

KIDNEY DIALYSIS FOUNDATION

ANNUAL REPORT

MEDICAL

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1. 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. The Alexandra Hospital centre closed down in April 2005 with patients transferred to the other two centres.

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 2005, there were 11 new entrants.

Twenty patients exited the programme (6 transplants, 5 deaths, 9 transfers). Of the 9 who transferred, 5 were interim patients awaiting start of peritoneal dialysis with KDF. In the prevalent population, average age was the number of patients with chronic glomerulonephritis as the etiology of renal failure was 58.4%, diabetic nephropathy 16.8%. Mean age of prevalent patients was 50.1 ± 9.3 years whilst the average age on entry was 52.7 ± 15.1 years. Overall first year survival of patients was 95.4% and five year survival 84.5%. 5 year survival in diabetics was 75.4% compared with 86.3% in non diabetics.

All patients are using high flux dialysers. Average blood flow was 276 ± 36 ml/min. 75.1% of patients dialyse 4 hours or more. 81.5% of patients use a native arteriovenous fistula. Dialysis adequacy as measured by single pool KT/V is >1.2 in 96.5% of patients.

Mean hemoglobin is now 10.9 g/dl. About 79.2% of all patients are on EPO. Less than 10% of patients (9.2%) are considered Fe deficient.

Lesser patients (72.3%) have a S Albumin of <40 g/l. Hyperparathyroidism and hyper-phosphatemia remains a problem. More patients are on intravenous Vitamin D.

Diabetes as a comorbidity was present in 19.1% of the population. 61.3% were on treatment for hypertension. Lipid profiles are improving with more having reached target values.

There was no significant changes in virology status. Hep B positivity was 5.2%, HCV 9.8%, HepB and HCV 1.7%.

Less patients were registered on the National Transplant waiting list (37%), likely due to more patients having comorbidities in an aging population.

2. 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 5 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.

KDF's first Peritoneal Dialysis Centre is also located at the Kreta Ayer Centre and was renovated with generous donations from the Khoo Foundation and Singapore Pools Pte Ltd. The Khoo Foundation also continues to contribute to the deficit funding of the Centre. The PD Centre obtained its license on 7 May 2003 but because of the SARS outbreak, it only became operational on 1 July 2003 when it accepted its first patient. The dialysis service is contracted out to a dialysis provider and the current provider is Baxter Healthcare Pte Ltd.

In January 2005, KDF was informed of the decision by Alexandra that the lease for the premises on which the dialysis centre was situated will not be renewed. The last day of operation was on 25 April 2005.

Dialysis medical care is provided by a team of 16 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 (Senior Executive, Patient Services) and Ms Aton Din (Nurse Educator). Dietetic counseling was provided for under the contract with the dialysis providers. The dieticians assigned were

Ms Pauline Chan and Emily Teo by Asia Renalcare and Ms Liow Min Choo by Fresenius Medical Care.

This report covers medical data collated at the end of 2005.

3. THE DIALYSIS CENTRES

The location and prevalent number of patients are listed below:

	Centre	Location	Patient No
1	Alexandra Hospital (ceased operation April 2005)	378, Alexandra Road, Alexandra Hospital, Level 2 Canteen Block	Nil
2	KDF-Bishan Centre	Block 197, Bishan Street 13 #01-575/583	94
3	San Wang Wu Ti - KDF Centre	Block 333, Kreta Ayer Road #03-33	79
4	KDF-Peritoneal Dialysis Centre	Block 333, Kreta Ayer Road #03-33	75

All haemodialysis 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 operating 3 shifts per day only from 4 April 2005.

ALEXANDRA HOSPITAL

The last day of operation of this centre was 25 April 2005. The existing patients were transferred to the other two remaining centres. Sixty (60) patients went to SWWT Kreta Ayer while 15 patients went to Bishan Centre.

BISHAN

This centre operated on three shifts from July 1998. The number of stations increased from the initial 15 to 20 in January 2003.

KRETA AYER – SAN WANG WU TI

The haemodialysis centre was operational from April 2003 to accommodate outpatients from the Singapore General Hospital who dialysed there for 3 months (29 April to 28 July 2003) during the SARS crisis.

With Fresenius Medical Care as the dialysis provider, the Kreta Ayer centre started taking patients from 1st September 2003. It initially had 8 patients who were transferred from Alexandra centre.

PERITONEAL DIALYSIS CENTRE

The Peritoneal Dialysis centre is located at the Kreta Ayer Centre and was opened on 1 July 2003. Two nurses run the PD Centre and also provide home visits. The current dialysis provider is Baxter Healthcare Pte Ltd. There were 75 patients on the programme as of 31 Dec 2005.

FUTURE PLANS

KDF hopes to start another haemodialysis centre to replace the Alexandra Hospital centre. Few sites have been suggested and a decision will be taken later in the year.

HAEMODIALYSIS PROGRAMME

4. STAFFING

MEDICAL

The medical staff comprises a pool of 16 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 (until Mar 05)
3. Dr Stephen Chew
4. A/Prof Lina Choong
5. Dr Marjorie Foo
6. Dr Ho Chee Khun
7. Dr Terence Kee (from June 05)
8. Dr Fred Lam (until Dec 05)
9. Dr Titus Lau
10. Dr Grace Lee
11. Dr Pary Sivaraman
12. Dr Pwee Hock Swee
13. Dr Tan Han Khim
14. Dr Tan Seng Hoe
15. Dr Yeoh Lee Ying
16. A/Prof A. Vathsala

Urgent medical cover was arranged as follows:

Alexandra Hospital:

Accident and Emergency department of AH

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 (Patient Services, Senior Executive) and Aton Din (Nurse Educator). Routine audits are performed on the provider to maintain standards. The Dialysis Providers are:

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

The current contract for Bishan Centre was effective from 1st March 2001 for five years and will be up for renewal in 2006.

The Dialysis Provider is responsible for rostering of the nursing personnel as at 31 Dec 2005 is listed as follows:

Centre	Renal trained	SN	AN	DT	Total
Bishan	2	8	1	5	16
SWWT	2	6	7	2	17
Grand total					33

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.

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 and Emily Teo at Bishan Dialysis Centre and Ms Liow Min Choo by Fresenius Medical Care at SWWT Dialysis Centre.

5. EQUIPMENT

DIALYSIS MACHINES

There are in total 40 dialysis machines.

These were located as follows:

	Baxter 1550	Baxter Tina	Fresenius 4008S
Bishan	5	11	7
Kreta Ayer	0	0	17

When Alexandra closed down, its 19 Baxter and 5 Gambro machines were condemned.

In March 2005, 12 Baxter 1550 machines in Bishan were replaced with 11 Baxter Tina machines. One Fresenius 4008S machine transferred from Alexandra Hospital

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 Pte Ltd.

Both centres use the Reverse Osmosis System. Pretreatment comprises of backwashable multimedia, activated carbon filter, regenerable water softener and pre cartridge filter before entering the RO membranes via high pressure pumps to allow reverse osmosis to take place. This removes most of the dissolved solids from the feed water. The product water then passes through 0.2 micron filter to be distributed to the dialysis stations. The distribution piping is a closed loop system.

At the end of each dialysis day the system undergoes auto-washing and flushing before going onto standby mode.

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.

There were 3 Renatron machines in Alexandra Hospital. Two were condemned when the centre closed down while the machine purchased in 1998 was transferred to SWWT centre to cater to hepatitis C cases. There are in total 6 Renatron machines in the two centres (three each).

The dialyzer reprocessing management software was upgraded to Renalog Reprocessing Management (RM) in September 2005 for Bishan centre.

The Renalog RM dialyzer reprocessing management software is a window-based system that provides capabilities to analyze and manage automatic and manual dialyzer reuse operations. Renalog RM is able to provide different standard or specific reports that can be printed, viewed and exported to editable file formats.

6. PATIENT CARE

Social Welfare

Patients continue to receive subsidies for dialysis fees and erythropoietin on a case by case basis. Calcijex was subsidise more recently, in April 2005,

Eighty one patients (46.6%) of the prevalent haemodialysis population received Medifund aid. Five received 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.

7. THE PATIENT POPULATION

As at 31 December 2005, we had 173 patients dialysing in 2 centres – 94 patients at Bishan Centre (BS) and 79 patients at Kreta Ayer (SWWT).

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	2005
New Cases	32	51	25	18	27	16	10	5	18 ⁺	5
New Cases (interim)									1	6
Transfers in from SDDU	28	43	1	0	0	0	0	0	0	0
Re-enter KDF	0	1	1	0	2	1	0	3	0	0
Total Entries	60	96	27	18	29	17	10	8	19	11
EXIT										
Transfer Out to non-KDF Programs	1	1	2	7	3	5	2	2	2 [#]	3
Transfer Out to KDF PD										5
Transplant	0	0	4	7	7	2	2	2	3 [*]	6
Withdraw from Dialysis/Default	0	1	3	1	0	1	1	0	0	1
Deaths	2	8	3	2	9	4	5	4	6	5
Total Exits	3	10	12	17	19	11	10	8	11	20
Total No of Pt	57	143	158	159	169	174	174	174	182	173

[#] Four patients went to CAPD – interim patients awaiting PD 3, vascular access problems 1.

^{*} Local deceased donor 2, overseas deceased donor 2 and living related transplants, 2.

Table 2 – Source of Referral

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SDDU	28	43	1	0	0	0	0	0	0	0
SGH	26	45	26	17	25	15	6	5	19	8
NUH	5	2	0	1	4	2	3	3	0	0
TTSH										2
Private	1	5	0	0	0	0	1	0	0	1
Total Entries	60	95	27	18	29	17	10	8	19	11

We supported patients on interim hemodialysis while awaiting living related transplant as well as patients waiting to enter the KDF Peritoneal Dialysis program as long as they were suitable for satellite dialysis

Eleven (11) patients were admitted to the programme in 2005: one failed peritoneal dialysis (peritonitis) another had a failed allograft. The rest initiated dialysis only recently. Of the latter group, three were accepted while awaiting transplant workup for living related transplant. The other three had interim hemodialysis while awaiting peritoneal dialysis.

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

Etiology	2001		2002		2003		2004		2005	
	n	%	n	%	n	%	n	%	n	%
Chronic glomerulonephritis	8	47.1	3	30.0	5	62.5	6	31.6	1	9.1
Diabetic nephropathy	2	11.8	2	20.0	0	0	7	36.8	6	54.5
Lupus nephritis	0	0	0	0	0	0	1	5.3	1	9.1
Obstructive uropathy	0	0	1	10.0	0	0	0	0	0	0
PCKD	1	5.9	0	0	0	0	1	5.3	1	9.1
TB kidney	0	0	0	0	1	12.5	0	0	0	0
Others	3	17.6	2	20.0	2	25.0	0	0	2	18.2
Unknown Etiology	3	17.6	2	20.0	0	0.0	4	21.1	0	0
Total	17	100.0	10	100.0	8	100.0	19	100.0	11	100.0

Patients with diabetes mellitus now form the majority of new cases (54.5%).

Table 4 – Etiology of Renal Failure in Prevalent Patients

Etiology	2001		2002		2003		2004		2005	
	n	%	n	%	n	%	n	%	n	%
Chronic glomerulonephritis	102	58.3	102	58.6	105	60.3	103	56.6	101	58.4
Diabetic nephropathy	21	12.0	22	12.6	21	12.1	27	14.8	29	16.8
Lupus nephritis	10	5.7	10	5.7	10	5.7	10	5.5	10	5.8
Obstructive uropathy	3	1.7	3	1.7	1	0.6	1	0.5	1	0.6
PCKD	8	4.6	7	4.0	5	2.9	5	2.7	4	2.3
TB kidney	2	1.1	1	0.6	2	1.1	2	1.1	2	1.2
VUR	2	1.1	3	1.7	5	2.9	5	2.7	3	1.7
Others	4	2.3	5	2.9	5	2.9	5	2.7	2	1.2
Unknown Etiology	22	13.1	21	12.1	20	11.5	24	13.2	21	12.1
Total	174	100.0	174	100	174	100	182	100	173	100

Majority of patients (58.4%) have chronic glomerulonephritis as the primary etiology of renal failure. Patients with diabetic nephropathy has increased to 16.8%.

Gender

Table 5 – Gender of New Patients

Gender	2001		2002		2003		2004		2005	
	n	%	n	%	N	%	N	%	n	%
Males	10	58.8	6	60.0	4	50.0	4	21.1	6	54.5
Females	7	41.2	4	40.0	4	50.0	15	78.9	5	45.4
Total	17	100.0	10	100.0	8	100.0	19	100.0	11	100.0

Table 6 – Gender of Prevalent Patients

Gender	2001		2002		2003		2004		2005	
	n	%	n	%	n	%	N	%		
Males	94	54.3	92	52.9	89	51.1	88	48.4	83	48.0
Females	80	45.7	82	47.1	85	48.9	94	51.6	90	52.0
Total	174	100.0	174	100.0	174	100.0	182	100.0	173	100

At the end of 2004, the ratio of male to female patients was 83:90. Males now number less than females.

Ethnic Distribution

Table 7 – Ethnic Distribution of New Patients

Race	2001		2002		2003		2004		2005	
	n	%	n	%	n	%	n	%	n	%
Chinese	15	88.2	9	90.0	4	50.0	17	89.5	10	90.9
Malay	2	11.8	1	10.0	4	50.0	1	5.3	1	9.1
Indian	0	0	0	0	0	0	1	5.3	0	0
Others	0	0	0	0	0	0	0	0	0	0
Total	17	100.0	10	100.0	8	100.0	19	100.0	11	100.0

Table 8 – Ethnic Distribution of Prevalent Patients

Race	2001		2002		2003		2004		2005	
	n	%	n	%	n	%	n	%	n	%
Chinese	138	79.4	139	79.9	137	78.7	144	79.1	134	77.5
Malay	25	14.3	24	13.8	27	15.5	27	14.8	28	16.2
Indian	11	6.3	11	6.3	10	5.7	11	6.0	11	6.4
Others	0	0	0	0.0	0	0.0	0	0	0	0
Total	174	100.0	174	100.0	174	100.0	182	100.0	173	100.0

The ethnic distribution of our prevalent patients was 77.5% Chinese, 16.2% Malays and 6.4% Indians.

Age

Table 9: Average age of entry into the Programme

The mean age at entry in 2005 was 52.7 ± 15.1 years. This is probably influenced by the patients going to PD, two of which were older than 60 years.

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Mean Age (years)	43	47.9	37.3	42.3	42.1	43.1	43.4	41.5	46.6	52.7
SD	8.2	6.7	9.2	10.0	11	10.6	12.1	7.3	8.8	15.1

Table 10: Average age of Prevalent patients on the Programme

Year	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Mean Age (years)	44.2	42.8	45.1	46.0	47.2	46.7	47.3	48.1	48.7	50.1
SD	7.7	8.2	8.5	8.7	9.5	9.3	9.4	9.3	9.3	9.3

Age of the prevalent dialysis population at the end of 2005 was 50.1 \pm 9.3 years. The mean prevalent age continues to rise as the existing population ages with a low turnover.

COMORBIDITY

There were 36 (20.8%) diabetics in the prevalent dialysis population in 2005 compared with 17.6% the previous year.

Thirty (30, 17.3%) have cardiac disease (ischemic heart disease or other cardiac problems)

DEATHS AND WITHDRAWALS

Twenty patients left the programme.

These included five deaths (two from acute myocardial infarction, one from septicaemia and two whose cause was listed as endstage renal failure), five patients who were on interim haemodialysis while awaiting start of peritoneal dialysis or living related transplantation, three to other programmes, six were transplanted while one went on conservative management after a cerebrovascular accident.

SURVIVAL

Patient survival was analysed by the Kaplan Meier method. There was a total of 295 entries (including 8 re-entries) into the programme.

Overall first year survival was 95.4% and 5 year survival 84.5%.

Table 11 – Survival of entire program as analysed in years 1997 - 2005

Yr of analysis	1997	1998	1999	2000	2001	2002	2003	2004	2005
1 yr	89%	91%	95%	94.4%	94.9%	94.8%	94.9%	95.2%	95.4%
2 yr	NA	88%	92%	90.6%	91.5%	91.6%	91.9%	92.3%	93.0%
3 yr	NA	NA	91%	88.6%	89.7%	90.0%	89.8%	90.4%	91.3%
4 yr	NA	NA	NA	88.6%	88.9%	87.2%	87.9%	87.6%	88.3%
5 yr	NA	NA	NA	NA	83.4%	82.5%	83.0%	83.3%	84.5%

Fig 1: Overall Patient Survival

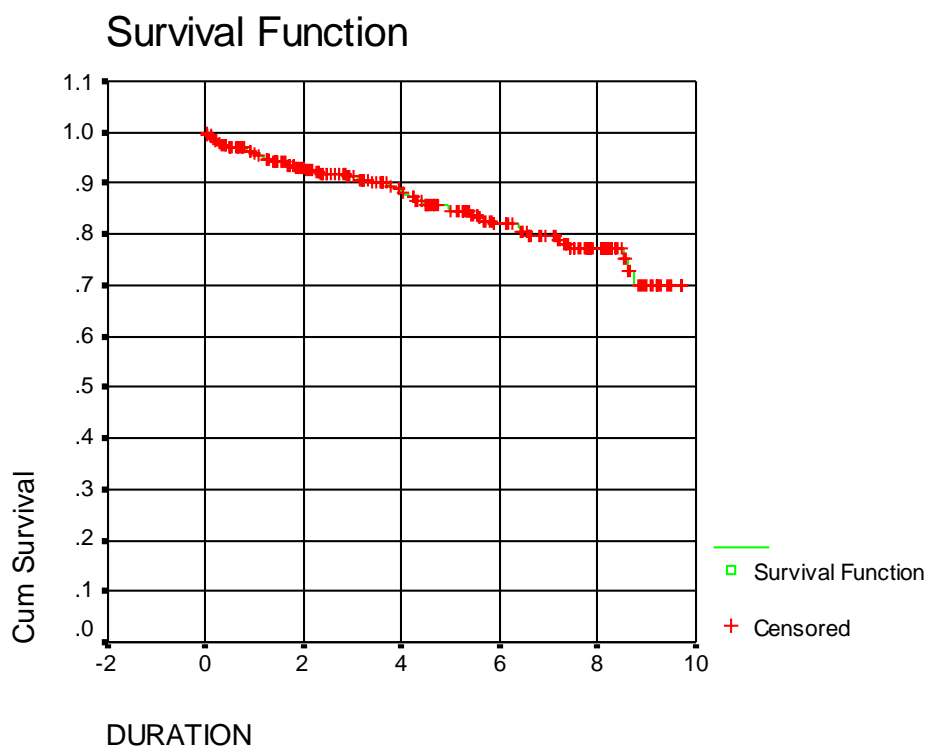
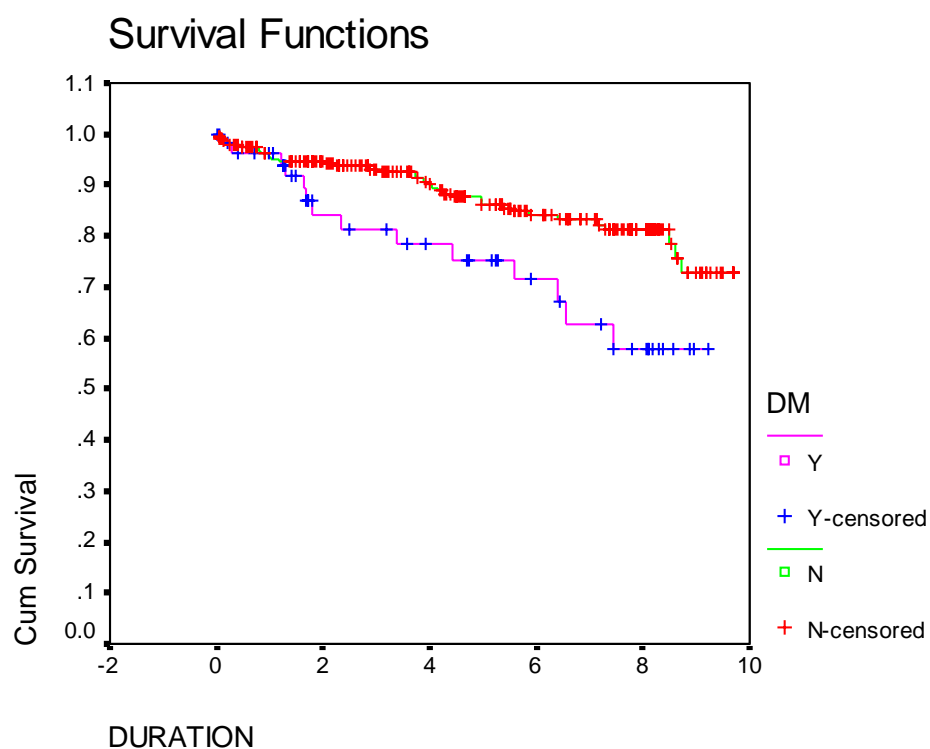


Table 12 - Survival Difference between Diabetics and Non diabetics 1996- 2005

Survival	Non-DM	DM
1 yr	95.2%	96.1%
2 yr	94.7%	84.2%
3 yr	93.2%	81.4%
4 yr	90.1%	75.8%
5 yr	86.3%	75.4%

As expected, diabetics have worse survival than non diabetics.

Fig 2: Patient Survival – Diabetic vs Non Diabetic



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

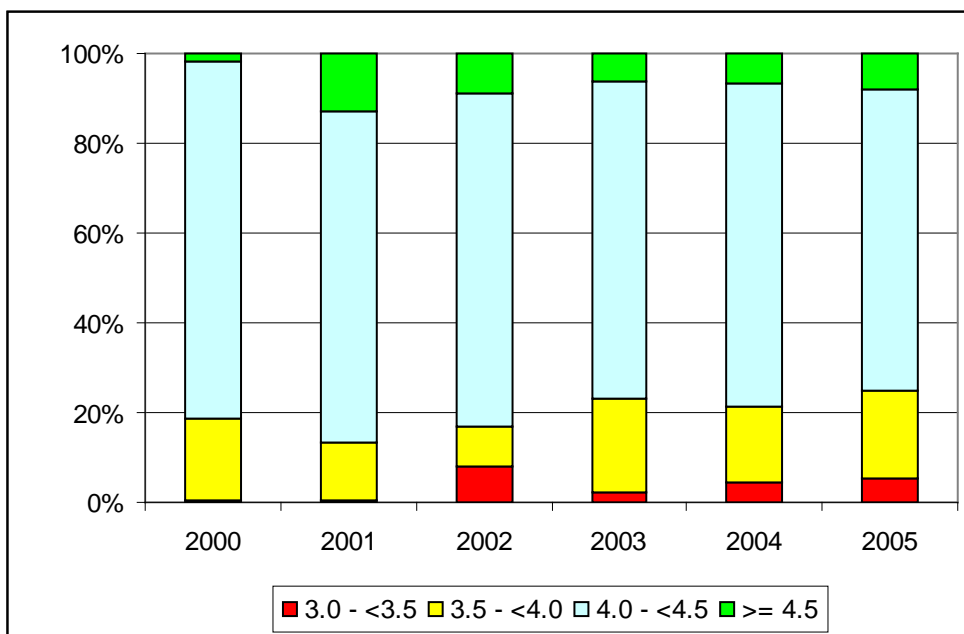
	2002		2003		2003		2004		2005	
	n	%	N	%	n	%	n	%	n	%
F6	0	0	2	1.2	0	0			2	1.20
F7	1	0.6	1	0.6	1	0.6	0	0.0	0	0
HF50	17	9.8	14	8.1	17	9.8	10	5.5	10	5.8
HF60	92	53.2	96	55.5	92	53.2	54	29.7	44	25.4
HF80	47	27.2	49	28.3	47	27.2	30	16.5	18	10.4
HF100	7	4	2	1.2	7	4	7	3.8	7	4.0
POLYFLUX11							7	3.8		
POLYFLUX14							39	21.4	48	27.7
POLYFLUX17							23	12.6	26	15.0
POLYFLUX21	9	5.2	7	5.2	9	5.2	11	6.0	17	9.8
FB210U							1	0.6	1	0.6
TOTAL	173		171		173		182		173	

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

ml/min	2000	2001	2002	2003	2004	2005
Mean	264	274	281	280	278	276
Std Dev	29	30	33	35	33	36
Min	133	200	200	208	208	180
Max	323	350	353	364	364	400

Blood flow is set at a minimum of 200 ml/min averaging 276 ± 36 ml/min range (180-400).

Figure 3: Dialysis Time Per Session



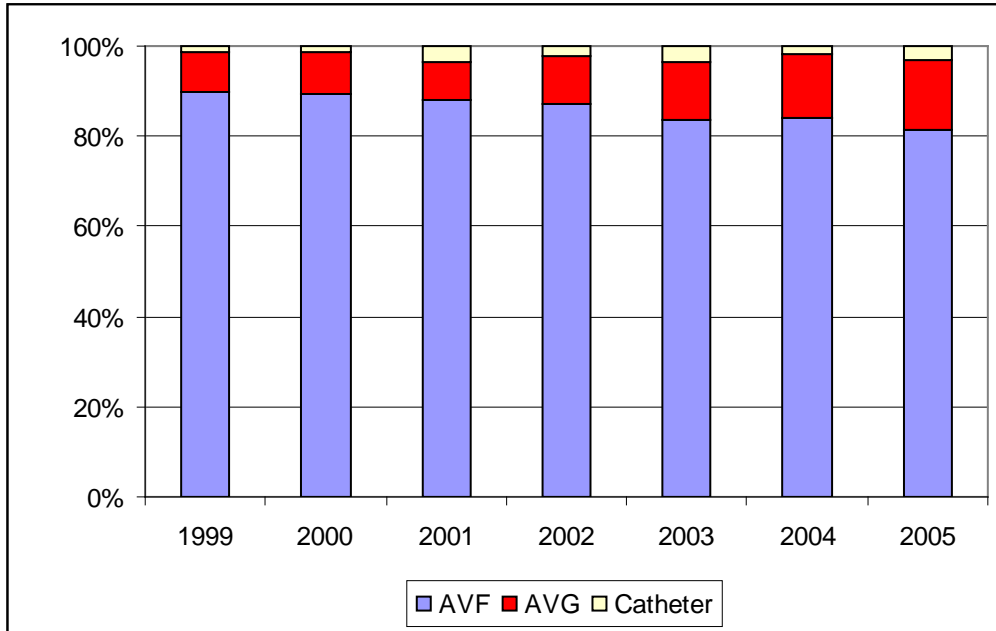
Most patients (75.1%) dialyze for 4 hours or more.

DIALYZER REUSE

Maximum reuse is 15 times. All centres use the Renatron System. There are separate reuse facilities for washing of dialyzers used by Hepatitis B and HCV positive patients in Bishan. SWWT centre started accepting hepatitis positive patients when AH centre closed down.

VASCULAR ACCESS

Fig 4: Vascular Access



Twenty seven patients or 15.6 % (27/173) were using grafts for vascular access, slightly higher than the previous year's proportion of 14.4%. More were on catheters (2.9%). The rest were using AV fistulae (81.5%).

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 5% or persistently low access flow with reduction of 25% below the previous reading was referred back to the surgeon.

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:

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

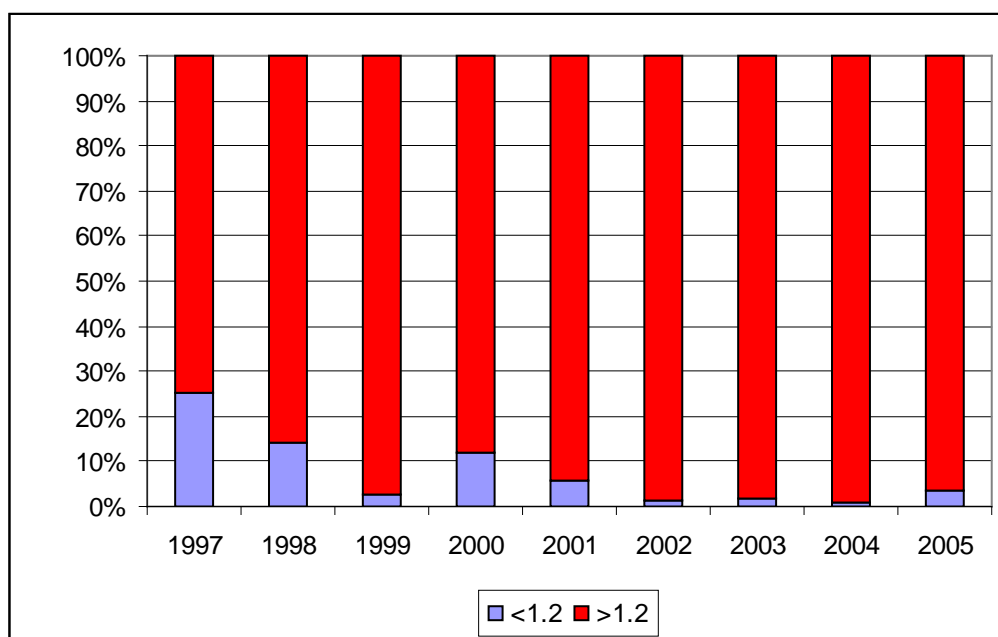
where R = post/pre urea
 UF = ultrafiltration in litres
 W = post dialysis weight

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

Our patients weighed 58.0 ± 14.3 kg (range 34.2 – 105.2 kg).

Majority of our patients (96.5 %) had a KT/V of 1.2 or greater in November / December 2005.

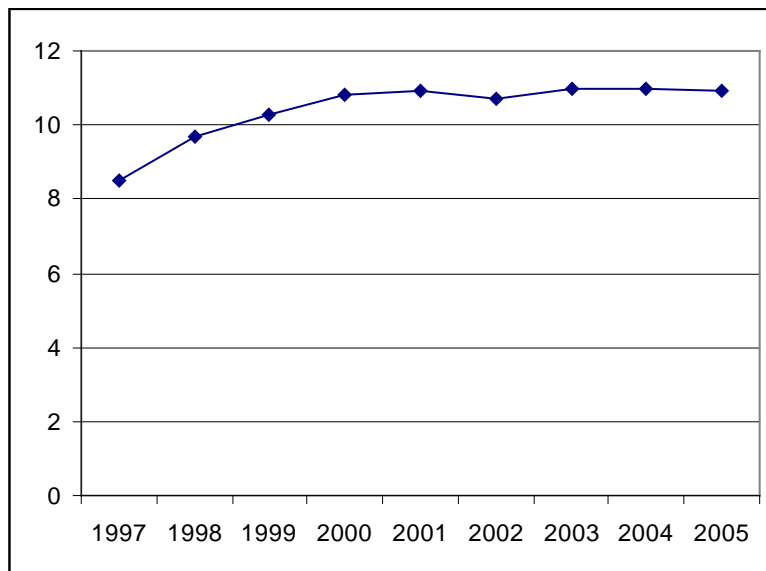
Fig 5: Percentage with KT/V index > 1.2



ANAEMIA

The mean Hb was calculated to be 10.9 ± 1.8 g/dl. 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 6: 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 (79.2) % of patients are on erythropoietin slightly lower than last years figure of 80%.

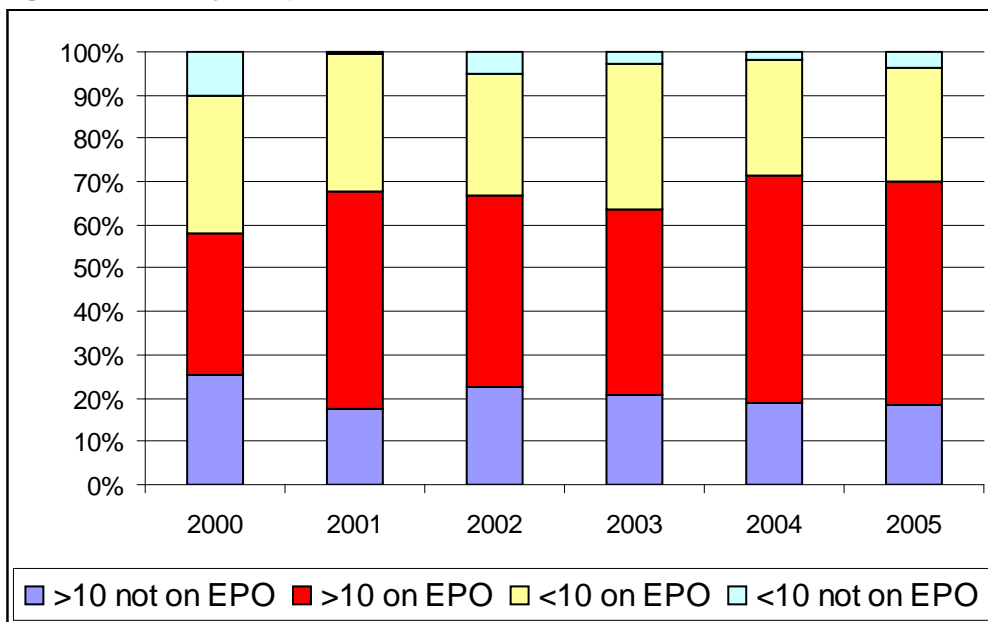
The cost of erythropoietin is Medishield claimable if the patient is eligible. In addition, patients are also eligible to apply for the Foundation's subsidy programme. There is no cap on the erythropoietin subsidy.

Patients who were on EPO used on the average 89 ± 55 units/kg body weight per week.

Because of the possibility of pure red cell aplasia from erythropoietin administration, all erythropoietin is now administered by the intravenous route. SWWT-Kreta Ayer Centre use Eprex while Bishan uses Recormon.

18.5% of the patients were not on EPO had a Hb of > 10 g/dl

Fig 7: Use of Erythropoietin



IRON STATUS

Table 15: Transferrin Saturation

	1999	2000	2001	2002	2003	2004	2005
Mean (%)	NA	37.4	37.3	40.3	39.0	37.4	36.2
SD	NA	16.2	16.3	15.9	13.9	14.8	16
% pats w TFSat <20%	15.1	8.8	9.2	7.5	6.5	6.6	9.2
Average HB when TFSat<20% (g/dl)	9.5	10.7	10.5	10.4	10.2	11.2	10.6
% pats wTFSat >20%	84.9	91.2	90.8	92.5	93.5	93.4	90.8
Average HB when TFSat>20% (g/dl)	10.4	10.8	11.0	10.7	11.0	11	10.9

As at the end of 2005, mean transferrin saturation was $36.2 \pm 16\%$ (range 5.1 – 93.9). The proportion of patients with transferrin saturation of less than 20% was 9.2% up from 6.6%. Only 6 out of 16 patients (37.5%) in this iron deficient group had a Hb of less than 10 g/dl. The average Hb of patients with transferrin saturation was greater or equal to 20% was 10.9 g/dl compared with 10.6 g/dl for those whose TF Sat was <20%

Fourteen patients used intravenous iron (Venofer) in 2005. A subsidy scheme for Venofer was started in April 2005

NUTRITION

Mean S Albumin was 37.5 ± 3.4 g/l. The number of patients with Serum albumin less than 40 g/dl decreased to 72.3%.

Table 16: Normalised Protein Catabolic Rate and S Albumin

	1999	2000	2001	2002	2003	2004	2005
NPCR (g/kgBW)							
• Mean \pm 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	1.12 ± 0.21
• % < 1.2	70.0	62.9	63.6	63.6	62.6	63.5	68.2
S Albumin (g/l)							
• Mean \pm 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	37.5 ± 3.4
• % <40	71.7	73.5	87.9	81.5	80.6	81.8	72.3
• % <35	9.0	14.1	31.6	19.7	22.9	21.0	16.8

RENAL BONE DISEASE

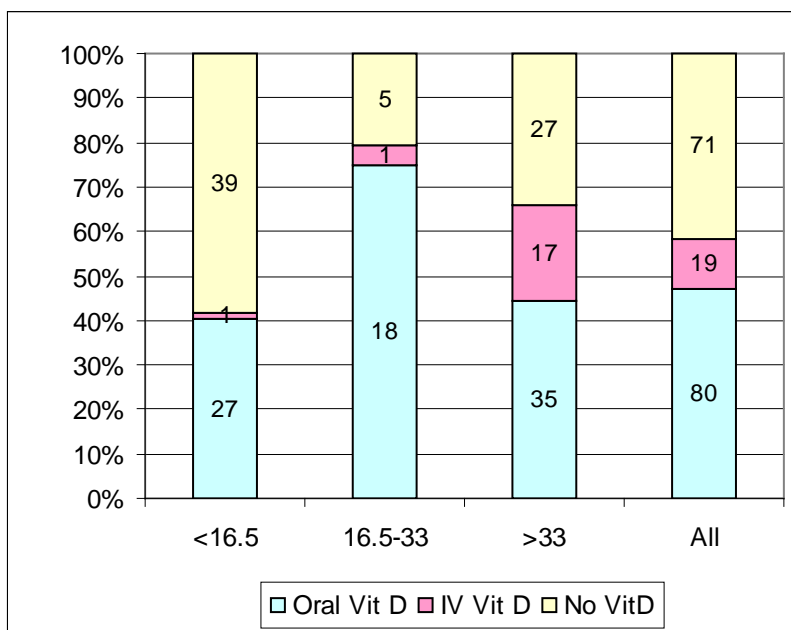
The KDOQI guidelines of 2003 (AJKD Vol 42 October 2003 Suppl 3) recommends treatment for patients on dialysis (CKD Stage 5) when iPTH exceed 33 pmol/l should be treated with Vit D analogs to main the PTH at 16.5-33 pmol/l.

Table 17: PTH levels

	2003	%	2004	%	2005	%
<16.5	67	39.4	51	30.6	46	26.7
16.5-33	24	14.1	26	15.6	37	21.5
>33.0	79	46.4	90	53.8	89	51.7
Total	170	100.0	167	100.0	172	100.0

A slightly lower proportion (51.7%) of the patients have intact parathyroid hormone levels elevated beyond 33 pmol/l. Hyperparathyroid bone disease is still a significant problem in the dialysis population.

Fig 8: Parathyroid Hormone levels and Vit D Treatment



In the group with low PTH (<16.5 pmol/l) which constitutes 26.7% (46) of all cases, only 4.1% (7) were on oral Vit D. These were probably on a tailing dose.

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 72.2 % (64/89). Those who were not treated 27.8% (25/90) had either high phosphate values or hypercalcemia. 12.4% (11/89) in this group were on intravenous calcitriol. A subsidy scheme for Calcijex was started in April 2005

An additional 6 patients had parathyroidectomy bringing the prevalent rate to 17.3% (30/173).

Table 18: Serum Phosphate levels

	1999	2000	2001	2002	2003	2004	2005
Mean S PO4 (mmol/L)	1.81	1.84	1.83	1.85	1.92	1.89	1.88
SD	0.6	0.53	0.52	0.47	0.53	0.49	0.51
% with S PO4 >2.0 mmol/l	NA	36.4	37.9	31.8	42.4	38.1	41.6

Mean S Phosphate was 1.88 ± 0.51 mmol/l. A significant proportion (41.6%) of patients have values above 2.0 mmol/l.

Majority of patients (60.7%) are on calcium acetate. Non calcium non-aluminium binders are now available to selected patients. They are costly and probably out of reach of most patients.. Patients may still be on calcium supplementation with regular calcium carbonate (non chewable formulation).

Fig 9: Phosphate binders in use

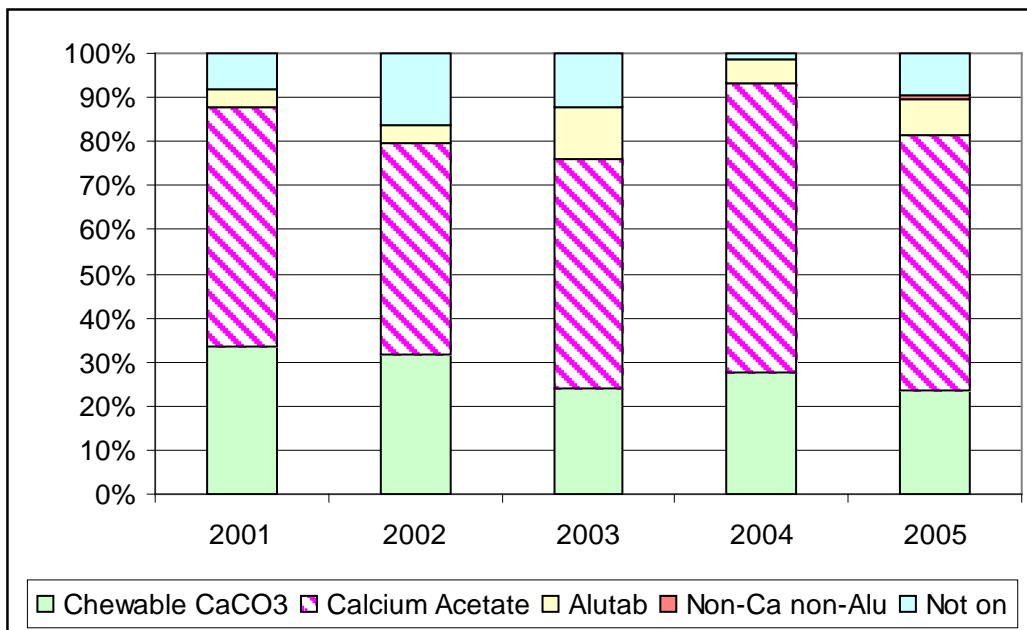


Table 19 Serum Calcium levels

	1999	2000	2001	2002	2003	2004	2005
Mean S Calcium (mmol/L)	2.59	2.59	2.53	2.54	2.56	2.48	2.44
SD	0.2	0.2	0.21	0.21	0.19	0.23	0.25

The mean calcium value is now lower - 2.44 ± 0.25 mmol/l. Low calcium dialysate is currently in use for an increasing number of patients (72.8%).

DIABETICS

The prevalent number of diabetic patients continues to increase to 36 (20.8%). This is not surprising as diabetic nephropathy is the etiology in about half of all new cases.

HYPERTENSION

61.3% (106/173) have recorded high blood pressures or have their blood pressures controlled with anti-hypertensive agents.

Table 20: Use of Antihypertensive Agents by number of Drugs

	2003	2004	2005
None	42.5%	30.8%	38.7%
1 Drug	30.5%	29.1%	28.3%
2 Drugs	18.4%	17.6%	22.0%
3 Drugs	8.0%	7.7%	8.7%
4 drugs	0.6%	3.8%	2.3%
	100.0%	100.0	100.0%

Almost 40% of the patients were not on antihypertensives and another 30% on one drug only.

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

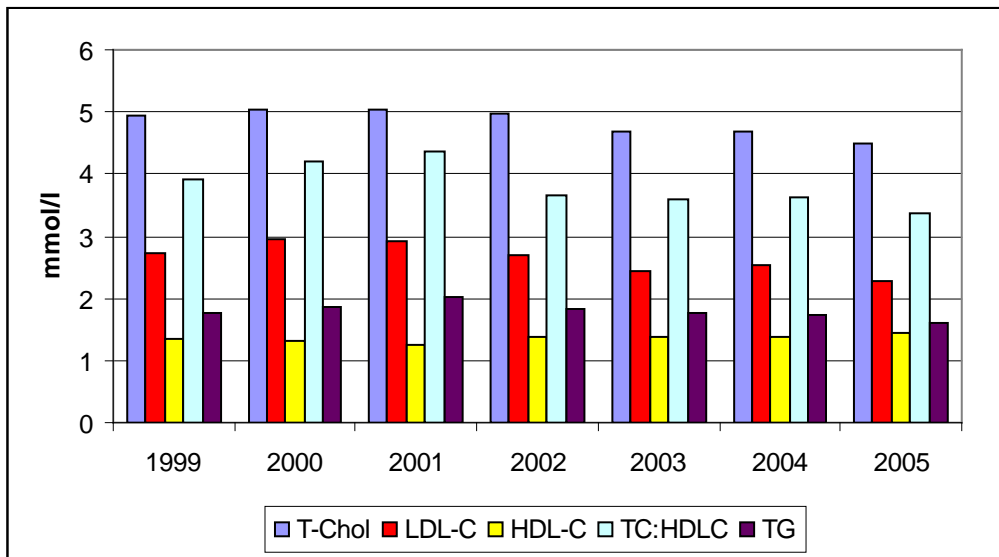
Table 21: Use of Antihypertensive Agents by Drug Type

	2002	2003	2004	2005
None	41.2%	41.6%	42.5%	38.7%
Beta blockers			31.6%	43.9%
Calcium channel Blockers			29.3%	31.2%
ACEI / ARB			25.3%	26.0%
Others			7.7%	5.8%
Total			100.0%	100.0%

HYPERLIPIDEMIA

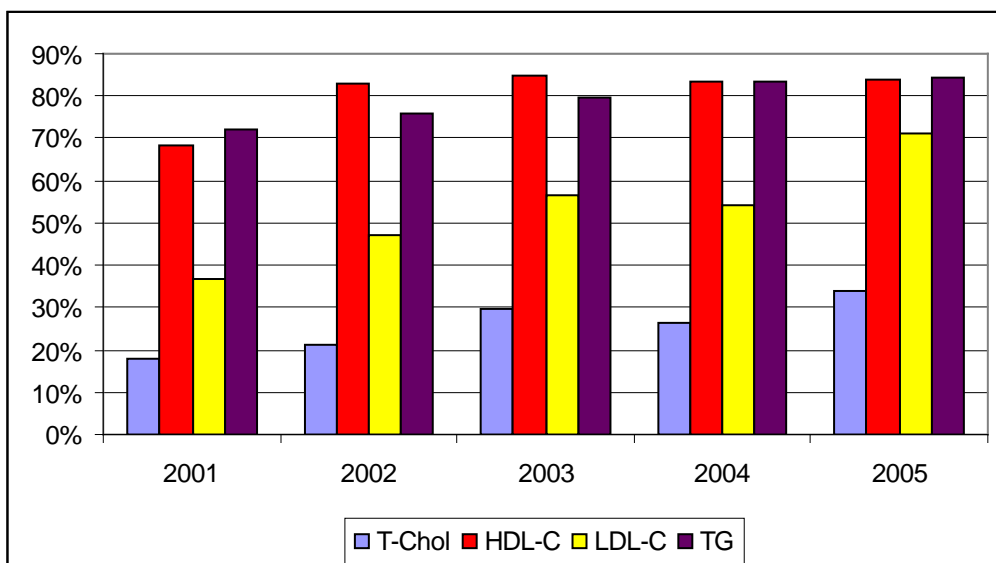
Mean total cholesterol was 4.49 mmol/l, LDL cholesterol 2.28 mmol/l, HDL-cholesterol 1.44 mmol/l, total cholesterol:HDL-cholesterol ratio 3.36 and triglyceride 1.59 mmol/l showing improvement across all measured values.

Figure 10: Lipids



The percentage of patients achieving MOH targets are as follows: cholesterol (<4.1 mmol/l) 34.1%, HDL-cholesterol (\geq 1.0 mmol/l) 83.8%, LDL cholesterol (<2.6 mmol/l) 71.3%, and triglycerides (<2.3 mmol/l) 84.4% .

Fig 11: Percentage of patients achieving target levels as recommended by MOH guidelines 2002



More than half the patients were on drug therapy. 48.6% were on one drug and 4% on two drugs. HMG-CoA reductase inhibitors were the most commonly used drug. 8.7% were on fibrates.

HEPATITIS SEROPOSITIVITY

5.2% (9/173) are hepatitis B carriers of which 3 are 'e' antigen positive, 9.8% 17/173 are anti-HCV positive for Hepatitis C antibody. Two patients had received interferon treatment and both patients' HCV PCR was negative. Three patients are both antiHCV and HepBsAg positive.

Table 22: Hepatitis Rates

	1997	1998	1999	2000	2001	2002	2003	2004	2005
HepB	9.8%	6.7%	6.9%	5.8%	5.7%	5.7%	7.5%	5.5%	5.2%
HCV	9.80%	10.10%	9.40%	9.40%	9.70%	9.20%	11.5%	10.9%	9.8%
HepB & HCV	1.40%	2%	1.90%	1.20%	1.10%	1.10%	1.7%	1.6%	1.7%

VANCOMYCIN RESISTENT ENTEROCOCCI

Following an outbreak in SGH at the beginning of the year. Patients admitted were screened and followup rectal swabs / stool cultures for VRE were performed. One patient in Bishan was found to be positive.

Guidelines for infection control of VRE were implemented.

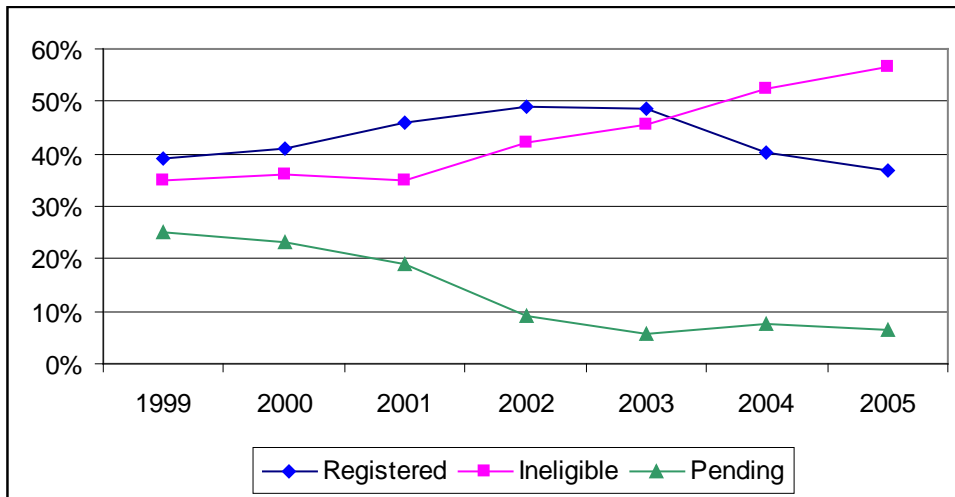
VACCINATION AGAINST INFLUENZA

Patients were offered vaccination. A total of 71 patients vaccinated with Fluarix

TRANSPLANT WAITING LIST

Only 64 patients (37%) are on the waiting list. There are very few patients not assessed. The number of ineligible patients grow as KDF takes in more patients with comorbidities since admission criteria was relaxed.

Figure 12: Proportion of patients on the Transplant Waiting List



CONCLUSION

The following year will see preparations for the third centre at Ghim Moh intensify.

KDF Haemodialysis Centres complement the peritoneal dialysis programme by offering interim haemodialysis when PD has not yet started or when the Tenckhoff catheter could not be used. Furthermore, interim haemodialysis at subsidized rates is also offered to those undergoing living related transplant workup.

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

A/PROF CHOONG HUI LIN
MEDICAL DIRECTOR