CHAPTER 4

Haemodialysis

Reporting the incidence, prevalence, and survival of haemodialysis patients in Australia and New Zealand; summarising dialysis prescriptions, laboratory results, dialysis adequacy, vascular access, and rates of home haemodialysis treatment

Contents

Summary and Highlights

The number of people commencing haemodialysis did not change greatly between 2020 and 2021. The number of prevalent patients did increase, in part because the number ceasing dialysis to receive a kidney transplant was lower again in 2021 as compared to 2020. The age distribution of both incident and prevalent groups differs between Australia and New Zealand, the peak being people aged 65-74 years in Australia, and 55-64 years in New Zealand. The proportion of prevalent patients aged 65 or more was 52% in Australia and 38% in New Zealand.

In terms of survival, 90% of persons in Australia aged less than 40 years survive 5 years if they have no diabetes or cardiovascular disease compared to 56% who have both co-morbidities. In New Zealand these figures are 91% and 56% respectively. For persons aged 75 and over, 5-year survival is 41% in Australia without diabetes or cardiovascular disease and 27% with both co-morbidities. In New Zealand, the corresponding figures are 11% and 23% respectively. Note that these figures are 'censored' for transplantation or change to peritoneal dialysis (i.e. people who receive a kidney transplant are removed from the dialysis cohort at the time of change of therapy).

Variation in dialysis practice between countries, Australian jurisdictions and caring hospitals is reported without consideration of "case mix".

Large variation continues with regards to the proportion of patients starting haemodialysis with established vascular access. Overall, this is lower in New Zealand compared to Australia but also varies between Australian states, and even more so by caring hospital. This variation is evident for prevalent vascular access also.

In both countries, more than 80% of patients receive three haemodialysis sessions per week for 4 to 5 hours each session. The proportion of patients having more than three sessions per week or more than 15 hours of haemodialysis each week was higher in New Zealand than Australia, but is steadily declining in both countries. The proportion having haemodialysis at home is greater in New Zealand than Australia but is also declining in both countries. There is a greater than three-fold difference between the Australian state/territory with the lowest and highest proportion having home haemodialysis.

In the second year of reporting of self-care versus not, for people in New Zealand and Australia respectively, 12% and 18% of people having haemodialysis at home were not self-caring, compared to 72% and 81% of people receiving dialysis in satellite. The Haemodialysis Working Group plans to explore this further.

The proportion of patients receiving haemodiafiltration peaked in 2018 at 37.8% of Australian haemodialysis patients and 22.4% of New Zealand haemodialysis patients. In 2021, this proportion was 31.7% and 19.3%, respectively. The proportion receiving more than 20L of substitution volume varied greatly between jurisdictions, and pre-dilution haemodiafiltration was more often used in New Zealand compared to Australia, although post-dilution was still the most common modality in both countries.

Suggested Citation

ANZDATA Registry. 45th Report, Chapter 4: Haemodialysis. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2022. Available at: http://www.anzdata.org.au

Incidence, Cessation and Prevalence

Table 4.1 presents the incidence, cessation and prevalence of haemodialysis patients in Australia and New Zealand over 2017-2021. Note that dialysis modality changes lasting less than 30 days are not included.

^Please note that in 2020 the ANZDATA registry began to record withdrawal from dialysis as a treatment decision in addition to documenting this as a cause of death. This change is reflected in fewer patients having death documented as cause of dialysis cessation in the table below. The great majority of people who withdraw from dialysis will pass away soon after this decision and therefore the total number of withdrawals and deaths can be compared with the number of deaths in previous years. Following cessation of HD with withdrawal from dialysis in 2020, the median days to death was 6, and 90% of patients died within 24 days.

Table 4.1 Incidence, Cessation and Prevalence of Haemodialysis Patients in Australia and New Zealand 2017-2021

Country		2017	2018	2019	2020	2021
Australia	**All patients who commenced HD**					
	First dialysis treatment or returning after kidney recovery	2208	2292	2414	2347	2332
	Transfer from PD (no prior HD)	407	392	390	392	431
	Transfer from PD (prior HD)	173	147	150	182	171
	Failed Transplant (no prior HD)	52	46	50	39	51
	Failed Transplant (prior HD)	161	199	163	154	178
	Total	**3001**	**3076**	**3167**	**3114**	**3163**
	All patients who ceased HD					
	Received kidney transplant	632	664	632	542	544
	Transfer to PD	312	291	325	307	285
	Kidney recovery	78	83	79	88	82
	Withdrawal from dialysis^	-	-	-	577	717
	Deaths	1639	1597	1637	1148	1026
	Total	**2661**	**2635**	**2674**	**2662**	**2654**
	Total patients on HD at 31 December	**10696**	**11115**	**11593**	**12026**	**12526**
	Patients on HD at home* at 31 December (% of all HD patients)	**1048 (9.8%)**	**1058 (9.5%)**	**1074 (9.3%)**	**1135 (9.4%)**	**1142 (9.1%)**
New Zealand	**All patients who commenced HD**					
	First dialysis treatment or returning after kidney recovery	383	363	386	410	435
	Transfer from PD (no prior HD)	78	98	102	124	140
	Transfer from PD (prior HD)	44	66	71	56	66
	Failed Transplant (no prior HD)	8	10	7	5	9
	Failed Transplant (prior HD)	21	21	18	27	27
	Total	**534**	**558**	**584**	**622**	**677**
	All patients who ceased HD					
	Received kidney transplant	96	80	106	84	75
	Transfer to PD	122	126	111	126	105
	Kidney recovery	15	14	12	15	4
	Withdrawal from dialysis^	-	-	-	59	73
	Deaths	300	275	323	220	225
	Total	**533**	**495**	**552**	**504**	**482**
	Total patients on HD at 31 December	**1934**	**2003**	**2030**	**2151**	**2345**
	Patients on HD at home* at 31 December (% of all HD patients)	**442 (22.9%)**	**425 (21.2%)**	**409 (20.1%)**	**390 (18.1%)**	**392 (16.7%)**

*Includes Community House HD

Figures 4.1-4.2 and Table 4.2 present the age distribution of incident and prevalent haemodialysis patients in Australia and New Zealand.

Figure 4.1.1 - Age (%) of Incident Haemodialysis Patients - Australia 2021

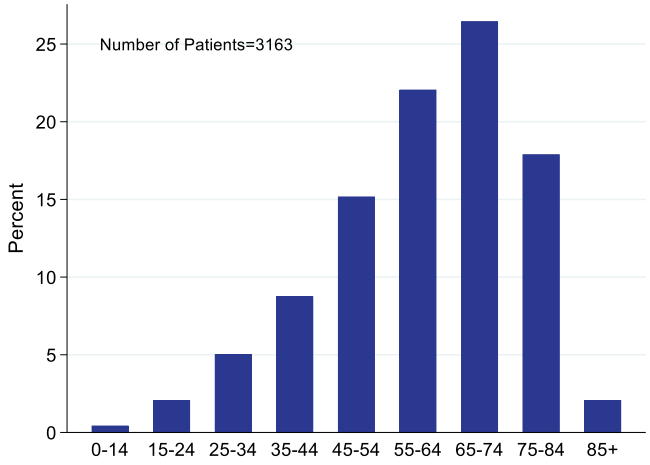


Figure 4.1.2 - Age (%) of Incident Haemodialysis Patients - New Zealand 2021

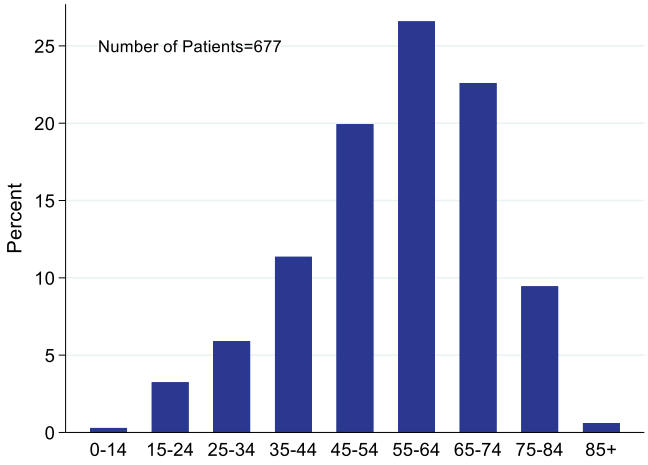


Figure 4.2.1 - Age (%) of Prevalent Haemodialysis Patients - Australia 31 Dec 2021

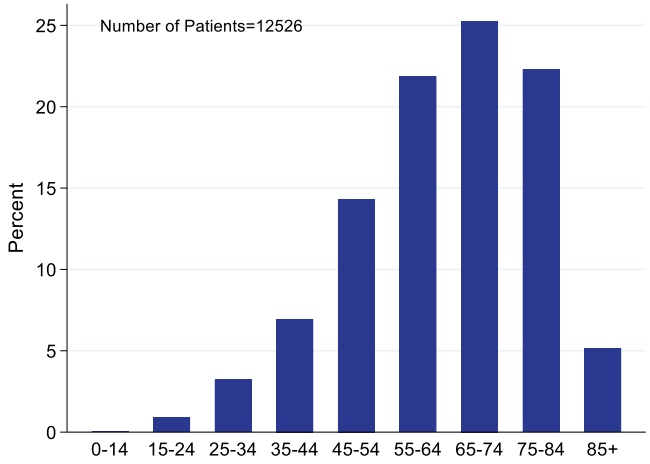


Figure 4.2.2 - Age (%) of Prevalent Haemodialysis Patients - New Zealand 31 Dec 2021

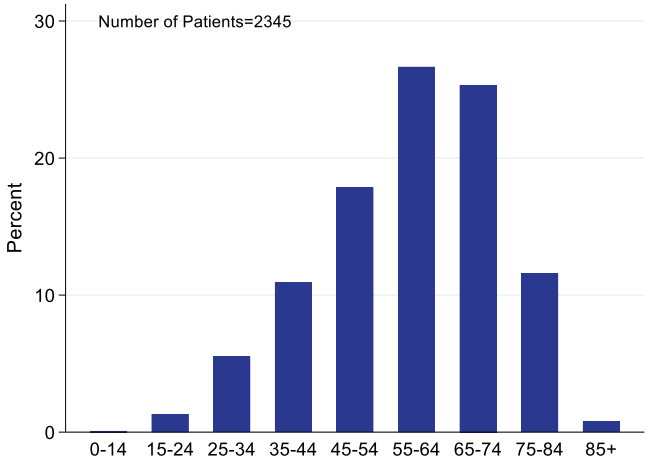


Table 4.2.1 Incident and Prevalent Haemodialysis Patients in Australia by Age Group 2017-2021

	Age group	2017	2018	2019	2020	2021
Incident Patients	**0-14**	17 (1%)	13 (0%)	10 (0%)	8 (0%)	14 (0%)
	15-24	70 (2%)	65 (2%)	64 (2%)	51 (2%)	66 (2%)
	25-34	148 (5%)	144 (5%)	151 (5%)	153 (5%)	159 (5%)
	35-44	248 (8%)	276 (9%)	228 (7%)	244 (8%)	277 (9%)
	45-54	503 (17%)	490 (16%)	567 (18%)	473 (15%)	480 (15%)
	55-64	692 (23%)	687 (22%)	678 (21%)	725 (23%)	698 (22%)
	65-74	764 (25%)	808 (26%)	853 (27%)	800 (26%)	837 (26%)
	75-84	505 (17%)	524 (17%)	542 (17%)	571 (18%)	566 (18%)
	85+	54 (2%)	69 (2%)	74 (2%)	89 (3%)	66 (2%)
	Total	**3001**	**3076**	**3167**	**3114**	**3163**
Prevalent Patients	**0-14**	9 (0%)	13 (0%)	6 (0%)	7 (0%)	7 (0%)
	15-24	108 (1%)	112 (1%)	110 (1%)	103 (1%)	111 (1%)
	25-34	358 (3%)	384 (3%)	398 (3%)	416 (3%)	404 (3%)
	35-44	763 (7%)	769 (7%)	754 (7%)	762 (6%)	871 (7%)
	45-54	1605 (15%)	1632 (15%)	1759 (15%)	1755 (15%)	1794 (14%)
	55-64	2289 (21%)	2404 (22%)	2514 (22%)	2677 (22%)	2739 (22%)
	65-74	2687 (25%)	2799 (25%)	2950 (25%)	3049 (25%)	3165 (25%)
	75-84	2333 (22%)	2445 (22%)	2536 (22%)	2657 (22%)	2791 (22%)
	85+	544 (5%)	557 (5%)	566 (5%)	600 (5%)	644 (5%)
	Total	**10696**	**11115**	**11593**	**12026**	**12526**

Table 4.2.2 Incident and Prevalent Haemodialysis Patients in New Zealand by Age Group 2017-2021

	Age group	2017	2018	2019	2020	2021
Incident Patients	0-14	3 (1%)	5 (1%)	1 (0%)	3 (0%)	2 (0%)
	15-24	13 (2%)	9 (2%)	9 (2%)	22 (4%)	22 (3%)
	25-34	42 (8%)	47 (8%)	43 (7%)	32 (5%)	40 (6%)
	35-44	40 (7%)	56 (10%)	55 (9%)	54 (9%)	77 (11%)
	45-54	119 (22%)	101 (18%)	146 (25%)	130 (21%)	135 (20%)
	55-64	135 (25%)	144 (26%)	153 (26%)	179 (29%)	180 (27%)
	65-74	138 (26%)	150 (27%)	115 (20%)	135 (22%)	153 (23%)
	75-84	43 (8%)	43 (8%)	61 (10%)	62 (10%)	64 (9%)
	85+	1 (0%)	3 (1%)	1 (0%)	5 (1%)	4 (1%)
	Total	**534**	**558**	**584**	**622**	**677**
Prevalent Patients	0-14	1 (0%)	3 (0%)	1 (0%)	1 (0%)	2 (0%)
	15-24	29 (1%)	33 (2%)	22 (1%)	31 (1%)	31 (1%)
	25-34	118 (6%)	122 (6%)	114 (6%)	121 (6%)	129 (6%)
	35-44	203 (10%)	210 (10%)	218 (11%)	222 (10%)	256 (11%)
	45-54	369 (19%)	368 (18%)	377 (19%)	404 (19%)	419 (18%)
	55-64	525 (27%)	535 (27%)	548 (27%)	576 (27%)	625 (27%)
	65-74	502 (26%)	526 (26%)	528 (26%)	540 (25%)	594 (25%)
	75-84	170 (9%)	192 (10%)	207 (10%)	240 (11%)	271 (12%)
	85+	17 (1%)	14 (1%)	15 (1%)	16 (1%)	18 (1%)
	Total	**1934**	**2003**	**2030**	**2151**	**2345**

Patient Survival

Table 4.3 and figure 4.3 present unadjusted haemodialysis patient survival by era and country. The outcome is patient death, censored at transplantation and transfer to peritoneal dialysis for ≥30 days. Survival for all incident kidney replacement therapy (KRT) patients who were treated with haemodialysis at commencement is reported.

Survival begins from the date of commencing KRT with haemodialysis.

Survival of people receiving dialysis differs substantially according to age, diabetes status and cardiovascular disease status (Tables 4.4 and 4.5) and data are presented this way to enable clinicians to estimate their patient's survival based on where they fit in this table. Survival by individual components of this table is presented in the Figures 4.4-4.7.

Table 4.3 Patient Survival by Era - Haemodialysis at KRT Start - Censored for Transplant and Transfer to PD: 2010-2021; % [95% Confidence Interval]

Country	Era	Number of Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	2010-2012	5478	93 [92, 94]	88 [87, 89]	69 [68, 70]	51 [49, 53]
	2013-2015	5617	94 [93, 94]	89 [88, 90]	70 [69, 71]	51 [50, 53]
	2016-2018	6451	95 [94, 95]	90 [89, 90]	70 [69, 71]	52 [50, 54]
	2019-2021	7017	94 [94, 95]	89 [88, 90]	-	-
New Zealand	2010-2012	991	93 [91, 95]	89 [87, 91]	71 [67, 74]	53 [49, 57]
	2013-2015	1028	95 [93, 96]	90 [88, 92]	71 [68, 74]	50 [47, 54]
	2016-2018	1081	93 [92, 95]	88 [86, 90]	73 [70, 76]	56 [51, 60]
	2019-2021	1215	95 [93, 96]	90 [88, 92]	-	-

Figure 4.3.1 - Patient Survival by Era - Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD

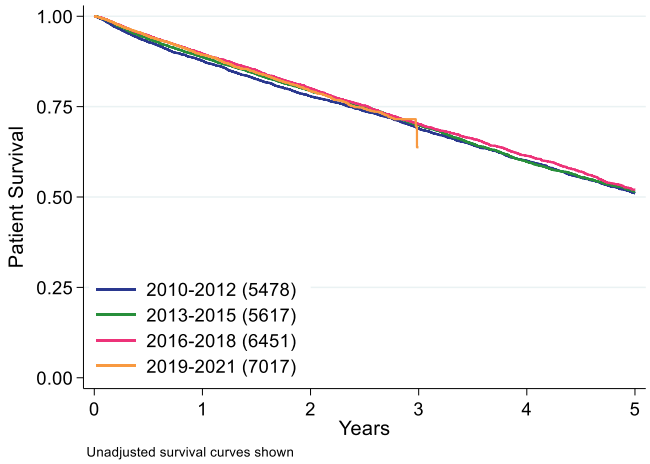


Figure 4.3.2 - Patient Survival by Era - Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplant and Transfer to PD

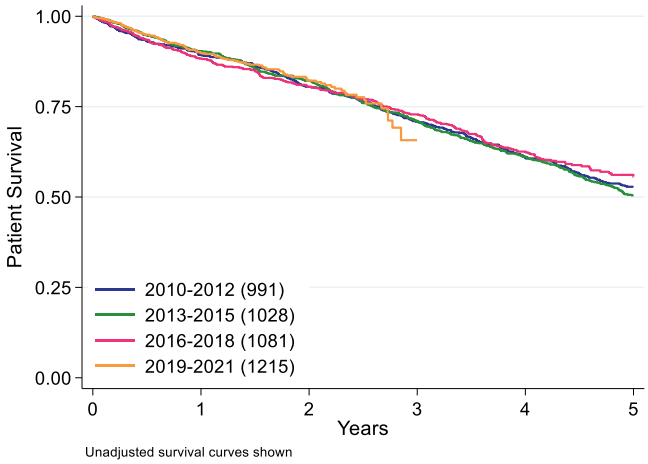


Table 4.4 Patient Survival by Age Group, Diabetes Status and Cardiovascular Disease Status - Haemodialysis at KRT Start - Censored for Transplant and Transfer to PD: Australia 2010-2021; % [95% Confidence Interval]

Age Group	Survival							
	DM-, CVD-		DM+, CVD-		DM-, CVD+		DM+, CVD+	
	1 year	5 years	1 year	5 years	1 year	5 years	1 year	5 years
<40 years	97 [96, 98]	90 [87, 92]	95 [92, 97]	72 [66, 78]	94 [87, 97]	68 [53, 80]	90 [85, 93]	56 [47, 64]
40-59 years	95 [94, 96]	75 [72, 78]	95 [94, 96]	70 [67, 73]	93 [90, 94]	61 [56, 66]	92 [90, 93]	56 [53, 58]
60-74 years	91 [89, 92]	60 [57, 64]	92 [90, 93]	58 [55, 61]	84 [82, 86]	47 [44, 50]	87 [85, 88]	43 [41, 45]
≥75 years	85 [83, 87]	41 [37, 44]	87 [85, 90]	40 [36, 45]	80 [77, 82]	34 [31, 37]	79 [77, 81]	27 [24, 29]

DM-, CVD- : No diabetes and no cardiovascular disease
DM+, CVD- : Diabetes but no cardiovascular disease
DM-, CVD+ : Cardiovascular disease but no diabetes
DM+, CVD+ : Both cardiovascular disease and diabetes

Table 4.5 Patient Survival by Age Group, Diabetes Status and Cardiovascular Disease Status - Haemodialysis at KRT Start - Censored for Transplant and Transfer to PD: New Zealand 2010-2021; % [95% Confidence Interval]

Age Group	Survival							
	DM-, CVD-		DM+, CVD-		DM-, CVD+		DM+, CVD+	
	1 year	5 years	1 year	5 years	1 year	5 years	1 year	5 years
<40 years	97 [93, 99]	91 [83, 95]	95 [88, 98]	71 [56, 81]	91 [69, 98]	79 [53, 92]	84 [65, 93]	56 [31, 75]
40-59 years	96 [93, 98]	74 [65, 80]	94 [91, 96]	67 [62, 72]	89 [81, 93]	55 [39, 68]	87 [84, 90]	46 [40, 52]
60-74 years	88 [83, 92]	52 [42, 61]	93 [89, 95]	55 [48, 61]	84 [77, 88]	40 [31, 48]	86 [83, 89]	40 [34, 45]
≥75 years	85 [74, 91]	11 [3, 25]	83 [71, 91]	29 [15, 45]	76 [65, 84]	24 [14, 37]	79 [70, 86]	23 [14, 33]

DM-, CVD- : No diabetes and no cardiovascular disease
DM+, CVD- : Diabetes but no cardiovascular disease
DM-, CVD+ : Cardiovascular disease but no diabetes
DM+, CVD+ : Both cardiovascular disease and diabetes

Figure 4.4.1 - Patient Survival by Age Group Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD

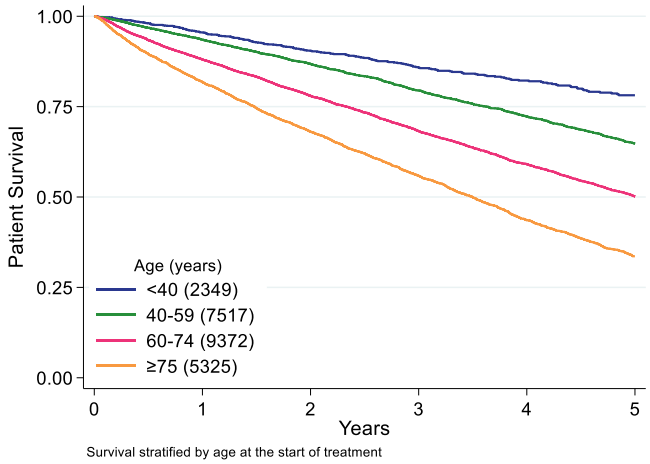


Figure 4.4.2 - Patient Survival by Age Group Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplant and Transfer to PD

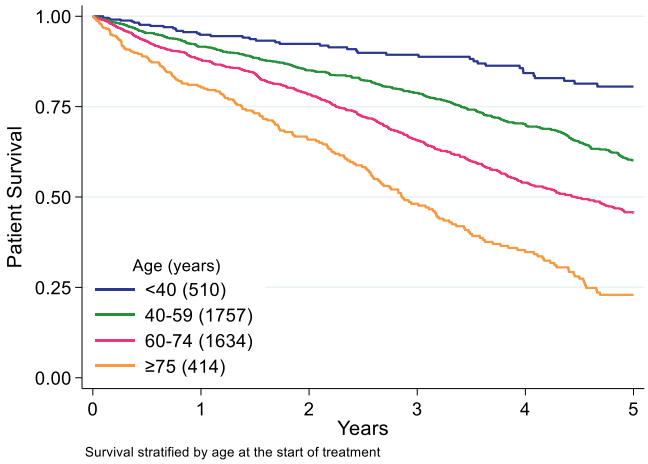


Figure 4.5.1 - Patient Survival by Diabetes Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD

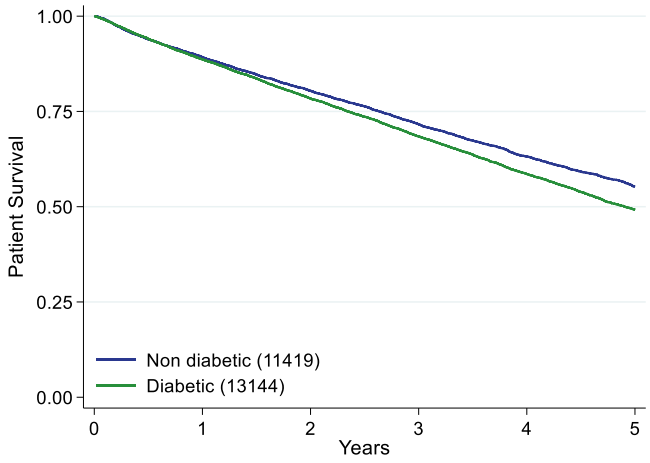


Figure 4.5.2 - Patient Survival by Diabetes Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplant and Transfer to PD

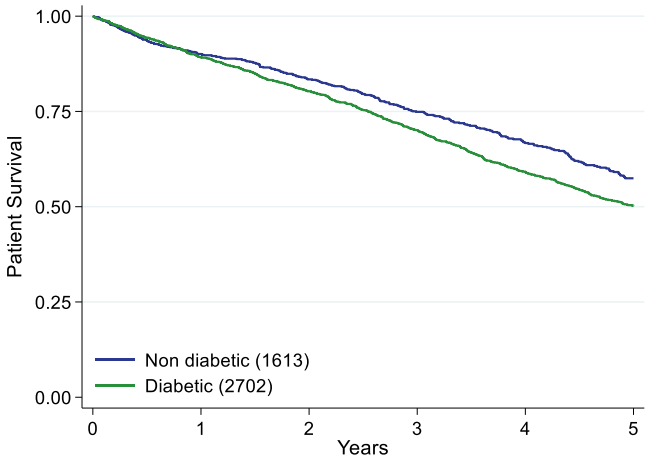


Figure 4.6.1 - Patient Survival by Age Group Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD No Diabetes and No Cardiovascular Disease

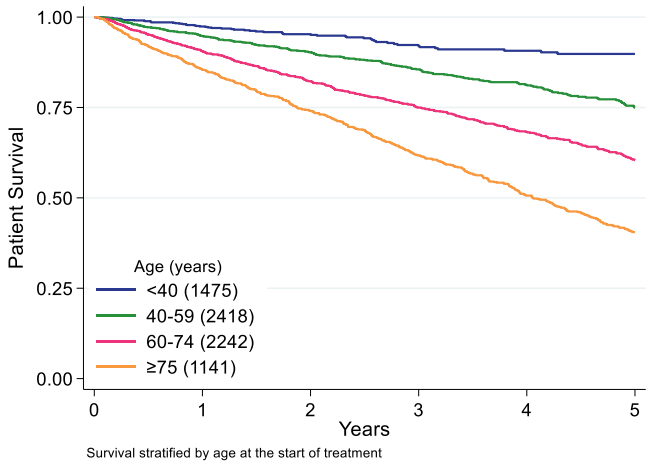


Figure 4.6.2 - Patient Survival by Age Group Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD Diabetes but No Cardiovascular Disease

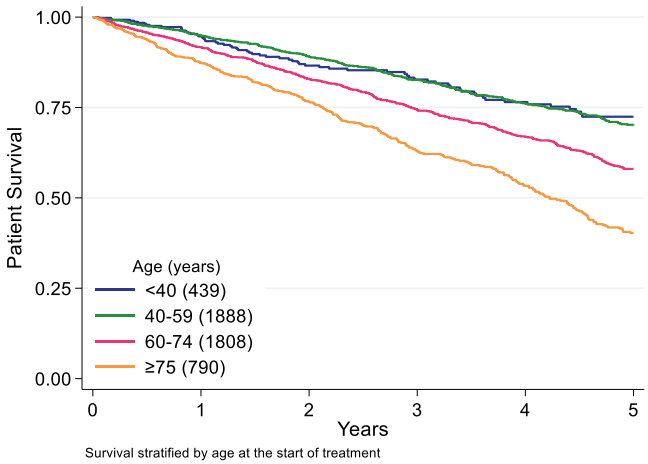


Figure 4.6.3 - Patient Survival by Age Group Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD Cardiovascular Disease but No Diabetes

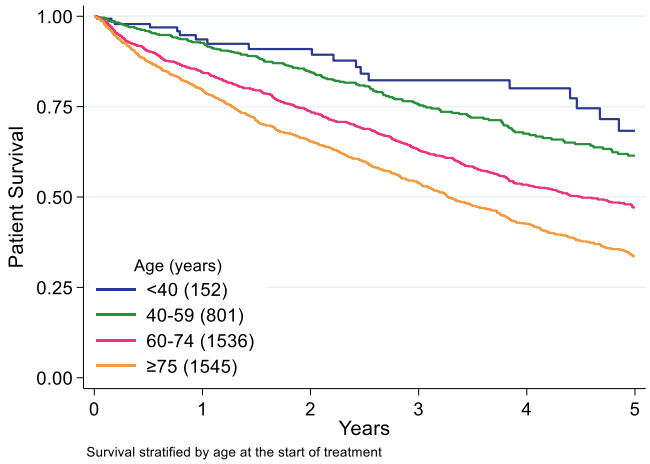


Figure 4.6.4 - Patient Survival by Age Group Haemodialysis at KRT Start - Australia 2010-2021 Censored for Transplant and Transfer to PD Both Diabetes and Cardiovascular Disease

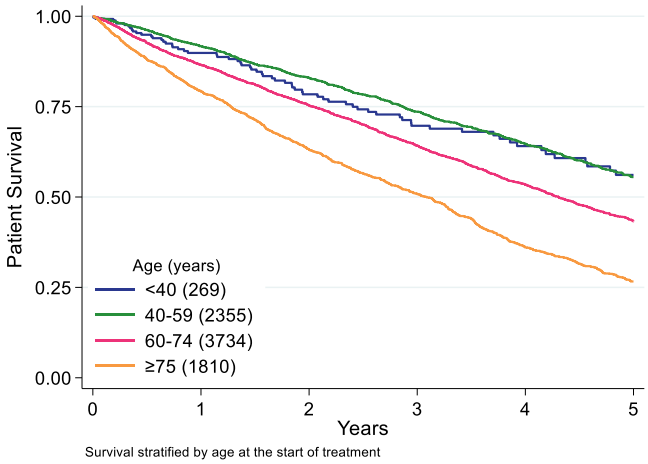


Figure 4.7.1 - Patient Survival by Age Group Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplant and Transfer to PD No Diabetes and No Cardiovascular Disease

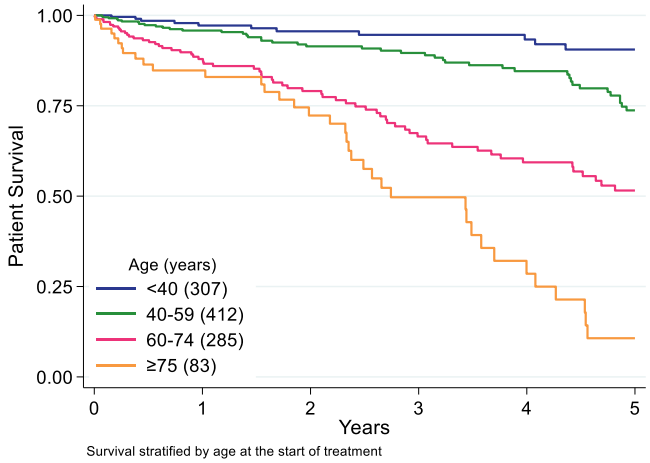


Figure 4.7.2 - Patient Survival by Age Group Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplantand Transfer to PD Diabetes but No Cardiovascular Disease

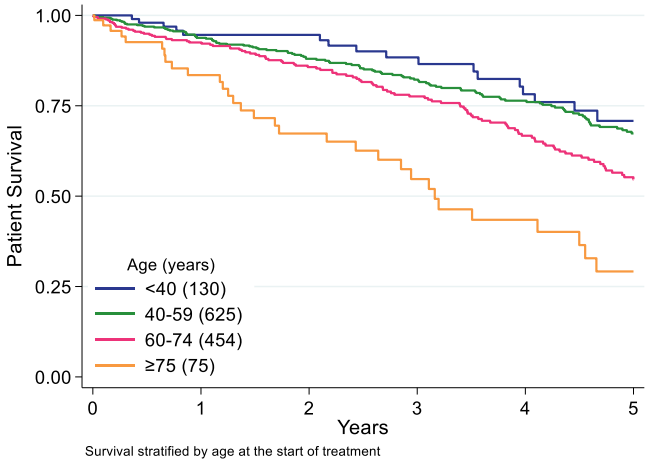


Figure 4.7.3 - Patient Survival by Age Group Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplant and Transfer to PD Cardiovascular Disease but No Diabetes

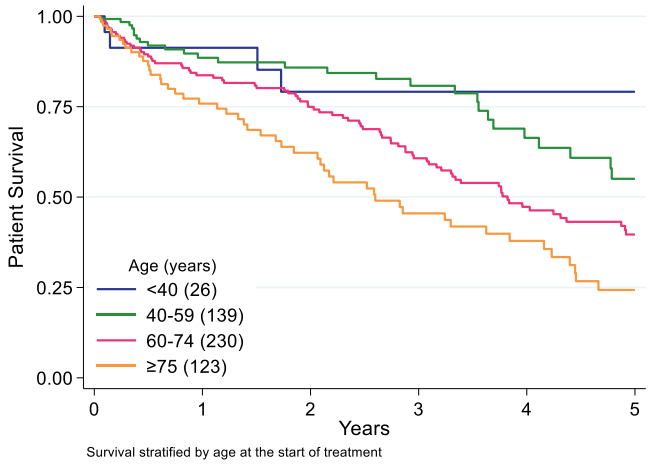
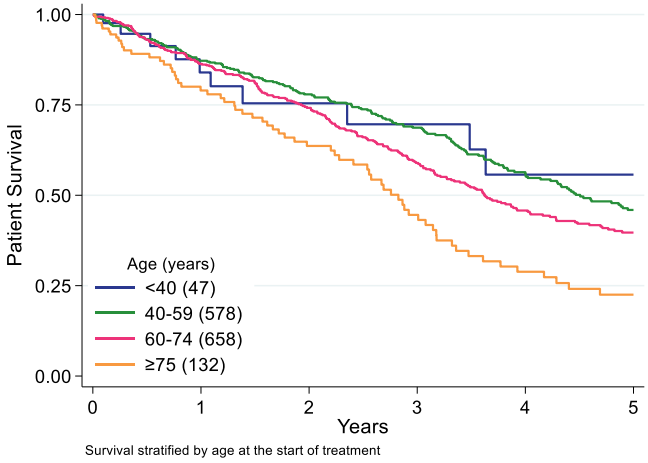


Figure 4.7.4 - Patient Survival by Age Group Haemodialysis at KRT Start - New Zealand 2010-2021 Censored for Transplant and Transfer to PD Both Diabetes and Cardiovascular Disease



Vascular Access

Incident Patients

Figures 4.8 to 4.11 and table 4.6 show data related to vascular access for incident haemodialysis patients.

ANZDATA does not collect information about indication for haemodialysis catheter usage, hence the reasons that around half of non-late referred patients commenced with a central venous catheter are not known.

Figure 4.8 - Vascular Access - Initial KRT - Haemodialysis as Initial Modality

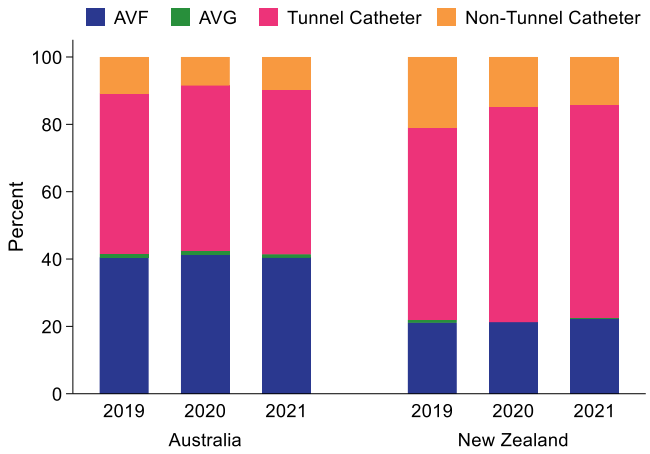


Figure 4.9 - Vascular Access - Initial KRT - By Age Group 2021

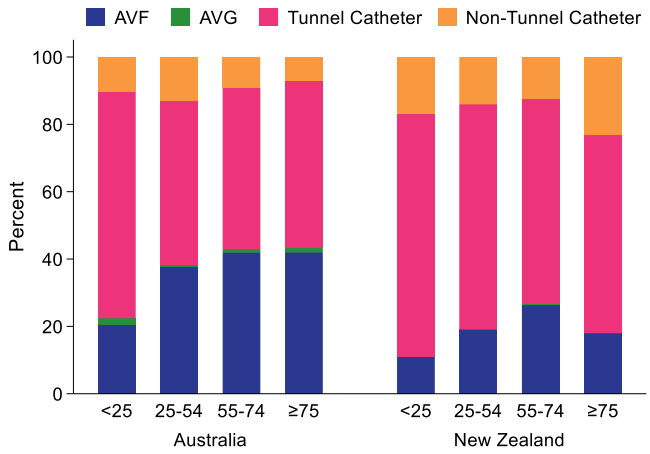


Figure 4.10.1 - Vascular Access - Initial KRT - By Gender - Australia

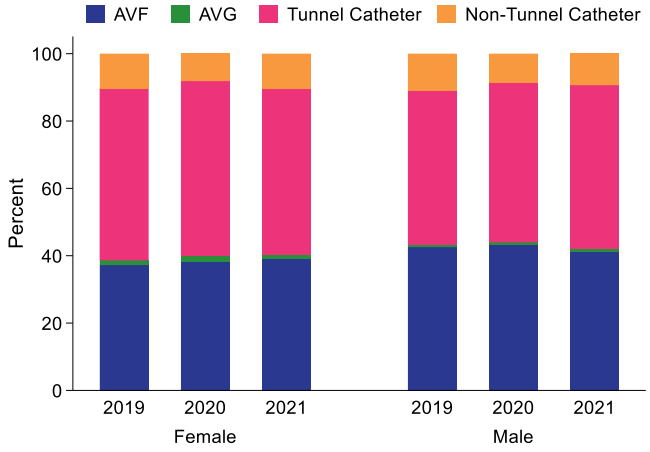


Figure 4.10.2 - Vascular Access - Initial KRT - By Gender - New Zealand

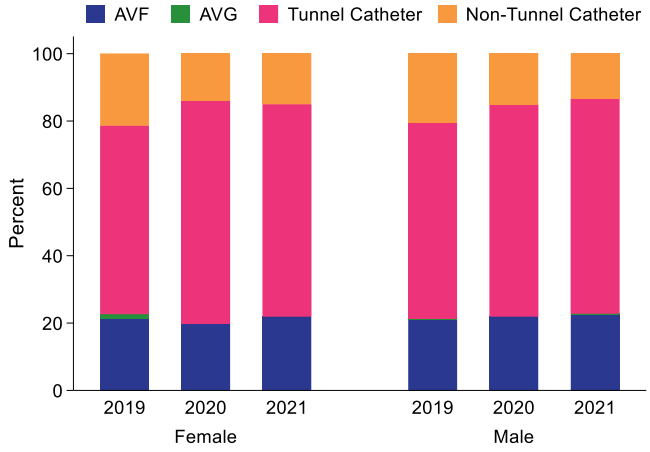


Figure 4.11.1 - Vascular Access - Initial KRT - By Referral Time - Australia

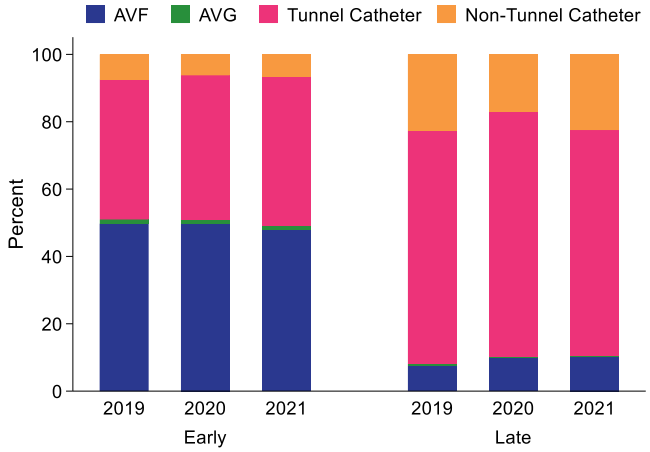


Figure 4.11.2 - Vascular Access - Initial KRT - By Referral Time - New Zealand

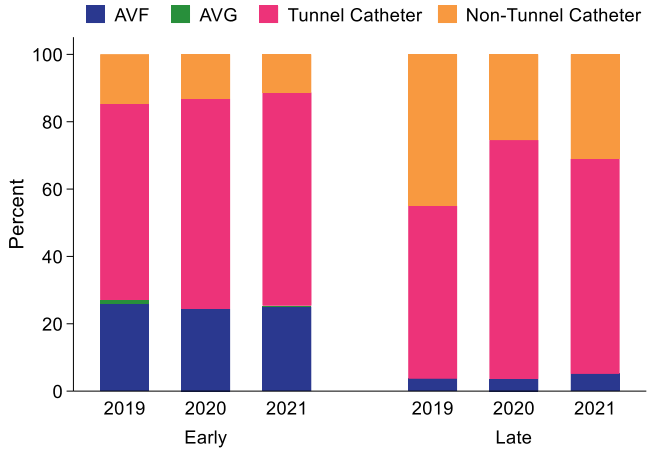


Table 4.6 Incident Vascular Access by Australian State/Territory and Country 2019-2021

State/Country	2019		2020		2021	
	AVF/AVG	CVC	AVF/AVG	CVC	AVF/AVG	CVC
QLD	214 (42%)	293 (58%)	207 (42%)	291 (58%)	233 (45%)	286 (55%)
NSW/ACT	308 (42%)	417 (58%)	294 (43%)	382 (57%)	283 (42%)	393 (58%)
VIC	203 (38%)	328 (62%)	262 (45%)	315 (55%)	211 (40%)	323 (60%)
TAS	24 (44%)	31 (56%)	11 (32%)	23 (68%)	13 (31%)	29 (69%)
SA	79 (47%)	88 (53%)	81 (49%)	85 (51%)	76 (48%)	82 (52%)
NT	49 (43%)	65 (57%)	31 (36%)	54 (64%)	46 (43%)	60 (57%)
WA	113 (40%)	170 (60%)	97 (35%)	181 (65%)	90 (34%)	174 (66%)
Australia	**990 (42%)**	**1392 (58%)**	**983 (42%)**	**1331 (58%)**	**952 (41%)**	**1347 (59%)**
New Zealand	**84 (22%)**	**299 (78%)**	**85 (21%)**	**315 (79%)**	**96 (22%)**	**331 (78%)**

Figure 4.12 shows the proportion of patients in each hospital starting haemodialysis as their first KRT with an AVF/AVG, arranged from lowest to highest. In Australia, this ranged widely from 15-87%. The corresponding range in New Zealand was 8-44%. This wide variation reflects differences in practices, protocols, resources and patient case-mix among centres.

Figure 4.12.1 - % Initial KRT HD Patients Starting with AVF/AVG - Australia 2021

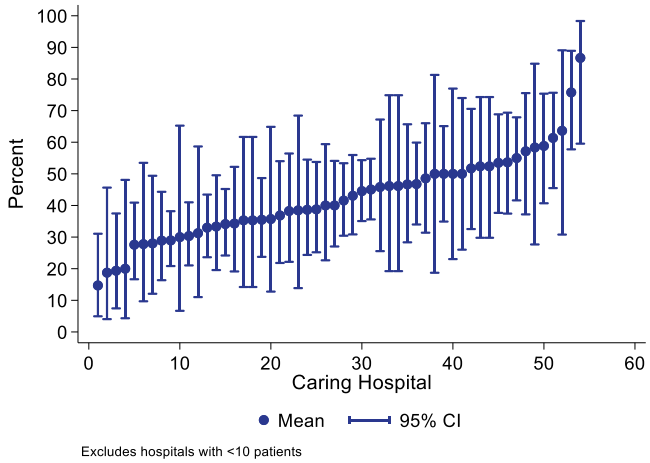
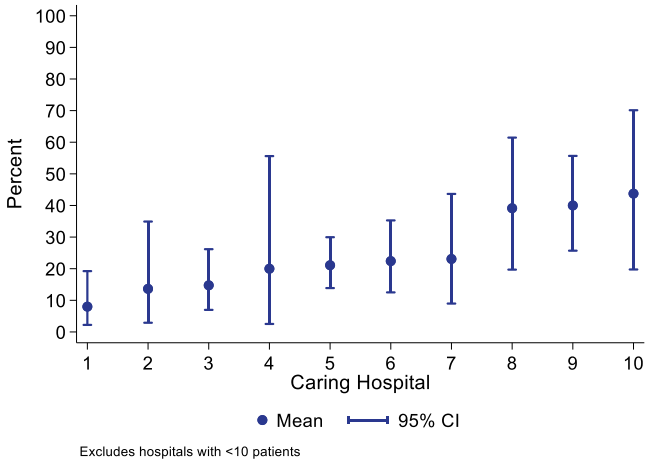


Figure 4.12.2 - % Initial KRT HD Patients Starting with AVF/AVG - New Zealand 2021



Prevalent Patients

Figures 4.13 to 4.16 and table 4.7 show dialysis access among prevalent (rather than incident) patients (those receiving haemodialysis at 31 December 2021).

Figure 4.13 - Prevalent Haemodialysis Access

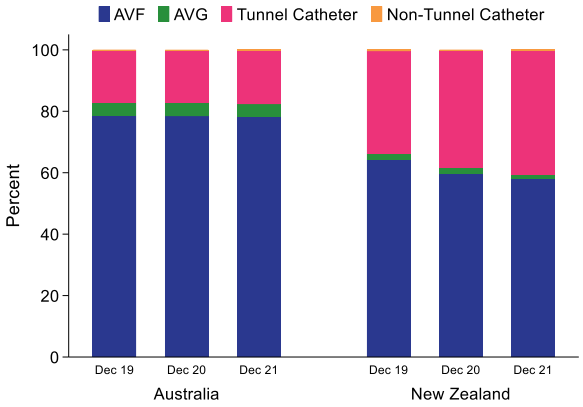


Figure 4.14 - Prevalent Haemodialysis Access - By Age Group 2021

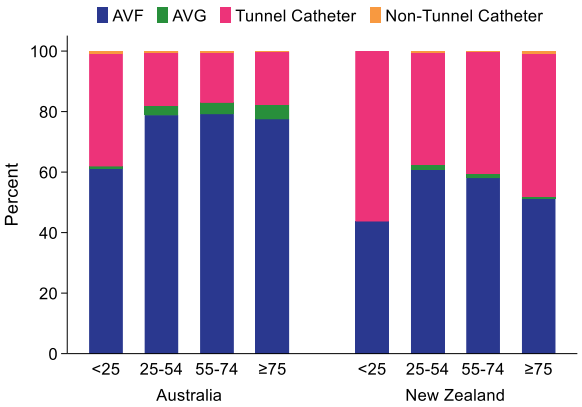


Figure 4.15.1 - Prevalent Haemodialysis Access - By Gender - Australia

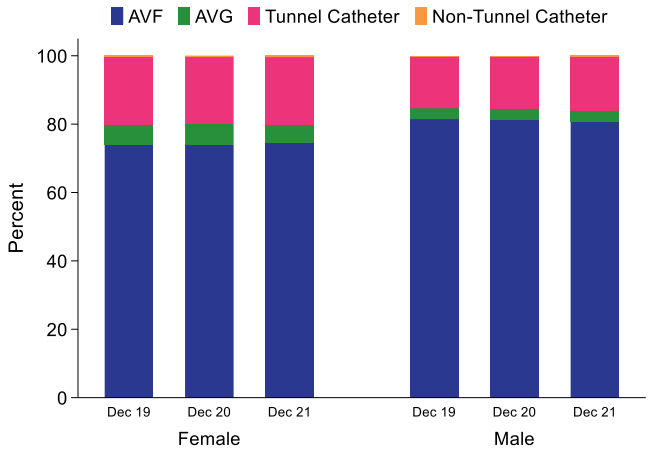


Figure 4.15.2 - Prevalent Haemodialysis Access - By Gender - New Zealand

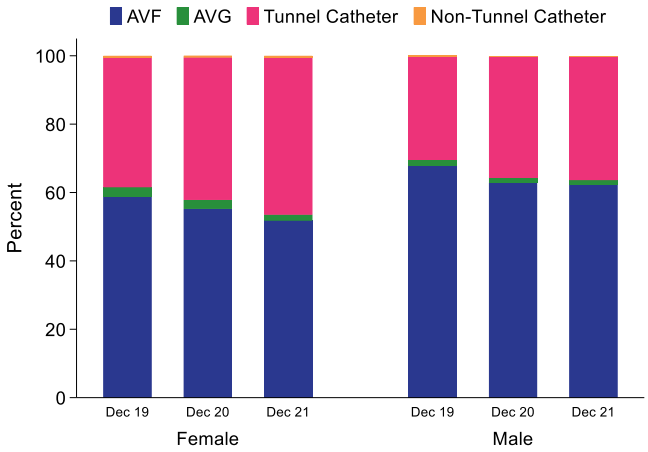


Figure 4.16 - Prevalent Haemodialysis Access - By Location 2021

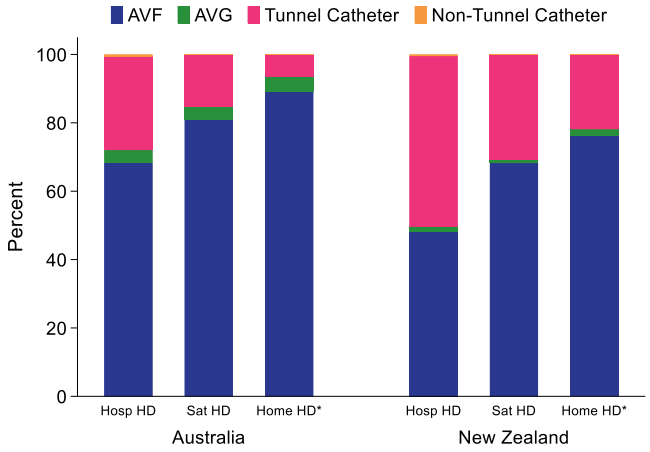


Table 4.7 Prevalent Vascular Access by Australian State/Territory and Country at 31 December 2021

State/Country	2019		2020		2021	
	AVF/AVG	CVC	AVF/AVG	CVC	AVF/AVG	CVC
QLD	1916 (85%)	347 (15%)	1978 (85%)	359 (15%)	2077 (84%)	403 (16%)
NSW/ACT	2740 (81%)	663 (19%)	2881 (81%)	685 (19%)	2947 (81%)	707 (19%)
VIC	2140 (83%)	434 (17%)	2313 (83%)	460 (17%)	2357 (83%)	494 (17%)
TAS	139 (72%)	55 (28%)	128 (74%)	46 (26%)	127 (70%)	54 (30%)
SA	695 (88%)	94 (12%)	728 (87%)	105 (13%)	762 (88%)	104 (12%)
NT	642 (91%)	65 (9%)	629 (91%)	62 (9%)	640 (92%)	57 (8%)
WA	915 (78%)	252 (22%)	972 (78%)	282 (22%)	971 (77%)	298 (23%)
Australia	**9187 (83%)**	**1910 (17%)**	**9629 (83%)**	**1999 (17%)**	**9881 (82%)**	**2117 (18%)**
New Zealand	**1288 (66%)**	**655 (34%)**	**1271 (62%)**	**787 (38%)**	**1318 (59%)**	**898 (41%)**

Figure 4.17 shows the proportion of haemodialysis patients at each hospital dialysing with an AVF/AVG on 31st December 2021, arranged from lowest to highest. In Australia, these proportions varied widely from 59-100%. The corresponding range in New Zealand was 37-80%.

Figure 4.17.1 - % Prevalent HD Patients Dialysing with AVF/AVG - Australia 31 December 2021

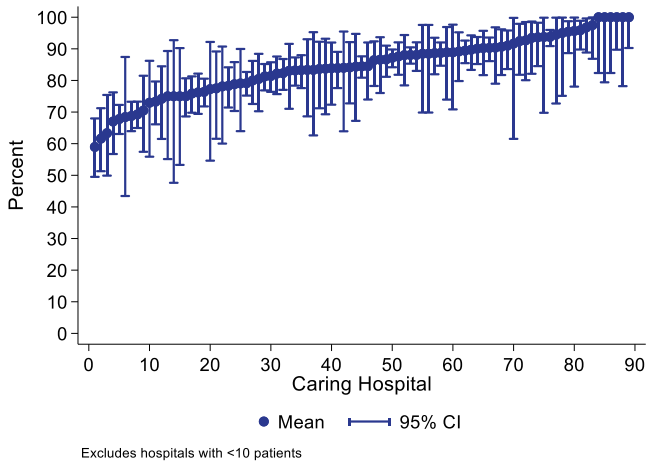
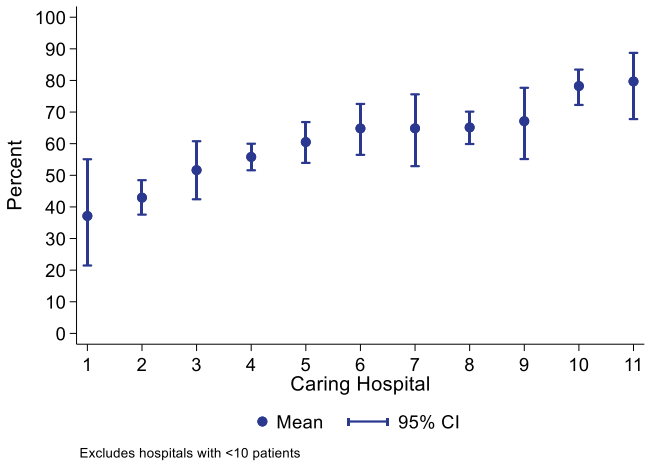


Figure 4.17.2 - % Prevalent HD Patients Dialysing with AVF/AVG - New Zealand 31 December 2021



Dialysis Prescription

Hours, Sessions and Blood Flow

Table 4.8 Blood Flow Rate by Type of Access - December 2021

Blood Flow Rate	Australia				New Zealand			
	AVF	AVG	CVC	Total	AVF	AVG	CVC	Total
<200	32 (0.3%)	2 (0.4%)	19 (0.9%)	**53 (0.4%)**	1 (0.1%)	0 (0.0%)	4 (0.4%)	**5 (0.2%)**
200-249	130 (1.4%)	8 (1.7%)	73 (3.4%)	**211 (1.7%)**	31 (2.4%)	1 (3.1%)	36 (4.0%)	**68 (2.9%)**
250-299	1385 (14.7%)	95 (20.2%)	768 (36.3%)	**2258 (18.0%)**	200 (15.6%)	4 (12.5%)	249 (27.7%)	**453 (19.3%)**
300-349	6486 (68.9%)	318 (67.7%)	1224 (57.8%)	**8102 (64.7%)**	801 (62.3%)	24 (75.0%)	557 (62.0%)	**1382 (58.9%)**
350-399	1165 (12.4%)	42 (8.9%)	24 (1.1%)	**1237 (9.9%)**	229 (17.8%)	2 (6.3%)	46 (5.1%)	**277 (11.8%)**
400+	205 (2.2%)	1 (0.2%)	4 (0.2%)	**210 (1.7%)**	24 (1.9%)	1 (3.1%)	2 (0.2%)	**27 (1.2%)**
Total	**9411**	**470**	**2117**	**12526**	**1286**	**32**	**898**	**2345**

* CVV-HD Patients excluded from Total.

** Blood Flow Rate or Type of Access Not Reported for 545 Australian and 133 New Zealand patients.

Figure 4.18.1 - Distribution of Blood Flow Rates - Prevalent Haemodialysis - Australia

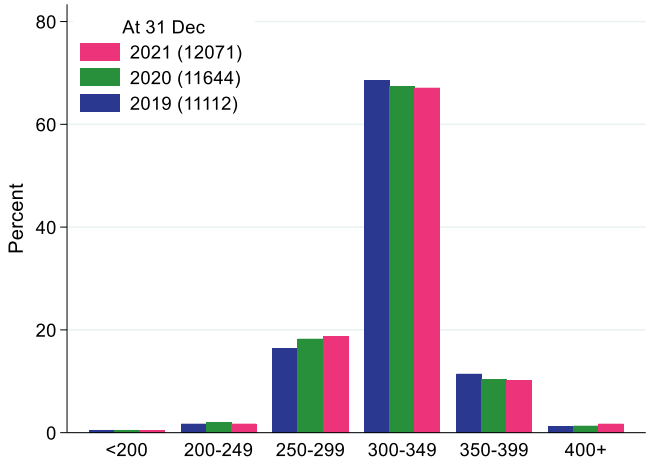


Figure 4.18.2 - Distribution of Blood Flow Rates - Prevalent Haemodialysis - New Zealand

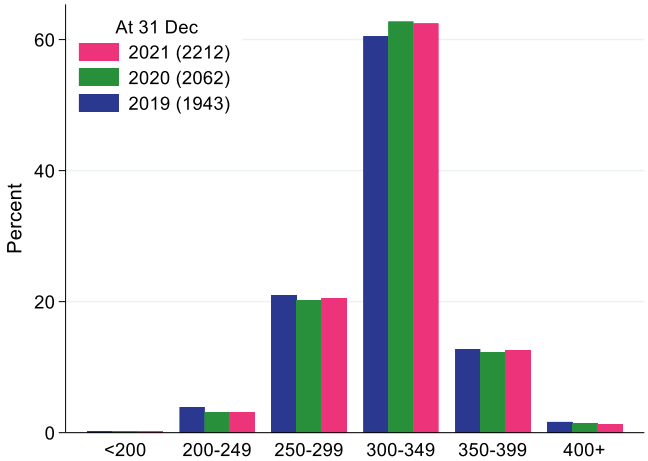


Table 4.9 shows the number of weekly sessions, and hours per session, at 31 December 2021. Figures 4.19 and 4.20 show HD frequency and session length respectively over 2019-2021. Figure 4.21 combines sessions and session length to show the total number of weekly hours of HD over 2019-2021.

Table 4.9 Duration and Number of Sessions per Week - December 2021

Country	Sessions per week	Hours of Each Treatment					
		<4	4	4.5	5	>5	Total
Australia	**<3**	116 (18.8%)	341 (55.2%)	84 (13.6%)	74 (12.0%)	3 (0.5%)	**618**
	3	483 (4.4%)	4699 (43.2%)	2491 (22.9%)	2796 (25.7%)	396 (3.6%)	**10865**
	3.1-4.9	33 (6.7%)	101 (20.4%)	51 (10.3%)	116 (23.4%)	194 (39.2%)	**495**
	5+	26 (38.8%)	10 (14.9%)	2 (3.0%)	7 (10.4%)	22 (32.8%)	**67**
	Total	**658 (5.5%)**	**5151 (42.8%)**	**2628 (21.8%)**	**2993 (24.8%)**	**615 (5.1%)**	**12045**
New Zealand	**<3**	8 (22.9%)	15 (42.9%)	0 (0.0%)	11 (31.4%)	1 (2.9%)	**35**
	3	36 (1.8%)	608 (31.0%)	517 (26.4%)	672 (34.3%)	129 (6.6%)	**1962**
	3.1-4.9	6 (2.9%)	52 (25.0%)	35 (16.8%)	65 (31.3%)	50 (24.0%)	**208**
	5+	4 (44.4%)	1 (11.1%)	1 (11.1%)	1 (11.1%)	2 (22.2%)	**9**
	Total	**54 (2.4%)**	**676 (30.5%)**	**553 (25.0%)**	**749 (33.8%)**	**182 (8.2%)**	**2214**

* Intermediate durations are rounded up, e.g. 4.25 is included in 4.5.
** Hours or number of sessions were not reported for 481 Australian and 131 New Zealand patients.

Figure 4.19 - Haemodialysis Frequency Per Week - 2019-2021

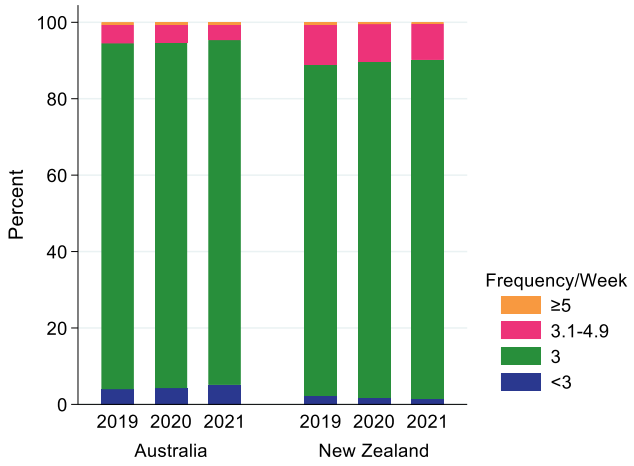


Figure 4.20 - Haemodialysis Session Length (Hours) - December 2019-2021

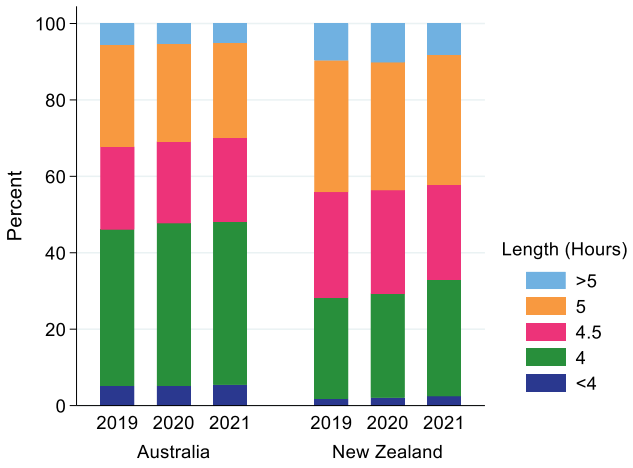
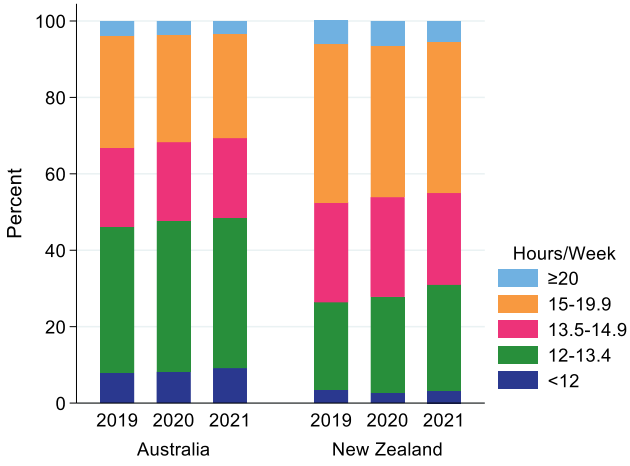


Figure 4.21 - Haemodialysis Duration (Hours Per Week) - December 2019-2021



Figures 4.22-4.24 show trends in dialysis prescription. Tables 4.10-4.12 present these same data for 2018-2021 by state and country.

Figure 4.22 - Percentage of HD Patients Dialysing More than 3 Days Per Week

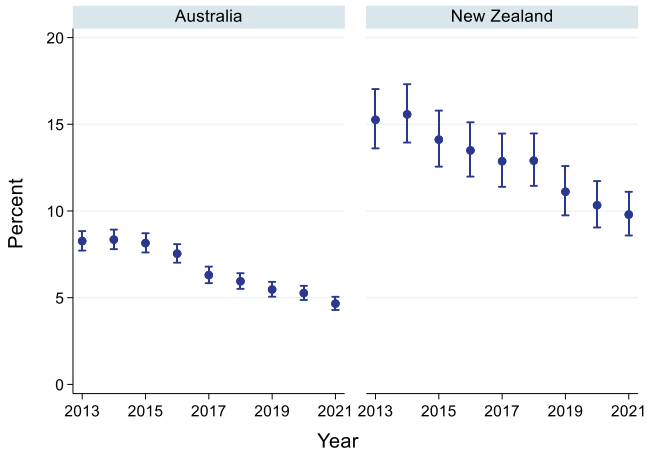


Figure 4.23 - Percentage of HD Patients Dialysing 3 Days Per Week Dialysing 5 Hours or Longer Per Session

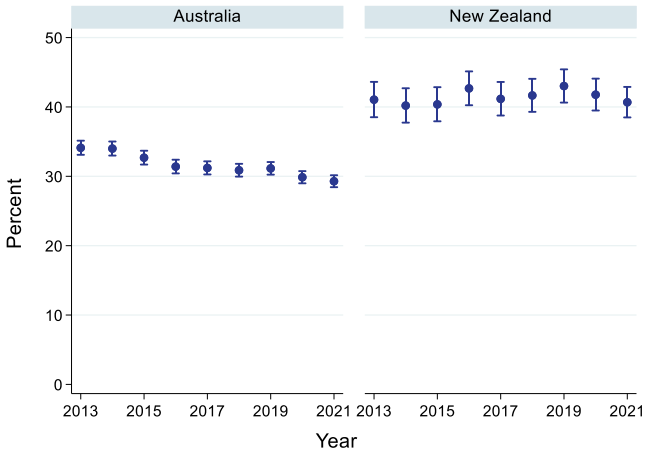


Figure 4.24 - Percentage of HD Patients Dialysing >15 Hours Per Week

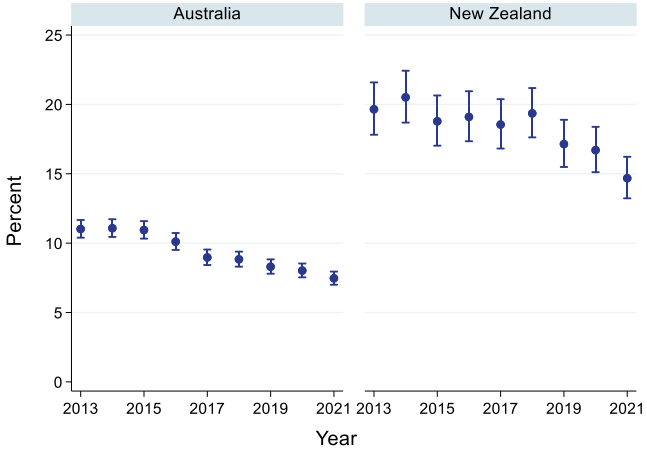


Table 4.10 Haemodialysis >3 Sessions per Week by Australian State/Territory and Country 2018-2021

State	2018	2019	2020	2021
QLD	159 (7.4%)	139 (6.1%)	113 (4.8%)	112 (4.5%)
NSW/ACT	178 (5.4%)	179 (5.2%)	179 (5.0%)	164 (4.4%)
VIC	178 (6.9%)	159 (6.2%)	190 (6.8%)	169 (5.9%)
TAS	15 (8.2%)	12 (6.2%)	16 (9.2%)	12 (6.6%)
SA	28 (3.6%)	32 (4.1%)	24 (2.9%)	25 (2.9%)
NT	7 (1.0%)	7 (1.0%)	5 (0.7%)	5 (0.7%)
WA	75 (6.6%)	81 (6.9%)	87 (6.9%)	76 (6.0%)
Australia	**640 (5.9%)**	**609 (5.5%)**	**614 (5.3%)**	**563 (4.7%)**
New Zealand	**252 (12.9%)**	**216 (11.1%)**	**213 (10.3%)**	**217 (9.8%)**

Table 4.11 Haemodialysis ≥5 Hours per Session - Three Sessions per Week by Australian State/Territory and Country 2018-2021

State	2018	2019	2020	2021
QLD	531 (28.3%)	569 (28.9%)	569 (27.7%)	509 (23.8%)
NSW/ACT	1423 (48.3%)	1466 (47.8%)	1493 (46.6%)	1512 (45.9%)
VIC	690 (29.4%)	705 (30.0%)	709 (28.1%)	764 (29.3%)
TAS	23 (14.0%)	31 (17.2%)	22 (14.2%)	20 (12.0%)
SA	76 (10.3%)	71 (9.6%)	70 (8.8%)	77 (9.4%)
NT	201 (30.2%)	220 (31.4%)	212 (31.2%)	226 (32.0%)
WA	69 (6.7%)	73 (6.9%)	74 (6.5%)	74 (6.6%)
Australia	**3013 (30.9%)**	**3135 (31.1%)**	**3149 (29.9%)**	**3182 (29.3%)**
New Zealand	**704 (41.7%)**	**723 (43.0%)**	**756 (41.8%)**	**798 (40.7%)**

Table 4.12 Haemodialysis >15 Hours per Week by Australian State/Territory and Country 2018-2021

State	2018	2019	2020	2021
QLD	197 (9.2%)	182 (8.0%)	156 (6.6%)	149 (6.0%)
NSW/ACT	402 (12.3%)	393 (11.5%)	412 (11.5%)	391 (10.7%)
VIC	221 (8.6%)	209 (8.1%)	230 (8.3%)	234 (8.2%)
TAS	15 (8.2%)	15 (7.7%)	18 (10.3%)	13 (7.2%)
SA	33 (4.3%)	32 (4.1%)	33 (4.0%)	31 (3.6%)
NT	20 (3.0%)	24 (3.4%)	15 (2.2%)	13 (1.8%)
WA	62 (5.5%)	68 (5.8%)	71 (5.6%)	68 (5.4%)
Australia	**950 (8.8%)**	**923 (8.3%)**	**935 (8.0%)**	**899 (7.5%)**
New Zealand	**378 (19.4%)**	**333 (17.1%)**	**344 (16.7%)**	**325 (14.7%)**

Haemodialysis and Haemodialfiltration

Figure 4.25 shows the change in percentage of haemodialysis patients treated with haemodiafiltration over time for Australia and New Zealand. Table 4.13 shows the use of high-flux dialysis and haemodiafiltration by state/territory and country in 2021.

Figure 4.25 - Use of Haemodiafiltration - Prevalent Haemodialysis Patients 2012-2021

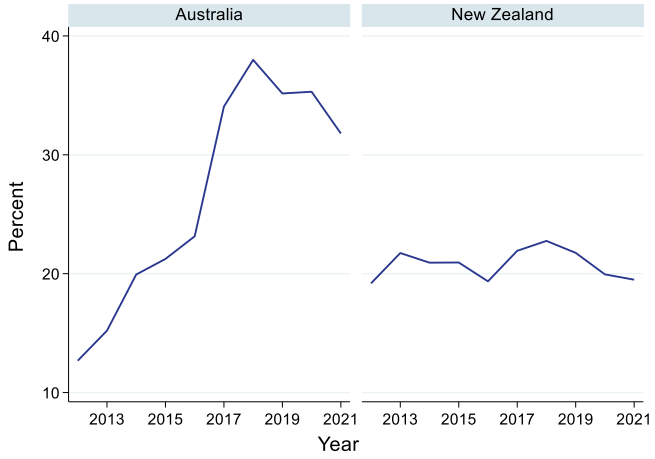


Table 4.13 Number of Patients Receiving Standard Haemodialysis (and Membrane Type), Haemofiltration and Haemodiafiltration - December 2021

HD Modality	QLD	NSW/ACT	VIC	TAS	SA	NT	WA	Australia	New Zealand
Haemodialysis	1409 (56.6%)	2604 (70.0%)	2399 (84.0%)	180 (99.4%)	591 (68.2%)	628 (87.7%)	441 (34.7%)	**8252 (68.2%)**	**1788 (80.5%)**
High Flux	1308	2401	2215	156	590	436	292	**7398**	**1540**
Non-High Flux*	99	192	182	24	1	189	146	**833**	**242**
Unreported	2	11	2	0	0	3	3	**21**	**6**
Haemofiltration	1 (0.0%)	7 (0.2%)	0 (0.0%)	0 (0.0%)	1 (0.1%)	1 (0.1%)	0 (0.0%)	**10 (0.1%)**	**5 (0.2%)**
Haemodiafiltration	1081 (43.4%)	1107 (29.8%)	456 (16.0%)	1 (0.6%)	274 (31.6%)	87 (12.2%)	831 (65.3%)	**3837 (31.7%)**	**428 (19.3%)**
Total	**2491**	**3718**	**2855**	**181**	**866**	**716**	**1272**	**12099**	**2221**

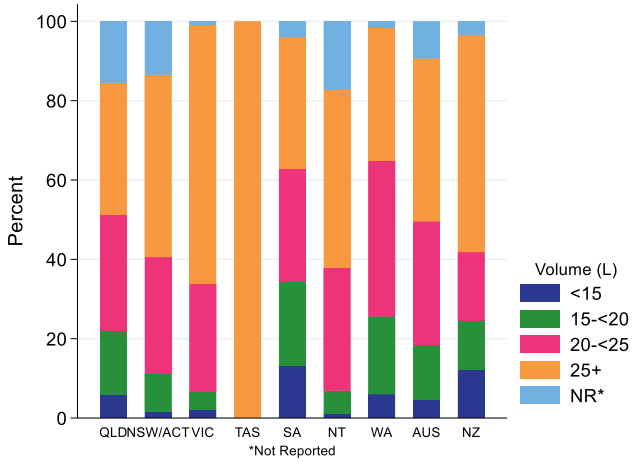
*Non-High Flux includes low flux **and** mid-cut-off or other membranes.

In the 2017 survey, the mode of delivery of substitution fluid for haemodiafiltration was recorded for the first time (table 4.14). In Australia and New Zealand, the predominant mode of delivery of substitution fluid for haemodiafiltration was post-dilution.

Table 4.14 Mode of delivery of substitution fluid in patients using haemodiafiltration - December 2021

Country	HDF Type	2017	2018	2019	2020	2021
Australia	**Predilution**	198 (6%)	231 (6%)	265 (7%)	299 (7%)	308 (8%)
	Mixed Dilution	62 (2%)	156 (4%)	67 (2%)	60 (1%)	49 (1%)
	Postdilution	3182 (92%)	3682 (90%)	3588 (92%)	3745 (91%)	3480 (91%)
	Not Reported	24 (1%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Total	**3466**	**4069**	**3920**	**4104**	**3837**
New Zealand	**Predilution**	148 (36%)	167 (38%)	89 (21%)	98 (24%)	92 (21%)
	Mixed Dilution	2 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (0%)
	Postdilution	265 (64%)	277 (62%)	336 (79%)	312 (76%)	334 (78%)
	Not Reported	1 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
	Total	**416**	**444**	**425**	**410**	**428**

Figure 4.26 - HDF Substitution Volume by State/Territory and Country - at 31 Dec 2021



Place of Dialysis and Self-care

Community house haemodialysis has been collected as a 'sub-modality' of haemodialysis since 2020. Community house haemodialysis enables patients/carers to undertake haemodialysis, independent of nursing or medical supervision, in a shared house or community facility.

Table 4.15 Prevalent Haemodialysis Patients by Method and Location 2017-2021

Country	Modality	2017	2018	2019	2020	2021
Australia	**Hospital**	2801 (26%)	2932 (26%)	2988 (26%)	3006 (25%)	3193 (25%)
	Satellite	6847 (64%)	7125 (64%)	7531 (65%)	7885 (66%)	8191 (65%)
	Home	1048 (10%)	1058 (10%)	1074 (9%)	1110 (9%)	1120 (9%)
	Community House	0 (0%)	0 (0%)	0 (0%)	25 (0%)	22 (0%)
	Total	**10696**	**11115**	**11593**	**12026**	**12526**
New Zealand	**Hospital**	1020 (53%)	1076 (54%)	1127 (56%)	1227 (57%)	1377 (59%)
	Satellite	472 (24%)	502 (25%)	494 (24%)	534 (25%)	576 (25%)
	Home	442 (23%)	425 (21%)	409 (20%)	357 (17%)	362 (15%)
	Community House	0 (0%)	0 (0%)	0 (0%)	33 (2%)	30 (1%)
	Total	**1934**	**2003**	**2030**	**2151**	**2345**

Self-care is defined as dialysis performed by the patient with minimal assistance from a health care professional. Self-care enables patients to perform dialysis procedures independent of nursing or medical assistance in any type of facility or community setting.

Table 4.16 Haemodialysis Patients by Self-care 2021

Country	Modality	Self Care	Not Self Care	Not Reported	Total
Australia	Hospital	383 (12%)	2672 (84%)	138 (4%)	3193
	Satellite	1255 (15%)	6672 (81%)	264 (3%)	8191
	Home	896 (80%)	196 (18%)	28 (3%)	1120
	Community House	5 (23%)	13 (59%)	4 (18%)	22
	Total	**2539 (20%)**	**9553 (76%)**	**434 (3%)**	**12526**
New Zealand	Hospital	110 (8%)	1167 (85%)	100 (7%)	1377
	Satellite	140 (24%)	417 (72%)	19 (3%)	576
	Home	312 (86%)	42 (12%)	8 (2%)	362
	Community House	24 (80%)	6 (20%)	0 (0%)	30
	Total	**586 (25%)**	**1632 (70%)**	**127 (5%)**	**2345**

Home Haemodialysis

Prevalence

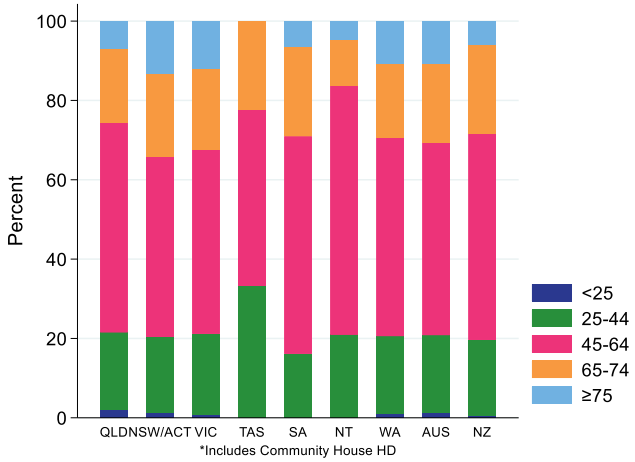
The distribution of prevalent home haemodialysis patients (including community house haemodialysis patients) by state is shown in table 4.17. The 2021 data are further stratified by age in figure 4.27.

Table 4.17 Number (%) of Prevalent Haemodialysis Patients Treated with Home Haemodialysis* 2017 - 2021

State	2017	2018	2019	2020	2021
QLD	248 (11.9%)	261 (11.8%)	254 (10.9%)	241 (9.8%)	246 (9.4%)
NSW/ACT	433 (13.1%)	446 (13.2%)	449 (12.7%)	470 (12.9%)	470 (12.5%)
VIC	196 (7.7%)	180 (6.8%)	189 (6.9%)	227 (8.0%)	241 (8.2%)
TAS	11 (6.3%)	12 (6.6%)	11 (5.6%)	8 (4.5%)	9 (4.9%)
SA	28 (3.7%)	34 (4.4%)	37 (4.6%)	29 (3.5%)	31 (3.6%)
NT	39 (5.8%)	34 (4.8%)	38 (5.2%)	56 (7.7%)	43 (5.8%)
WA	93 (7.9%)	91 (7.5%)	96 (7.5%)	104 (7.9%)	102 (7.2%)
Australia	**1048 (9.8%)**	**1058 (9.5%)**	**1074 (9.3%)**	**1135 (9.4%)**	**1142 (9.1%)**
New Zealand	**442 (22.9%)**	**425 (21.2%)**	**409 (20.1%)**	**390 (18.1%)**	**392 (16.7%)**

*Includes Community House HD

Figure 4.27 - Age Distribution of Home HD* Patients by State/Territory and Country - at 31 Dec 2021



The trends in the proportion treated with home haemodialysis in different age groups are illustrated in figure 4.28.

Figure 4.28.1 - Home HD* Percent of all HD by Age at 31 Dec 2021 - Australia

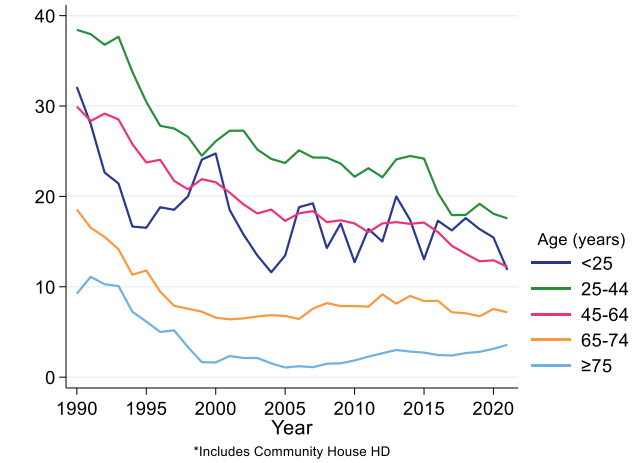
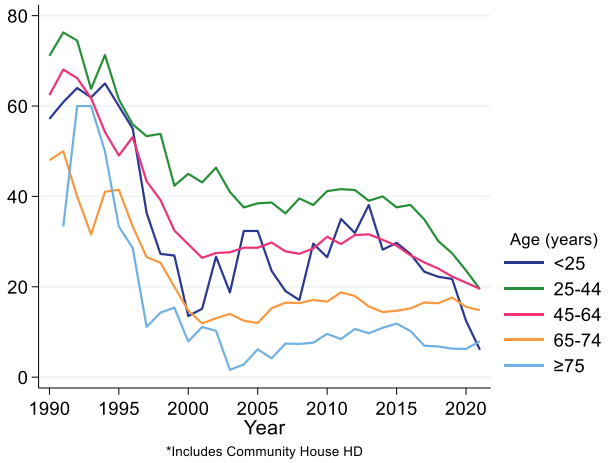


Figure 4.28.2 - Home HD* Percent of all HD by Age at 31 Dec 2021 - New Zealand



There is substantial variation between hospitals, and between countries, in the proportion of haemodialysis patients who dialyse at home (figure 4.29).

Figure 4.29.1 - % Haemodialysis Patients on Home HD* - Australia 31 December 2021

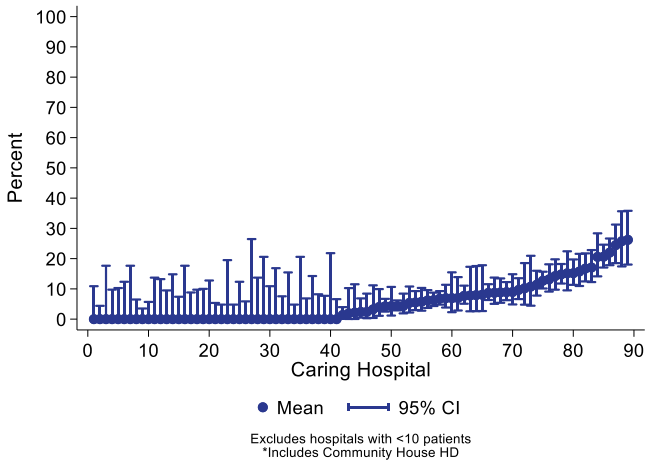
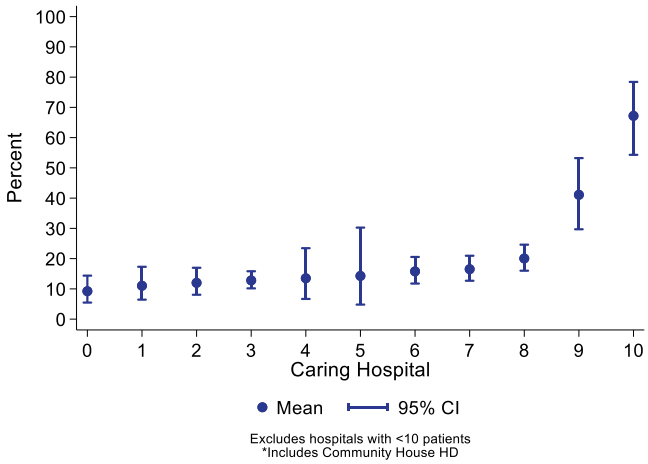


Figure 4.29.2 - % Haemodialysis Patients on Home HD* - New Zealand 31 December 2021



Home Haemodialysis Survival and Treatment Failure

Home haemodialysis treatment failure refers to cessation of home haemodialysis (including community house haemodialysis) to have haemodialysis in satellite or hospital for more than 30 days, to do peritoneal dialysis for more than 30 days, or due to death of the patient. Receipt of a kidney transplant is not a 'treatment failure' and so follow-up is censored at transplantation, or 31 Dec 2021. Only patients initiating home haemodialysis within the first 365 days of KRT commencement are included. When death of a patient is counted as a censoring event (rather than 'failure'), the differences between the age groups become less apparent (figure 4.32).

Figure 4.30 - Technique Survival - Home Haemodialysis* 2011 - 2021

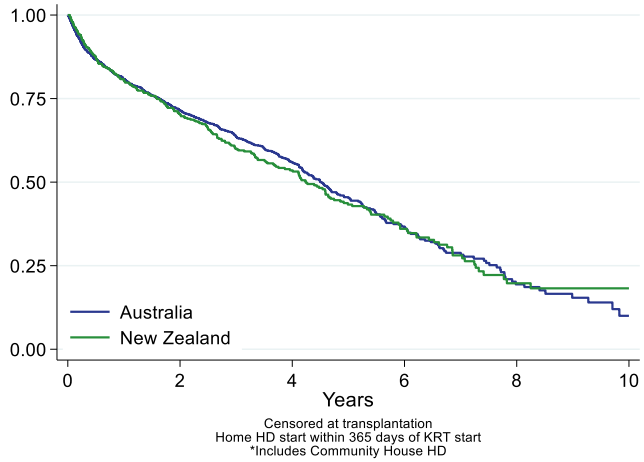


Figure 4.31 - Technique Survival by Age Group - Home Haemodialysis* 2011 - 2021

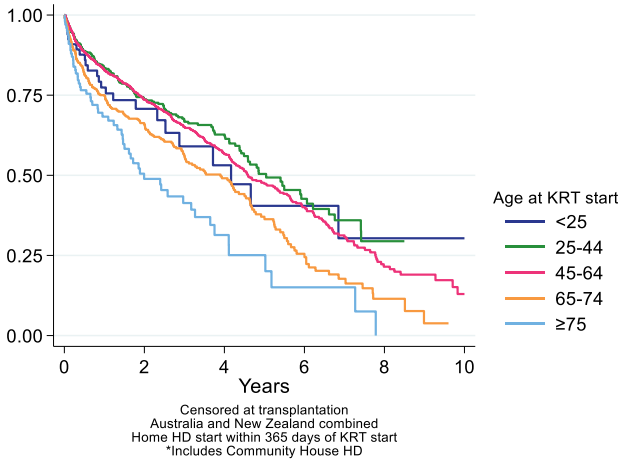
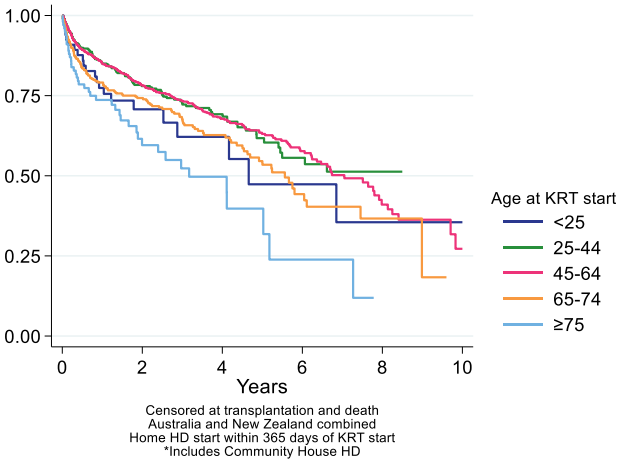


Figure 4.32 - Death-Censored Technique Survival by Age Group - Home Haemodialysis 2011 – 2021

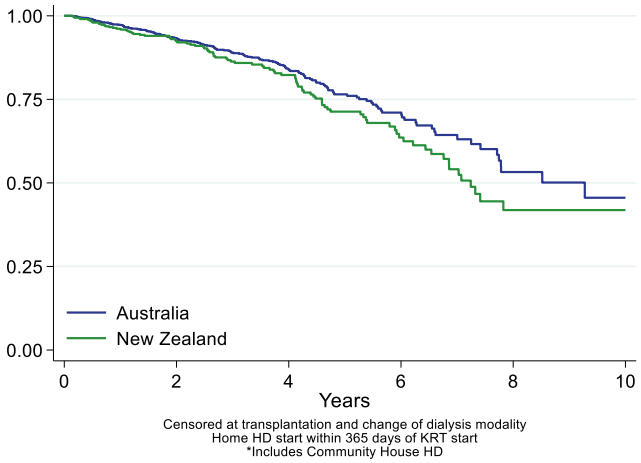


The modality or status following home haemodialysis treatment failure or censoring for 2011 - 2021 are shown in table 4.18.

Table 4.18 Reason for Home Haemodialysis Treatment Failure 2011-2021

Modality or Status Following Treatment Failure	Australia	New Zealand
Other HD >= 30 days	463 (26%)	159 (29%)
PD >= 30 days	42 (2%)	11 (2%)
Transplant	550 (31%)	120 (22%)
Lost to Follow Up	3 (0%)	0 (0%)
Renal Recovery	14 (1%)	5 (1%)
End of follow-up	530 (30%)	167 (30%)
Death	168 (9%)	88 (16%)
Withdrawal from dialysis	15 (1%)	6 (1%)
Total	**1785**	**556**

Figure 4.33 - Patient Survival - Home Haemodialysis* 2011 – 2021



Home Haemodialysis Prescription

The following figures explore trends in home haemodialysis prescriptions.

Figure 4.34 - Home Haemodialysis* Frequency Per Week - 2019-2021

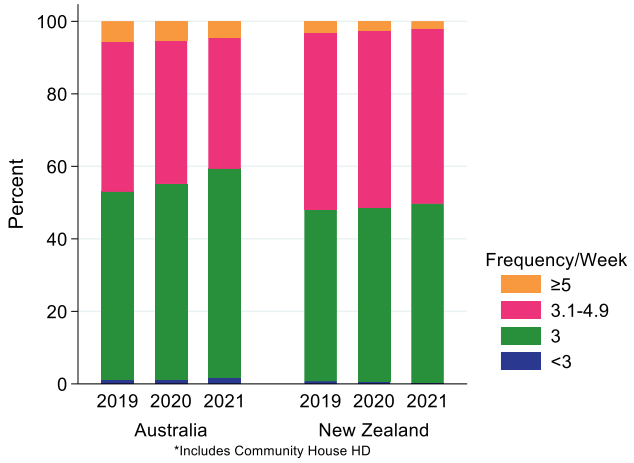


Figure 4.35 - Home Haemodialysis* Session Length (Hours) - December 2019-2021

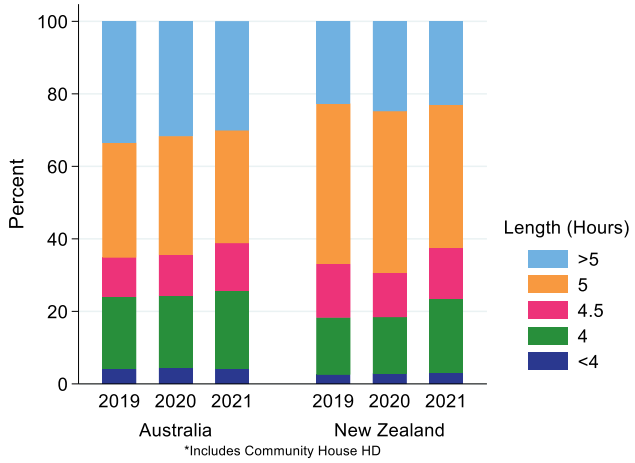


Figure 4.36 - Home Haemodialysis* Duration (Hours Per Week) - December 2019-2021

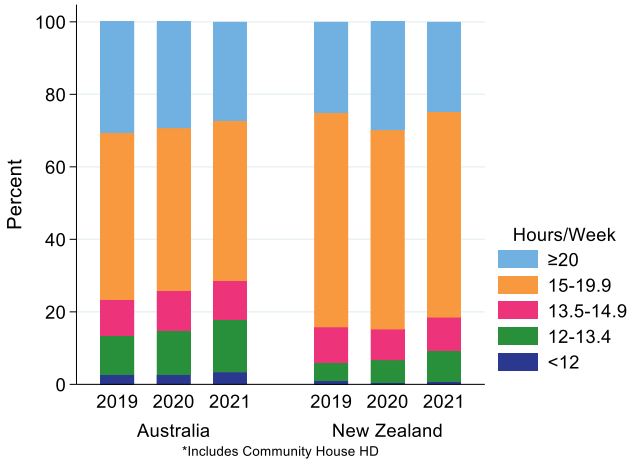


Figure 4.37 - Percentage of Home HD* Patients Dialysing More than 3 Days Per Week

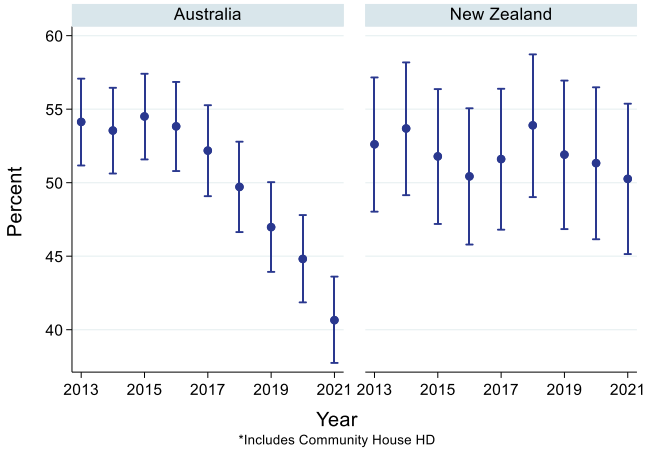


Figure 4.38 - Percentage of Home HD* Patients Dialysing 3 Days Per Week Dialysing 5 Hours or Longer Per Session

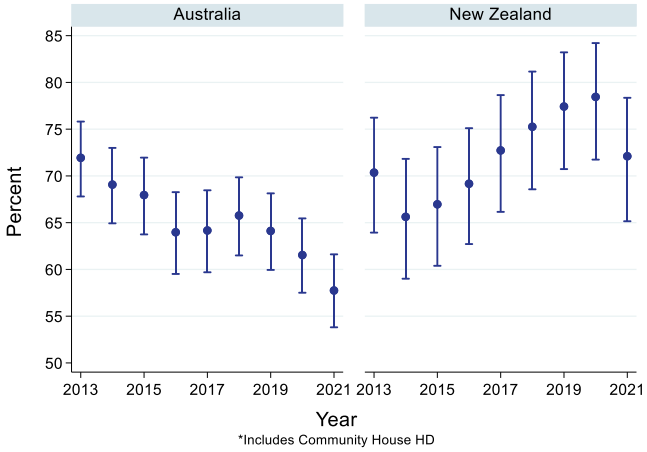
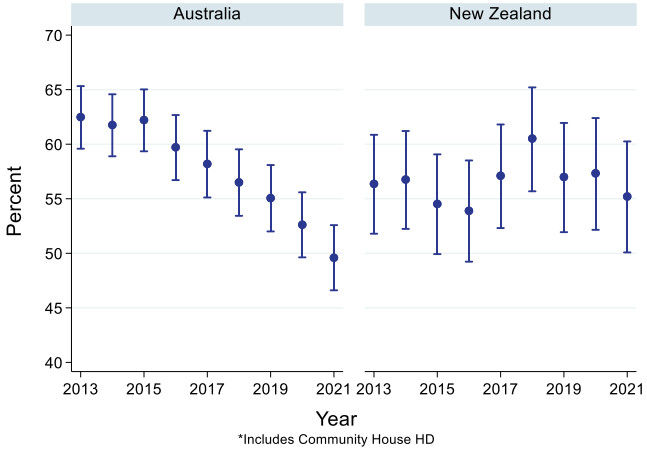


Figure 4.39 - Percentage of Home HD* Patients Dialysing >15 Hours Per Week



Laboratory Based Data at the time of the Annual Survey

Anaemia management

The median haemoglobin at 31 Dec 2021 of haemodialysis patients at each centre ranged from 102 to 123g/L in Australia and 107 to 115g/L in New Zealand (Figure 4.40). 79% of patients in Australia, and 76% in New Zealand were prescribed an erythropoiesis stimulating agent (ESA) at the time of the annual survey.

Figure 4.40.1 - Haemoglobin in Haemodialysis Patients - Australia 31 December 2021

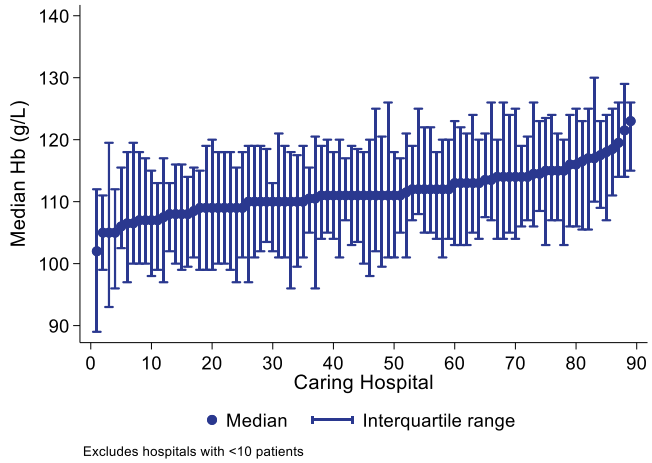
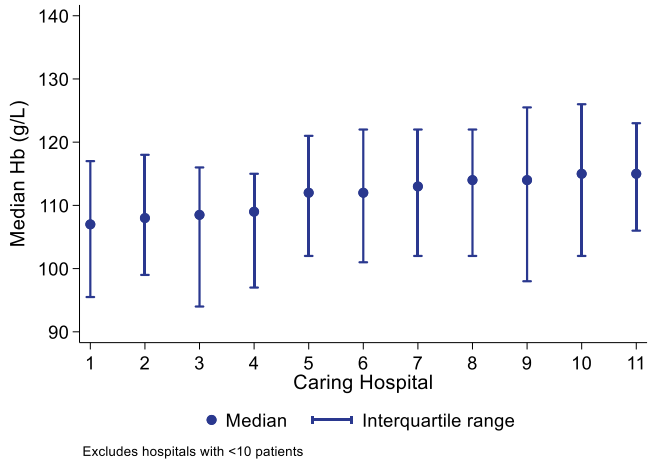


Figure 4.40.2 - Haemoglobin in Haemodialysis Patients - New Zealand 31 December 2021



The proportion of patients on haemodialysis prescribed an ESA whose haemoglobin was between 100-115g/L ranged from 17-72% in Australia and 32-46% in New Zealand (Figure 4.41).

Figure 4.41.1 - % Haemodialysis Patients receiving an ESA with Hb 100-115 g/L - Australia 31 December 2021

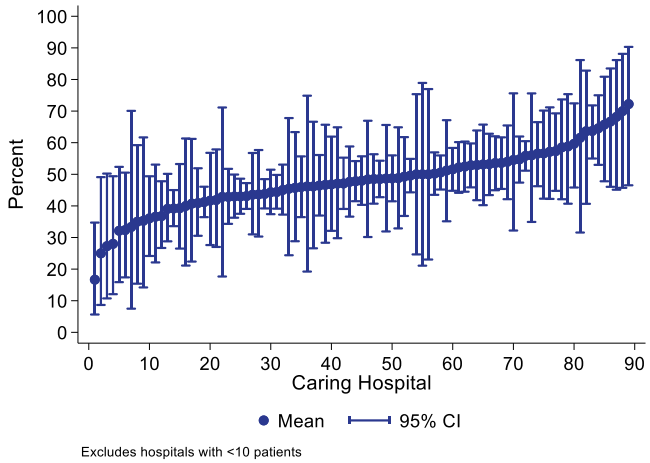
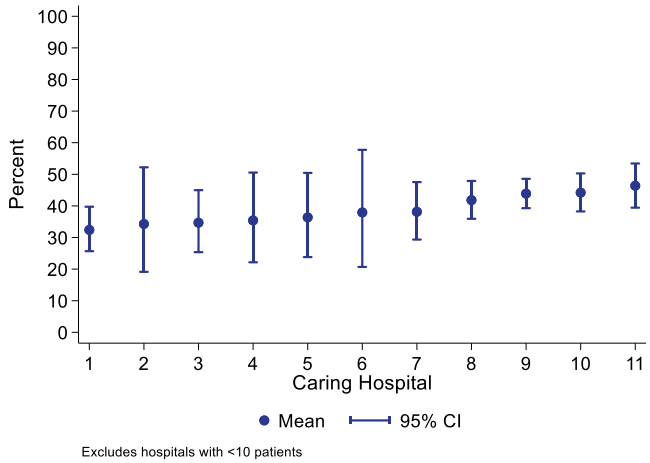


Figure 4.41.2 - % Haemodialysis Patients receiving an ESA with Hb 100-115 g/L - New Zealand 31 December 2021



The proportion of patients receiving an ESA considered iron replete (ferritin between 200-500µg/L) ranged from 7-71% in Australia and 18-57% in New Zealand (figure 4.42). Figure 4.43 presents equivalent data for transferrin saturation.

Figure 4.42.1 - % Haemodialysis Patients receiving an ESA with Ferritin 200-500 µg/L - Australia 31 December 2021

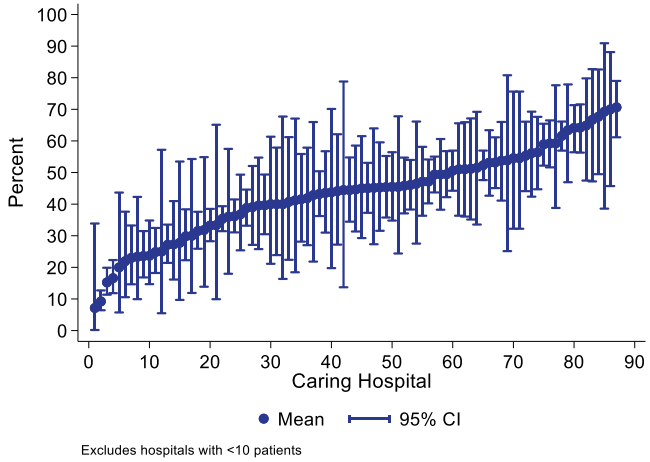


Figure 4.42.2 - % Haemodialysis Patients receiving an ESA with Ferritin 200-500 µg/L - New Zealand 31 December 2021

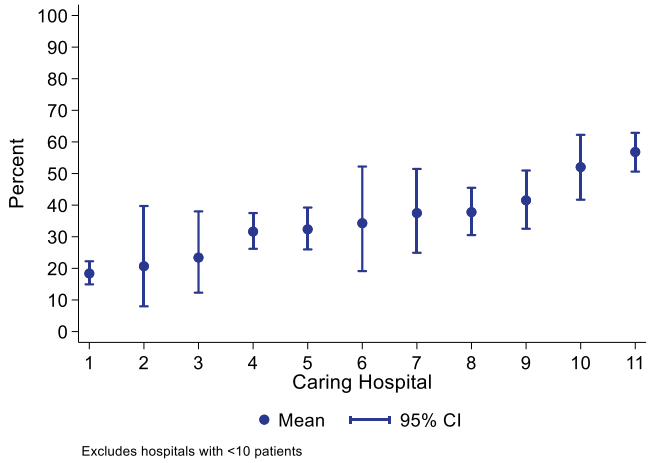


Figure 4.43.1 - % Haemodialysis Patients receiving an ESA with TSat>20% - Australia 31 December 2021

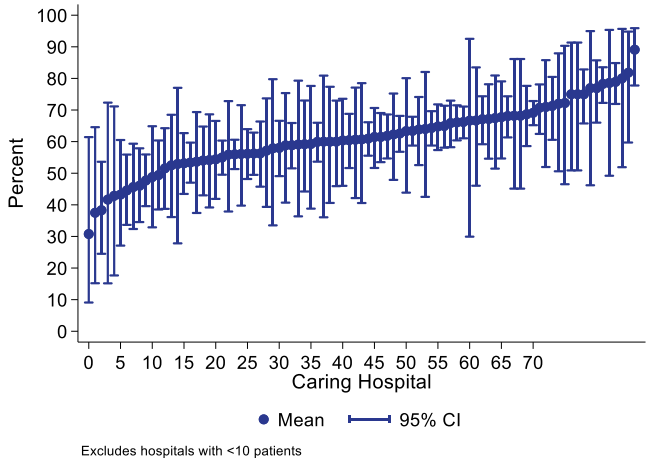
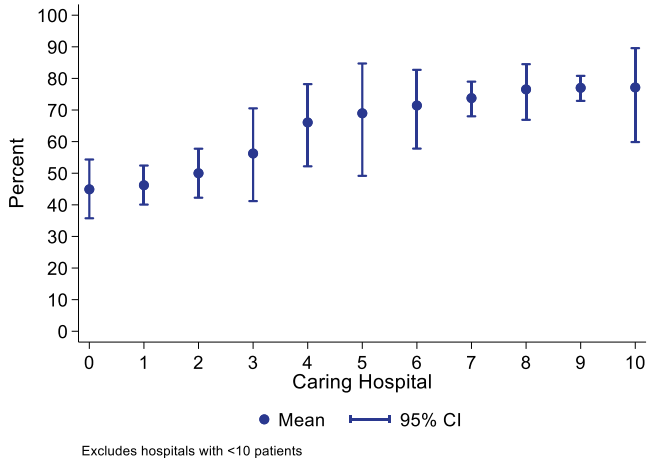


Figure 4.43.2 - % Haemodialysis Patients receiving an ESA with TSat>20% - New Zealand 31 December 2021



Calcium and Phosphate

Figures 4.44 and 4.45 show the proportions of patients with serum calcium between 2.1-2.4mmol/L and phosphate between 0.8-1.6mmol/L respectively at the time of the annual survey. Note that the calcium is not corrected for albumin.

Figure 4.44.1 - % Haemodialysis Patients with Calcium 2.1-2.4 mmol/L - Australia 31 December 2021

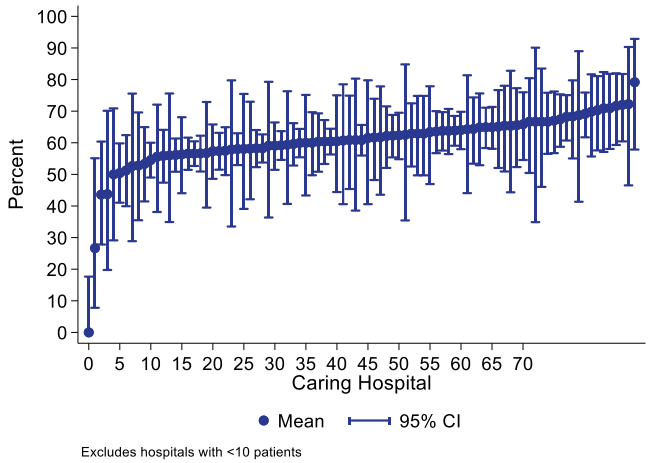


Figure 4.44.2 - % Haemodialysis Patients with Calcium 2.1-2.4 mmol/L - New Zealand 31 December 2021

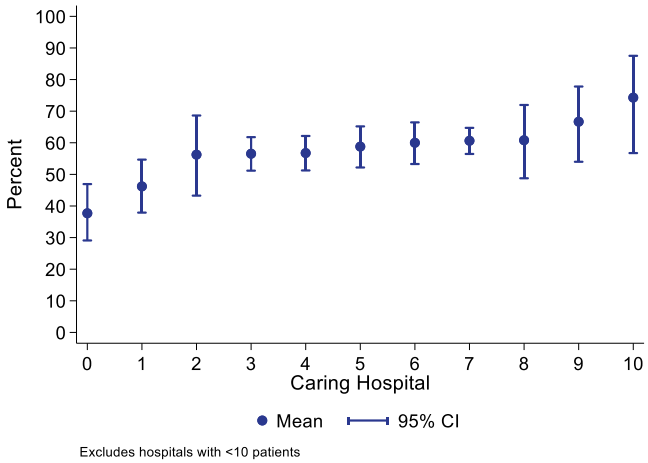


Figure 4.45.1 - % Haemodialysis Patients with Phosphate 0.8-1.6 mmol/L - Australia 31 December 2021

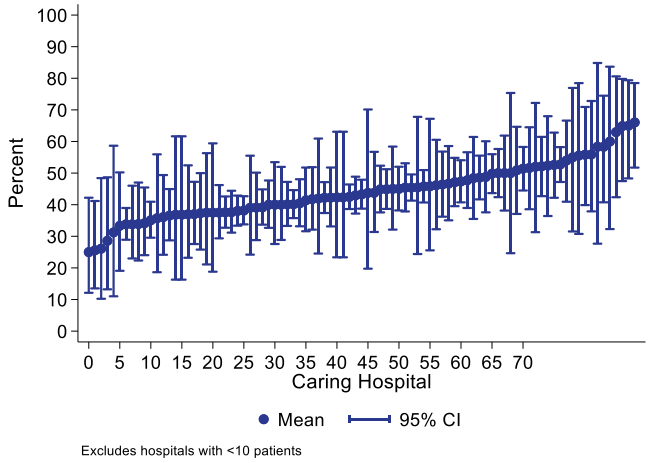
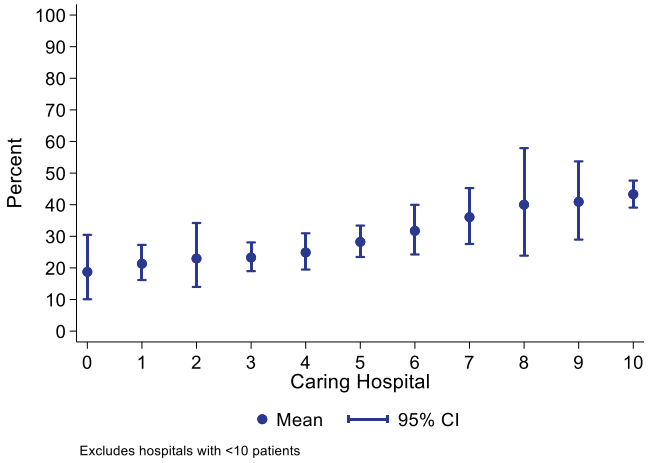


Figure 4.45.2 - % Haemodialysis Patients with Phosphate 0.8-1.6 mmol/L - New Zealand 31 December 2021



Urea Reduction Ratio

Figure 4.46 shows the distribution of urea reduction ratio (URR) by country over 2019-2021. Figure 4.47 presents the 2021 data stratified by vascular access type.

Figure 4.46 - Urea Reduction Ratio - HD Three Sessions Per Week

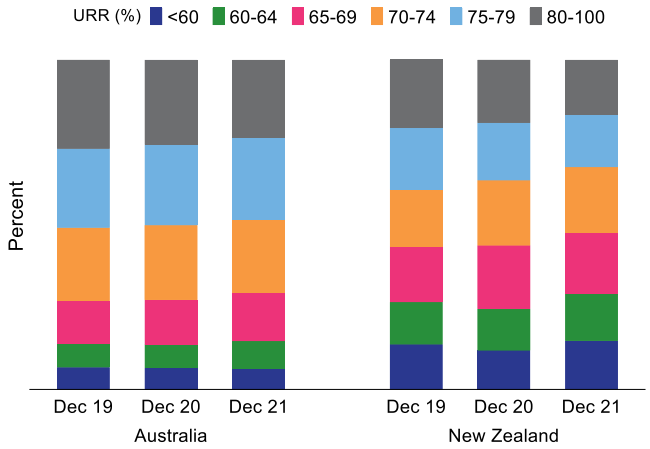


Figure 4.47 - Urea Reduction Ratio - By Type of Access, 2021 HD Three Sessions Per Week

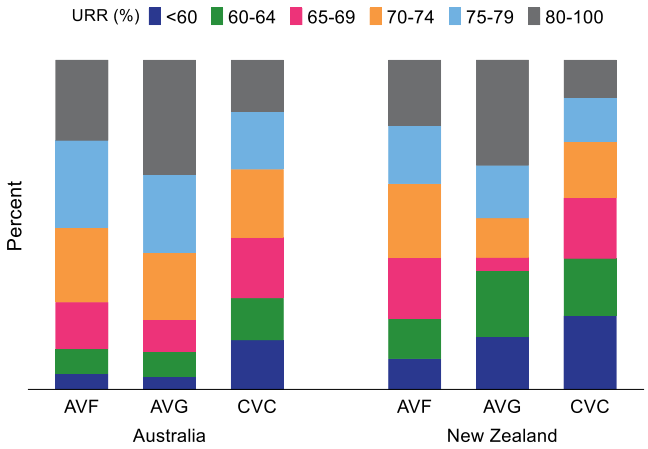


Table 4.19 presents URR by dialysis session duration. In general, as expected, the proportion of patients with a URR >70% typically increases with longer session duration.

Table 4.19 Urea Reduction Ratio - Prevalent Patients Three Sessions per Week - December 2021

Country	Hours per Session	Urea Reduction Ratio %		
		≤70	>70	Total
Australia	**<4 hours**	182 (42.2%)	249 (57.8%)	**431**
	4 hours	1404 (33.2%)	2820 (66.8%)	**4224**
	>4-5 hours	1525 (31.3%)	3342 (68.7%)	**4867**
	>5 hours	101 (30.1%)	234 (69.9%)	**335**
	Total	**3212 (32.6%)**	**6645 (67.4%)**	**9857**
New Zealand	**<4 hours**	18 (56.3%)	14 (43.8%)	**32**
	4 hours	292 (53.0%)	259 (47.0%)	**551**
	>4-5 hours	490 (47.5%)	542 (52.5%)	**1032**
	>5 hours	52 (50.0%)	52 (50.0%)	**104**
	Total	**852 (49.6%)**	**867 (50.4%)**	**1719**

Figure 4.48 shows the distribution of median URR by treating hospital for patients dialysing three times per week. In Australia the median ranged from 65-88%, and in New Zealand it ranged from 63-75%.

Figure 4.48.1 - Median URR in Haemodialysis Patients - Three Sessions Per Week Australia 31 December 2021

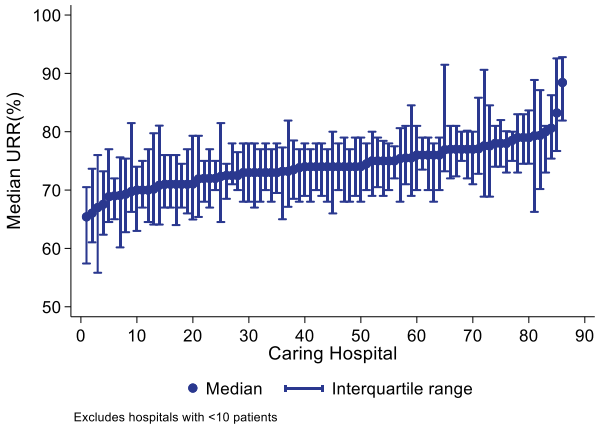


Figure 4.48.2 - Median URR in Haemodialysis Patients - Three Sessions Per Week New Zealand 31 December 2021

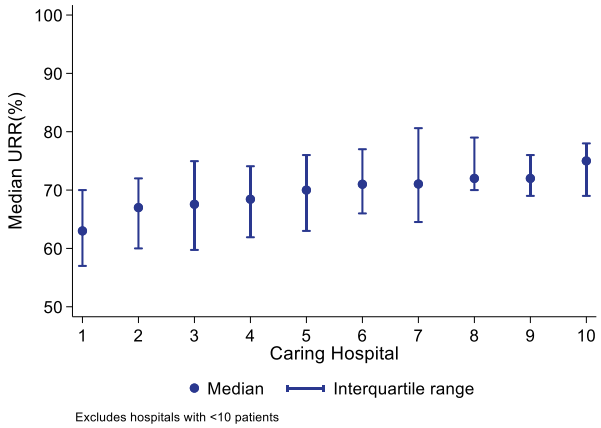


Figure 4.49 shows the proportion of patients with a URR >70%. In Australia this proportion ranged from 25-100%, and in New Zealand from 24-72%.

Figure 4.49.1 - % Haemodialysis Patients with URR>70% - Three Sessions Per Week Australia 31 December 2021

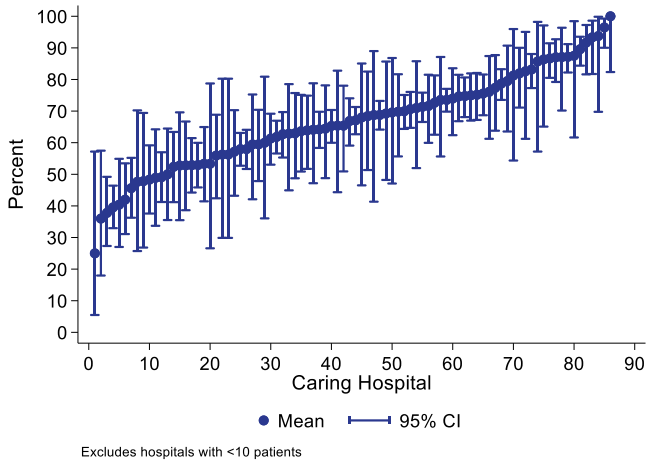


Figure 4.49.2 - % Haemodialysis Patients with URR>70% - Three Sessions Per Week New Zealand 31 December 2021