CHAPTER 5

HAEMODIALYSIS

(including Home Haemodialysis)

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2013 Annual Report - 36th Edition

Stock and Flow

Australia

The annual stock and flow of HD patients during the period 2008-2012 is shown in Figures 5.1, 5.2 and 5.3.

There were 9,219 patients receiving HD treatment at 31st December 2012, an increase of 3%; of these 28% were hospital based, 61% were in satellite centres and 11% at home. Home haemodialysis data are presented in detail from page 5.36.

A total of 1,788 patients received HD for the first time during the year, a slight decrease from the previous year.

The proportion of all HD patients in each age group is shown in Figure 5.7. There were 2,484 people ≥ 75 years receiving haemodialysis, including 447 people ≥ 85 years, a rise of 7% from 2011, following a 7% rise for the previous year.

There were 539 transplant operations to people receiving HD treatment, 6% of all HD patients dialysing and 8% of those patients < 65 years.

There were 1,214 deaths in 2012.

Figure 5.1

Stock and Flow of Haemodialysis Patients 2008 - 2012

	2008	2009	2010	2011	2012
Australia					
Patients new to HD	2155	2078	2042	2184	2130
First dialysis treatment	1794	1725	1728	1848	1788
Previous dialysis (PD)	321	314	279	302	299
Failed transplant	40	39	35	34	43
Transplanted	534	495	546	521	539
Deaths	1197	1220	1151	1242	1214
Never transplanted	1134	1144	1083	1167	1138
Previous transplant	63	76	68	75	76
Transfer to PD	480	428	373	406	418
Patients dialysing at 31 December	7928	8263	8613	8961	9219
Patients dialysis at home at 31 December	952	978	981	993	1048
% of all home dialysis (HD and PD) patients	30%	31%	32%	32%	32%
New Zealand					
Patients new to HD	394	429	402	411	410
First dialysis treatment	320	360	336	319	331
Previous dialysis (PD)	66	59	59	82	70
Failed transplant	8	10	7	10	9
Transplanted	69	61	50	65	45
Deaths	236	208	203	232	223
Never transplanted	219	195	180	222	216
Previous transplant	17	13	23	10	7
Transfer to PD	161	118	166	144	127
Patients dialysing at 31 December	1343	1481	1556	1597	1697
Patients dialysis at home at 31 December	331	378	425	432	469
% of all home dialysis (HD and PD) patients	30%	32%	34%	35%	38%

New Zealand

The annual stock and flow of HD patients during the period 2008-2012 is shown in Figures 5.1, 5.4 and 5.5.

There were 1,697 patients receiving treatment at 31st December 2012, a continuation of the trend from previous years.

Hospital based HD (49%), satellite HD (23%) and home HD (27%) proportions reflect increases in uptake of hospital based treatments and a decrease in satellite HD patients. Home HD remains unchanged.

New Zealand data are continued on page 4-5.

Figure 5.2

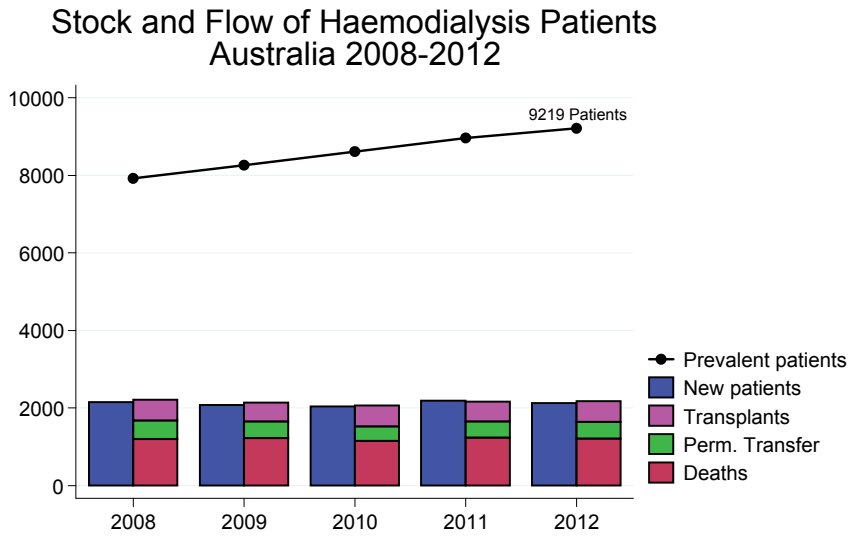


Figure 5.3

Stock and Flow of Haemodialysis Patients
Australia 2008 - 2012 Number (%)

Age Groups	2008	2009	2010	2011	2012
New Patients *					
00-14 years	13 (1%)	9 (0%)	14 (1%)	15 (1%)	20 (1%)
15-24 years	42 (2%)	45 (2%)	44 (2%)	46 (2%)	44 (2%)
25-34 years	101 (5%)	88 (4%)	76 (4%)	82 (4%)	109 (5%)
35-44 years	173 (8%)	179 (9%)	173 (8%)	198 (9%)	170 (8%)
45-54 years	345 (16%)	313 (15%)	315 (15%)	328 (15%)	359 (17%)
55-64 years	451 (21%)	451 (22%)	443 (22%)	490 (22%)	484 (23%)
65-74 years	541 (25%)	519 (25%)	485 (24%)	533 (24%)	492 (23%)
75-84 years	432 (20%)	416 (20%)	408 (20%)	429 (20%)	388 (18%)
>=85 years	57 (3%)	58 (3%)	84 (4%)	63 (3%)	64 (3%)
Total	**2155 (17%)**	**2078 (16%)**	**2042 (16%)**	**2184 (17%)**	**2130 (17%)**
Patients Dialysing					
00-14 years	10 (0%)	9 (0%)	10 (0%)	10 (0%)	11 (0%)
15-24 years	88 (1%)	91 (1%)	100 (1%)	112 (1%)	112 (1%)
25-34 years	290 (4%)	292 (4%)	289 (3%)	283 (3%)	295 (3%)
35-44 years	693 (9%)	696 (8%)	697 (8%)	733 (8%)	723 (8%)
45-54 years	1275 (16%)	1315 (16%)	1314 (15%)	1336 (15%)	1352 (15%)
55-64 years	1725 (22%)	1790 (22%)	1871 (22%)	1945 (22%)	2014 (22%)
65-74 years	1896 (24%)	1989 (24%)	2072 (24%)	2141 (24%)	2228 (24%)
75-84 years	1684 (21%)	1771 (21%)	1869 (22%)	1982 (22%)	2037 (22%)
>=85 years	267 (3%)	310 (4%)	391 (5%)	419 (5%)	447 (5%)
Total	**7928 (16%)**	**8263 (16%)**	**8613 (17%)**	**8961 (18%)**	**9219 (18%)**
Primary Renal Disease *					
Glomerulonephritis	464 (22%)	508 (24%)	427 (21%)	477 (22%)	400 (19%)
Analgesic Nephropathy	46 (2%)	41 (2%)	38 (2%)	27 (1%)	30 (1%)
Hypertension	316 (15%)	280 (13%)	268 (13%)	316 (14%)	224 (11%)
Polycystic Disease	125 (6%)	123 (6%)	136 (7%)	125 (6%)	104 (5%)
Reflux Nephropathy	59 (3%)	61 (3%)	43 (2%)	51 (2%)	54 (3%)
Diabetic Nephropathy	750 (35%)	687 (33%)	742 (36%)	796 (36%)	809 (38%)
Miscellaneous	238 (11%)	245 (12%)	274 (13%)	276 (13%)	390 (18%)
Uncertain	157 (7%)	133 (6%)	114 (6%)	116 (5%)	119 (6%)
Total	**2155 (17%)**	**2078 (16%)**	**2042 (16%)**	**2184 (17%)**	**2130 (17%)**

* New patients receiving first haemodialysis treatment

Figure 5.4

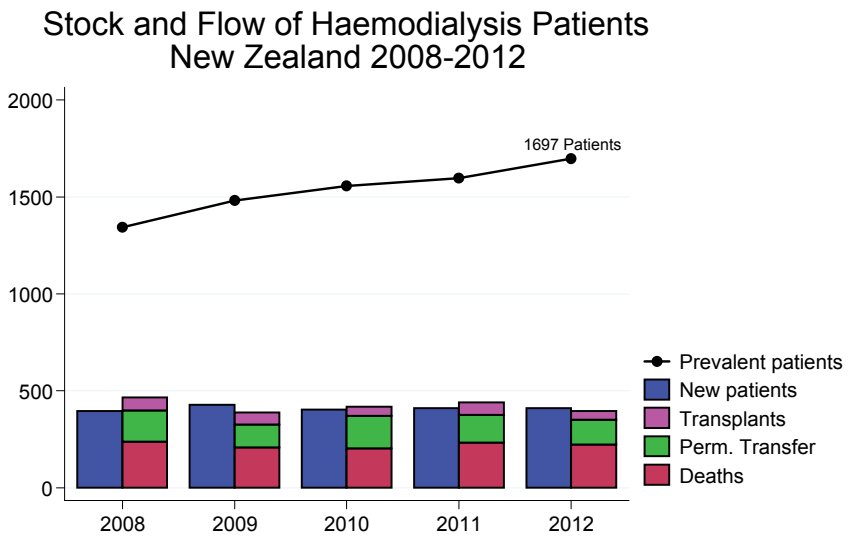


Figure 5.5

Stock and Flow of Haemodialysis Patients
New Zealand 2008 - 2012 Number (%)

Age Groups	2008	2009	2010	2011	2012
New Patients *					
00-14 years	5 (1%)	2 (0%)	1 (0%)	1 (0%)	5 (1%)
15-24 years	19 (5%)	10 (2%)	12 (3%)	14 (3%)	19 (5%)
25-34 years	15 (4%)	24 (6%)	12 (3%)	19 (5%)	20 (5%)
35-44 years	34 (9%)	54 (13%)	41 (10%)	44 (11%)	38 (9%)
45-54 years	84 (21%)	89 (21%)	99 (25%)	83 (20%)	76 (19%)
55-64 years	117 (30%)	103 (24%)	113 (28%)	108 (26%)	123 (30%)
65-74 years	89 (23%)	93 (22%)	82 (20%)	100 (24%)	94 (23%)
75-84 years	30 (8%)	51 (12%)	39 (10%)	38 (9%)	35 (9%)
>=85 years	1 (0%)	3 (1%)	3 (1%)	4 (1%)	0 (0%)
Total	**394 (3%)**	**429 (3%)**	**402 (3%)**	**411 (3%)**	**410 (3%)**
Patients Dialysing					
00-14 years	3 (0%)	3 (0%)	4 (0%)	1 (0%)	2 (0%)
15-24 years	38 (3%)	41 (3%)	45 (3%)	39 (2%)	45 (3%)
25-34 years	76 (6%)	90 (6%)	90 (6%)	90 (6%)	98 (6%)
35-44 years	149 (11%)	162 (11%)	165 (11%)	173 (11%)	173 (10%)
45-54 years	275 (20%)	309 (21%)	331 (21%)	334 (21%)	348 (21%)
55-64 years	373 (28%)	403 (27%)	431 (28%)	453 (28%)	481 (28%)
65-74 years	293 (22%)	316 (21%)	323 (21%)	341 (21%)	372 (22%)
75-84 years	126 (9%)	146 (10%)	152 (10%)	146 (9%)	163 (10%)
>=85 years	10 (1%)	11 (1%)	15 (1%)	20 (1%)	15 (1%)
Total	**1343 (3%)**	**1481 (3%)**	**1556 (3%)**	**1597 (3%)**	**1697 (3%)**
Primary Renal Disease *					
Glomerulonephritis	72 (18%)	97 (23%)	89 (22%)	99 (24%)	78 (19%)
Analgesic Nephropathy	1 (0%)	1 (0%)	0 (0%)	2 (0%)	3 (1%)
Hypertension	30 (8%)	43 (10%)	36 (9%)	41 (10%)	42 (10%)
Polycystic Disease	14 (4%)	18 (4%)	14 (3%)	20 (5%)	16 (4%)
Reflux Nephropathy	9 (2%)	3 (1%)	6 (1%)	8 (2%)	9 (2%)
Diabetic Nephropathy	204 (52%)	212 (49%)	207 (51%)	177 (43%)	204 (50%)
Miscellaneous	49 (12%)	41 (10%)	38 (9%)	44 (11%)	45 (11%)
Uncertain	15 (4%)	14 (3%)	12 (3%)	20 (5%)	13 (3%)
Total	**394 (3%)**	**429 (3%)**	**402 (3%)**	**411 (3%)**	**410 (3%)**

* New patients receiving first haemodialysis treatment

Figure 5.6

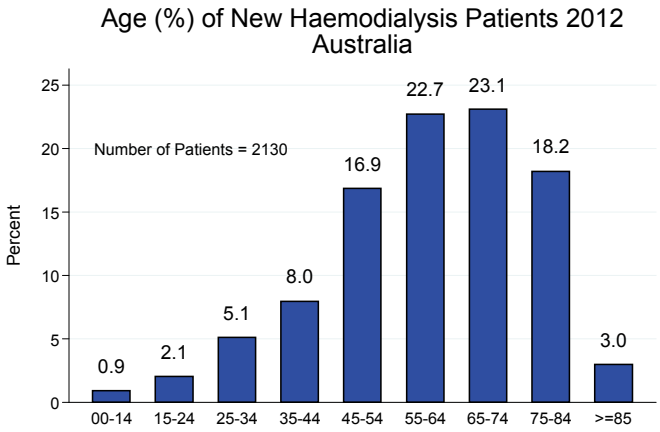
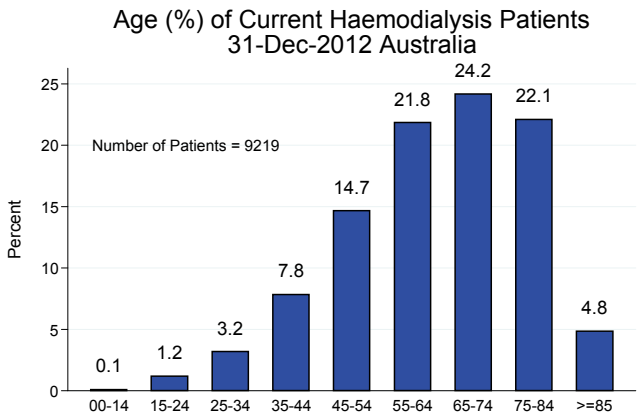


Figure 5.7



NEW ZEALAND (continued from page 5-2)

There were 410 patients who received HD for the first time in 2012, similar to previous years. Almost eighty one percent (80.7%) were dialysing for the first time, 17% were previously dialysing with peritoneal dialysis and the remaining 2% had failed transplants.

The modal age group for new HD patients was 55-64 years (30%), 11% were <35 years and 31% ≥ 65 years (Figures 5.5 and 5.8). The age distribution of the prevalent HD population was similar (Figure 5.9).

There were 45 HD patients who received transplants in 2012 (65 in 2011). Only one patient ≥ 65 years was transplanted in 2012 compared with four in 2011.

There were 223 deaths in 2012.

Figure 5.8

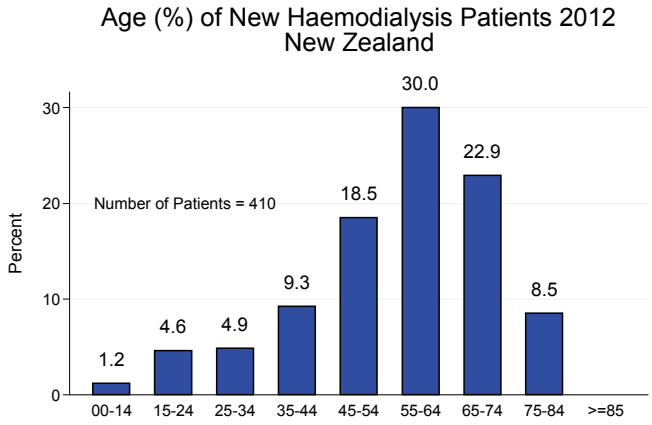
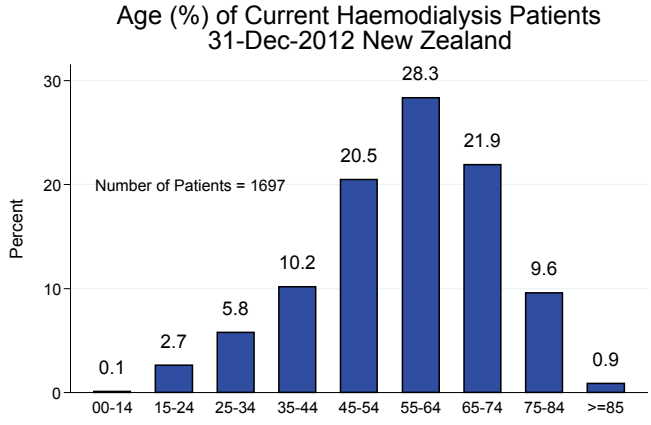


Figure 5.9



AUSTRALIA

Blood flow rates in Australia showed a similar picture as in 2011. The proportion receiving a blood flow rate of 300 mls/minute or higher was 83% in 2012.

Only 3.3% (274 patients) had blood flow rates < 250 mls/minute. Blood flow rates were not reported in 447 patients.

Blood flow rates of 350 mls/minute and higher were less frequent in patients dialysing using central venous catheters than in those using AVFs or AVGs (Figure 5.11).

NEW ZEALAND

In December 2012, 70% of patients were prescribed 300 mls/minute or higher.

There were 8.6% using < 250 mls/minute; many of these were receiving long hour HD.

Figure 5.10

Blood Flow Rates (mls/minute) 2008 - 2012

Country		No. Pts	*CVV HD excluded	NR **	Mls/Minute					
					<200	200-249	250-299	300-349	350-399	>400
Aust	2008	7927	0	3	52	350	1282	4340	1591	309
	2009	8255	1	4	47	292	1208	4742	1630	331
	2010	8599	3	10	39	296	1226	4986	1721	318
	2011	8927	0	20	28	270	1247	5194	1890	278
	2012	9219	0	447	53	221	1263	5193	1764	278
NZ	2008	1343	0	0	6	101	426	553	232	25
	2009	1481	1	0	4	94	368	680	300	34
	2010	1555	0	1	5	96	393	769	259	32
	2011	1596	0	2	4	106	332	910	224	18
	2012	1697	0	29	8	116	383	871	257	33

Figure 5.11

Blood Flow Rate by Type of Access December 2012

Blood Flow Rate	Australia				New Zealand			
	AVF	AVG	CVC*	NR**	AVF	AVG	CVC	NR**
<200	36 (0.5%)	2 (0.3%)	14 (1.1%)	1 (0.2%)	6 (0.5%)	0 (0.0%)	2 (0.5%)	0 (0.0%)
200-249	138 (2.0%)	21 (3.3%)	60 (4.8%)	2 (0.4%)	78 (6.3%)	2 (2.9%)	35 (9.3%)	1 (4.8%)
250-299	837 (12.2%)	101 (15.9%)	311 (24.8%)	14 (3.1%)	199 (16.2%)	22 (31.9%)	156 (41.3%)	6 (28.6%)
300-349	4003 (58.2%)	383 (60.3%)	722 (57.5%)	85 (18.8%)	661 (53.8%)	38 (55.1%)	166 (43.9%)	6 (28.6%)
350-399	1547 (22.5%)	106 (16.7%)	89 (7.1%)	22 (4.9%)	244 (19.9%)	4 (5.8%)	9 (2.4%)	0 (0.0%)
400+	261 (3.8%)	14 (2.2%)	1 (0.1%)	2 (0.4%)	30 (2.4%)	2 (2.9%)	1 (0.3%)	0 (0.0%)
NR**	54 (0.8%)	8 (1.3%)	59 (4.7%)	326 (72.1%)	11 (0.9%)	1 (1.4%)	9 (2.4%)	8 (38.1%)
Total	**6876**	**635**	**1256**	**452**	**1229**	**69**	**378**	**21**

* Number of patients having C.V.V. HD not included. NR** - Not Reported

Figure 5.12

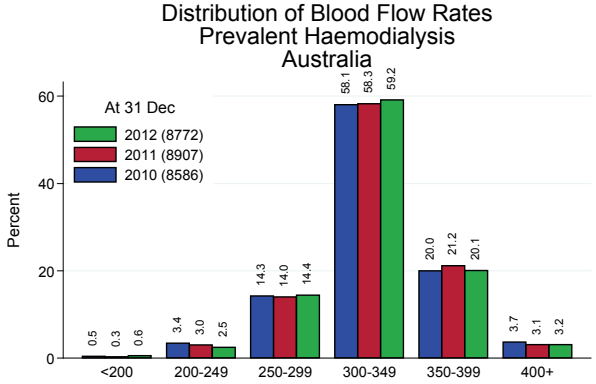


Figure 5.13

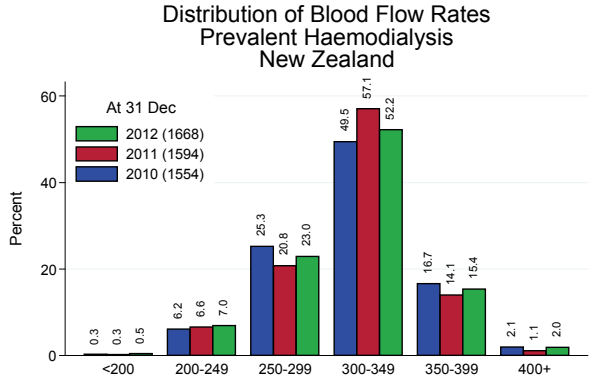


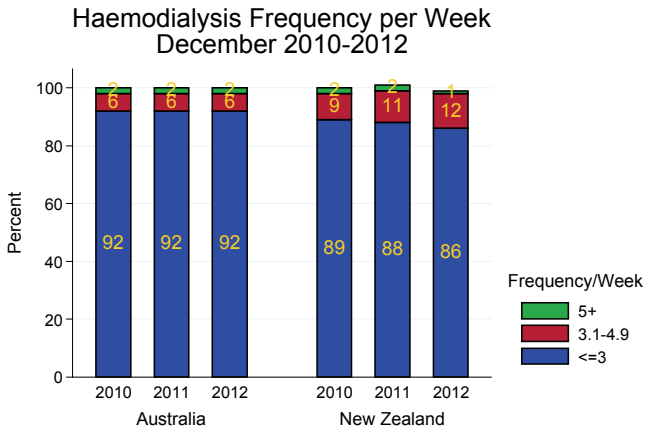
Figure 5.14

Duration and Number of Sessions Per Week
December 2011

Sessions Per week	Hours of Each Treatment							Total
	<4	4	4.5	5	5.5	>5.5	Not Reported	
Australia								
3.1-4.9	321 (4.0)	3177 (39.3)	1868 (23.1)	2358 (29.2)	127 (1.6)	226 (2.8)	6 (0.1)	8083
<=3	41 (7.3)	95 (16.9)	54 (9.6)	117 (20.9)	16 (2.9)	238 (42.4)	0 (0.0)	561
>=5	64 (40.8)	44 (28.0)	0 (0.0)	7 (4.5)	2 (1.3)	39 (24.8)	1 (0.6)	157
Not reported	1 (0.2)	0 (0.0)	2 (0.5)	1 (0.2)	0 (0.0)	1 (0.2)	413 (98.8)	418
Total	**427 (4.6)**	**3316 (36.0)**	**1924 (20.9)**	**2483 (26.9)**	**145 (1.6)**	**504 (5.5)**	**420 (4.6)**	**9219**
New Zealand								
3.1-4.9	32 (2.2)	452 (31.3)	380 (26.3)	465 (32.2)	41 (2.8)	61 (4.2)	12 (0.8)	1443
<=3	5 (2.4)	39 (18.9)	25 (12.1)	61 (29.6)	10 (4.9)	60 (29.1)	6 (2.9)	206
>=5	6 (28.6)	5 (23.8)	1 (4.8)	4 (19.0)	0 (0.0)	3 (14.3)	2 (9.5)	21
Not reported	0 (0.0)	0 (0.0)	0 (0.0)	3 (11.1)	0 (0.0)	3 (11.1)	21 (77.8)	27
Total	**43 (2.5)**	**496 (29.2)**	**406 (23.9)**	**533 (31.4)**	**51 (3.0)**	**127 (7.5)**	**41 (2.4)**	**1697**

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

Figure 5.15



Frequent and Long Haemodialysis

(Figures 5.14 - 5.23)

The proportions of those dialysing > 3 times per week in Australia has plateaued, with no change from 2009. In New Zealand the proportion dialysing more than three times per week continues to increase. The proportions dialysing ≥ 4.5 hours per session has slowly increased. The proportion dialysing more than the "standard" 12 hours per week has been steadily increasing.

In 2012, 59% and 70% of HD patients were dialysing ≥ 13.5 hours per week in Australia and New Zealand respectively. Figures 5.16-5.20 show these from several perspectives.

Figure 5.16

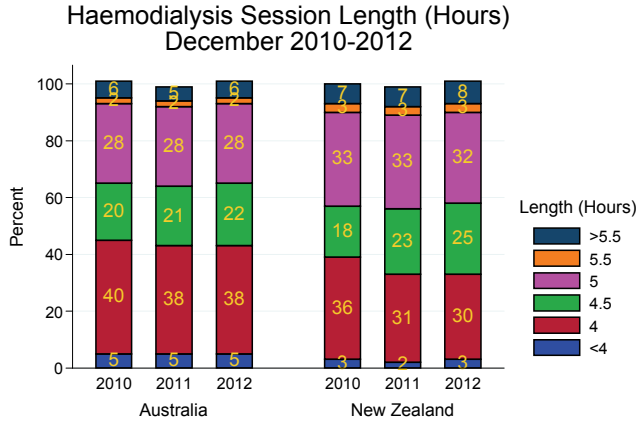


Figure 5.17

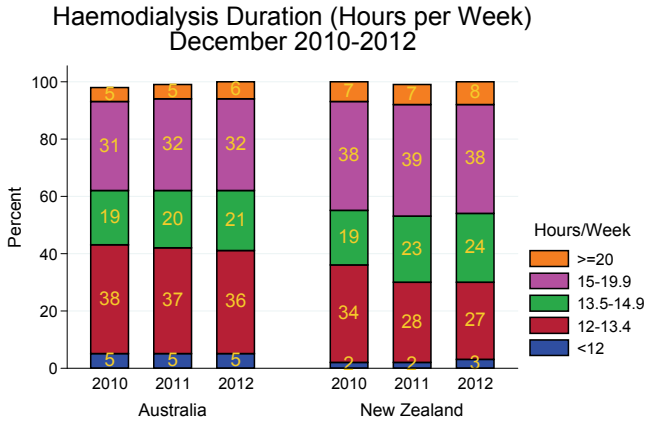


Figure 5.18

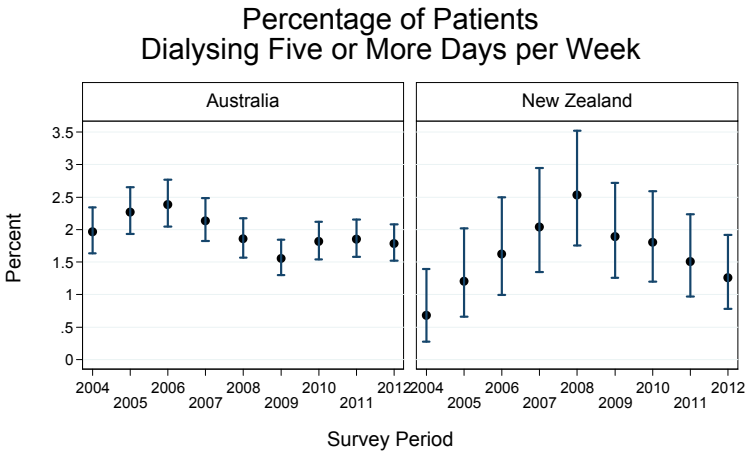


Figure 5.19

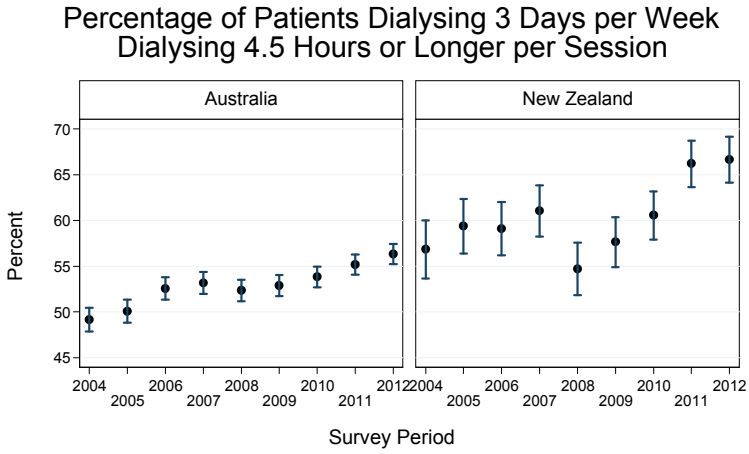
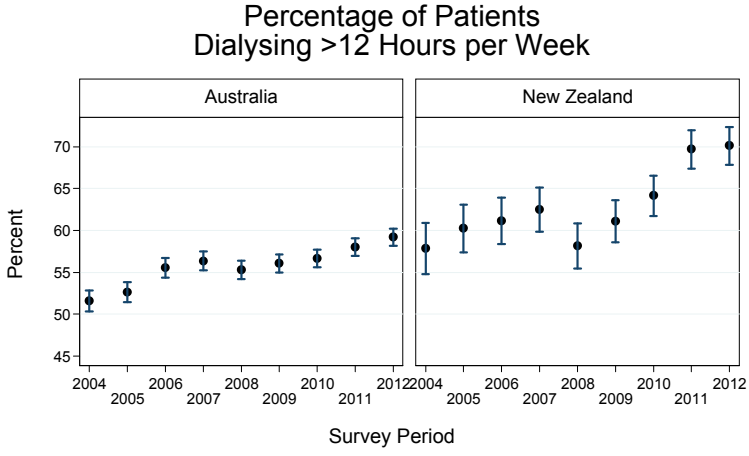


Figure 5.20



Dialysis frequency and session length vary among the Australian jurisdictions. Patients in Queensland and Victoria are more likely to dialyse more frequently, while patients in New South Wales/ACT and the Northern Territory tend to dialyse longer per session on average (Figures 5.21 - 5.23).

Figure 5.21

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

	Australia							New Zealand
	Qld	NSW/ACT	Vic	Tas	SA	NT	WA	
2012	58 (3.6%)	25 (0.9%)	46 (2.0%)	3 (1.7%)	11 (1.9%)	3 (0.6%)	11 (1.4%)	21 (1.3%)
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	52 (3.2%)	25 (0.9%)	48 (2.2%)	3 (2.1%)	8 (1.4%)	5 (1.2%)	15 (1.9%)	28 (1.8%)
2009	41 (2.6%)	28 (1.0%)	40 (1.9%)	2 (1.4%)	7 (1.3%)	0 (0.0%)	10 (1.3%)	28 (1.9%)

Figure 5.22

Haemodialysis Percentage ≥ 4.5 Hours Per Session
Three Sessions per Week
By Australian State and Country

	Australia							New Zealand
	Qld	NSW/ACT	Vic	Tas	SA	NT	WA	
2012	802 (59.6%)	1886 (73.8%)	956 (45.7%)	107 (67.7%)	132 (24.4%)	351 (77.0%)	217 (28.7%)	940 (66.7%)
2011	843 (58.7%)	1927 (74.3%)	890 (42.5%)	100 (69.4%)	133 (24.1%)	319 (74.9%)	227 (28.5%)	921 (66.2%)
2010	829 (59.5%)	1859 (72.8%)	757 (37.8%)	79 (61.2%)	138 (26.2%)	301 (77.2%)	201 (27.1%)	828 (60.6%)
2009	788 (58.6%)	1748 (72.6%)	663 (34.9%)	81 (60.4%)	132 (25.9%)	305 (80.9%)	192 (26.7%)	754 (57.6%)

Figure 5.23

Haemodialysis Percentage >12 Hours per Week
By Australian State and Country

	Australia							New Zealand
	Qld	NSW/ACT	Vic	Tas	SA	NT	WA	
2012	983 (61.7%)	2134 (75.1%)	1167 (50.4%)	126 (70.0%)	161 (27.5%)	358 (77.2%)	277 (34.1%)	1157 (70.1%)
2011	1009 (61.4%)	2185 (75.1%)	1087 (47.1%)	112 (70.9%)	160 (26.8%)	328 (75.4%)	287 (33.3%)	1111 (69.7%)
2010	996 (61.4%)	2083 (73.8%)	959 (43.0%)	92 (63.0%)	167 (29.5%)	311 (77.4%)	257 (32.1%)	997 (64.2%)
2009	964 (61.5%)	1990 (73.4%)	873 (41.1%)	92 (62.2%)	161 (29.8%)	308 (80.4%)	238 (30.7%)	905 (61.1%)

OUTCOMES AMONG HAEMODIALYSIS PATIENTS

In Australia, there has been little change in haemodialysis patient survival over time, after adjusting for age, diabetes status, sex, race and comorbidities.

In New Zealand, recent cohorts have slightly better survival. Unadjusted survivals are shown in Figures 5.24-5.26.

In both countries, diabetes status and age have marked effects on haemodialysis patient survival. (Figures 5.24 - 5.34).

Note: For all tables and graphs the times indicated are from the 90th day and not the first treatment.

Figure 5.24

Patient Survival - 90 days after HD start
Censored for Transplant 2001 - 2012
% [95% Confidence Interval]

	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
2001-2003	3467	96 [95, 97]	90 [88, 91]	68 [66, 70]	50 [48, 52]
2004-2006	4222	96 [95, 97]	89 [88, 90]	68 [67, 70]	50 [48, 51]
2007-2009	4697	96 [95, 96]	90 [89, 91]	70 [69, 72]	53 [51, 55]
2010-2012	4450	96 [96, 97]	91 [90, 92]	-	-
New Zealand					
2001-2003	653	97 [95, 98]	92 [90, 94]	72 [68, 76]	54 [50, 59]
2004-2006	704	97 [95, 98]	91 [89, 93]	71 [67, 75]	51 [47, 55]
2007-2009	793	96 [94, 97]	91 [89, 93]	71 [68, 75]	53 [47, 58]
2010-2012	735	98 [96, 99]	94 [91, 95]	-	-

Unadjusted survivals shown

Figure 5.25

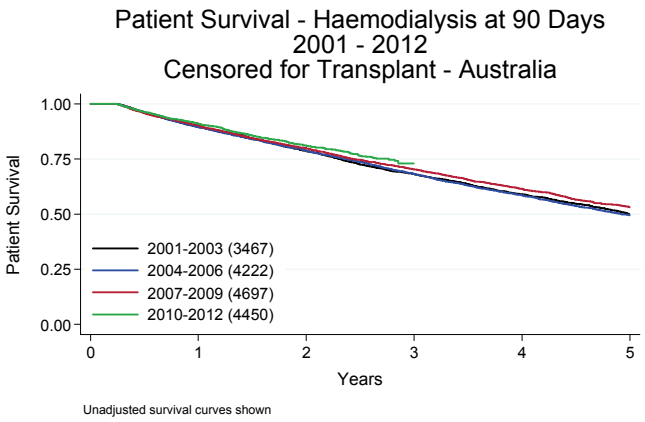
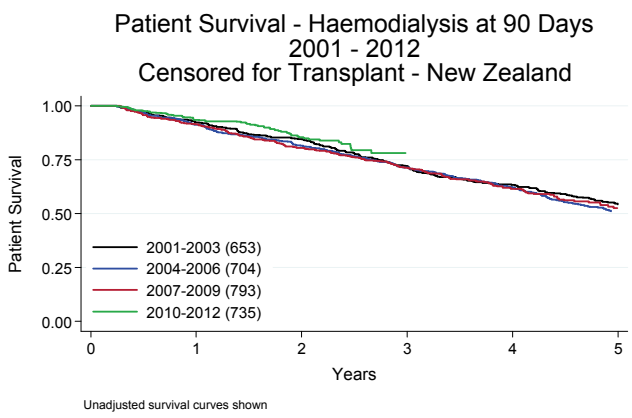


Figure 5.26



Figures 5.27- 5.28

These figures show survival curves for patients treated with haemodialysis at day 90, adjusted to a median age of 63.1 years for Australia and 57.2 years for New Zealand; non-diabetic primary renal disease; caucasoid race; female gender and no comorbid conditions (lung disease, coronary artery disease, peripheral vascular disease or cerebrovascular disease).

Note: x axis scale refers to time after day 90. PRD = Primary renal disease.

Figure 5.32-5.34 show survival stratified by age at the start of treatment.

Figure 5.27

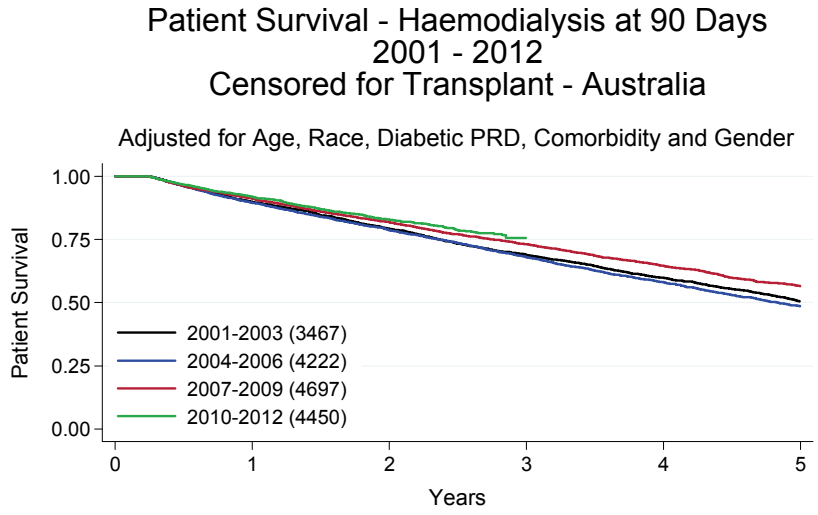


Figure 5.28

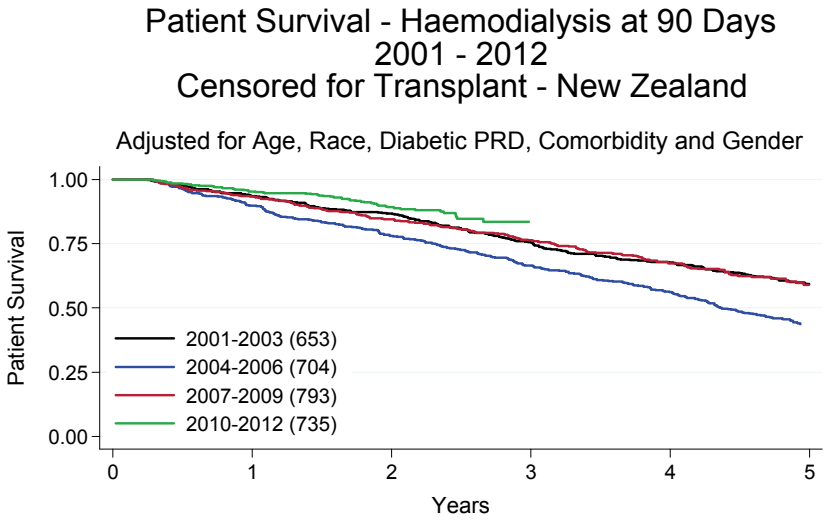


Figure 5.29

Haemodialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant 2001 - 2012
% [95% Confidence Interval]

		Survival			
	No. of Patients	6 months	1 year	3 years	5 years
Australia					
Non Diabetic	11228	96 [96, 96]	90 [89, 91]	70 [69, 71]	53 [51, 54]
Diabetic	5616	96 [96, 97]	90 [89, 91]	68 [67, 70]	49 [47, 50]
New Zealand					
Non Diabetic	1501	97 [95, 97]	92 [91, 94]	76 [73, 78]	58 [54, 62]
Diabetic	1387	97 [96, 98]	92 [90, 93]	69 [66, 72]	49 [45, 52]

Figure 5.30

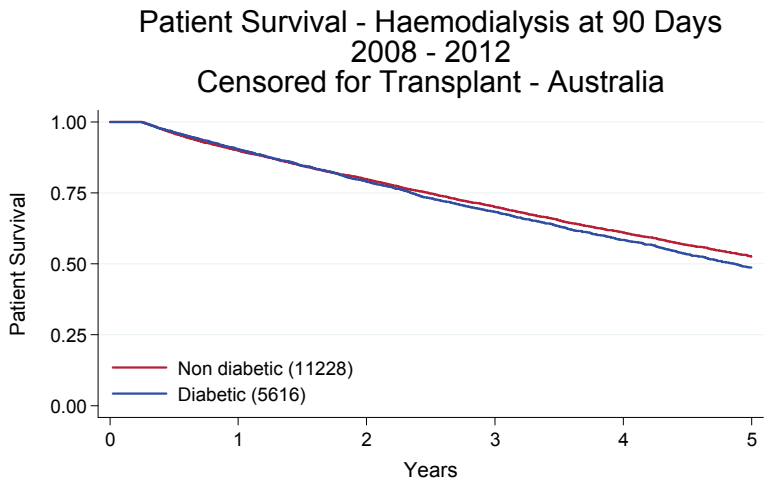


Figure 5.31

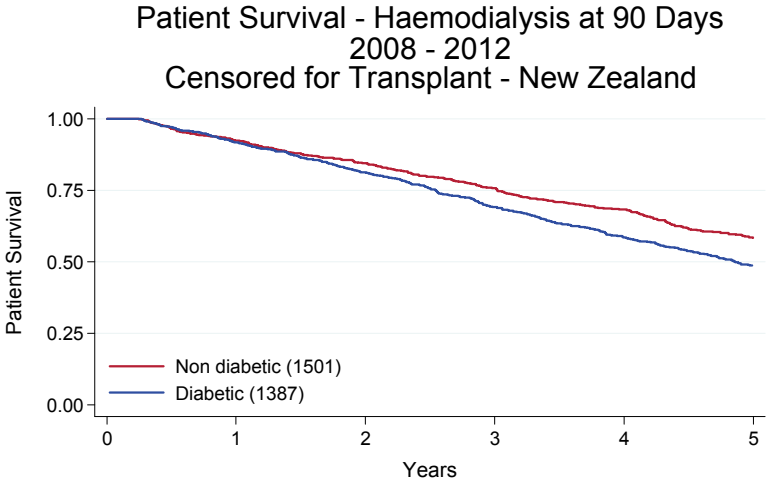


Figure 5.32

Haemodialysis at 90 Days
Patient Survival - By Age Group
Censored for Transplant 2001 - 2012
% [95% Confidence Interval]

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
<40 years	1720	99 [98, 99]	97 [96, 98]	88 [86, 90]	80 [77, 83]
40-59 years	5362	98 [97, 98]	94 [94, 95]	81 [80, 82]	68 [66, 69]
60-74 years	6047	95 [95, 96]	89 [88, 89]	67 [66, 68]	48 [47, 50]
>=75 years	3715	93 [93, 94]	84 [83, 85]	53 [51, 55]	29 [27, 31]
New Zealand					
<40 years	396	100 [98, 100]	97 [95, 99]	83 [77, 87]	75 [68, 81]
40-59 years	1248	97 [96, 98]	95 [93, 96]	80 [77, 82]	63 [59, 67]
60-74 years	1000	96 [94, 97]	90 [87, 92]	66 [62, 69]	43 [38, 47]
>=75 years	244	95 [91, 97]	82 [76, 87]	48 [41, 56]	22 [14, 30]

Survival stratified by age at the start of treatment

Figure 5.33

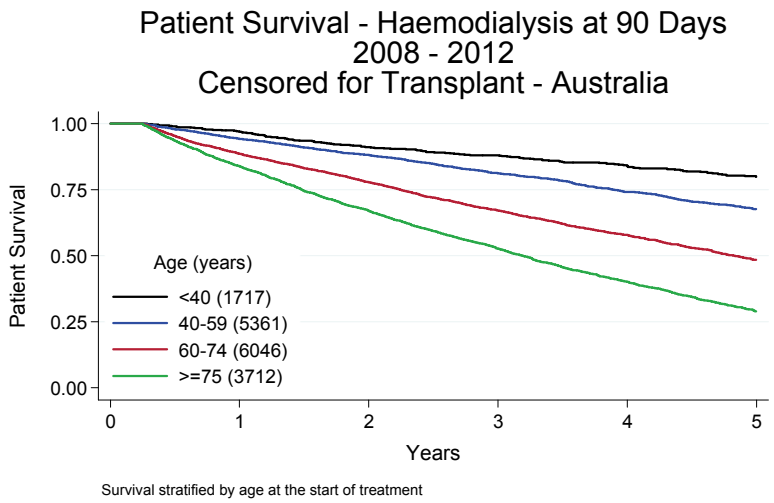
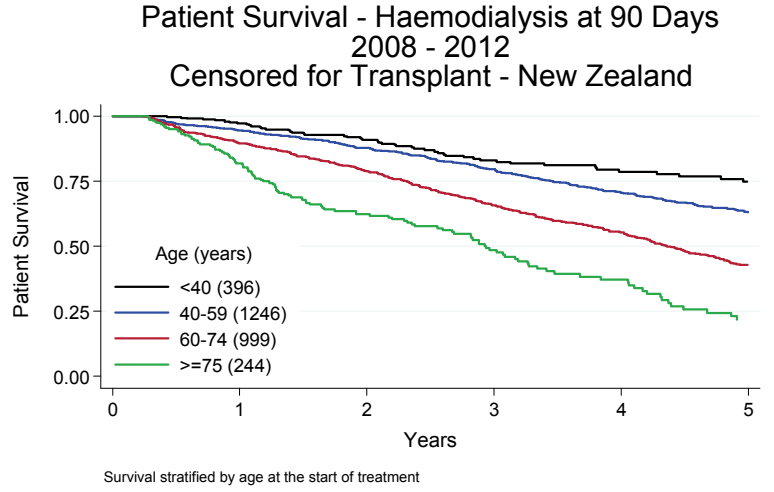


Figure 5.34



Membrane Type and Surface Areas

Australia

Figures 5.35 - 5.37.

Usage of low flux polysulfone dialysers was 0.44% in 2012, 0.77% in December 2011, 2.5% in 2010 and 5% in 2008). The use of high flux polysulphone continues to decrease (0.07% in 2012, <1% in 2011, 2010 and 2009, 1.5% in 2008, 7% in both 2007 and 2006, 9% in 2005 and 39% in 2004.

High flux Polysulphone-Helixone decreased to 61% in December 2012 from 63% in 2011, 57% in 2010, 53% in 2009 and 49% in 2008. Similarly high flux Polyamix increased to 22% in 2012 from 33% in the previous years.

99% of patients were receiving dialysis with high flux dialysers in 2012 (99% in 2011, 96% in 2010, 88% in 2009 and 81% in 2008).

New Zealand

Figures 5.35, 5.36 and 5.39.

Low flux polysulphone decreased to 11.2% in December 2012, from 11% and 13% in December 2011 and 2010 respectively.

81% (1349 patients) were reported as receiving dialysis with high flux dialysers in December 2012, an increase from 77% (1223 patients) in 2011 and 62% (924 patients) in 2010.

Figure 5.35

Haemodialyser Membrane Types by Surface Area 31-Dec-2012

Dialyser Membrane Type	Flux	Square Metres						Total
		<1.0	1.0-1.4	1.5-1.7	1.8-1.9	>1.9		
Australia								
Cellulose Triacetate	High	.	.	1	5	21	.	27
Polyamix	High	3	26	358	.	1604	.	1991
Polyamix	Low	.	2	16	.	24	.	42
Polyethersulfone	High	.	.	4	2	97	.	103
Polynephron	High	.	.	.	.	105	.	105
Polysulphone	High	1	2	.	2	1	.	6
Polysulphone	Low	.	.	.	10	31	.	41
Polysulphone-Helixone	High	2	500	.	3194	1911	.	5607
Purima	Mid	.	.	13	.	.	.	13
Revaclear	High	.	180	.	.	.	.	180
Revaclear Max	High	.	.	.	455	.	.	455
Synphan	Low	.	3	.	.	.	.	3
Unreported	Unreported	.	.	.	.	.	646	646
Total		**6**	**713**	**392**	**3668**	**3794**	**646**	**9219**
New Zealand								
Polyamix	High	.	1	9	.	68	.	78
Polyamix	Low	.	1	44	.	83	.	128
Polysulphone	Low	.	3	.	84	103	.	190
Polysulphone-Helixone	High	.	299	.	363	344	.	1006
Revaclear	High	.	10	.	.	.	.	10
Revaclear Max	High	.	.	.	255	.	.	255
Unreported	Unreported	.	.	.	.	.	30	30
Total		**.**	**314**	**53**	**702**	**598**	**30**	**1697**

Figure 5.36

Number of Patients at end of 2012 by HD Modality

	NT	NSW/ACT	VIC	QLD	SA	WA	TAS	NZ	Total
HAEMODIALYSIS-HOLLOW FIBRE	463	2458	2262	1323	416	668	153	1351	9094
HAEMOFILTRATION	0	10	0	2	1	2	0	1	16
HAEMODIAFILTRATION	5	400	53	286	173	172	27	322	1438
Total	468	2869	2316	1613	590	842	180	1674	10552

Figure 5.37

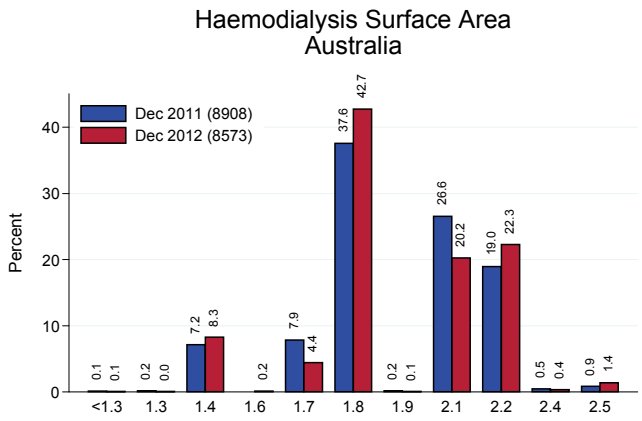
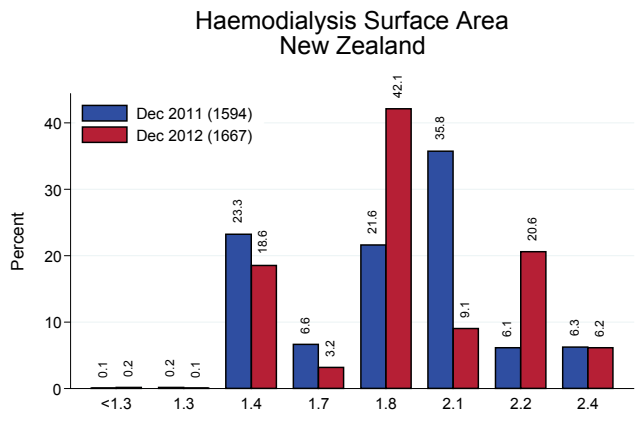


Figure 5.38



ANAEMIA

In Australia, mean haemoglobin and erythropoietic agent use has gradually reduced. Haemodialysis patients had a higher erythropoietic agent usage despite a similar mean haemoglobin compared with peritoneal dialysis patients (Figures 5.39 - 5.40).

In New Zealand, mean haemoglobin has stabilised. The increase in erythropoietic agent usage seen over 2005-2012 has reached a plateau and begun to fall.

Figure 5.39

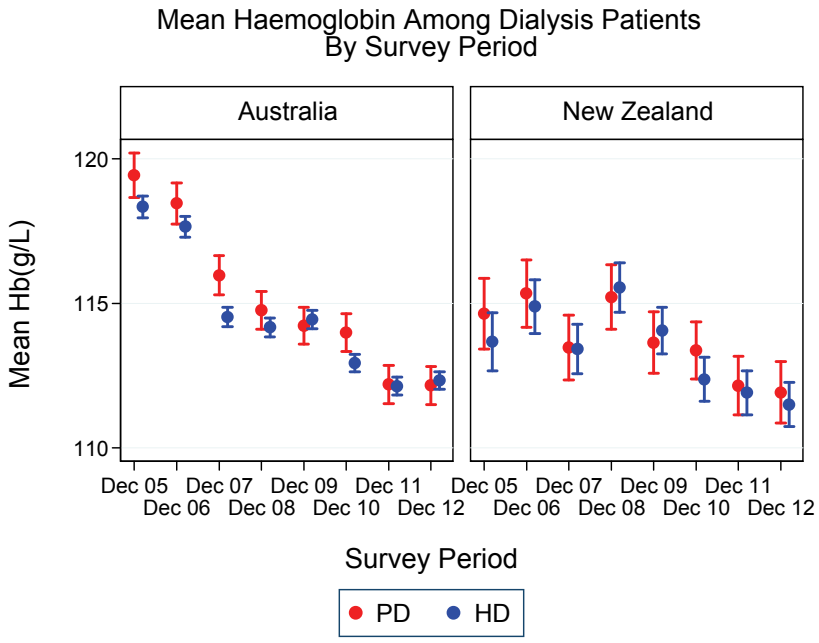
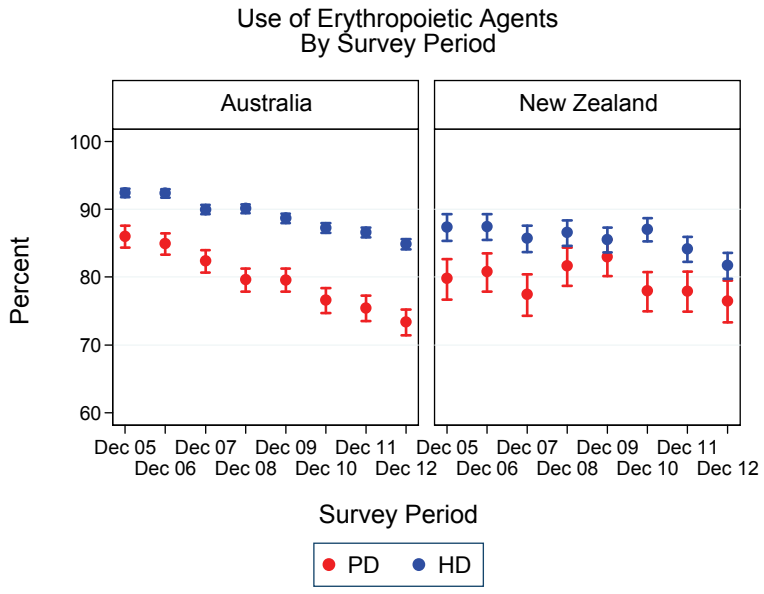


Figure 5.40



HAEMOGLOBIN

In Australia, among patients dialysing at 31 December 2012, haemoglobin was <110 g/L in 41% and ≥140g/L in 3% of haemodialysis patients, which is the same as the previous two years.

In New Zealand, the corresponding percentages were 44% and 4% respectively. Figure 5.42 shows the proportion of patients with proven or likely cardiovascular disease reported as a comorbidity to the Registry, achieving the clinical target of haemoglobin ≤ 120 g/L.

Figure 5.41

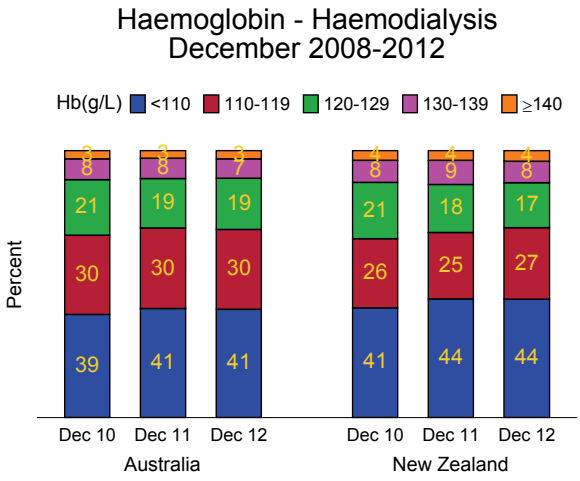
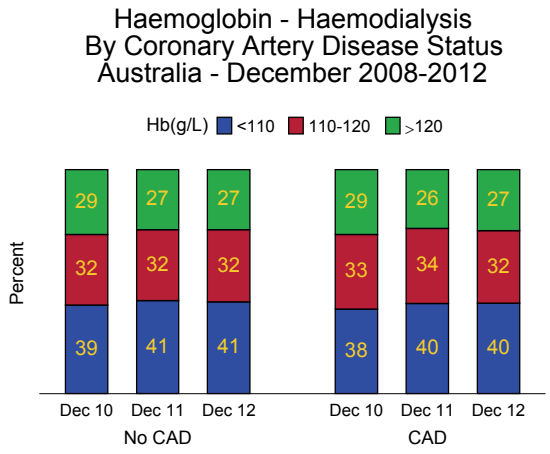
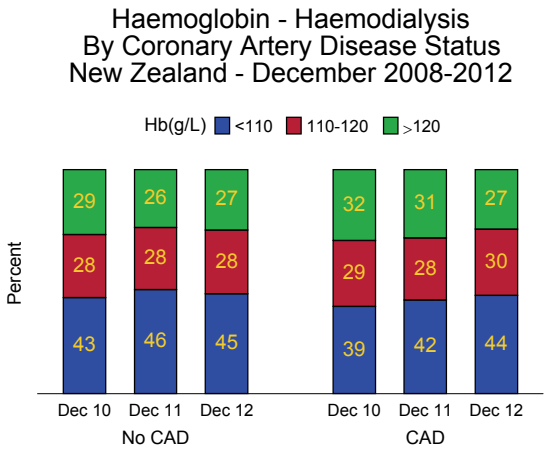


Figure 5.42





Haemoglobin by Treating Centre

Figures 5.43- 5.46

The first 2 figures show the median haemoglobin (with inter-quartile range) for individual centres, arranged from lowest to highest. Also shown are the proportion of patients in each centre with a haemoglobin of 110-129 g/L.

In Australia, median haemoglobin for each centre ranged from 105.5 to 122 g/L for haemodialysis patients and in New Zealand 105-116 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 32% to 78% for haemodialysis patients and for New Zealand 34% to 51%. For Figures 5.45 and 5.46 the error bars show the 95% confidence intervals.

Figure 5.43

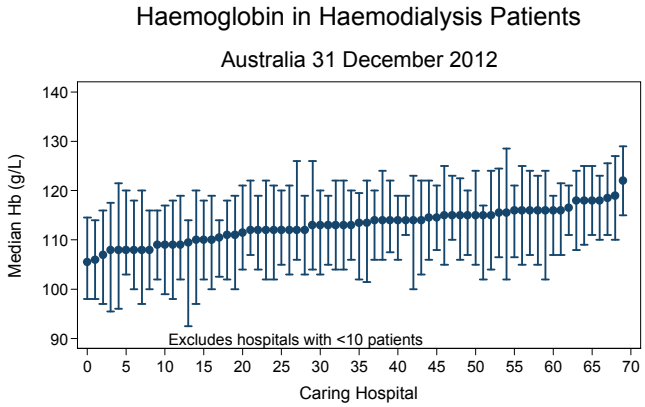


Figure 5.44

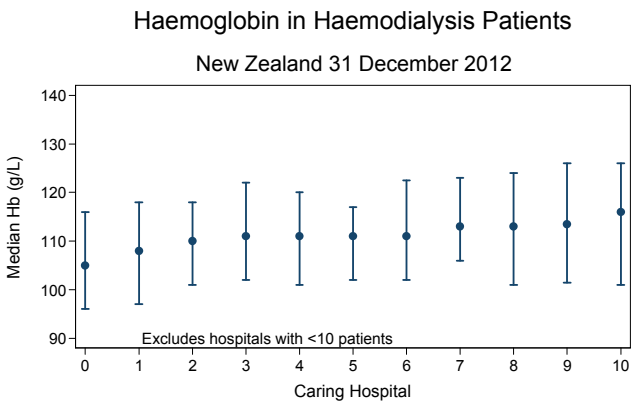


Figure 5.45

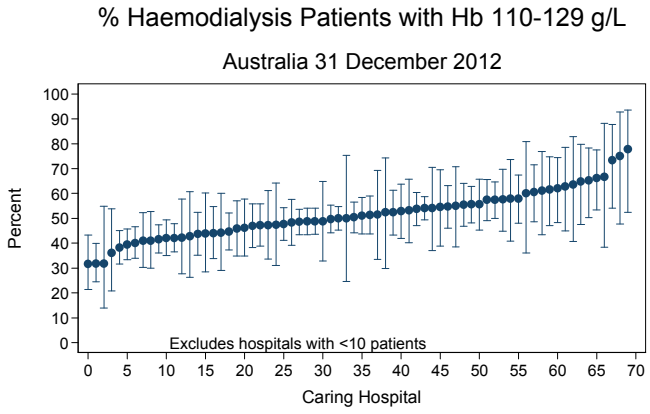
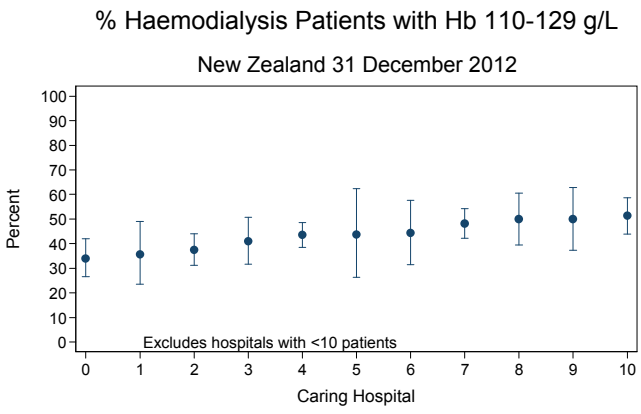


Figure 5.46



FERRITIN AND TRANSFERRIN SATURATION

Figures 5.47 - 5.48

In Australia and New Zealand the proportions of haemodialysis patients with ferritin <200 mcg/L and those with ferritin ≥ 500 mcg/L have been relatively stable.

In Australia distributions of transferrin saturation have been unchanged for the past three years, while in New Zealand the proportion with a transferrin saturation <20 has decreased from 38% in December 2011 to 34% in 2012.

Figure 5.47

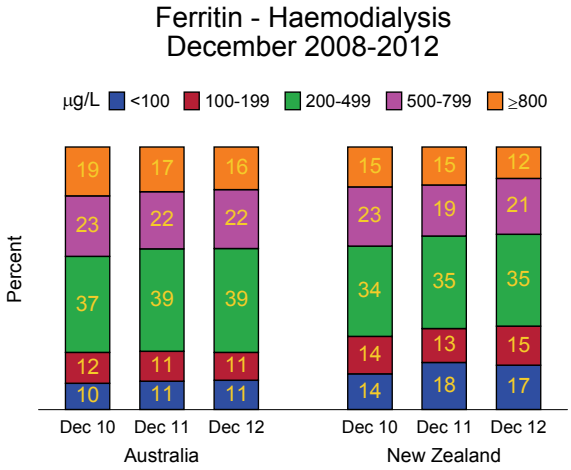
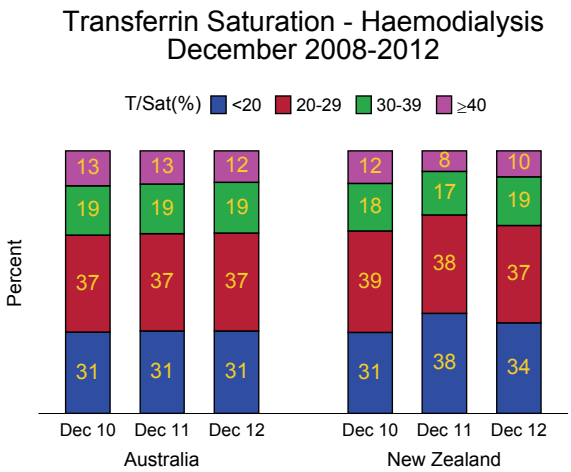


Figure 5.48



Ferritin by Treating Centre

Figures 5.49 - 5.52

These figures show the proportions of patients in each centre with ferritin of 200-500 mcg/L and transferrin saturation of >20% respectively, as recommended by the CARI guidelines.

In Australia, the proportions of patients with ferritin within this range in each centre varied widely between 3-72% for haemodialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 30-86%. This large variation probably reflects differences in practices, protocols and patient case-mix among centres.

In New Zealand, the corresponding figures for ferritin were between 23-49% for haemodialysis patients and the corresponding figures for transferrin saturation were between 48-71%. In both countries, significant proportions of patients did not have ferritin and transferrin saturation within the recommended ranges, even in the “best performing” centres.

Figure 5.49

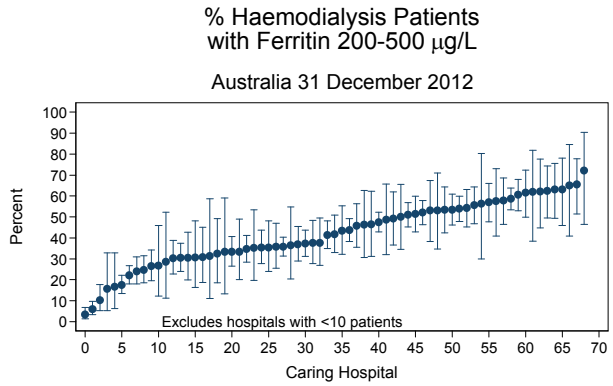


Figure 5.50

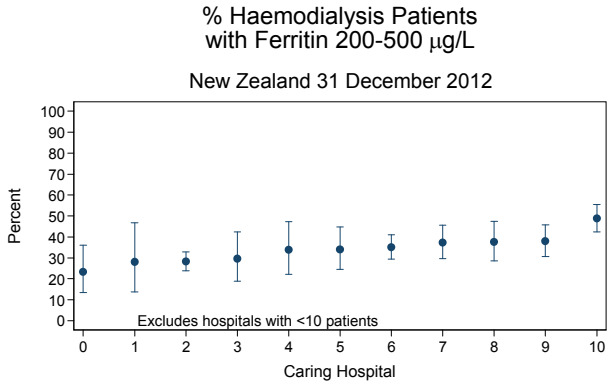


Figure 5.51

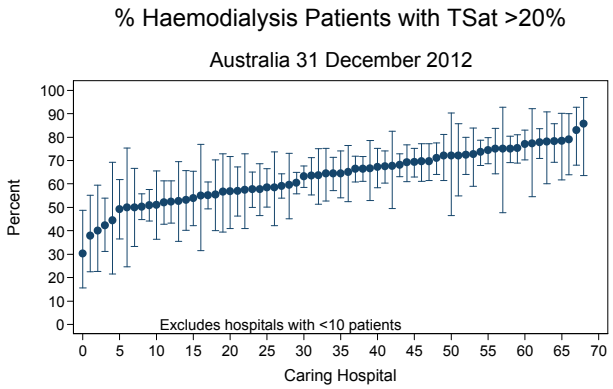
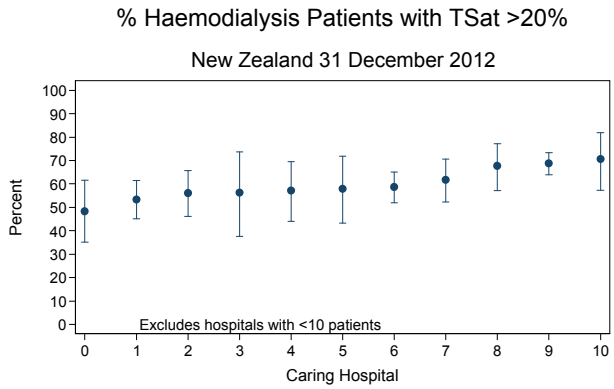


Figure 5.52

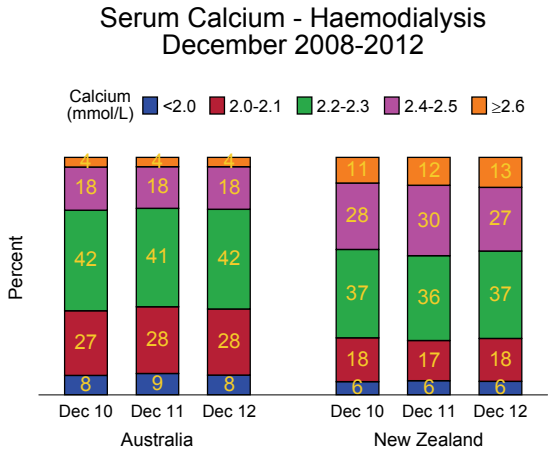


SERUM CALCIUM

Figure 5.53

In Australia the proportions of patients with serum calcium ≥ 2.4 mmol/L is stable. In New Zealand it has decreased from 40% in December 2011 to 40% in December 2012. The proportion with calcium < 2.2 mmol/L is stable in each country, and is higher in Australia than New Zealand.

Figure 5.53



SERUM CALCIUM BY TREATING CENTRE

Figures 5.54 and 5.55 show the proportions of patients at each centre with serum calcium 2.1 -2.4 mmol/L, as recommended by the CARI guidelines. Note that the values in the guidelines are for corrected total calcium, while those in this report are for uncorrected total calcium.

In Australia, the proportions ranged widely between 39-81% for haemodialysis patients, while in New Zealand the corresponding proportions were 47-72%.

Figure 5.54

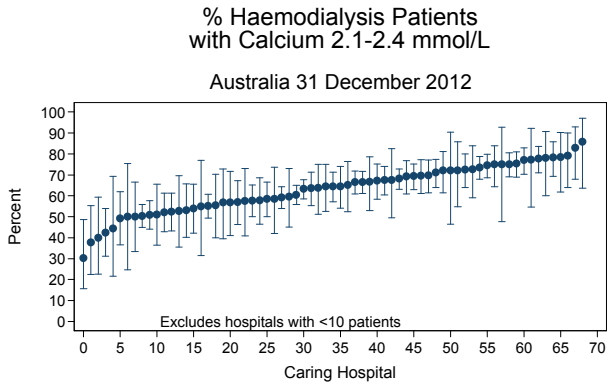
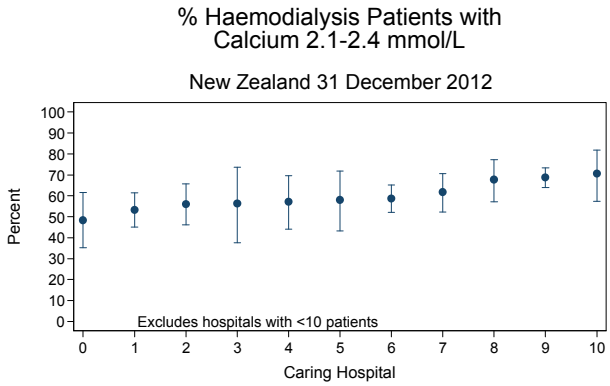


Figure 5.55

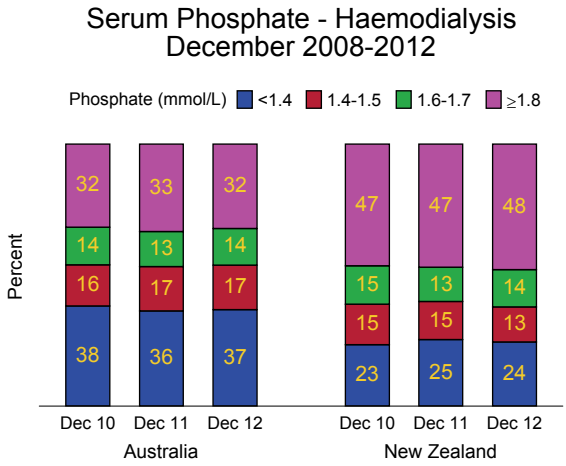


Serum Phosphate

Figure 5.56

In Australia, the control of serum phosphate has stabilised after a period of steady improvements. In New Zealand as well, the proportion with serum phosphate > 1.8 mmol/L has largely remained stable.

Figure 5.56



Serum Phosphate by Treating Centre

Figures 5.57 - 5.58 show the proportions of patients at each centre with serum phosphate 0.8-1.6 mmol/L, as recommended by the CARI guidelines.

In Australia, the proportions ranged widely between 27-75% for haemodialysis patients and in

New Zealand, the corresponding proportions were 29-54%.

Figure 5.57

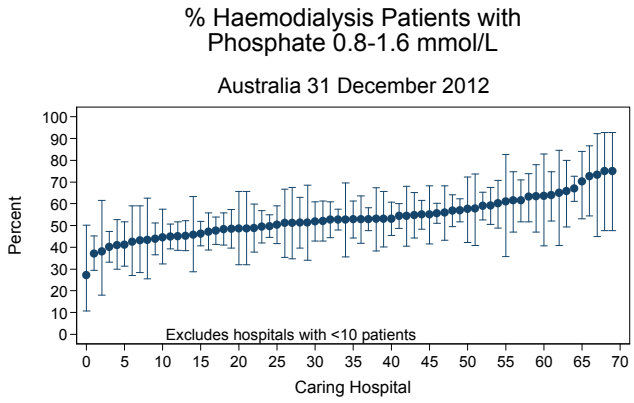
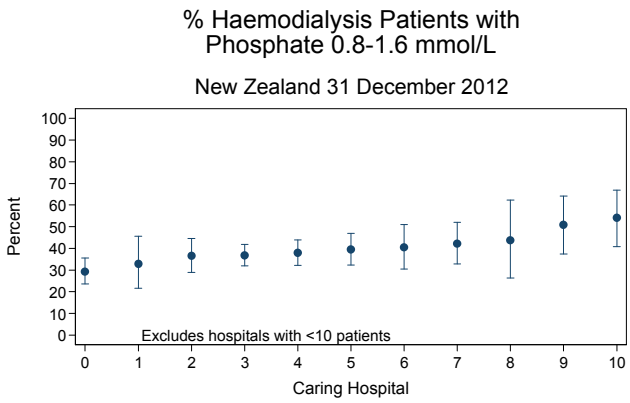


Figure 5.58



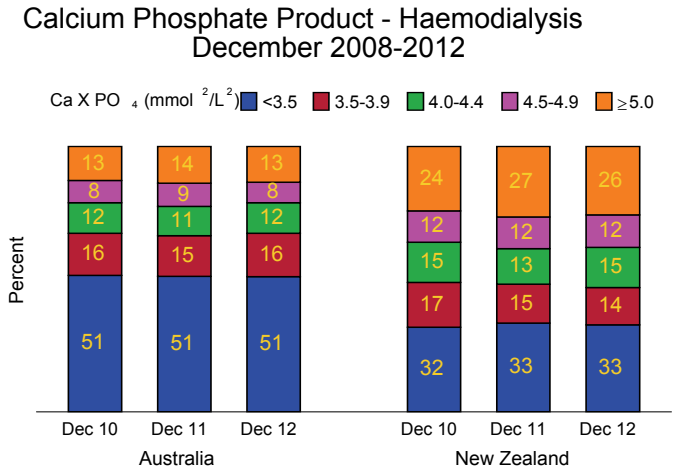
CALCIUM-PHOSPHATE PRODUCT

Figure 5.59

In both Australia and New Zealand, improvements in the calcium-phosphate product seen over the last few years have plateaued.

Overall, the proportion of people with high calcium-phosphate product was substantially higher in New Zealand than Australia.

Figure 5.59



Figures 5.60 - 5.61 show the proportions of patients at each centre with calcium-phosphate product <4.0 mmol^2/L^2, as recommended by the CARI guidelines.

In Australia, the proportions ranged widely between 32-87% for haemodialysis patients while in New Zealand, the corresponding proportions were 36-64%.

Figure 5.60

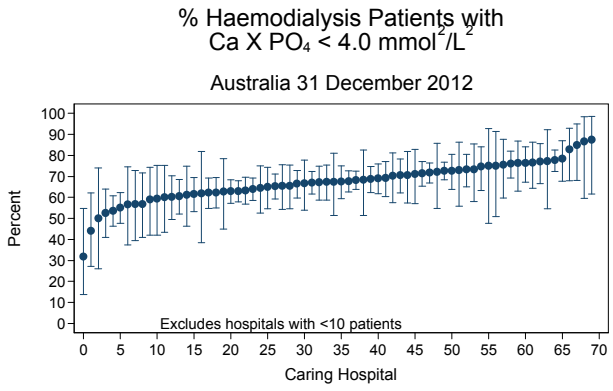
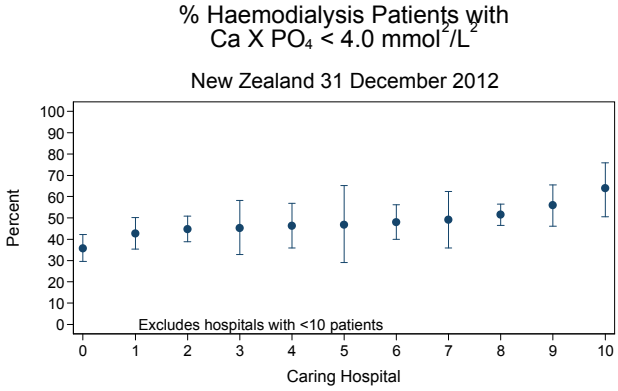


Figure 5.61



Urea Reduction Ratio

Figures 5.62-5.64

Distributions of URR values have shown an increase in those in higher URR groups the past three years. About 10% and 27% of patients on haemodialysis three times a week have URR <65% in Australia and New Zealand respectively.

URR is highest in patients dialysing with an AV graft and lowest in those using catheters (Figure 5.63). Of those with URR < 65%, 14% in Australia and 23% in New Zealand had CVC access.

Figure 5.62

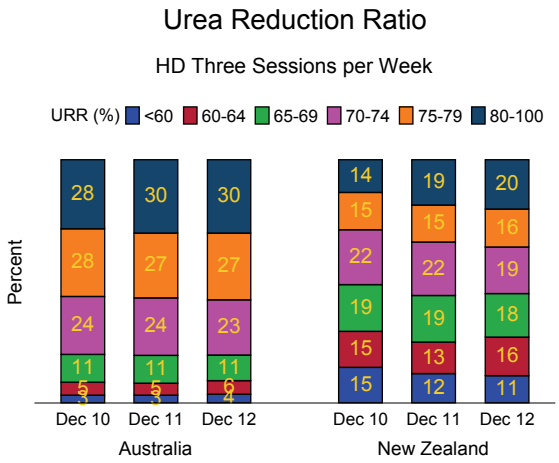


Figure 5.63

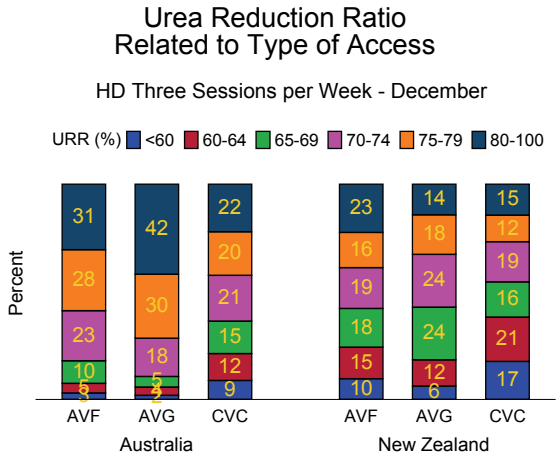


Figure 5.64

Urea Reduction Ratio - Prevalent Patients
Three Sessions per Week - December 2012

Hours per Session	Urea Reduction Ratio %		
	< 65	>=65	Total
Australia			
<4 hours	37 (13.6%)	236 (86.4%)	273
4 hours	275 (9.6%)	2603 (90.4%)	2878
>4-5 hours	326 (8.6%)	3486 (91.4%)	3812
>5 hours	18 (6.6%)	255 (93.4%)	273
Total	**656 (9.1%)**	**6580 (90.9%)**	**7236**
New Zealand			
<4 hours	10 (41.7%)	14 (58.3%)	24
4 hours	111 (28.9%)	273 (71.1%)	384
>4-5 hours	199 (26.7%)	547 (73.3%)	746
>5 hours	15 (19.7%)	61 (80.3%)	76
Total	**335 (27.2%)**	**895 (72.8%)**	**1230**

Urea Reduction Ratio by Treating Centre

Figures 5.65 and 5.66 show the median URR in each hospital and Figures 5.67 and 5.68 show the proportions of haemodialysis patients dialysing three times per week in each hospital with URR > 70%, the target recommended by the CARI guidelines.

Median URR values in the respective countries did not vary greatly: 70-88% in Australia and 66-84% in New Zealand. However, the proportions with URR >70% in each unit varied widely, from 44-100% in Australia and 34-90% in New Zealand.

Figure 5.65

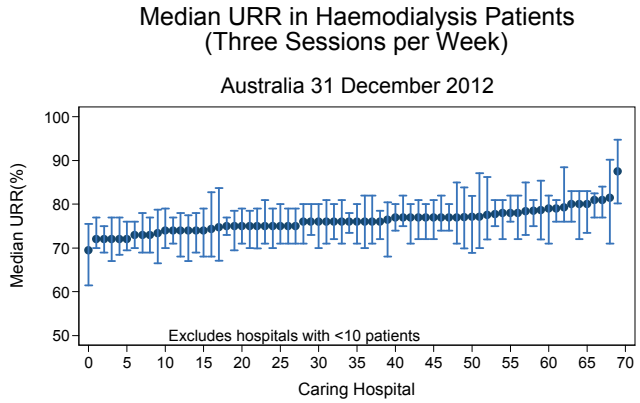


Figure 5.66

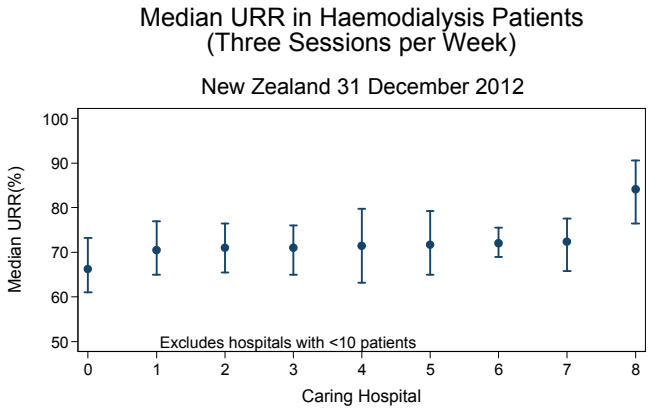


Figure 5.67

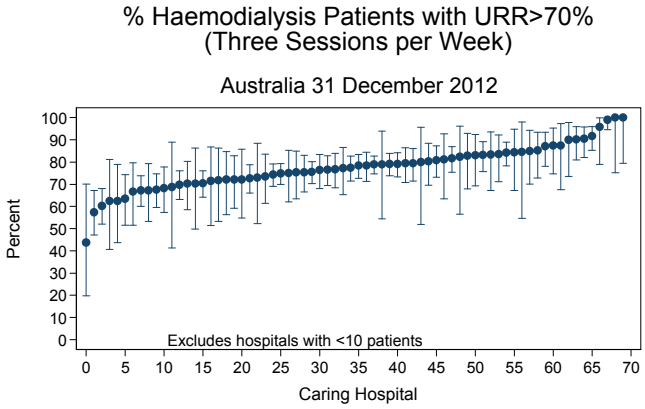
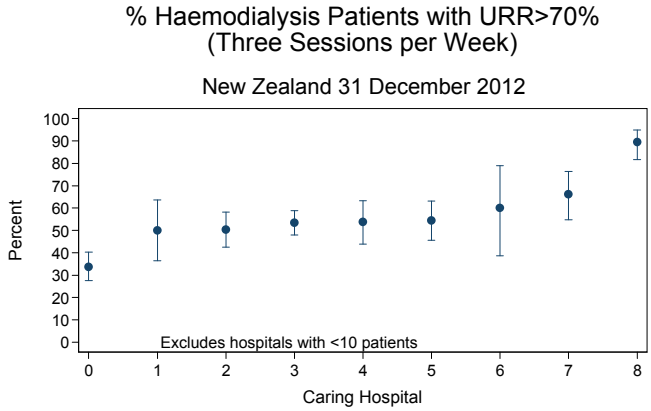


Figure 5.68



VASCULAR ACCESS AT FIRST TREATMENT

Figures 5.69 to 5.78

The proportion of patients starting haemodialysis with an AVF has continued to rise in both Australia and New Zealand although the majority of patients still commence with a catheter.

In Australia, tunnelled catheters were more common than non-tunnelled, but the reverse was true in New Zealand. Overall, in New Zealand the use of non-tunnelled catheter has decreased to 35% in 2012 from 45% in 2010.

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 5.69

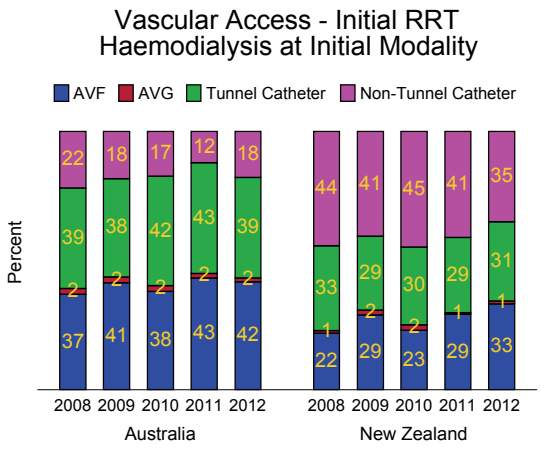


Figure 5.70

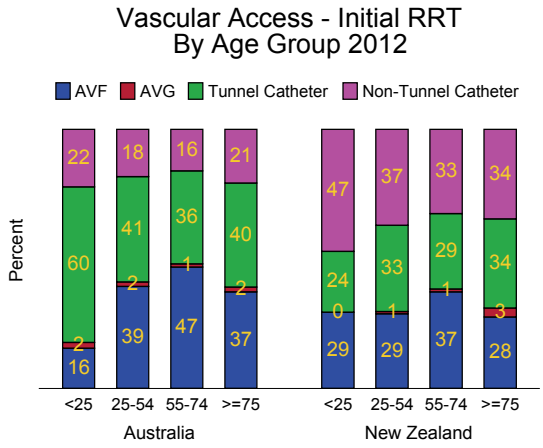


Figure 5.71

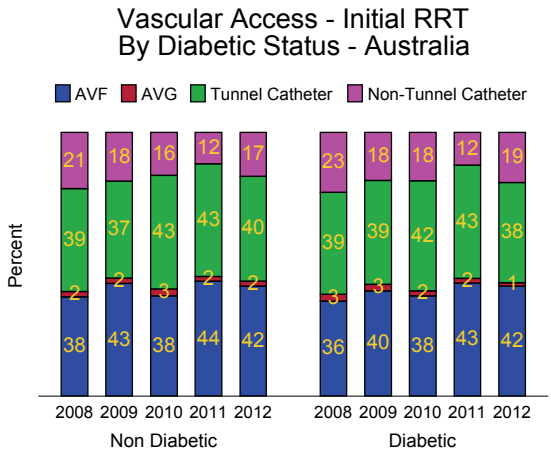
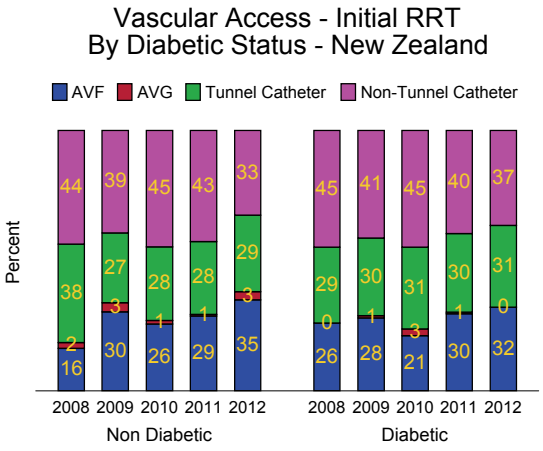
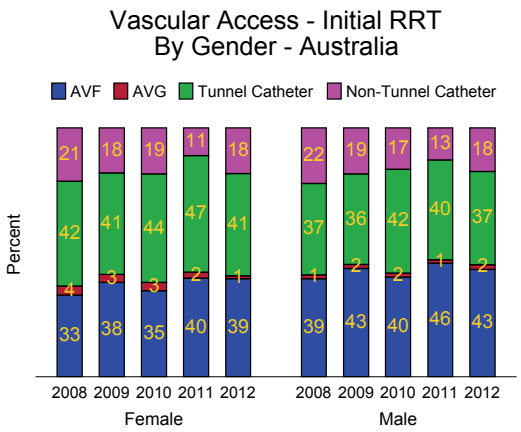


Figure 5.72



Vascular Access at First Treatment

Figure 5.73



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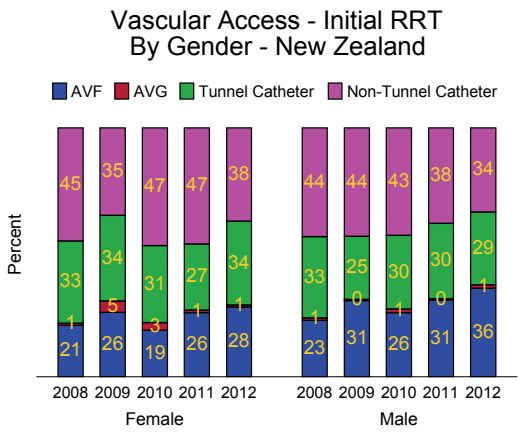


Figure 5.75

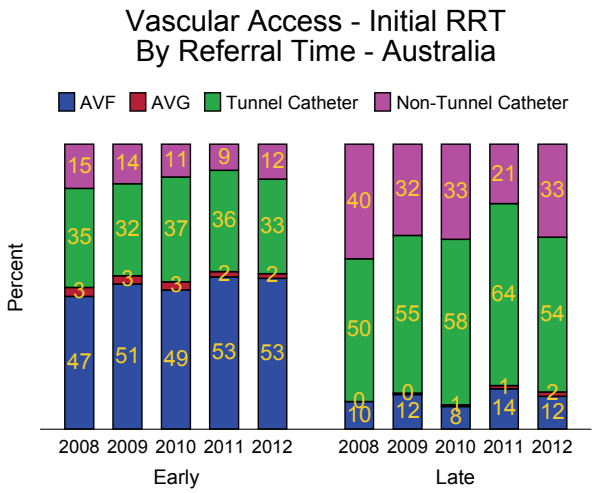


Figure 5.76

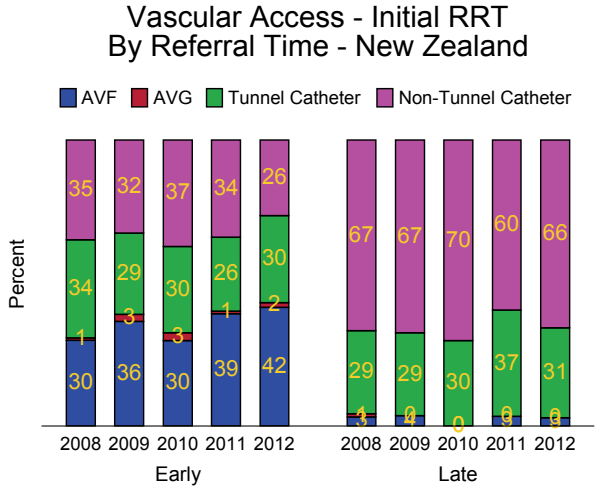


Figure 5.77

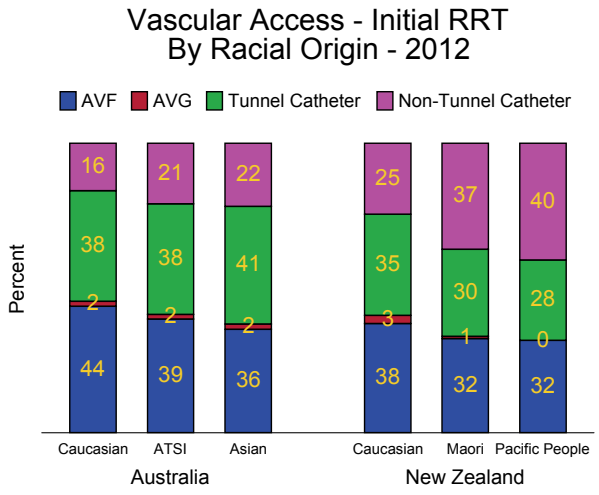
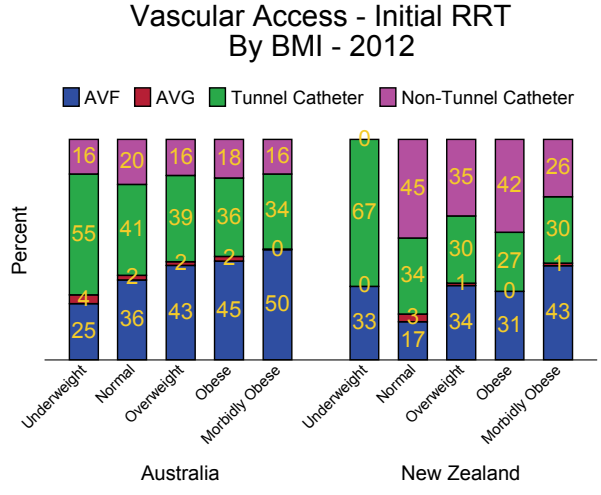


Figure 5.78



VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.79

Vascular Access at First Treatment
Haemodialysis as Initial Modality 1-Jan-2009 to 31-Dec-2012

	2009		2010		2011		2012	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
QLD	152 (41%)	219 (59%)	138 (40%)	208 (60%)	132 (39%)	203 (61%)	141 (45%)	169 (55%)
NSW/ACT	187 (37%)	317 (63%)	201 (37%)	339 (63%)	229 (39%)	358 (61%)	225 (39%)	353 (61%)
Vic	214 (50%)	217 (50%)	201 (45%)	246 (55%)	231 (51%)	225 (49%)	206 (49%)	216 (51%)
Tas	16 (43%)	21 (57%)	19 (61%)	12 (39%)	19 (61%)	12 (39%)	22 (63%)	13 (37%)
SA	89 (61%)	58 (39%)	56 (41%)	82 (59%)	92 (69%)	42 (31%)	70 (49%)	72 (51%)
NT	27 (46%)	32 (54%)	25 (45%)	30 (55%)	38 (49%)	40 (51%)	26 (30%)	60 (70%)
WA	66 (38%)	108 (62%)	55 (32%)	115 (68%)	85 (39%)	131 (61%)	68 (38%)	110 (62%)
New Zealand								
	111 (31%)	249 (69%)	84 (25%)	251 (75%)	95 (30%)	224 (70%)	113 (34%)	216 (66%)

Figures 5.80 and 5.81 show 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 18-77%. The corresponding range in New Zealand was 19-68%. This wide variation reflects differences in practices, protocols, resources and patient case-mix among centres.

Figure 5.80

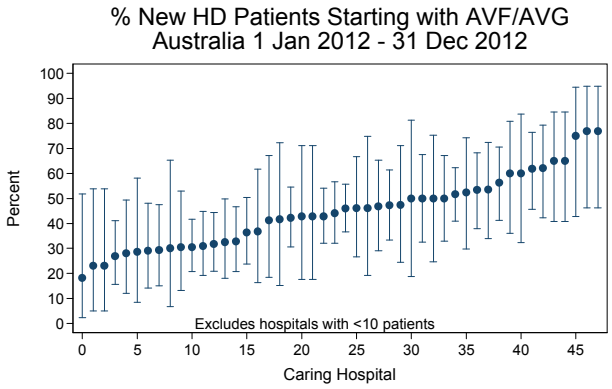
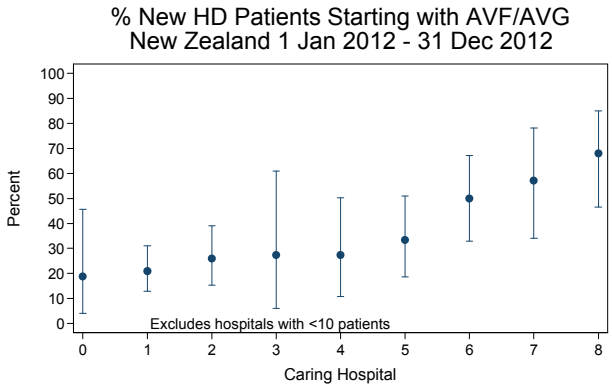


Figure 5.81



PREVALENT HAEMODIALYSIS ACCESS

Figures 5.82 - 5.90

These show dialysis access among prevalent (rather than incident) patients (those receiving haemodialysis at 31 December 2012).

In both Australia and New Zealand, the proportions of patients dialysing with an AV graft at 31 December 2012 are declining, while those dialysing with an AV fistulas are stable. The proportions dialysing with catheters have increased in New Zealand more than in Australia in 2012.

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.

Figure 5.82

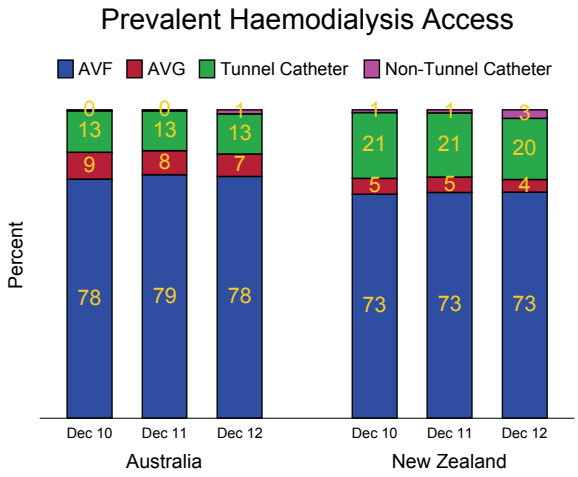
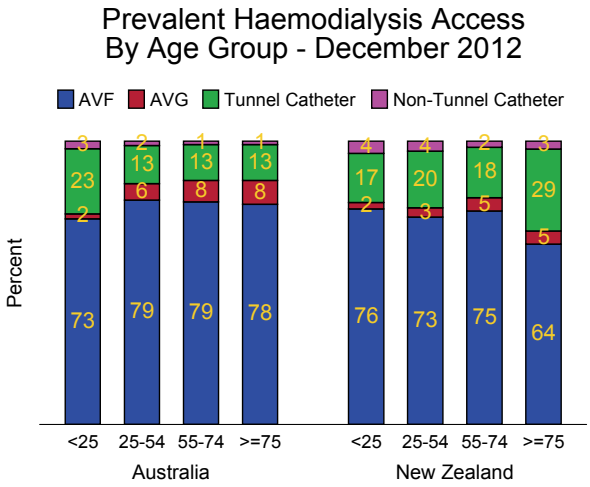


Figure 5.83



Prevalent Haemodialysis Access

Figure 5.84

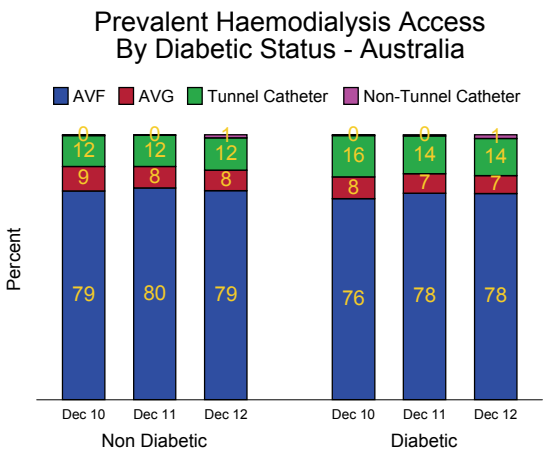
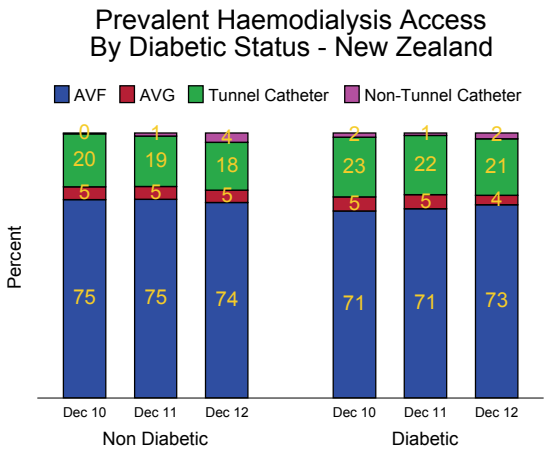


Figure 5.85



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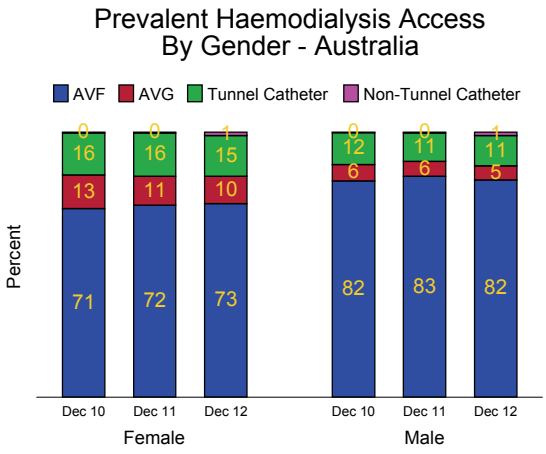


Figure 5.87

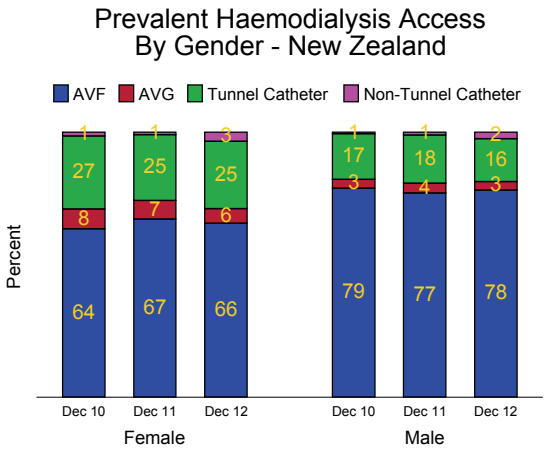
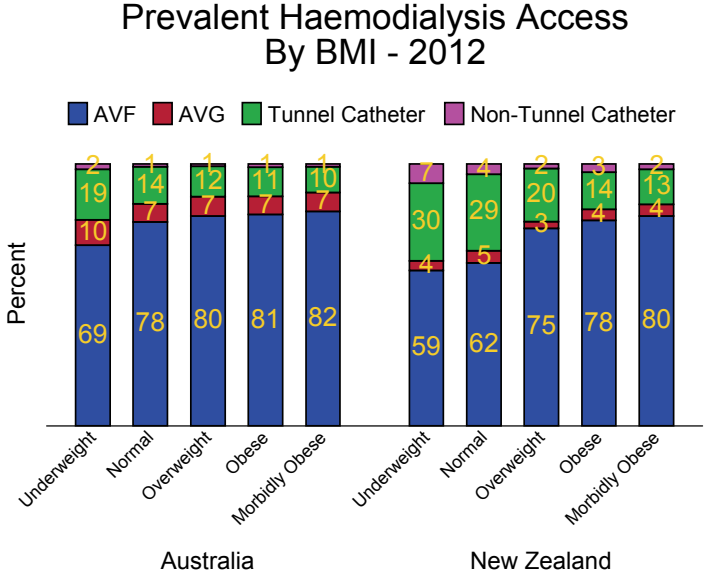


Figure 5.88



PREVALENT HAEMODIALYSIS ACCESS

In Australia indigenous people were more likely to be dialysing with an AVF. In New Zealand, Maori 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 5.89

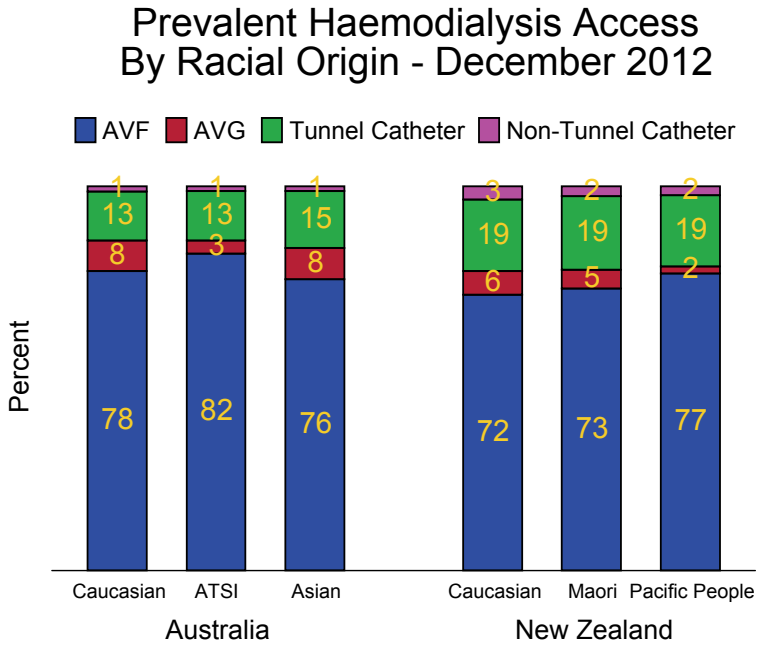
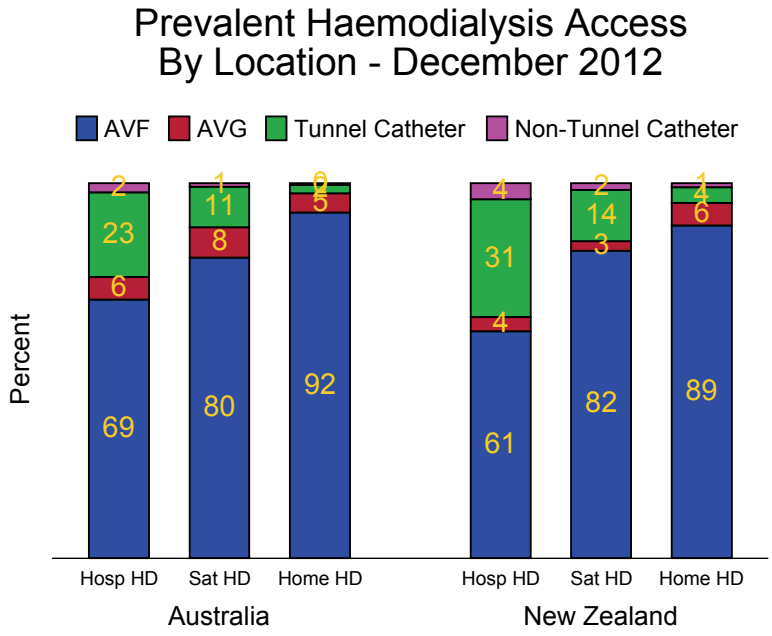


Figure 5.90



Prevalent Haemodialysis Access

Figures 5.91 - 5.93 show the proportion of haemodialysis patients at each state or hospital dialysing with an AVF/AVG on 31st December, 2012, arranged from the lowest to the highest.

In Australia, the hospital proportions varied widely from 71-100%. The corresponding range in New Zealand was 68-89%. The error bars displayed show the 95% confidence intervals.

Figure 5.91

Prevalent Vascular Access at 31-Dec-2012

	Dec 2010		Dec 2011		Dec 2012	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia						
QLD	1426 (88%)	196 (12%)	1430 (87%)	212 (13%)	1383 (87%)	208 (13%)
NSW/ACT	2391 (85%)	432 (15%)	2492 (86%)	414 (14%)	2418 (85%)	442 (15%)
Vic	1972 (88%)	257 (12%)	2049 (89%)	256 (11%)	2022 (88%)	278 (12%)
Tas	128 (88%)	18 (12%)	134 (85%)	24 (15%)	152 (84%)	29 (16%)
SA	505 (89%)	61 (11%)	555 (93%)	41 (7%)	541 (92%)	46 (8%)
NT	368 (92%)	34 (8%)	393 (90%)	42 (10%)	394 (86%)	65 (14%)
WA	621 (77%)	183 (23%)	674 (78%)	190 (22%)	600 (76%)	187 (24%)
New Zealand						
	1209 (78%)	346 (22%)	1246 (78%)	347 (22%)	1298 (77%)	378 (23%)

Figure 5.92

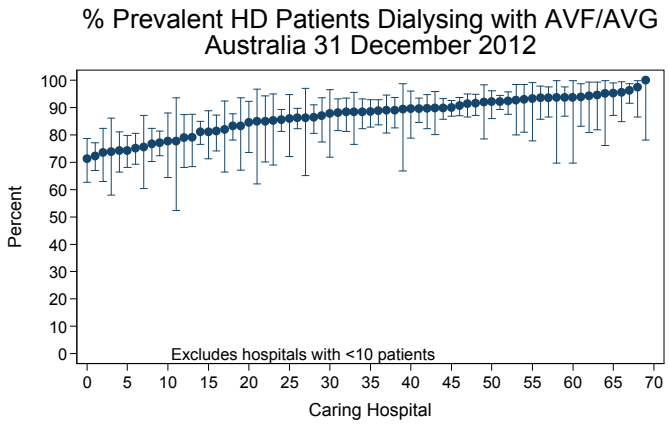
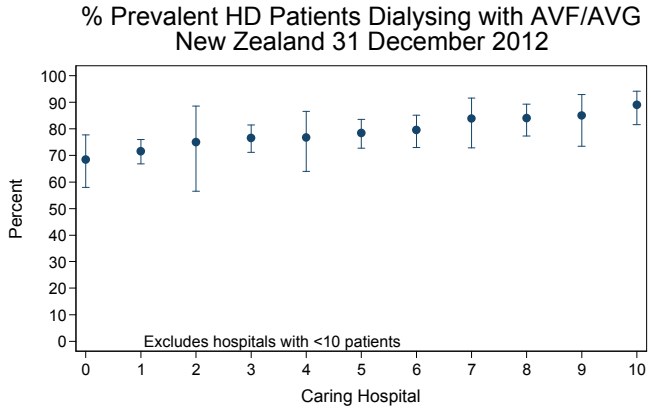


Figure 5.93



OBESITY AMONG INCIDENT HAEMODIALYSIS PATIENTS

Figures 5.94 - 5.99 show the proportions of incident haemodialysis patients with obesity and morbid obesity. In both Australia and New Zealand obesity rates have been increasing over the last ten years. The proportion of morbidly obese patients starting haemodialysis has doubled from 2003 to 2012 in Australia and increased by approximately 63% in New Zealand.

As might be expected, patients with diabetes are more likely to be obese or morbidly obese compared with those without diabetes (Figures 5.99 - 5.100).

Obesity for these analysis is defined as a BMI>30kg/m². Morbid obesity is defined as ≥35kg/m²

Figure 5.94

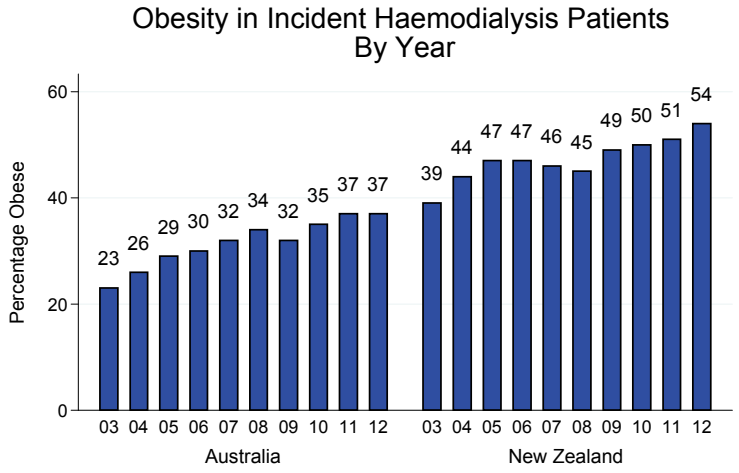


Figure 5.95

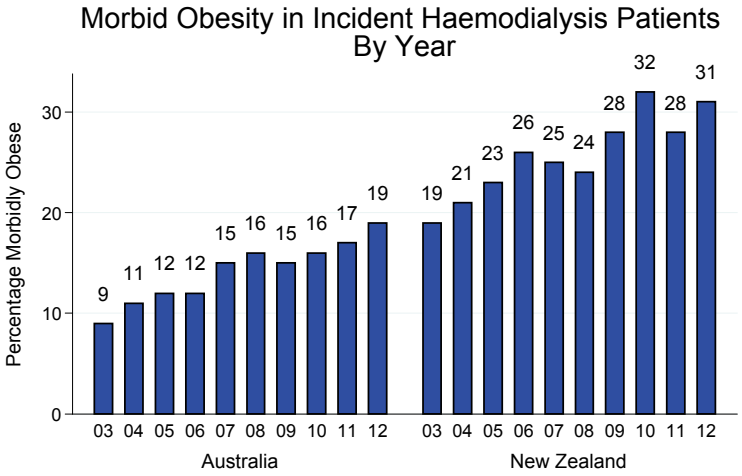
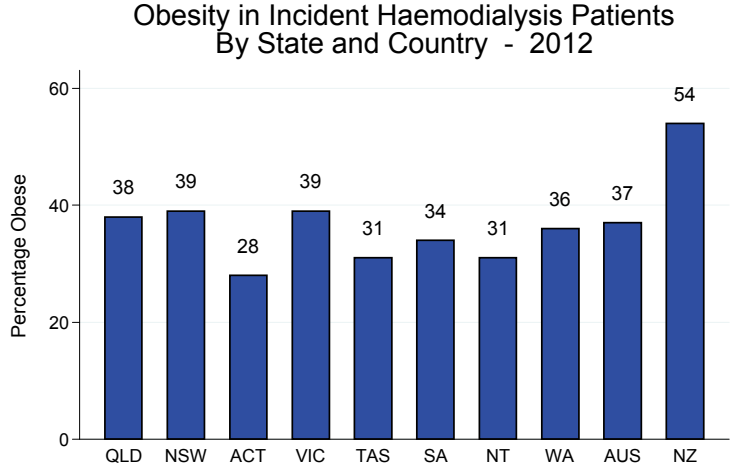


Figure 5.96



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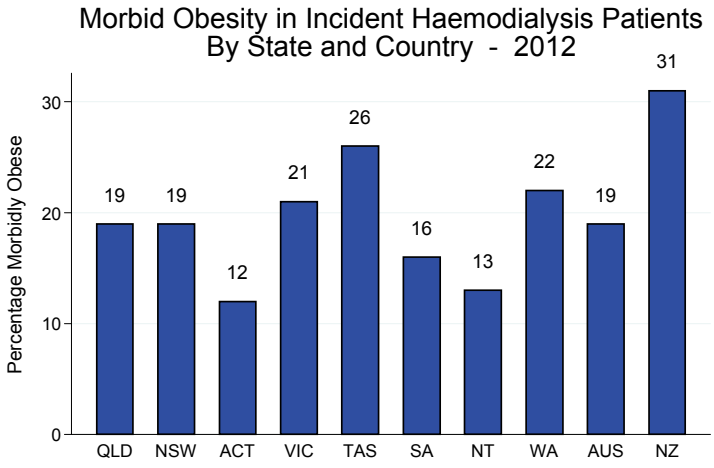

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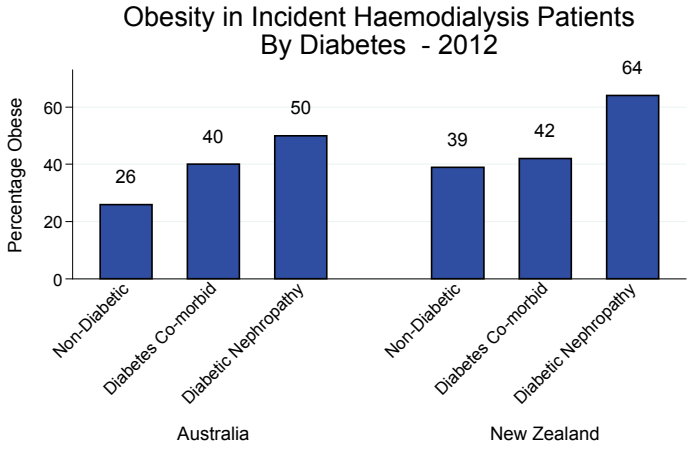
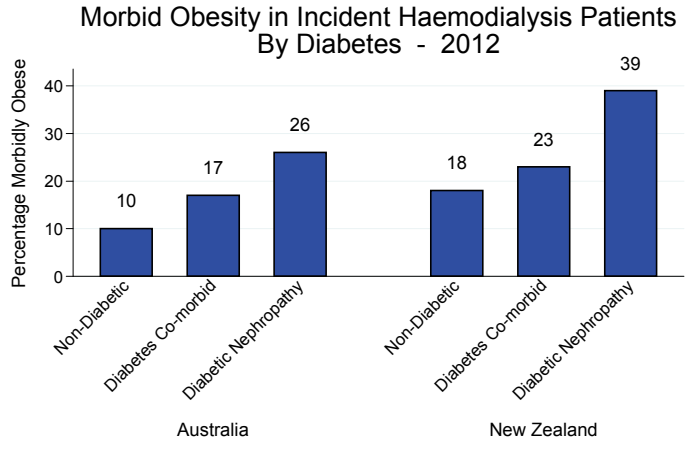


Figure 5.99



OBESITY AMONG PREVALENT HAEMODIALYSIS PATIENTS

Figures 5.100 - 5.105 show the proportion of prevalent haemodialysis patients with obesity and morbid obesity. In both Australia and New Zealand prevalent obesity rates have been increasing over the last ten years. In Australia the proportion of morbidly obese patients treated with haemodialysis has nearly doubled from 2003 to 2012.

Patients with diabetes are more likely to be obese or morbidly obese compared to those without diabetes (Figures 5.104 and 5.105).

Figure 5.100

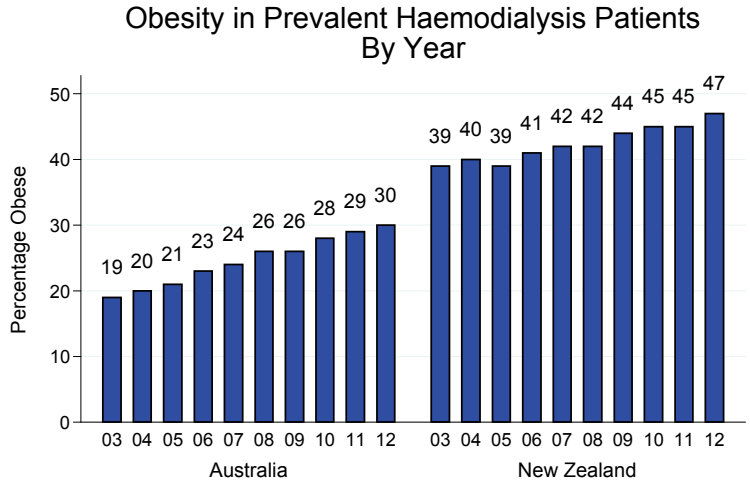
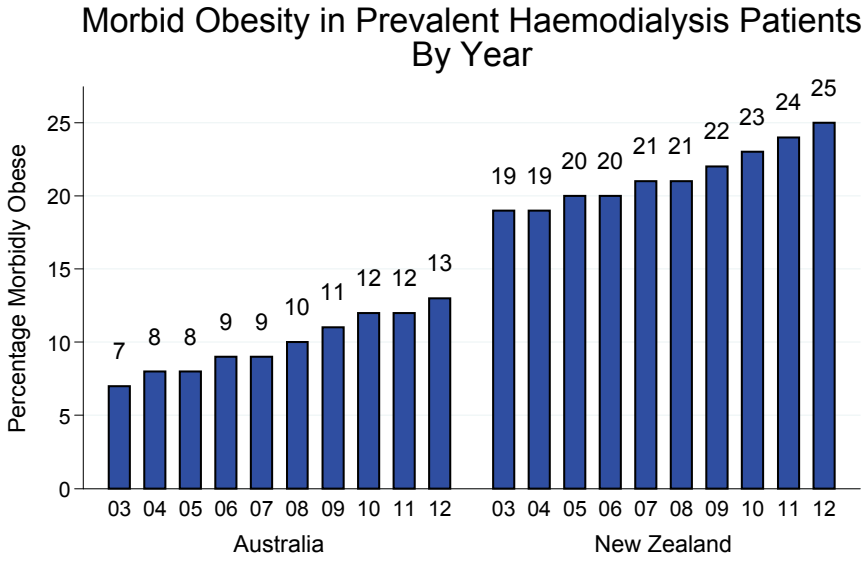


Figure 5.101



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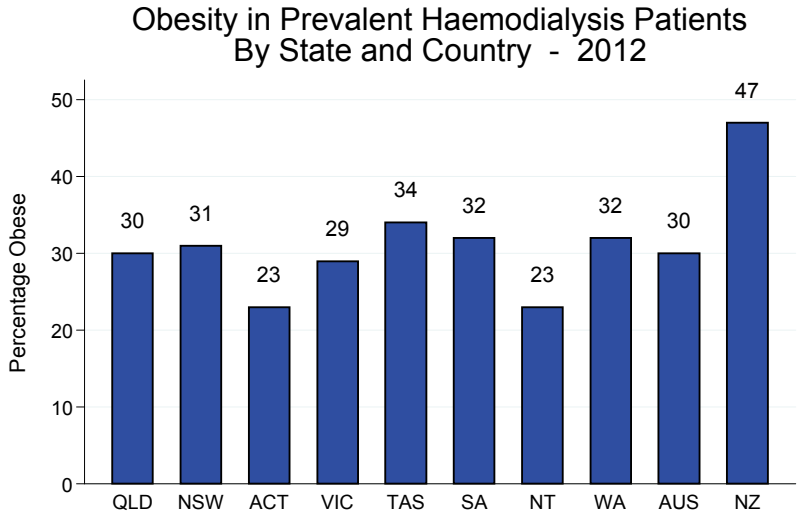
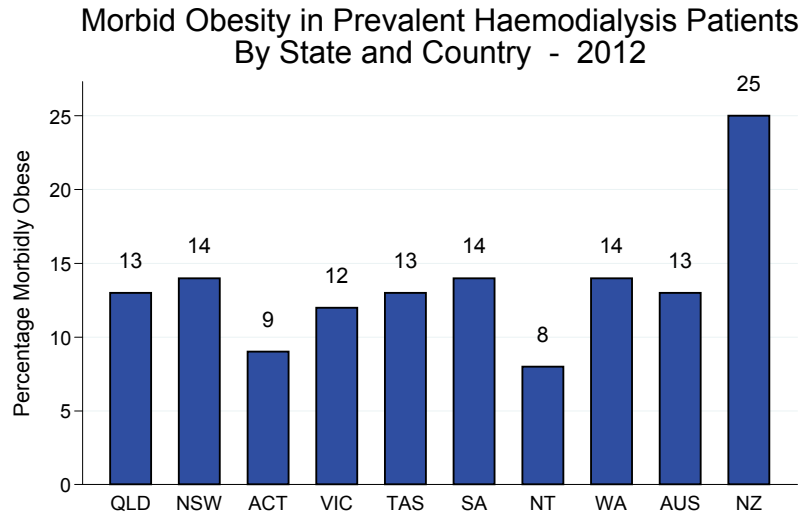


Figure 5.103



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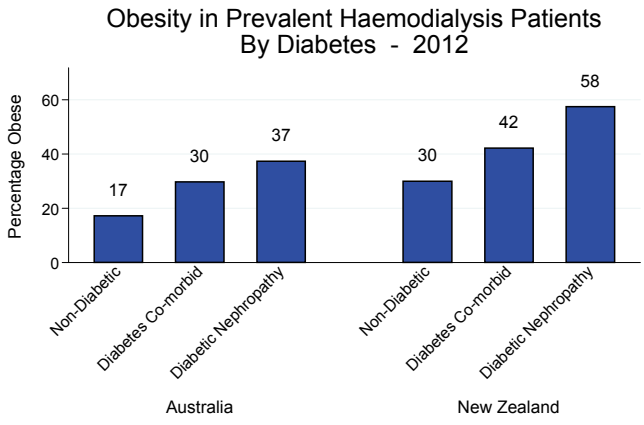
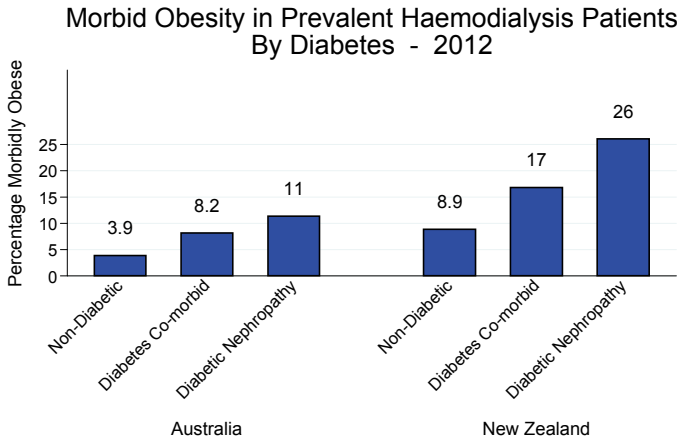


Figure 5.105



Home Haemodialysis

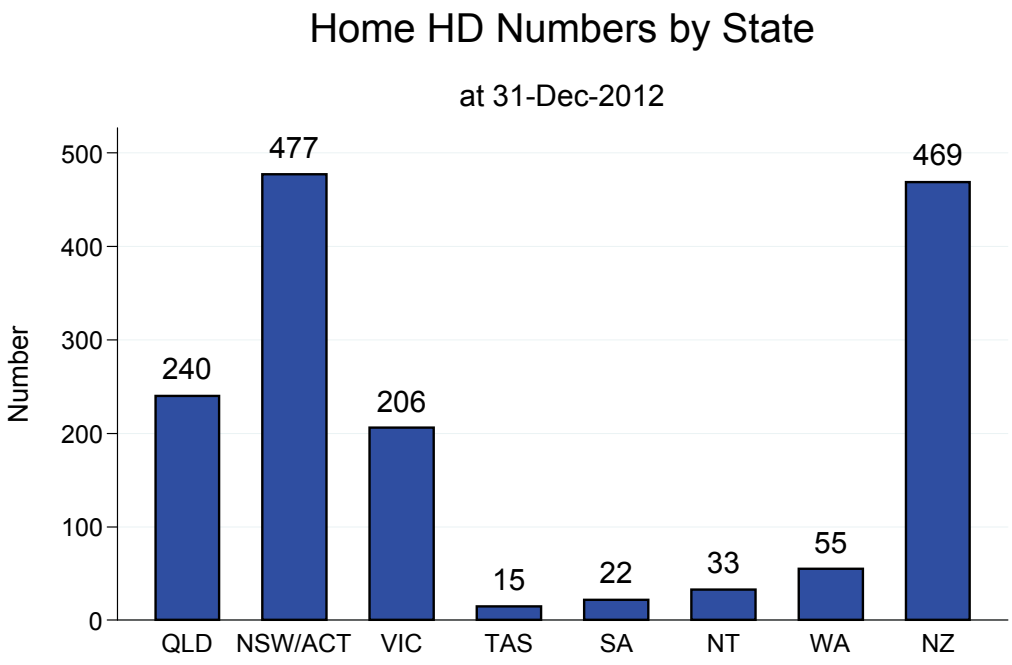
The proportion of all prevalent dialysis patients who were using home HD in each State was 12% for New South Wales / ACT, 11.5% Queensland, 7.4% Victoria, 6.6% the Northern Territory, 7% Tasmania, 4.8% Western Australia and 3% for South Australia.

The distribution of patients receiving home haemodialysis by state is shown in Figure 5.106. As can be appreciated, numbers are greatest in New South Wales and in New Zealand, with substantial numbers also in Victoria and Queensland.

These proportions were lower among older people (Figure 5.108).

Considerable further discussion is contained in chapter 4 .

Figure 5.106



The distribution of prevalent home dialysis patients by age group is shown in Figure 5.107.

Figure 5.107

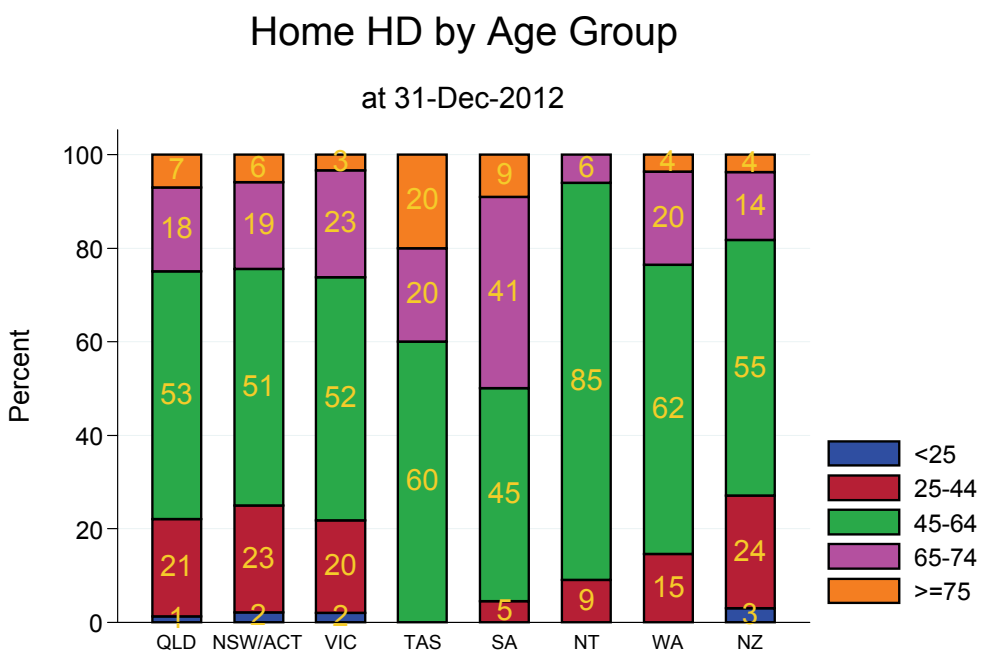


Figure 5.108

Proportion (%) of Prevalent Patients aged ≥ 65 years Treated with Home Haemodialysis 2008 - 2012

State	2008	2009	2010	2011	2012
Australia	243 (4.4%)	254 (4.3%)	276 (4.5%)	298 (4.7%)	349 (5.3%)
Queensland	37 (4.1%)	37 (4.0%)	41 (4.2%)	47 (4.9%)	60 (6.1%)
New South Wales/ACT	97 (5.4%)	100 (5.3%)	102 (5.2%)	109 (5.4%)	117 (5.5%)
Victoria	44 (3.5%)	43 (3.3%)	47 (3.4%)	47 (3.2%)	54 (3.5%)
Tasmania	2 (2.7%)	2 (2.4%)	4 (4.3%)	4 (4.0%)	6 (5.4%)
South Australia	0 (0.0%)	0 (0.0%)	3 (0.8%)	4 (1.0%)	11 (2.7%)
Northern Territory	1 (2.0%)	1 (2.3%)	1 (1.9%)	1 (1.7%)	2 (2.9%)
Western Australia	4 (0.9%)	5 (1.1%)	8 (1.7%)	9 (1.8%)	13 (2.5%)
New Zealand	58 (8.2%)	66 (8.6%)	70 (8.5%)	77 (9.3%)	86 (10.1%)

The trend in numbers treated with home HD for different age groups are illustrated for Australia and New Zealand in the Figure 5.109 and 5.110. 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 5.109

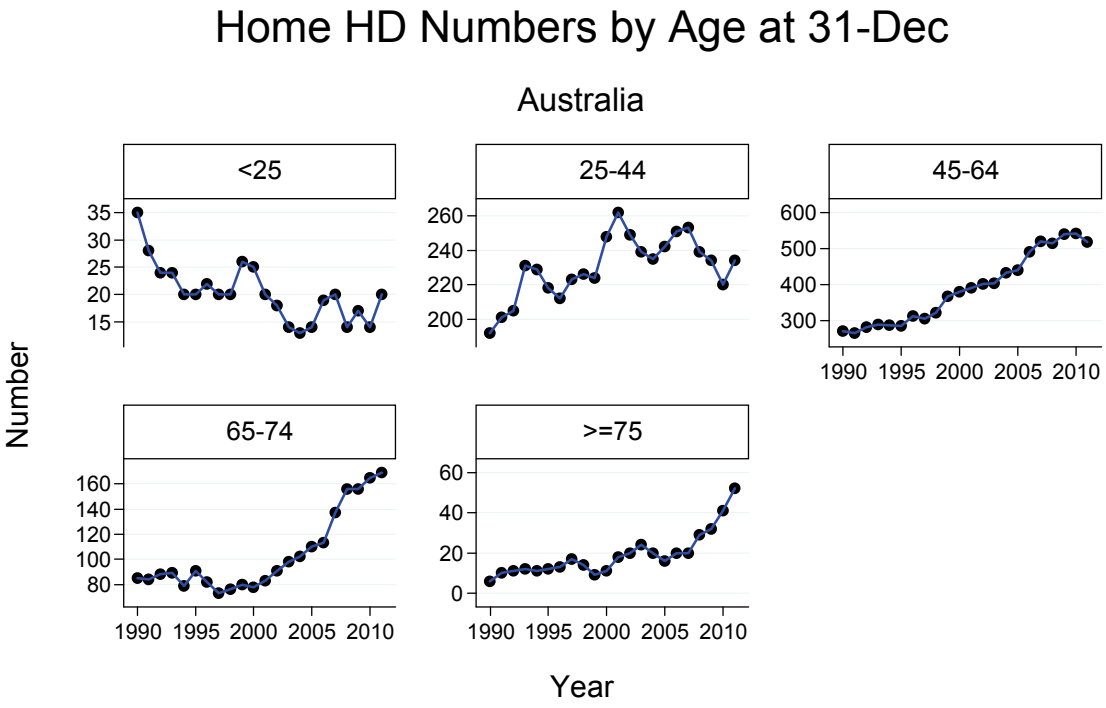
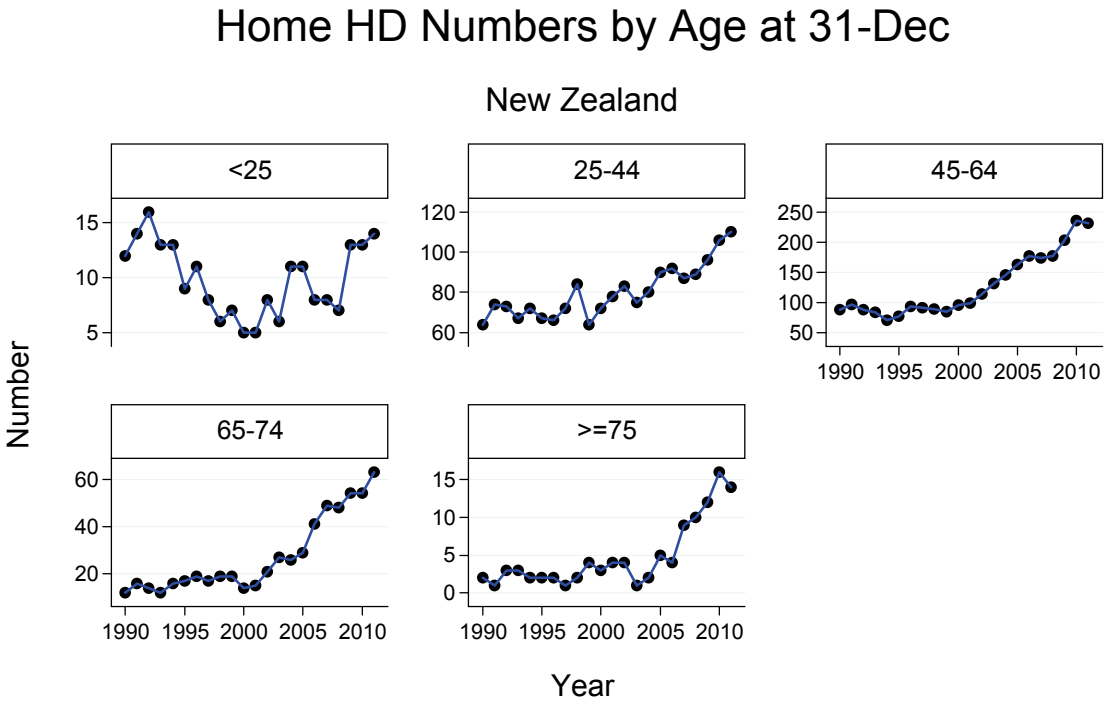


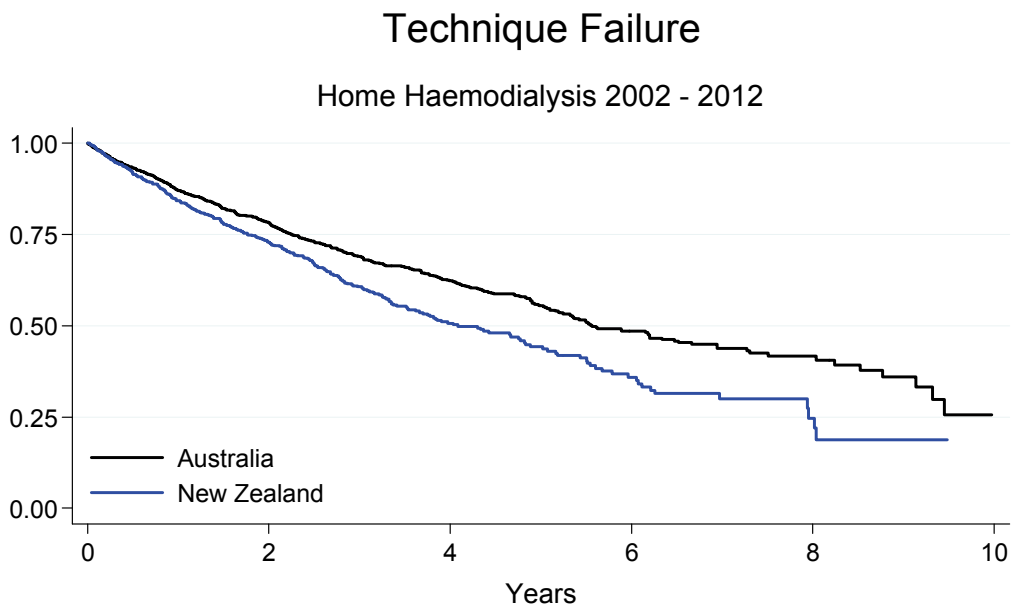
Figure 5.110



Technique failure

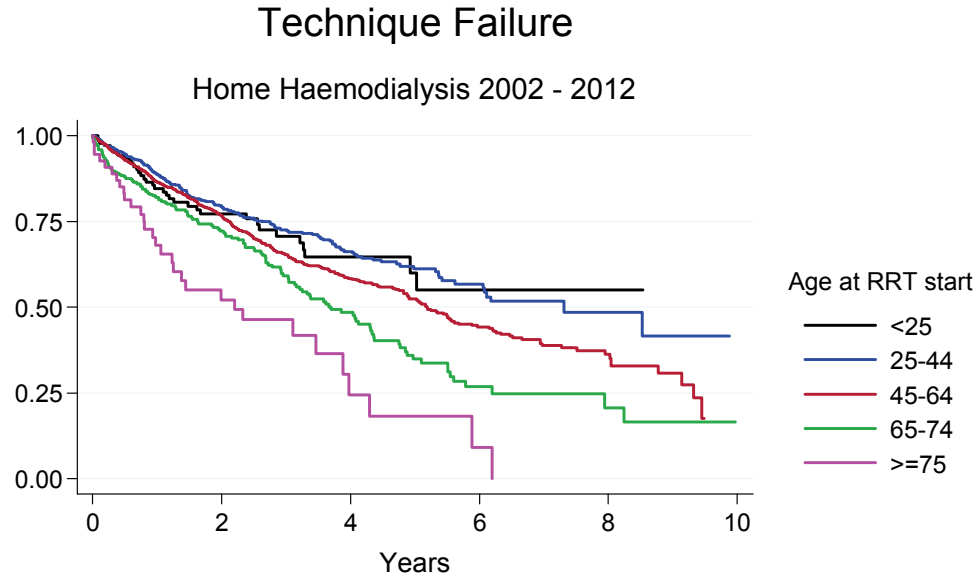
The following three figures explore the concept of technique failure as applied to home haemodialysis. Each treatment episode can end in a variety of ways. Changes to another dialysis modality (either institutional haemodialysis or peritoneal dialysis) are considered a “failure”, as is death. Follow-up is censored at transplantation, or 31 Dec 2012.

Figure 5.111



Censored at transplantation

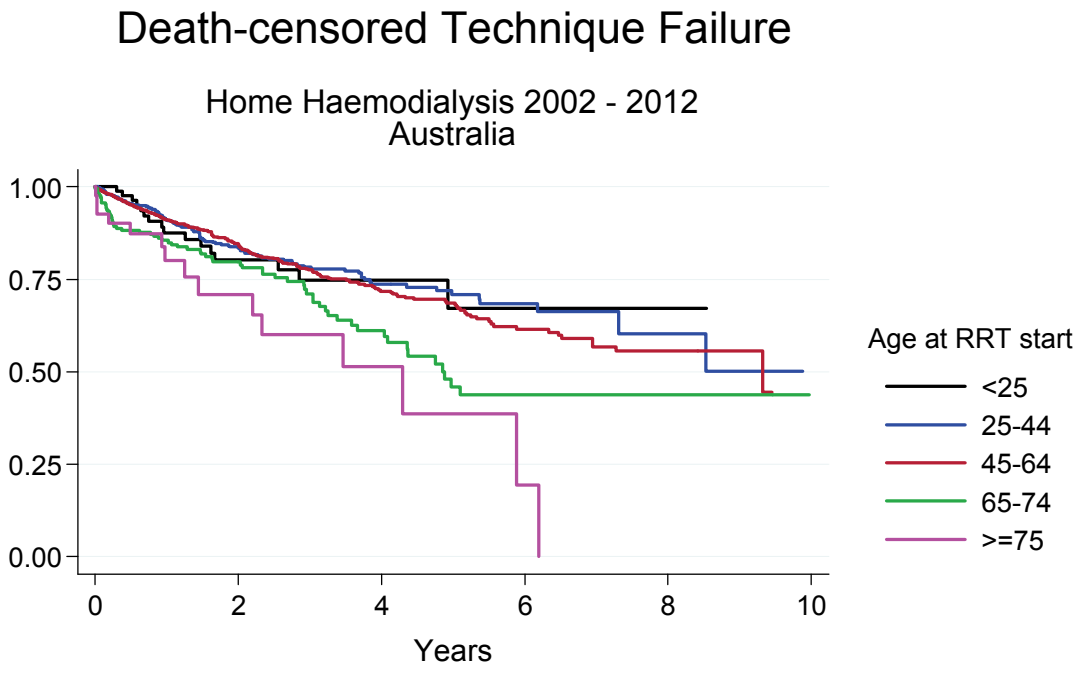
Figure 5.112



Censored at transplantation
Australia and New Zealand combined

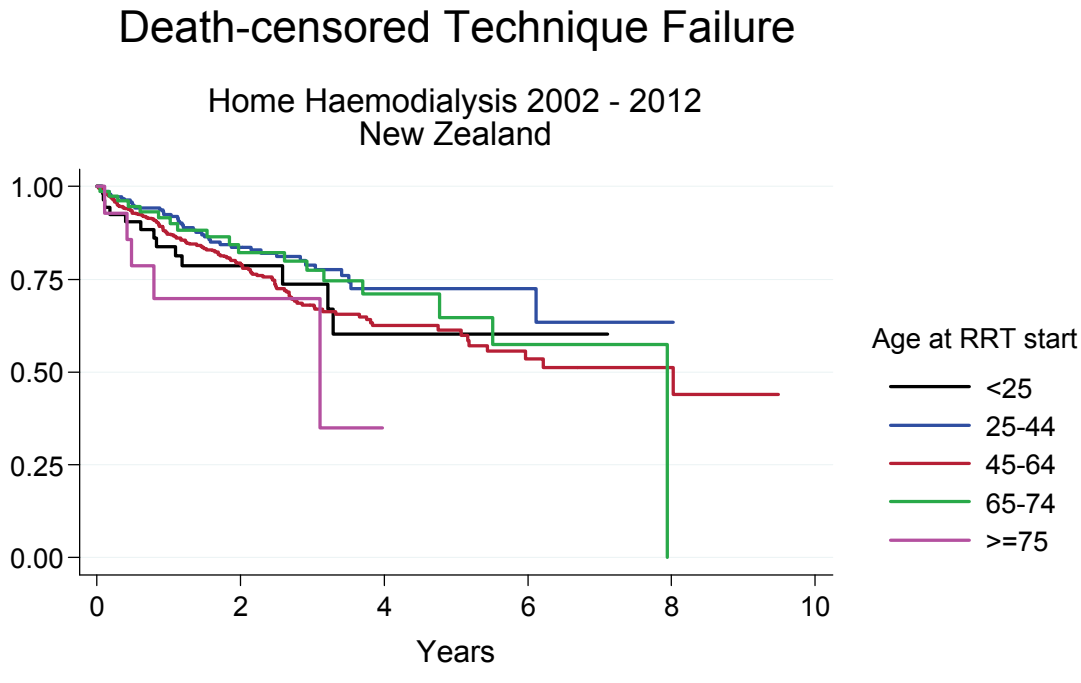
When death of patient is counted as a censoring event (rather than "failure"), the differences between the age groups become less apparent (Figure 5.113). It can be seen that (among those alive and not transplanted) over 75% of home haemodialysis patients continue in this therapy after 2 years. However, as time passes there is a progressive difference which emerges with higher technique failure rates among the older patients.

Figure 5.113



Censored at transplantation and death

Figure 5.114



Censored at transplantation and death

Definitions in use

CARI guidelines	**Caring for Australasians with Renal Impairment guidelines**
Quotidian HD	**> 3 sessions/week and/or > 5.5 hours/session**
Long Hour HD	**≥ 6.5 hours per HD session**
High Flux Dialyser	**Ultrafiltration coefficient (kuf) >20 ml/hr/mmHg as specified by the manufacturer)**
AVF	**Native vein arteriovenous fistula**
AVG	**Synthetic arteriovenous bridge graft**
CVC	**Central venous HD catheter (Includes both tunnelled and non-tunnelled unless otherwise stated)**
Obese	**BMI ≥ 30**
Morbid Obesity	**BMI ≥ 35**

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