



Australia &
New Zealand Dialysis
& Transplant Registry

Chapter 4

Haemodialysis

ANZDATA gratefully acknowledges the contributions of the Haemodialysis Working Group convened by Kevan Polkinghorne

Contents:

Haemodialysis	4-1
Stock and Flow	4-2
Dialysis Prescription	4-6
Anaemia	4-13
Biochemistry	4-19
Dialysis Adequacy	4-22
Vascular Access	4-24
Prevalent Patients	4-27
Survival	4-32
Home Haemodialysis	4-35

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Stock and Flow

Table 4.1 presents the stock and flow of haemodialysis patients in Australia and New Zealand over 2010-2014. The number of incident patients in each country remains approximately constant, in contrast to ongoing strong growth in prevalent numbers. Table 4.2 presents incident and prevalent patients by age group, and incident patients by primary renal disease. In both countries diabetic nephropathy is the leading cause of ESKD leading to haemodialysis.

Figures 4.1 - 4.4 present the age distribution of incident and prevalent haemodialysis patients in Australia and New Zealand.

Table 4.1

Stock and Flow of Haemodialysis Patients in Australia and New Zealand 2010 - 2014

Country	Event	2010	2011	2012	2013	2014
Australia	Patients new to HD	2057	2199	2183	2146	2082
	First dialysis treatment	1741	1863	1827	1779	1757
	Previous dialysis (PD)	281	301	305	320	278
	Failed transplant	35	35	51	47	47
	Transplanted	546	522	545	549	568
	Deaths	1151	1249	1261	1325	1288
	Never transplanted	1083	1174	1181	1238	1213
	Previous transplant	68	75	80	87	75
	Transfer to PD	373	409	434	391	385
	Patients dialysing at 31 December	8638	8991	9257	9470	9619
	Patients dialysis at home at 31 December	984	1004	1087	1119	1138
	% of all home dialysis (HD and PD) patients	32%	33%	33%	33%	32%
	New Zealand	Patients new to HD	403	410	418	429	429
First dialysis treatment		336	318	334	355	340
Previous dialysis (PD)		60	82	75	68	79
Failed transplant		7	10	9	6	10
Transplanted		50	65	45	61	69
Deaths		203	232	228	227	221
Never transplanted		180	222	221	215	213
Previous transplant		23	10	7	12	8
Transfer to PD		167	144	133	158	133
Patients dialysing at 31 December		1556	1597	1690	1755	1859
Patients dialysis at home at 31 December		425	434	472	475	491
% of all home dialysis (HD and PD) patients		34%	35%	38%	36%	37%

Table 4.2.1

Stock and Flow Australia 2010 - 2014

	2010	2011	2012	2013	2014	
New Patients*	00-14 years	14 (1%)	15 (1%)	21 (1%)	17 (1%)	12 (1%)
	15-24 years	44 (2%)	46 (2%)	44 (2%)	54 (3%)	42 (2%)
	25-34 years	77 (4%)	85 (4%)	111 (5%)	90 (4%)	97 (5%)
	35-44 years	174 (8%)	197 (9%)	176 (8%)	172 (8%)	173 (8%)
	45-54 years	319 (16%)	332 (15%)	367 (17%)	325 (15%)	329 (16%)
	55-64 years	444 (22%)	492 (22%)	497 (23%)	496 (23%)	487 (23%)
	65-74 years	489 (24%)	536 (24%)	510 (23%)	523 (24%)	474 (23%)
	75-84 years	412 (20%)	432 (20%)	393 (18%)	417 (19%)	418 (20%)
	≥85 years	84 (4%)	64 (3%)	64 (3%)	52 (2%)	50 (2%)
	Total	2057 (16%)	2199 (17%)	2183 (17%)	2146 (17%)	2082 (16%)
Patients Dialysing	00-14 years	10 (0%)	10 (0%)	11 (0%)	14 (0%)	10 (0%)
	15-24 years	100 (1%)	112 (1%)	111 (1%)	105 (1%)	98 (1%)
	25-34 years	290 (3%)	287 (3%)	302 (3%)	303 (3%)	323 (3%)
	35-44 years	698 (8%)	734 (8%)	728 (8%)	731 (8%)	736 (8%)
	45-54 years	1318 (15%)	1341 (15%)	1359 (15%)	1428 (15%)	1458 (15%)
	55-64 years	1879 (22%)	1953 (22%)	2026 (22%)	2012 (21%)	2028 (21%)
	65-74 years	2076 (24%)	2143 (24%)	2241 (24%)	2303 (24%)	2302 (24%)
	75-84 years	1874 (22%)	1989 (22%)	2035 (22%)	2121 (22%)	2167 (23%)
	≥85 years	393 (5%)	422 (5%)	444 (5%)	453 (5%)	497 (5%)
	Total	8638 (16%)	8991 (17%)	9257 (17%)	9470 (17%)	9619 (18%)
Primary Renal Disease*	Analgescic Nephropathy	38 (2%)	28 (1%)	33 (2%)	26 (1%)	14 (1%)
	Diabetic Nephropathy	748 (36%)	802 (36%)	853 (39%)	809 (38%)	792 (38%)
	Glomerulonephritis	429 (21%)	481 (22%)	434 (20%)	396 (18%)	410 (20%)
	Hypertension	271 (13%)	319 (15%)	240 (11%)	254 (12%)	202 (10%)
	Miscellaneous	277 (13%)	282 (13%)	362 (17%)	403 (19%)	401 (19%)
	Polycystic Disease	136 (7%)	126 (6%)	110 (5%)	124 (6%)	123 (6%)
	Reflux Nephropathy	43 (2%)	51 (2%)	57 (3%)	39 (2%)	42 (2%)
	Uncertain	2057 (16%)	2199 (17%)	2183 (17%)	2146 (17%)	2082 (16%)
	Total	115 (6%)	110 (5%)	94 (4%)	95 (4%)	98 (5%)

* New patients receiving first haemodialysis treatment

Table 4.2.2

Stock and Flow New Zealand 2010 - 2014

	2010	2011	2012	2013	2014	
New Patients*	00-14 years	1 (0%)	1 (0%)	5 (1%)	0 (0%)	3 (1%)
	15-24 years	12 (3%)	14 (3%)	18 (4%)	7 (2%)	11 (3%)
	25-34 years	13 (3%)	19 (5%)	20 (5%)	28 (7%)	30 (7%)
	35-44 years	41 (10%)	44 (11%)	38 (9%)	52 (12%)	32 (7%)
	45-54 years	99 (25%)	83 (20%)	80 (19%)	95 (22%)	87 (20%)
	55-64 years	113 (28%)	107 (26%)	126 (30%)	110 (26%)	121 (28%)
	65-74 years	82 (20%)	100 (24%)	96 (23%)	100 (23%)	112 (26%)
	75-84 years	39 (10%)	38 (9%)	35 (8%)	35 (8%)	33 (8%)
	≥85 years	3 (1%)	4 (1%)	0 (0%)	2 (0%)	0 (0%)
	Total	403 (3%)	410 (3%)	418 (3%)	429 (3%)	429 (3%)
Patients Dialysing	00-14 years	4 (0%)	1 (0%)	2 (0%)	2 (0%)	2 (0%)
	15-24 years	45 (3%)	39 (2%)	45 (3%)	40 (2%)	38 (2%)
	25-34 years	91 (6%)	90 (6%)	98 (6%)	103 (6%)	119 (6%)
	35-44 years	165 (11%)	173 (11%)	171 (10%)	188 (11%)	189 (10%)
	45-54 years	330 (21%)	334 (21%)	344 (20%)	347 (20%)	377 (20%)
	55-64 years	431 (28%)	453 (28%)	480 (28%)	496 (28%)	503 (27%)
	65-74 years	323 (21%)	341 (21%)	372 (22%)	394 (22%)	446 (24%)
	75-84 years	152 (10%)	146 (9%)	163 (10%)	165 (9%)	165 (9%)
	≥85 years	15 (1%)	20 (1%)	15 (1%)	20 (1%)	20 (1%)
	Total	1556 (3%)	1597 (3%)	1690 (3%)	1755 (3%)	1859 (3%)
Primary Renal Disease*	Analgesic Nephropathy	0 (0%)	2 (0%)	3 (1%)	1 (0%)	1 (0%)
	Diabetic Nephropathy	208 (52%)	176 (43%)	208 (50%)	223 (52%)	216 (50%)
	Glomerulonephritis	89 (22%)	100 (24%)	81 (19%)	82 (19%)	67 (16%)
	Hypertension	36 (9%)	41 (10%)	42 (10%)	41 (10%)	37 (9%)
	Miscellaneous	38 (9%)	43 (10%)	45 (11%)	46 (11%)	78 (18%)
	Polycystic Disease	14 (3%)	20 (5%)	17 (4%)	19 (4%)	13 (3%)
	Reflux Nephropathy	6 (1%)	8 (2%)	9 (2%)	8 (2%)	11 (3%)
	Uncertain	403 (3%)	410 (3%)	418 (3%)	429 (3%)	429 (3%)
	Total	12 (3%)	20 (5%)	13 (3%)	9 (2%)	6 (1%)

* New patients receiving first haemodialysis treatment

Figure 4.1

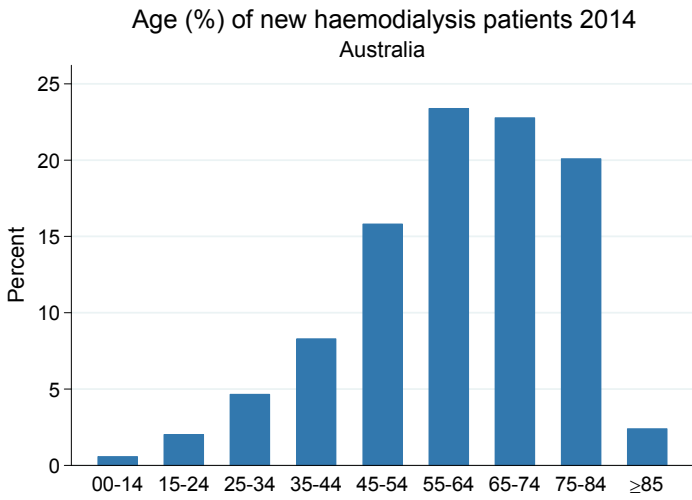


Figure 4.2

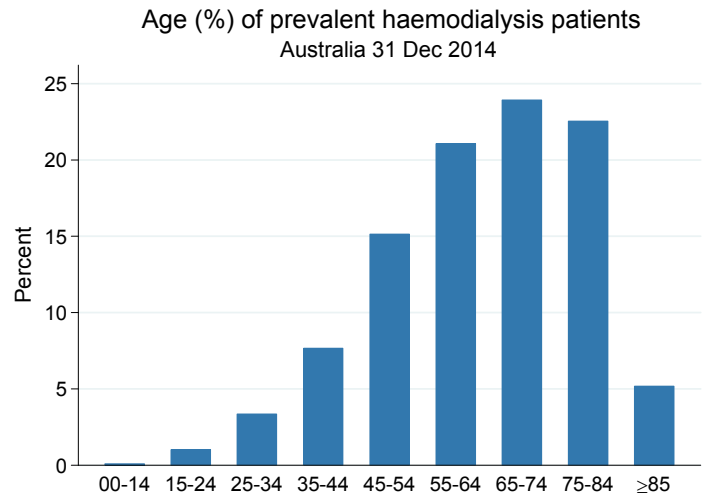


Figure 4.3

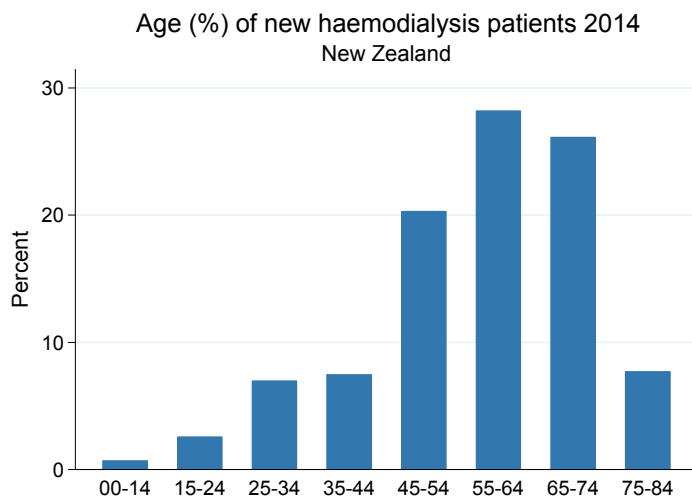
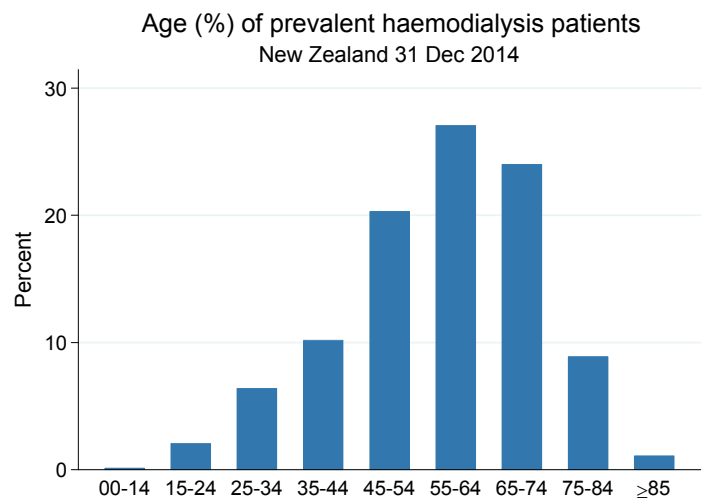


Figure 4.4



Dialysis Prescription

Table 4.3 shows the blood flow rates by year and country. Flows of 300-349mL/min are the most common in each country. Table 4.4 presents the same data by vascular access type; the distribution of blood flow rates is similar within each type of access, although slightly lower rates are seen in patients dialysing with a central venous catheter (CVC). The overall distribution of blood flow rates over 2012-14 is shown in figure 4.5.

Table 4.3

Blood Flow Rates (mls/minute) 2010-2014

Country	Year	Total Patients	CVV HD Excluded*	NR**	<200	200-249	250-299	300-349	350-399	400+
Australia	2010	8626	3	16	39	296	1230	4998	1725	319
	2011	8968	0	26	28	270	1253	5215	1898	278
	2012	9231	0	163	45	231	1291	5354	1860	287
	2013	9447	4	108	33	221	1305	5614	1916	246
	2014	9619	0	439	51	205	1385	5527	1796	216
New Zealand	2010	1555	0	1	5	96	393	769	259	32
	2011	1596	0	1	4	106	332	911	224	18
	2012	1688	0	21	6	116	384	871	257	33
	2013	1754	0	3	3	106	399	954	255	34
	2014	1859	0	40	3	106	409	995	264	42

* CVV HD Patients excluded from Total. ** Not Reported

Table 4.4

Blood Flow Rate by Type of Access December 2014

Blood Flow Rate	Australia				New Zealand			
	AVF	AVG	CVC*	NR**	AVF	AVG	CVC*	NR**
<200	37 (0.5%)	3 (0.4%)	11 (0.9%)	0 (0.0%)	3 (0.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
200-249	123 (1.7%)	19 (2.8%)	62 (4.9%)	1 (0.2%)	82 (6.1%)	0 (0.0%)	24 (5.9%)	0 (0.0%)
250-299	913 (12.6%)	124 (18.5%)	338 (26.8%)	10 (2.2%)	222 (16.6%)	19 (24.4%)	164 (40.6%)	4 (9.3%)
300-349	4354 (60.2%)	397 (59.3%)	750 (59.6%)	26 (5.6%)	732 (54.9%)	52 (66.7%)	206 (51.0%)	5 (11.6%)
350-399	1579 (21.8%)	120 (17.9%)	92 (7.3%)	5 (1.1%)	249 (18.7%)	7 (9.0%)	8 (2.0%)	0 (0.0%)
400+	204 (2.8%)	7 (1.0%)	5 (0.4%)	0 (0.0%)	41 (3.1%)	0 (0.0%)	1 (0.2%)	0 (0.0%)
NR**	17 (0.2%)	0 (0.0%)	1 (0.1%)	421 (90.9%)	5 (0.4%)	0 (0.0%)	1 (0.2%)	34 (79.1%)
Total	7227	670	1259	463	1334	78	404	43

* CVV HD Patients excluded from Total.

** Not Reported

Figure 4.5.1

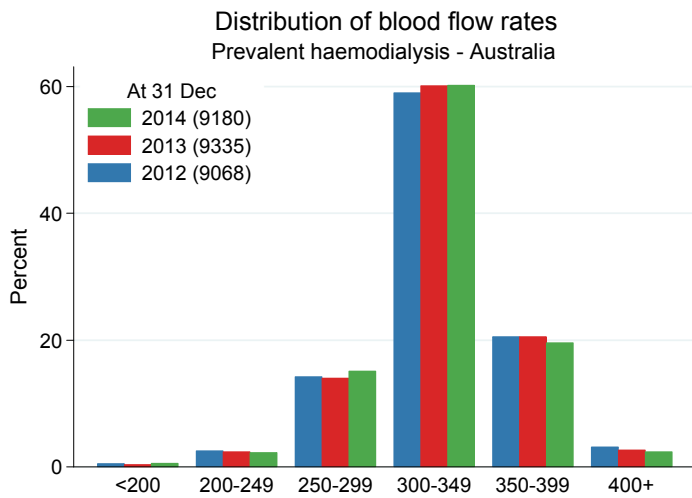


Figure 4.5.2

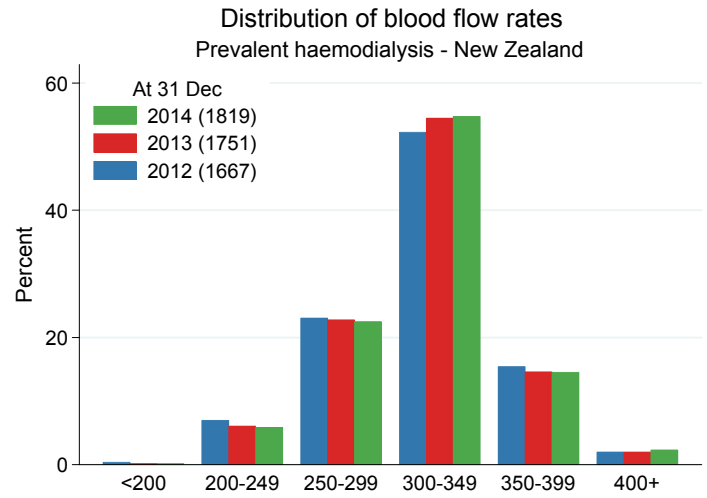


Table 4.5 shows the number of weekly sessions, and hours per session, at 31 December 2014. In each country the large majority are dialysing for ≤ 3 sessions per week, and for between 4-5 hours per session. Figures 4.6 and 4.7 show HD frequency and session length respectively over 2012-2014. Figure 4.8 combines sessions and session length to show the total number of weekly hours of HD over 2012-2014. New Zealand patients receive slightly more total hours of weekly HD compared with Australian patients.

Table 4.5

Duration and Number of Sessions per Week - December 2014

Country	Sessions per week	Hours of Each Treatment						Not Reported	Total
		<4	4	4.5	5	5.5	>5.5		
Australia	≤ 3	369 (4.4)	3237 (38.5)	1976 (23.5)	2466 (29.3)	154 (1.8)	214 (2.5)	1 (0.0)	8417
	3.1-4.9	57 (8.9)	126 (19.6)	55 (8.6)	122 (19.0)	20 (3.1)	263 (40.9)	0 (0.0)	643
	5+	48 (36.9)	27 (20.8)	3 (2.3)	10 (7.7)	1 (0.8)	40 (30.8)	1 (0.8)	130
	Not Reported	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	429 (100.0)	429
	Total	474 (4.9)	3390 (35.2)	2034 (21.1)	2598 (27.0)	175 (1.8)	517 (5.4)	431 (4.5)	9619
New Zealand	≤ 3	26 (1.7)	472 (30.7)	419 (27.3)	497 (32.4)	49 (3.2)	73 (4.8)	0 (0.0)	1536
	3.1-4.9	13 (4.8)	48 (17.6)	40 (14.7)	80 (29.4)	15 (5.5)	76 (27.9)	0 (0.0)	272
	5+	5 (31.3)	4 (25.0)	1 (6.3)	3 (18.8)	1 (6.3)	2 (12.5)	0 (0.0)	16
	Not Reported	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	35 (100.0)	35
	Total	44 (2.4)	524 (28.2)	460 (24.7)	580 (31.2)	65 (3.5)	151 (8.1)	35 (1.9)	1859

Intermediate durations are rounded up, e.g. 4.25 is included in 4.5.

Figure 4.6

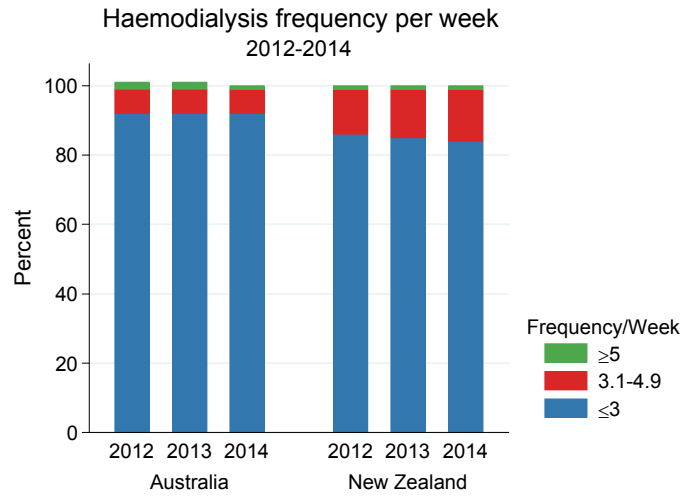


Figure 4.7

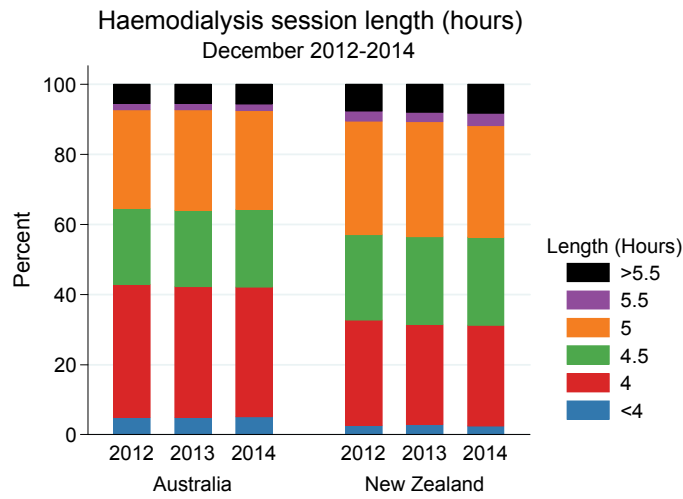
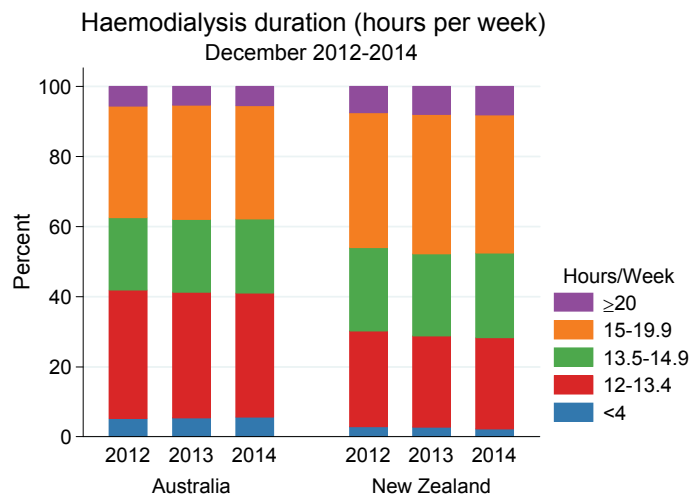


Figure 4.8



Figures 4.9-4.11 show trends in dialysis prescription. The proportion of patients dialysing five days or more per week continues to fall in both countries. Amongst the patients dialysing three times per week, the previously increasing proportion dialysing 4.5 hours or longer seems to have plateaued as has the proportion dialysing >12 hours per week. Tables 4.6-4.8 present these same data for 2011-2014 by state and country.

Figure 4.9

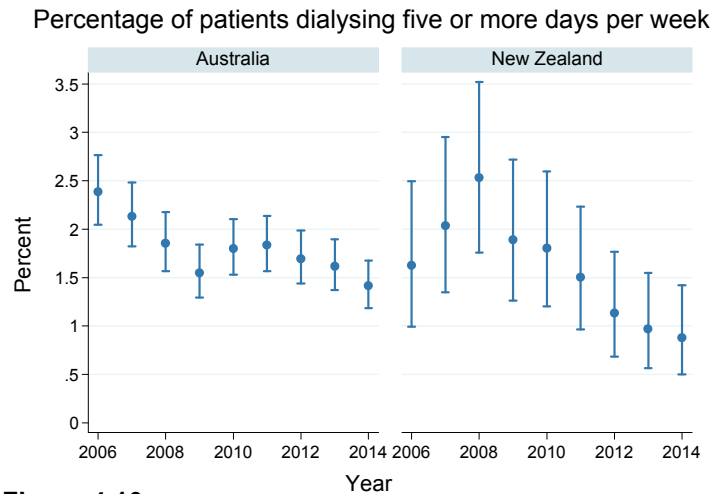


Figure 4.10

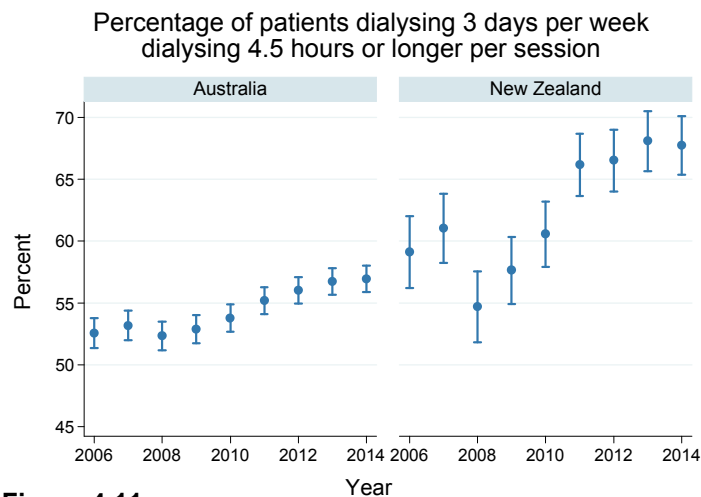


Figure 4.11

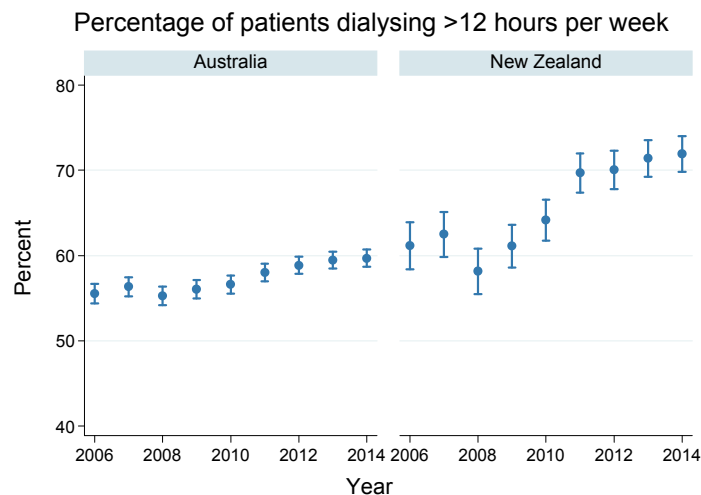


Table 4.6

**Haemodialysis \geq 5 Sessions per Week
By Australian State and Country**

Year	Australia							New Zealand
	QLD	NSW/ACT	VIC	TAS	SA	NT	WA	
2014	43 (2.5%)	20 (0.7%)	47 (2.0%)	3 (1.6%)	6 (1.0%)	2 (0.4%)	9 (1.1%)	16 (0.9%)
2013	53 (3.0%)	20 (0.7%)	54 (2.3%)	4 (2.3%)	4 (0.6%)	1 (0.2%)	15 (1.7%)	17 (1.0%)
2012	55 (3.3%)	21 (0.7%)	48 (2.1%)	3 (1.6%)	11 (1.9%)	3 (0.6%)	13 (1.5%)	19 (1.1%)
2011	61 (3.7%)	23 (0.8%)	50 (2.2%)	2 (1.3%)	7 (1.2%)	3 (0.7%)	18 (2.1%)	24 (1.5%)

Table 4.7

**Haemodialysis \geq 4.5 Hours per Session
Three Sessions per Week
By Australian State and Country**

Year	Australia							New Zealand
	QLD	NSW/ACT	VIC	TAS	SA	NT	WA	
2014	851 (57.8%)	1979 (72.9%)	1027 (48.7%)	99 (63.1%)	171 (29.5%)	361 (73.4%)	208 (28.7%)	1030 (67.8%)
2013	900 (59.9%)	2051 (74.6%)	980 (46.1%)	98 (66.2%)	145 (25.2%)	342 (71.5%)	237 (29.6%)	999 (68.1%)
2012	827 (58.9%)	1963 (73.7%)	956 (45.4%)	110 (68.3%)	134 (24.4%)	350 (77.1%)	227 (27.9%)	942 (66.5%)
2011	842 (58.6%)	1941 (74.4%)	890 (42.4%)	100 (69.0%)	133 (23.8%)	318 (75.0%)	230 (28.7%)	920 (66.2%)

Table 4.8

**Haemodialysis $>$ 12 Hours per Week
By Australian State and Country**

Year	Australia							New Zealand
	QLD	NSW/ACT	VIC	TAS	SA	NT	WA	
2014	1062 (61.4%)	2191 (73.2%)	1264 (53.4%)	127 (67.6%)	204 (33.2%)	369 (73.2%)	267 (33.5%)	1312 (71.9%)
2013	1085 (62.4%)	2299 (74.7%)	1231 (51.7%)	121 (69.1%)	173 (27.9%)	347 (71.8%)	299 (34.5%)	1251 (71.4%)
2012	1009 (61.2%)	2219 (74.7%)	1178 (50.4%)	128 (70.3%)	162 (27.3%)	357 (77.3%)	287 (32.6%)	1162 (70.1%)
2011	1010 (61.3%)	2199 (75.2%)	1089 (47.1%)	112 (70.4%)	160 (26.7%)	327 (75.5%)	290 (33.5%)	1112 (69.7%)

Table 4.9 shows the dialysis membranes in use at the end of 2014. Nearly all patients in both countries were dialysing using high-flux membranes. Table 4.10 and figure 4.12 provide further information on dialysis type and surface area. The use of haemodiafiltration has increased strongly in both countries since 2008 (Figure 4.12).

Table 4.9 Dialysis Membrane Use - December 2014

Country	Dialyser Membrane Type	Flux	Square Metres					Unreported	Total
			<1.0	1.0-1.4	1.5-1.7	1.8-1.9	≥2.0		
Australia	Acrylonitrile Smsc	High	.	6	11	.	.	.	17
	Cellulose Acetate	Low	3	.	.	.	.	.	3
	Cellulose Triacetate	High	.	.	1	17	24	.	42
	Cuprophan	Mid	.	1	.	.	.	.	1
	Helixone Plus	High	3	244	.	1583	1724	.	3554
	Ploynephron	High	.	.	.	.	33	.	33
	Polyamix	High	2	45	435	.	1461	.	1943
	Polyamix	Low	.	.	11	.	1	.	12
	Polyethersulfone	High	.	.	12	15	156	.	183
	Polynephron	High	.	2	5	37	124	.	168
	Polysulphone	High	.	1	.	25	3	.	29
	Polysulphone	Low	.	5	.	6	26	.	37
	Polysulphone-Helixone	High	1	100	.	1008	804	.	1913
	Purima	Mid	.	.	7	.	.	.	7
	Revaclear	High	.	228	.	.	.	.	228
	Revaclear Max	High	.	.	.	1005	.	.	1005
Unreported	Unreported	.	.	.	.	.	444	444	
Total			9	632	482	3696	4356	444	9619
New Zealand	Helixone Plus	High	.	230	.	194	266	.	690
	Polyamix	High	.	1	8	.	48	.	57
	Polyamix	Low	.	1	29	.	62	.	92
	Polysulphone	High	.	2	.	1	.	.	3
	Polysulphone	Low	9	4	.	63	89	.	165
	Polysulphone-Helixone	High	1	20	.	123	318	.	462
	Polysulphone-Helixone	Low	.	1	.	.	.	.	1
	Revaclear	High	.	23	.	.	.	.	23
	Revaclear Max	High	.	.	.	331	.	.	331
	Unreported	Unreported	.	.	.	.	.	35	35
Total			10	282	37	712	783	35	1859

Table 4.10

Number of Patients by HD Modality - 31 December 2014

	NT	NSW/ACT	VIC	QLD	SA	WA	TAS	NZ	Total
Haemodialysis - plate dialysers	0	1	4	0	0	0	0	0	5
Haemodialysis - hollow fibre dialysers	515	2449	2201	1243	395	725	167	1447	9142
Haemofiltration	0	7	5	13	28	6	0	1	60
Haemodiafiltration	13	629	184	526	189	261	21	384	2207
Total	528	3086	2394	1782	612	992	188	1832	11414

Figure 4.12

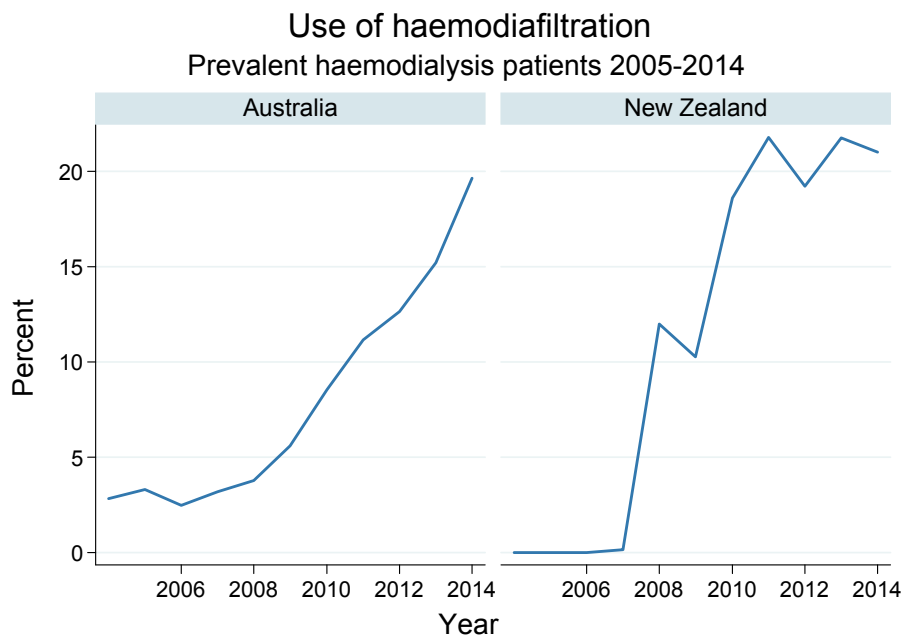


Figure 4.13.1

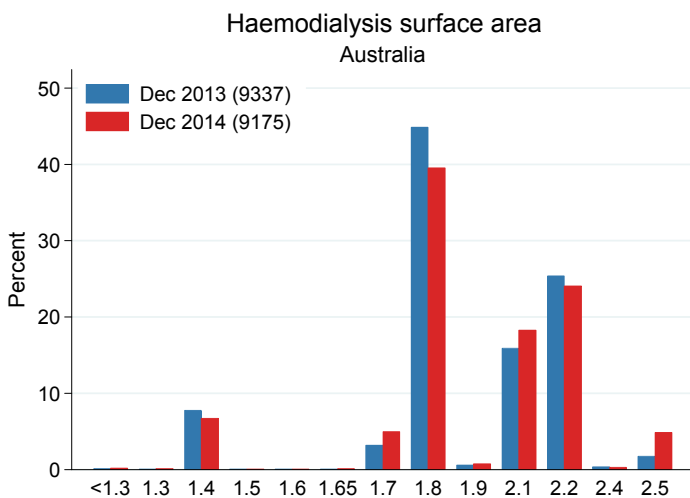
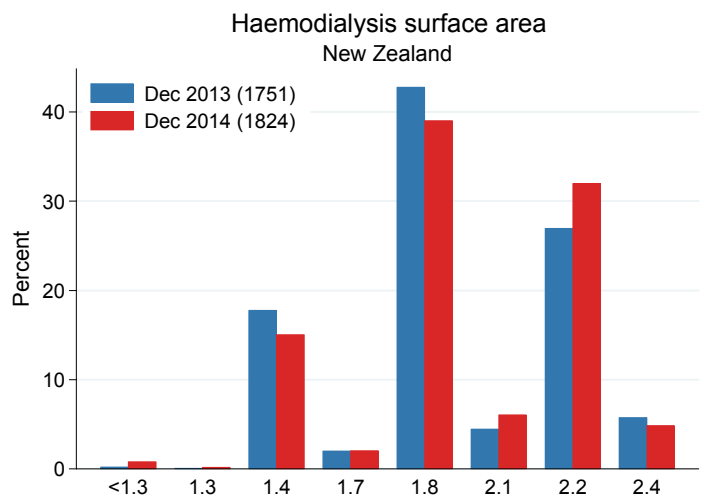


Figure 4.13.2



Anaemia

Figure 4.14 shows the mean haemoglobin (Hb) in haemodialysis patients over the last eight years. In both countries the mean Hb has fallen substantially. Figure 4.15 shows the distribution of haemoglobin in haemodialysis patients over the last 3 years, and figure 4.16 presents the same data stratified by the presence or absence of coronary artery disease.

Figure 4.14

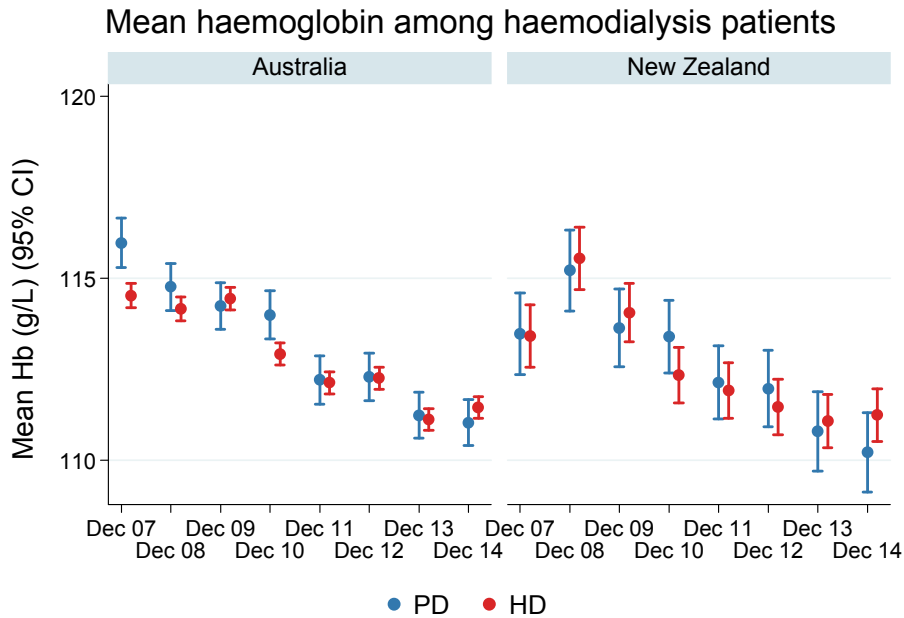


Figure 4.15

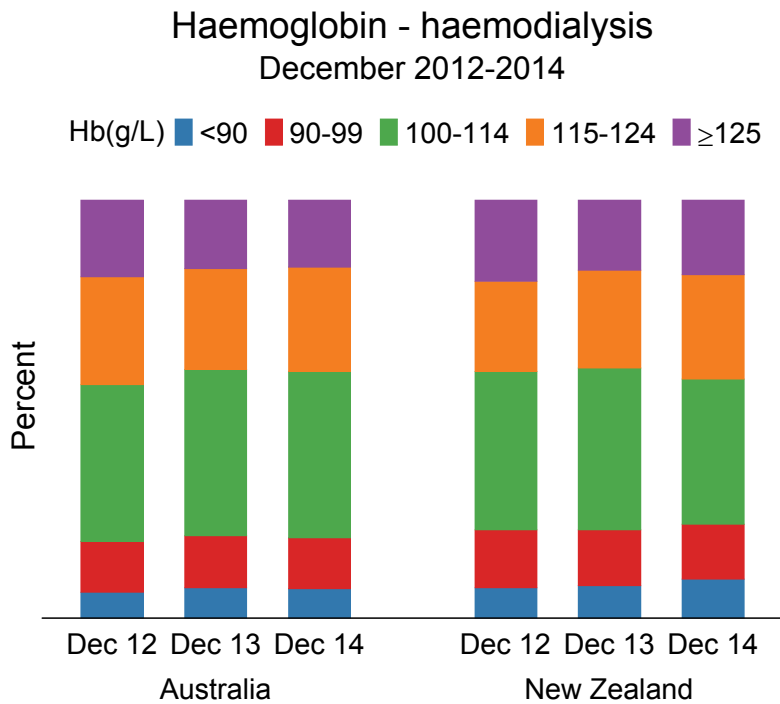


Figure 4.16.1

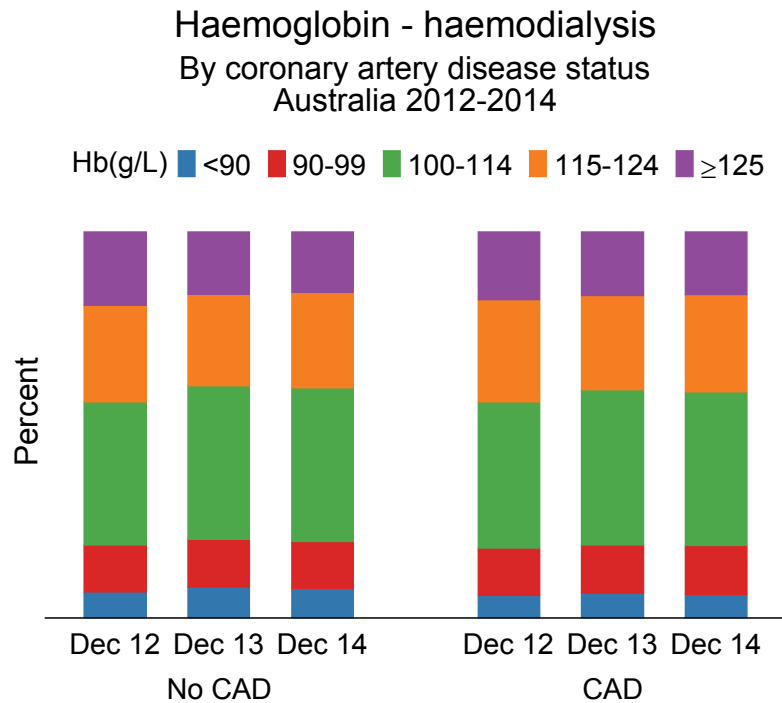


Figure 4.16.2

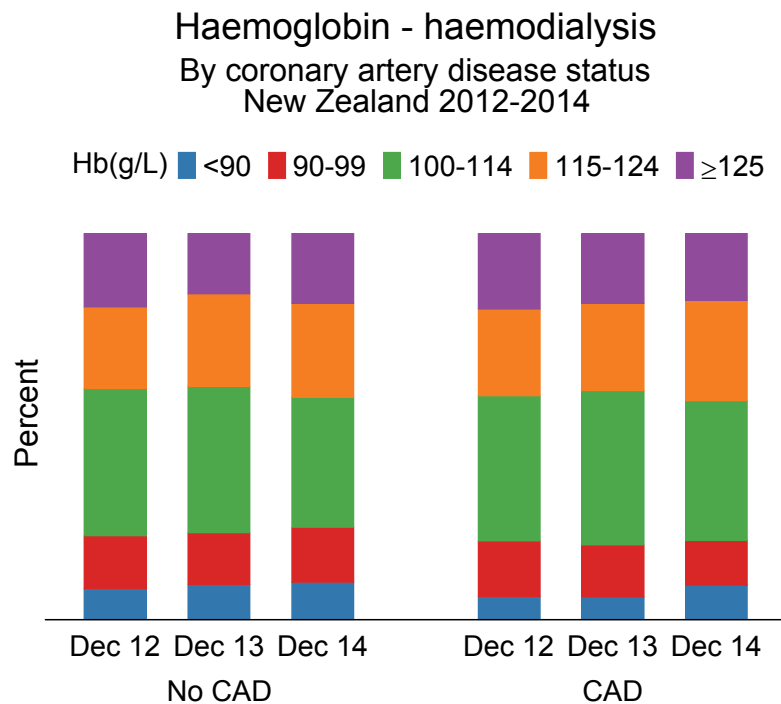


Figure 4.17 shows the variation in Hb between treating hospitals; median Hb ranged from 103 to 120g/L in Australia and 105-115g/L in New Zealand.. Figure 4.18 shows the proportion of patients with Hb between 110-129g/L; the proportion ranged from 17-77% in Australia and 32-54% in New Zealand.

Figure 4.17.1

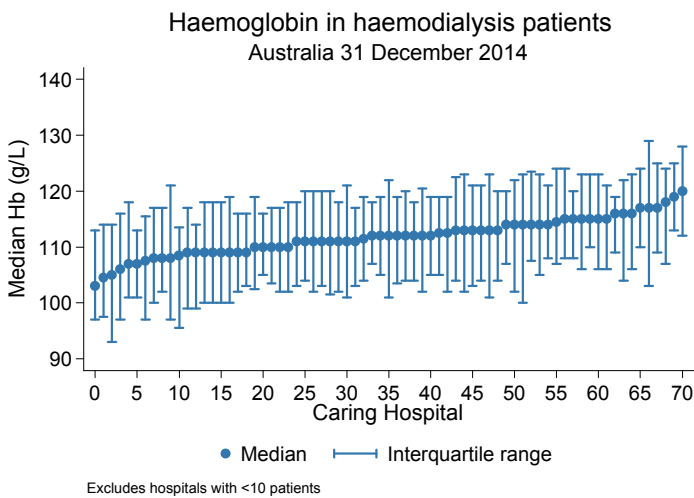


Figure 4.17.2

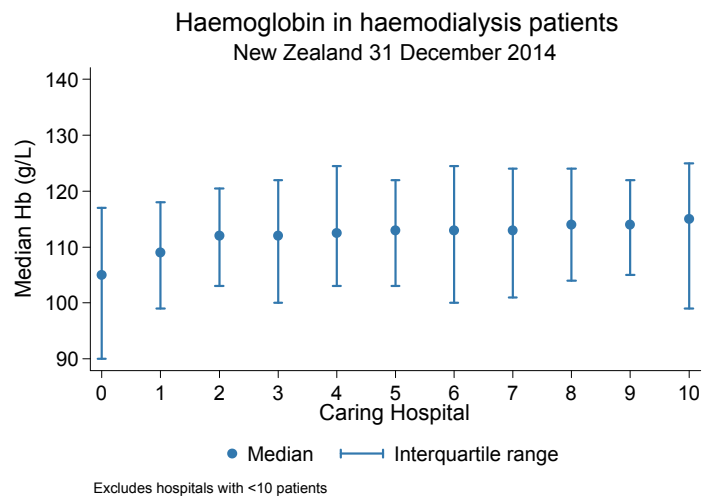


Figure 4.18.1

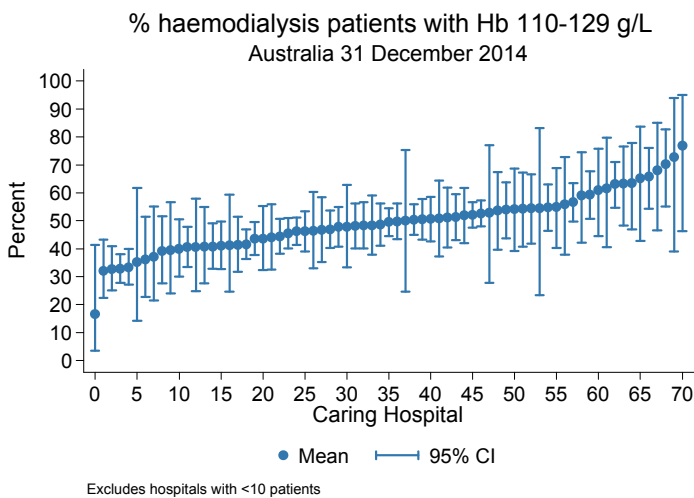


Figure 4.18.2

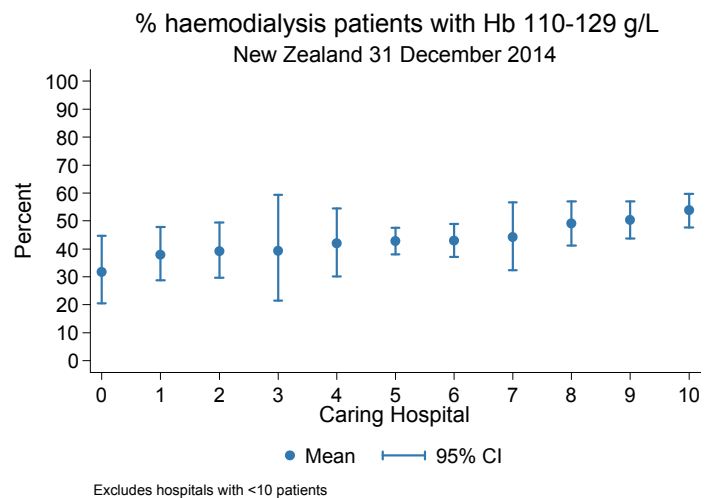


Figure 4.19 shows the distribution of ferritin in HD patients over 2012-14. The proportion of patients with ferritin between 200-500µg/L ranged from 6-74% in Australia and 29-44% in New Zealand (figure 4.20). Figures 4.21-4.22 present equivalent data for transferrin saturation.

Figure 4.19

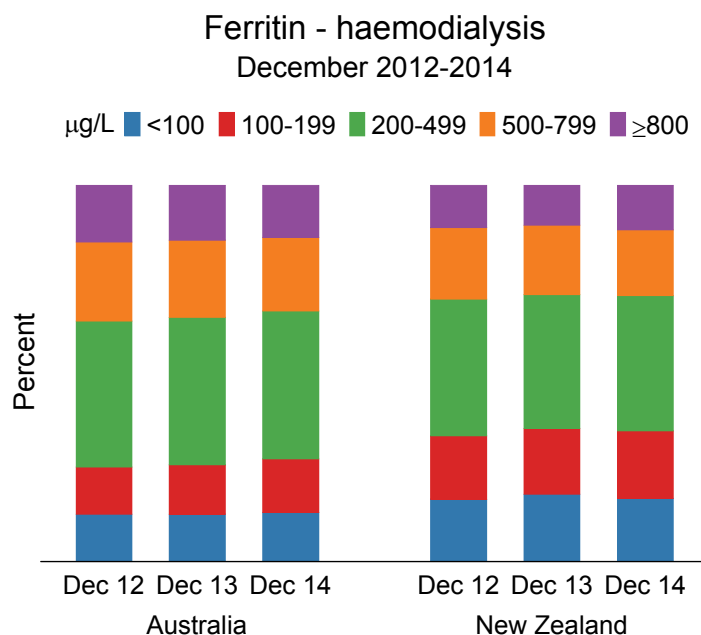


Figure 4.20.1

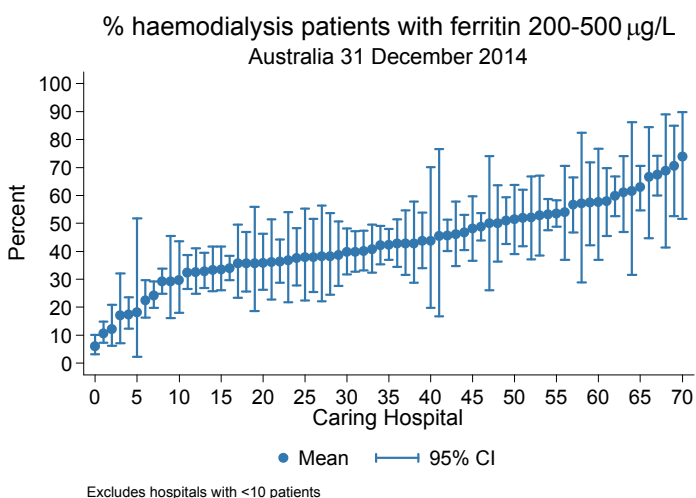


Figure 4.20.2

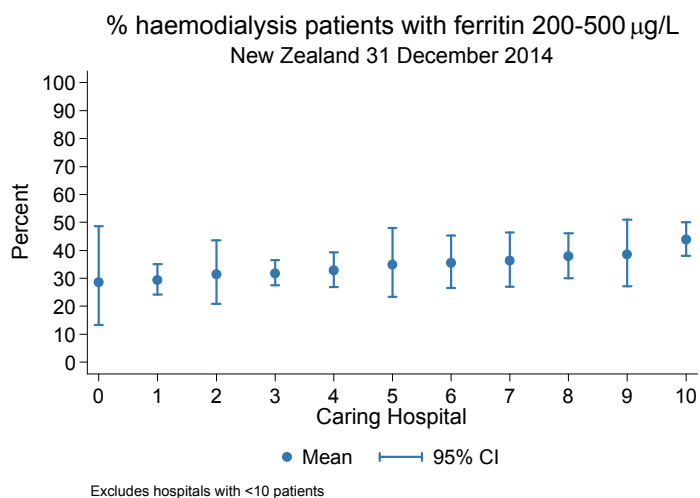


Figure 4.21

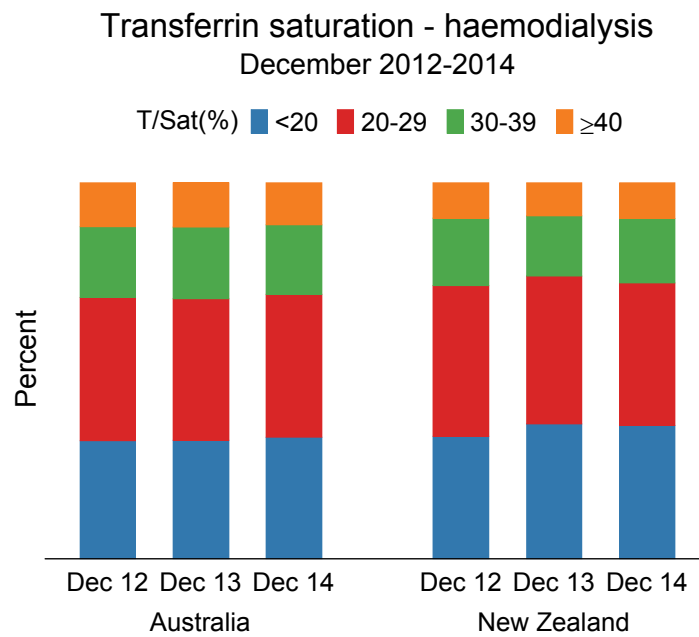


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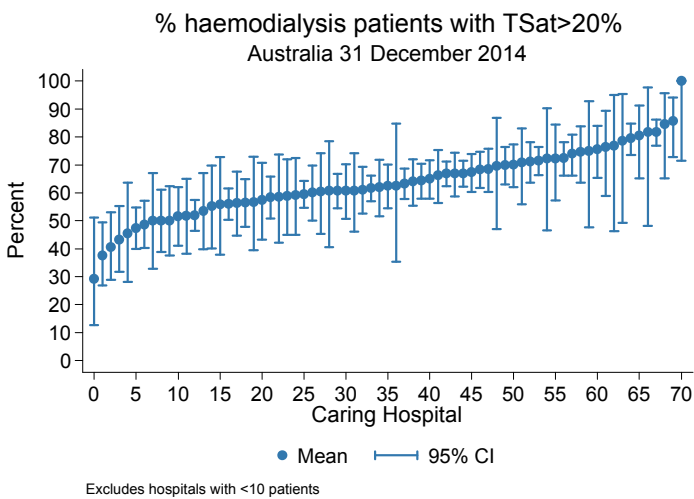
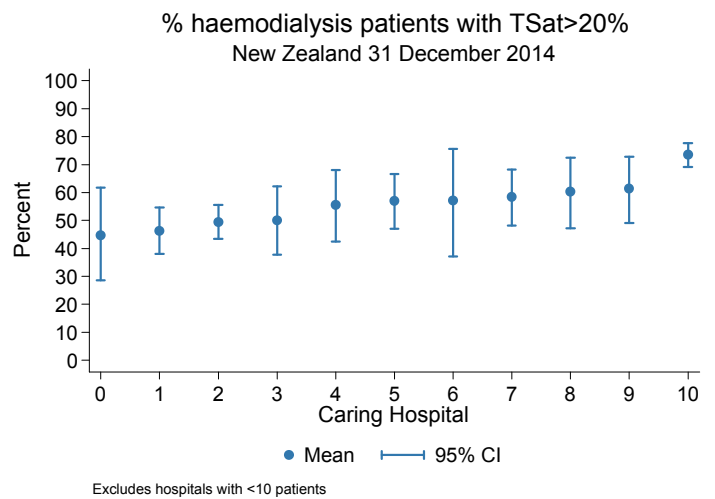
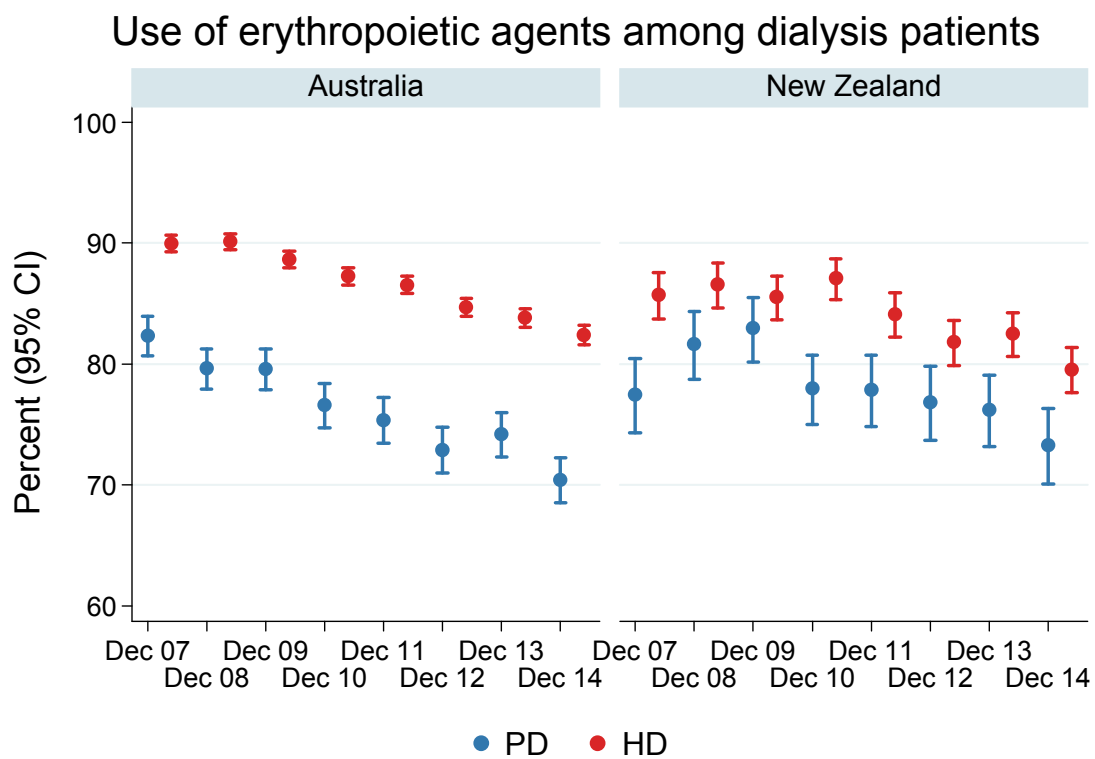


Figure 4.22.2



The use of erythropoietic agents has been falling in both HD and PD patients in both countries, although the majority of dialysis patients still receive them (figure 4.23).

Figure 4.23



Biochemistry

Figures 4.24-4.29 present the distribution of calcium, phosphate and calcium-phosphate product. These numbers remain stable compared with previous years.

Figure 4.24

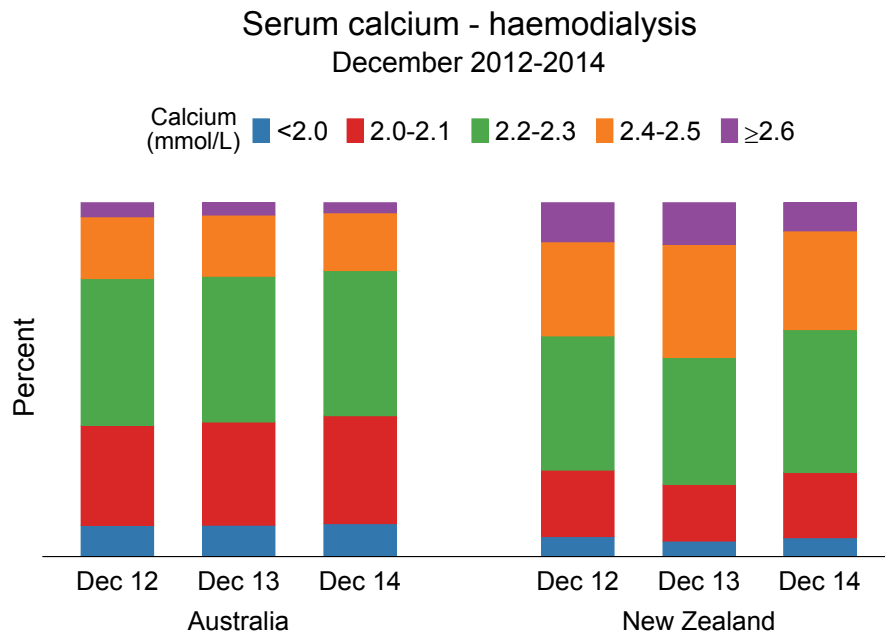


Figure 4.25.1

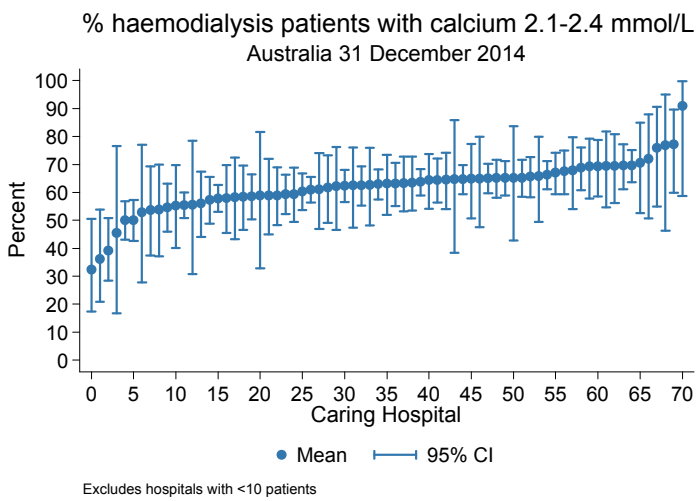


Figure 4.25.2

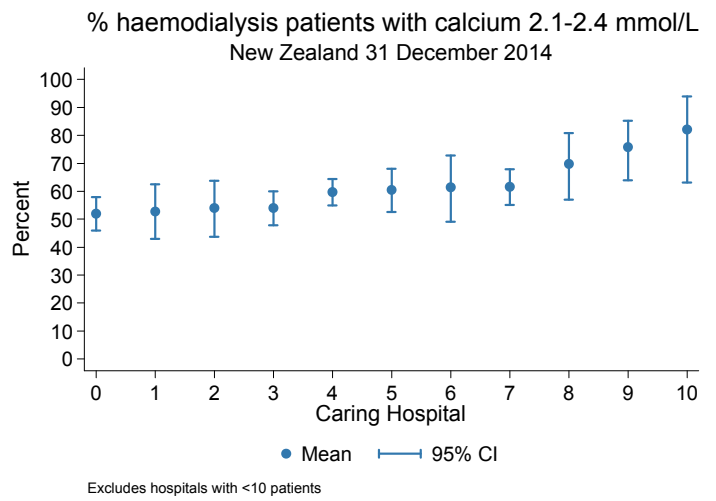


Figure 4.26

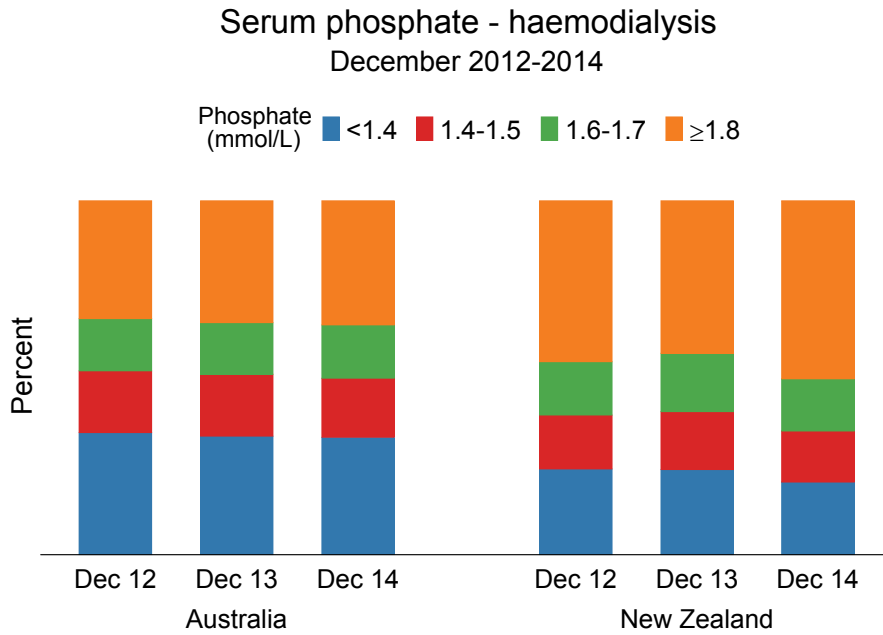


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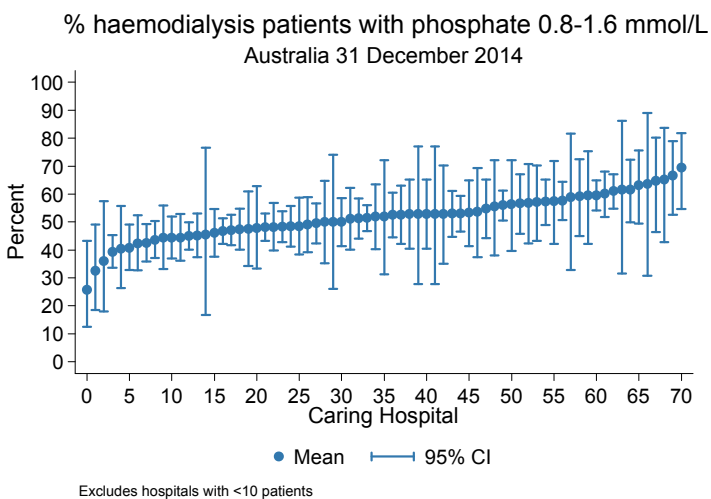


Figure 4.27.2

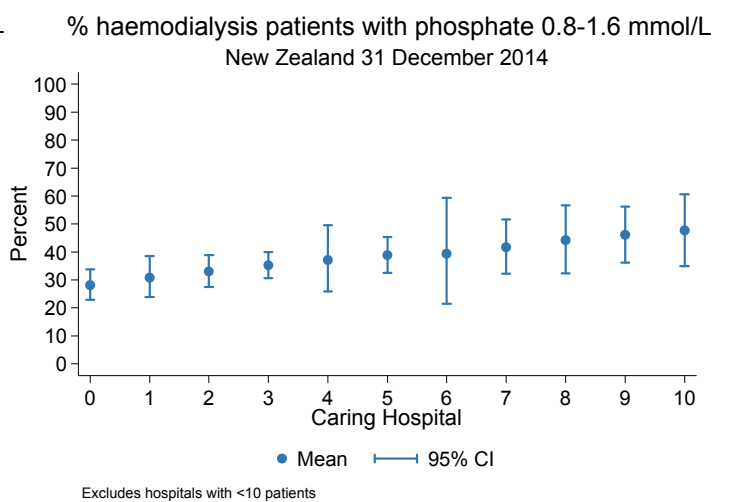


Figure 4.28

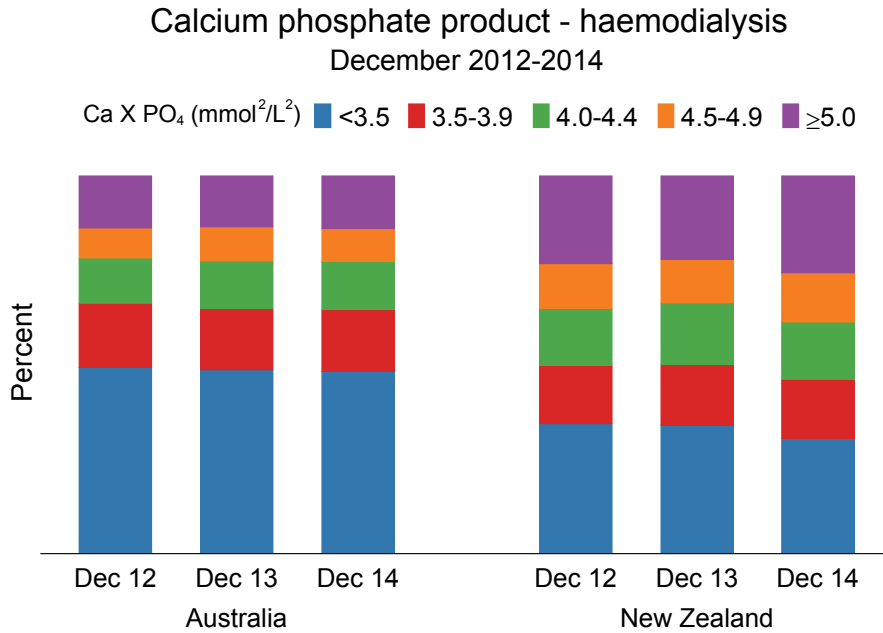


Figure 4.29.1

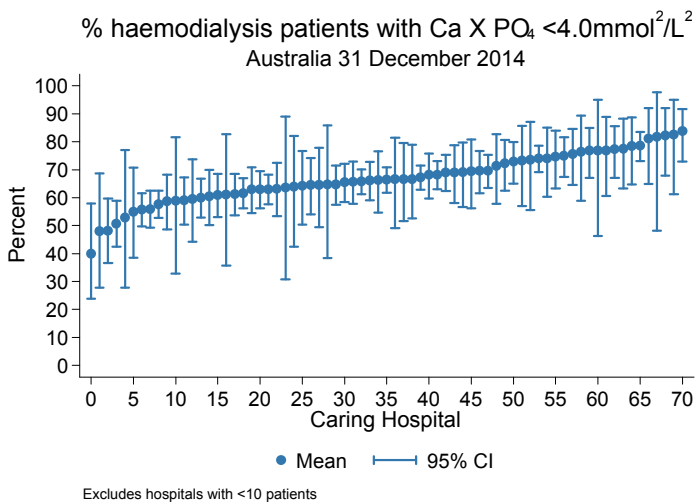
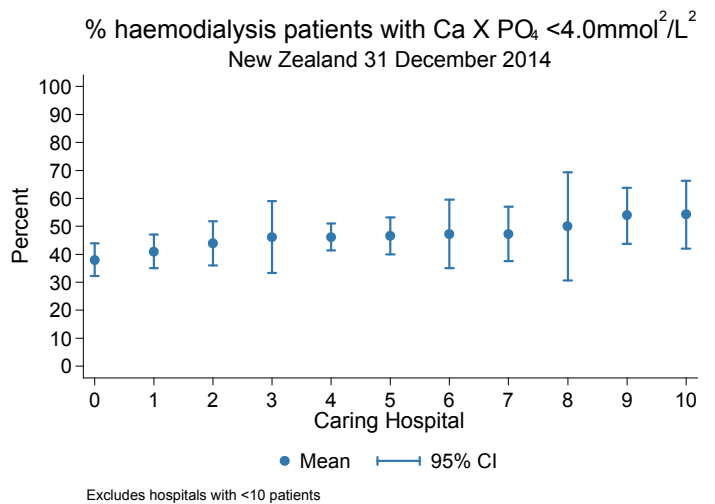


Figure 4.29.2



Dialysis Adequacy

Figures 4.30-4.33 and table 4.11 present the urea reduction ratio (URR) of patients dialysing three times per week.

Figure 4.30 shows the distribution of URR by country over 2012-14; there is little change from year to year, and clearances are lower in New Zealand than in Australia. Figure 4.31 presents the 2014 data stratified by vascular access type.

Figure 4.30

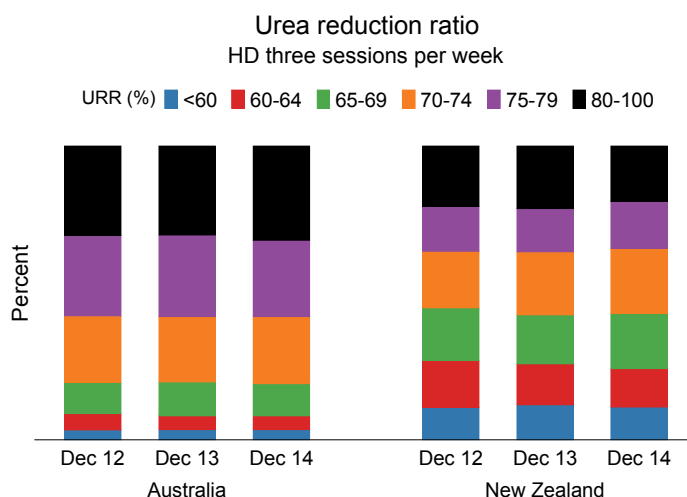


Figure 4.31

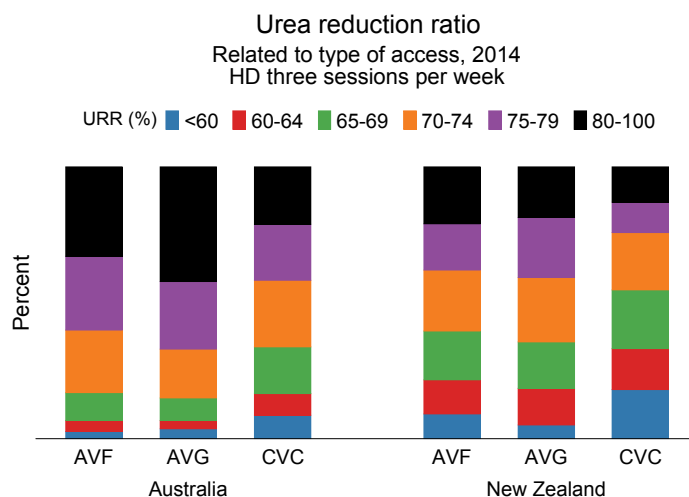


Table 4.11 presents URR by dialysis session duration. In general, as expected, the proportion of patients with a URR $\geq 65\%$ increases with longer session duration.

Table 4.11

Urea Reduction Ratio - Prevalent Patients Three Sessions per Week - December 2014

Country	Hours per Session	Urea Reduction Ratio %		Total
		<65	≥ 65	
Australia	<4 hours	46 (14.7%)	266 (85.3%)	312
	4 hours	258 (8.8%)	2671 (91.2%)	2929
	>4-5 hours	287 (7.0%)	3806 (93.0%)	4093
	>5 hours	30 (9.9%)	272 (90.1%)	302
	Total	621 (8.1%)	7015 (91.9%)	7636
New Zealand	<4 hours	11 (47.8%)	12 (52.2%)	23
	4 hours	133 (31.6%)	288 (68.4%)	421
	>4-5 hours	163 (20.7%)	625 (79.3%)	788
	>5 hours	14 (15.6%)	76 (84.4%)	90
	Total	321 (24.3%)	1001 (75.7%)	1322

Figure 4.32 shows the distribution of median URR by treating hospital. In Australia the median ranged from 69-88%, and in New Zealand it ranged from 68-83%. Figure 4.33 shows the proportion of patients with a URR >70%. In Australia this proportion ranged from 47-100%, and in New Zealand from 42-94%.

Figure 4.32.1

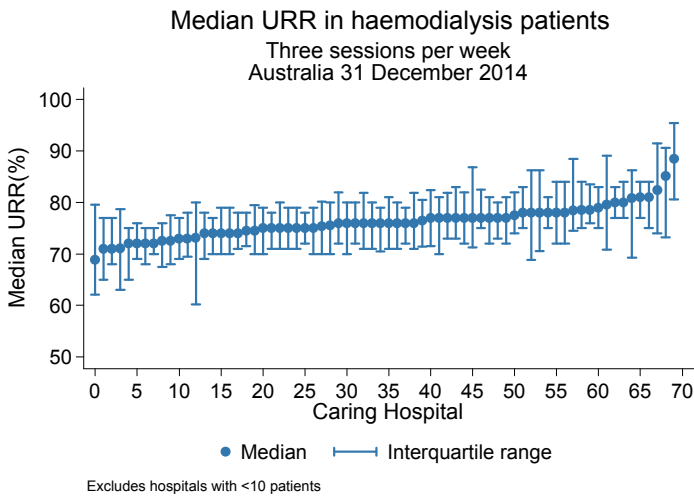


Figure 4.32.2

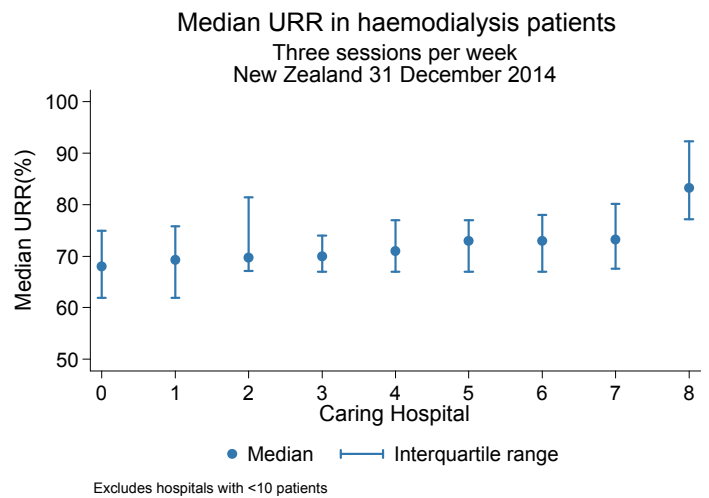


Figure 4.33.1

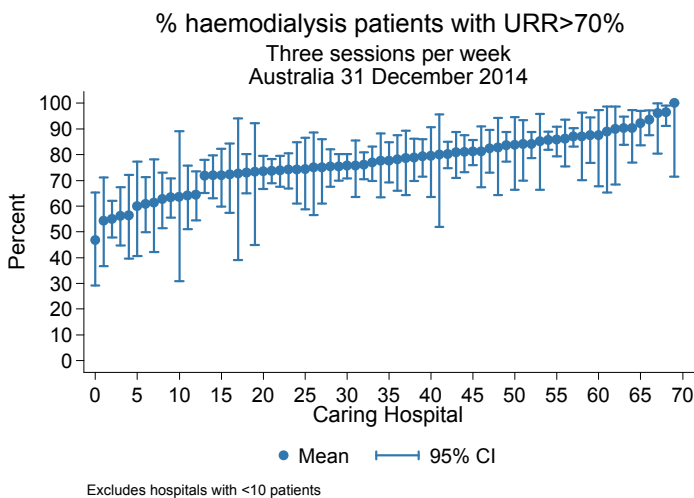
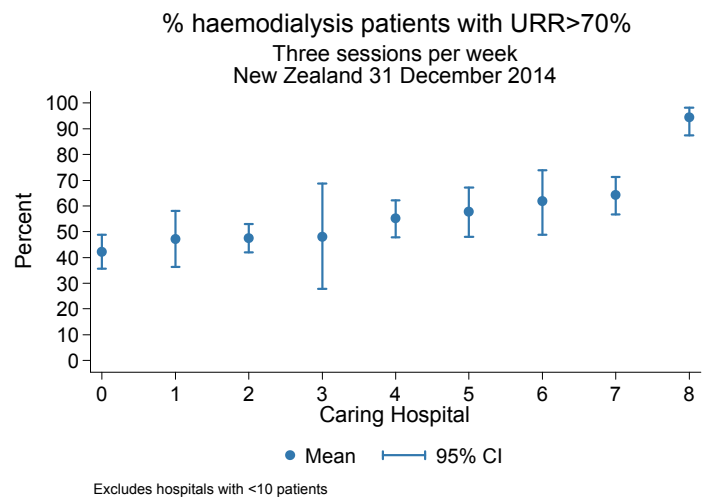


Figure 4.33.2



Vascular Access

Incident Patients

Figures 4.34 to 4.40 and table 4.12

The majority of patients commence haemodialysis with a catheter; tunnelled catheters are more common than non-tunnelled. Female, young (age <25years) patients and those patients who were first seen by nephrologists <3 months before starting haemodialysis (“late referrals”) were less likely to start with an AVF or AVG.

In both Australian and New Zealand indigenous peoples had similar or decreased rates of AVF or AVG at the commencement of dialysis.

ANZDATA does not collect information about indication for HD catheter usage, hence the reason less than half of non-late referred patients commence with a central venous catheter is not known.

Figure 4.34

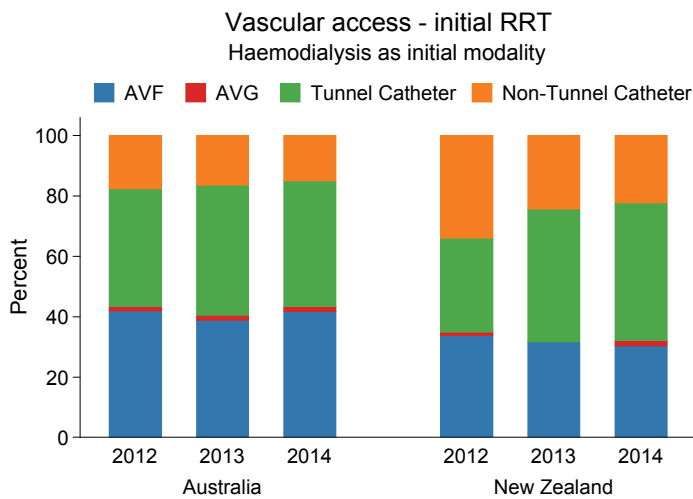


Figure 4.35

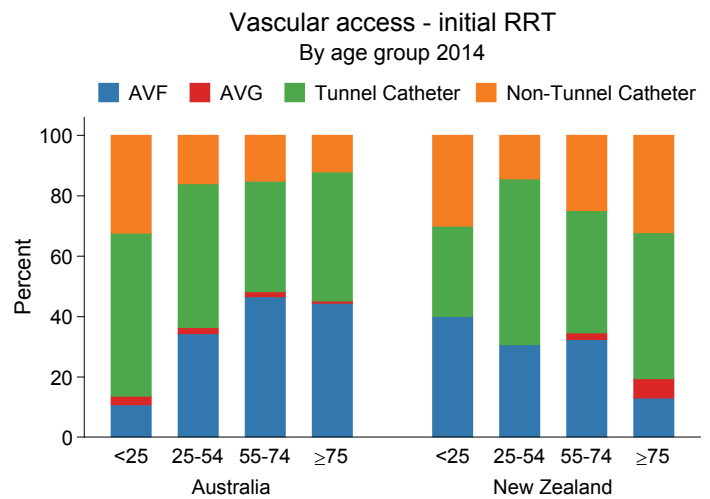


Figure 4.36.1

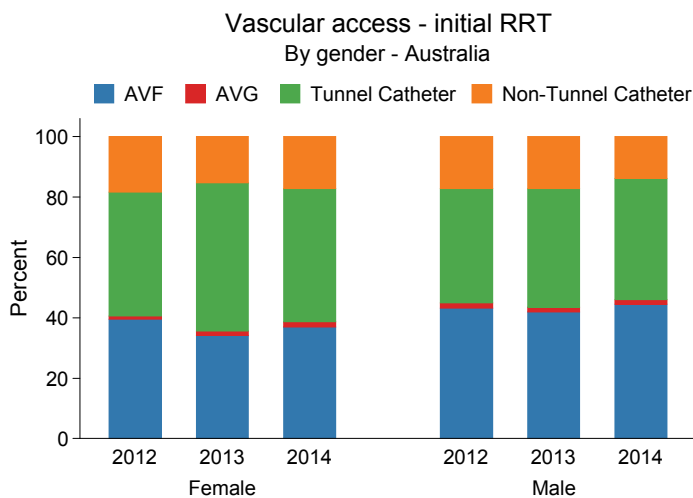


Figure 4.36.2

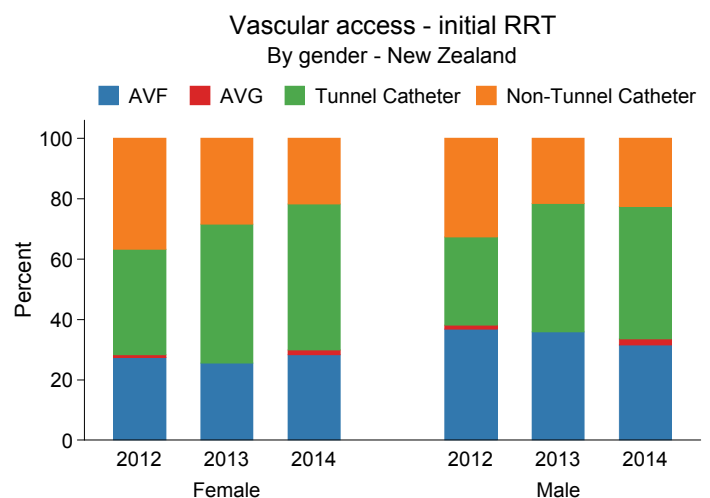


Figure 4.37

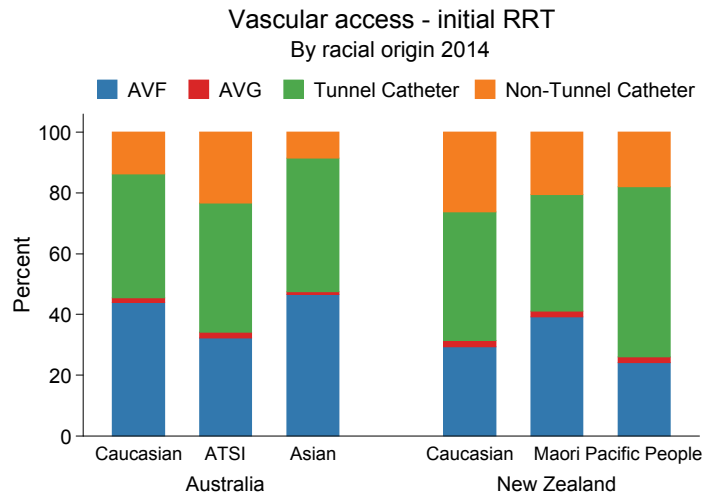


Figure 4.38.1

Figure 4.38.2

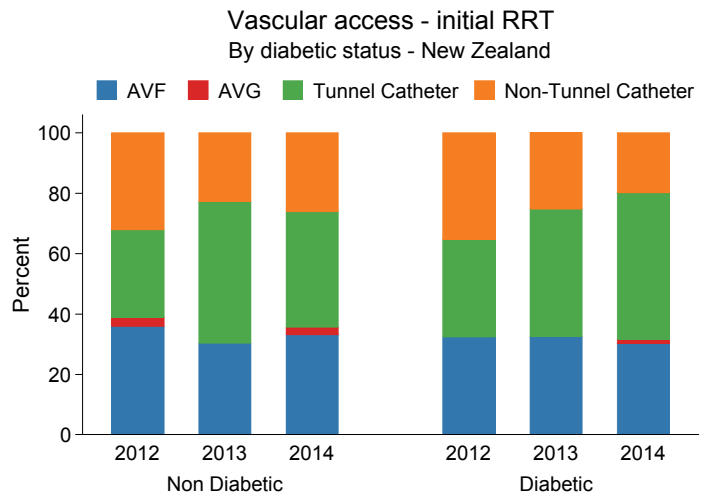
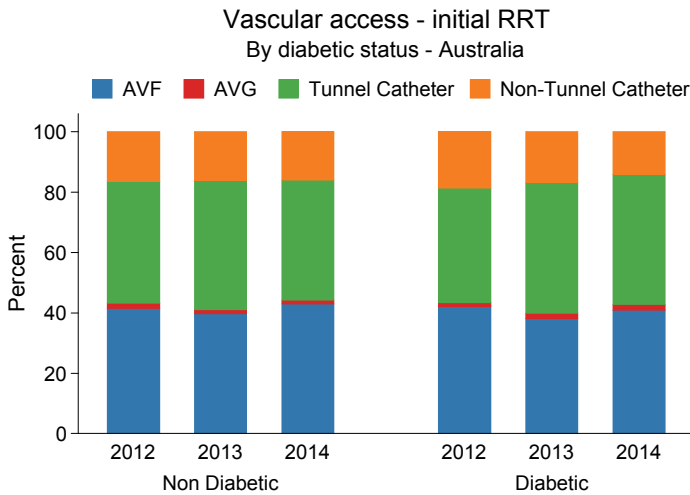


Figure 4.39

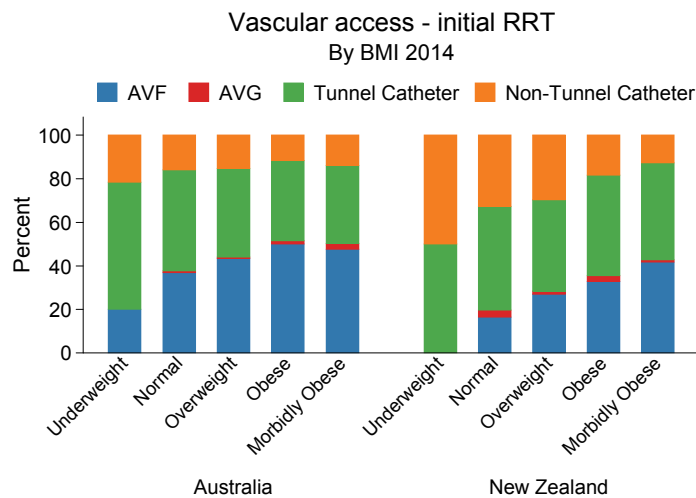


Figure 4.40.1

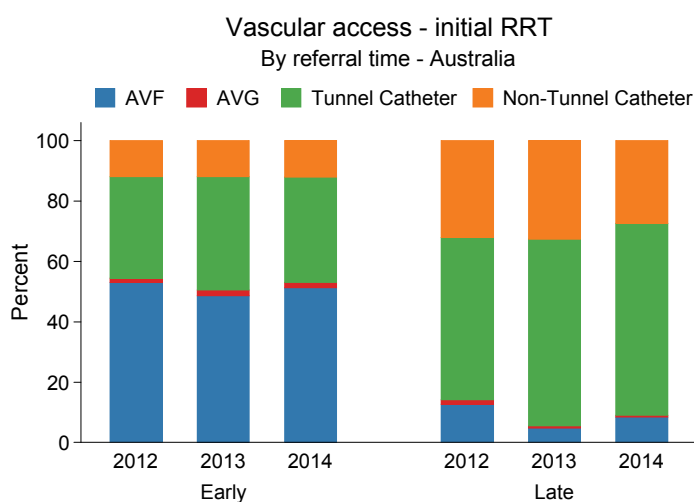


Figure 4.40.2

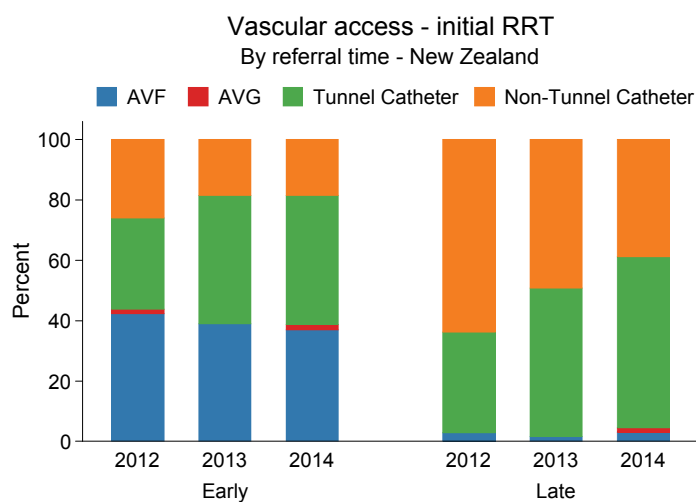


Table 4.12

Incident Vascular Access 2012 - 2014

Initial state	2012		2013		2014	
	AVF/AVG	CVC	AVF/AVG	CVC	AVF/AVG	CVC
QLD	143 (45%)	174 (55%)	144 (43%)	190 (57%)	132 (46%)	156 (54%)
NSW/ACT	233 (39%)	364 (61%)	215 (39%)	339 (61%)	193 (39%)	307 (61%)
VIC	213 (49%)	218 (51%)	204 (46%)	240 (54%)	197 (45%)	240 (55%)
TAS	22 (63%)	13 (37%)	13 (46%)	15 (54%)	16 (44%)	20 (56%)
SA	71 (49%)	73 (51%)	46 (38%)	76 (62%)	75 (65%)	41 (35%)
NT	26 (30%)	61 (70%)	20 (26%)	56 (74%)	41 (38%)	67 (62%)
WA	70 (38%)	115 (62%)	68 (34%)	132 (66%)	89 (39%)	141 (61%)
NZ	116 (35%)	216 (65%)	111 (32%)	239 (68%)	108 (32%)	229 (68%)

Figure 4.41 shows the proportion of patients in each hospital starting haemodialysis with an AVF/AVG, arranged from the lowest to the highest. In Australia, this ranged widely from 12-77%. The corresponding range in New Zealand was 18-55%. This wide variation reflects differences in practices, protocols, resources and patient case-mix among centres.

Figure 4.41.1

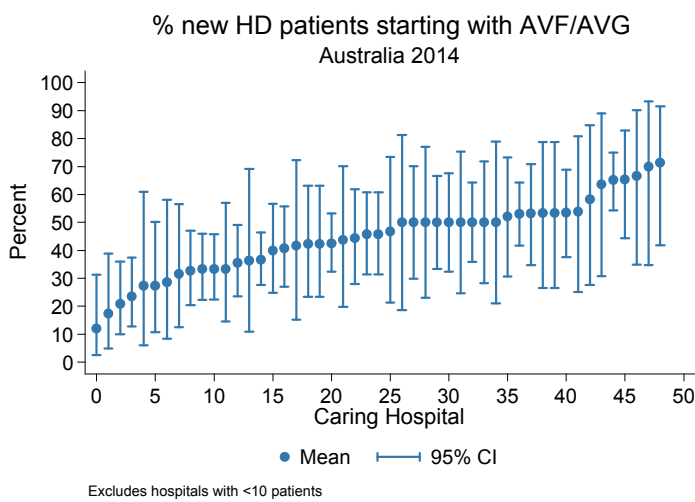
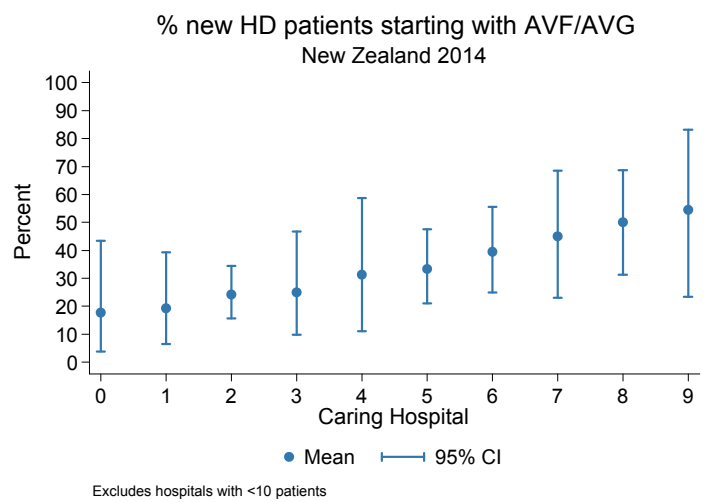


Figure 4.41.2



Prevalent Patients

Figures 4.42 to 4.49 and table 4.13

These show dialysis access among prevalent (rather than incident) patients (those receiving haemodialysis at 31 December 2014).

In both Australia and New Zealand, the proportions of patients dialysing with AV grafts and fistulae at 31 December are stable.

Female patients in both countries, young (age <25 years) in Australia and old (age ≥75 years) patients in New Zealand were less likely to be dialysing with an AVF or AVG.

In Australia indigenous people were more likely to be dialysing with an AVF. In New Zealand, Māori and Pacific people were more likely to dialyse with an AVF. Patients on home haemodialysis have the highest rate of AVF use in both Australia and New Zealand.

Figure 4.42

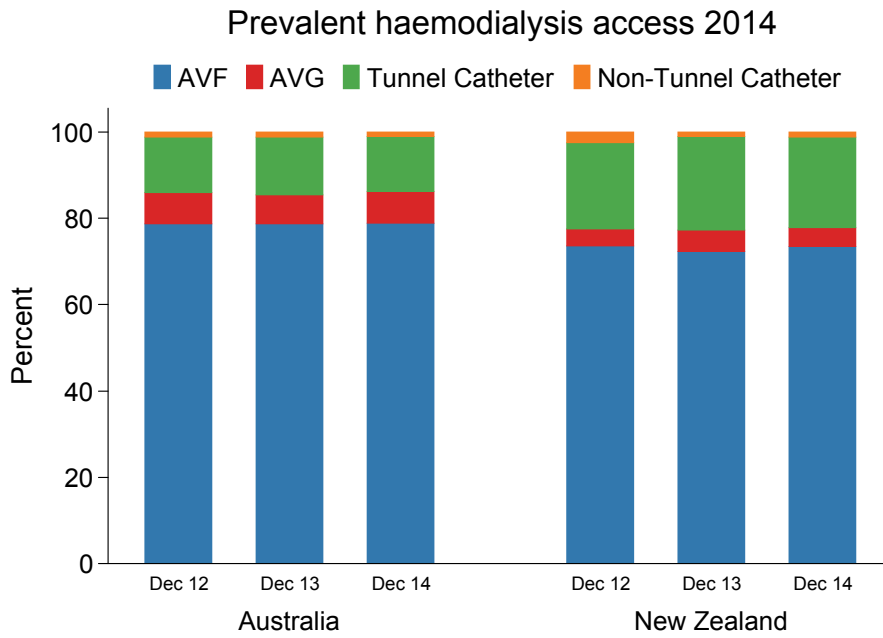


Figure 4.43

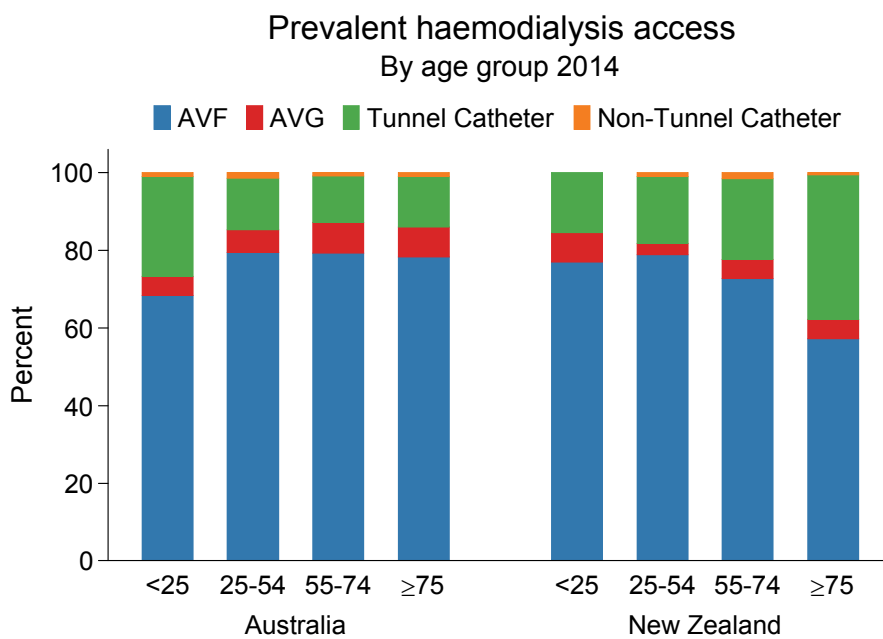


Figure 4.44.1

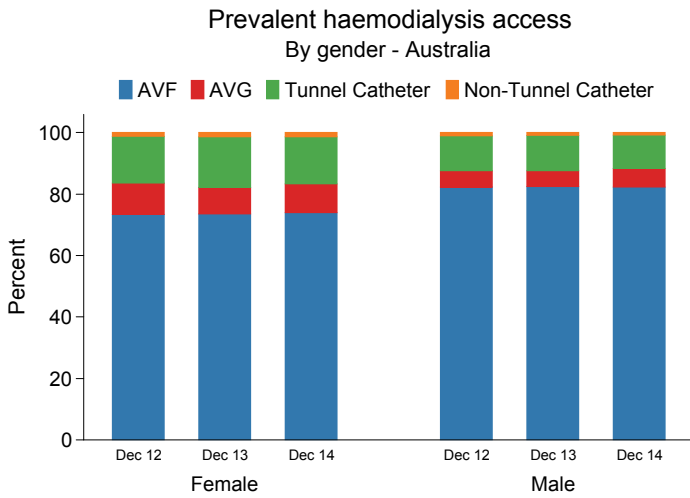


Figure 4.44.2

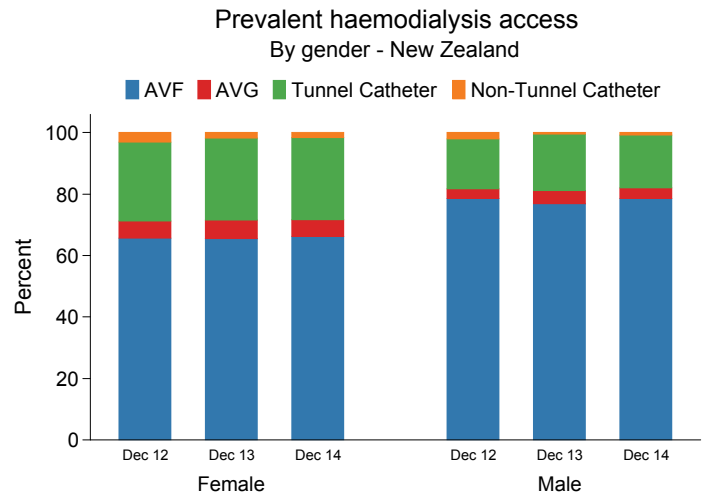


Figure 4.45

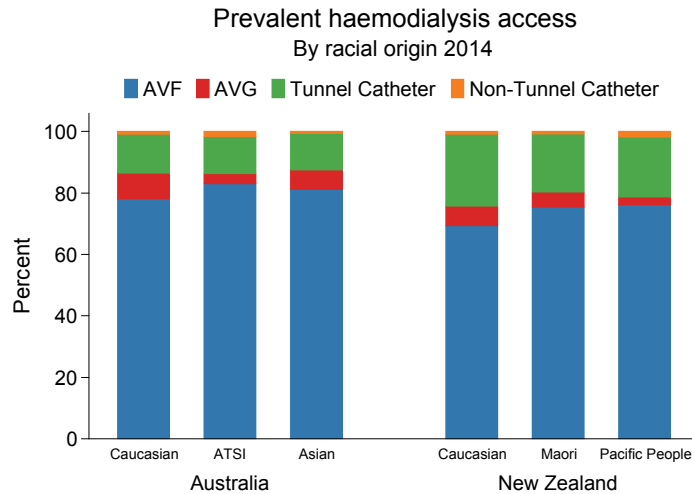


Figure 4.46.1

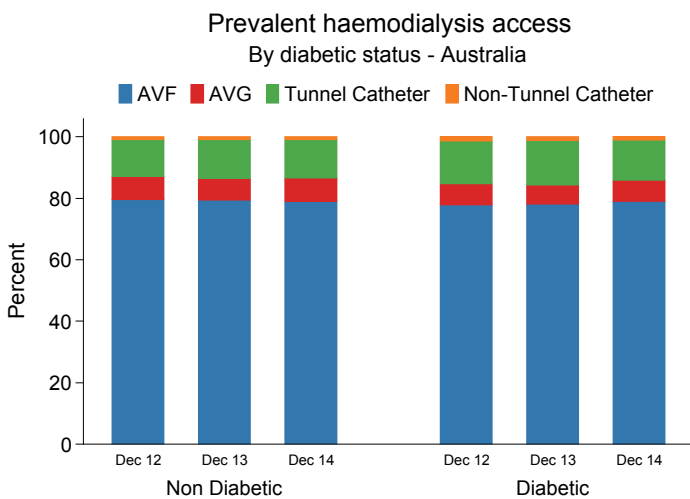


Figure 4.46.2

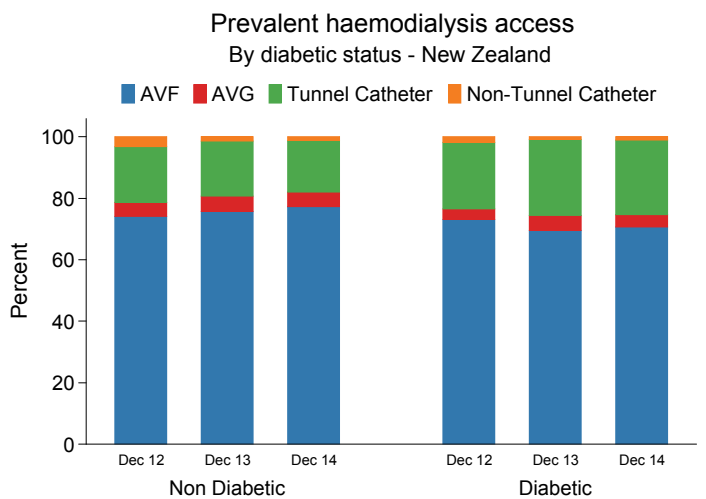


Figure 4.47

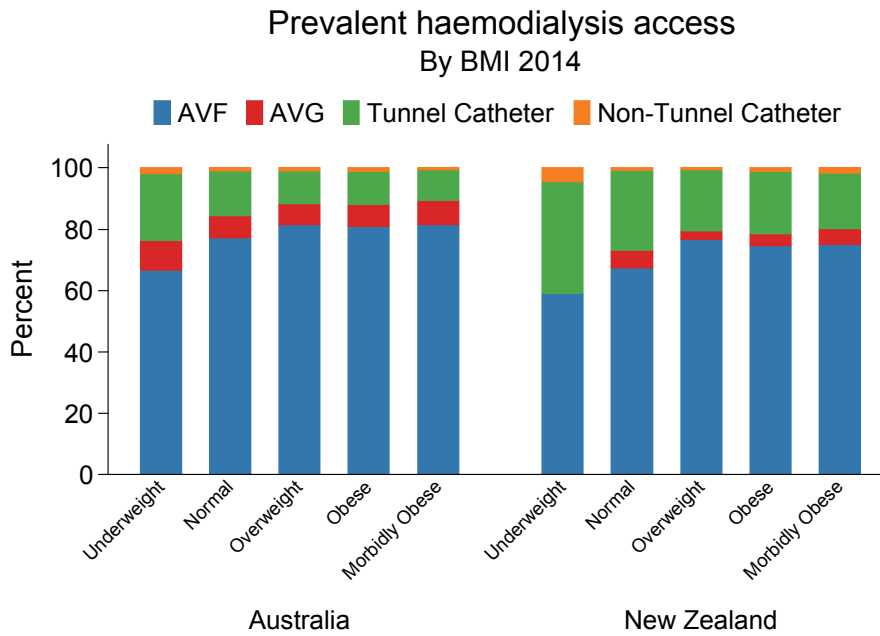


Figure 4.48

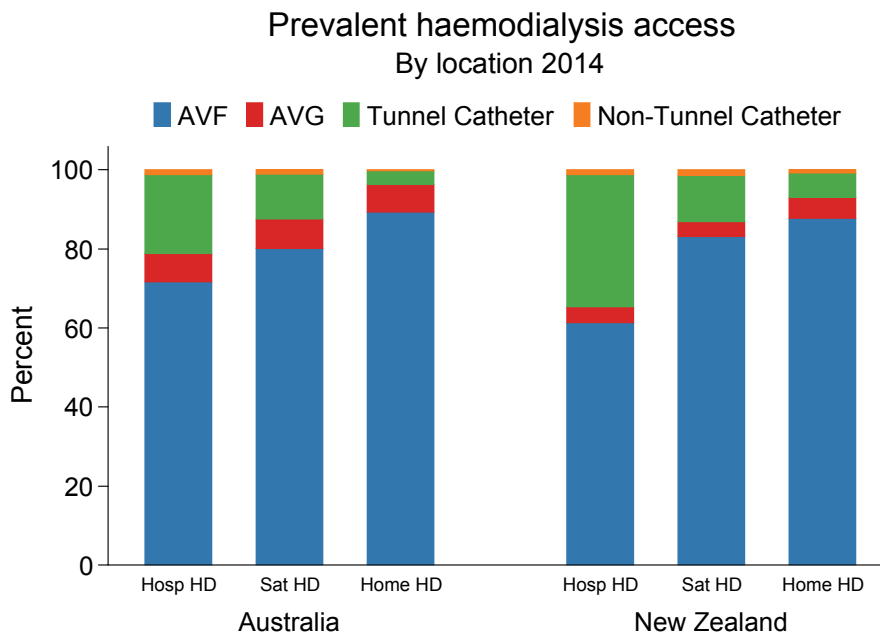


Table 4.13

Prevalent Vascular Access at 31 December

State/Country	2012		2013		2014	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
QLD	1429 (87%)	213 (13%)	1531 (88%)	216 (12%)	1522 (89%)	195 (11%)
NSW/ACT	2529 (85%)	441 (15%)	2553 (83%)	521 (17%)	2524 (85%)	459 (15%)
VIC	2048 (88%)	276 (12%)	2088 (88%)	283 (12%)	2061 (87%)	301 (13%)
TAS	153 (84%)	29 (16%)	147 (84%)	28 (16%)	155 (82%)	33 (18%)
SA	546 (92%)	45 (8%)	572 (92%)	49 (8%)	573 (93%)	40 (7%)
NT	392 (86%)	66 (14%)	405 (84%)	78 (16%)	430 (85%)	74 (15%)
WA	684 (78%)	193 (22%)	687 (79%)	188 (21%)	628 (80%)	156 (20%)
New Zealand	1299 (78%)	375 (22%)	1350 (77%)	398 (23%)	1412 (78%)	403 (22%)

Figure 4.49 shows the proportion of haemodialysis patients at each state or hospital dialysing with an AVF/AVG on 31st December 2013, arranged from the lowest to the highest. In Australia, the hospital proportions varied widely from 67-100%. The corresponding range in New Zealand was 59-90%.

Figure 4.49.1

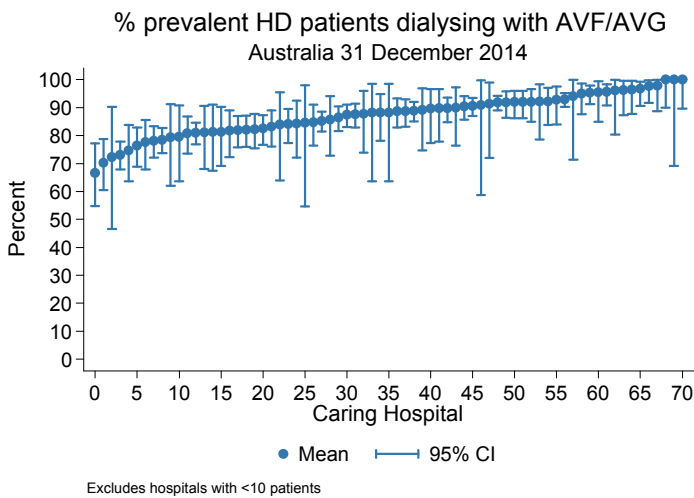
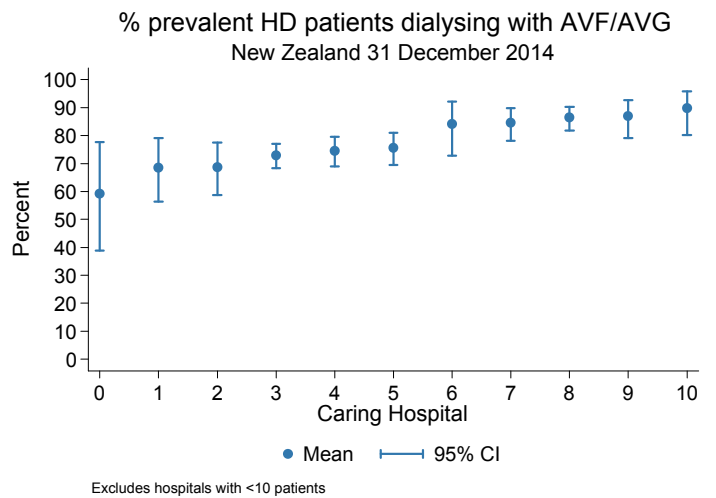


Figure 4.49.2



Survival

Table 4.14 and figure 4.50 present unadjusted haemodialysis patient survival by era and country, censored at transplantation. There has been very little change over eras. Table 4.15 and figure 4.51 present the same data stratified by age, and table 4.16 and figure 4.52 present the same data by diabetic status.

Table 4.14

**Patient Survival - 90 Days after HD start
Censored for Transplant 2003 - 2014
% [95% Confidence Interval]**

Country	Years	No. Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	2003-2005	3934	96 [95, 97]	89 [88, 90]	68 [67, 70]	49 [48, 51]
	2006-2008	4633	96 [95, 96]	90 [89, 91]	69 [68, 71]	52 [50, 53]
	2009-2011	4798	96 [96, 97]	91 [90, 92]	72 [70, 73]	55 [53, 57]
	2012-2014	4446	96 [96, 97]	91 [90, 92]	-	-
New Zealand	2003-2005	691	97 [95, 98]	91 [88, 93]	72 [68, 75]	52 [47, 56]
	2006-2008	737	96 [95, 98]	92 [89, 94]	71 [67, 74]	52 [48, 57]
	2009-2011	835	97 [96, 98]	94 [92, 95]	73 [70, 76]	56 [51, 60]
	2012-2014	811	96 [95, 97]	93 [91, 95]	-	-

Figure 4.50.1

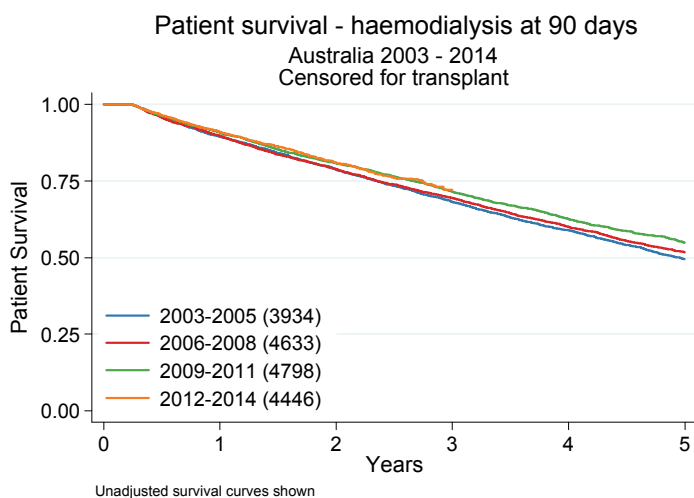


Figure 4.50.2

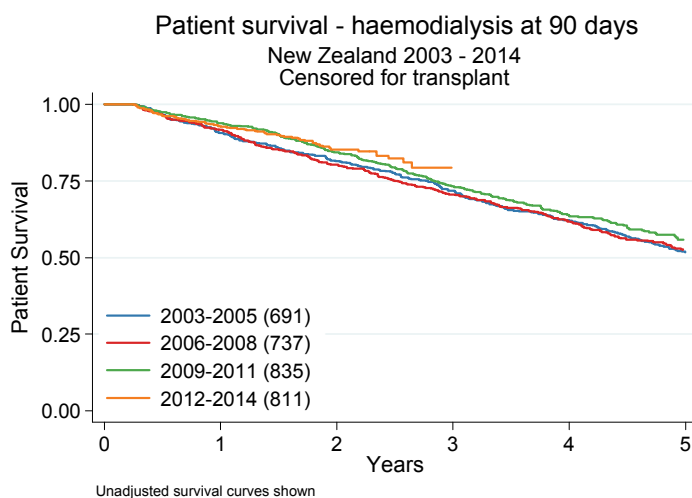


Table 4.15

**Patient Survival - By Age Group - Haemodialysis at 90 Days
Censored for Transplant 2003 - 2014
% [95% Confidence Interval]**

Country	Age Group	No. Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	<40 years	1707	99 [98, 99]	97 [96, 98]	89 [87, 91]	80 [76, 82]
	40-59 years	5626	98 [97, 98]	94 [94, 95]	82 [80, 83]	68 [66, 70]
	60-74 years	6420	95 [95, 96]	89 [88, 90]	68 [67, 69]	50 [49, 52]
	≥75 years	4058	94 [93, 94]	84 [83, 85]	55 [53, 56]	32 [30, 33]
New Zealand	<40 years	399	100 [98, 100]	98 [95, 99]	85 [80, 89]	77 [70, 83]
	40-59 years	1312	97 [96, 98]	95 [93, 96]	80 [77, 83]	63 [59, 66]
	60-74 years	1089	96 [94, 97]	90 [88, 92]	67 [63, 70]	45 [41, 49]
	≥75 years	274	94 [90, 96]	84 [78, 88]	46 [39, 53]	23 [16, 30]

Figure 4.51.1

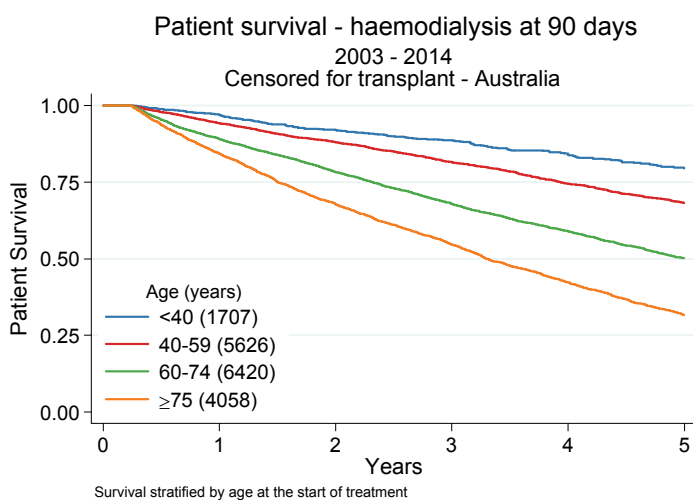


Figure 4.51.2

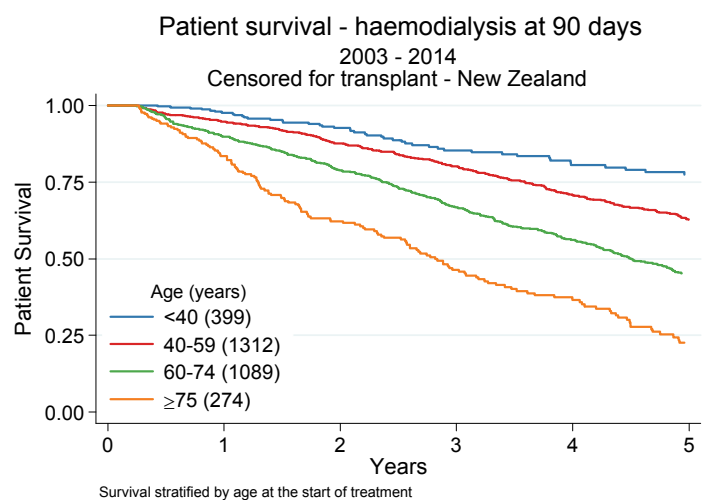


Table 4.16

**Patient Survival - Diabetic / Non Diabetic - Haemodialysis at 90 Days
Censored for Transplant 2003 - 2014
% [95% Confidence Interval]**

Country	Diabetes	No. Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	Non diabetic	11474	96 [96, 96]	90 [89, 90]	71 [70, 72]	53 [52, 55]
	Diabetic	6337	97 [96, 97]	91 [90, 92]	69 [68, 70]	50 [49, 52]
New Zealand	Non diabetic	1535	96 [95, 97]	93 [91, 94]	76 [73, 78]	59 [55, 62]
	Diabetic	1539	97 [96, 98]	92 [90, 93]	70 [67, 73]	50 [46, 53]

Figure 4.52.1

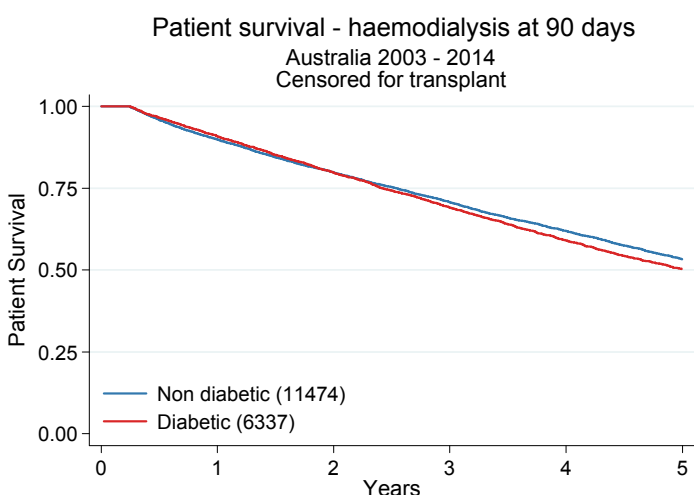


Figure 4.52.2

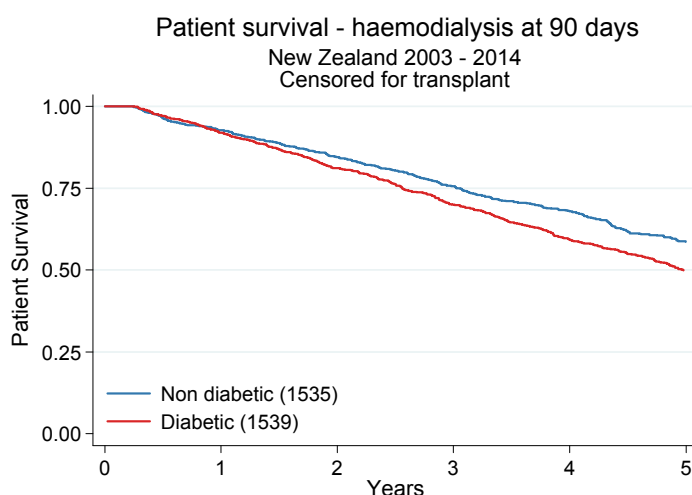


Figure 4.53 presents survival curves by era, adjusted for a number of demographic and clinical characteristics. After adjustment for these confounders, survival appears to be improving slightly with time.

Figure 4.53.1

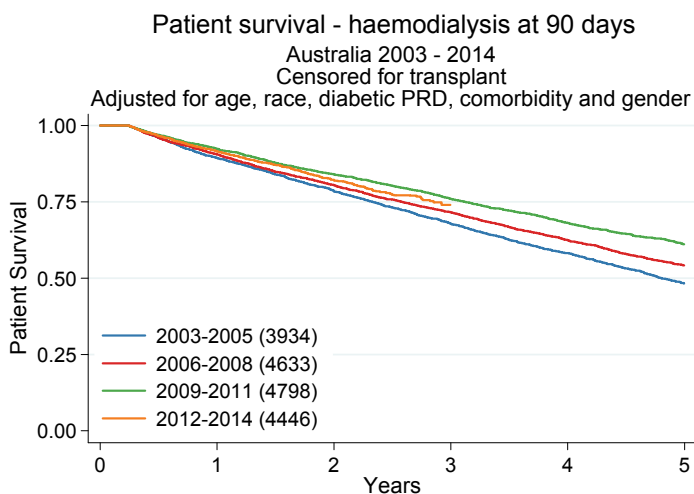
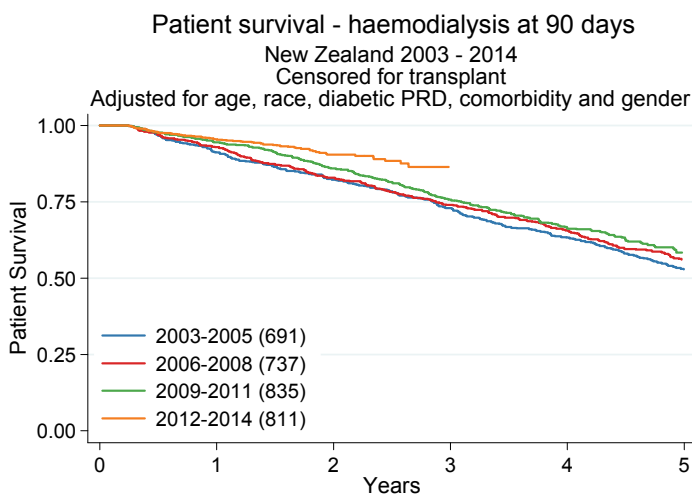


Figure 4.53.2



Home Haemodialysis

The distribution of patients receiving home haemodialysis by state and country is shown in Figure 4.54. As can be appreciated, numbers are greatest in New South Wales and in New Zealand, with substantial numbers also in Victoria and Queensland.

The distribution of prevalent home haemodialysis patients by age group is shown in Figure 4.55. Table 4.17 shows the prevalence of home haemodialysis amongst patients aged 65 and older.

Figure 4.54

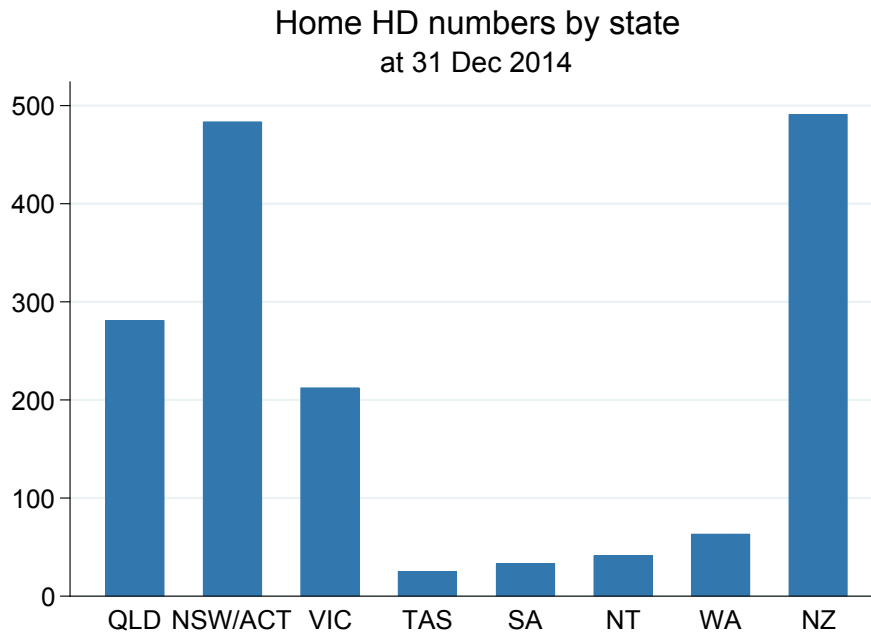


Figure 4.55

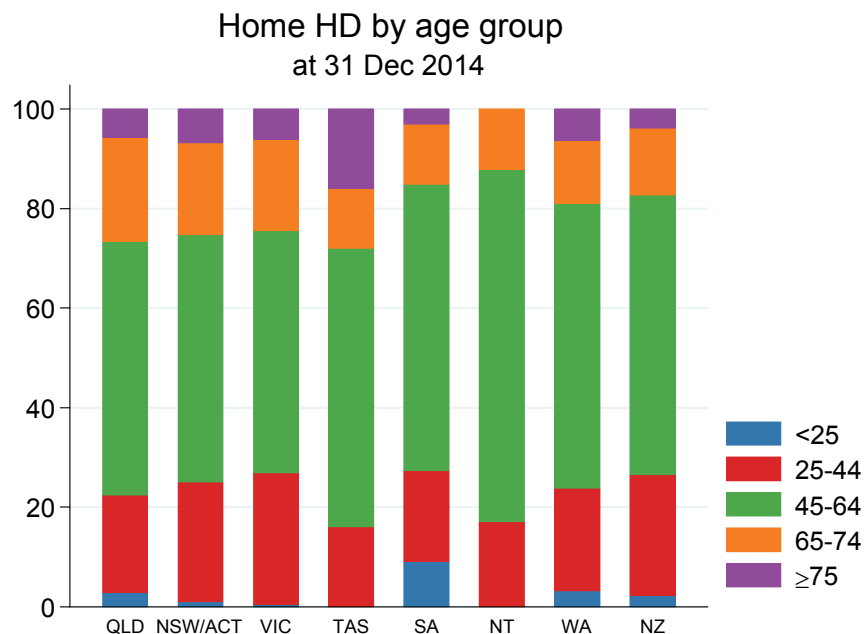


Table 4.17

**Number (%) of Prevalent Dialysis Patients aged ≥65 years
Treated with Home Haemodialysis 2009 - 2013**

Country/State	2010	2011	2012	2013	2014
Australia	275 (4.5%)	299 (4.7%)	356 (5.4%)	341 (5.0%)	363 (5.1%)
QLD	41 (4.2%)	48 (4.9%)	63 (6.3%)	65 (6.3%)	75 (7.0%)
NSW/ACT	101 (5.2%)	107 (5.3%)	119 (5.6%)	117 (5.3%)	122 (5.4%)
VIC	47 (3.4%)	47 (3.2%)	55 (3.6%)	49 (3.0%)	52 (3.1%)
TAS	4 (4.3%)	4 (4.0%)	6 (5.4%)	6 (5.5%)	7 (6.4%)
SA	3 (0.8%)	4 (1.0%)	11 (2.7%)	10 (2.3%)	5 (1.2%)
NT	1 (1.9%)	2 (3.4%)	3 (4.5%)	4 (5.6%)	5 (6.3%)
WA	8 (1.7%)	9 (1.8%)	13 (2.6%)	10 (2.0%)	12 (2.1%)
New Zealand	70 (8.5%)	78 (9.5%)	86 (10.1%)	80 (8.9%)	85 (8.9%)

The trends in numbers treated with home HD for different age groups are illustrated in figure 4.56. The Y axes for individual graphs vary – the absolute numbers in the age groups 25 to 64 years are substantially greater than among older patients. However, there has been strong growth in the older age groups in the last few years.

Figure 4.56.1

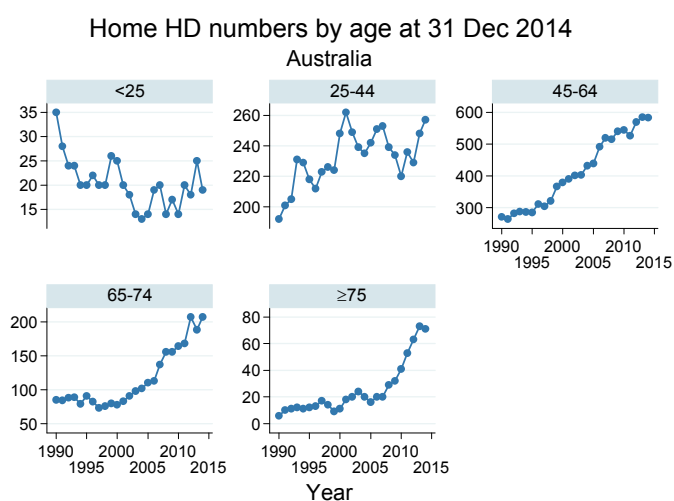
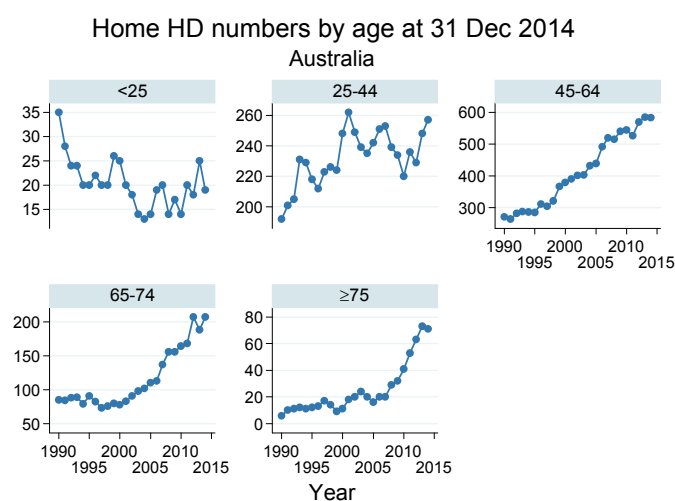


Figure 4.56.2



The following figures explore the concept of technique failure as applied to home haemodialysis. Each treatment episode can end in a variety of ways. Changes to another dialysis modality (either institutional haemodialysis or peritoneal dialysis) for 30 or more days are considered a “failure”, as is death. Follow-up is censored at transplantation, or 31 Dec 2014. When death of a patient is counted as a censoring event (rather than “failure”), the differences between the age groups become less apparent (figure 4.59). It can be seen that (among those alive and not transplanted) over 75% of home haemodialysis patients continue on this therapy after 2 years. However, as time passes there is a progressive difference which emerges with higher technique failure rates among the older patients.

Figure 4.57

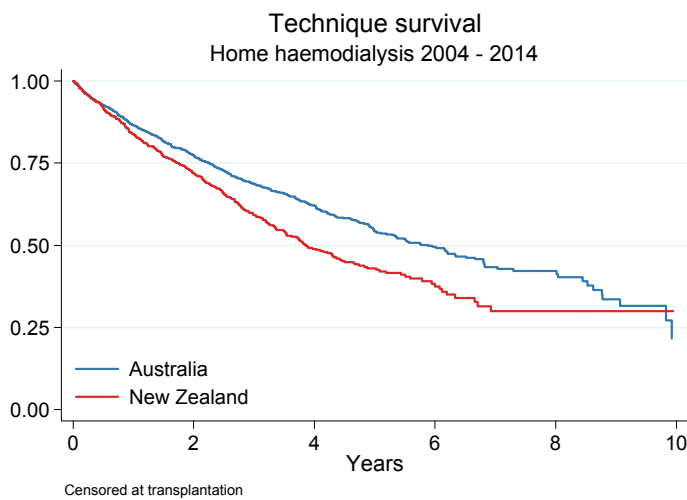


Figure 4.58

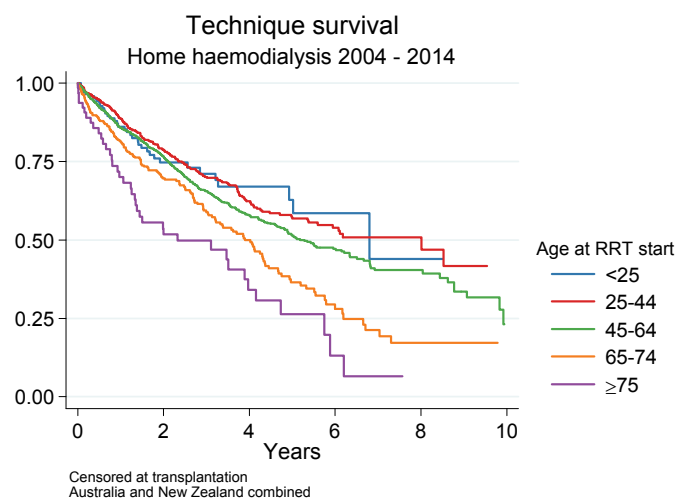


Figure 4.59.1

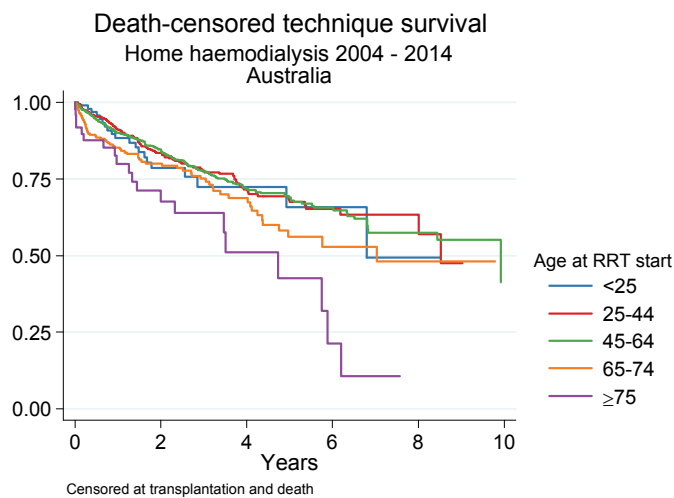
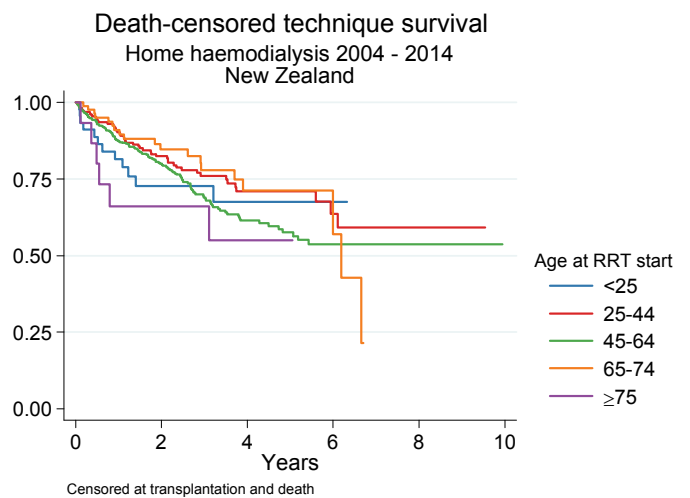


Figure 4.59.2



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