



Australia &
New Zealand Dialysis
& Transplant Registry

Chapter 4

Haemodialysis

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

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Stock and Flow

Table 4.1 presents the stock and flow of haemodialysis patients in Australia and New Zealand over 2009-2013. 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 2009 - 2013

Country	Event	2009	2010	2011	2012	2013
Australia	Patients new to HD	2078	2049	2195	2172	2122
	First dialysis treatment	1725	1734	1859	1816	1759
	Previous dialysis (PD)	314	280	301	305	317
	Failed transplant	39	35	35	51	46
	Transplanted	495	546	522	545	549
	Deaths	1220	1151	1247	1258	1281
	Never transplanted	1144	1083	1172	1178	1196
	Previous transplant	76	68	75	80	85
	Transfer to PD	428	373	408	428	389
	Patients dialysing at 31 December	8265	8623	8976	9240	9468
	Patients dialysis at home at 31 December	979	982	1000	1077	1095
	% of all home dialysis (HD and PD) patients	31%	32%	32%	32%	32%
	New Zealand	Patients new to HD	429	403	410	415	427
First dialysis treatment		360	336	318	332	353
Previous dialysis (PD)		59	60	82	74	68
Failed transplant		10	7	10	9	6
Transplanted		61	50	65	45	60
Deaths		208	203	232	228	225
Never transplanted		195	180	222	221	213
Previous transplant		13	23	10	7	12
Transfer to PD		118	167	144	132	158
Patients dialysing at 31 December		1481	1556	1597	1689	1752
Patients dialysis at home at 31 December		378	425	434	473	475
% of all home dialysis (HD and PD) patients		32%	34%	35%	38%	36%

Table 4.2.1

Stock and Flow Australia 2009 - 2013

	2009	2010	2011	2012	2013	
New Patients*	00-14 years	9 (0%)	14 (1%)	15 (1%)	21 (1%)	17 (1%)
	15-24 years	45 (2%)	44 (2%)	46 (2%)	43 (2%)	56 (3%)
	25-34 years	88 (4%)	77 (4%)	85 (4%)	110 (5%)	88 (4%)
	35-44 years	180 (9%)	173 (8%)	197 (9%)	175 (8%)	170 (8%)
	45-54 years	312 (15%)	317 (15%)	331 (15%)	367 (17%)	323 (15%)
	55-64 years	451 (22%)	444 (22%)	492 (22%)	495 (23%)	492 (23%)
	65-74 years	518 (25%)	487 (24%)	535 (24%)	506 (23%)	515 (24%)
	75-84 years	417 (20%)	409 (20%)	431 (20%)	392 (18%)	410 (19%)
	≥85 years	58 (3%)	84 (4%)	63 (3%)	63 (3%)	51 (2%)
Total	2078 (16%)	2049 (16%)	2195 (17%)	2172 (17%)	2122 (17%)	
Patients Dialysing	00-14 years	9 (0%)	10 (0%)	10 (0%)	11 (0%)	14 (0%)
	15-24 years	91 (1%)	100 (1%)	112 (1%)	111 (1%)	106 (1%)
	25-34 years	292 (4%)	290 (3%)	287 (3%)	301 (3%)	298 (3%)
	35-44 years	697 (8%)	698 (8%)	734 (8%)	729 (8%)	733 (8%)
	45-54 years	1314 (16%)	1315 (15%)	1339 (15%)	1357 (15%)	1423 (15%)
	55-64 years	1792 (22%)	1875 (22%)	1951 (22%)	2027 (22%)	2018 (21%)
	65-74 years	1989 (24%)	2073 (24%)	2140 (24%)	2237 (24%)	2301 (24%)
	75-84 years	1770 (21%)	1869 (22%)	1983 (22%)	2026 (22%)	2121 (22%)
	≥85 years	311 (4%)	393 (5%)	420 (5%)	441 (5%)	454 (5%)
Total	8265 (16%)	8623 (16%)	8976 (17%)	9240 (18%)	9468 (18%)	
Primary Renal Disease*	Analgesic Nephropathy	41 (2%)	38 (2%)	28 (1%)	33 (2%)	24 (1%)
	Diabetic Nephropathy	687 (33%)	746 (36%)	799 (36%)	847 (39%)	777 (37%)
	Glomerulonephritis	508 (24%)	429 (21%)	482 (22%)	425 (20%)	389 (18%)
	Hypertension	280 (13%)	269 (13%)	318 (14%)	237 (11%)	243 (11%)
	Miscellaneous	245 (12%)	274 (13%)	279 (13%)	367 (17%)	429 (20%)
	Polycystic Disease	123 (6%)	135 (7%)	126 (6%)	108 (5%)	122 (6%)
	Reflux Nephropathy	61 (3%)	43 (2%)	51 (2%)	56 (3%)	38 (2%)
	Uncertain	133 (6%)	115 (6%)	112 (5%)	99 (5%)	100 (5%)
Total	2078 (16%)	2049 (16%)	2195 (17%)	2172 (17%)	2122 (17%)	

* New patients receiving first haemodialysis treatment

Table 4.2.2

Stock and Flow New Zealand 2009 - 2013

	2009	2010	2011	2012	2013	
New Patients*	00-14 years	2 (0%)	1 (0%)	1 (0%)	5 (1%)	0 (0%)
	15-24 years	10 (2%)	12 (3%)	14 (3%)	18 (4%)	7 (2%)
	25-34 years	24 (6%)	13 (3%)	19 (5%)	20 (5%)	27 (6%)
	35-44 years	54 (13%)	41 (10%)	44 (11%)	38 (9%)	51 (12%)
	45-54 years	89 (21%)	99 (25%)	83 (20%)	79 (19%)	95 (22%)
	55-64 years	103 (24%)	113 (28%)	107 (26%)	125 (30%)	110 (26%)
	65-74 years	93 (22%)	82 (20%)	100 (24%)	95 (23%)	100 (23%)
	75-84 years	51 (12%)	39 (10%)	38 (9%)	35 (8%)	35 (8%)
	≥85 years	3 (1%)	3 (1%)	4 (1%)	0 (0%)	2 (0%)
Total	429 (3%)	403 (3%)	410 (3%)	415 (3%)	427 (3%)	
Patients Dialysing	00-14 years	3 (0%)	4 (0%)	1 (0%)	2 (0%)	2 (0%)
	15-24 years	41 (3%)	45 (3%)	39 (2%)	45 (3%)	40 (2%)
	25-34 years	90 (6%)	91 (6%)	90 (6%)	98 (6%)	102 (6%)
	35-44 years	162 (11%)	165 (11%)	173 (11%)	172 (10%)	187 (11%)
	45-54 years	309 (21%)	330 (21%)	334 (21%)	343 (20%)	348 (20%)
	55-64 years	403 (27%)	431 (28%)	453 (28%)	481 (28%)	496 (28%)
	65-74 years	316 (21%)	323 (21%)	341 (21%)	370 (22%)	393 (22%)
	75-84 years	146 (10%)	152 (10%)	146 (9%)	163 (10%)	164 (9%)
	≥85 years	11 (1%)	15 (1%)	20 (1%)	15 (1%)	20 (1%)
Total	1481 (3%)	1556 (3%)	1597 (3%)	1689 (3%)	1752 (3%)	
Primary Renal Disease*	Analgesic Nephropathy	1 (0%)	0 (0%)	2 (0%)	3 (1%)	1 (0%)
	Diabetic Nephropathy	212 (49%)	208 (52%)	176 (43%)	205 (49%)	222 (52%)
	Glomerulonephritis	97 (23%)	89 (22%)	100 (24%)	81 (20%)	79 (19%)
	Hypertension	43 (10%)	36 (9%)	41 (10%)	42 (10%)	41 (10%)
	Miscellaneous	41 (10%)	38 (9%)	43 (10%)	45 (11%)	48 (11%)
	Polycystic Disease	18 (4%)	14 (3%)	20 (5%)	17 (4%)	19 (4%)
	Reflux Nephropathy	3 (1%)	6 (1%)	8 (2%)	9 (2%)	8 (2%)
	Uncertain	14 (3%)	12 (3%)	20 (5%)	13 (3%)	9 (2%)
Total	429 (3%)	403 (3%)	410 (3%)	415 (3%)	427 (3%)	

* New patients receiving first haemodialysis treatment

Figure 4.1

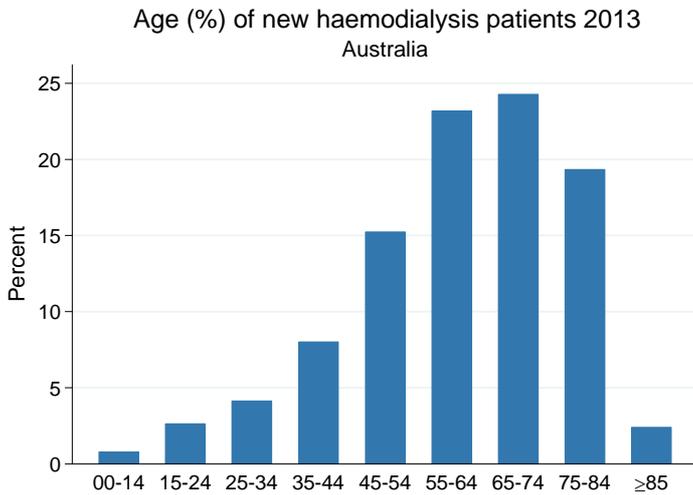


Figure 4.2

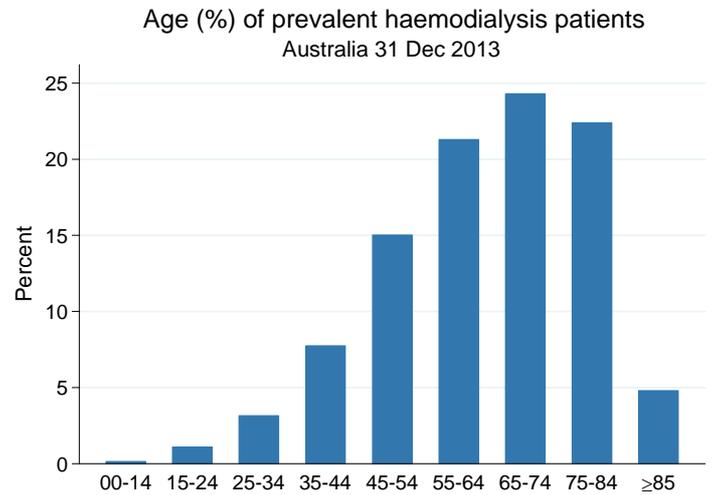


Figure 4.3

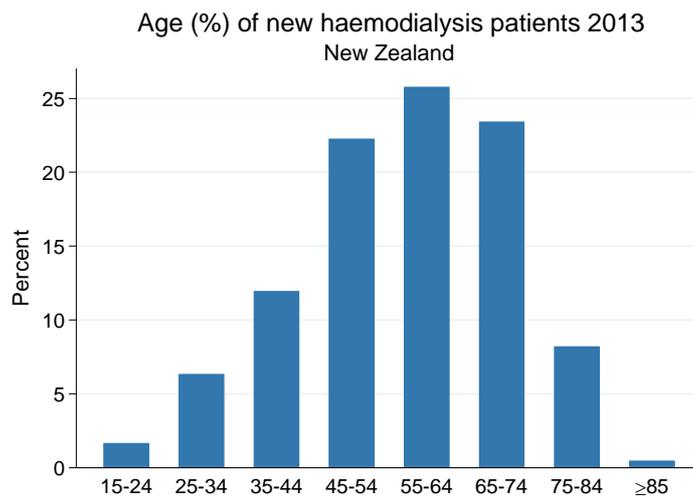
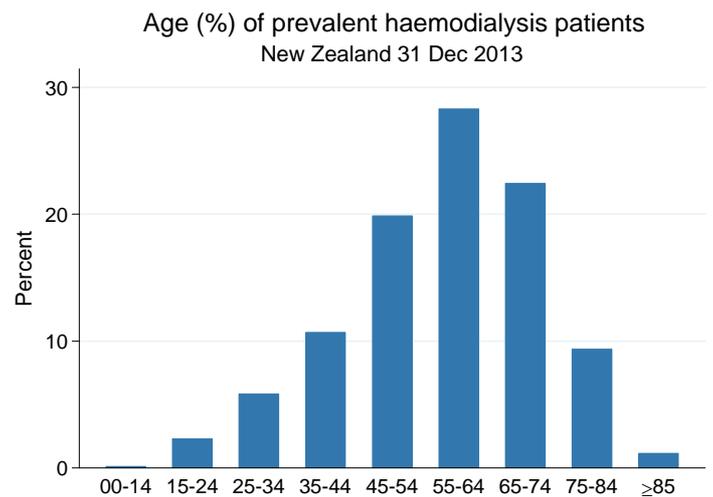


Figure 4.4



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 2011-13 is shown in figure 4.5.

Table 4.3

Blood Flow Rates (mls/minute) 2009-2013

Country	Year	Total Patients	CVV HD Excluded*	NR**	<200	200-249	250-299	300-349	350-399	400+
Australia	2009	8258	1	4	47	292	1208	4745	1630	331
	2010	8612	3	12	39	296	1227	4995	1722	318
	2011	8951	0	22	28	270	1251	5210	1893	277
	2012	9211	0	219	44	231	1285	5309	1836	287
	2013	9468	3	179	34	220	1298	5590	1897	247
New Zealand	2009	1481	1	0	4	94	368	680	300	34
	2010	1555	0	1	5	96	393	769	259	32
	2011	1596	0	1	4	106	332	911	224	18
	2012	1687	0	23	7	115	383	868	258	33
	2013	1752	0	4	3	106	400	950	255	34

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

Table 4.4

Blood Flow Rate by Type of Access December 2013

Blood Flow Rate	Australia				New Zealand			
	AVF	AVG	CVC*	NR**	AVF	AVG	CVC*	NR**
<200	11 (0.2%)	0 (0.0%)	23 (1.7%)	0 (0.0%)	2 (0.2%)	0 (0.0%)	1 (0.3%)	0 (0.0%)
200-249	134 (1.8%)	20 (3.2%)	66 (4.8%)	0 (0.0%)	74 (5.8%)	3 (3.5%)	29 (7.4%)	0 (0.0%)
250-299	864 (11.8%)	92 (14.8%)	337 (24.4%)	5 (3.8%)	215 (17.0%)	26 (30.2%)	156 (39.6%)	3 (42.9%)
300-349	4397 (60.0%)	387 (62.4%)	785 (56.8%)	21 (15.9%)	701 (55.4%)	50 (58.1%)	196 (49.7%)	3 (42.9%)
350-399	1680 (22.9%)	103 (16.6%)	108 (7.8%)	6 (4.5%)	240 (19.0%)	7 (8.1%)	8 (2.0%)	0 (0.0%)
400+	225 (3.1%)	18 (2.9%)	4 (0.3%)	0 (0.0%)	33 (2.6%)	0 (0.0%)	1 (0.3%)	0 (0.0%)
NR**	21 (0.3%)	0 (0.0%)	58 (4.2%)	100 (75.8%)	0 (0.0%)	0 (0.0%)	3 (0.8%)	1 (14.3%)
Total	7332	620	1381	132	1265	86	394	7

* CVV HD Patients excluded from Total.

** Not Reported

Figure 4.5.1

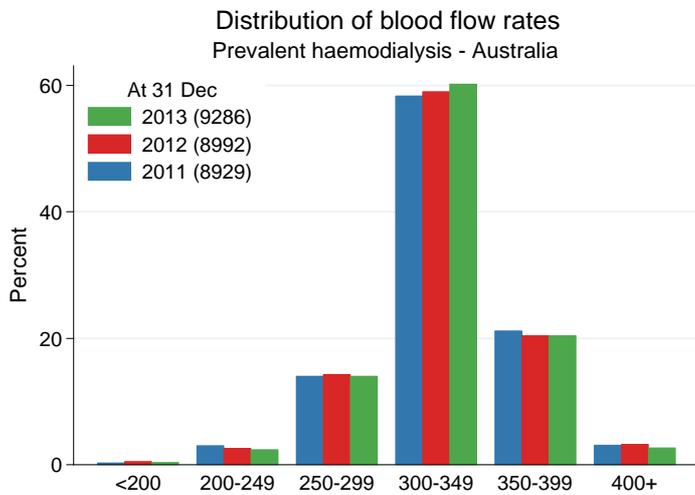


Figure 4.5.2

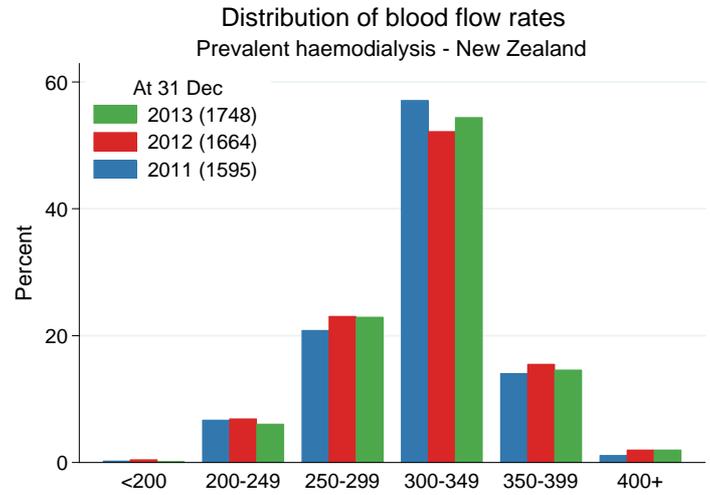


Table 4.5 shows the number of weekly sessions, and hours per session, at 31 December 2013. In each country the large majority are dialysing for ≤ 3 sessions per week, and for between 4-5 hours per session. Figures 4.6 and 4.7 show HD frequency and session length respectively over 2011-2013. Figure 4.8 combines sessions and session length to show the total number of weekly hours of HD over 2011-2013. 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 2013

Country	Sessions per week	Hours of Each Treatment						Not Reported	Total
		≤ 4	4	4.5	5	5.5	>5.5		
Australia	≤ 3	348 (4.1)	3297 (38.6)	1975 (23.1)	2540 (29.8)	147 (1.7)	226 (2.6)	0 (0.0)	8533
	3.1-4.9	45 (7.4)	116 (19.0)	60 (9.8)	128 (21.0)	17 (2.8)	244 (40.0)	0 (0.0)	610
	5+	55 (36.7)	39 (26.0)	4 (2.7)	8 (5.3)	2 (1.3)	42 (28.0)	0 (0.0)	150
	Not Reported	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	175 (100.0)	175
	Total	448 (4.7)	3452 (36.5)	2039 (21.5)	2676 (28.3)	166 (1.8)	512 (5.4)	175 (1.8)	9468
New Zealand	≤ 3	27 (1.8)	453 (30.4)	394 (26.5)	502 (33.7)	36 (2.4)	76 (5.1)	0 (0.0)	1488
	3.1-4.9	17 (7.0)	42 (17.2)	40 (16.4)	75 (30.7)	7 (2.9)	63 (25.8)	0 (0.0)	244
	5+	7 (41.2)	4 (23.5)	1 (5.9)	2 (11.8)	0 (0.0)	3 (17.6)	0 (0.0)	17
	Not Reported	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (100.0)	3
	Total	51 (2.9)	499 (28.5)	435 (24.8)	579 (33.0)	43 (2.5)	142 (8.1)	3 (0.2)	1752

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

Figure 4.6

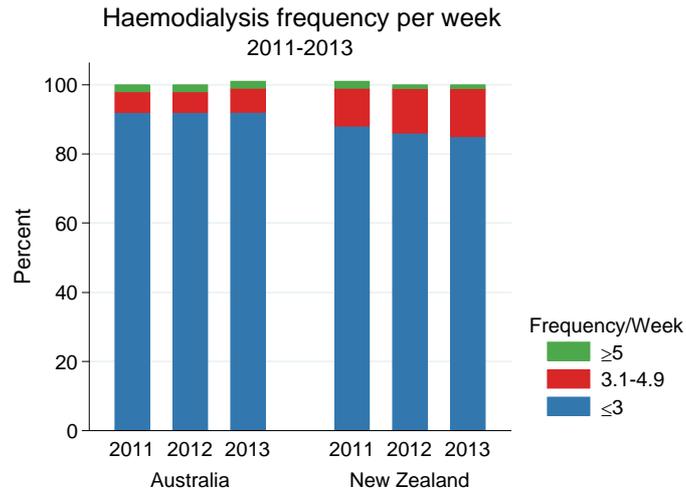


Figure 4.7

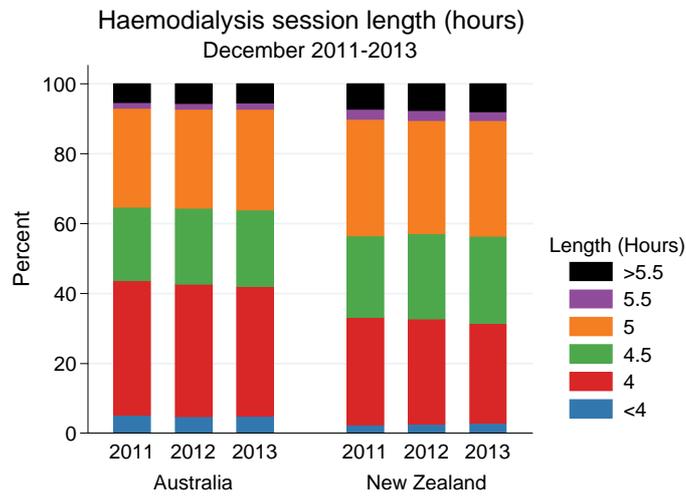
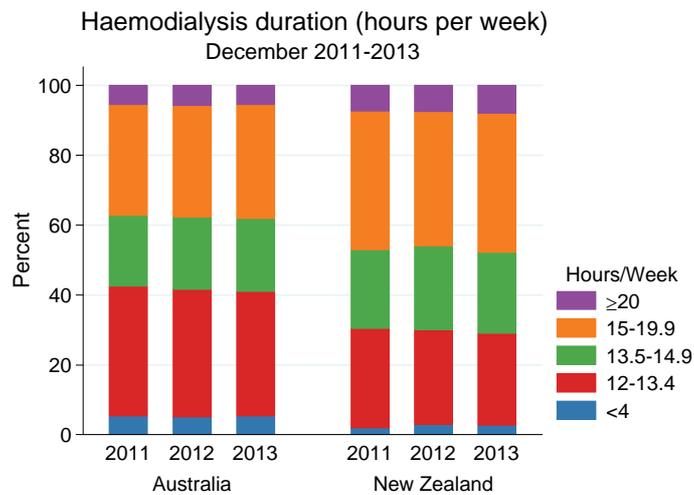


Figure 4.8



Figures 4.9-4.11 show trends in dialysis prescription. The number of patients dialysing five days or more per week continue to fall in New Zealand but has stabilised in Australia. Conversely, of patients dialysing three days per week, the proportion dialysing 4.5 hours or longer per session has been steadily increasing in each country. Similarly, there has been a steady increase in the proportion of patients dialysing >12 hours per week. Tables 4.6-4.8 present these same data for 2010-2013 by state.

Figure 4.9

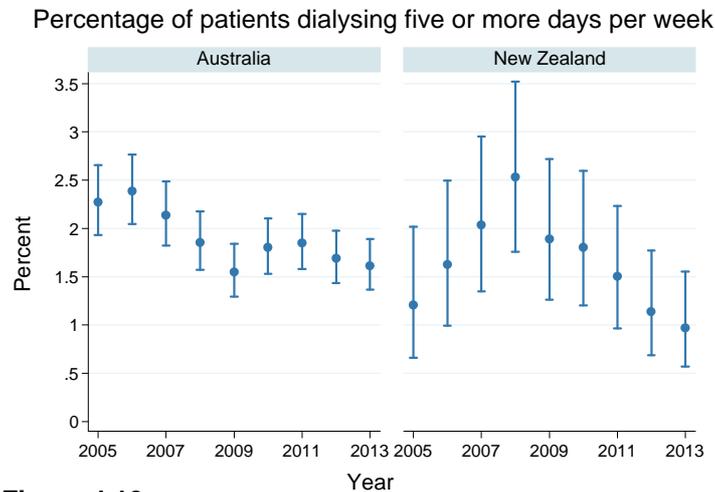


Figure 4.10

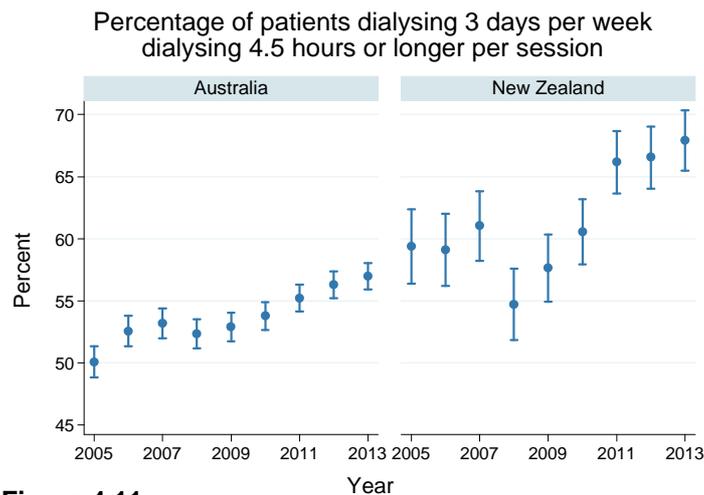


Figure 4.11

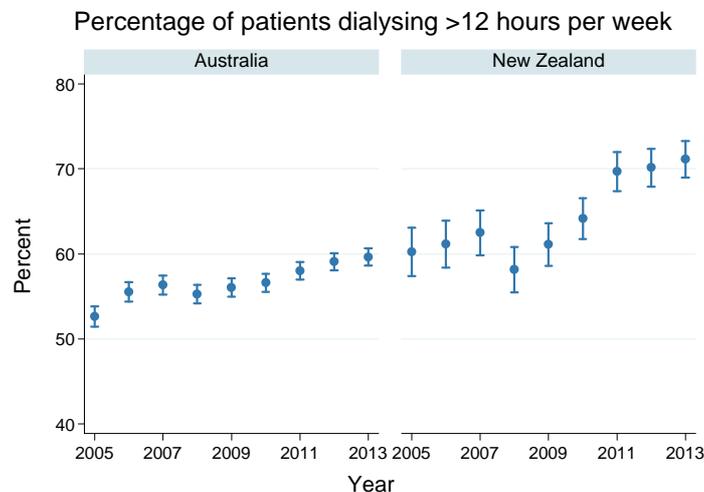


Table 4.6

**Haemodialysis ≥ 5 Sessions per Week
By Australian State and Country**

Year	Australia							New Zealand
	QLD	NSW/ACT	VIC	TAS	SA	NT	WA	
2013	52 (3.0%)	21 (0.7%)	53 (2.2%)	5 (2.8%)	4 (0.6%)	1 (0.2%)	14 (1.6%)	17 (1.0%)
2012	55 (3.3%)	23 (0.8%)	46 (2.0%)	3 (1.6%)	11 (1.9%)	3 (0.6%)	11 (1.3%)	19 (1.1%)
2011	61 (3.7%)	24 (0.8%)	50 (2.2%)	2 (1.3%)	7 (1.2%)	3 (0.7%)	18 (2.1%)	24 (1.5%)
2010	51 (3.1%)	25 (0.9%)	48 (2.2%)	3 (2.1%)	8 (1.4%)	5 (1.2%)	15 (1.9%)	28 (1.8%)

Table 4.7

**Haemodialysis ≥ 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	
2013	899 (59.7%)	2039 (74.5%)	982 (46.5%)	98 (65.8%)	146 (25.5%)	345 (71.7%)	245 (31.1%)	998 (67.9%)
2012	824 (58.9%)	1943 (73.7%)	956 (45.6%)	110 (68.3%)	134 (24.5%)	351 (77.3%)	235 (29.7%)	940 (66.6%)
2011	844 (58.7%)	1936 (74.4%)	890 (42.5%)	100 (69.0%)	133 (23.9%)	319 (75.1%)	230 (28.8%)	920 (66.2%)
2010	829 (59.5%)	1862 (72.8%)	757 (37.7%)	79 (61.2%)	138 (26.0%)	301 (77.2%)	201 (27.1%)	828 (60.6%)

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	
2013	1081 (62.2%)	2284 (74.6%)	1225 (51.9%)	121 (68.8%)	175 (28.2%)	351 (72.1%)	304 (35.8%)	1245 (71.2%)
2012	1004 (61.0%)	2201 (74.8%)	1172 (50.4%)	128 (70.3%)	162 (27.4%)	358 (77.5%)	291 (34.2%)	1161 (70.2%)
2011	1009 (61.3%)	2194 (75.2%)	1088 (47.1%)	112 (70.4%)	160 (26.7%)	328 (75.6%)	290 (33.6%)	1112 (69.7%)
2010	995 (61.3%)	2086 (73.8%)	959 (43.0%)	92 (63.0%)	167 (29.3%)	311 (77.4%)	257 (32.1%)	997 (64.2%)

Table 4.9 shows the dialysis membranes in use at the end of 2013. 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 2013

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	.	.	1	.	.	.	1
	Cellulose Acetate	Low	.	.	.	.	1	.	1
	Cellulose Triacetate	High	.	.	3	19	41	.	63
	Helixone Plus	High	.	.	1	1	51	.	53
	Polyamix	High	6	30	269	.	1299	.	1604
	Polyamix	Low	.	2	17	.	2	.	21
	Polyethersulfone	High	.	.	12	35	168	.	215
	Polynephron	High	.	.	.	.	80	.	80
	Polysulphone	High	.	.	.	3	.	.	3
	Polysulphone	Low	.	5	.	10	32	.	47
	Polysulphone-Helixone	High	1	434	.	3090	2358	.	5883
	Purima	Mid	.	.	9	.	.	.	9
	Revaclear	High	.	257	.	.	.	.	257
	Revaclear Max	High	.	.	.	1045	.	.	1045
	Unreported	Unreported	.	.	.	.	.	186	186
Total			7	728	312	4203	4032	186	9468
New Zealand	Polyamix	High	.	.	3	.	22	.	25
	Polyamix	Low	.	2	31	.	56	.	89
	Polysulphone	Low	.	4	.	77	102	.	183
	Polysulphone-Helixone	High	.	290	.	304	469	.	1063
	Revaclear	High	.	21	.	.	.	.	21
	Revaclear Max	High	.	.	.	367	.	.	367
	Unreported	Unreported	.	.	.	.	.	4	4
Total			.	317	34	748	649	4	1752

Table 4.10

Number of Patients by HD Modality - 31 December 2013

	NT	NSW/ACT	VIC	QLD	SA	WA	TAS	NZ	Total
Haemodialysis - plate dialysers	0	1	0	0	1	0	0	0	2
Haemodialysis - hollow fibre dialysers	483	2,649	2,289	1,359	401	687	134	1367	9,369
Haemofiltration	0	4	2	24	0	1	0	2	33
Haemodiafiltration	2	435	73	379	216	233	42	373	1,753
Redy-Hollow fibre dialyser	0	0	0	0	1	0	0	0	1
Total	485	3,089	2,364	1,762	619	921	176	1742	11,158

Figure 4.12

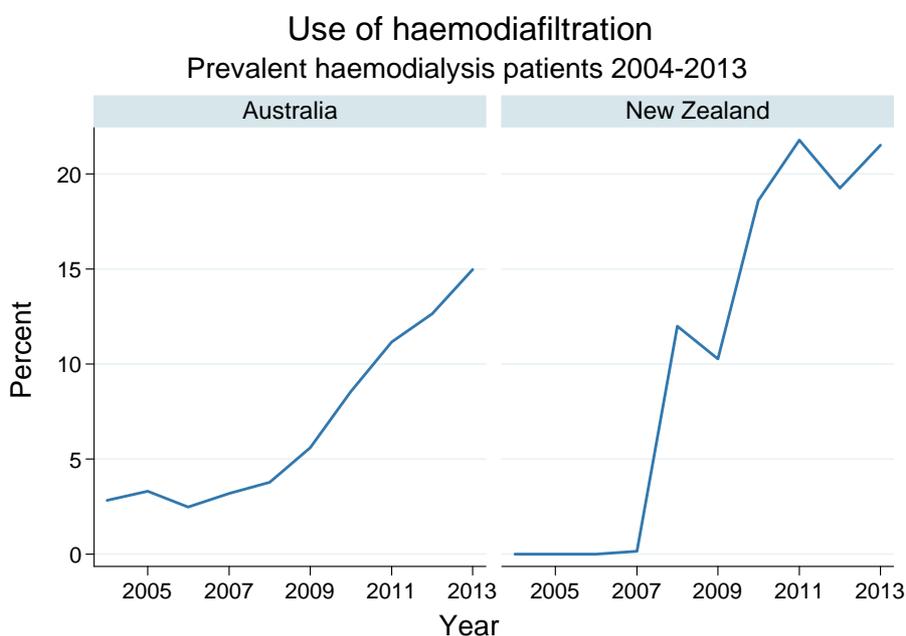


Figure 4.13.1

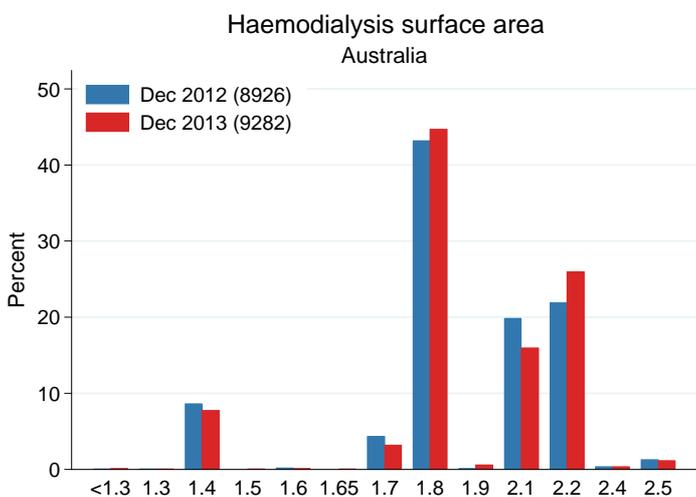
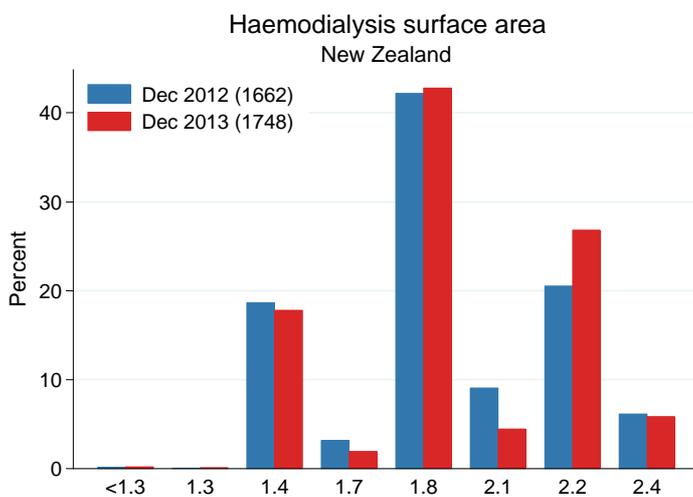


Figure 4.13.2



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

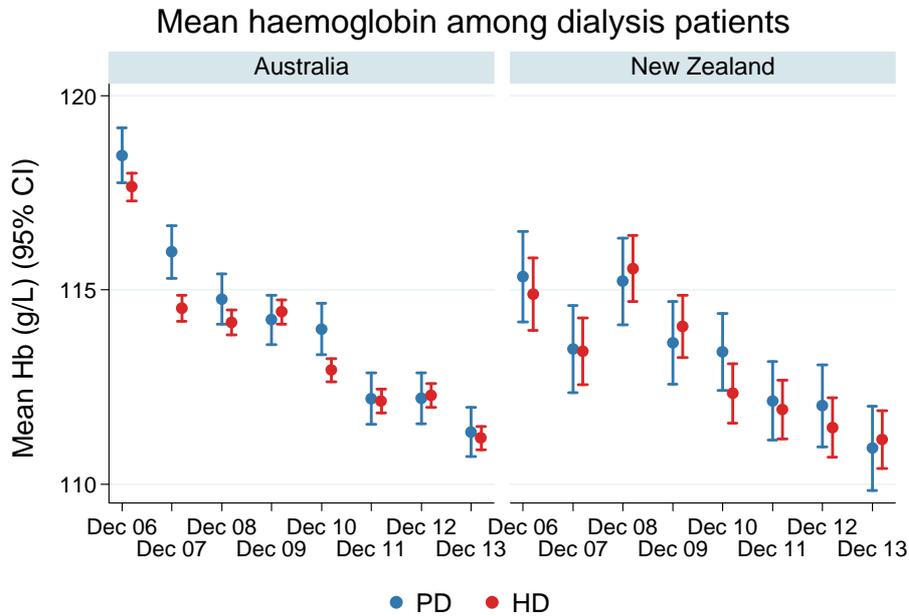


Figure 4.15

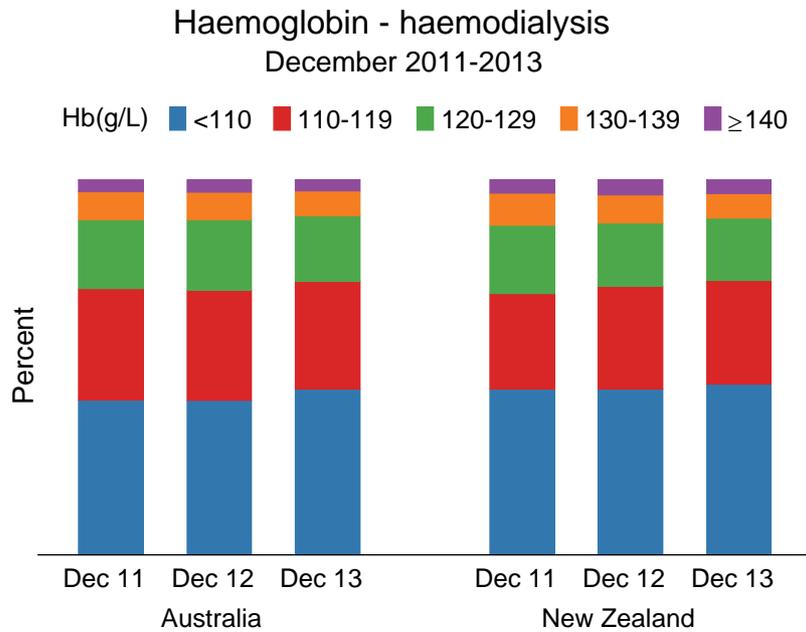


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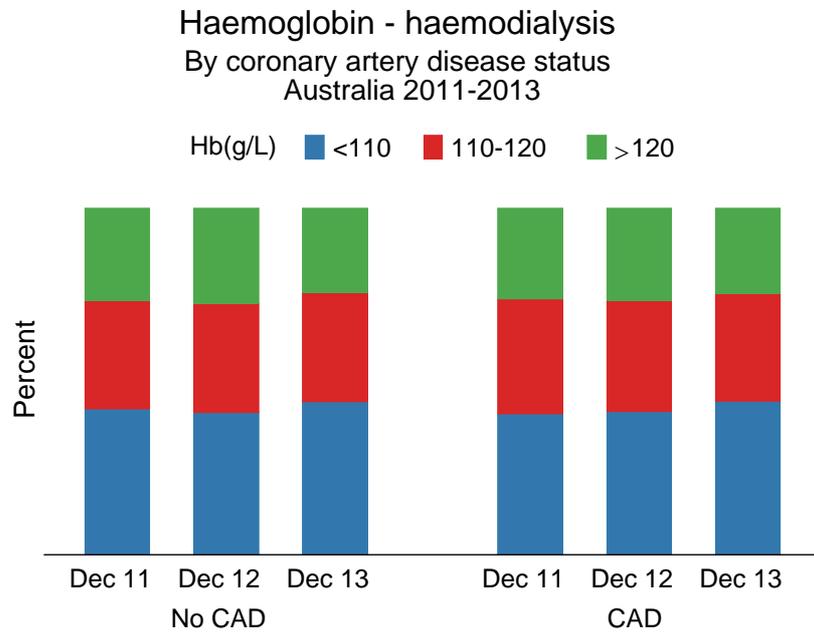


Figure 4.16.2

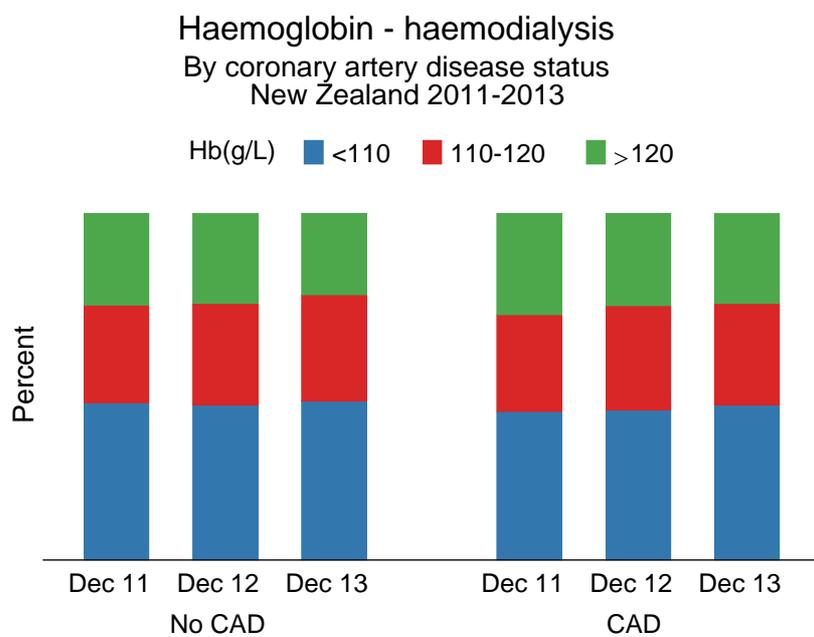


Figure 4.17 shows the variation in Hb between treating hospitals; median Hb ranged from 106 to 119.5g/L in Australia and 102-116g/L in New Zealand.. Figure 4.18 shows the proportion of patients with Hb between 110-129g/L; the proportion ranged from 28-74% in Australia and 24-51% in New Zealand.

Figure 4.17.1

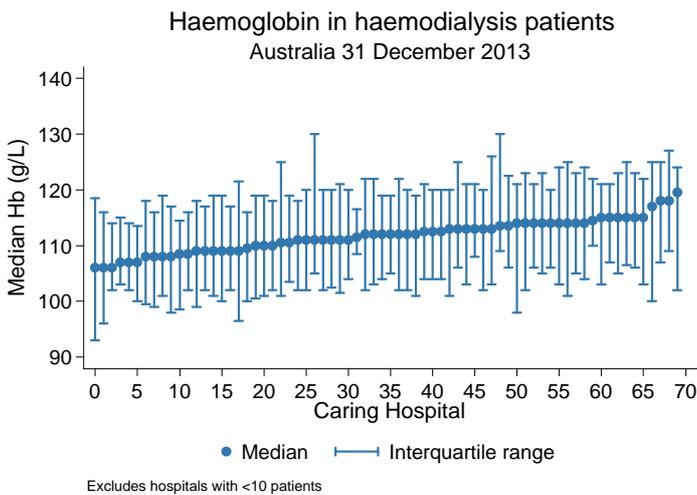


Figure 4.17.2

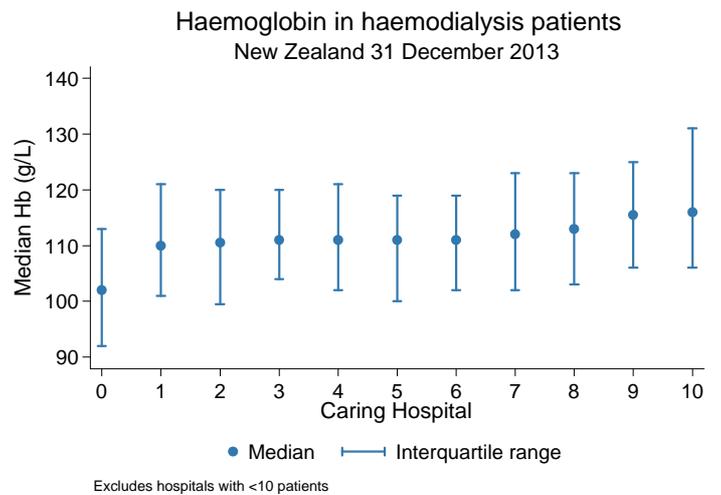


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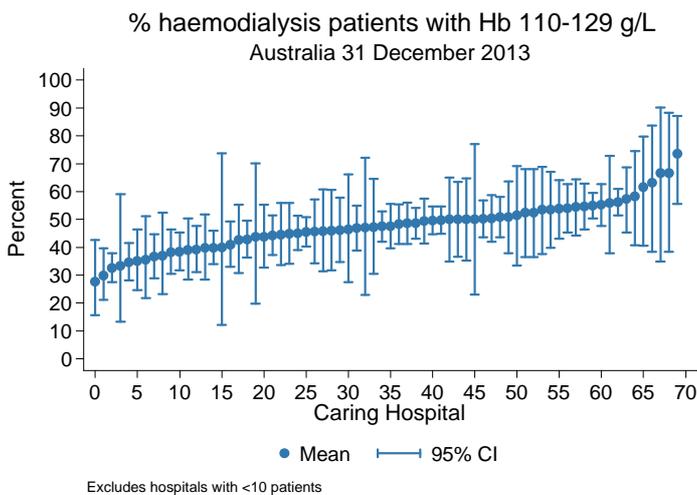


Figure 4.18.2

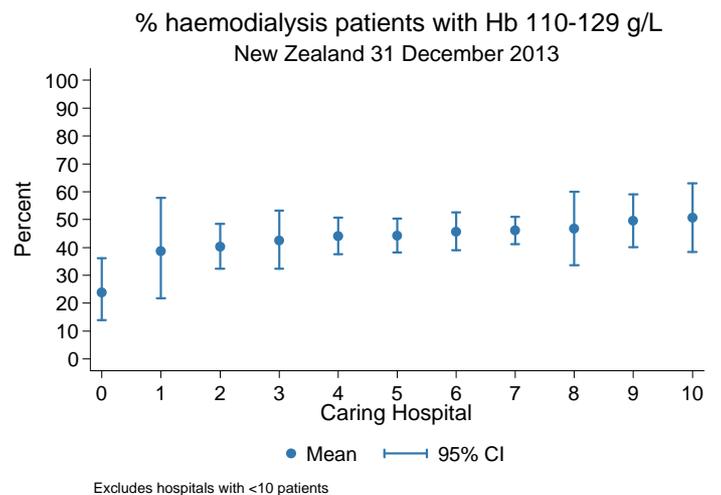


Figure 4.19 shows the distribution of ferritin in HD patients over 2011-13. The proportion of patients with ferritin between 200-500µg/L ranged from 3-75% in Australia and 25-49% in New Zealand (figure 4.20). Figures 4.21-4.22 present equivalent data for transferrin saturation.

Figure 4.19

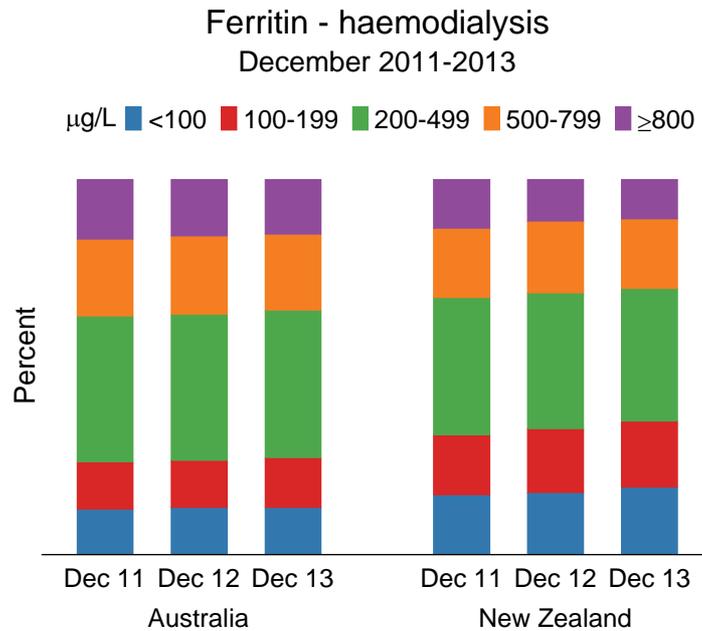


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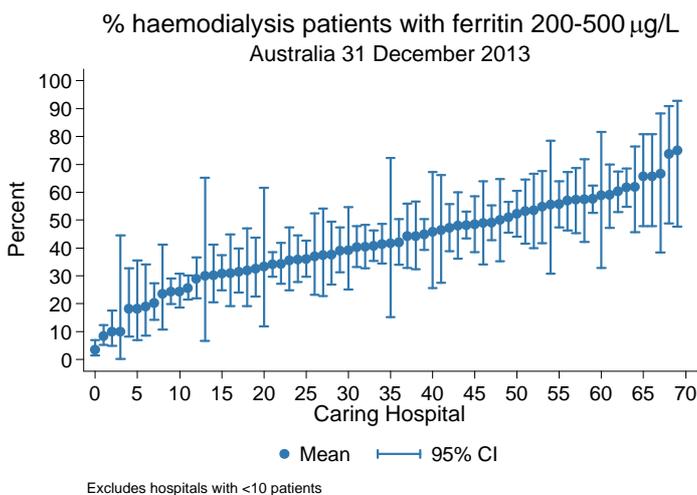


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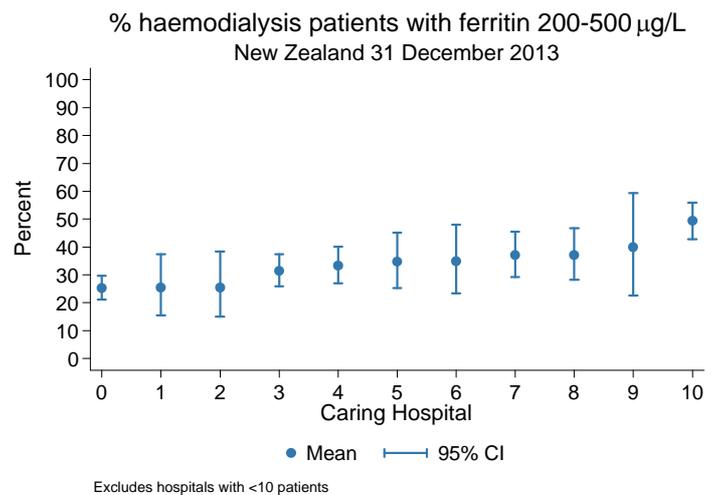


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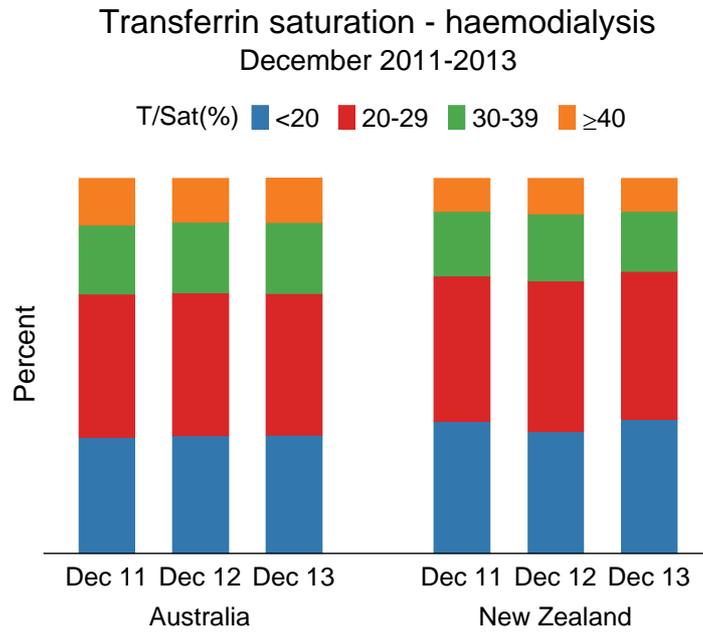


Figure 4.22.1

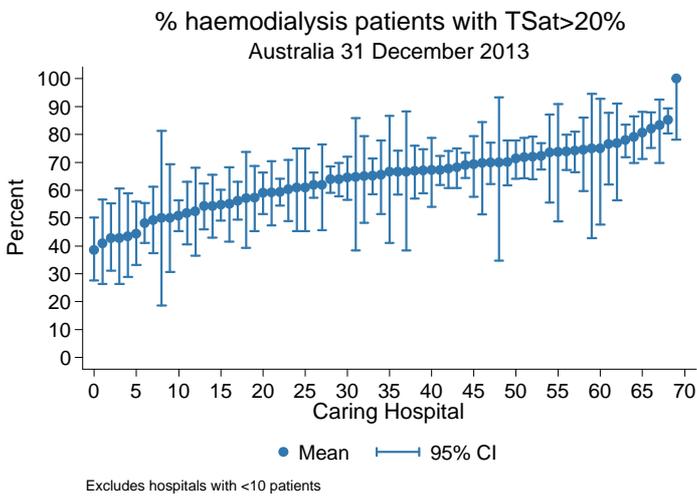
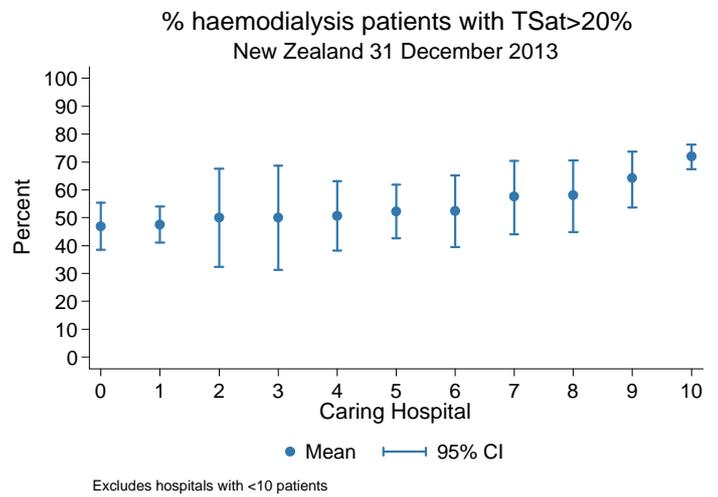
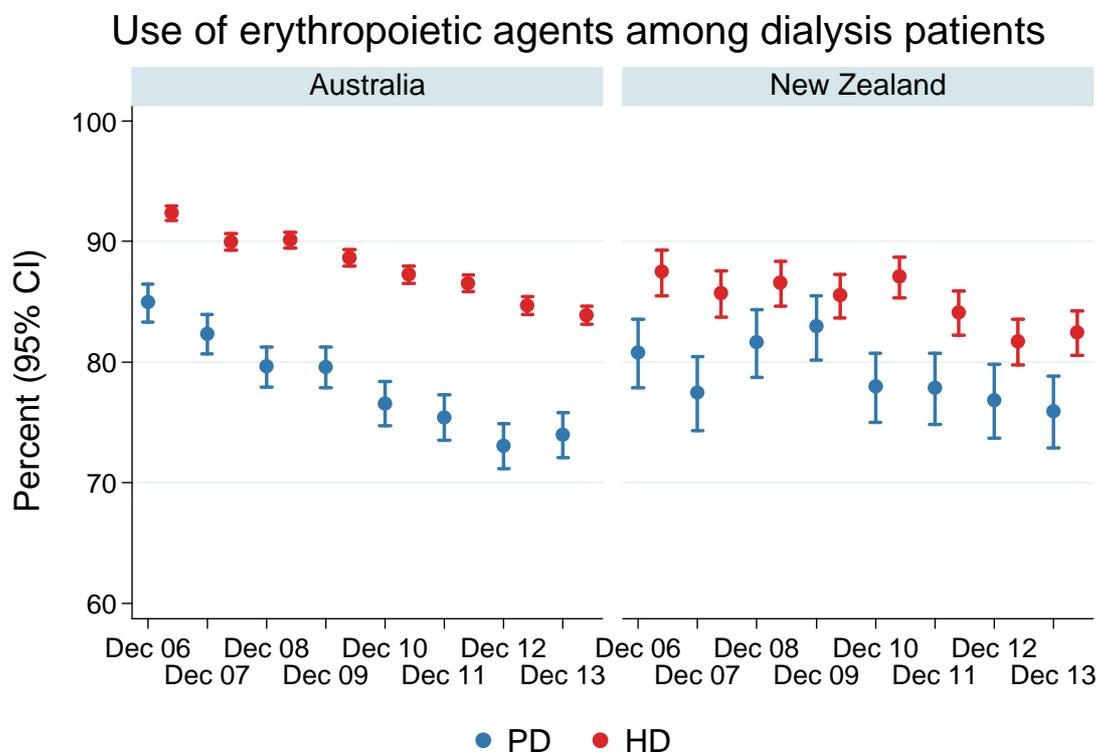


Figure 4.22.2



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

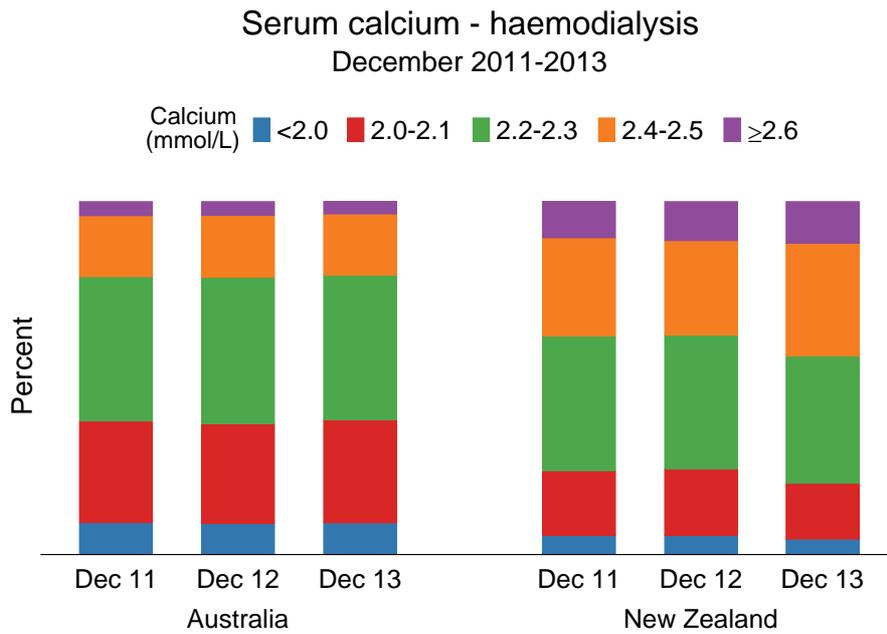


Figure 4.25.1

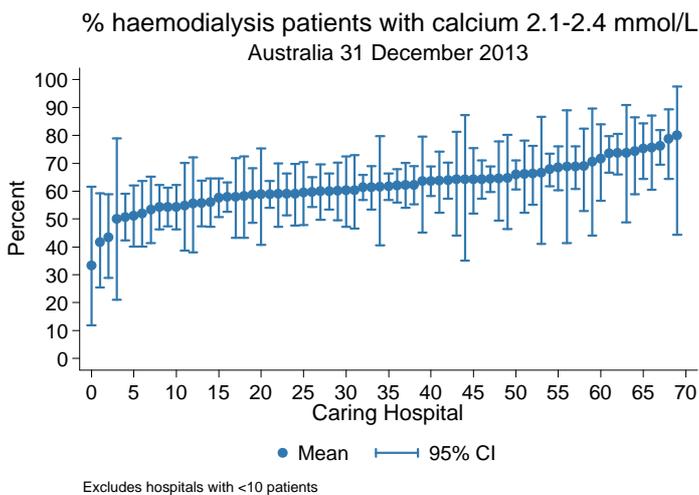


Figure 4.25.2

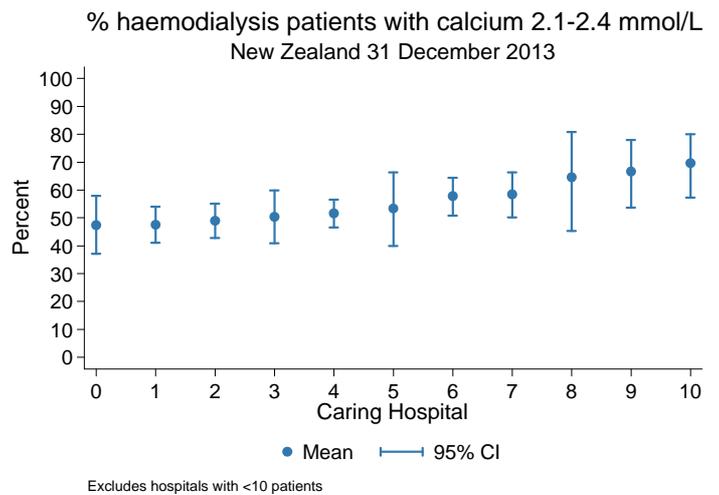


Figure 4.26

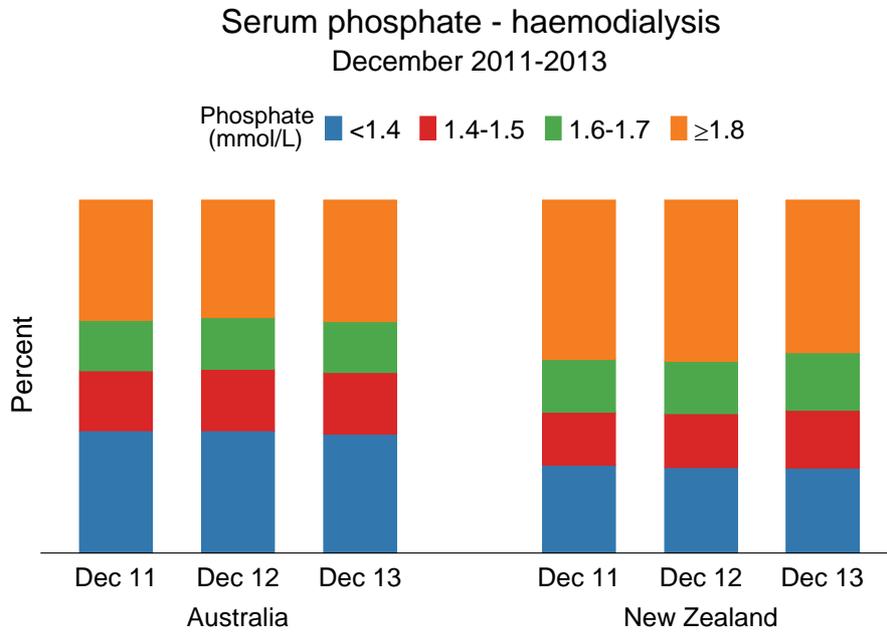


Figure 4.27.1

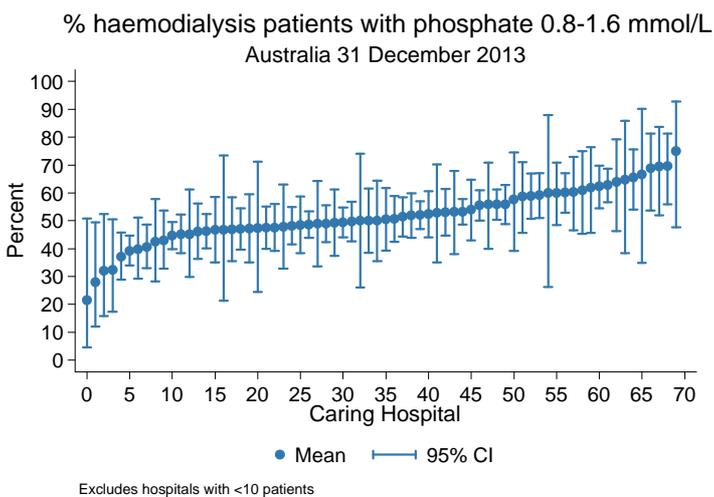


Figure 4.27.2

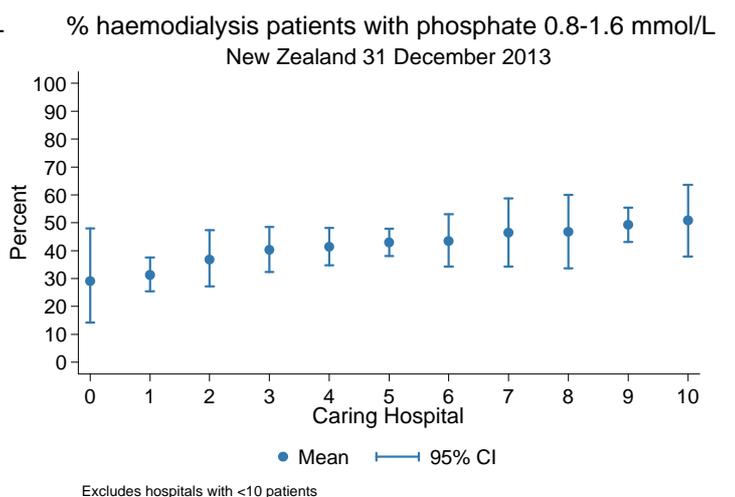


Figure 4.28

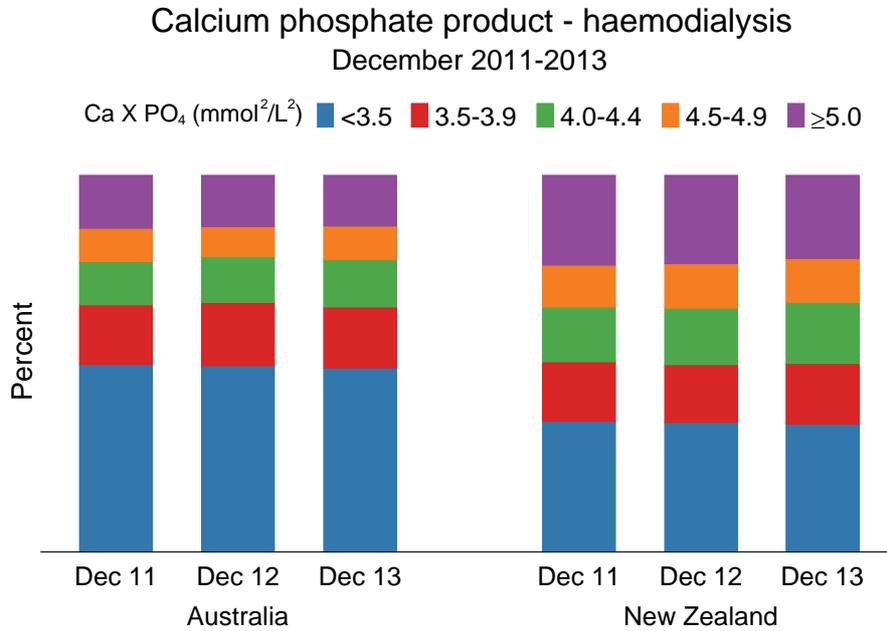


Figure 4.29.1

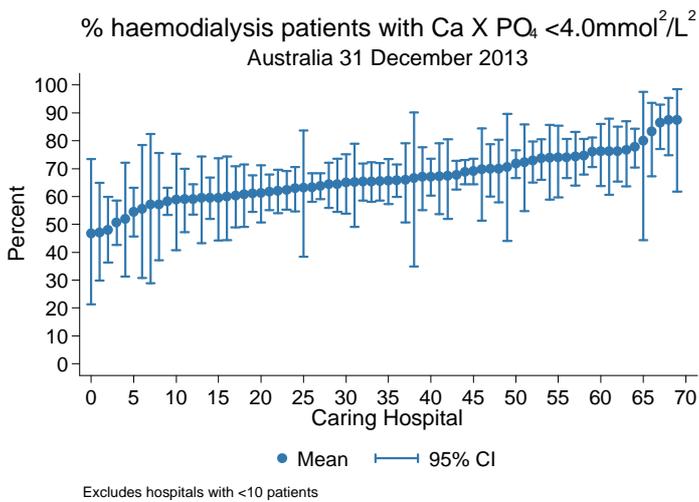
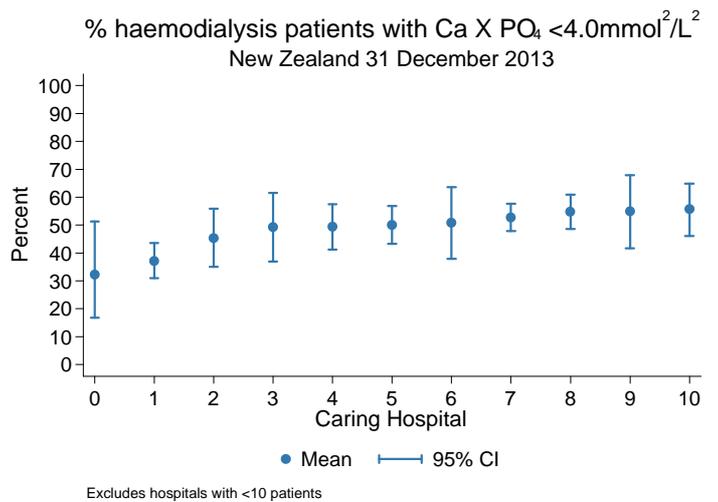


Figure 4.29.2



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 2011-13; there is little change from year to year, and clearances are lower in New Zealand than in Australia. Figure 4.31 presents the 2013 data stratified by vascular access type.

Figure 4.30

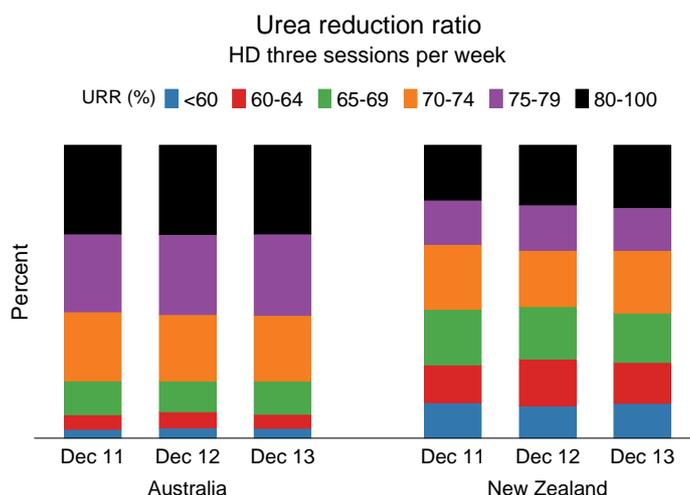


Figure 4.31

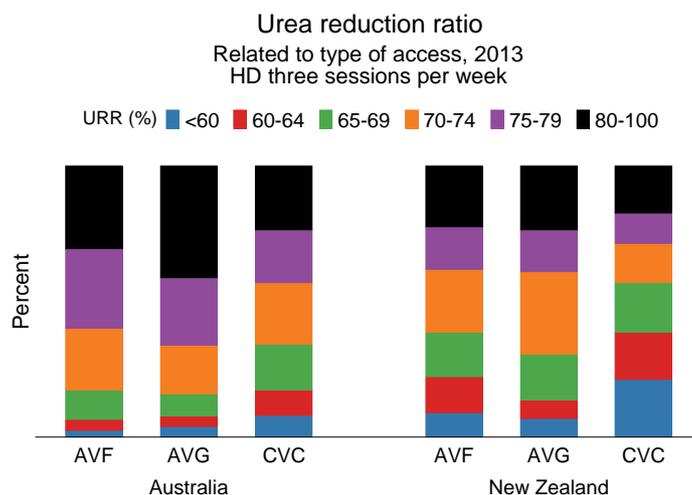


Table 4.11 presents URR by dialysis session duration. In general, as expected, the proportion of patients with a URR $\geq 65\%$ increases with longer session duration.

Table 4.11

**Urea Reduction Ratio - Prevalent Patients
Three Sessions per Week - December 2013**

Country	Hours per Session	Urea Reduction Ratio %		Total
		<65	≥ 65	
Australia	<4 hours	39 (13.7%)	245 (86.3%)	284
	4 hours	261 (9.0%)	2649 (91.0%)	2910
	>4-5 hours	297 (7.2%)	3822 (92.8%)	4119
	>5 hours	28 (9.7%)	261 (90.3%)	289
	Total	625 (8.2%)	6977 (91.8%)	7602
New Zealand	<4 hours	6 (26.1%)	17 (73.9%)	23
	4 hours	118 (29.4%)	283 (70.6%)	401
	>4-5 hours	194 (24.9%)	586 (75.1%)	780
	>5 hours	13 (17.1%)	63 (82.9%)	76
	Total	331 (25.9%)	949 (74.1%)	1280

Figure 4.32 shows the distribution of median URR by treating hospital. In Australia the median ranged from 71-88%, 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 51-100%, and in New Zealand from 42-89%.

Figure 4.32.1

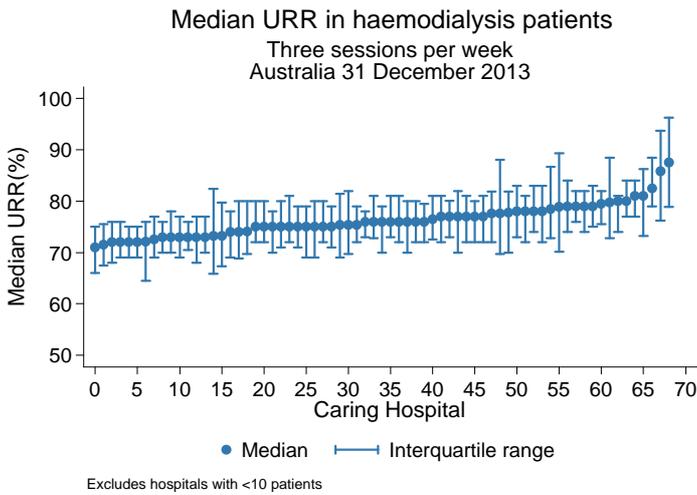


Figure 4.32.2

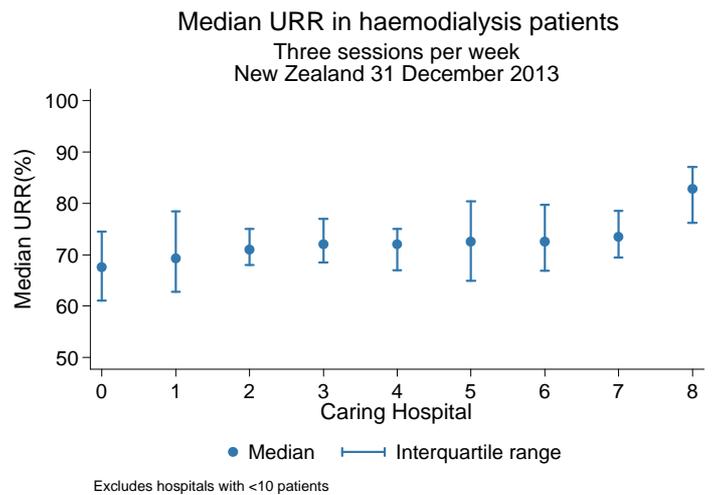


Figure 4.33.1

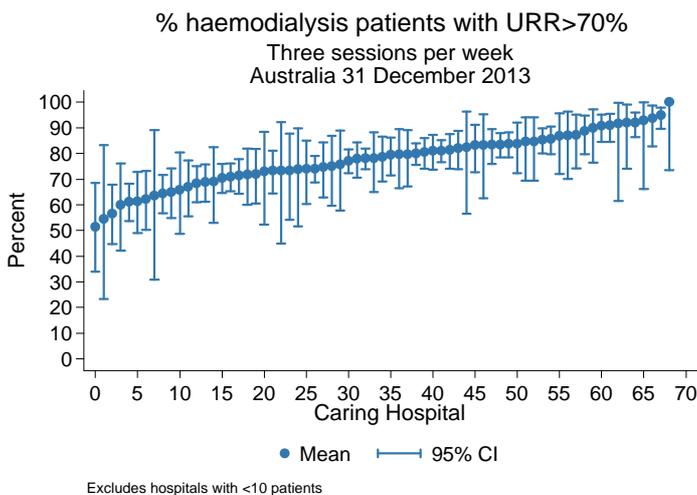
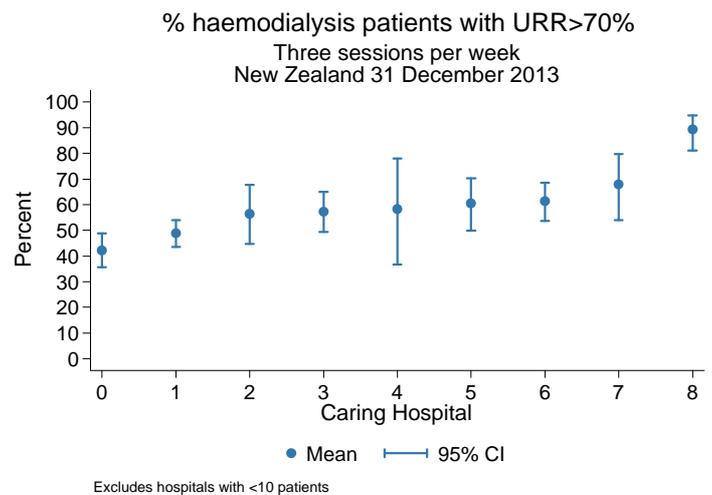


Figure 4.33.2



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

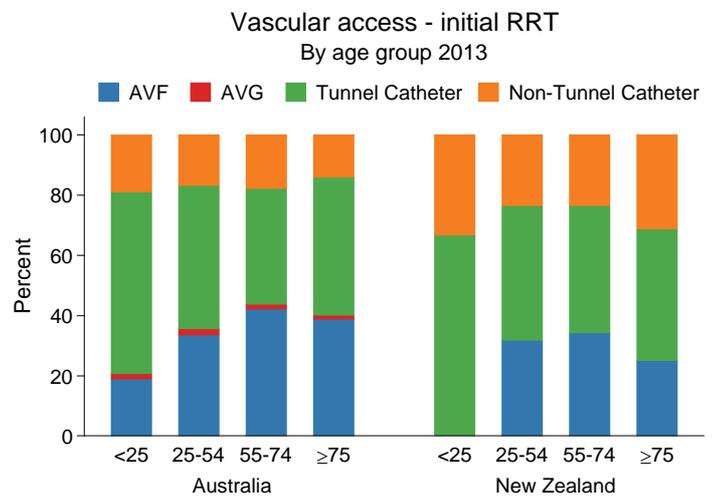
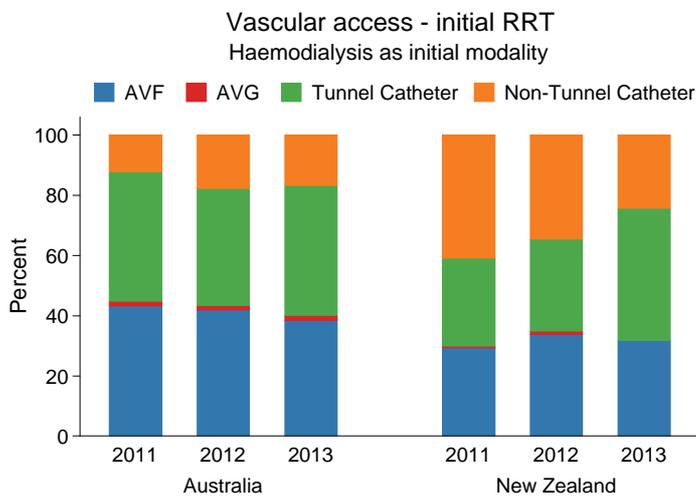


Figure 4.36.1

Figure 4.36.2

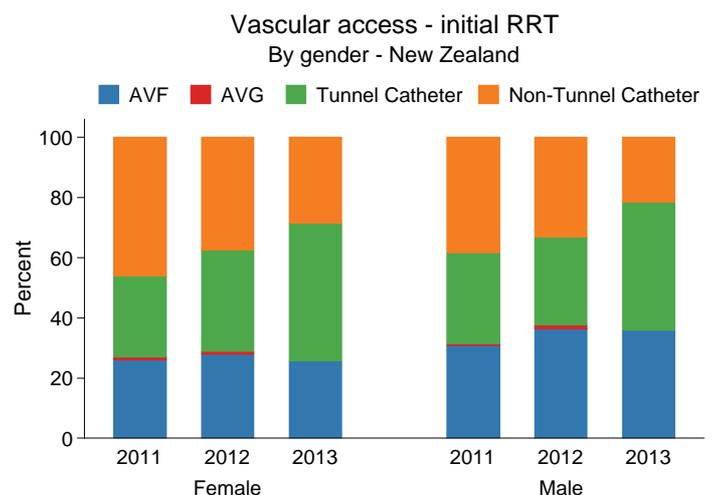
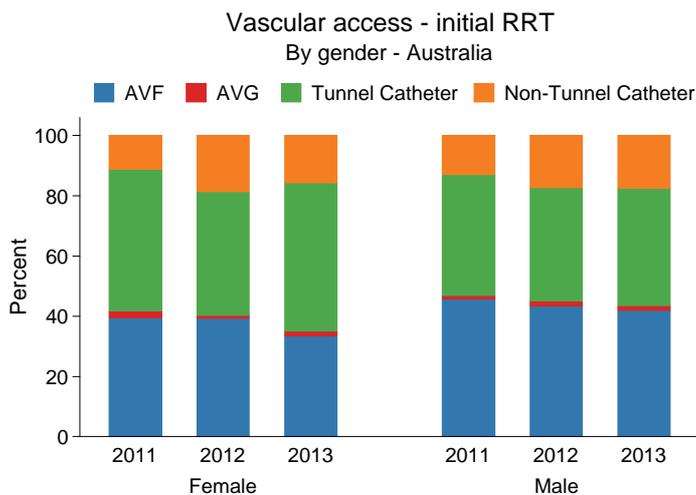


Figure 4.37

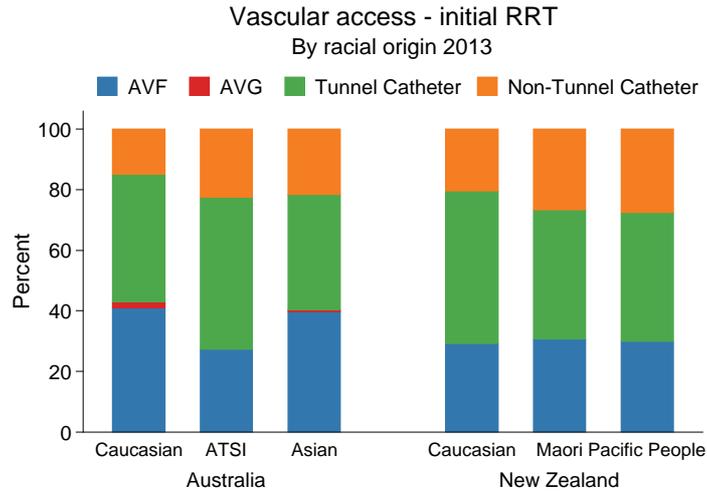


Figure 4.38.1

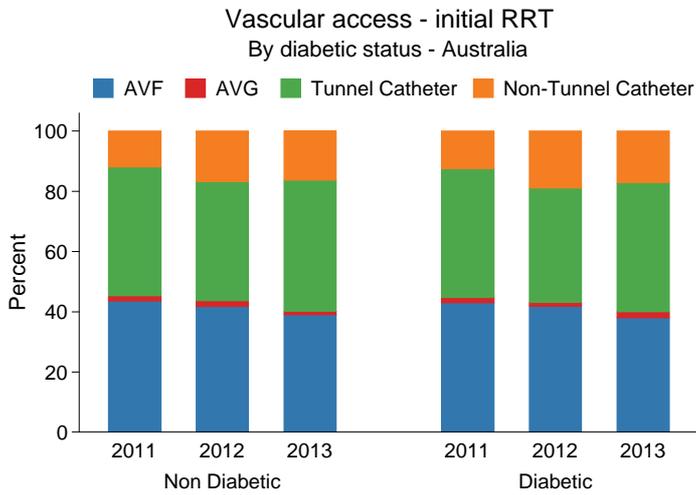


Figure 4.38.2

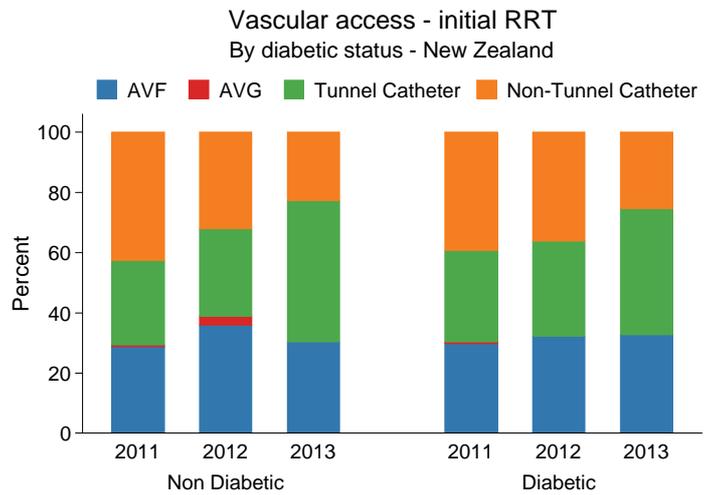


Figure 4.39

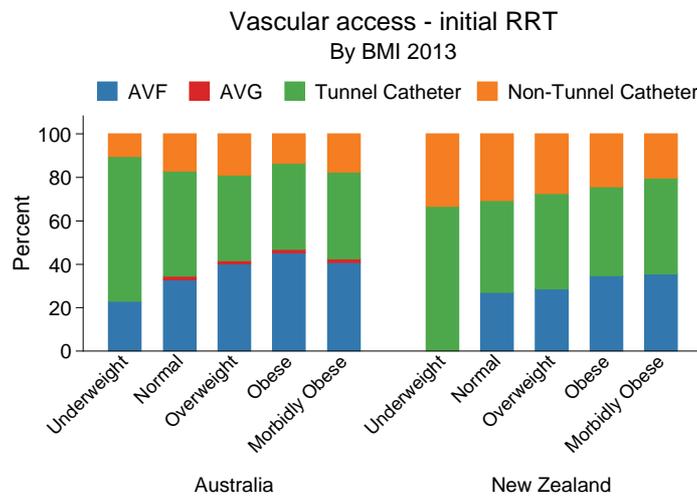


Figure 4.40.1

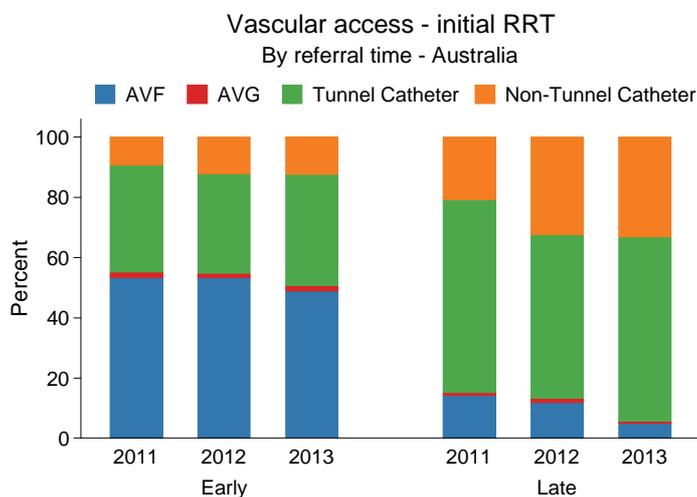


Figure 4.40.2

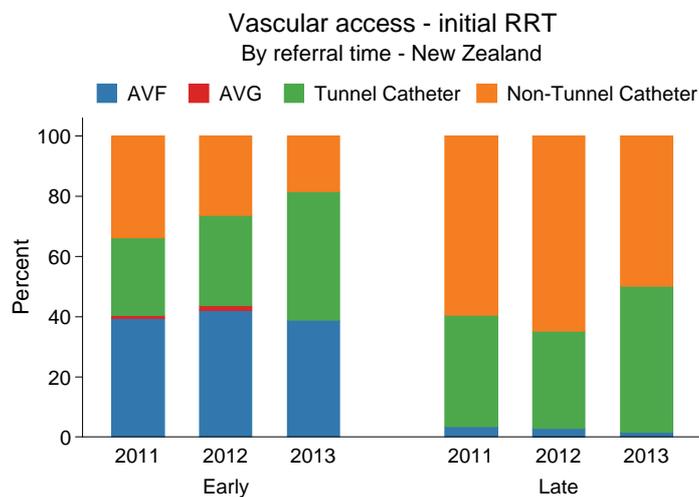


Table 4.12

Incident Vascular Access 2011 - 2013

Initial state	2011		2012		2013	
	AVF/AVG	CVC	AVF/AVG	CVC	AVF/AVG	CVC
QLD	131 (39%)	204 (61%)	143 (45%)	173 (55%)	138 (43%)	186 (57%)
NSW/ACT	232 (39%)	361 (61%)	230 (39%)	362 (61%)	215 (39%)	338 (61%)
VIC	232 (51%)	225 (49%)	210 (49%)	215 (51%)	198 (45%)	239 (55%)
TAS	19 (59%)	13 (41%)	22 (63%)	13 (37%)	13 (46%)	15 (54%)
SA	92 (68%)	43 (32%)	71 (49%)	73 (51%)	47 (38%)	76 (62%)
NT	37 (48%)	40 (52%)	26 (30%)	61 (70%)	20 (27%)	55 (73%)
WA	85 (39%)	132 (61%)	69 (38%)	111 (62%)	66 (33%)	134 (67%)
NZ	95 (30%)	223 (70%)	115 (35%)	215 (65%)	111 (32%)	238 (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 8-64%. The corresponding range in New Zealand was 17-45%. This wide variation reflects differences in practices, protocols, resources and patient case-mix among centres.

Figure 4.41.1

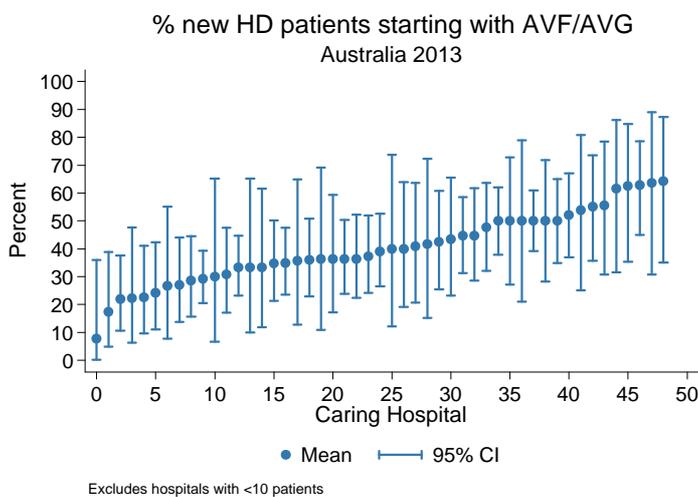
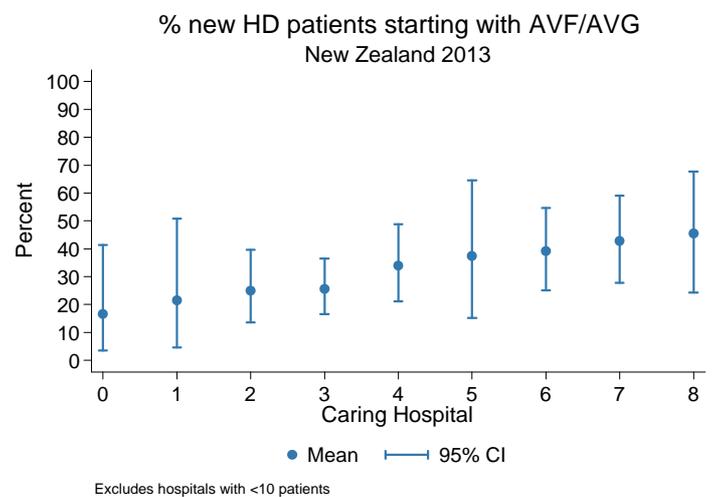


Figure 4.41.2



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 2013).

In both Australia and New Zealand, the proportions of patients dialysing with an AV graft at 31 December are declining, while those dialysing with an AV fistula are stable.

Female patients in both countries, young (age < 25 years) in Australia or 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

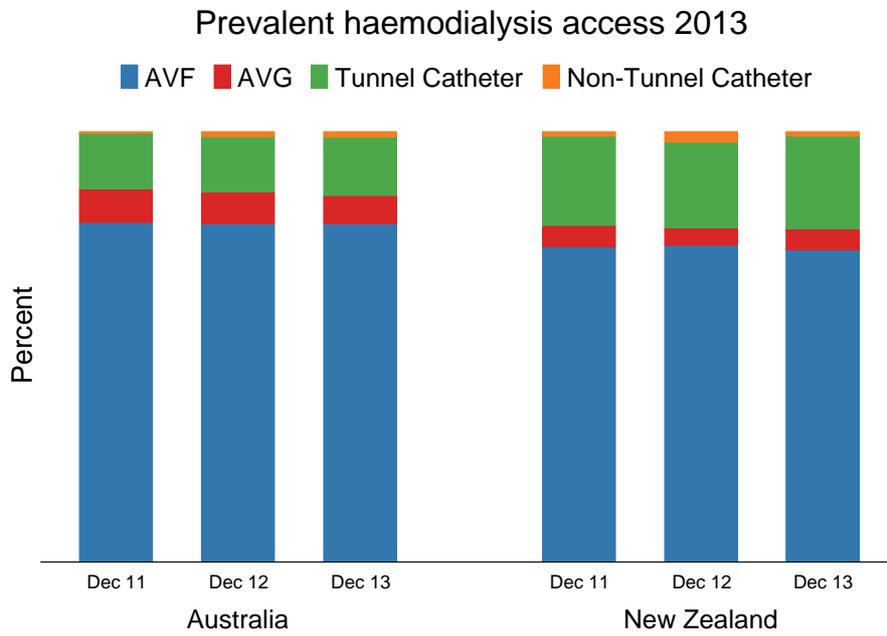


Figure 4.43

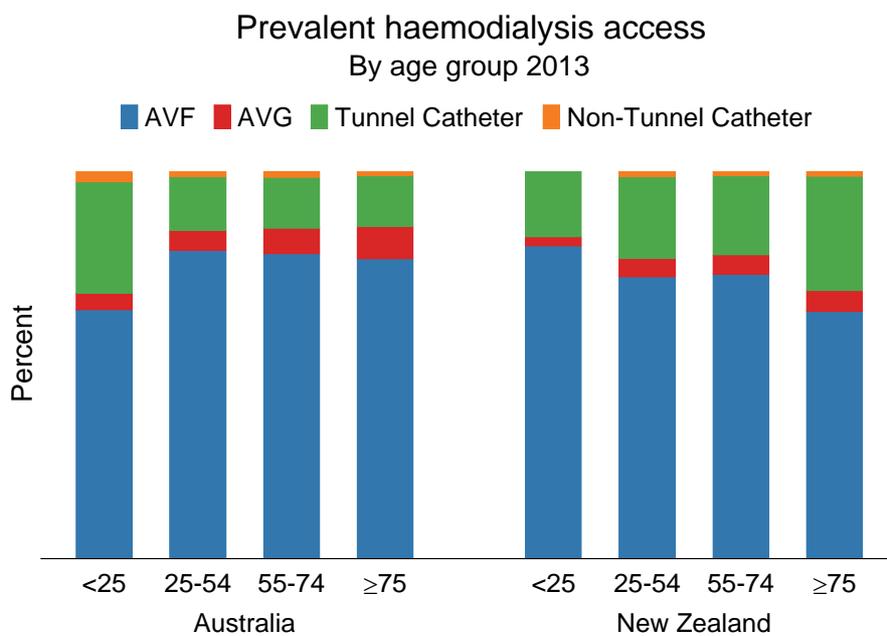


Figure 4.44.1

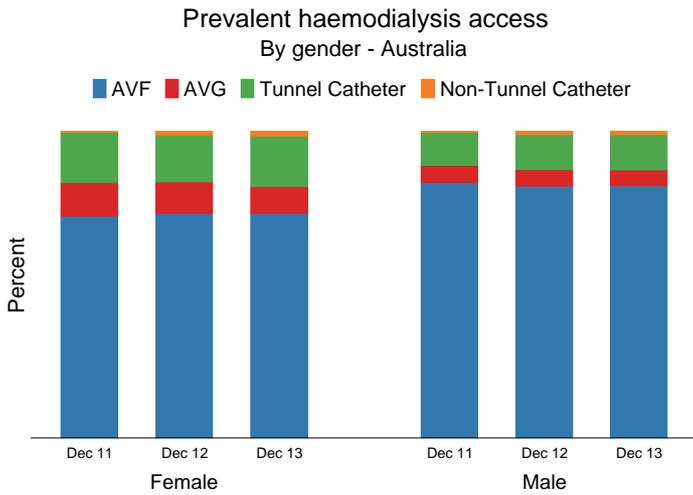


Figure 4.44.2

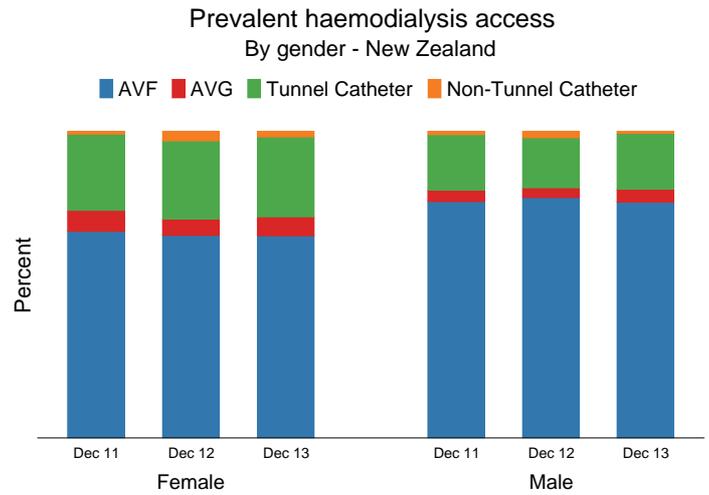


Figure 4.45

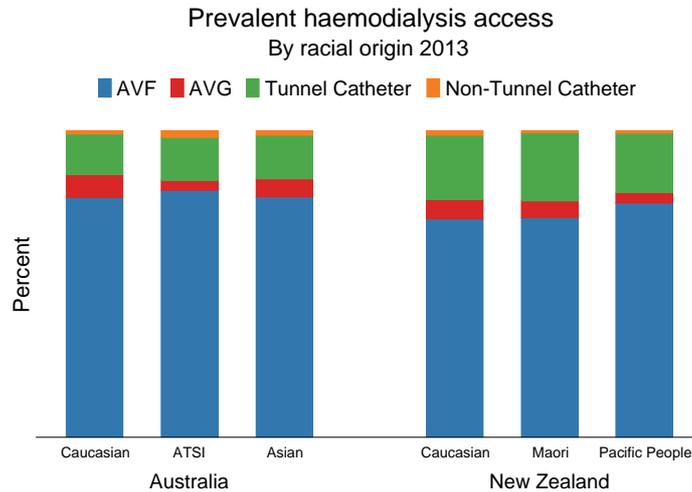


Figure 4.46.1

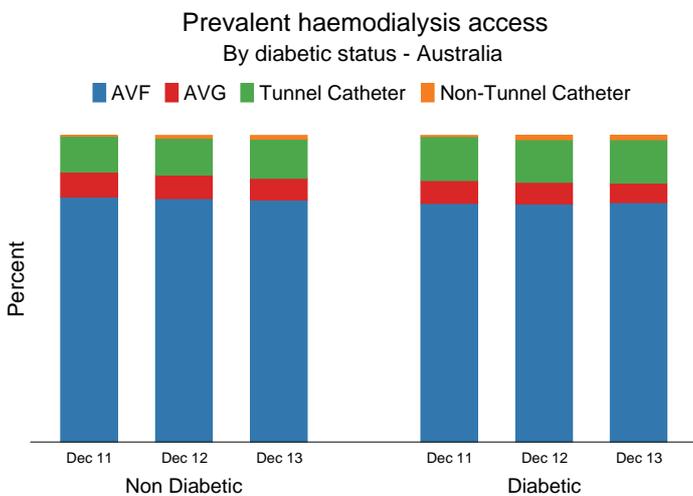


Figure 4.46.2

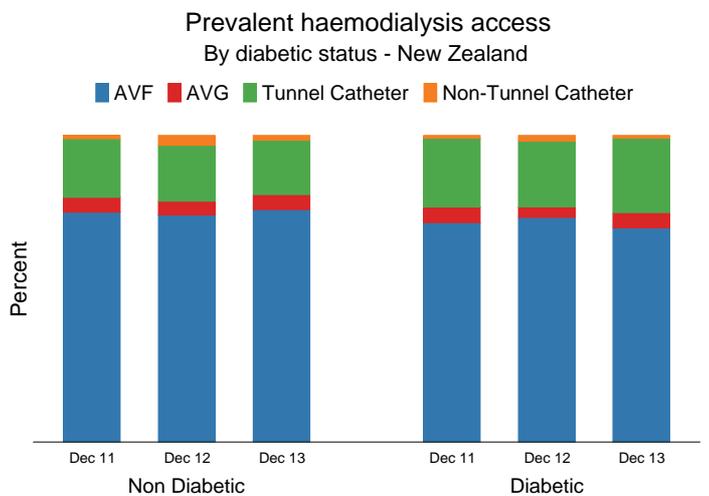


Figure 4.47

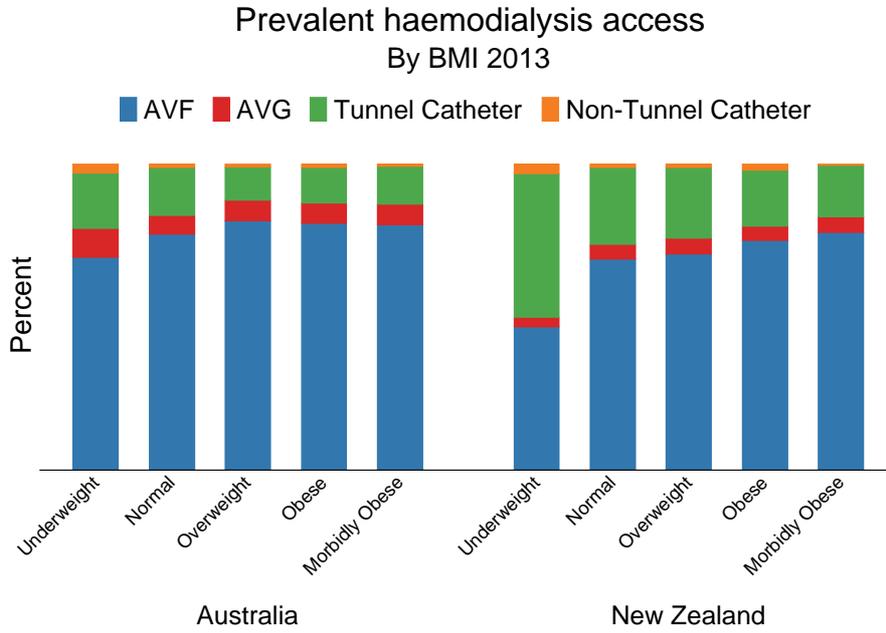


Figure 4.48

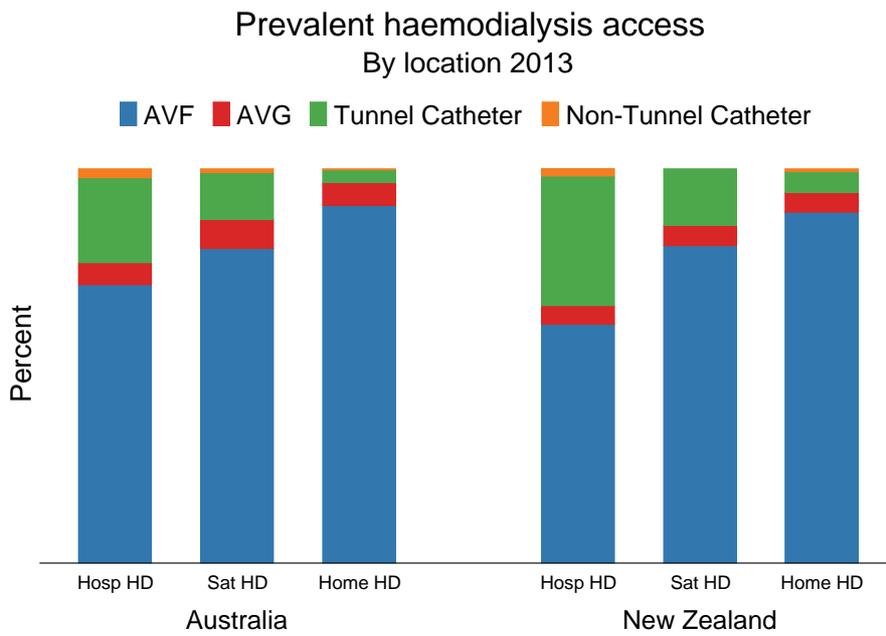


Table 4.13

Prevalent Vascular Access at 31 December

State/Country	2011		2012		2013	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
QLD	1431 (87%)	212 (13%)	1422 (87%)	215 (13%)	1523 (87%)	220 (13%)
NSW/ACT	2498 (86%)	419 (14%)	2509 (85%)	441 (15%)	2546 (83%)	518 (17%)
Vic	2051 (89%)	255 (11%)	2041 (88%)	274 (12%)	2078 (88%)	285 (12%)
Tas	134 (84%)	25 (16%)	153 (84%)	29 (16%)	148 (84%)	28 (16%)
SA	557 (93%)	42 (7%)	545 (92%)	45 (8%)	570 (92%)	49 (8%)
NT	392 (90%)	42 (10%)	393 (86%)	65 (14%)	408 (84%)	79 (16%)
WA	675 (78%)	189 (22%)	658 (77%)	193 (23%)	682 (77%)	199 (23%)
New Zealand	1247 (78%)	347 (22%)	1297 (78%)	374 (22%)	1351 (77%)	394 (23%)

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 69-100%. The corresponding range in New Zealand was 71-93%.

Figure 4.49.1

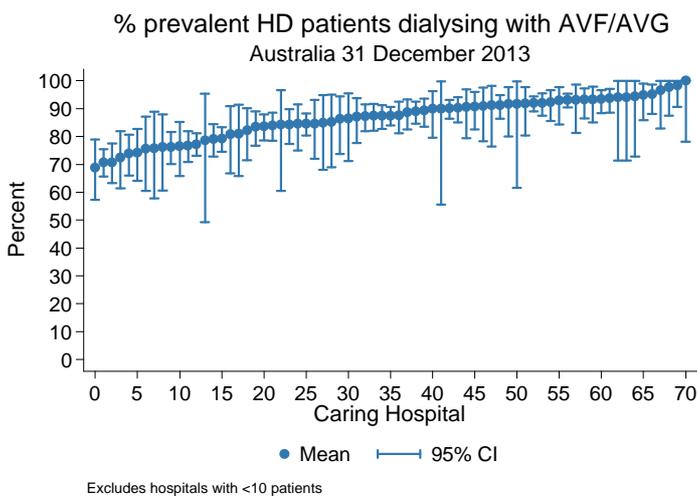
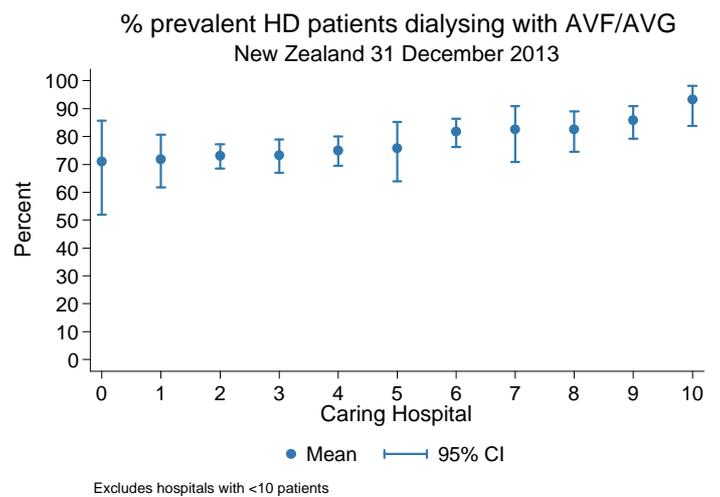


Figure 4.49.2



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 2002 - 2013
% [95% Confidence Interval]**

Country	Years	No. Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	2002-2004	3591	96 [95, 97]	89 [88, 90]	68 [67, 70]	49 [47, 51]
	2005-2007	4501	96 [95, 96]	90 [89, 91]	69 [67, 70]	51 [50, 53]
	2008-2010	4726	96 [95, 97]	91 [90, 91]	70 [69, 72]	53 [51, 55]
	2011-2013	4538	96 [96, 97]	91 [90, 92]	-	-
New Zealand	2002-2004	658	97 [95, 98]	91 [88, 93]	73 [69, 77]	53 [49, 58]
	2005-2007	724	97 [95, 98]	92 [89, 94]	70 [66, 73]	51 [46, 55]
	2008-2010	822	96 [95, 97]	92 [90, 94]	73 [69, 76]	56 [51, 60]
	2011-2013	750	97 [95, 98]	92 [90, 94]	-	-

Figure 4.50.1

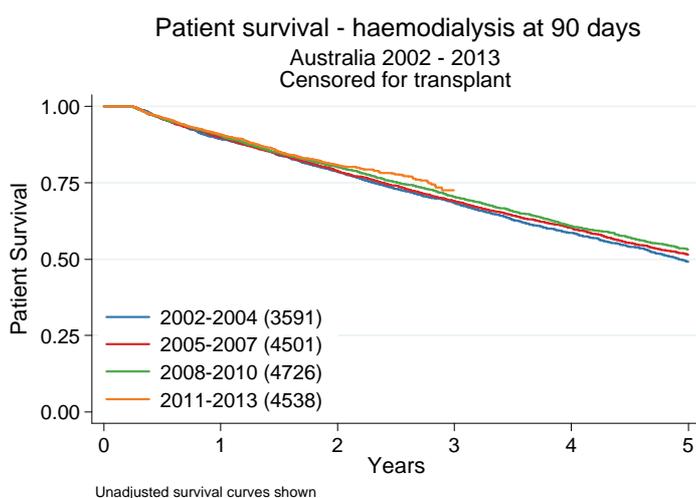


Figure 4.50.2

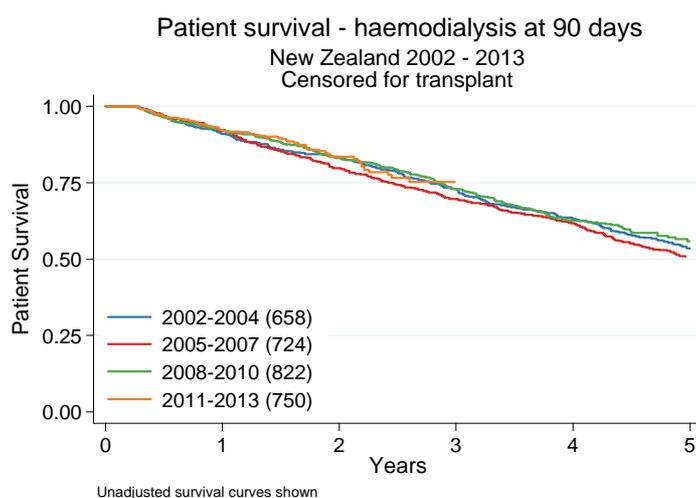


Table 4.15

**Patient Survival - By Age Group - Haemodialysis at 90 Days
Censored for Transplant 2002 - 2013
% [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 [77, 83]
	40-59 years	5504	98 [97, 98]	94 [93, 95]	81 [80, 83]	68 [66, 70]
	60-74 years	6257	95 [95, 96]	89 [88, 90]	68 [66, 69]	49 [48, 51]
	≥75 years	3888	93 [93, 94]	84 [83, 85]	54 [52, 55]	30 [28, 32]
New Zealand	<40 years	393	100 [98, 100]	98 [95, 99]	84 [78, 88]	76 [69, 82]
	40-59 years	1274	97 [96, 98]	95 [93, 96]	80 [77, 83]	63 [59, 66]
	60-74 years	1030	96 [94, 97]	89 [87, 91]	66 [62, 69]	43 [39, 47]
	≥75 years	257	95 [91, 97]	83 [77, 87]	47 [39, 54]	24 [17, 32]

Figure 4.51.1

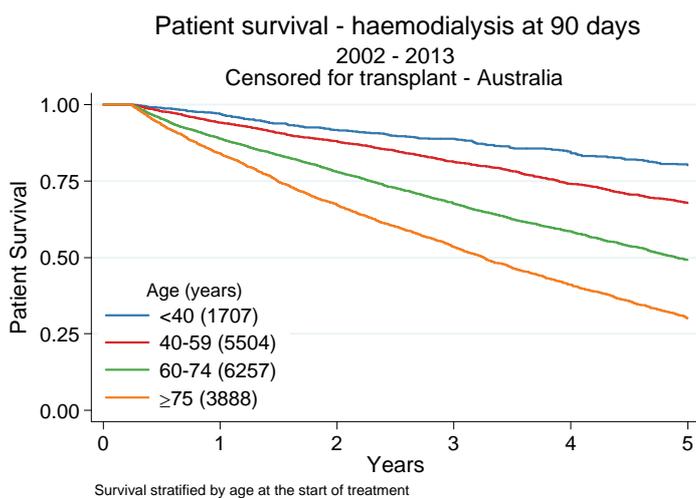


Figure 4.51.2

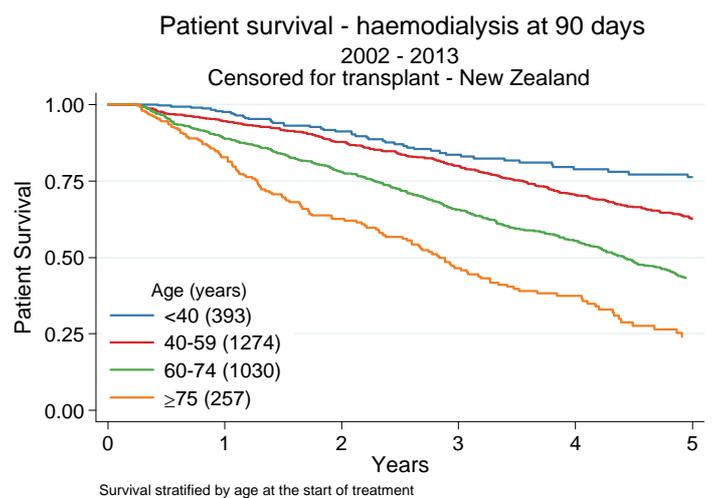


Table 4.16

**Patient Survival - Diabetic / Non Diabetic - Haemodialysis at 90 Days
Censored for Transplant 2002 - 2013
% [95% Confidence Interval]**

Country	Diabetes	No. Patients	Survival			
			6 months	1 year	3 years	5 years
Australia	Non diabetic	11335	96 [95, 96]	90 [89, 90]	70 [69, 71]	53 [51, 54]
	Diabetic	6021	97 [96, 97]	91 [90, 91]	69 [67, 70]	50 [48, 51]
New Zealand	Non diabetic	1503	96 [95, 97]	92 [91, 94]	75 [72, 77]	57 [54, 61]
	Diabetic	1451	97 [96, 98]	92 [90, 93]	70 [67, 72]	50 [46, 53]

Figure 4.52.1

Figure 4.52.2

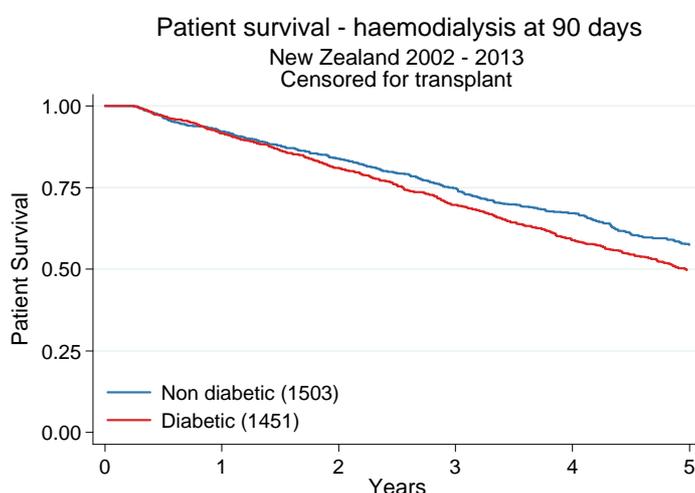
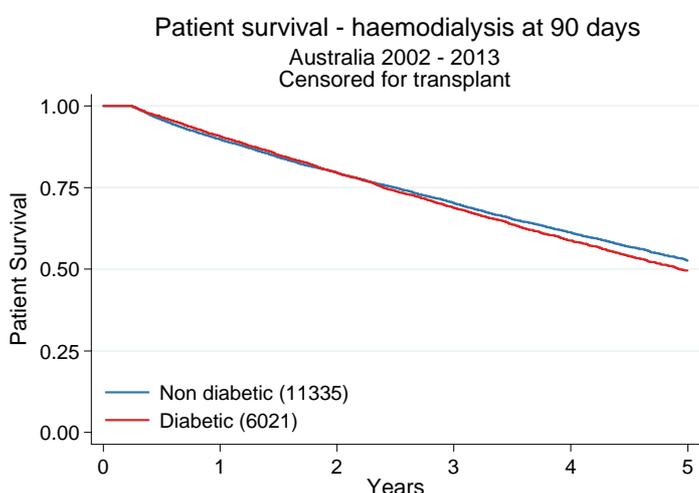
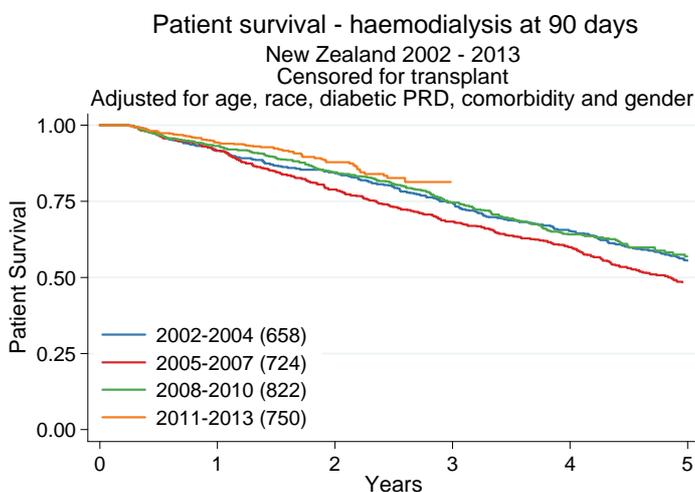
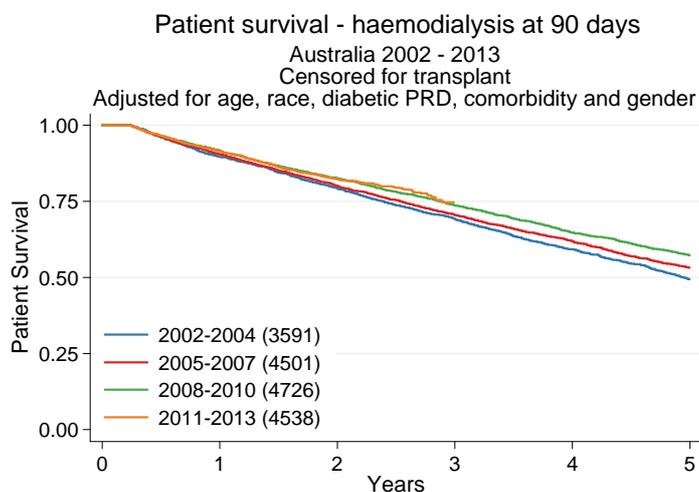


Figure 4.53 presents survival curves by era, adjusted for a number of demographic and clinical characteristics. After adjustment for these confounders, survival appears to be improving slightly with time.

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

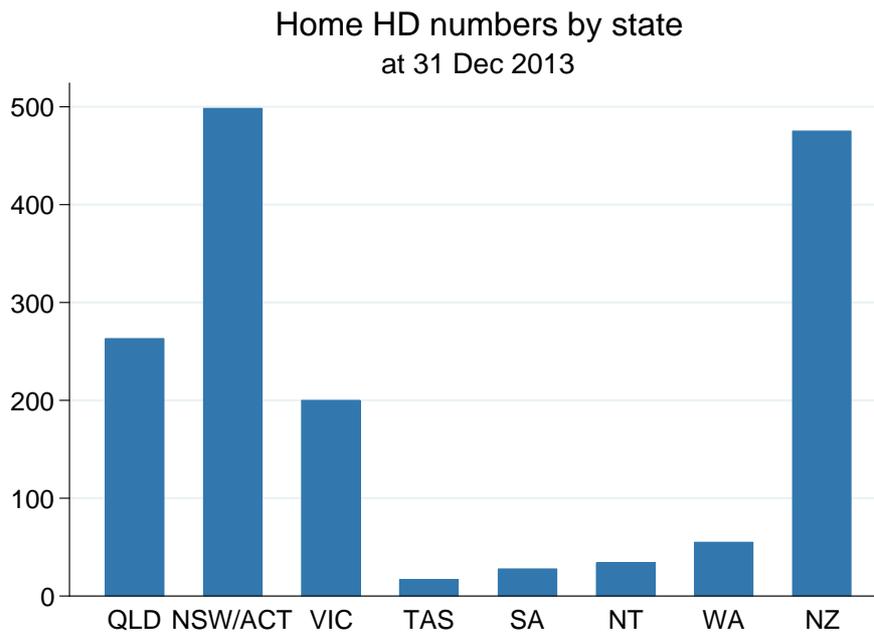


Figure 4.55

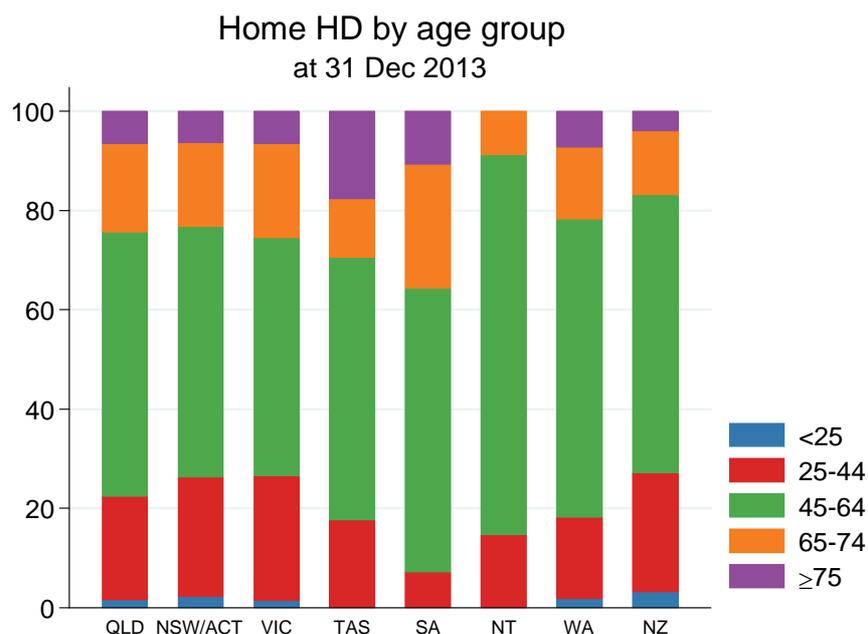


Table 4.17

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

Country/State	2009	2010	2011	2012	2013
Australia	254 (4.3%)	275 (4.5%)	298 (4.7%)	354 (5.4%)	341 (5.0%)
QLD	37 (4.0%)	41 (4.2%)	47 (4.9%)	62 (6.3%)	64 (6.2%)
NSW/ACT	100 (5.3%)	101 (5.2%)	107 (5.3%)	118 (5.6%)	116 (5.3%)
VIC	43 (3.3%)	47 (3.4%)	47 (3.2%)	55 (3.6%)	51 (3.2%)
TAS	2 (2.4%)	4 (4.3%)	4 (4.0%)	6 (5.4%)	5 (4.6%)
SA	0 (0.0%)	3 (0.8%)	4 (1.0%)	11 (2.7%)	10 (2.3%)
NT	1 (2.3%)	1 (1.9%)	2 (3.4%)	3 (4.5%)	3 (4.1%)
WA	5 (1.1%)	8 (1.7%)	9 (1.8%)	13 (2.6%)	12 (2.3%)
New Zealand	66 (8.6%)	70 (8.5%)	78 (9.5%)	86 (10.1%)	80 (9.0%)

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

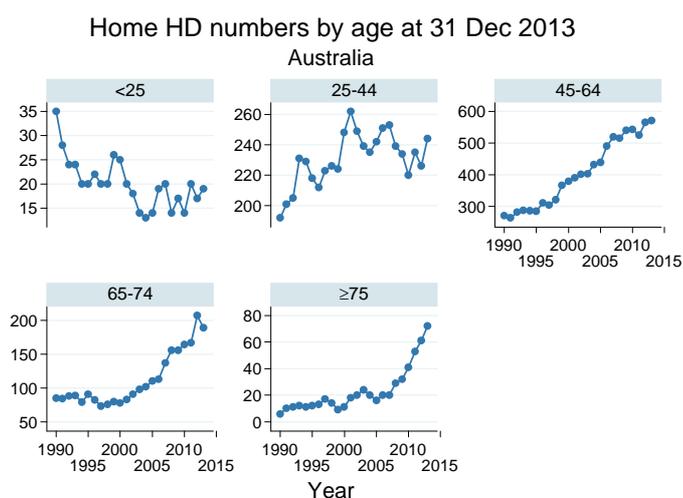
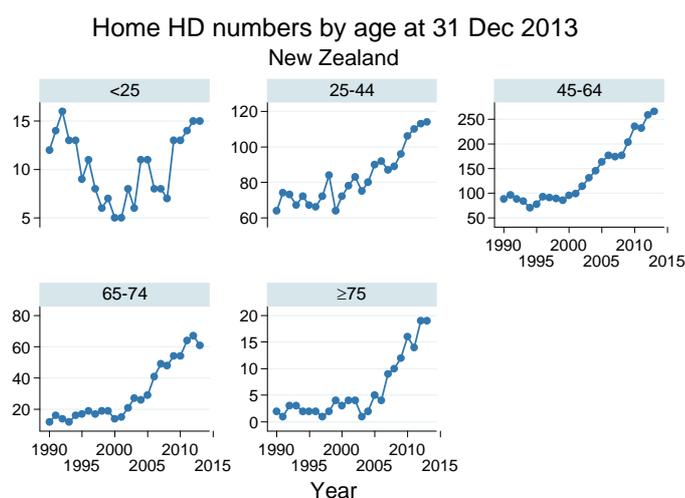


Figure 4.56.2



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 2013. When death of 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

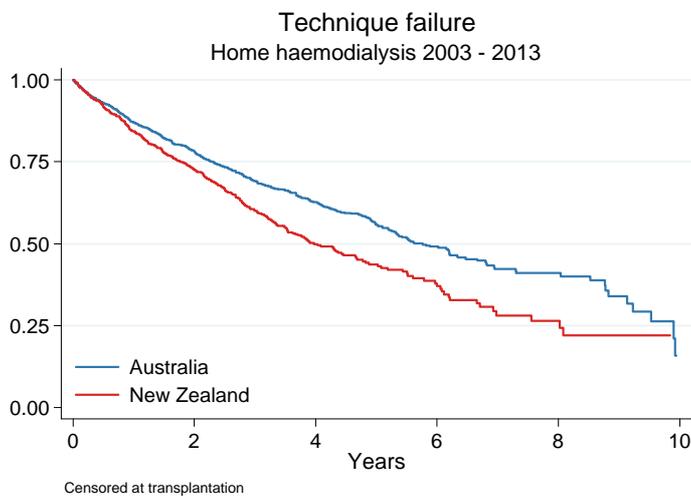


Figure 4.58

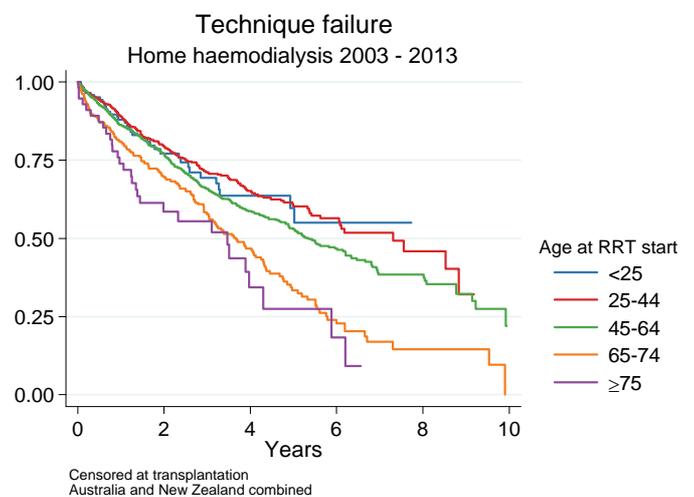


Figure 4.59.1

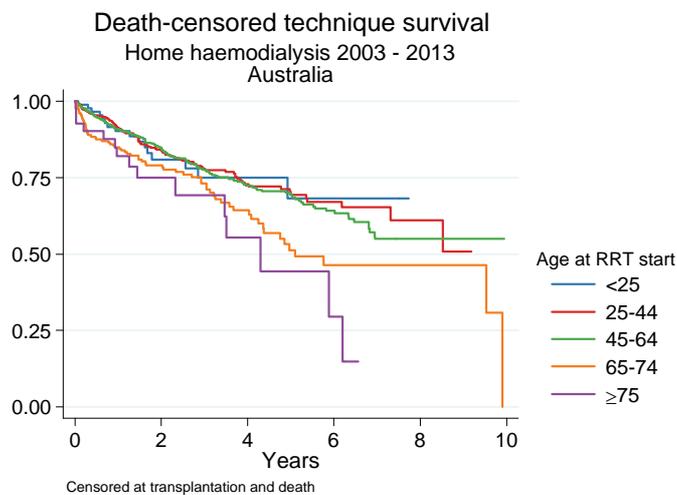
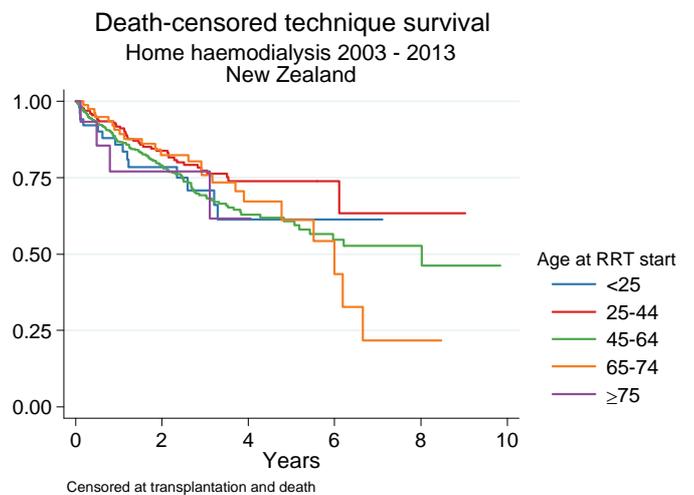


Figure 4.59.2



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C-\ Royal Adelaide Hospital
East Wing 9th Floor
North Terrace, Adelaide
South Australia
Australia

www.anzdata.org.au

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