CHAPTER 11

PAEDIATRIC

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2013 Annual Report - 36th Edition

This year, as well as providing a summary of current trends in the frequency and causes of ESKD, the paediatric report will focus on dialysis delivery and adequacy, technique survival and biochemical outcomes, as well as an overview of the frequency, causes and treatment of children and adolescents with ESKD.

Incidence and Prevalence of ESKD in Children and Adolescents 1991 - 2012

General Overview

As shown in Figure 11.1, there is no clear long term trend in the incidence of children and adolescents developing ESKD and being treated with renal replacement therapy, although there are fluctuations from year to year. Prevalent numbers of treated ESKD have gradually increased across all age groups reflecting improved survival through increased duration of ESKD (Figure 11.2).

Figure 11.1

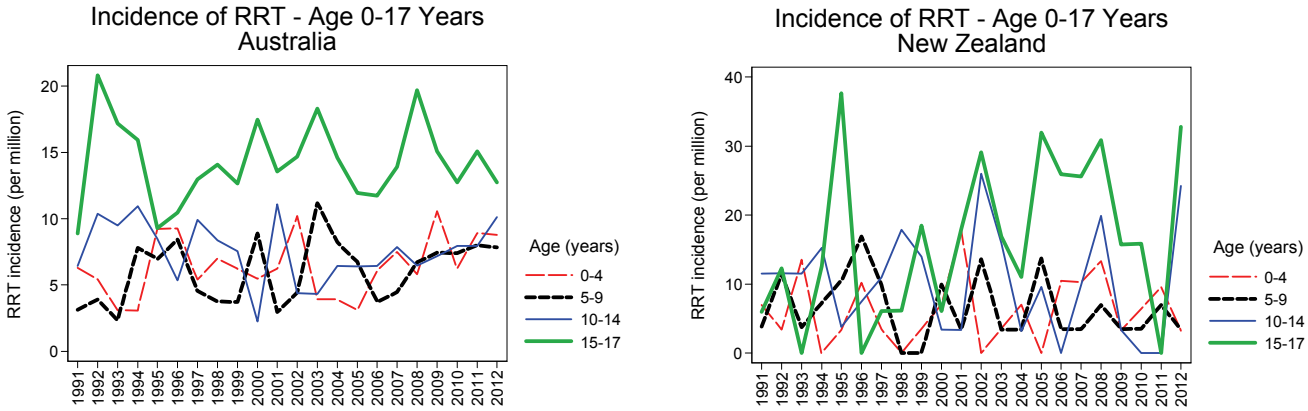
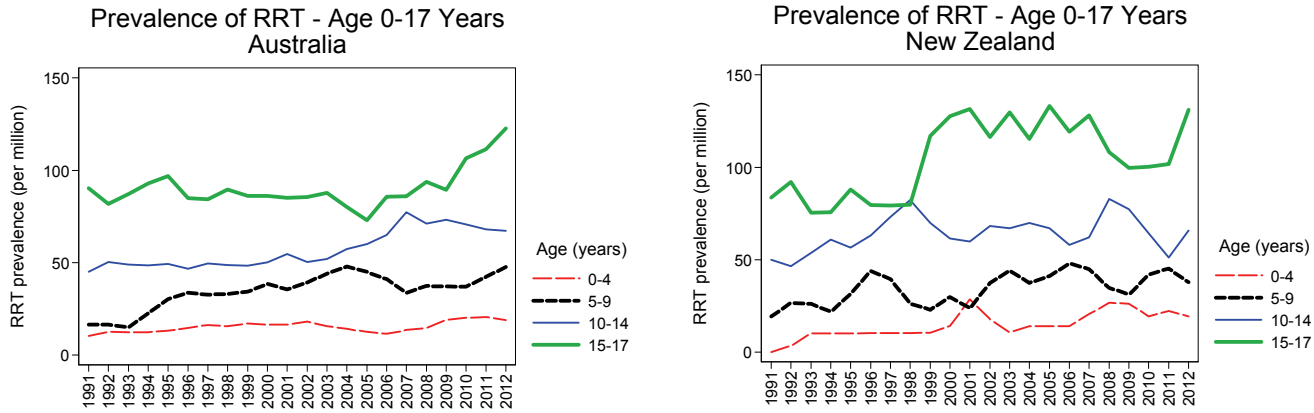


Figure 11.2



CAUSES OF ESKD IN CHILDREN AND ADOLESCENTS 2007 - 2012

Overall, glomerulonephritis remains the most common cause of ESKD in children and adolescents (29%) but causes vary significantly with age. In young children renal hypoplasia/dysplasia is the most common cause while reflux nephropathy is a common cause of ESKD in adolescents.

Figure 11.3

Causes of End Stage Kidney Disease In Children and Adolescents 2007 - 2012 Australia and New Zealand

Primary Renal Disease	Age Groups (Years)				Total
	0-4	5-9	10-14	15-17	
GN	10 (12%)	20 (31%)	27 (33%)	40 (40%)	97 (29%)
Familial GN	-	-	2 (2%)	3 (3%)	5 (2%)
Reflux Nephropathy	4 (5%)	2 (3%)	5 (6%)	10 (10%)	21 (6%)
Polycystic Kidney Disease	8 (10%)	5 (8%)	1 (1%)	2 (2%)	16 (5%)
Medullary Cystic Disease	-	1 (2%)	4 (5%)	2 (2%)	7 (2%)
Posterior Urethral Valve	7 (9%)	-	11 (13%)	2 (2%)	20 (6%)
Haemolytic Uraemic Syndrome	7 (9%)	1 (2%)	2 (2%)	2 (2%)	12 (4%)
Hypoplasia/Dysplasia	24 (29%)	14 (22%)	10 (12%)	14 (14%)	62 (19%)
Diabetes	-	-	1 (1%)	-	1 (0%)
Cortical Necrosis	2 (2%)	2 (3%)	2 (2%)	3 (3%)	9 (3%)
Interstitial Nephritis	-	1 (2%)	1 (1%)	1 (1%)	3 (1%)
Cystinosis	-	1 (2%)	1 (1%)	-	2 (1%)
Uncertain	1 (1%)	2 (3%)	-	5 (5%)	8 (2%)
Misc/Other	19 (23%)	16 (25%)	16 (19%)	16 (16%)	67 (20%)
Total	82	65	83	100	330

MODALITY OF TREATMENT 2007 - 2012

The modality of the first renal replacement treatment is shown in Figure 11.4. Although numbers are small and therefore fluctuate from year to year, around 20% of children and adolescents receive pre-emptive kidney transplants. Of the remainder, similar numbers commence renal replacement therapy with haemodialysis or peritoneal dialysis.

Figure 11.4

Modality of Initial Renal Replacement Therapy
By Year of First Treatment - Australia and New Zealand
< 18 Years of Age at First Treatment

Current Treatment	Year						
	2007	2008	2009	2010	2011	2012	Total
0-9 Years	**20**	**23**	**27**	**22**	**29**	**26**	**147**
HD	4 (20%)	6 (26%)	4 (15%)	5 (23%)	10 (34%)	8 (31%)	37 (25%)
PD	14 (70%)	15 (65%)	17 (63%)	14 (64%)	14 (48%)	12 (46%)	86 (59%)
Transplant	2 (10%)	2 (9%)	6 (22%)	3 (14%)	5 (17%)	6 (23%)	24 (16%)
10-17 Years	31	38	27	25	24	38	183
HD	12 (39%)	22 (58%)	12 (44%)	13 (52%)	8 (33%)	16 (42%)	83 (45%)
PD	12 (39%)	8 (21%)	12 (44%)	5 (20%)	10 (42%)	15 (39%)	62 (34%)
Transplant	7 (23%)	8 (21%)	3 (11%)	7 (28%)	6 (25%)	7 (18%)	38 (21%)
Total	51	61	54	47	53	64	330

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

Figure 11.5

Modality of Treatment for all Patients in Australia and New Zealand
< 18 Years of Age at 31st December

Current Treatment	Year						
	2007	2008	2009	2010	2011	2012	Total
Haemodialysis	24 (8%)	35 (11%)	29 (9%)	30 (9%)	29 (9%)	30 (8%)	177 (9%)
Peritoneal Dialysis	55 (18%)	54 (17%)	57 (18%)	50 (15%)	52 (16%)	49 (14%)	317 (16%)
Transplant	229 (74%)	225 (72%)	229 (73%)	245 (75%)	251 (76%)	275 (78%)	1454 (75%)
Total	**308**	**314**	**315**	**325**	**332**	**354**	**1948**

DIALYSIS DELIVERY AND ADEQUACY

DIALYSIS HOURS

Figure 11.6 and 11.7 summarise the recent trends in HD practice among Paediatric patients.

Figure 11.6

Mean Sessions per Week (95% CI)
Among Haemodialysis Patients
December 2008-2012

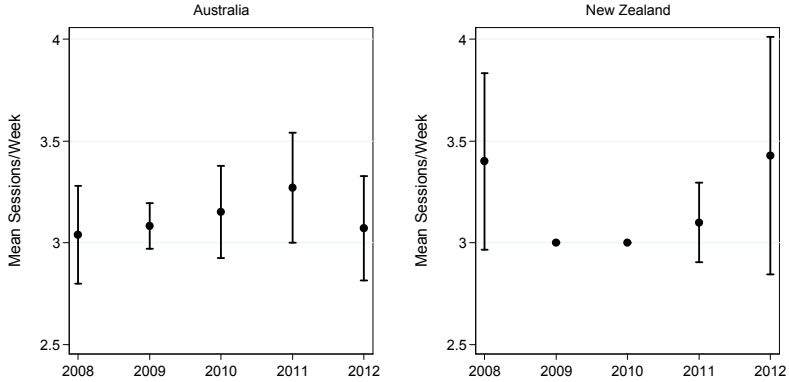
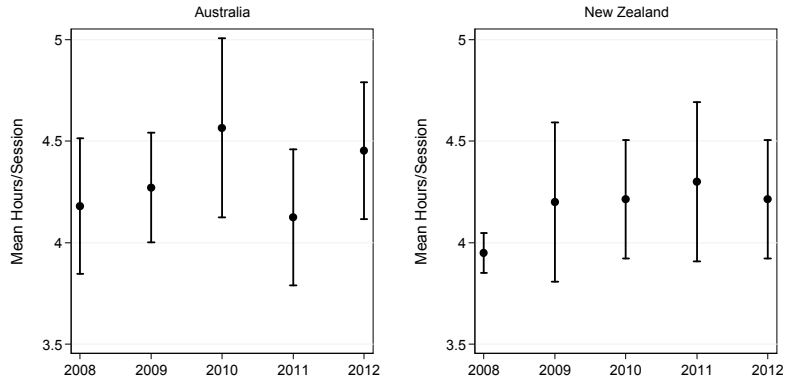


Figure 11.7

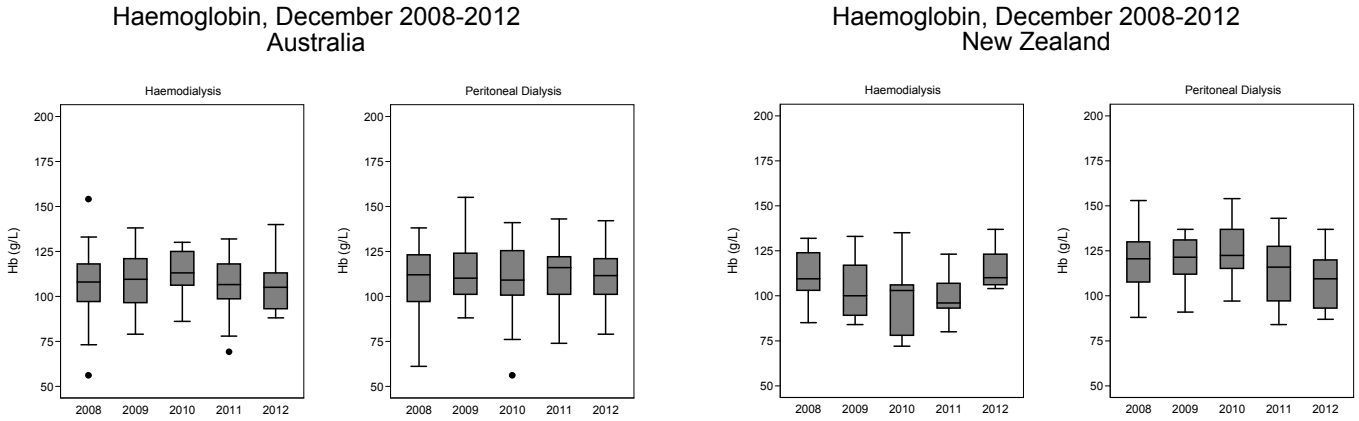
Mean Hours per Session (95% CI)
Among Haemodialysis Patients
December 2008-2012



HAEMOGLOBIN

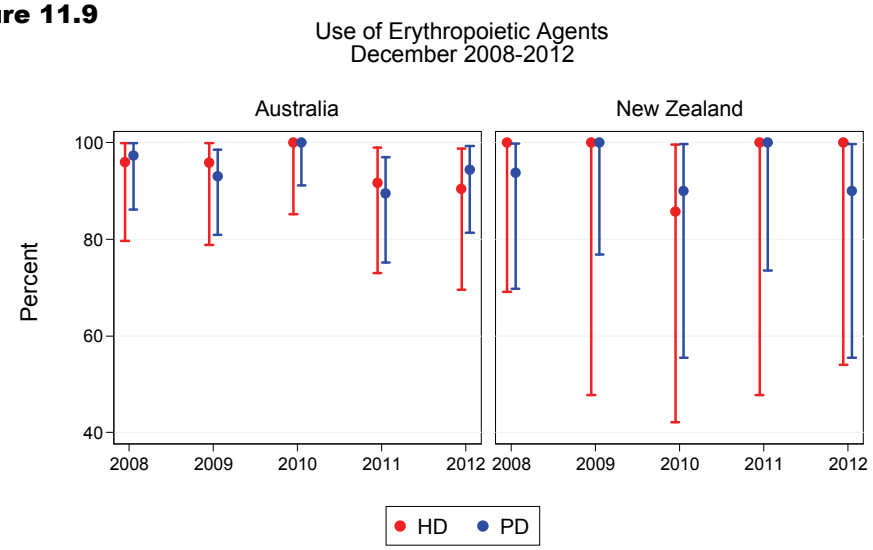
Various dialysis process indicators are summarized in Figures 11.8 - 11.16. For all of these graphs, the box indicates the 25th, 50th, and 75th centiles. The “Whiskers” indicate the 95th centiles for each category.

Figure 11.8



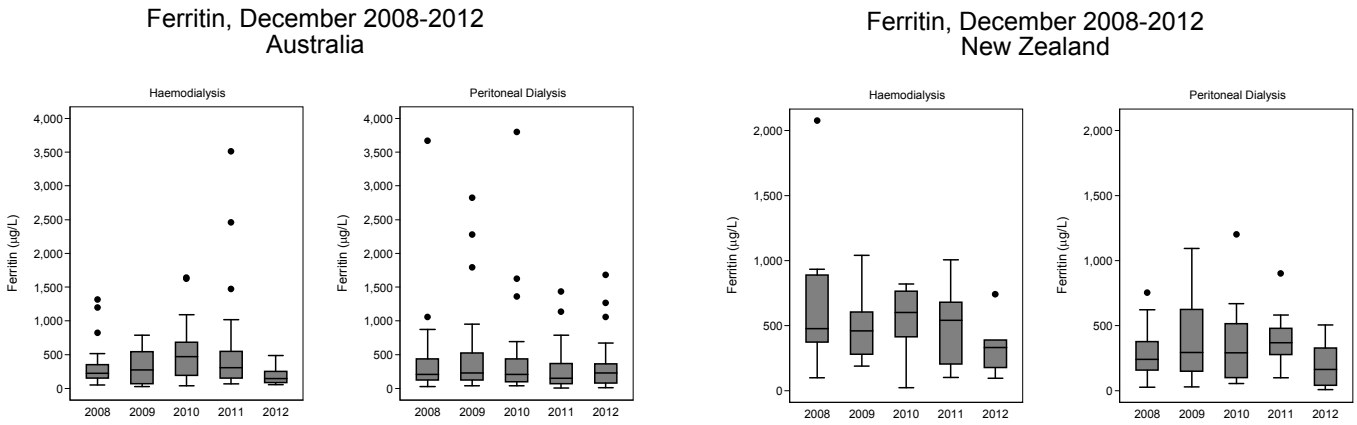
ERYTHROPOIETIC AGENT USAGE

Figure 11.9



FERRITIN

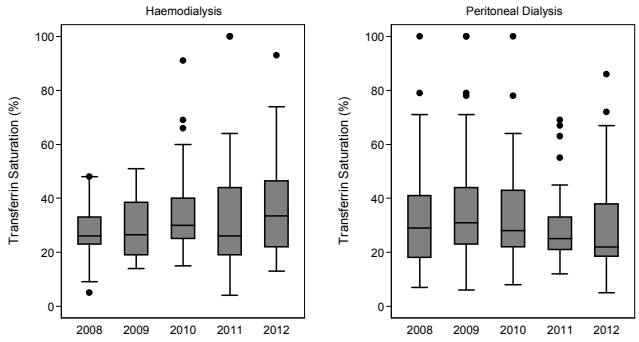
Figure 11.10



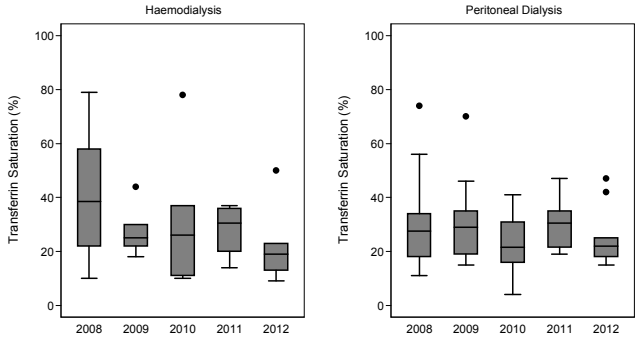
TRANSFERRITIN SATURATION

Figure 11.11

Transferrin Saturation, December 2008-2012
Australia



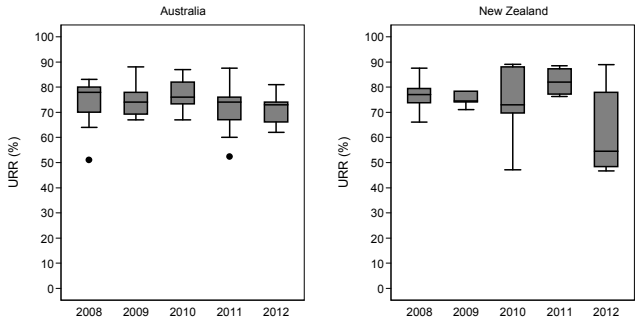
Transferrin Saturation, December 2008-2012
New Zealand



UREA REDUCTION RATIO (HD PATIENTS)
KT/V (PD PATIENTS)

Figure 11.12

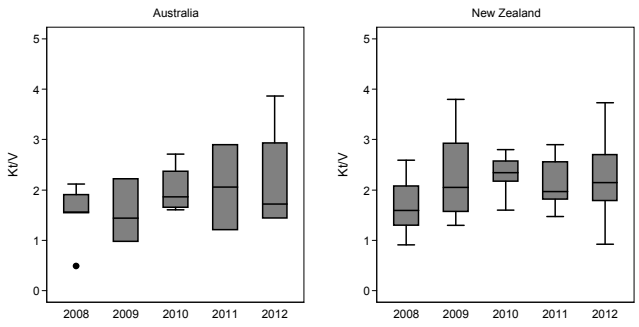
Urea Reduction Ratio (HD Patients)
December 2008-2012



URR ≥ 90% excluded as non-physiological.

Figure 11.13

Kt/V (PD Patients)
December 2008-2012



Kt/V > 4 excluded as non-physiological.

Dialysis adequacy is reported for the majority of NZ patients. However the reporting rates of adequacy for Australian patients are low, particularly for those on PD. The NZ data suggest that the majority of patients meet accepted targets for adequacy.

Figure 11.14

Proportion of Prevalent Patients for whom URR or Kt/V was reported < 18 Years of Age at 31st December in Australia and New Zealand 2008 - 2012

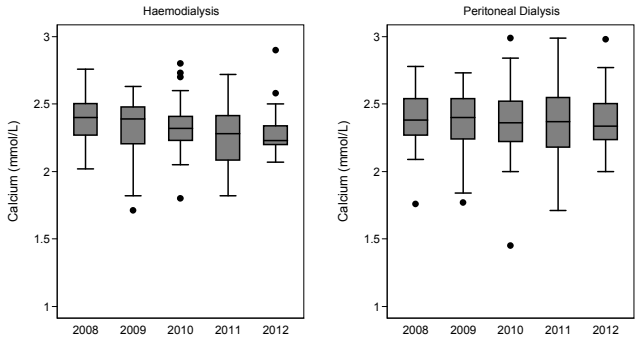
Current Treatment	Modality	Year				
		2008	2009	2010	2011	2012
Australia	Haemodialysis	56%	96%	96%	63%	61%
Australia	Peritoneal Dialysis	13%	7%	10%	5%	10%
New Zealand	Haemodialysis	80%	100%	100%	80%	86%
New Zealand	Peritoneal Dialysis	94%	93%	90%	100%	80%

BIOCHEMICAL OUTCOMES

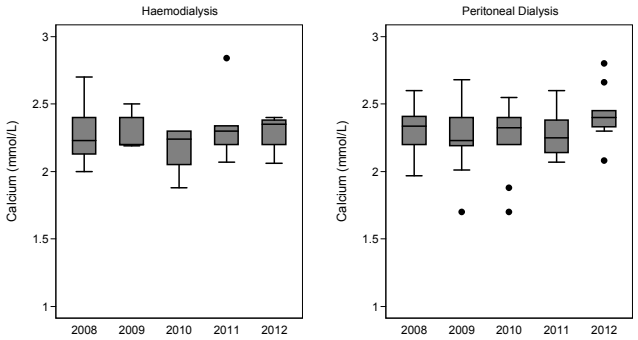
SERUM CALCIUM

Figure 11.15

Serum Calcium, December 2008-2012
Australia



Serum Calcium, December 2008-2012
New Zealand

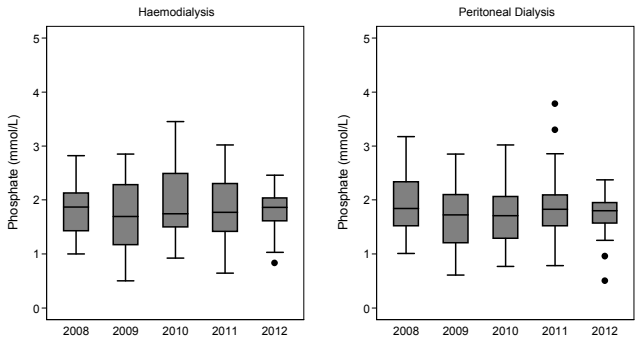


SERUM PHOSPHATE

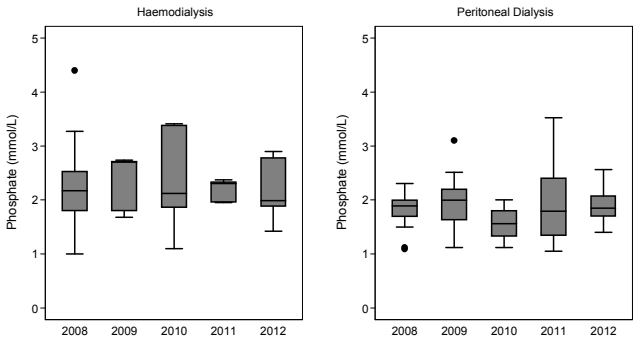
For HD patients, Serum Phosphate is reported from a pre-dialysis specimen of a mid–week session.

Figure 11.16

Serum Phosphate, December 2008-2012
Australia



Serum Phosphate, December 2008-2012
New Zealand

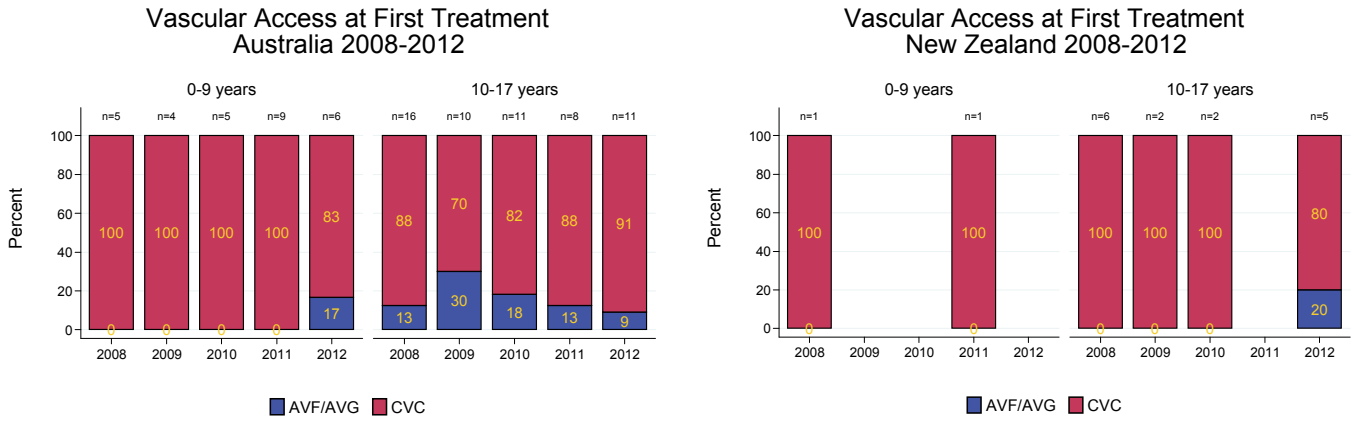


Vascular Access

Vascular access for haemodialysis is summarised in Figures 11.17 -11.18.

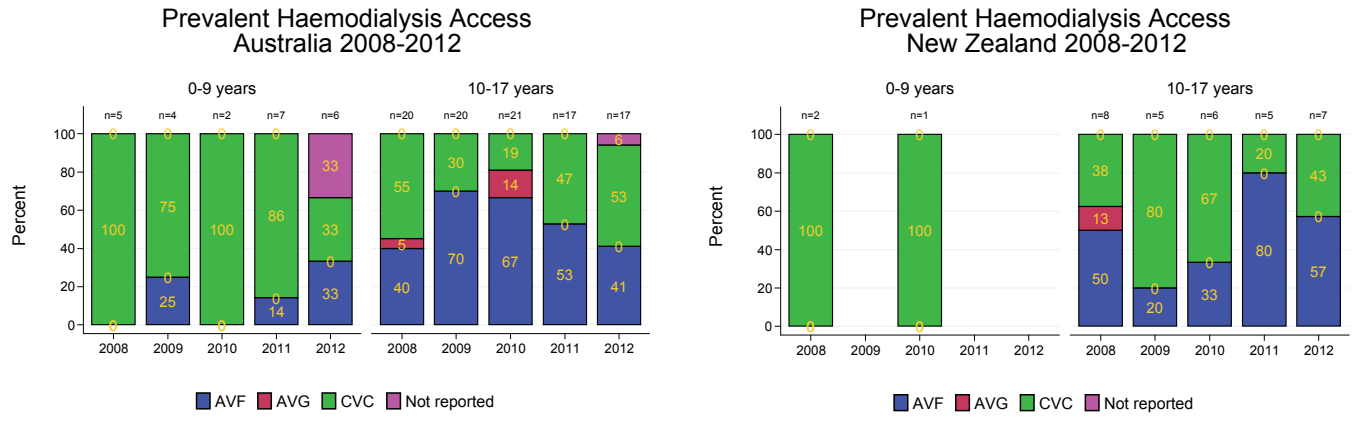
At First Treatment Haemodialysis Access

Figure 11.17



Prevalent Haemodialysis Access

Figure 11.18



HAEMODIALYSIS SURVIVAL BY AGE CATEGORY

Figure 11.19

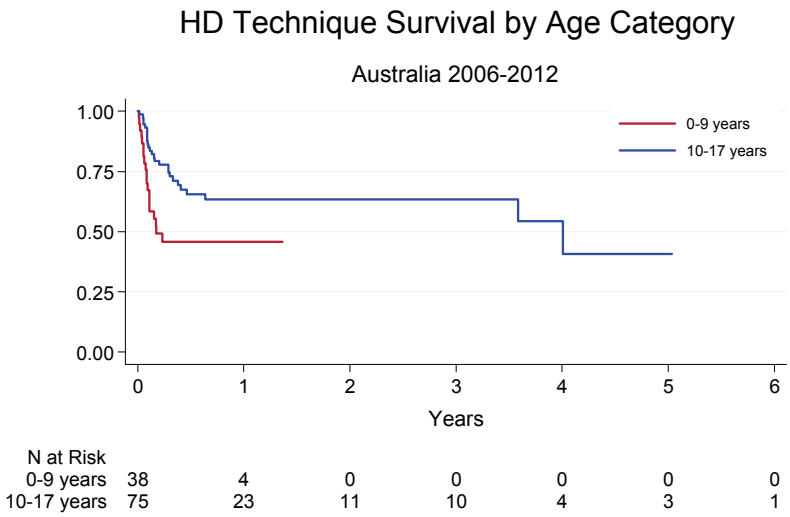
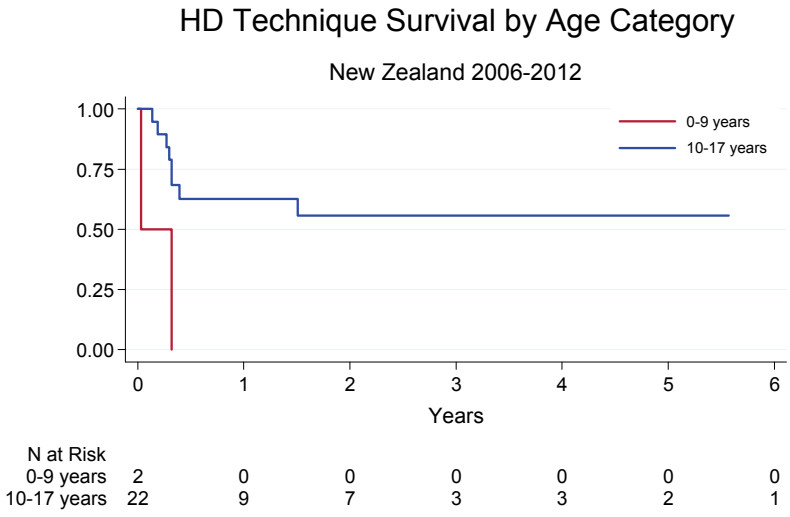


Figure 11.20



Haemodialysis technique survival, censored for transplantation, loss to follow-up and recovery of renal function is presented above

Of the total 137 patients, 54 changed from HD to PD. Of those 54 patients, 30% changed within 30 days, 35% changed between 1 to 2 months and 31% changed between 2 and 6 months. 31% of patients received a transplant within 1 year and 34% received a transplant within 2 years.

PD Technique Survival by Age Category

PD technique survival, censored for transplantation, loss to follow-up and recovery of renal function is presented below. The numbers available for analysis after the first year drop significantly in each age group in both countries, due to transplantation. Of the 170 patients, 41 (24%) received a transplant within one year of commencement of RRT. By two years a total of 73 (43%) of patients had received transplants.

Use of PD solutions is shown in Figure 11.23.

Figure 11.21

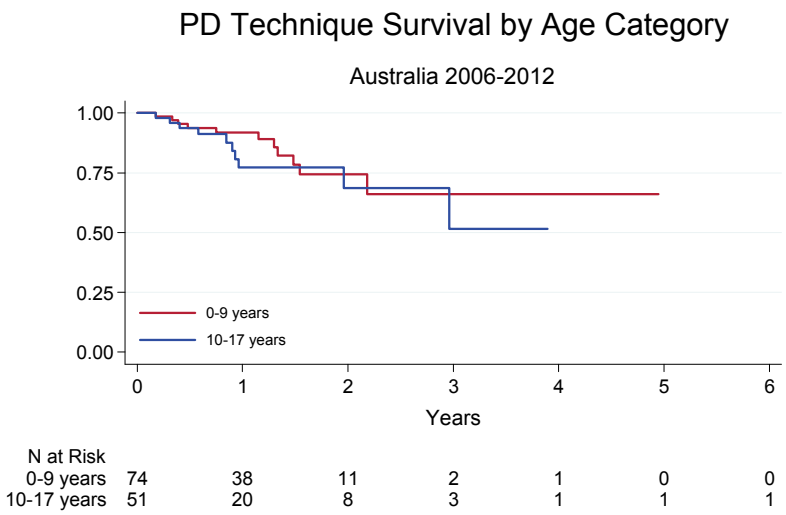


Figure 11.22

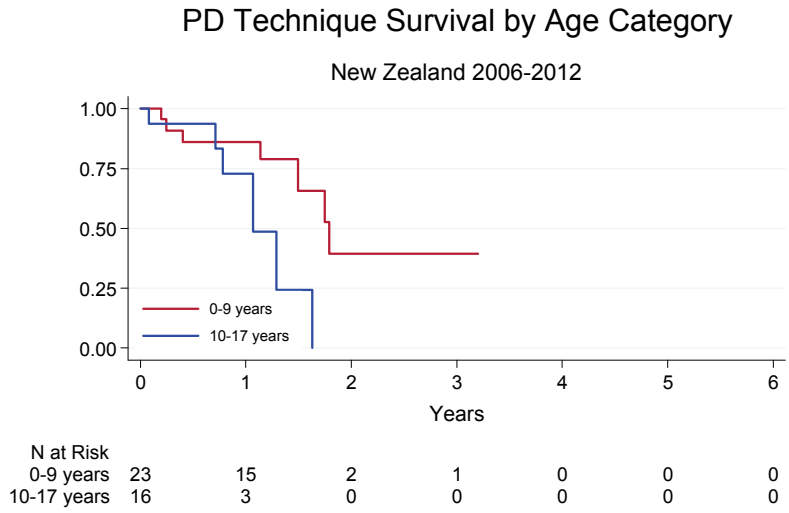


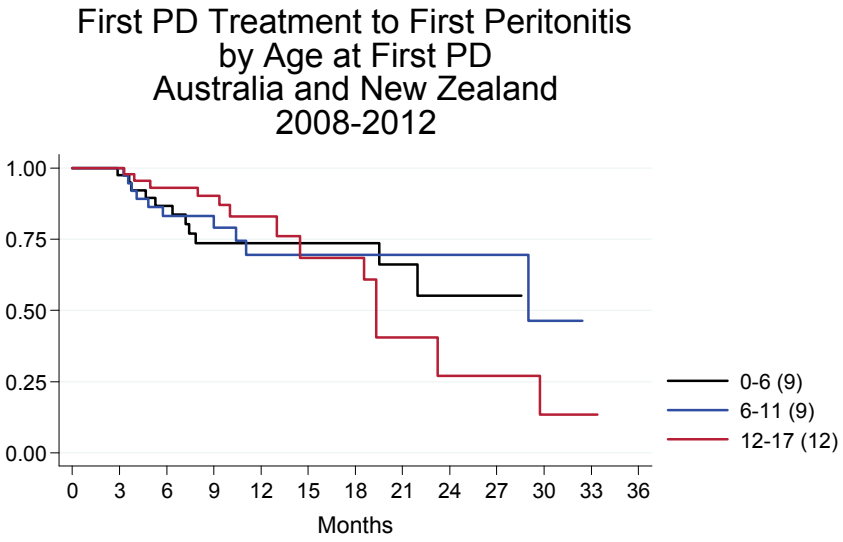
Figure 11.23

Use of PD Solutions 2009 - 2012

Solutions	Australia				New Zealand			
	2009	2010	2011	2012	2009	2010	2011	2012
	(n = 43)	(n = 40)	(n = 40)	(n = 39)	(n = 14)	(n = 10)	(n = 12)	(n = 10)
Glucose	42 (98%)	30 (75%)	28 (70%)	35 (90%)	14 (100%)	10 (100%)	12 (100%)	10 (100%)
Icodextrin	2 (5%)	2 (5%)	6 (15%)	9 (23%)	1 (7%)	0 (0%)	2 (17%)	3 (30%)
Low GDP Lactate	11 (26%)	17 (43%)	11 (28%)	5 (13%)	12 (86%)	8 (80%)	10 (83%)	5 (50%)
Low GDP Bicarbonate	1 (2%)	8 (20%)	6 (15%)	4 (10%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Time to First Peritonitis For Patients < 18 years old

Figure 11.24



Prior to 2012, there has not been an appreciable change in peritonitis rates in Australia, which have been around 1 episode of peritonitis per patient year. Time from commencement of PD to first peritonitis tends to be shorter in younger patients.

Peritonitis Rates For Patients < 18 years old

Figure 11.25