

CHAPTER 5

PAEDIATRIC RENAL REPLACEMENT THERAPY

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SECTION A: RRT PROVISION FOR PAEDIATRIC PATIENTS

This chapter presents data on paediatric patients less than 20 years of age receiving renal replacement therapy (RRT) from 2002 to 2011.

The dialysis acceptance rate for the paediatric population had increased to 11 per million age related population (pmarp) in 2010 and 8 pmarp in 2011 (data for 2011 however is preliminary as at the time of writing this report there might still be some new patients yet to be notified to the registry). There was a significant drop in the number of new transplant done in 2010 compared to previous years with only 9 transplants compared to an average of about 20 in the previous years. However in 2011 the number had increased again encouragingly to 18. The overall incidence rate for all RRT was 12 pmarp in 2010 and 10 pmarp in 2011.

As expected, with increasing number of children on dialysis and improved survival; the number of prevalent patients continued to rise. At the end of 2011, 869 paediatric patients were receiving RRT in Malaysia. Of these, 670 (77%) were on dialysis. The equivalent dialysis prevalence rate more than doubled over the last 10 years from 41 pmarp in 2002 to 84 pmarp in 2011. The prevalent HD population continued to expand at a higher rate than the PD population although the dialysis acceptance rate for new PD patients was higher, consistent with higher technique failure among PD patients.

Table 5.1: Stock and flow of Paediatric Renal Replacement Therapy (RRT) 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
New HD patients	29	32	39	34	51	35	45	35	47	31
New PD patients	54	38	41	47	44	51	50	69	57	56
New Transplants	13	11	11	18	23	20	21	19	9	18
HD deaths	11	6	10	9	7	11	11	14	15	19
PD deaths	8	12	6	9	17	8	11	11	15	14
Transplant deaths	1	2	0	1	1	3	4	2	2	4
On HD at 31 st December	160	183	216	241	286	312	351	367	406	414
On PD at 31 st December	152	164	176	193	189	202	208	238	250	256
Functioning transplant at 31 st December	113	117	126	140	157	167	174	180	181	199

Figure 5.1 (a): Incidence cases of RRT by modality in children under 20 years old, 2002-2011

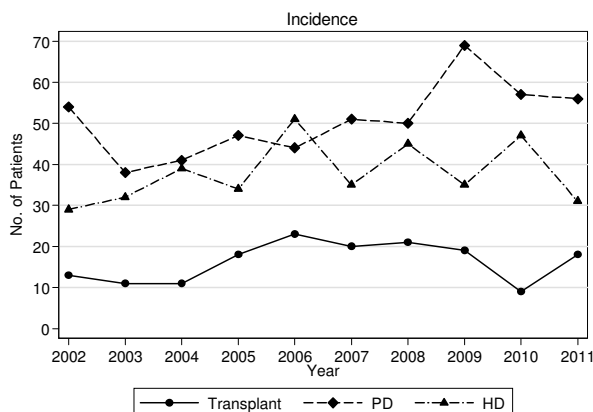


Figure 5.1 (b): Prevalence cases of RRT by modality in children under 20 years old, 2002-2011

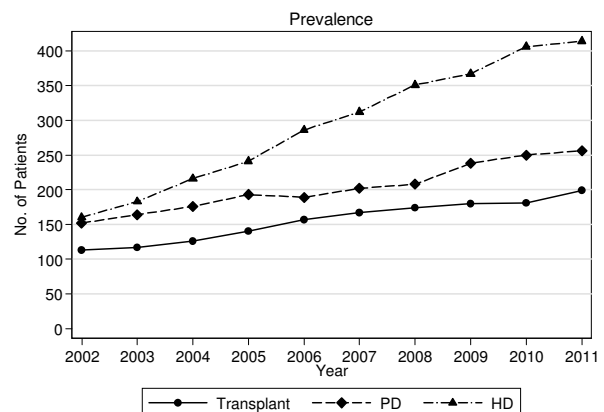
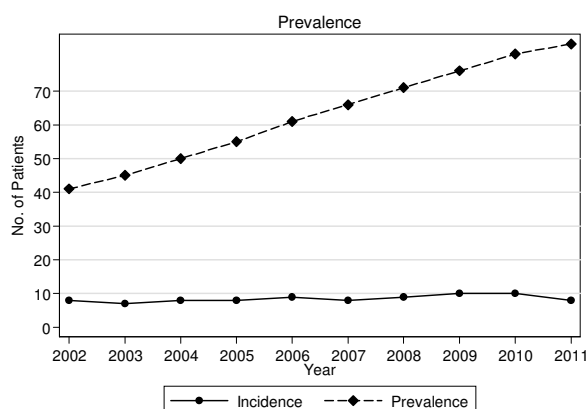


Table 5.2: Paediatric dialysis and transplant rates per million age-group population 2002-2011

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Incidence Rate										
New HD	3	3	4	3	5	3	4	3	5	3
New PD	5	4	4	5	4	5	5	7	6	5
New Transplant	1	1	1	2	2	2	2	2	1	2
All RRT	9	8	9	10	11	10	11	12	12	10
Prevalence Rate at 31st December										
On HD	15	18	21	23	27	30	34	35	39	40
On PD	15	16	17	19	18	19	20	23	24	25
Functioning Graft	11	11	12	13	15	16	17	17	17	19
All RRT	41	45	50	55	60	65	71	75	80	84

Figure 5.2: Incidence and prevalence rate per million age related population years old on RRT, 2002-2011



SECTION B: DISTRIBUTION OF PAEDIATRIC DIALYSIS PATIENTS

The treatment gap between the more economically developed states of West Malaysia and East Malaysia had become less obvious over the years with the set up of new paediatric and adult nephrology centres in these regions particularly in the east coast of West Malaysia and East Malaysia where the number of new dialysis patients had increased significantly over the last 5 years.

Table 5.3 (a): Dialysis treatment rate by state, per million state age group populations, 2002-2011

State	2002-2006	2007-2011
Pulau Pinang	15	11
Melaka	13	10
Johor	9	11
Perak	9	9
Selangor & Putrajaya	7	9
Kuala Lumpur	8	10
Negeri Sembilan	9	10
Kedah	7	8
Perlis	8	6
Terengganu	8	12
Pahang	6	12
Kelantan	7	6
Sarawak	7	7
Sabah & WP Labuan	5	7

Table 5.3 (b): New dialysis patients by state, 2002-2011

State	2002-2006	2007-2011
Pulau Pinang	38	28
Melaka	19	15
Johor	52	65
Perak	44	43
Selangor & Putrajaya	60	81
Kuala Lumpur	21	30
Negeri Sembilan	16	18
Kedah	26	31
Perlis	4	3
Terengganu	19	26
Pahang	19	34
Kelantan	27	24
Sarawak	32	35
Sabah & WP Labuan	31	41

There had been consistently more males compared to females among the population of children on dialysis and transplant. This trend had persisted over the last 10 years; probably a reflection of the higher incidence of ESRD among the males. However this gender disparity appears to be less marked in recent years perhaps reflecting a gender bias in the early years.

Table 5.4: Number of new dialysis and transplant patients by gender 2002-2011

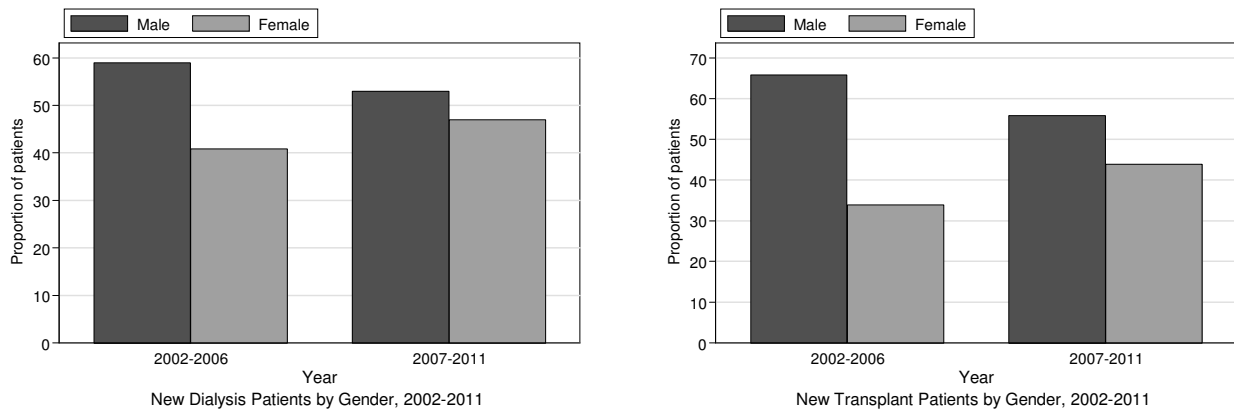
a) New Dialysis

Year	Male		Female	
	n	%	n	%
2002-2006	243	59	166	41
2007-2011	254	53	222	47

b) New Transplant

Year	Male		Female	
	n	%	n	%
2002-2006	50	66	26	34
2007-2011	49	56	38	44

Figure 5.4: Number of new dialysis and transplant patients by gender 2002-2011

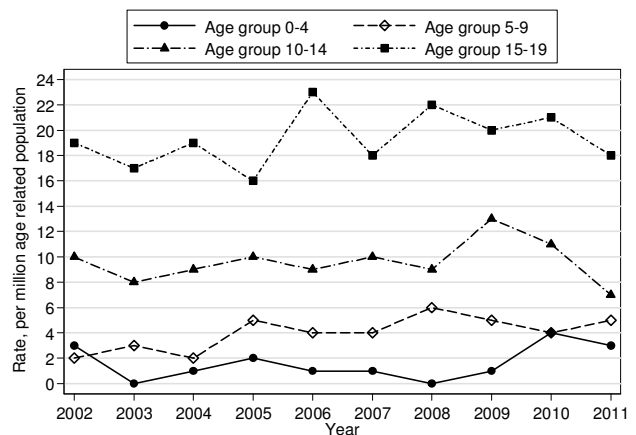


The dialysis treatment rate had fairly leveled off over the last 10 years across the paediatric age spectrum. The treatment rate had remained consistently higher among the older age groups. However over the last 2 years the treatment rate amongst the 0-4 years old had shown a significant increase to 3-4 pmp.

Table 5.5: New RRT rate, per million age related population by age group 2002-2011

Year	New RRT rate, pmp			
	Age group (years)			
	0-4	5-9	10-14	15-19
2002	3	2	10	19
2003	0	3	8	17
2004	1	2	9	19
2005	2	5	10	16
2006	1	4	9	23
2007	1	4	10	18
2008	0	6	9	22
2009	1	5	13	20
2010	4	4	11	21
2011	3	5	7	18

Figure 5.5: New RRT rate by age group 2002-2011

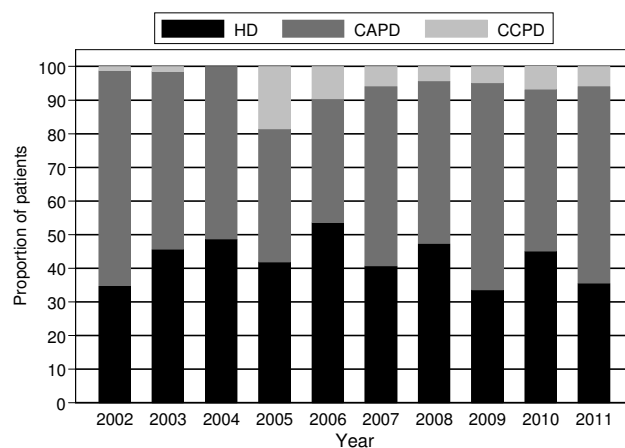


PD was the first modality of dialysis in about two thirds of patients. Majority of them were on CAPD while a small percentage (about 6%) was started on automated PD (CCPD).

Table 5.6: New dialysis by treatment modality 2002-2011

Year	HD		CAPD		CCPD	
	n	%	n	%	n	%
2002	29	35	53	64	1	1
2003	32	46	37	53	1	1
2004	39	49	41	51	0	0
2005	34	42	32	40	15	19
2006	51	54	35	37	9	9
2007	35	41	46	53	5	6
2008	45	47	46	48	4	4
2009	35	34	64	62	5	5
2010	47	45	50	48	7	7
2011	31	36	51	59	5	6

Figure 5.6: New dialysis by treatment modality 2002-2011

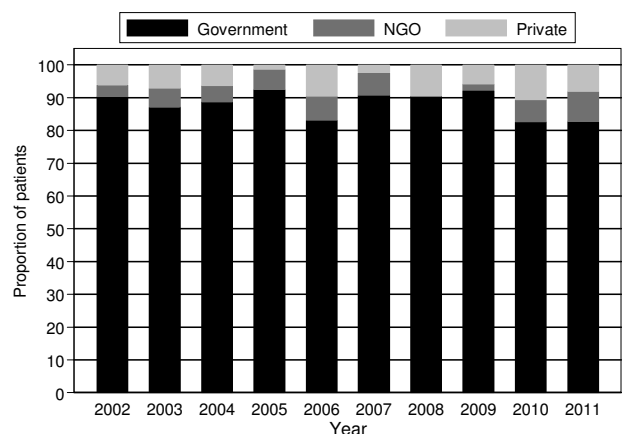


Most of the children received their dialysis treatment from government centres and hence were government funded.

Table 5.7: New dialysis by sector 2002-2011

Year	Government		NGO		Private	
	n	%	n	%	n	%
2002	75	90	3	4	5	6
2003	61	87	4	6	5	7
2004	71	89	4	5	5	6
2005	75	93	5	6	1	1
2006	79	83	7	7	9	9
2007	78	91	6	7	2	2
2008	86	91	0	0	9	9
2009	96	92	2	2	6	6
2010	86	83	7	7	11	11
2011	72	83	8	9	7	8

Figure 5.7: New dialysis by sector 2002-2011



SECTION C: PRIMARY RENAL DISEASE

The most common primary renal disease identified was glomerulonephritis, which accounted for about 22% of the patients. FSGS on its own accounted for about 7% of the ESRD population. SLE was the second commonest known cause ESRD in girls. The proportion of children presenting with ESRD of unknown aetiology was still high at 36%.

Table 5.8: Primary renal disease by sex, 2002-2011

Primary Renal Disease	Male		Female		All	
	n	%	n	%	n	%
Glomerulonephritis	97	25	57	19	154	22
FSGS	22	6	25	8	47	7
Refux nephropathy	25	6	7	2	32	5
SLE	7	2	36	12	43	6
Obstructive uropathy	34	9	17	6	51	7
Renal dysplasia	16	4	9	3	25	4
Hereditary nephritis	11	3	3	1	14	2
Cystic kidney disease	2	1	5	2	7	1
Metabolic	3	1	3	1	6	1
Others	28	7	37	12	65	9
Unknown	145	37	103	34	248	36

SECTION D: TYPES OF RENAL TRANSPLANTATION

Living related renal transplant used to be the commonest type of transplantation done among children. However the trend has changed over the last 5 years in that cadaveric renal transplant is now the most common transplantation done accounting for about 58% compared to 32% for living related renal transplant. The number of transplant from overseas commercial cadaveric programme has reduced significantly over the recent years.

Table 5.9: Types of renal transplantation, 2002-2011

Year	2002-2006		2007-2011	
	n	%	n	%
Commercial cadaver	23	31	8	9
Commercial living donor	3	4	0	0
Living related donor	28	37	27	32
Cadaver	21	28	49	58
Living emotionally related	0	0	1	1
TOTAL	75	100	85	100

SECTION E: SURVIVAL ANALYSIS

Renal transplantation had the best patient survival with 97% survival at 5 years and 10 years. HD patients consistently showed better survival compared to PD patients and this disparity becomes more marked when censored for change of dialysis modality. The separation of the survival curve became more obvious after about 4 to 5 years of dialysis with PD patients showing a poorer outcome compared to HD. (Figure 6.10b)

Table 5.10 (a): Patient survival by dialysis modality analysis (not censored with change of modality)

Modality Interval (months)	Transplant			PD			HD		
	n	% survival	SE	n	% survival	SE	n	% survival	SE
0	68	100		732	100		596	100	
6	67	97	2	678	97	1	556	96	1
12	67	97	2	631	94	1	529	94	1
24	65	97	2	536	88	1	459	89	1
36	64	97	2	454	85	1	414	86	1
48	61	97	2	397	82	2	362	83	2
60	59	97	2	343	79	2	325	82	2
72	58	97	2	301	76	2	278	80	2
84	56	97	2	255	72	2	247	78	2
96	55	97	2	221	70	2	211	76	2
108	55	97	2	194	68	2	187	75	2
120	54	97	2	144	65	2	167	75	2

Figure 5.10 (a): Patient survival by dialysis modality analysis (not censored with change of modality)

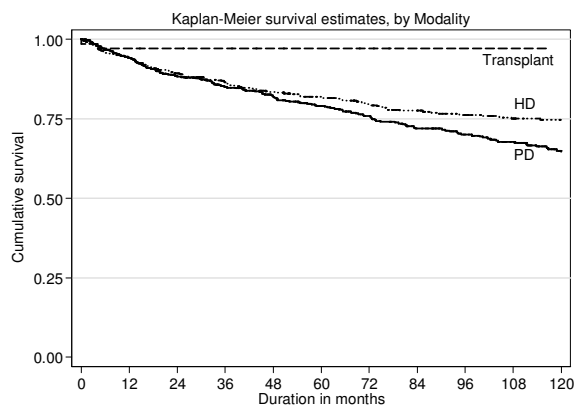


Figure 5.10 (b): Patient survival by dialysis modality analysis (censored with change of modality)

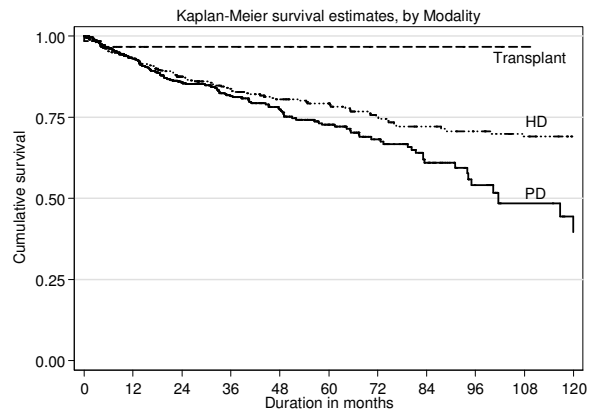


Table 5.10 (b): Patient survival by dialysis modality analysis (censored with change of modality)

Modality Interval (months)	Transplant			PD			HD		
	n	% survival	SE	n	% survival	SE	n	% survival	SE
0	68	100		732	100		596	100	
6	57	97	2	555	96	1	444	95	1
12	51	97	2	471	93	1	384	93	1
24	47	97	2	337	86	2	304	88	2
36	46	97	2	244	81	2	252	83	2
48	45	97	2	185	77	2	201	81	2
60	41	97	2	134	73	2	169	79	2
72	39	97	2	96	68	3	133	75	3
84	38	97	2	58	61	4	109	72	3
96	36	97	2	30	54	5	95	71	3
108	33	97	2	14	48	6	81	69	3
120	32	97	2	9	39	7	69	69	3

After the first year; dialysis technique failure rate was much higher amongst PD patients with progressive widening of the technique survival curve with increasing years on dialysis. Technique survival at 5 years was only 49% for PD compared to 77% for HD. (Table 5.11) The graft survival for paediatric transplants was 91% at 1 year and 79% at 5 years. (Table 5.12)

Table 5.11: Dialysis technique survival by modality, 2002-2011

Interval (months)	PD			HD		
	n	% survival	SE	n	% survival	SE
0	767	100		714	100	
6	696	95	1	640	94	1
12	608	89	1	574	91	1
24	445	78	2	443	84	1
36	316	66	2	372	81	2
48	237	58	2	305	78	2
60	168	49	2	258	77	2
72	123	41	2	206	74	2
84	78	31	2	176	71	2
96	49	24	2	135	69	2
108	33	20	2	110	68	2
120	19	17	3	91	68	2

Figure 5.11: Dialysis technique survival by modality, 2002-2011

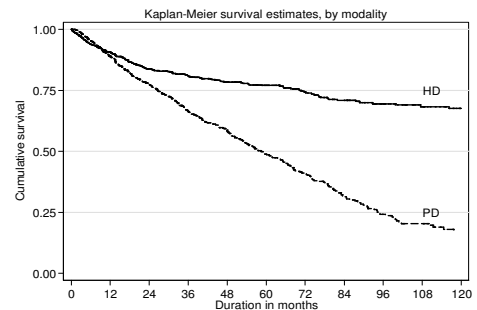


Table 5.12: Transplant graft survival, 2002-2011

Interval (month)	n	% survival	SE
0	252	100	
6	221	92	2
12	213	91	2
24	196	87	2
36	174	85	2
48	150	81	3
60	130	79	3
72	109	77	3
84	91	72	3
96	80	70	4
108	69	66	4

Figure 5.12: Transplant graft survival, 2002-2011

