CHAPTER 11

PAEDIATRIC REPORT

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This year the paediatric report will include three focused sections –

- an overview of frequency, causes and treatment modalities for children with ESKD
- dialysis adequacy data, technique survival and peritonitis
- anaemia

INCIDENCE AND PREVALENCE OF ESKD IN CHILDREN AND ADOLESCENTS 1980-2004

GENERAL OVERVIEW

As shown in Figure 11.1 the incidence of children and adolescents developing ESKD and being treated with renal replacement therapy has remained consistent at around 8-10 per million in the past 25 years. This reflects a stable incidence of disease and threshold for treatment during this time period.

In comparison, the prevalence of treated ESKD has steadily increased since 1980, from about 25 to 50 per million population 0-19 years old. Given the stable incidence this is due to the increased duration that children and adolescents have ESKD, and demonstrates improved survival. This appears to be the case for all age groups.

Figure 11.1 Incidence of RRT per million population in the 0 - 19 year age group

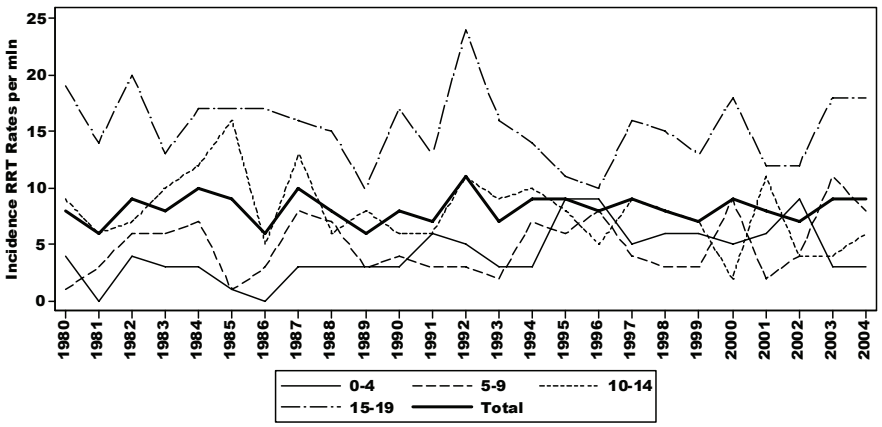
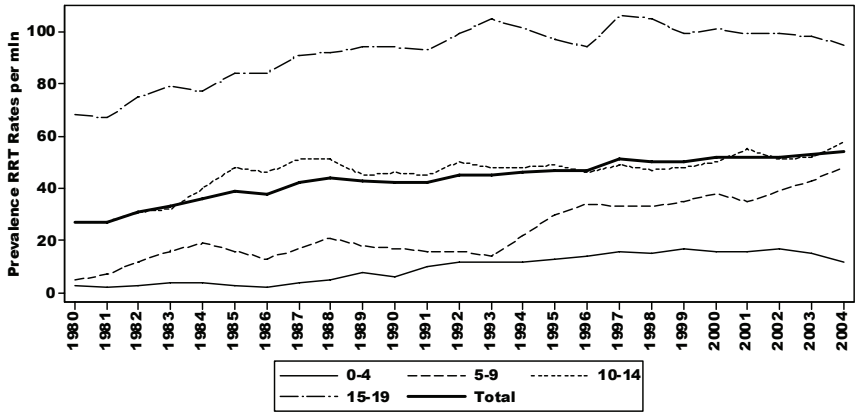


Figure 11.2 Prevalence of RRT per million population in the 0 - 19 year age group



Causes of ESKD in Children and Adolescents 1999-2004

Overall, glomerulonephritis remains the most common cause of ESKD in children and adolescents (42%) but causes vary significantly with age. In young children hypoplasia/dysplasia is the most common cause, whereas among older children and adolescents reflux nephropathy is an important cause.

Figure 11.3

Causes of End Stage Kidney Disease
By Age Group 1999 - 2004

Primary Renal Disease	Age Groups				Total
	0-4	5-9	10-14	15-19	
Glomerulonephritis	2 (2%)	13 (13%)	16 (16%)	66 (68%)	**97 (100%)**
Familial Glomerulonephritis	-	-	1 (9%)	10 (91%)	**11 (100%)**
Reflux Nephropathy	1 (3%)	6 (18%)	3 (9%)	23 (70%)	**33 (100%)**
Polycystic Kidney Disease	-	3 (43%)	3 (43%)	1 (14%)	**7 (100%)**
Medullary Cystic Disease	1 (6%)	2 (12%)	5 (31%)	8 (50%)	**16 (100%)**
Posterior Urethral Valve	9 (45%)	2 (10%)	5 (25%)	4 (20%)	**20 (100%)**
Haemolytic Uraemic Syndrome	-	2 (50%)	-	2 (50%)	**4 (100%)**
Hypoplasia/Dysplasia	14 (41%)	11 (32%)	8 (24%)	1 (3%)	**34 (100%)**
Diabetes	-	-	-	1 (100%)	**1 (100%)**
Cortical Necrosis	3 (27%)	2 (18%)	3 (27%)	3 (27%)	**11 (100%)**
Interstitial Nephritis	-	1 (17%)	-	5 (83%)	**6 (100%)**
Cystinosis	-	3 (50%)	3 (50%)	-	**6 (100%)**
Uncertain	1 (12%)	-	4 (50%)	3 (37%)	**8 (100%)**
Miscellaneous/Other	14 (30%)	12 (26%)	5 (11%)	15 (33%)	**46 (100%)**
Total	**45 (15%)**	**57 (19%)**	**56 (19%)**	**142 (47%)**	**300 (100%)**

Modality of Treatment 1999-2004

The modality of the first renal replacement treatment is shown in Figure 11.4. Although the numbers are small and therefore fluctuate from year to year, around 15% of children receive a pre-emptive kidney transplant with the remainder split equally between peritoneal dialysis and haemodialysis.

For prevalent patients (fig 11.5), a very different pattern is seen with the great majority of children and adolescents with a functioning transplant. This reflects the relatively high rate of transplantation among children.

Figure 11.4

Modality of Initial Renal Replacement Therapy
By Year of First Treatment, all Australia and New Zealand
< 20 Years of Age at First Treatment

Current Treatment	Year					
	2000	2001	2002	2003	2004	Total
Haemodialysis	20 (36%)	27 (47%)	24 (38%)	28 (42%)	31 (54%)	**130 (43%)**
Peritoneal Dialysis	24 (44%)	23 (40%)	33 (52%)	28 (42%)	21 (37%)	**129 (43%)**
Transplant	11 (20%)	8 (14%)	6 (10%)	11 (16%)	5 (9%)	**41 (14%)**
Total	**55 (100%)**	**58 (100%)**	**63 (100%)**	**67 (100%)**	**57 (100%)**	**300 (100%)**

Figure 11.5

Modality of Treatment for all Patients in Australia and New Zealand < 20 Years of Age at 31-December

Current Treatment	Year					
	2000	2001	2002	2003	2004	Total
Haemodialysis	47 (14%)	56 (16%)	51 (14%)	43 (12%)	56 (15%)	**253 (14%)**
Peritoneal Dialysis	58 (17%)	59 (17%)	70 (20%)	67 (18%)	49 (13%)	**303 (17%)**
Transplant	234 (69%)	231 (67%)	238 (66%)	256 (70%)	261 (71%)	**1220 (69%)**
Total	**339 (100%)**	**346 (100%)**	**359 (100%)**	**366 (100%)**	**366 (100%)**	**1776 (100%)**

DIALYSIS ADEQUACY DATA, TECHNIQUE SURVIVAL AND PERITONITIS

DATA PROVISION FOR DIALYSIS ADEQUACY AND DELIVERY

For haemodialysis patients, treating centres have no difficulty in providing data on dialysis delivery (100% completion) and only minor difficulty for adequacy data (75% completion). The provision of data is poorer for peritoneal dialysis patients where active testing procedures are required, for example, PET and clearance tests. Overall, PET results were only reported for around 40% of paediatric patients who received PD, with similar proportions for residual renal function and for peritoneal Kt/V. Completion is greater for older than younger patients (in whom testing presents some logistic challenges). There are also country differences, with completion rates for PD data higher in NZ than Australia These findings may reflect the attitude of paediatric nephrologists towards the value of adequacy testing in children, particularly within Australia. This situation contrasts with adequacy data for adults, which has good completion rates in both countries. Analyses of PD adequacy data for the paediatric group are therefore not presented. However, this is a problem under active investigation.

Figure 11.6

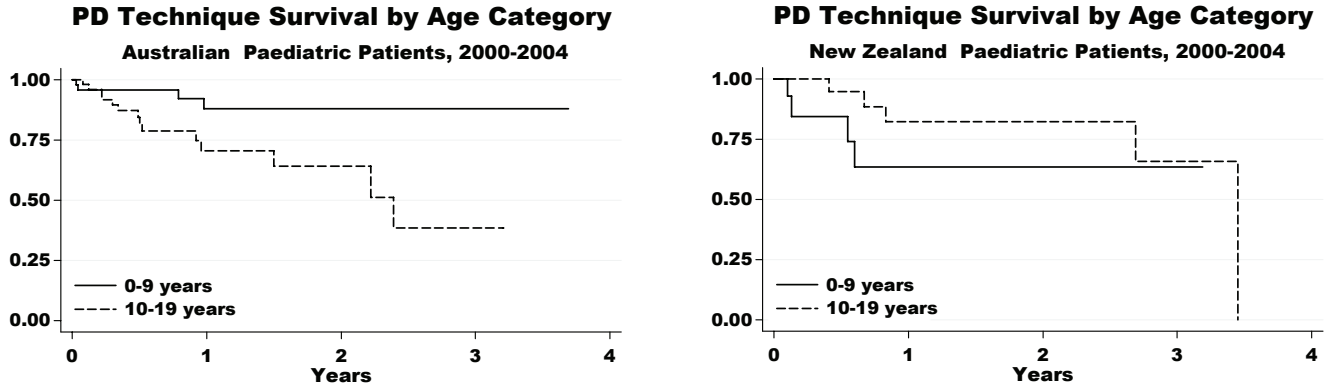
Percentage of Survey Questions Completed January 2000 - December 2004

	Age	% of HD Related Questions Answered			% of PD Related Questions Answered				
		HD Frequency	HD	URR +	Weekly	PET	Weekly	KtV	Residual
Australia	**Total**	**100%**	**100%**	**76%**	**99%**	**28%**	**32%**	**33%**	**33%**
	0-9 years	100%	100%	77%	100%	9%	12%	13%	15%
	10-19 years	100%	100%	76%	99%	46%	51%	51%	49%
New Zealand	**Total**	**100%**	**100%**	**75%**	**100%**	**69%**	**61%**	**61%**	**59%**
	0-9 years	100%	100%	56%	100%	61%	54%	54%	50%
	10-19 years	100%	100%	77%	100%	73%	65%	65%	64%
Total		**100%**	**100%**	**76%**	**99%**	**40%**	**41%**	**41%**	**41%**

Peritoneal Dialysis Technique Survival

PD technique survival, censored for death, transplantation, loss to follow up and recovery of renal function is presented in Figure 11.7. The numbers available for analysis after the first year drop significantly in each age group in both countries probably due to early transplantation. Technique failure is relatively high among teenagers in Australia and among younger children in New Zealand and occurs at a steady rate from commencement.

Figure 11.7



Peritonitis

Although the number of cases is relatively small, the present data for the recent five year period show that for children and young people on peritoneal dialysis, peritonitis is a common experience (38% in Australia and 44% in New Zealand) (fig 11.8). As expected, it is more prevalent in the pre-school age group but still remarkably common in both countries amongst most age groups. Further studies are required to explore the causes of peritonitis and technique failure in peritoneal dialysis patients within the paediatric age range.

Figure 11.8

Patients Experiencing One or More Episodes of Peritonitis January 2000 - December 2004

Age Groups	Peritonitis		
	Yes	No	TOTAL
Australia			
0-4 years	13	12	**25**
5-9 years	24	10	**34**
10-14 years	9	8	**17**
15-19 years	30	16	**46**
Total	**76**	**46**	**122**
New Zealand			
0-4 years	3	5	**8**
5-9 years	1	7	**8**
10-14 years	11	4	**15**
15-19 years	10	4	**14**
Total	**25**	**20**	**45**

PAEDIATRIC ANAEMIA MANAGEMENT

A cross-sectional survey of anaemia management was undertaken on all patients treated within Australian and New Zealand Paediatric Units at the ANZDATA census date of 30 December, 2004. On that date, 252 patients were receiving care in Paediatric Units, with 39 (15%) being treated with either peritoneal dialysis or haemodialysis and 213 (85%) having received a kidney transplant. Data on anaemia management in the transplant population are not included in this report.

The distribution of haemoglobin according to dialysis modality is shown in Figure 11.9. Fourteen percent of haemodialysis patients and 33% of peritoneal dialysis patients were below the currently recommended target haemoglobin concentration of 10 g/dl (p=0.20). There was no significant relationship between age and haemoglobin level (fig 11.10).

Figure 11.9 Haemoglobin level according to dialysis modality

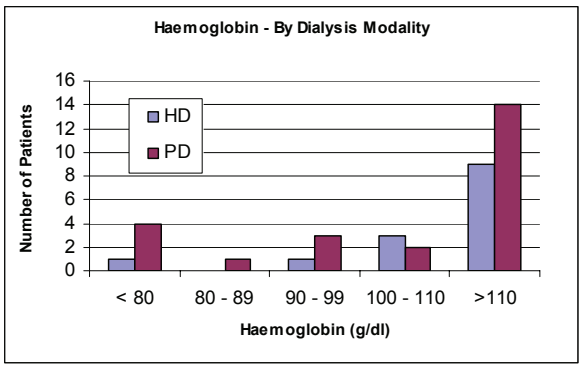
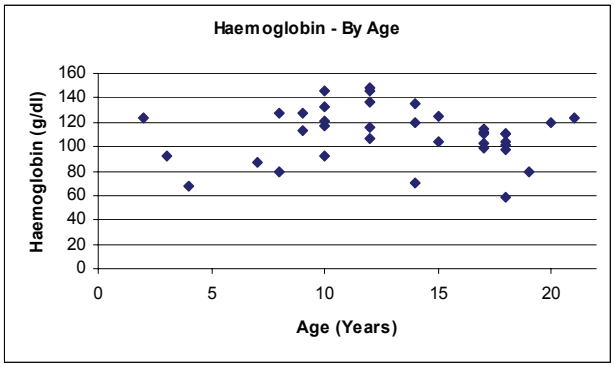


Figure 11.10 Age distribution of haemoglobin level



The transferrin and ferritin levels were not significantly different between haemodialysis and peritoneal dialysis groups (fig 11.11). Five children had ferritin levels <100 µg/l, nine had transferrin saturation levels <20% and three children had both.

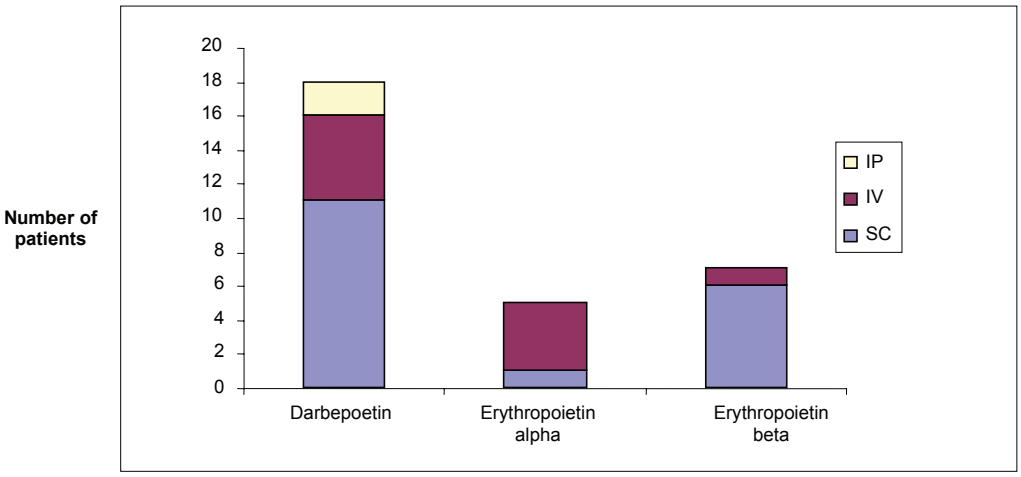
Figure 11.11

Iron Parameters for Dialysis Patients
Data are means and ranges

	HD n = 14	PD n = 24
Ferritin (µg/l)	331 (60 - 584)	533 (55 - 2115)
	p = 0.18	
Transferrin Saturation (%)	26 (7 - 46)	33 (11 - 86)
	p = 0.20	

Thirty eight (97%) of the dialysis patients were currently being treated with some form of recombinant erythropoietin. Method of administration varied with most children on darbepoetin treated subcutaneously, and all but one patient on erythropoeitin treated intravenously (fig 11.12).

Figure 11.12 Type and Mode of Administration of Erythropoietin.



This data provides a brief snapshot of anaemia management of paediatric dialysis patients within Australian and New Zealand. Further studies in paediatric populations are required to assess the impact of haemoglobin level on important clinical outcomes such as cardiovascular disease.