



CHAPTER 12

Paediatric Patients with Kidney Failure Requiring Replacement Therapy

As well as a summary of current trends in the frequency and causes of Kidney Failure in paediatrics, this report focuses specifically on current trends in the epidemiology and outcomes of paediatric dialysis

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SUMMARY AND HIGHLIGHTS

The incidence of kidney replacement therapy (KRT) among children in Australia and New Zealand remains stable at approximately 8 per million population. Prevalence is also generally stable, with the exception of a gradual increase among children aged 10-17 years in Australia. Overall the prevalence is approximately 54 per million population.

The primary disease causing kidney failure treated with KRT differs by age groups. Congenital anomalies of the kidney and urinary tract (CAKUT) account for nearly 50% of incident cases in children under 5 years of age, compared with 27% in those aged 15-17 years. In contrast, glomerular disease is the primary diagnosis in 35% of incident cases among 15-17-year-olds, compared with 25% in children under 5 years. Since the introduction of the 2012 ERA-EDTA diagnostic codes, first used in the 2023 report (2022 data), the proportion of children coded as having an uncertain primary kidney disease has decreased from 11% to 7%. The proportion coded as miscellaneous has remained stable at 9%, and those with no diagnosis reported remains low at 1%. A key goal of the paediatric working group is to further reduce the number of children coded as uncertain or not reported. The increasing integration of genomics into routine clinical practice may assist with retrospective diagnostic clarification.

Over the past six years, pre-emptive transplantation has accounted for 17% of initial KRT modality in children; however, in 2024 this proportion was notably lower at 12%. While absolute numbers remain small and year-to-year variability is expected, there is no clear evidence of an upward trend. A higher-than-usual proportion of children commenced KRT with haemodialysis in 2024, particularly among those aged 10-17 years. Most of these patients were treated in adult renal units. This pattern may reflect later presentation and could partially explain the reduction in pre-emptive transplantation.

Educational participation appears stable, with 29% of school-aged children enrolled in modified education programmes. Body mass index (BMI) reporting was poor among children on peritoneal dialysis, which is unexpected given that this information is likely to be routinely collected in clinical care. Weight remains an important issue in the post-transplant population, with 36% of children classified as overweight or obese.

This year, as well as providing a summary of current trends in the frequency and causes of kidney failure, the paediatric report for 2024 data focuses on current trends in the epidemiology and outcomes of paediatric dialysis. Dialysis adequacy for peritoneal dialysis is not routinely measured in Australia. Among haemodialysis patients, urea reduction ratio (URR) has been recorded for only 64% of patients on average over the past five years. In contrast, dialysis adequacy is measured for both PD and HD patients in New Zealand. Across both countries, children receiving haemodialysis typically undergo three sessions per week, each lasting approximately four hours. Key haematological and biochemical parameters appear stable over time, as does the use of erythropoiesis-stimulating agents. Use of arteriovenous fistulas remains uncommon, particularly in Australia. This may reflect the relatively short duration of haemodialysis prior to transplantation in many paediatric patients. Peritonitis rates remain stable from year to year and do not appear to vary significantly by age, which is somewhat unexpected.

Overall, paediatric dialysis activity remains stable across Australia and New Zealand. The absence of routine conventional adequacy measures for peritoneal dialysis in Australia warrants further consideration, particularly in terms of how contemporary clinical practice can be better reflected in future registry data.

SUGGESTED CITATION

H McCarthy, C Davies, S Bateman, J Chen, P Clayton, D Forcey, F Kholmurodova, D Lee, K Marshall, S McDonald, W Mulley, K Polkinghorne, K Richards, M Roberts, B Solomon, G Irish. 48th Report, Chapter 12: Paediatric Patients with Kidney Failure Requiring Replacement Therapy. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2025. Available at: <http://www.anzdata.org.au>

INCIDENCE AND PREVALENCE

The definition of paediatric used throughout this chapter is any patient below 18 years of age (at the time of commencing kidney replacement therapy (KRT) for incident data, or at the time of the annual survey (31 December 2024) for prevalent data). It is acknowledged that some of these patients may have been receiving their care in adult renal units, and some patients treated in paediatric units who are aged 18 years or older will not be included.

Population estimates for Australia and New Zealand used throughout this chapter for the calculation of incidence per million population were sourced from the Australian Bureau of Statistics (2024)¹ and Stats NZ (2024)², respectively.

Figure 12.1 shows the annual incidence of KRT per million age matched population. There is no change in the incidence of KRT in children and adolescents in either Australia or New Zealand. The small absolute numbers of incident patients produce large year to year fluctuations.

Figure 12.1.1
Incidence of KRT - Age 0-17 Years - Australia

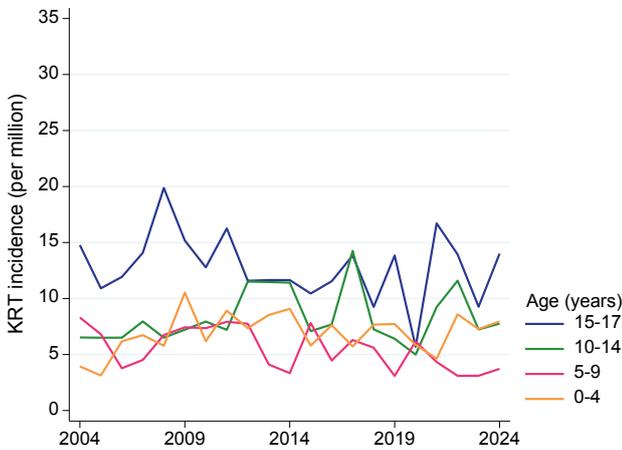
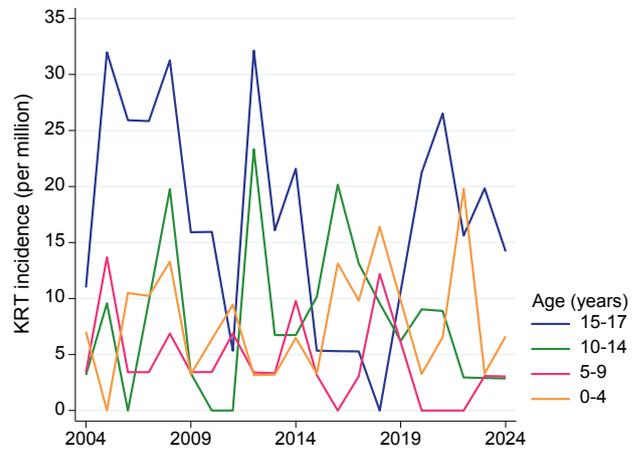


Figure 12.1.2
Incidence of KRT - Age 0-17 Years - New Zealand



In Australia the prevalent numbers of treated kidney failure have gradually increased in older age groups (Figure 12.2.1); the trends are less clear in New Zealand (Figure 12.2.2).

Figure 12.2.1
Prevalence of KRT - Age 0-17 Years - Australia

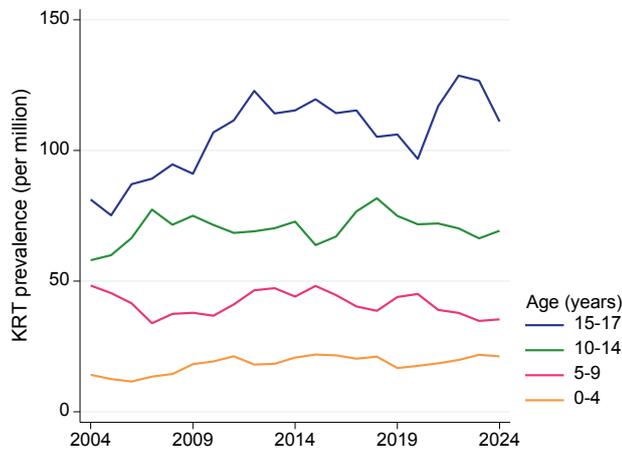
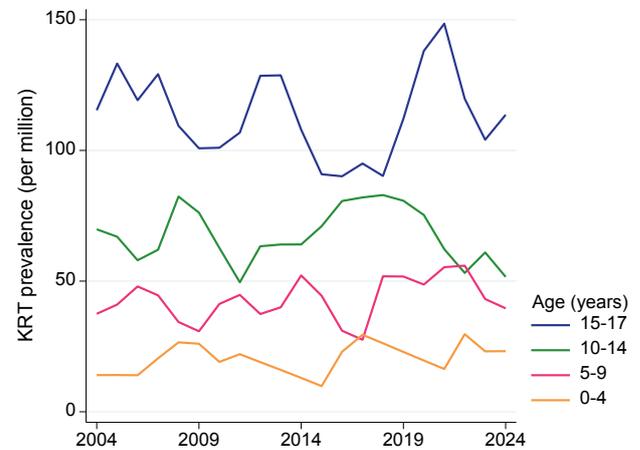


Figure 12.2.2
Prevalence of KRT - Age 0-17 Years - New Zealand



PRIMARY KIDNEY DISEASE

The primary kidney disease of new patients over 2019-2024 are shown by age group in Table 12.1. From 2022, primary kidney disease was collected according to the updated European Renal Association/European Dialysis and Transplantation Association categories, with primary diseases reported prior to 2022 mapped to these categories. Collectively, congenital abnormalities of the kidney and urinary tract (CAKUT) are the predominant cause of kidney failure in younger children, with glomerular disease being the most common cause in adolescents.

Table 12.1
Primary Kidney Disease by Age, Incident Patients Australia and New Zealand 2019-2024

Primary kidney disease	0-4	5-10	10-14	15-17	Total
CAKUT	39 (49%)	16 (38%)	34 (39%)	24 (27%)	113 (38%)
- Hypodysplasia/Dysplasia	26 (33%)	9 (21%)	26 (30%)	14 (16%)	75 (25%)
- Reflux Nephropathy	-	1 (2%)	3 (3%)	6 (7%)	10 (3%)
- Posterior Urethral Valves	13 (16%)	6 (14%)	5 (6%)	4 (4%)	28 (9%)
Glomerular Disease	20 (25%)	14 (33%)	24 (27%)	31 (35%)	89 (30%)
- Congenital Nephrotic Syndrome	16 (20%)	2 (5%)	2 (2%)	4 (4%)	24 (8%)
- Focal Segmental Glomerulosclerosis (FSGS)	1 (1%)	5 (12%)	8 (9%)	7 (8%)	21 (7%)
- Alport Syndrome	-	1 (2%)	-	4 (4%)	5 (2%)
Polycystic Kidney Disease	2 (3%)	1 (2%)	4 (5%)	-	7 (2%)
Nephronophthisis/ Autosomal Dominant Tubulointerstitial Kidney Disease (ADTKD)	4 (5%)	3 (7%)	5 (6%)	7 (8%)	19 (6%)
Haemolytic Uraemic Syndrome	3 (4%)	-	1 (1%)	-	4 (1%)
Cortical Necrosis	2 (3%)	-	2 (2%)	1 (1%)	5 (2%)
Interstitial Nephritis	-	1 (2%)	1 (1%)	2 (2%)	4 (1%)
Cystinosis	-	1 (2%)	4 (5%)	2 (2%)	7 (2%)
Uncertain	5 (6%)	2 (5%)	5 (6%)	8 (9%)	20 (7%)
Miscellaneous/Other	4 (5%)	4 (10%)	6 (7%)	14 (16%)	28 (9%)
Not reported	-	-	2 (2%)	-	2 (1%)
Total	79	42	88	89	298

MODALITY OF TREATMENT

The modality of the first kidney replacement treatment is shown in Table 12.2. Although numbers are small and therefore fluctuate from year to year, around 15-20% of children and adolescents receive pre-emptive kidney transplants. Of the remainder, PD is more common in younger patients (<10 years), and for older patients similar numbers start on HD and PD.

Table 12.2
Modality of Initial Kidney Replacement Therapy by Year of First Treatment, Australia and New Zealand

Age group	2019	2020	2021	2022	2023	2024	Total
0-9 Years	22	20	16	24	18	21	121
HD	3 (14%)	4 (20%)	5 (31%)	2 (8%)	4 (22%)	4 (19%)	22 (18%)
PD	15 (68%)	13 (65%)	8 (50%)	17 (71%)	11 (61%)	15 (71%)	79 (65%)
Transplant	4 (18%)	3 (15%)	3 (19%)	5 (21%)	3 (17%)	2 (10%)	20 (17%)
10-17 Years	26	20	38	36	26	31	177
HD	10 (38%)	5 (25%)	16 (42%)	13 (36%)	9 (35%)	17 (55%)	70 (40%)
PD	12 (46%)	10 (50%)	14 (37%)	20 (56%)	11 (42%)	10 (32%)	77 (44%)
Transplant	4 (15%)	5 (25%)	8 (21%)	3 (8%)	6 (23%)	4 (13%)	30 (17%)
Total	48	40	54	60	44	52	298

For prevalent patients (Table 12.3), a very different pattern is seen, with the great majority (79% in 2024) of children and adolescents with a functioning transplant. This reflects the relatively high rate of transplantation among children.

Table 12.3
Modality of Prevalent Patients by Year of Treatment, Australia and New Zealand

Current treatment	2019	2020	2021	2022	2023	2024
HD	16 (4%)	17 (5%)	21 (5%)	18 (5%)	14 (4%)	26 (7%)
PD [^]	47 (12%)	50 (13%)	53 (14%)	67 (17%)	52 (14%)	52 (14%)
Transplant	314 (83%)	306 (82%)	311 (81%)	309 (78%)	319 (83%)	300 (79%)
Total	377	373	385	394	385	378

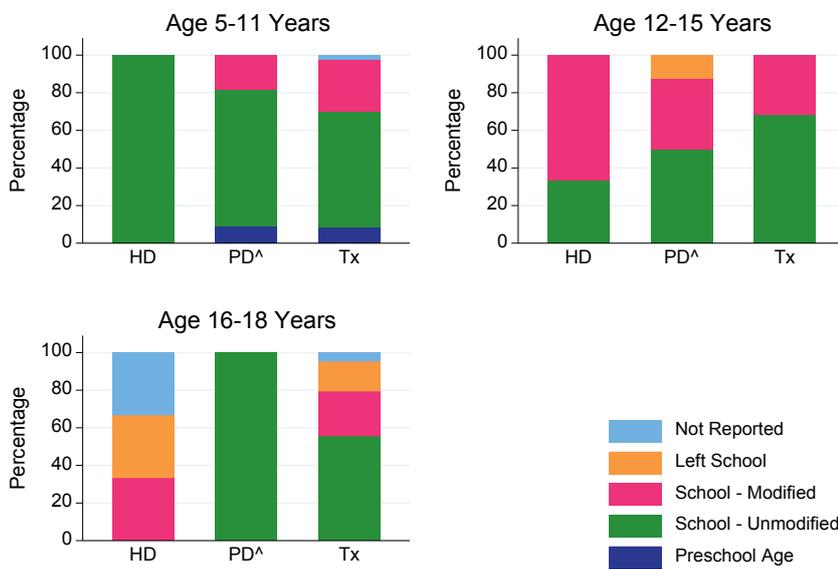
[^]Includes Hybrid Dialysis

PAEDIATRIC ASSESSMENT

The paediatric survey is collected on all children commencing kidney replacement therapy before the age of 15 and collection continues until they reach 18 years of age (children aged 15 years and older at time of starting KRT are excluded from the data presented below). This survey records data on height, weight and an assessment of educational participation.

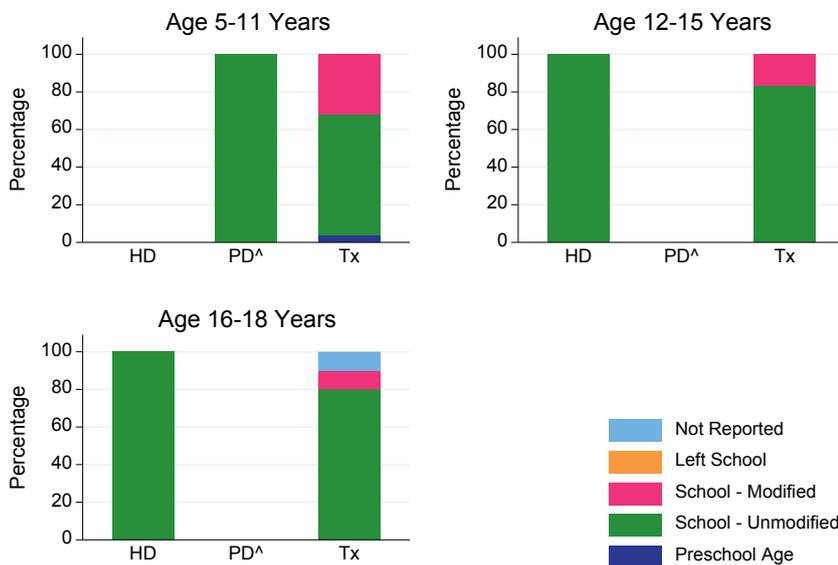
Amongst those 12 years or older, modified schooling (within an additional needs class and/or school, requirement for a teacher’s aid or home schooling) was undertaken for a substantial percentage of dialysis recipients (Figure 12.3 and Table 12.4). Note that multiple categories of paediatric assessment have been collapsed into single groups for reporting purposes (see the survey form for details: <https://anzorrg.org.au/data-management/data-forms>)

Figure 12.3.1
Educational Participation by Age Group and Treatment Modality - Australia 2024



^Includes Hybrid Dialysis

Figure 12.3.2
Educational Participation by Age Group and Treatment Modality - New Zealand 2024



^Includes Hybrid Dialysis

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Table 12.4
Educational Participation by Age Group and Treatment Modality 2024

Country	Educational Participation	Haemodialysis				Peritoneal Dialysis [^]				Transplant			
		5-11	12-15	16-18	Total	5-11	12-15	16-18	Total	5-11	12-15	16-18	Total
Australia	Preschool Age	0	0	0	0	1	0	0	1	7	0	0	7
	School - Unmodified	3	2	0	5	8	4	5	17	49	60	35	144
	School - Modified	0	4	1	5	2	3	0	5	22	28	15	65
	Left School	0	0	1	1	0	1	0	1	0	0	10	10
	Not reported	0	0	1	1	0	0	0	0	2	0	3	5
	Total	3	6	3	12	11	8	5	24	80	88	63	231
New Zealand	Preschool Age	0	0	0	0	0	0	0	0	1	0	0	1
	School - Unmodified	0	1	1	2	1	0	0	1	16	10	8	34
	School - Modified	0	0	0	0	0	0	0	0	8	2	1	11
	Left School	0	0	0	0	0	0	0	0	0	0	0	0
	Not reported	0	0	0	0	0	0	0	0	0	0	1	1
	Total	0	1	1	2	1	0	0	1	25	12	10	47

[^]Includes Hybrid Dialysis

Paediatric body mass index (BMI) categories are determined using age adjusted z-scores. Z-scores are calculated by comparing an individual's measurements to a 'growth reference' or 'growth standard'. In Australia, a higher proportion of transplant recipients and haemodialysis patients were overweight or obese, compared with children and adolescents treated with peritoneal dialysis (Figure 12.4 and Table 12.5). New Zealand data should be interpreted with caution due to low numbers of patients.

Figure 12.4.1
Body Mass Index of Prevalent Paediatric Patients by Treatment Modality - Australia 2024

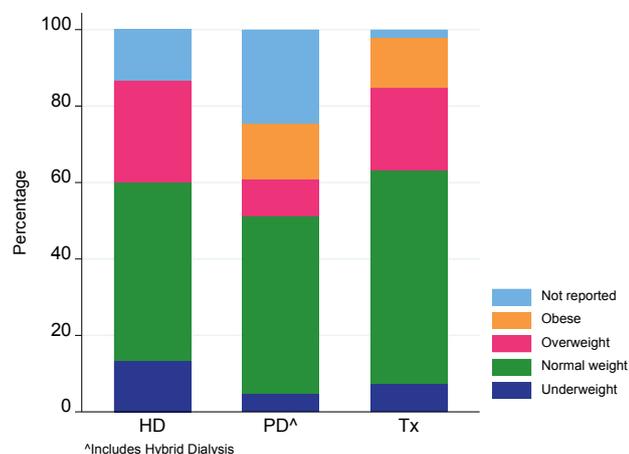
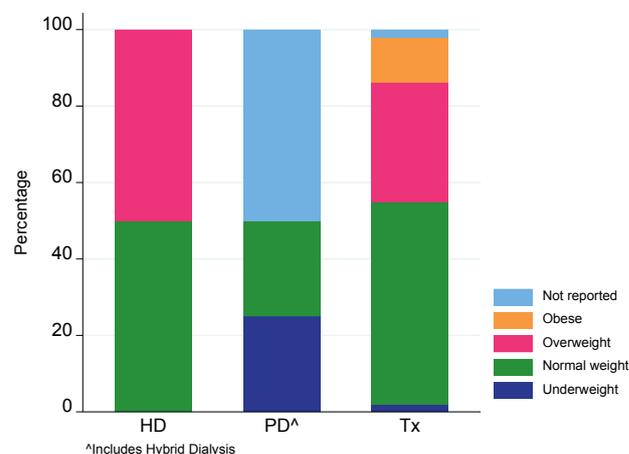


Figure 12.4.2
Body Mass Index of Prevalent Paediatric Patients by Treatment Modality - New Zealand 2024



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Table 12.5
Body Mass Index by Treatment Modality 2024

Country	Body Mass Index	Haemodialysis	Peritoneal Dialysis [^]	Transplant	Total
Australia	Underweight	2	2	18	22
	Normal weight	7	19	136	162
	Overweight	4	4	52	60
	Obese	0	6	32	38
	Not reported	2	10	5	17
	Total	15	41	243	299
New Zealand	Underweight	0	1	1	2
	Normal weight	1	1	27	29
	Overweight	1	0	16	17
	Obese	0	0	6	6
	Not reported	0	2	1	3
	Total	2	4	51	57

[^]Includes Hybrid Dialysis

DIALYSIS DELIVERY AND ADEQUACY

Various dialysis process indicators are summarized in Figures 12.5 to 12.14. For all of these graphs, the box indicates the 25th, 50th, and 75th centiles. The “whiskers” indicate the 95th centiles for each category.

Figure 12.5.1
Haemoglobin, Paediatric Dialysis Patients - Australia, December 2020-2024

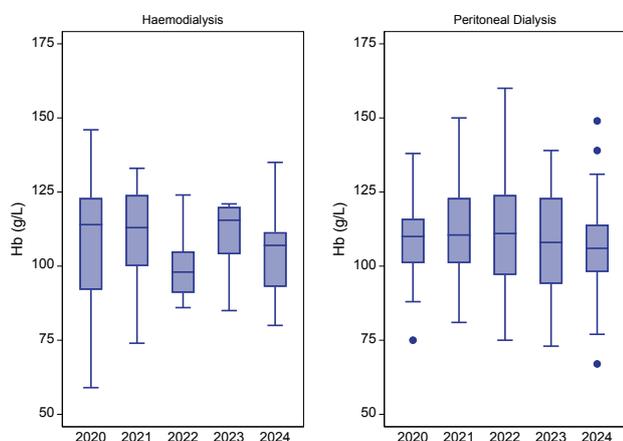


Figure 12.5.2
Haemoglobin, Paediatric Dialysis Patients - New Zealand, December 2020-2024

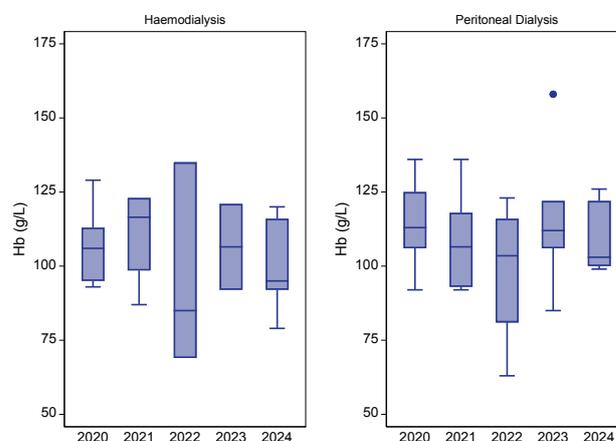


Figure 12.6
Use of Erythropoietic Agents in Paediatric Dialysis Patients (95% CI) - December 2020-2024

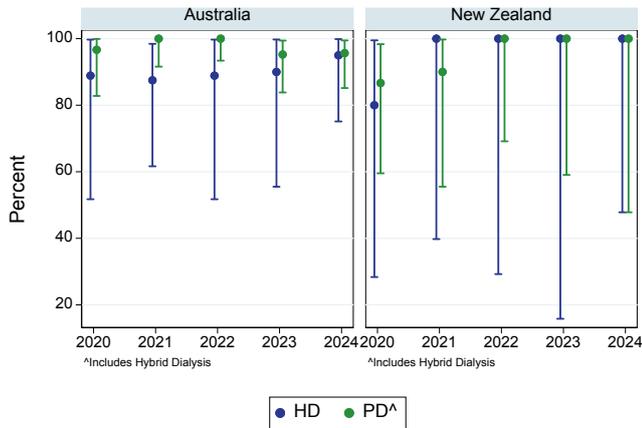


Figure 12.7.1
Ferritin, Paediatric Dialysis Patients - Australia, December 2020-2024

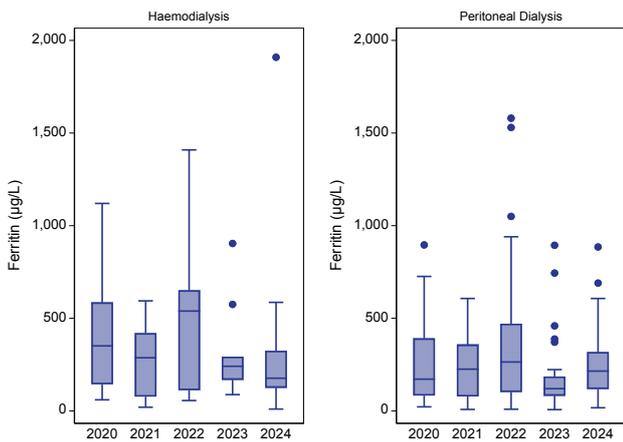


Figure 12.7.2
Ferritin, Paediatric Dialysis Patients - New Zealand, December 2020-2024

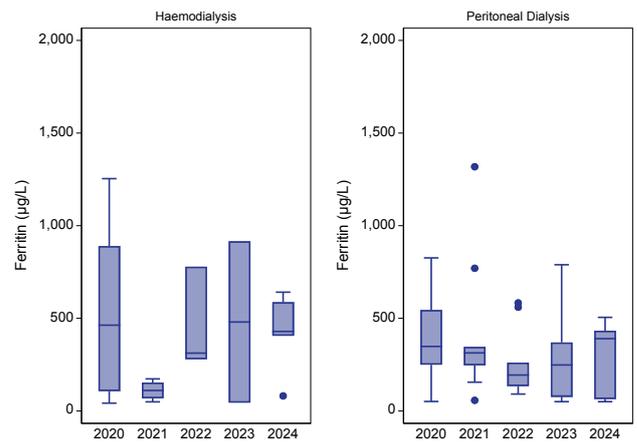


Figure 12.8.1
Transferrin Saturation, Paediatric Dialysis Patients - Australia, December 2020-2024

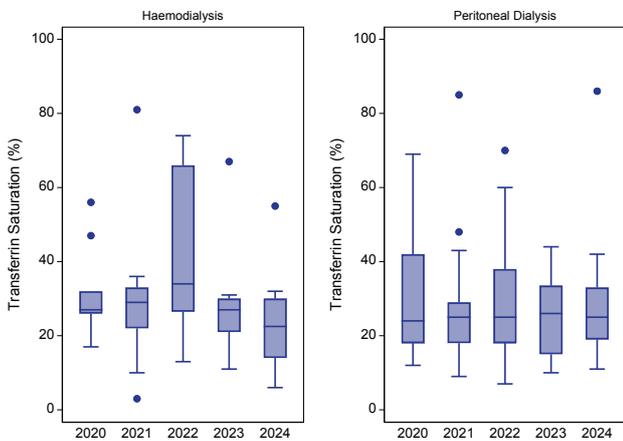


Figure 12.8.2
Transferrin Saturation, Paediatric Dialysis Patients - New Zealand, December 2020-2024

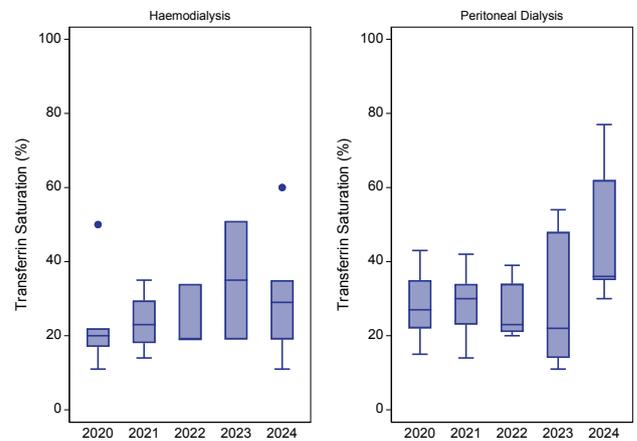


Figure 12.9.1
Serum Calcium, Paediatric Dialysis Patients - Australia, December 2020-2024

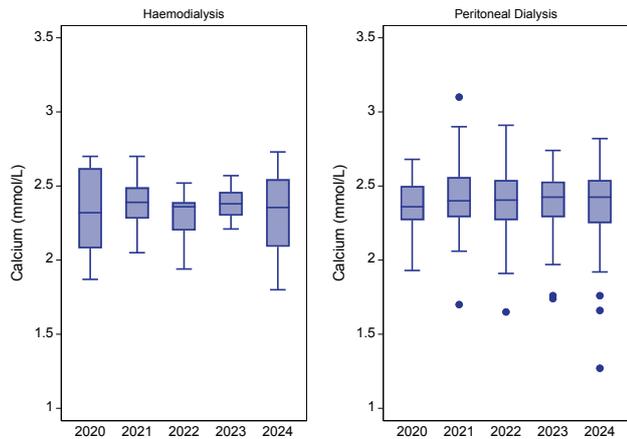


Figure 12.9.2
Serum Calcium, Paediatric Dialysis Patients - New Zealand, December 2020-2024

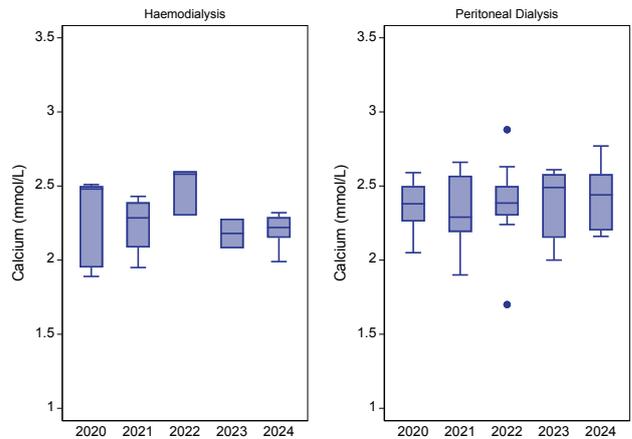


Figure 12.10.1
Serum Phosphate, Paediatric Dialysis Patients - Australia, December 2020-2024

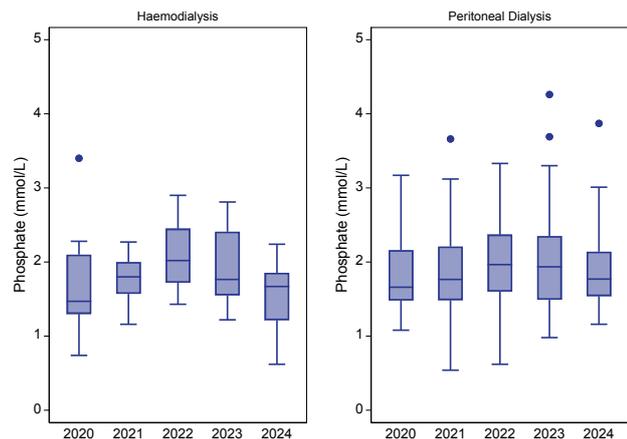
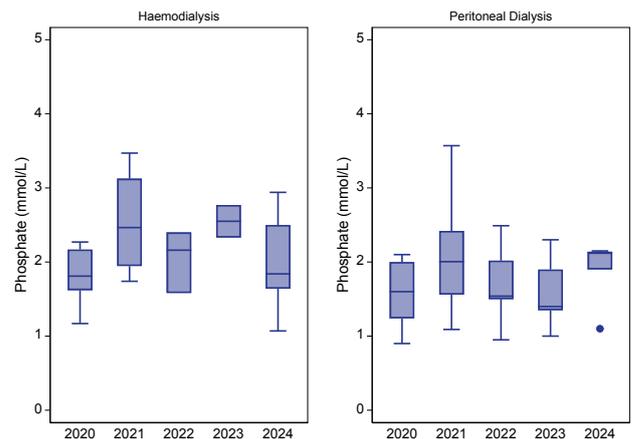


Figure 12.10.2
Serum Phosphate, Paediatric Dialysis Patients - New Zealand, December 2020-2024



Figures 12.11 and 12.12 summarise the recent trends in HD prescription among paediatric patients.

Figure 12.11
Mean Sessions per Week (95% CI) - Among Paediatric Haemodialysis Patients December 2020-2024

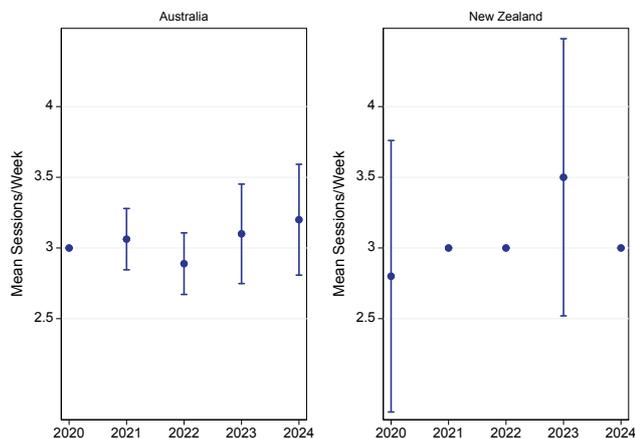
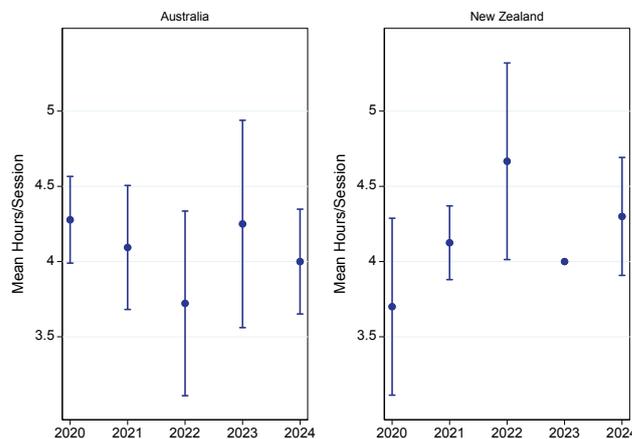


Figure 12.12
Mean Hours per Session (95% CI) - Among Paediatric Haemodialysis Patients December 2020-2024



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Figures 12.13 and 12.14 show measures of dialysis adequacy for Australia and New Zealand. Note that very few units in Australia report Kt/V for paediatric patients on peritoneal dialysis.

Figure 12.13
Urea Reduction Ratio (Paediatric HD Patients) - December 2020-2024

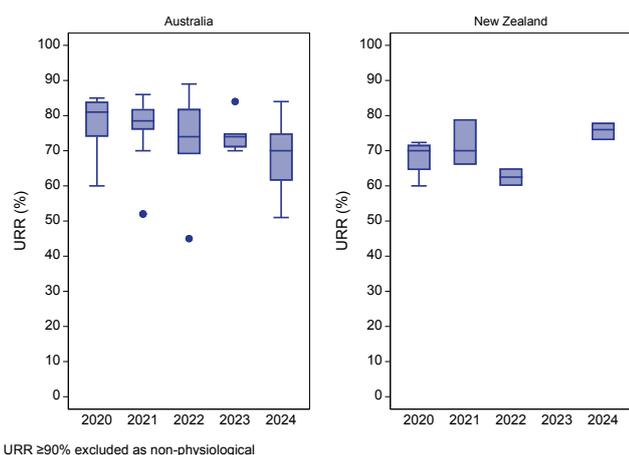


Figure 12.14
Kt/V (Paediatric PD Patients) - December 2020-2024

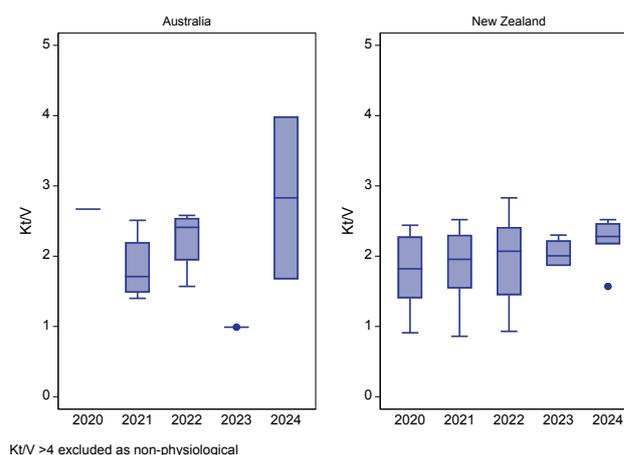


Table 12.6
Proportion of Prevalent Paediatric Dialysis Patients for whom URR or Kt/V was reported 2020-2024

Country	Modality	2020	2021	2022	2023	2024
Australia	HD	67%	82%	47%	50%	76%
	PD [^]	3%	14%	11%	2%	4%
New Zealand	HD	80%	75%	67%	100%	100%
	PD [^]	73%	80%	80%	57%	100%

[^]Includes Hybrid Dialysis

VASCULAR ACCESS

Vascular access for haemodialysis is summarised in Figures 12.15 and 12.16. The majority of paediatric patients commence haemodialysis via a central line. In 2024 in Australia, 10% of prevalent paediatric haemodialysis patients were dialysing via a native arteriovenous fistula; this figure was 20% in New Zealand.

Figure 12.15.1
Incident Haemodialysis Access, Paediatric HD Patients - Australia 2020-2024

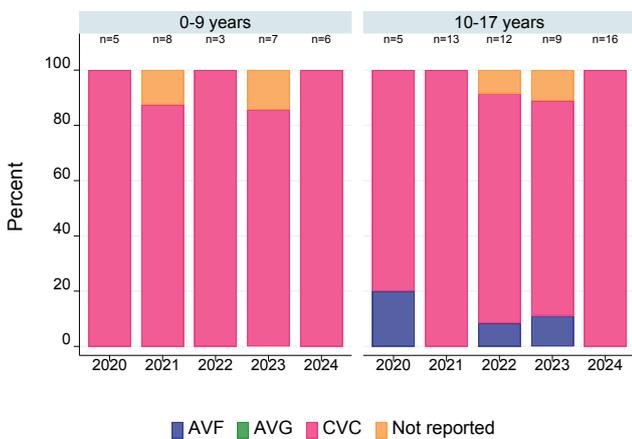


Figure 12.15.2
Incident Haemodialysis Access, Paediatric HD Patients - New Zealand 2020-2024

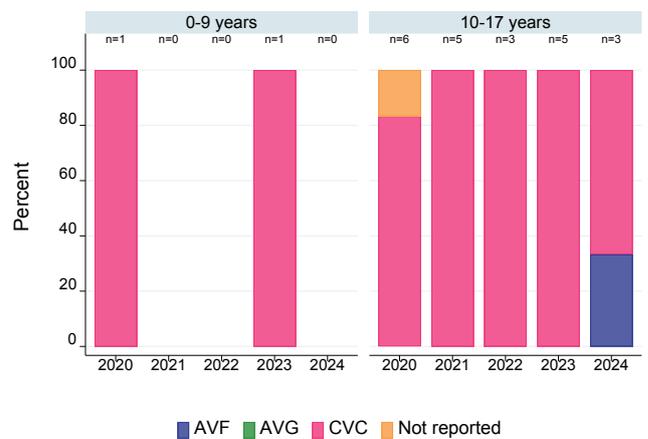
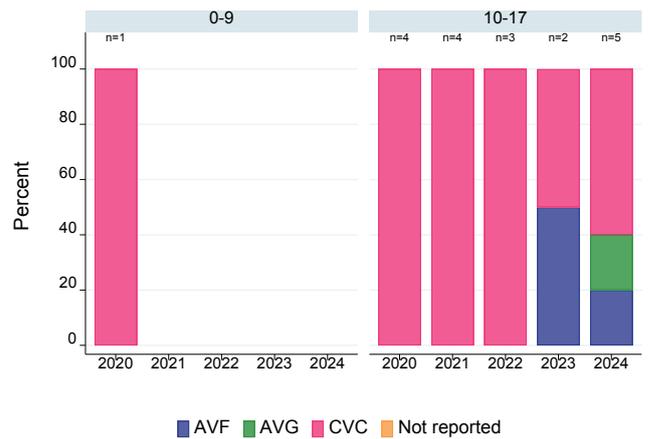


Figure 12.16.1
Prevalent Haemodialysis Access, Paediatric HD Patients - Australia 2020-2024



Figure 12.16.2
Prevalent Haemodialysis Access, Paediatric HD Patients - New Zealand 2020-2024



PERITONEAL DIALYSIS

Time on peritoneal dialysis (previously known as technique survival), censored for transplantation, loss to follow-up and recovery of renal function is presented below. Only patients initiating PD within the first 365 days of KRT commencement are included. Patients commencing PD after a transplant are excluded. The numbers available for analysis after the first year drop significantly in each group in both countries, due to transplantation. Of the 214 patients, 53 (25%) received a transplant within one year of commencement of PD. By two years a total of 97 (45%) of patients had received transplants.

Figure 12.17.1
Time on Peritoneal Dialysis[^] by Age Category - Australia 2018-2024

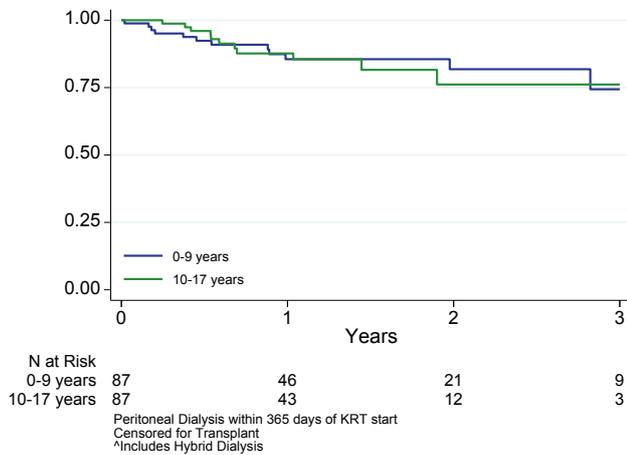
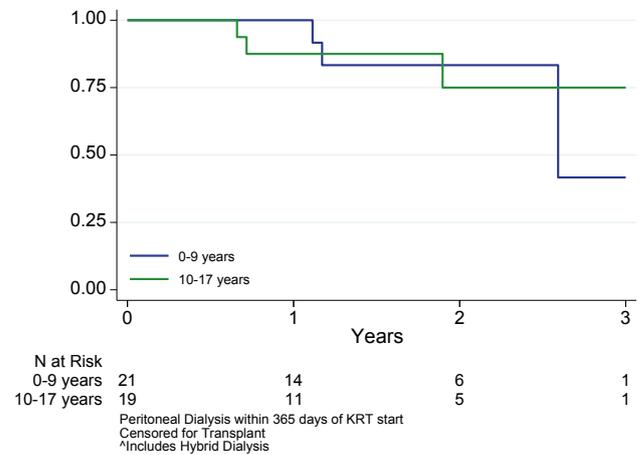


Figure 12.17.2
Time on Peritoneal Dialysis[^] by Age Category - New Zealand 2018-2024



The use of PD solutions is shown in Table 12.7. There is considerably more use of icodextrin in paediatric patients in 2024 in Australia (23%) compared with New Zealand (0%).

Table 12.7
Use of PD[^] Solutions 2021-2024

Solution	Australia				New Zealand			
	2021	2022	2023	2024	2021	2022	2023	2024
	(n = 43)	(n = 57)	(n = 45)	(n = 47)	(n = 10)	(n = 10)	(n = 7)	(n = 5)
Icodextrin	13 (30%)	23 (40%)	12 (27%)	11 (23%)	2 (20%)	1 (10%)	0 (0%)	0 (0%)
Low GDP	21 (49%)	17 (30%)	17 (38%)	16 (34%)	8 (80%)	7 (70%)	7 (100%)	5 (100%)

[^]Includes Hybrid Dialysis

PERITONITIS

Peritonitis-free survival is presented in Figure 12.18 and the peritonitis rate is presented in Figure 12.19.

Figure 12.18
First PD Treatment to First Peritonitis - by Age at First PD Australia and New Zealand 2020-2024

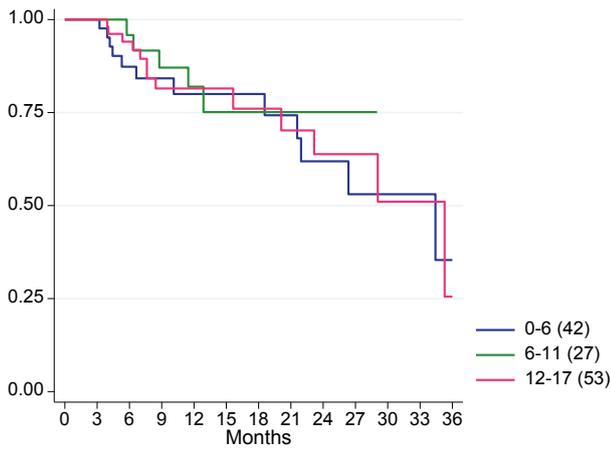
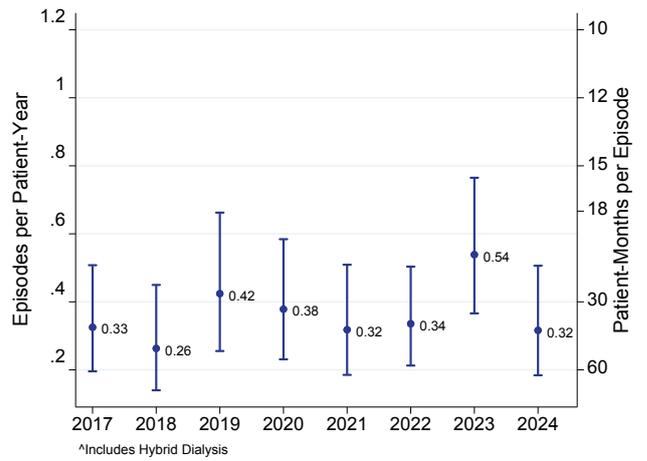


Figure 12.19
Peritonitis rate, Paediatric PD^ Patients - Australia and New Zealand 2017-2024



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2. This work is based on/includes Stats NZ's data which are licensed by Stats NZ for re-use under the Creative Commons Attribution 4.0 International licence. Stats NZ, 2024, Estimated Resident Population by Age and Sex (1991+) (Annual-Jun), NZ Infoshare, viewed 12 Dec 2024, <http://infoshare.stats.govt.nz/>



CHAPTER 12

Paediatric Patients with Kidney Failure
Requiring Replacement Therapy