

# **CHAPTER 6**

## **Paediatric Renal Replacement Therapy**

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**SECTION A: RRT PROVISION FOR PAEDIATRIC PATIENTS**

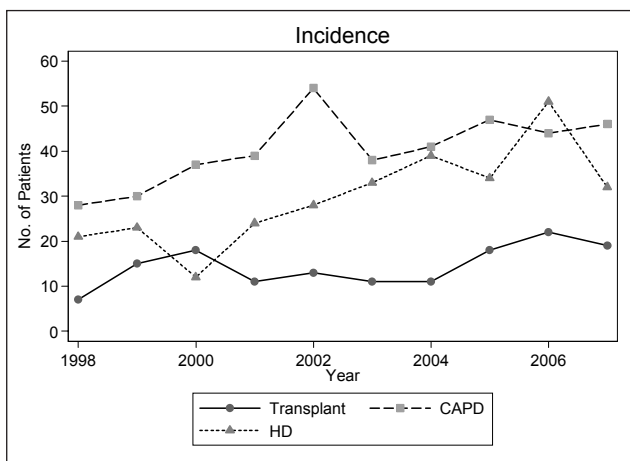
The paediatric RRT population in this report is defined as patients less than 20 years of age. After the progressive rise in incident dialysis patients during the 80s and 90s; the number of children commencing on dialysis (HD and CAPD) had begun to plateau over the last 5 years. The dialysis acceptance rate increased gradually from 5 per million age related population (pmarp) in 1998 to 8 pmarp in 2002 and it had stabilized around 8 pmarp over the last 5 years. The number of new transplants had shown an encouraging increase over the last 3 years in terms of numbers although the transplant rate remains at 2 pmarp.

As expected, the number of prevalent dialysis patients continue to rise and by the end of 2007 there was a total of 509 children under 20 on dialysis. The equivalent dialysis prevalence rate increased from 16 pmarp in 1998 to 45 in 2007. There were 166 children with a functioning graft in 2007.

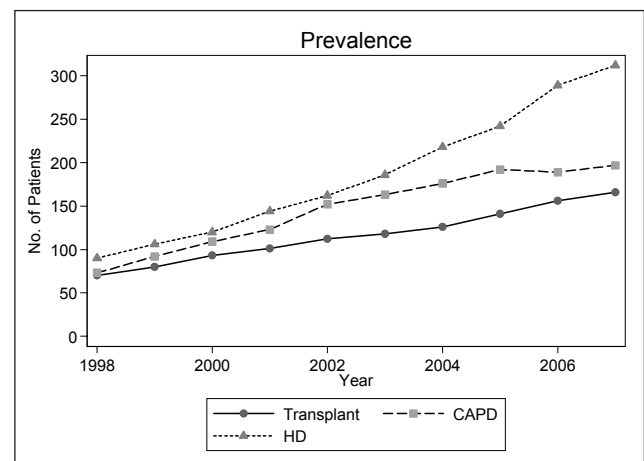
**Table 6.1:** Stock and Flow of Paediatric Renal Replacement Therapy 1998-2007

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
New HD patients	21	23	12	24	28	33	39	34	51	32
New CAPD patients	28	30	37	39	54	38	41	47	44	46
New Transplants	7	15	18	11	13	11	11	18	22	19
HD deaths	3	2	4	1	11	6	10	9	7	10
CAPD deaths	7	2	3	8	8	9	5	9	16	8
Transplant deaths	2	0	1	0	1	2	1	1	3	3
On HD at 31st Dec	90	106	120	144	162	186	218	242	289	312
On CAPD at 31st Dec	73	92	109	123	152	163	176	192	189	197
Functioning transplant at 31st Dec	70	80	93	101	112	118	126	141	156	166

**Figure 6.1(a):** Incident cases of RRT by modality in children under 20 years old, 1998-2007



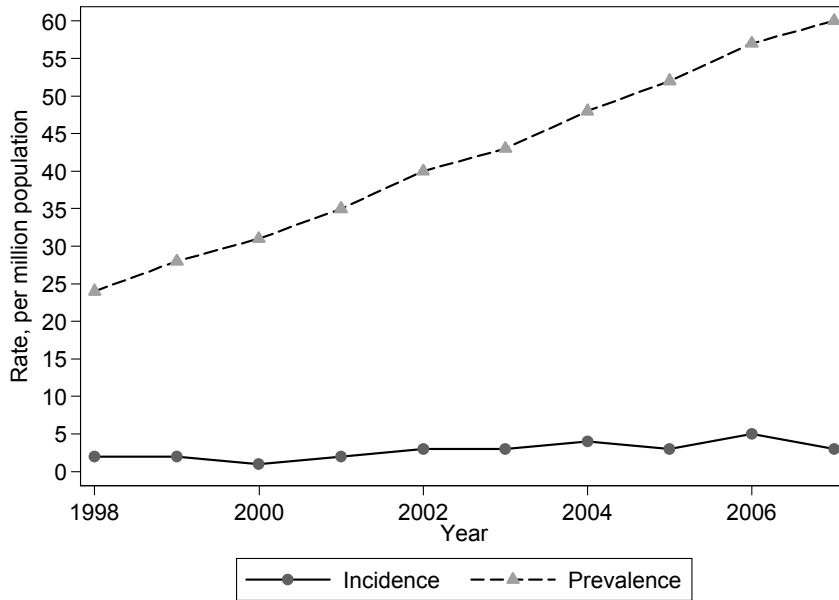
**Figure 6.1(b):** Prevalent cases of RRT by modality in children under 20 years old, 1998-2007



**Table 6.2:** Paediatric Dialysis and Transplant Rates per million age-group population 1998-2007

Year	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
<b>Incidence Rate</b>										
New HD	2	2	1	2	3	3	4	3	5	3
New CAPD	3	3	4	4	5	4	4	4	4	4
New Transplant	1	2	2	1	1	1	1	2	2	2
All RRT	5	6	5	6	8	7	7	8	8	7
<b>Prevalence Rate at 31st December</b>										
On HD	9	11	12	14	15	17	20	22	26	28
On CAPD	7	9	11	12	14	15	16	17	17	17
Functioning Graft	7	8	9	10	11	11	12	13	14	15
All RRT	23	28	32	36	40	43	48	52	57	60

**Figure 6.2:** Incidence and prevalence rate per million age related population years old on RRT, 1998-2007



**SECTION B: DISTRIBUTION OF PAEDIATRIC DIALYSIS PATIENTS**

Table 6.3(a) shows that the treatment rate is consistently higher for states in the west coast of West Malaysia compared to the east coast or East Malaysia. However in terms of numbers; there had been significant increase in new dialysis patients in East Malaysia over the last 5 years most likely due to the availability of nephrology services in that region. (table 6.3b)

**Table 6.3(a):** Dialysis Treatment Rate by State, per million state age group population; 1998-2007

State	1998-2002	2003-2007
Pulau Pinang	9	15
Melaka	8	15
Johor	8	10
Perak	5	10
Selangor & Putrajaya	9	7
Kuala Lumpur	12	11
Negeri Sembilan	10	12
Kedah	8	7
Perlis	14	8
Terengganu	9	9
Pahang	7	8
Kelantan	4	8
Sarawak	5	7
Sabah & WP Labuan	2	6

**Table 6.3(b):** New Dialysis Patients by State, 1998-2007

State	1998-2002	2003-2007
Pulau Pinang	21	39
Melaka	11	22
Johor	49	62
Perak	22	47
Selangor & Putrajaya	65	65
Kuala Lumpur	31	33
Negeri Sembilan	18	24
Kedah	31	29
Perlis	7	4
Terengganu	21	23
Pahang	20	26
Kelantan	16	31
Sarawak	22	35
Sabah & WP Labuan	16	40

There had been consistently more males than females among the population of children on dialysis over the last 10 years. This is probably due to higher incidence of ESRD among males. However this gender disparity appears more marked among the transplanted patients.

**Figure 6.4:** Number of New Dialysis and Transplant Patients by gender 1998-2007

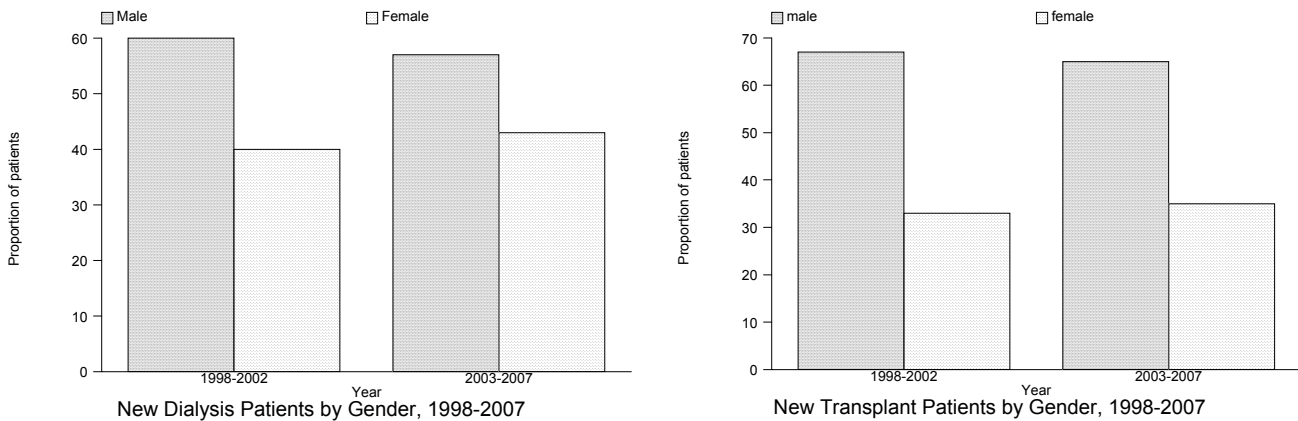


Figure 6.5 shows that the treatment rate had begun to level off for all the age groups including the oldest age group of 15-19 years old. The number of 0-4 year olds provided chronic dialysis treatment remained very low at around 1 pmarp.

**Figure 6.5:** Dialysis and Transplant Treatment Rate by Age group 1998-2007

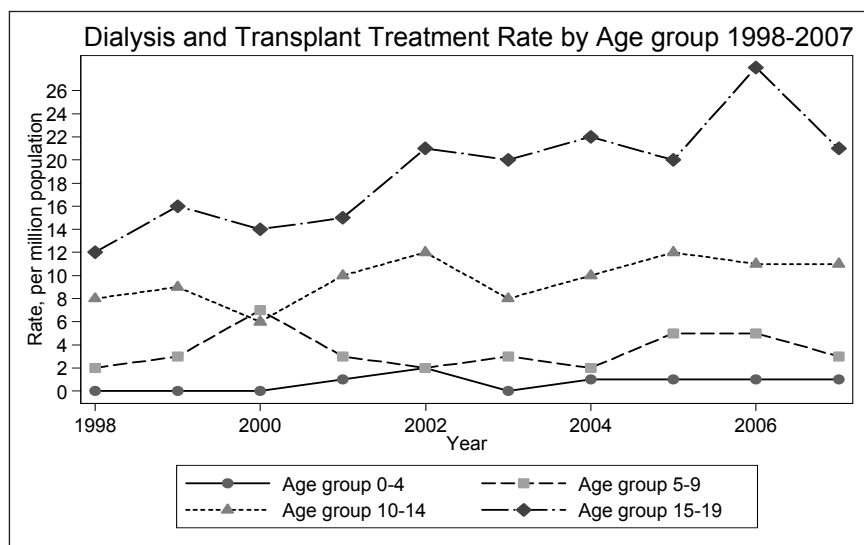


Figure 6.6 shows that CAPD was the preferred mode of initial dialysis modality; however over the last 3 years a significant proportion of children were also started on automated PD (CCPD) as the first modality of dialysis.

**Figure 6.6:** New Dialysis by treatment modality 1998-2007

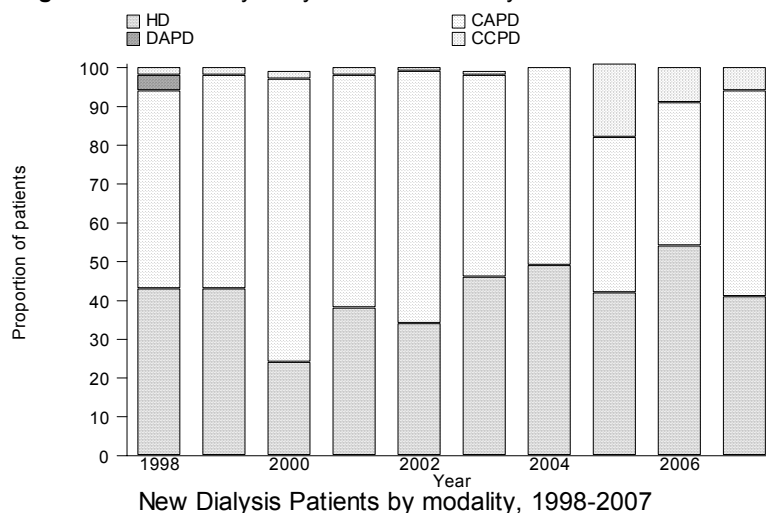
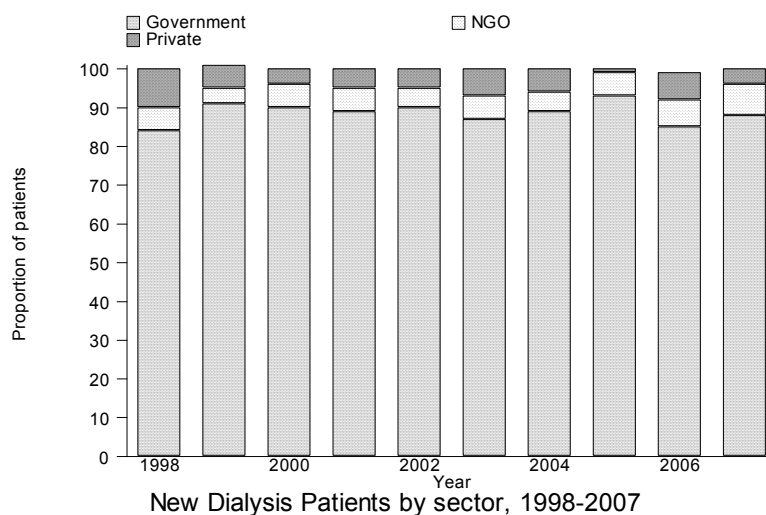


Figure 6.7 shows that up to 90% of children less than 20 years of age received their dialysis treatment from government centres and hence were government funded.

**Figure 6.7:** New Dialysis by sector 1998-2007



**SECTION C: PRIMARY RENAL DISEASE**

Glomerulonephritis was the commonest known cause of ESRD accounting for 21% of patients. FSGS on its own accounted for 8% of ESRD. The number of children presenting with ESRD of unknown aetiology was still high at 47%.

**Table 6.8:** Primary renal disease by sex, 1998-2007

Primary Renal Disease	Male		Female		All	
	N	%	N	%	N	%
Glomerulonephritis	93	22	57	19	150	21
FSGS	33	8	26	9	59	8
Refux nephropathy	20	5	6	2	26	4
SLE	12	3	36	12	48	7
Obstructive uropathy	32	8	8	3	40	6
Renal dysplasia	12	3	6	2	18	3
Others	8	2	10	3	18	3
Hereditary nephritis	10	2	1	0	11	2
Cystic kidney disease	3	1	4	1	7	1
Drug induced nephropathy	0	0	1	0	1	0
Metabolic	3	1	1	0	4	1
Unknown	192	46	142	48	334	47

**SECTION D: TYPES OF RENAL TRANSPLANTATION.**

Table 6.9 shows that living related transplant is the commonest type of transplantation done among children. However the encouraging trend over the last 5 years showed that cadaveric renal transplantation had increased and accounted for 38% of transplants done. (similar to living related transplants.) About a quarter (23%) of renal transplantation was done overseas under the commercial cadaver donor program.

**Table 6.9:** Types of Renal Transplant 1998 – 2007

Year	1998-2002		2003-2007	
	No.	%	No.	%
Commercial Cadaver	8	13	19	23
Commercial Living donor	3	5	1	1
Living related donor	34	54	30	38
Cadaver	18	28	30	38
Living emotionally related	0	0	0	0
TOTAL	63	100	80	100

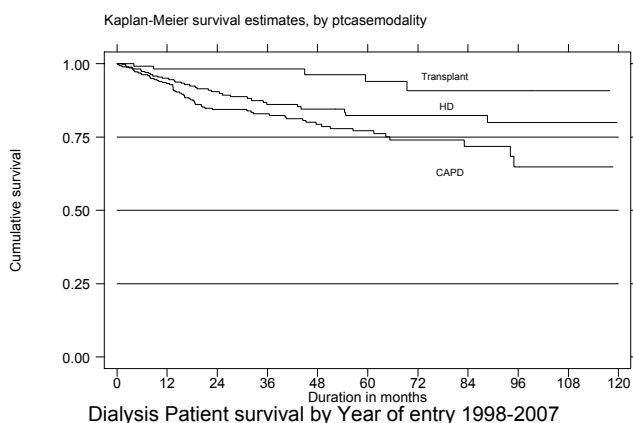
**SECTION E: SURVIVAL ANALYSIS**

Table and Figure 6.10 show that renal transplantation has the best patient survival; with 94% survival at 5 years. Haemodialysis and CAPD showed comparable survival up till 7 years into dialysis when analyzed without consideration of change of modality of dialysis.(as per ITT) However when censored for change of modality; after 5 years there is progressive separation of the survival curve with CAPD showing a poorer outcome compared to HD (Figure 6.10b)

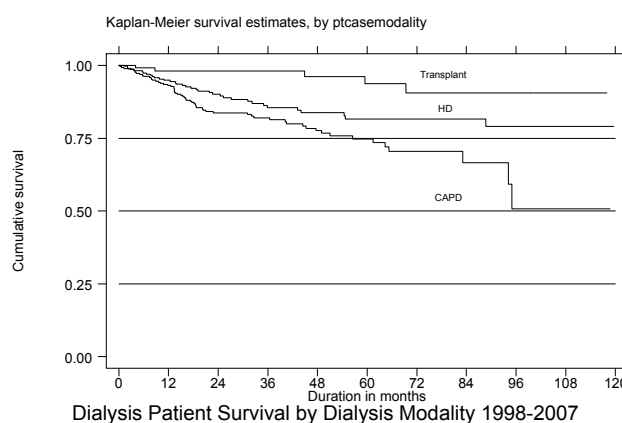
**Table 6.10(a):** Patient survival by dialysis modality analysis as per ITT

Modality Interval (months)	Transplant			CAPD			HD		
	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	126	100	-	333	100	-	279	100	-
12	100	98	1	262	93	1	229	95	1
60	41	94	3	88	77	3	66	82	3

**Figure 6.10 (a):** Patient survival by dialysis modality analysis as per ITT



**Figure 6.10(b):** Patient survival by dialysis modality analysis censored with change of modality



**Table 6.10(b):** Patient survival by dialysis modality analysis censored with change of modality

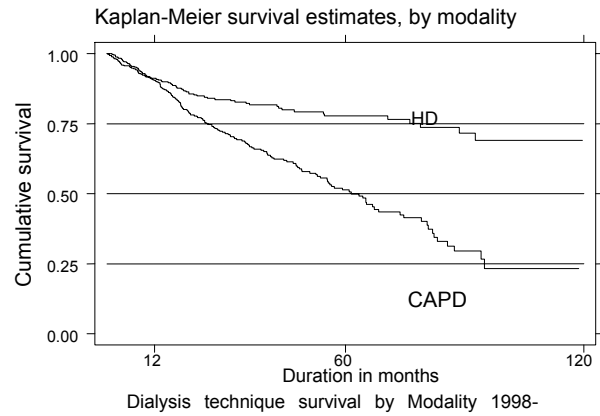
Modality Interval (months)	Transplant			CAPD			HD		
	No.	% Survival	SE	No.	% Survival	SE	No.	% Survival	SE
0	126	100	-	333	100	-	279	100	-
12	97	98	1	251	93	1	218	95	1
60	40	94	3	66	75	3	63	82	3

Table and Figure 6.11 showed that after the first year; dialysis technique failure rate was much higher amongst CAPD patients with progressive widening of the technique survival curve with increasing years on dialysis. Technique survival at 5- years was only 50% for CAPD compared to 78% for HD.

**Table 6.11:** Dialysis Technique Survival by Modality, 1998-2007

Modality Interval (years)	CAPD			HD		
	No.	% Survival	SE	No.	% Survival	SE
12	327	90	1	309	91	1
60	80	51	3	86	78	3

**Figure 6.11:** Dialysis Technique Survival by Modality, 1998-2007



The graft survival for paediatric transplants was 91% at 1 year and 79% at 5 years.

**Table 6.12:** Transplant Graft Survival, 1998- 2007

interval (year)	No.	% survival	SE
0	126	100	0
12	97	91	3
60	40	79	5

**Figure 6.12:** Transplant Graft Survival, 1998 – 2007

