

## **CHAPTER 5**

# **PAEDIATRIC RENAL REPLACEMENT THERAPY**

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**A: RRT PROVISION FOR PAEDIATRIC PATIENTS**

The paediatric RRT population in this report is defined as patients less than 20 years of age. The number of new patients commencing on dialysis had increased from 12 in 1990 to 75 in 2005 giving a dialysis acceptance rate of 7 per million age related population (pmarp) respectively. However the incidence rate has plateaued at 7 pmarp over the last 4 years ie since 2002. There has been no noticeable increase in the number of new transplants in 2005 and the transplant rate remained at 1 pmarp (as it has been since the 1990s) giving a total renal replacement treatment rate of 8 pmarp.

The number of prevalent dialysis patients continued to rise and by the end of 2005; there were a total of 429 children under 20 on dialysis. The equivalent dialysis prevalence rate increased from 4 pmarp in 1990 to 39 in 2005. The number of patients with functioning transplants increased only slightly from 38 in 1990 to 120 in 2005 (prevalence rate of 4 and 11 pmarp respectively).

**Table 5.01:** Stock and Flow of Paediatric Renal Replacement Therapy 1990-2005

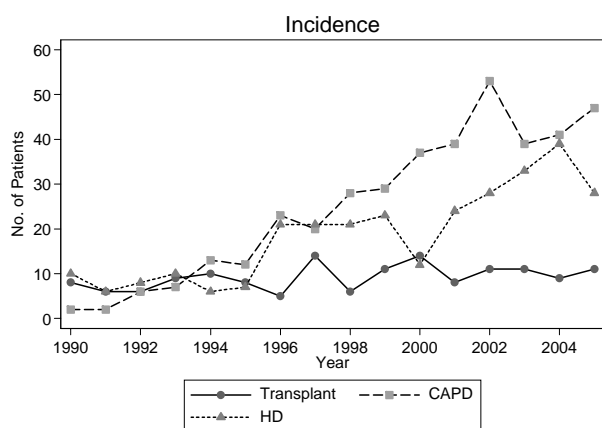
Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
New HD patients	10	6	8	10	6	7	21	21	21	23
New CAPD patients	2	2	6	7	13	12	23	20	28	29
New Transplants	8	6	6	9	10	8	5	14	6	11
HD deaths	0	2	1	2	0	2	0	3	3	2
CAPD deaths	0	2	0	0	0	2	2	3	7	2
Transplant deaths	1	0	0	0	1	0	2	0	0	0
On HD at 31st Dec	26	26	29	32	34	38	56	70	90	106
On CAPD at 31st Dec	5	5	8	14	26	32	51	62	73	91
Functioning transplant at 31st December	38	40	45	53	61	66	62	71	74	83

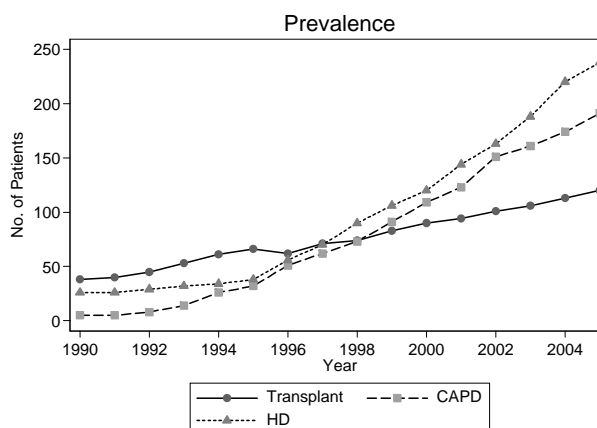
Year	2000	2001	2002	2003	2004	2005
New HD patients	12	24	28	33	39	28
New CAPD patients	37	39	53	39	41	47
New Transplants	14	8	11	11	9	11
HD deaths	4	1	10	6	10	7
CAPD deaths	3	8	8	9	5	9
Transplant deaths	1	0	1	1	0	1
On HD at 31st Dec	120	144	163	188	220	238
On CAPD at 31st Dec	109	123	151	161	174	191
Functioning transplant at 31st December	90	94	101	106	113	120

Dec. = December

**Figure 5.01 (a):** Incident cases of RRT by modality in children under 20 years old, 1990-2005

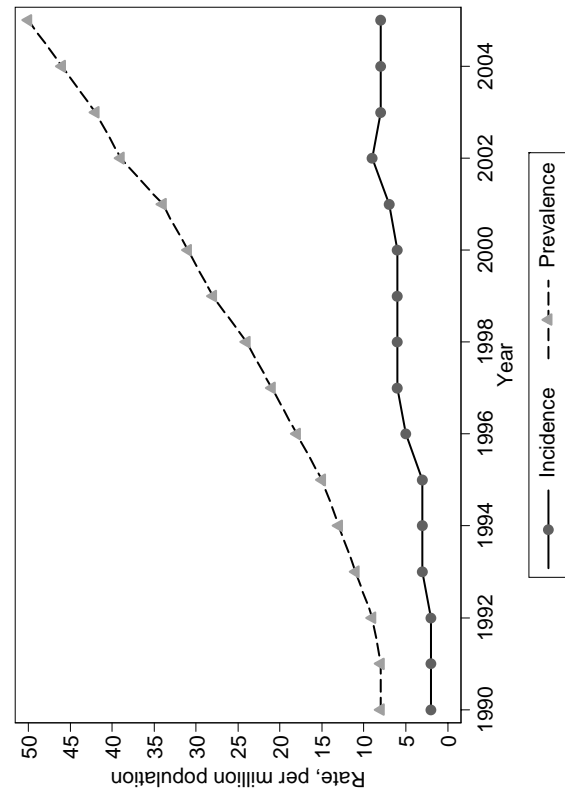


**Figure 5.01 (b):** Prevalent cases of RRT by modality in children under 20 years old, 1990-2005



**Table 5.02:** Paediatric Dialysis and Transplant Treatment Rates per million age-group population 1990-2005

Year	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
<b>Incidence Rate</b>																
New HD	1	1	1	1	1	1	2	2	2	2	1	2	3	3	4	3
New CAPD	0	0	1	1	1	2	2	2	3	3	4	4	5	4	4	4
New Transplant	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
All RRT	2	2	2	3	3	3	5	6	6	6	6	7	9	8	8	8
<b>Prevalence Rate</b>																
On HD	3	3	3	4	4	4	6	7	9	11	12	14	15	17	20	22
On CAPD	1	1	1	2	3	3	5	6	7	9	11	12	14	15	16	17
Functioning Graft	4	5	5	6	7	7	7	7	8	8	9	9	9	10	10	11
All RRT	8	8	9	11	13	15	18	21	24	28	31	34	39	42	46	50



**Figure 5.02:** RRT Incidence and prevalence rate per million age related population, 1990-2005

**B: DISTRIBUTION OF PAEDIATRIC DIALYSIS**

Table 5.03a shows that the treatment rate was still noticeably higher for states in the west coast of West Malaysia compared to the east coast or East Malaysia. However in terms of absolute number of dialysis treatment by state (table 5.03b) the difference is not obvious.

**Table 5.03a:** Dialysis Treatment Rate by State, per million state age group population, 1990-2005.

State	1990-1994	1995-1999	2000-2005
Negeri Sembilan	2	9	15
Negeri Melaka	2	5	15
Pulau Pinang	4	4	13
Johor Darul Takzim	0	5	12
Kedah & Perlis	2	5	11
Terengganu Darul Iman	0	3	11
Selangor & W. Persekutuan	3	8	10
Perak Darul Redzuan	1	3	8
Kelantan Darul Naim	0	1	8
Pahang Darul Makmur	1	5	8
Sarawak	2	5	7
Sabah	1	1	4

**Table 5.03b:** Dialysis Treatment by State in absolute number; 1990-2005

State	1990-1994	1995-1999	2000-2005
Selangor & W. Persekutuan	25	71	109
Johor Darul Takzim	2	26	74
Kedah & Perlis	6	21	49
Perak Darul Redzuan	6	12	39
Sarawak	9	21	35
Pulau Pinang	10	9	34
Kelantan Darul Naim	1	3	32
Negeri Sembilan	4	17	29
Sabah	7	9	29
Terengganu Darul Iman	1	8	27
Pahang Darul Makmur	3	15	25
Negeri Melaka	3	7	22

Figure 5.04 shows persistent trend of male predominance amongst the new dialysis and transplant patients consistent with higher incidence of ESRD among males. However this trend appears more marked among the transplant recipients.

**Figure 5.04:** Number of New Dialysis and Transplant Patients by gender 1990-2005

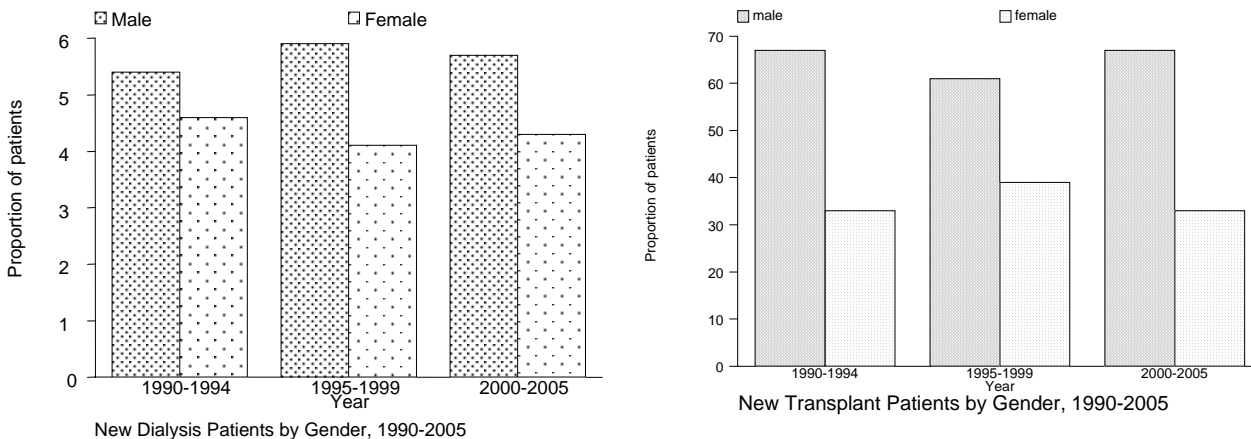


Figure 5.05 shows after the initial rise in the early 1990s; the treatment rates have begun to level off for all the age groups. It is also noted for the first time a significant drop in the treatment rates for the age 15-19 years from 20 pmarp in 2004 to 14 pmarp in 2005. The number of 0-4 year olds provided chronic dialysis treatment remained very low at 1 pmarp. The overall incidence of paediatric RRT in Malaysia remained at 8 pmarp.

**Figure 5.05:** Dialysis and Transplant Treatment Rate by Age group 1990-2005

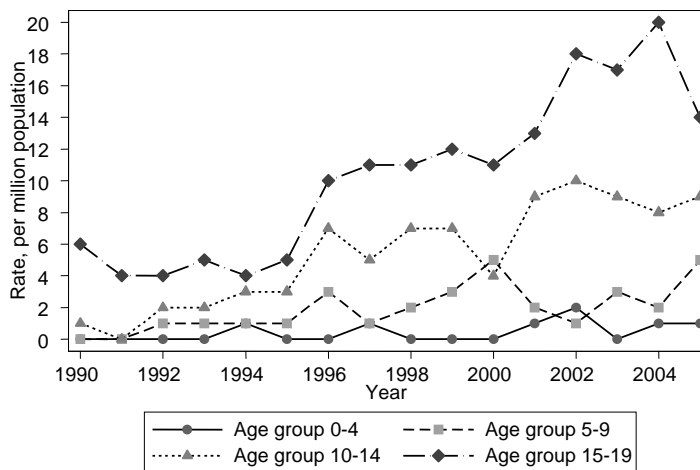


Figure 5.06 shows that CAPD was the preferred mode of dialysis as the initial treatment modality; the converse of that seen in the early 1990s when the CAPD experience was still new to nephrologist taking care of children. A significant change noted in 2005 is that up to 20% of children were started on continuous cycling peritoneal dialysis (CCPD) as the first modality of dialysis. This was made possible when the cost of CCPD/automated peritoneal dialysis was reduced through a special programme only available to children on dialysis.

**Figure 5.06:** New Dialysis by treatment modality 1990-2005

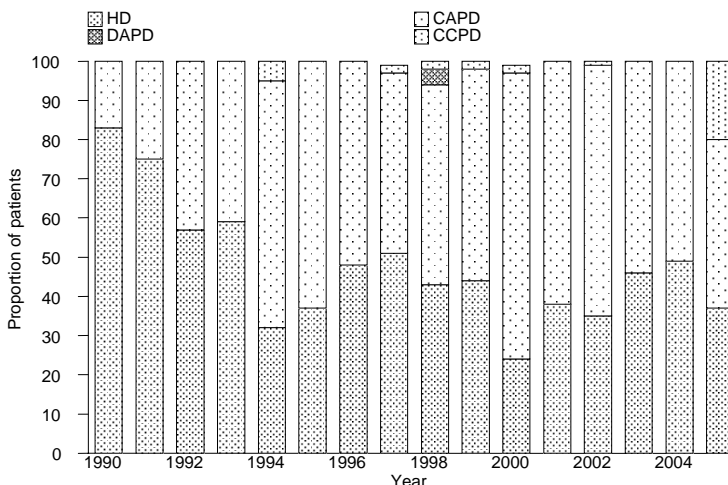
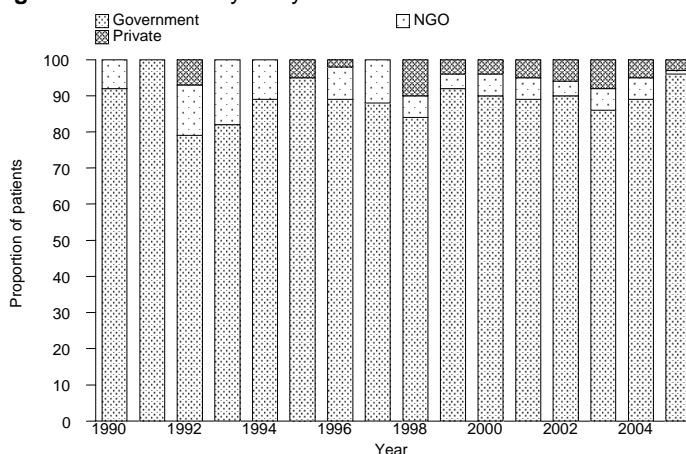


Figure 5.07 shows that more than 90% of children less than 20 years of age receive their dialysis treatment from government centres and hence government funded, unlike in adults where only one third of dialysis patients were treated in government centres.

**Figure 5.07: New Dialysis by sector 1990-2005**



**C: PRIMARY RENAL DIASEASE**

Glomerulonephritis was the commonest known cause of ESRD accounting for 28 %. Focal segemental glomeulosclerosis (FSGS) on its own accounted for 11 % of ESRD. Up to 34 % of these children still presented with ESRD of unknown aetiology ie they presented for the first time in end stage renal failure.

**Table 5.08: Primary Renal Disease 1990-2005**

Primary Renal Disease	Male		Female		Total	
	N	%	N	%	N	%
Glomerulonephritis	158	28	105	27	263	28
Focal Segmental Glomerulosclerosis	71	13	31	8	102	11
Reflux nephropathy	45	8	20	5	65	7
SLE	18	3	51	13	69	7
Obstructive uropathy	40	7	8	2	48	5
Renal dysplasia	17	3	12	3	29	3
Others	12	2	6	2	18	2
Hereditary nephritis	15	3	5	1	20	2
Cystic kidney disease	5	1	4	1	9	1
Drug induced nephropathy	0	0	4	1	4	0
Metabolic	1	0	0	0	1	0
Unknown	178	32	141	36	319	34
Total	560	100	387	100	947	100

## D: TYPES OF RENAL TRANSPLANT

Table 5.09 shows that living related renal transplantation was still the commonest type of transplantation done but the incidence of cadaveric transplantation has increased considerably in the last 6 years. A significant number of children had their renal transplantation done overseas – the commercial cadaver and living donor programs.

**Table 5.09:** Types of Renal Transplant 1990-2005

Year	1990-1994		1995-1999		2000-2005	
	No.	%	No.	%	No.	%
Commercial Cadaver	1	3	9	20	13	20
Commercial Living donor	9	23	2	5	4	6
Living related donor	29	74	31	70	30	47
Cadaver	0	0	2	5	17	27
Living emotionally related	0	0	0	0	0	0
TOTAL	39	100	44	100	64	100

## E: SURVIVAL ANALYSIS

Table and figure 5.10 show the obvious superiority of transplantation over CAPD and HD in terms of patient survival. Patient survival for renal transplantation was 97% for 1 year, 94% at 5 years and 94% at 10 years post transplant. Patient survival for HD was 94% for 1 year, 85% for 5 years and 78% for 10 years. CAPD patients showed the worst survival; 95% at 1 year and 81% at 5 years. There were too few CAPD patients at 10 years for meaningful analysis.

Figure 5.10 shows that patient survival for CAPD and HD were quite comparable up till 3-5 years into dialysis.

**Table 5.10:** Patient Survival by Modality of RRT, 1990-2005

Modality Interval (years)	Transplant			CAPD			HD		
	No.	% survival	SE	No.	% survival	SE	No.	% survival	SE
1	124	97	1	321	95	1	284	94	1
5	76	94	2	71	81	3	100	85	2
10	32	94	2	4	44	15	18	78	4
12	19	94	2	2	22	18	12	78	4
14	5	94	2	-	-	-	2	53	16

\* No. = Number at risk SE = Standard Error

**Figure 5.10:** Patient Survival by Modality of RRT, 1990-2005

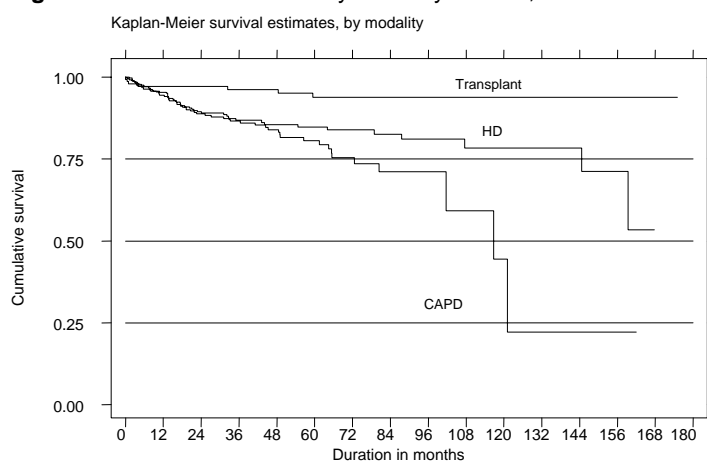


Table and Figure 5.11 below show comparable technique survival for both HD and CAPD in the first 2 years of dialysis. After that CAPD showed a progressive deterioration in technique survival compared to HD.

**Table 5.11:** Dialysis Technique Survival by Modality, 1990-2005

Modality Interval (years)	CAPD			HD		
	No.	% survival	SE	No.	% survival	SE
1	321	90	2	284	91	2
5	71	53	3	100	80	2
10	4	13	5	18	73	4
12	2	6	5	12	68	6
14	-	-	-	2	46	15

\* No. = Number at risk SE = Standard Error

**Figure 5.11:** Dialysis Technique Survival by Modality, 1990-2005

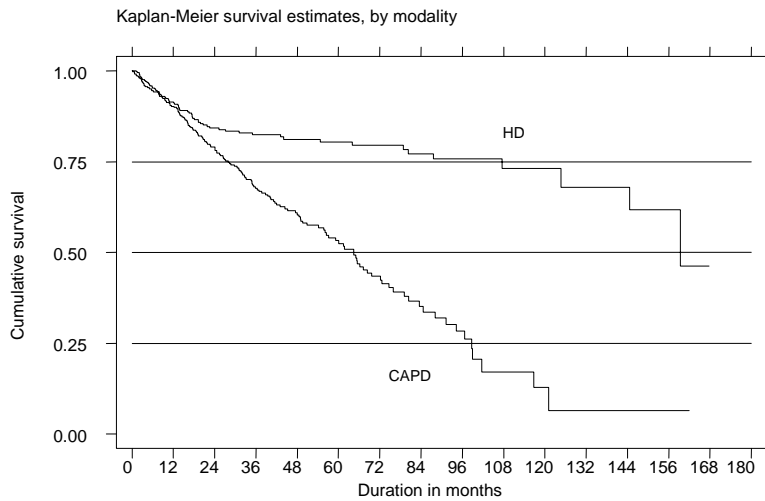


Table and Figure 5.12 show that the graft survival was 90% at 1 year, 79% at 5 years and 67% at 10 years.

**Table 5.12:** Transplant Graft Survival 1990-2005

Interval (years)	No.	% survival	SE
1	124	90	2
5	76	79	4
10	32	67	5
12	19	64	6
14	5	45	10

\* No. = Number at risk SE = Standard Error

**Figure 5.12:** Transplant Graft Survival 1990-2005

