21.0

RENAL BONE DISEASE

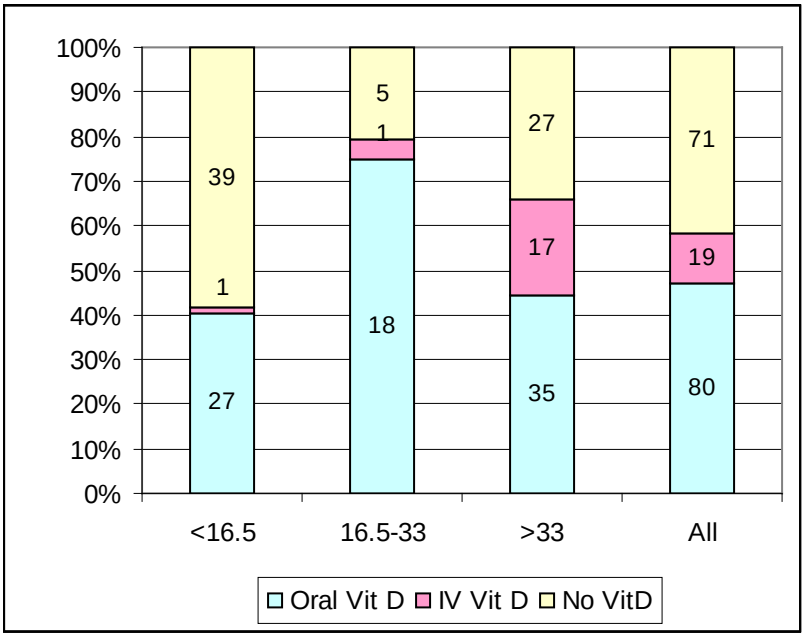
The new KDOQI guidelines (AJKD Vol 42 October 2003 Suppl 3) recommends treatment for patients on dialysis (CKD Stage 5) when iPTH exceed 33 pmol/ l should be treated with Vit D analogs to main the PTH at 16.5-33 pmol/l.

Table 15: PTH levels

	2003	%
<16.5	67	39.4
16.5-33	24	14.1
>33.0	79	46.4
Total	170	100.0

Just under half (46.6%) the patients have intact parathyroid hormone levels elevated beyond 33 pmol/l. This reflects significant hyperparathyroidism and bone disease in half the dialysis population.

Fig 7: Parathyroid Hormone levels and Vit D Treatment



K/DOQI now aims for a PTH level of 16.5 – 33 pmol/l. The percentage of patients with PTH>33 pmol/l being treated with Vit D was 65.8 % (52/79). Those who were not treated (27/79) had either high phosphate values or hypercalcemia. 21.5% in this group (17/79) were on invtravenous calcitriol.

More patients (13.7%) have had parathyroidectomy performed of which 5 were done in 2004..

Table 16 Serum Phosphate levels

	1999	2000	2001	2002	2003	2004
Mean S PO4 (mmol/L)	1.81	1.84	1.83	1.85	1.92	1.89
SD	0.6	0.53	0.52	0.47	0.53	0.49
% with S PO4 >2.0 mmol/l	NA	36.4	37.9	31.8	42.4	38.1

Mean S Phosphate was 1.89 $\pm$ 0.49 mmol/l lower than the previous year. 38.1% of patients have values above 2.0 mmol/l.

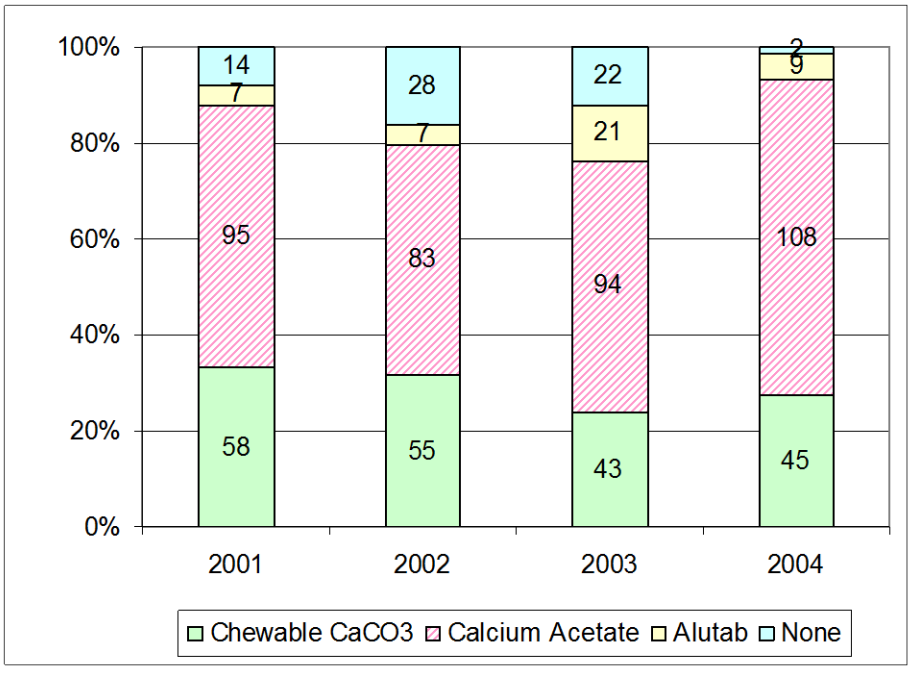


Table 17 Serum Calcium levels

	1999	2000	2001	2002	2003	2004
Mean S Calcium (mmol/L)	2.59	2.59	2.53	2.54	2.56	2.48
SD	0.2	0.2	0.21	0.21	0.19	0.23

The mean calcium value is now lower - 2.48 $\pm$ 0.23 mmol/l. Low calcium dialysate is currently in use for 64.3% of patients.

HEPATITIS SEROPOSITIVITY

7.5% (13/174) are hepatitis B carriers. Twenty three patients (13.2%) are serologically positive for Hepatitis C antibody. One was HCV PCR negative. Another three had received interferon tratment and had become PCR negative. There were 4 patients are serologically positive for both hepatitis B and C positive one of whom was HCV PCR negative. Two seroconversions were noted in 2003. Both patients became positive after their pilgrimage to Mecca.

Table 18: Hepatitis Rates

	1997	1998	1999	2000	2001	2002	2003	2004
HepB	9.8%	6.7%	6.9%	5.8%	5.7%	5.7%	7.5%	5.5%
HCV	9.80%	10.10%	9.40%	9.40%	9.70%	9.20%	11.5%	10.9%
HepB & HCV	1.40%	2%	1.90%	1.20%	1.10%	1.10%	1.7%	1.6%

DIABETICS

The prevalent number of diabetic patients has increased to 32 (17.6%) more than last year with a higher intake of diabetics. This contrasts with the national figure of about 9%.

HYPERTENSION

57.5% (100/174) have recorded high blood pressures or have their blood pressures controlled with anti-hypertensive agents. This is slightly lower than the previous year's percentage.

Table 19 : Use of Antihypertensive Agents by number of Drugs

	2003	**2004**
None	42.5%	30.8
1 Drug	30.5%	29.1
2 Drugs	18.4%	17.6
3 Drugs	8.0%	7.7
4 drugs	0.6%	3.8
	100.0%	100.0

Approximately 30% of the patients were not on antihypertensives and another 30% on one drug only.

Calcium channel blockers and beta blockers were the most common types of antihypertensives used.

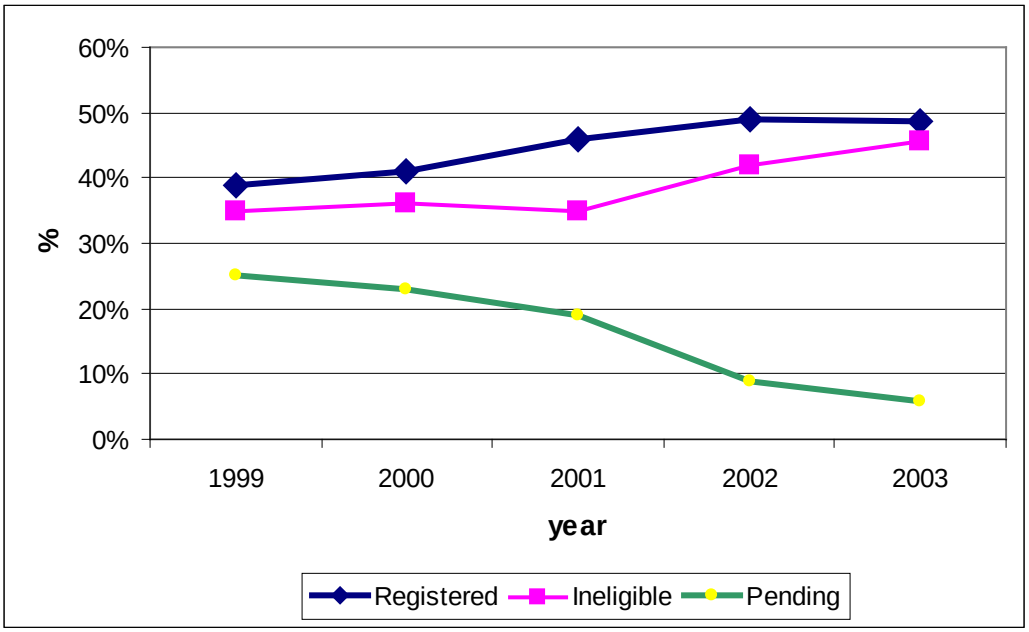
Table 20 : Use of Antihypertensive Agents by Drug Type

	2002	2003	2004
None	41.2%	41.6%	42.5%
Beta blockers			31.6%
Calcium channel Blockers			29.3%
ACEI / ARB			25.3%
Others			7.7%
Total			100.0%

TRANSPLANT WAITING LIST

Eighty five patients (46%) are on the waiting list. Less patients remain unassessed for transplant but more patients were deemed in eligible than the previous year.

Figure 10: Proportion of patients on the Transplant Waiting List



CONCLUSION

The following year will see our patients housed in only 2 centres.

KDF Haemodialysis Centres complement other renal replacement therapies by offering bridging dialysis to those awaiting peritoneal dialysis or transplantation.

Patients with more comorbidities are expected with the revision of criteria for low dependency dialysis.

We would like to thank all those who participated in the care of the patients.

DR CHOONG HUI LIN
MEDICAL DIRECTOR