CHAPTER 5

HAEMODIALYSIS

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Definitions

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 Obe\sity	**BMI ≥ 35**

STOCK AND FLOW

AUSTRALIA

The annual stock and flow of HD patients during the period 2005-2009 is shown in Figures 5.1, 5.2 and 5.3.

There were 8,164 patients (373 per million) receiving HD treatment at 31st December 2009, an increase of 3%; of these 29% were hospital based, 59% were in satellite centres and 12% at home, the same as in 2008.

The proportion of all prevalent dialysis patients who were using home HD in each State was 14% for New South Wales, 12% the ACT, 10% Queensland, 8% Victoria, 7% the Northern Territory, 5% Tasmania, 3% Western Australia and 2% for South Australia. These proportions were lower among older people (Figure 5.6).

A total of 2,001 patients received HD for the first time during the year, a decrease of 6% from 2008, after an increase of 6% from 2007 to 2008.

The proportion of all HD patients in each age group is shown in Figure 5.8. There were 2,064 people ≥ 75 years receiving haemodialysis, including 308 people ≥ 85 years, a rise of 15% from 2008, following a 25% rise for the previous year.

There were 493 transplant operations, an 8% decrease from 2008 (535 operations), representing 6% of all HD patients dialysing and 11% of those patients < 65 years. There were 41 patients aged ≥ 65 years transplanted.

There were 1,217 deaths in 2009 (1,200 in 2008).

For more detail regarding age and mode of HD in each State see Appendix II at the Website (www.anzdata.org.au/ANZDATA/AnzdataReport/download.htm).

Figure 5.1

Stock and Flow of Haemodialysis Patients 2005 - 2009

	2005	2006	2007	2008	2009
Australia					
Patients new to HD	2025	2061	2017	2139	2001
First Dialysis Treatment	1730	1775	1726	1780	1654
Previous Dialysis (PD)	258	254	268	319	309
Failed Transplant	37	32	23	40	38
Transplanted	415	427	405	535	493
Deaths	927	1036	1163	1200	1217
Never Transplanted	859	962	1084	1137	1141
Previous Transplant	68	74	79	63	76
Transfers to Peritoneal Dialysis	489	556	446	506	413
Patients Dialysing (HD) at 31 December	6779	7209	7583	7898	8164
Patients Dialysing (HD) at Home 31 December	820	893	949	948	963
% of all Home Dialysis (HD and PD) Patients	31%	31%	31%	30%	31%
New Zealand					
Patients new to HD	389	408	378	395	417
First Dialysis Treatment	300	328	309	321	348
Previous Dialysis (PD)	74	70	57	66	59
Failed Transplant	15	10	12	8	10
Transplanted	44	51	60	69	61
Deaths	150	181	176	236	205
Never Transplanted	136	166	166	219	192
Previous Transplant	14	15	10	17	13
Transfers to Peritoneal Dialysis	136	190	157	166	115
Patients Dialysing (HD) at 31 December	1160	1232	1324	1340	1470
Patients Dialysing (HD) at Home 31 December	298	322	328	331	369
% of all Home Dialysis (HD and PD) Patients	29%	30%	31%	30%	32%

NEW ZEALAND

The annual stock and flow of HD patients during the period 2005-2009 is shown in Figures 5.1, 5.4 and 5.5.

There were 1,470 patients (341 per million) receiving treatment at 31st December 2009, a 10% increase from 2008, following only a 1% increase from the previous year.

Hospital based HD (46%), satellite HD (29%) and home HD (25%) have all remained the same for the past three years.

New Zealand is continued on page 5-6.

Figure 5.2

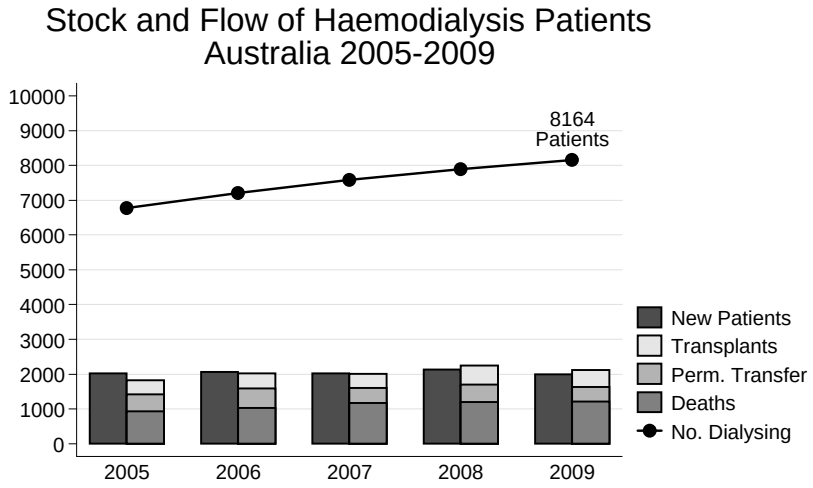


Figure 5.3

Stock and Flow of Haemodialysis Patients
Australia 2005 - 2009 Number (%)

Age Groups	2005	2006	2007	2008	2009
New Patients *					
00-14 years	15 (1%)	13 (1%)	9 (<1%)	13 (1%)	9 (<1%)
15-24 years	41 (2%)	34 (2%)	46 (2%)	42 (2%)	46 (2%)
25-34 years	107 (5%)	78 (4%)	94 (5%)	101 (5%)	84 (4%)
35-44 years	176 (9%)	197 (10%)	187 (9%)	170 (8%)	170 (8%)
45-54 years	316 (16%)	296 (14%)	315 (16%)	344 (16%)	302 (15%)
55-64 years	428 (21%)	454 (22%)	435 (22%)	445 (21%)	433 (22%)
65-74 years	528 (26%)	533 (26%)	484 (24%)	538 (25%)	495 (25%)
75-84 years	377 (19%)	411 (20%)	403 (20%)	429 (20%)	406 (20%)
>=85 years	37 (2%)	45 (2%)	44 (2%)	57 (3%)	56 (3%)
Total	2025 (100%)	2061 (100%)	2017 (100%)	2139 (100%)	2001 (100%)
Patients Dialysing					
00-14 years	7 (<1%)	7 (<1%)	5 (<1%)	10 (<1%)	9 (<1%)
15-25 years	97 (1%)	94 (1%)	98 (1%)	88 (1%)	92 (1%)
25-34 years	351 (5%)	302 (4%)	304 (4%)	290 (4%)	289 (4%)
35-44 years	669 (10%)	696 (10%)	736 (10%)	690 (9%)	685 (8%)
45-54 years	1106 (16%)	1140 (16%)	1208 (16%)	1268 (16%)	1299 (16%)
55-64 years	1427 (21%)	1565 (22%)	1614 (21%)	1713 (22%)	1764 (22%)
65-74 years	1625 (24%)	1753 (24%)	1805 (24%)	1892 (24%)	1962 (24%)
75-84 years	1351 (20%)	1468 (20%)	1600 (21%)	1680 (21%)	1756 (22%)
>=85 years	146 (2%)	184 (3%)	213 (3%)	267 (3%)	308 (4%)
Total	6779 (100%)	7209 (100%)	7583 (100%)	7898 (100%)	8164 (100%)
Primary Renal Disease *					
Glomerulonephritis	475 (23%)	463 (22%)	479 (24%)	460 (22%)	486 (24%)
Analgesic Nephropathy	57 (3%)	48 (2%)	46 (2%)	45 (2%)	36 (2%)
Hypertension	311 (15%)	307 (15%)	320 (16%)	320 (15%)	279 (14%)
Polycystic Disease	146 (7%)	134 (7%)	128 (6%)	126 (6%)	116 (6%)
Reflux Nephropathy	52 (3%)	62 (3%)	56 (3%)	58 (3%)	60 (3%)
Diabetic Nephropathy	637 (31%)	681 (33%)	638 (32%)	741 (35%)	667 (33%)
Miscellaneous	231 (11%)	252 (12%)	217 (11%)	232 (11%)	223 (11%)
Uncertain	116 (6%)	114 (6%)	133 (7%)	157 (7%)	134 (7%)
Total	2025 (100%)	2061 (100%)	2017 (100%)	2139 (100%)	2001 (100%)

* New patients receiving first haemodialysis treatment

Figure 5.4

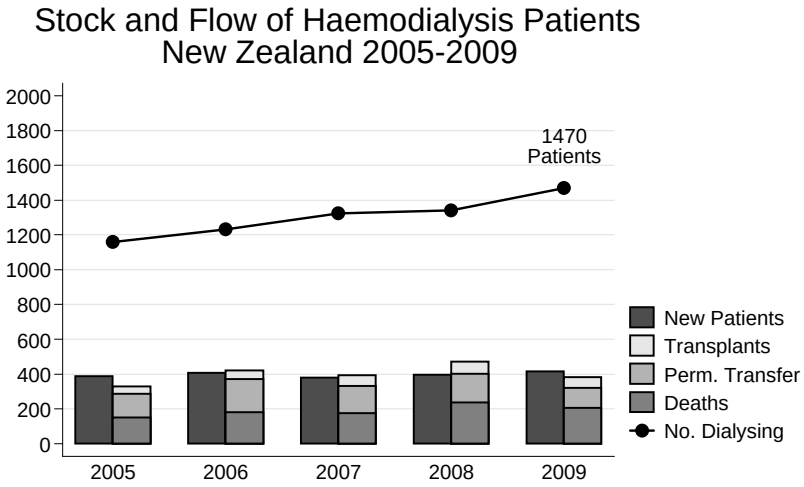


Figure 5.5

Stock and Flow of Haemodialysis Patients
New Zealand 2005 - 2009 Number (%)

Age Groups	2005	2006	2007	2008	2009
New Patients *					
00-14 years	2 (1%)	3 (1%)	3 (1%)	5 (1%)	2 (<1%)
15-24 years	12 (3%)	15 (4%)	21 (6%)	19 (5%)	10 (2%)
25-34 years	14 (4%)	30 (7%)	17 (4%)	15 (4%)	24 (6%)
35-44 years	44 (11%)	33 (8%)	45 (12%)	34 (9%)	51 (12%)
45-54 years	79 (20%)	92 (23%)	63 (17%)	84 (21%)	84 (20%)
55-64 years	120 (31%)	96 (24%)	98 (26%)	117 (30%)	103 (25%)
65-74 years	91 (23%)	95 (23%)	89 (24%)	90 (23%)	89 (21%)
75-84 years	23 (6%)	40 (10%)	38 (10%)	30 (8%)	51 (12%)
>=85 years	4 (1%)	4 (1%)	4 (1%)	1 (<1%)	3 (1%)
Total	389 (100%)	408 (100%)	378 (100%)	395 (100%)	417 (100%)
Patients Dialysing					
00-14 years	2 (<1%)	2 (<1%)	3 (<1%)	3 (<1%)	3 (<1%)
15-25 years	32 (3%)	32 (3%)	39 (3%)	38 (3%)	41 (3%)
25-34 years	82 (7%)	88 (7%)	80 (6%)	76 (6%)	91 (6%)
35-44 years	152 (13%)	150 (12%)	160 (12%)	149 (11%)	161 (11%)
45-54 years	244 (21%)	247 (20%)	261 (20%)	275 (21%)	304 (21%)
55-64 years	325 (28%)	347 (28%)	362 (27%)	373 (28%)	403 (27%)
65-74 years	242 (21%)	270 (22%)	299 (23%)	291 (22%)	311 (21%)
75-84 years	76 (7%)	87 (7%)	107 (8%)	125 (9%)	145 (10%)
>=85 years	5 (<1%)	9 (1%)	13 (1%)	10 (1%)	11 (1%)
Total	1160 (100%)	1232 (100%)	1324 (100%)	1340 (100%)	1470 (100%)
Primary Renal Disease *					
Glomerulonephritis	96 (25%)	92 (23%)	88 (23%)	71 (18%)	94 (23%)
Analgesic Nephropathy	-	1 (<1%)	3 (1%)	1 (<1%)	1 (<1%)
Hypertension	38 (10%)	40 (10%)	44 (12%)	35 (9%)	44 (11%)
Polycystic Disease	29 (7%)	23 (6%)	15 (4%)	14 (4%)	18 (4%)
Reflux Nephropathy	9 (2%)	7 (2%)	8 (2%)	9 (2%)	3 (1%)
Diabetic Nephropathy	161 (41%)	184 (45%)	161 (43%)	204 (52%)	203 (49%)
Miscellaneous	37 (10%)	32 (8%)	47 (12%)	46 (12%)	40 (10%)
Uncertain	19 (5%)	29 (7%)	12 (3%)	15 (4%)	14 (3%)
Total	389 (100%)	408 (100%)	378 (100%)	395 (100%)	417 (100%)

* New patients receiving first haemodialysis treatment

Figure 5.6

Proportion (%) of Prevalent Patients aged ≥ 65 years Treated with Home Haemodialysis 2005 - 2009

State	2005	2006	2007	2008	2009
Queensland	2.5%	3.5%	3.7%	4.3%	4.1%
New South Wales	5.9%	4.9%	5.4%	5.5%	5.3%
Australian Capital Territory	2.5%	4.2%	3.8%	4.4%	5.6%
Victoria	2.0%	2.1%	2.9%	3.6%	3.5%
Tasmania	1.4%	3.0%	2.6%	2.7%	2.4%
South Australia	1.1%	-	-	-	-
Northern Territory	-	2.1%	2.0%	2.0%	2.3%
Western Australia	0.3%	0.3%	-	0.9%	1.1%
Australia	3.1%	3.1%	3.4%	3.8%	3.8%
New Zealand	5.4%	6.6%	8.1%	8.2%	8.5%

Figure 5.7

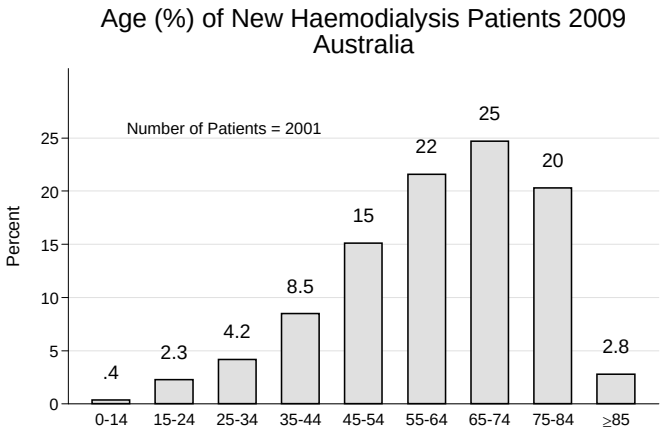
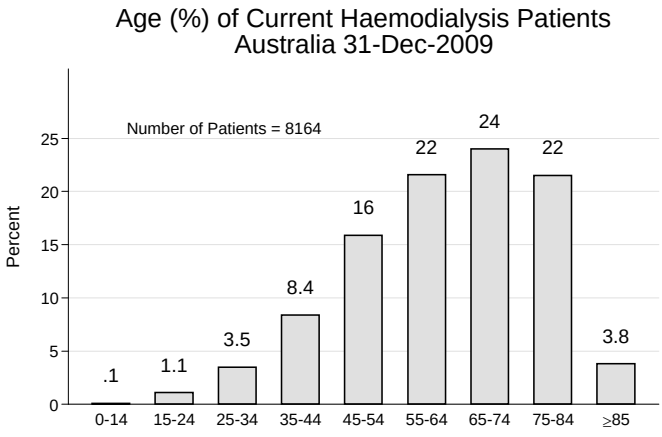


Figure 5.8



NEW ZEALAND (continued from page 5-2)

There were 417 patients who received HD for the first time, a 6% increase in number from 2008, following a 4% increase from the previous year. Eighty three percent were having their initial dialysis treatment, 14% were previously dialysing with peritoneal dialysis and 2% were failed transplants.

The modal age group for new HD patients was 55-64 years (25%), 9% were <35 years and 34% ≥ 65 years (Figures 5.5 and 5.9). The age distribution of the prevalent HD population was 55-64 years (27%), 9% were <35 years and 32% were ≥ 65 years (Figure 5.10).

There were 61 HD patients who received transplants in 2009 (69 in 2008), representing 4% of all HD patients dialysing and 5% of those patients < 65 years. Nine patients ≥ 65 years were transplanted.

There were 205 deaths in 2009 compared to 236 the previous year.

For more details see Appendix III at the Website (www.anzdata.org.au/ANZDATA/AnzdataReport/download.htm).

Figure 5.9

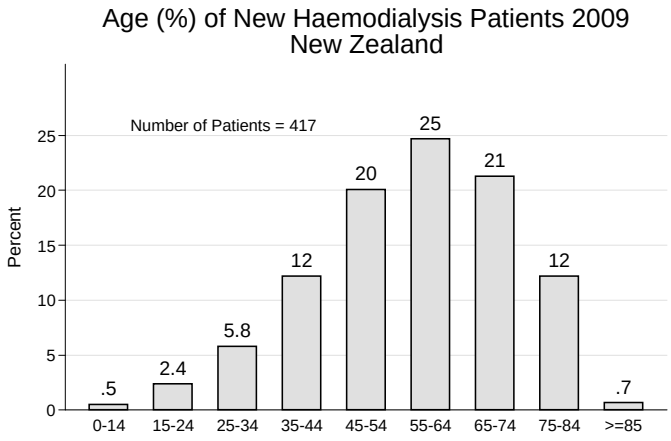
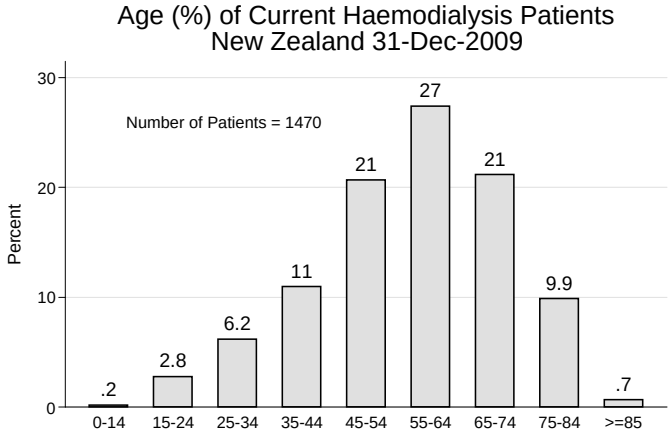


Figure 5.10



AUSTRALIA

Blood flow rates in Australia continued to slowly rise. The proportion receiving a prescribed blood flow rate of 300 mls/minute or higher has risen to 81% in 2009 from 79% in 2008 and 77% in 2007.

Only 4% (338 patients) were prescribed < 250 mls/minute.

Blood flow rates are lower in patients dialysing using central venous catheters than in those using AVFs or AVGs (Figure 5.12).

Figure 5.11

Blood Flow Rates (mls/minute) 2005 - 2009

Country		No. Pts	*	Mls/Minute					
				<200	200-249	250-299	300-349	350-399	>400
Aust	December 2009	8163	1	0.6%	3.6%	14.7%	57.4%	19.7%	4.0%
	December 2008	7898	-	0.7%	4.4%	16.2%	54.8%	20.0%	3.9%
	December 2007	7581	2	0.5%	4.5%	18.4%	53.2%	19.5%	3.9%
	December 2006	7208	1	0.4%	4.5%	19.3%	52.3%	19.1%	4.4%
	December 2005	6779	-	0.6%	4.9%	19.4%	53.3%	18.2%	3.6%
NZ	December 2009	1469	1	0.3%	6.4%	25.3%	45.6%	20.1%	2.3%
	December 2008	1340	-	0.4%	7.5%	31.8%	41.1%	17.2%	1.9%
	December 2007	1324	-	0.5%	6.6%	28.8%	41.1%	21.0%	2.1%
	December 2006	1232	-	0.4%	6.9%	26.3%	44.8%	19.5%	2.1%
	December 2005	1160	-	0.5%	9.5%	23.8%	42.6%	21.6%	2.0%

NEW ZEALAND

In December 2009, 68% of patients were prescribed 300 mls/minute or higher compared to 60% in 2008 and 64% in 2007.

There were 7% (98 patients) using < 250 mls/minute, compared to 8% in 2008 and 7% in 2007; many of these were receiving long hour HD.

Figure 5.12

Blood Flow Rate by Type of Access December 2009

Blood Flow Rate	Australia			New Zealand		
	AVF	AVG	CVC *	AVF	AVG	CVC
<200	25 (0.4%)	2 (0.3%)	21 (1.8%)	2 (0.2%)	-	2 (0.5%)
200-249	186 (3.0%)	20 (2.6%)	84 (7.3%)	61 (6%)	4 (4.9%)	29 (7.8%)
250-299	778 (12.5%)	120 (15.4%)	306 (26.7%)	170 (16.7%)	38 (46.9%)	163 (44.1%)
300-349	3543 (56.8%)	502 (64.4%)	641 (55.8%)	481 (47.2%)	36 (44.4%)	153 (41.4%)
350-399	1401 (22.5%)	114 (14.6%)	91 (7.9%)	270 (26.5%)	3 (3.7%)	23 (6.2%)
>=400	303 (4.9%)	21 (2.7%)	5 (0.4%)	34 (3.3%)	-	-
Total	6236 (100%)	779 (100%)	1148 (100%)	1018 (100%)	81 (100%)	370 (100%)

* Number of patients having C.V.V. HD not included

Figure 5.13

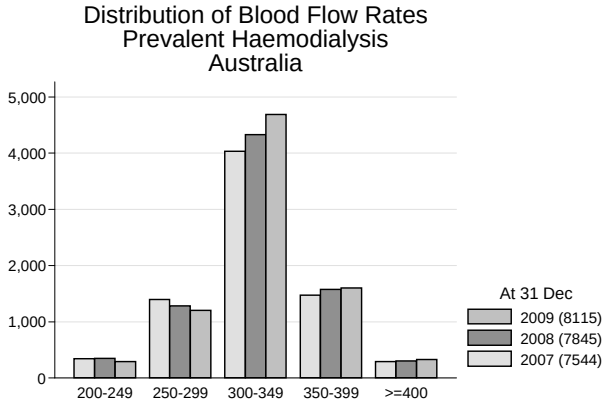


Figure 5.14

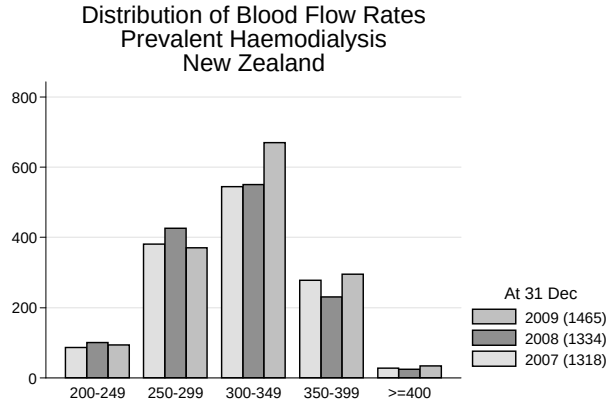
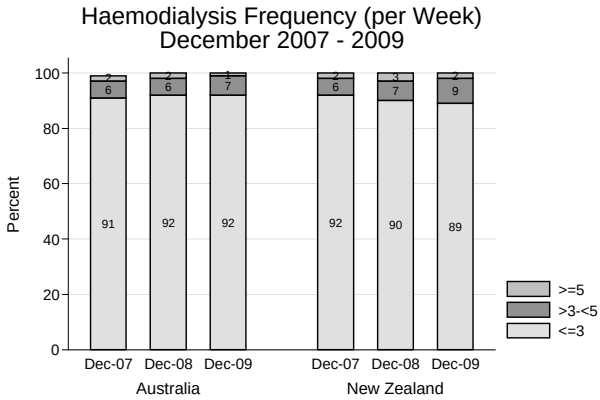


Figure 5.15

Duration and Number of Sessions Per Week
December 2009

Sessions Per week	Hours of Each Treatment						Total
	<4	4	4>4-4.5	>4.5-5	>5-5.5	>5.5	
Australia							
≤ 3	327 (4.4%)	3186 (42.6%)	1547 (20.7%)	2103 (28.1%)	126 (1.7%)	183 (2.4%)	7472 (100%)
3.5-4.5	35 (6.1%)	95 (16.6%)	46 (8.1%)	104 (18.2%)	15 (2.6%)	274 (48.1%)	569 (100%)
≥ 5	60 (49.0%)	25 (20.0%)	1 (0.8%)	3 (2.4%)	2 (1.6%)	31 (25.4%)	122 (100%)
Total	422 (5.2%)	3306 (40.5%)	1594 (19.5%)	2210 (27.1%)	143 (1.8%)	488 (6.0%)	8163 (100%)
New Zealand							
≤ 3	32 (2.4%)	531 (40.4%)	263 (20.0%)	405 (30.8%)	28 (2.1%)	53 (4.0%)	1312 (100%)
3.5-4.5	9 (6.9%)	24 (18.6%)	16 (12.4%)	42 (32.6%)	5 (3.9%)	33 (25.6%)	129 (100%)
≥ 5	7 (25.0%)	10 (35.7%)	3 (10.7%)	4 (14.2%)	2 (7.1%)	2 (7.1%)	28 (100%)
Total	48 (3.3%)	565 (38.5%)	282 (19.2%)	451 (30.7%)	35 (2.4%)	88 (6.0%)	1469 (100%)

Figure 5.16



FREQUENT AND LONG HAEMODIALYSIS

(Figures 5.15 - 5.24)

The proportions of those dialysing > 3 times per week in Australia has plateaued with no change from 2007 to 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 plateaued as has the total hours per week. As a result, the proportions dialysing more than the "standard" 12 hours per week has now stabilised in both Australia and New Zealand.

In 2009, 56% and 61% of HD patients were dialysing ≥ 13.5 hours per week in Australia and New Zealand respectively.

Figure 5.17

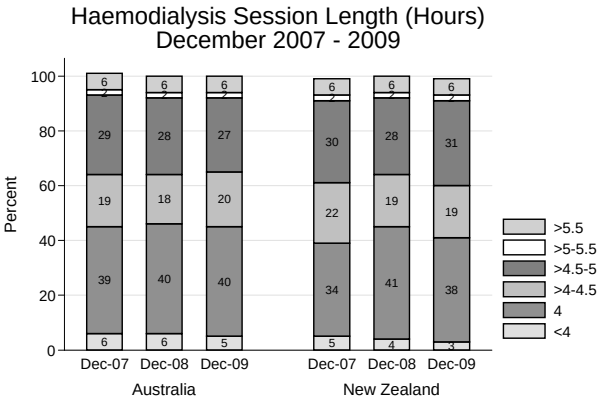


Figure 5.18

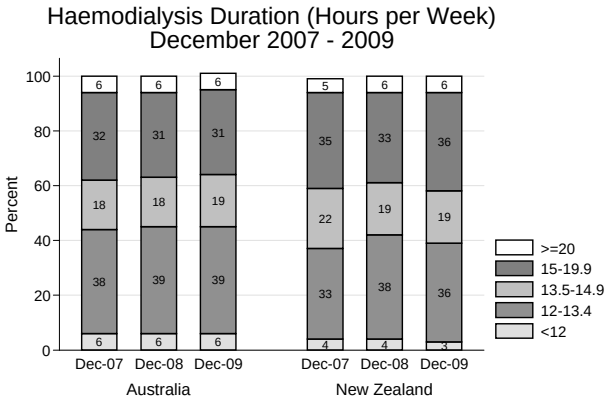


Figure 5.19

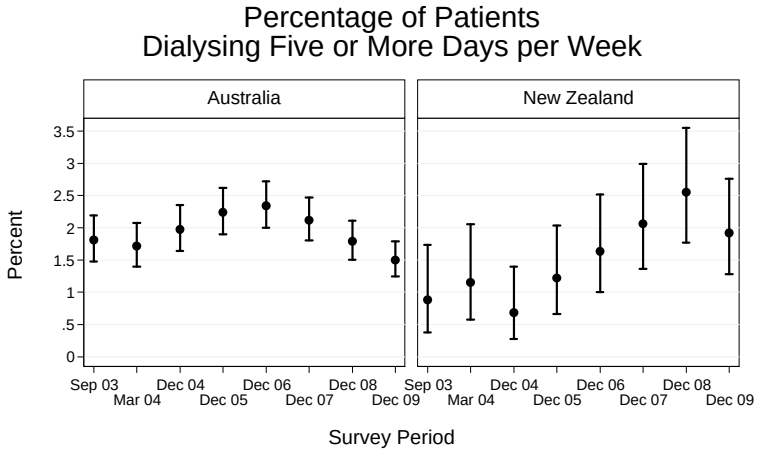


Figure 5.20

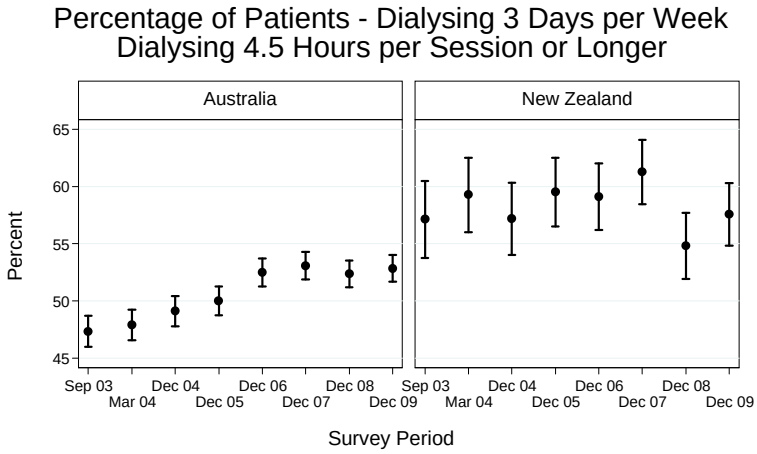
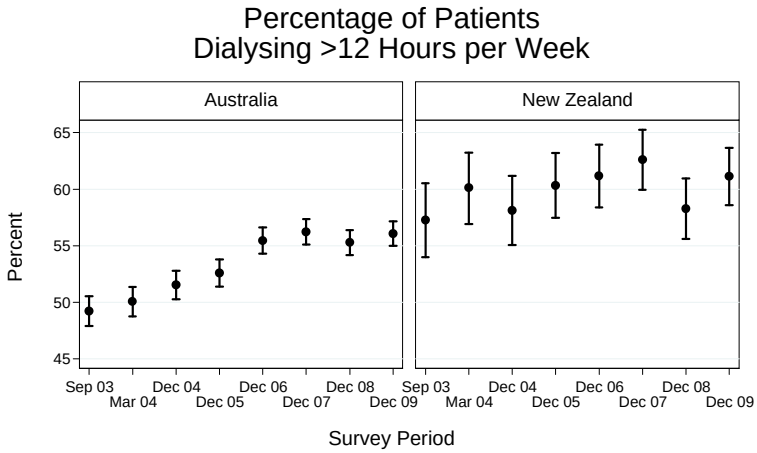


Figure 5.21



Dialysis frequency and session length vary among the Australian States. Patients in Queensland, Victoria and South Australia 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 5.22 - 5.25).

Figure 5.22

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

	Australia							New Zealand
	Qld	NSW/ACT	Vic	Tas	SA	NT	WA	
Dec 09	40 (2.6%)	26 (1.0%)	37 (1.8%)	2 (1.4%)	7 (1.3%)	-	10 (1.3%)	28 (1.9%)
Dec 08	51 (3.5%)	25 (1.0%)	45 (2.2%)	2 (1.5%)	10 (2.0%)	1 (0.3%)	12 (1.6%)	34 (2.5%)
Dec 07	59 (4.3%)	25 (1.0%)	52 (2.6%)	1 (0.8%)	9 (1.9%)	-	14 (1.9%)	27 (2.0%)
Dec 06	50 (3.9%)	33 (1.4%)	56 (2.9%)	3 (2.4%)	14 (3.0%)	3 (1.0%)	12 (1.7%)	20 (1.6%)

Figure 5.23

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	
Dec-09	777 (58.2%)	1716 (72.5%)	662 (35.0%)	81 (61.4%)	131 (26.2%)	305 (80.7%)	191 (26.7%)	743 (57.4%)
Dec-08	723 (57.7%)	1729 (74.1%)	642 (34.7%)	55 (45.1%)	105 (22.9%)	278 (79.0%)	176 (24.8%)	649 (54.7%)
Dec-07	686 (59.3%)	1676 (74.0%)	613 (34.1%)	46 (40.0%)	121 (27.0%)	279 (85.1%)	186 (27.6%)	732 (61.2%)
Dec-06	620 (56.7%)	1656 (76.0%)	579 (33.3%)	43 (38.4%)	117 (26.8%)	248 (83.8%)	157 (24.2%)	668 (59.1%)

Figure 5.24

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

	Australia							New Zealand
	Qld	NSW/ACT	Vic	Tas	SA	NT	WA	
Dec-09	951 (61.2%)	1953 (73.4%)	868 (41.1%)	92 (63%)	161 (30.4%)	308 (80.2%)	237 (30.7%)	895 (60.9%)
Dec-08	889 (60.5%)	1944 (74.4%)	839 (40.6%)	64 (47.8%)	131 (26.7%)	285 (78.9%)	215 (28.1%)	779 (58.1%)
Dec-07	854 (62.0%)	1891 (74.7%)	806 (40.2%)	55 (42.6%)	155 (32.1%)	285 (85.1%)	225 (31.3%)	828 (62.5%)
Dec-06	771 (60.0%)	1829 (76.3%)	758 (39.2%)	54 (43.2%)	144 (30.4%)	255 (83.3%)	193 (28.1%)	753 (61.1%)

OUTCOME 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 better survival.

In both countries, diabetes status and age have marked effects on haemodialysis patient survival. (Figures 5.25 - 5.35).

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

Figure 5.25

Haemodialysis at 90 Days Patient Survival
Censored for Transplant 1998 - 2009
% [95% Confidence Interval]

	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
1998-2000	2958	93 [92, 94]	87 [86, 88]	66 [64, 67]	50 [48, 52]
2001-2003	3372	93 [92, 93]	87 [86, 88]	65 [64, 67]	46 [44, 48]
2004-2006	4132	93 [92, 93]	87 [86, 88]	64 [63, 66]	46 [44, 48]
2007-2009	4597	93 [92, 94]	87 [86, 88]	66 [62, 69]	-
New Zealand					
1998-2000	410	92 [89, 95]	85 [81, 88]	58 [53, 63]	42 [37, 47]
2001-2003	633	94 [92, 96]	89 [86, 91]	65 [60, 68]	44 [40, 48]
2004-2006	695	95 [93, 96]	87 [85, 90]	67 [63, 70]	46 [41, 51]
2007-2009	755	93 [91, 95]	86 [83, 89]	64 [57, 71]	-

Figure 5.26

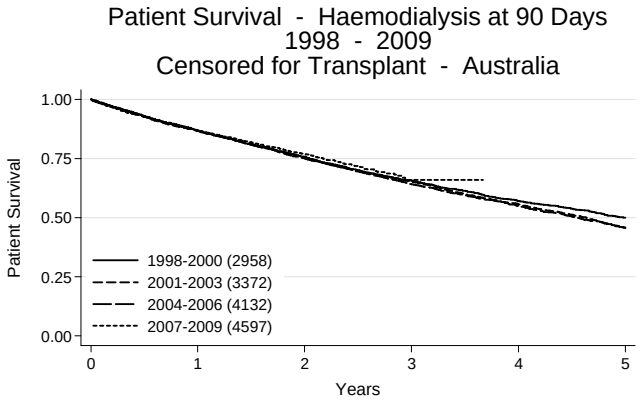
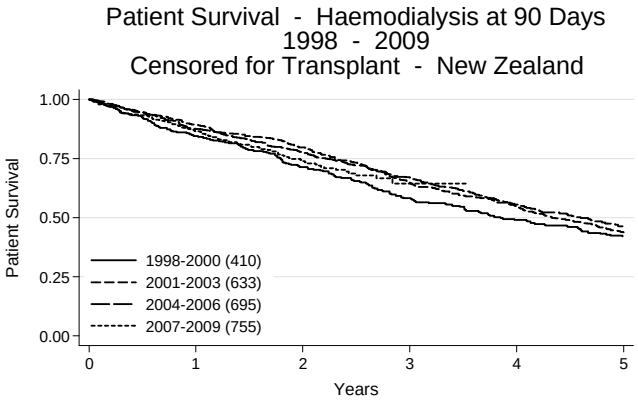


Figure 5.27



Figures 5.28- 5.29

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 5.28

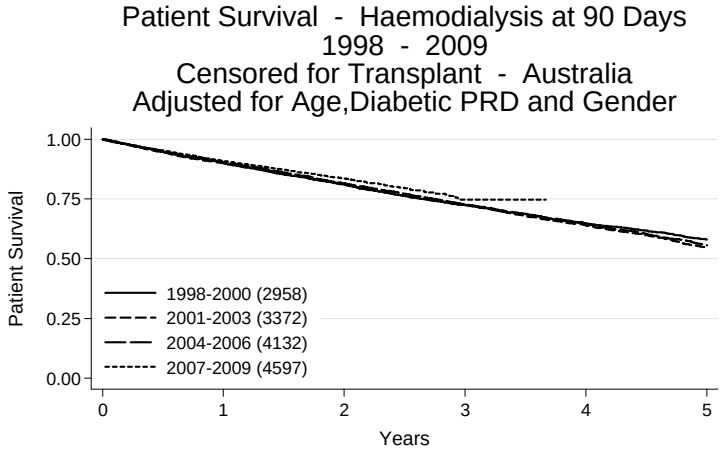


Figure 5.29

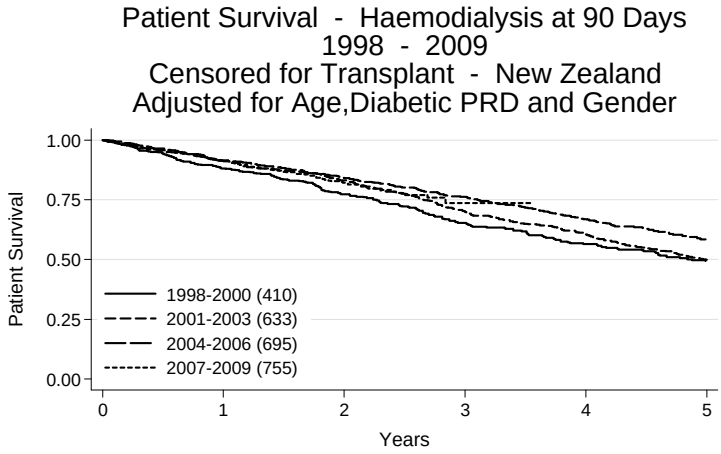


Figure 5.30

Haemodialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant 1998 - 2009
% [95% Confidence Interval]

	Survival			
	6 months	1 year	3 years	5 years
Australia				
Non Diabetic (n=10,622)	93 [92, 93]	87 [86, 88]	67 [66, 68]	50 [48, 51]
Diabetic (n=4437)	93 [93, 94]	86 [85, 87]	61 [60, 63]	42 [40, 44]
New Zealand				
Non Diabetic (n=1372)	94 [92, 95]	87 [85, 89]	67 [64, 70]	51 [48, 55]
Diabetic (n=1121)	94 [92, 95]	87 [85, 89]	60 [57, 64]	37 [33, 40]

Figure 5.31

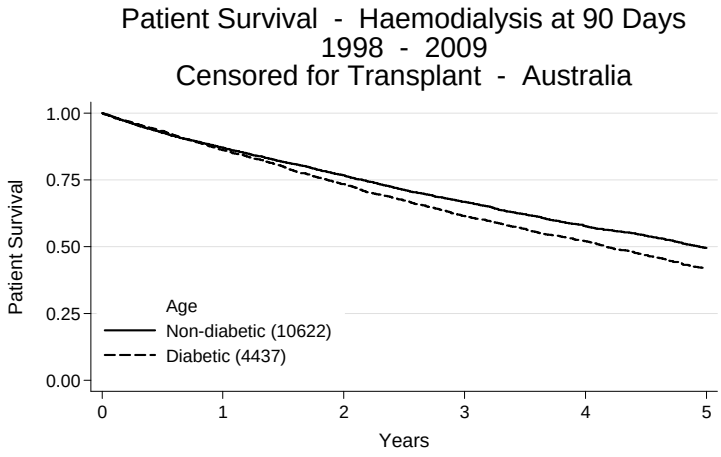


Figure 5.32

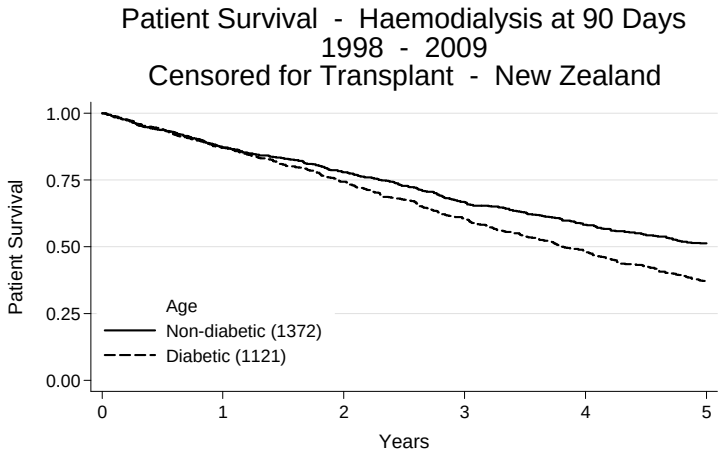


Figure 5.33

Haemodialysis at 90 Days
Patient Survival - By Age Group
Censored for Transplant 1998 - 2009
% [95% Confidence Interval]

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	1734	98 [97, 98]	95 [94, 96]	86 [84, 88]	80 [77, 83]
40-59 years	4836	96 [95, 97]	92 [91, 93]	77 [76, 79]	63 [61, 65]
60-74 years	5405	91 [90, 92]	84 [83, 85]	61 [60, 63]	42 [40, 43]
75 and over	3084	88 [87, 89]	78 [77, 80]	46 [44, 48]	24 [22, 26]
New Zealand					
0-39 years	384	98 [96, 99]	94 [91, 96]	80 [74, 84]	68 [60, 74]
40-59 years	1062	95 [94, 97]	90 [88, 92]	71 [67, 74]	50 [46, 54]
60-74 years	849	91 [89, 93]	85 [82, 87]	56 [53, 60]	36 [32, 40]
75 and over	198	87 [81, 91]	67 [60, 73]	33 [26, 41]	15 [10, 22]

Figure 5.34

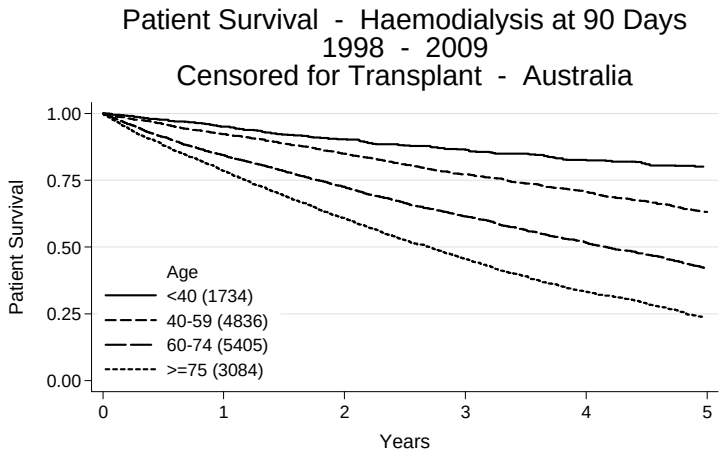
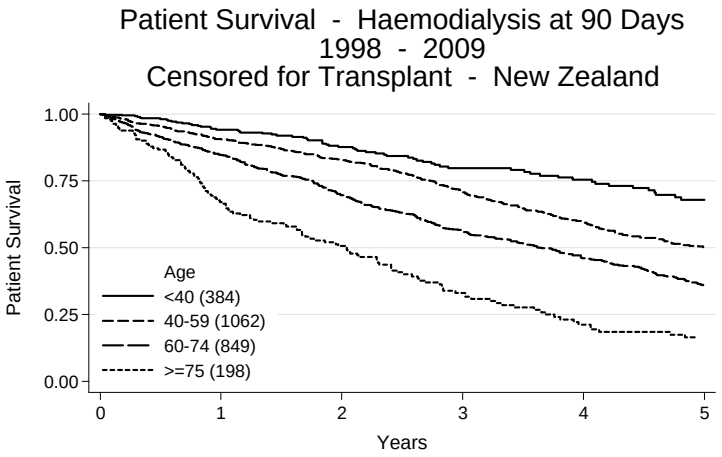


Figure 5.35



MEMBRANE TYPE AND SURFACE AREAS

AUSTRALIA Figures 5.36 - 5.38.

Usage of low flux polysulfone dialysers remains at 5% in 2009, (5% in December 2008, 7% in 2007 and 16% in 2006), while the use of high flux polysulphone continues to decrease (1% in 2009, 1.5% in 2008, 7% in both 2007 and 2006, 9% in 2005 and 39% in 2004.

High flux Polysulphone-Helixone increased to 53% in December 2009 from 49% in 2008, 39% in 2007, 34% in 2006 and 27% in 2005. High flux Polyamix increased to 29% this year from 26% last year and 20% in 2007.

There were 88% of patients receiving dialysis with high flux dialysers in 2009 (81% in 2008, 72% in 2007, 64% in 2006 and 57% in 2005).

Six patients were receiving haemofiltration, two each in New South Wales and Western Australia and one each in Queensland and Victoria, and 451/8163 HD patients haemodiafiltration, compared to 285/7903 HD patients in 2008. In 2009 the numbers receiving haemodiafiltration in each State were Queensland (165/1555), New South Wales (169/2449), the ACT (4/213), Victoria (8/2113), Tasmania (34/146), South Australia (38/530, the Northern Territory (0/530) and Western Australia (33/773).

NEW ZEALAND Figures 5.36 and 5.38.

Low flux polysulphone decreased to 19% in December 2009, from 24% and 38% in December 2008 and 2007 respectively.

There were 62% (911 patients) reported as receiving dialysis with high flux dialysers in December 2009, an increase from 52% (701patients) in 2008 and 29% (382 patients) in 2007.

There were 148 patients in December 2009, who were receiving haemodiafiltration compared to 160 patients in 2008. There were no patients having haemofiltration.

Figure 5.36

Haemodialyser Membrane Types

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 Acetate	Low	-	-	1	-	2	3
Cellulose Triacetate	High	-	-	1	9	66	76
Diacetate	Low	-	-	9	-	5	14
Polyamix	High	1	51	760	-	1559	2371
Polyamix	Low	-	22	283	-	289	594
Polyethersulfone	High	-	-	5	104	228	337
Polynephron	High	-	-	-	-	1	1
Polysulphone	High	-	18	-	34	22	74
Polysulphone	Low	5	22	-	156	200	383
Polysulphone-Helixone	High	-	808	-	2754	746	4308
Polysynthane	Low	-	-	-	-	2	2
Total		**6**	**921**	**1059**	**3057**	**3120**	**8163**
New Zealand							
Polyamix	High	-	2	52	-	317	371
Polyamix	Low	-	4	90	-	178	272
Polysulphone	High	-	5	-	60	-	65
Polysulphone	Low	1	11	-	134	140	286
Polysulphone-Helixone	High	-	364	-	107	4	475
Total		**1**	**386**	**142**	**301**	**639**	**1469**

Figure 5.37

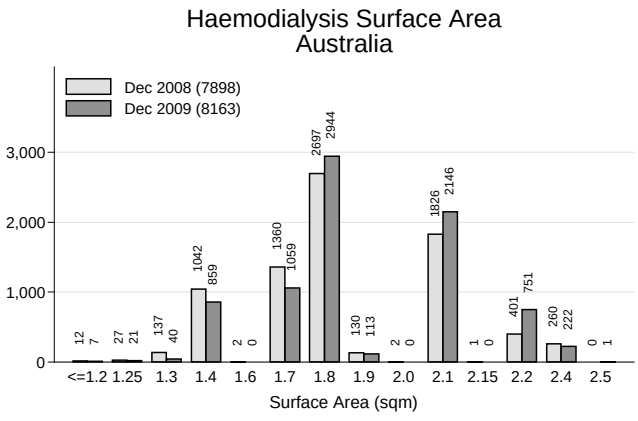
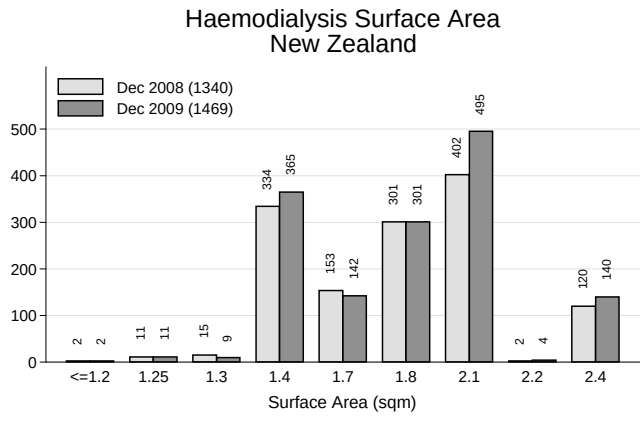


Figure 5.38



ANAEMIA

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

In New Zealand, mean haemoglobin has stabilised at 114 g/L. The increase in erythropoietic agent usage seen over 2003-2005 has reached a plateau.

Figure 5.39

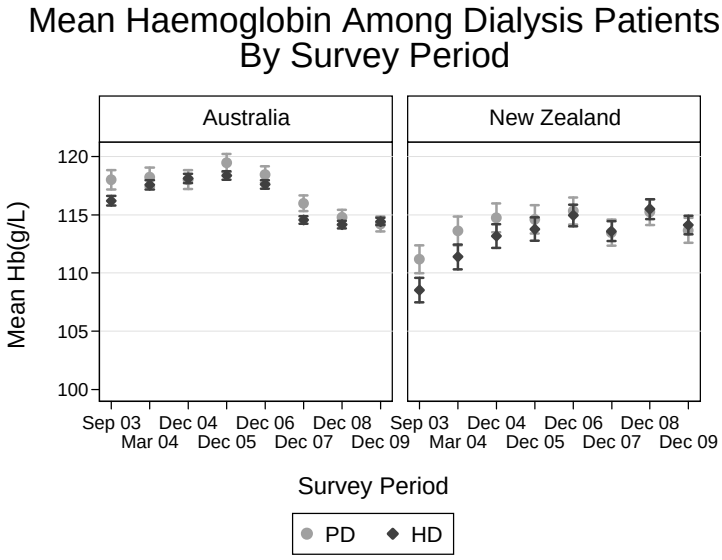
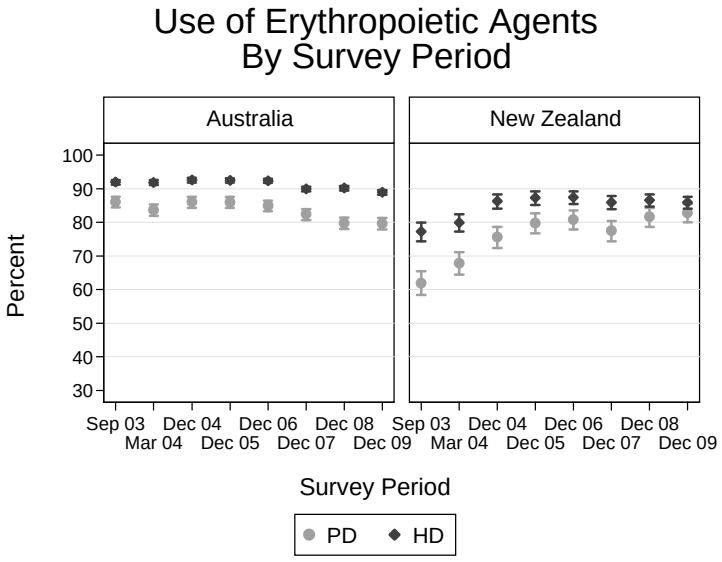


Figure 5.40



HAEMOGLOBIN

In Australia, haemoglobin is <110 g/L in 35% and ≥140g/L in 4% of haemodialysis patients, which is the same as the previous two years.

In New Zealand, the corresponding percentages are 38% and 5% 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

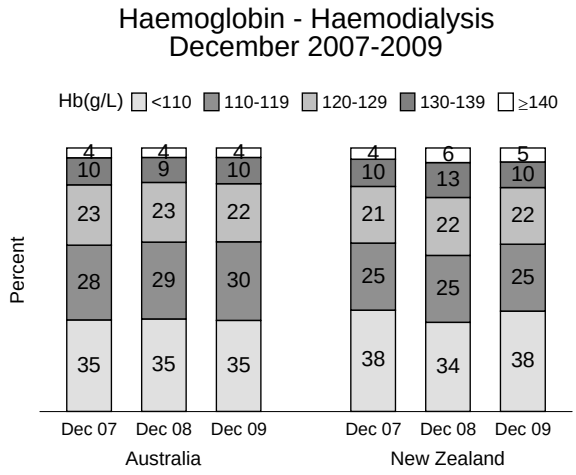
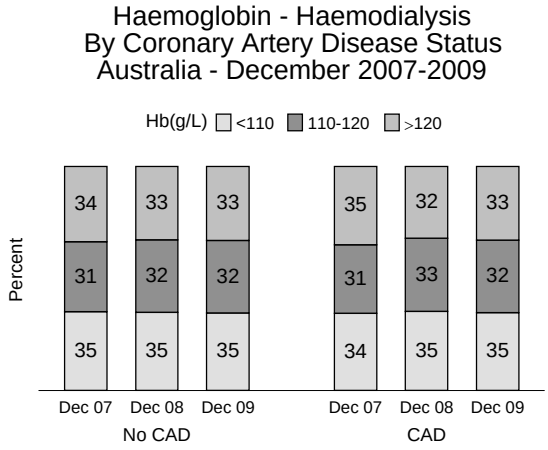
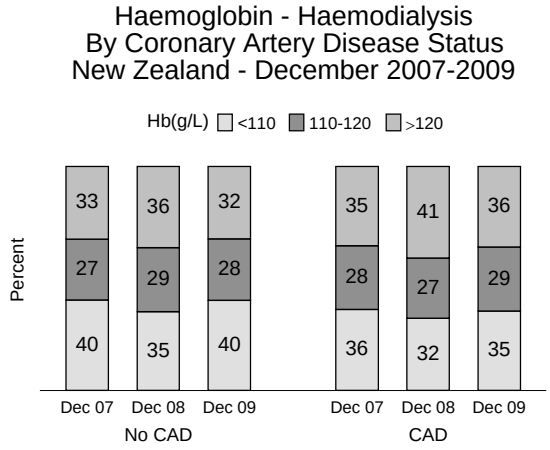


Figure 5.42





HAEMOGLOBIN BY TREATING CENTRE

Figures 5.43 - 5.46

These 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 to 125 g/L for haemodialysis patients and in New Zealand 107-118 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 32% to 79% for haemodialysis patients and for New Zealand 35% to 59%.

Figure 5.43

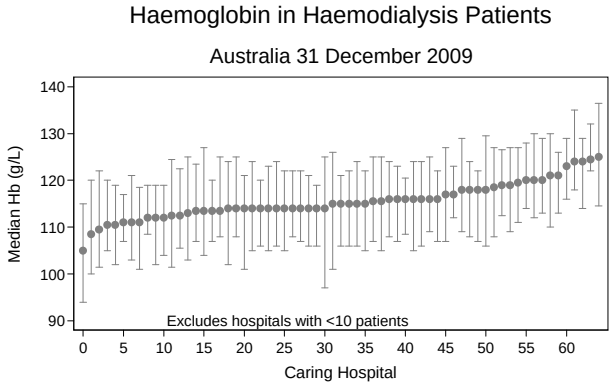


Figure 5.44

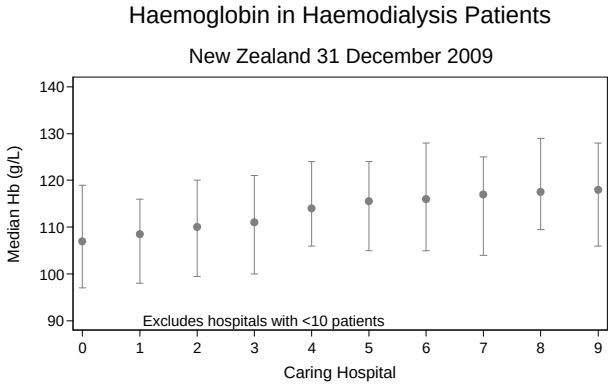


Figure 5.45

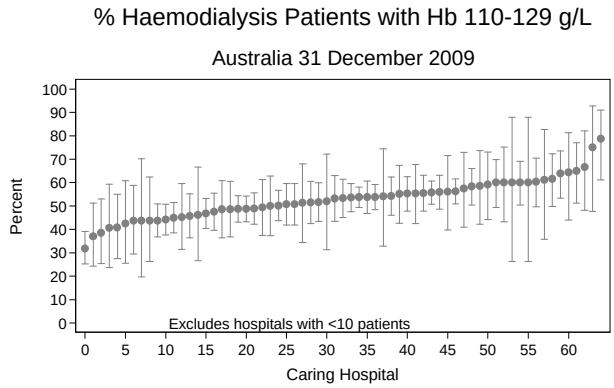
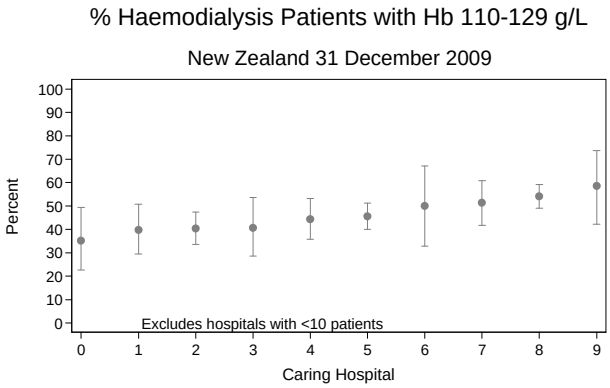


Figure 5.46



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 both 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 reduced.

Figure 5.47

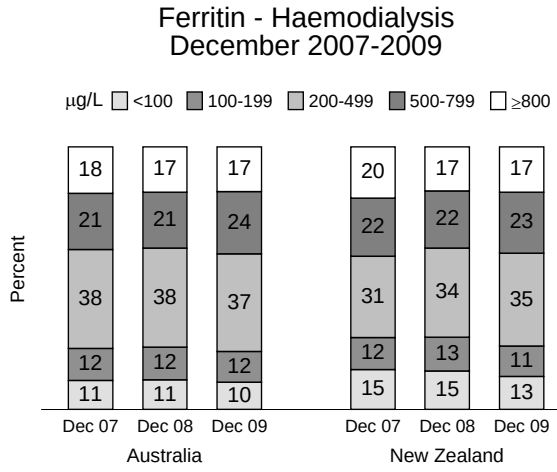
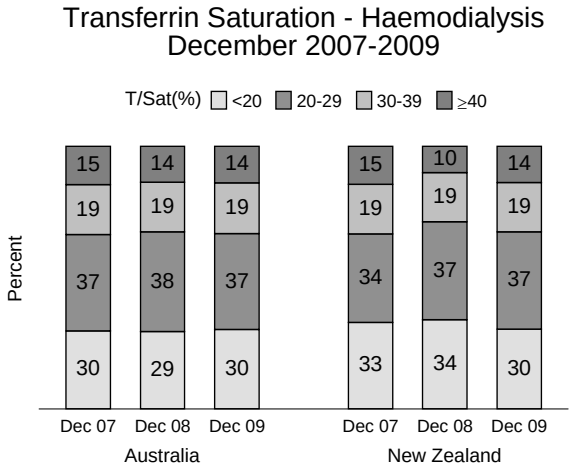


Figure 5.48



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 2-80% for haemodialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 33-100%. Again, 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 17-54% for haemodialysis patients and the corresponding figures for transferrin saturation were between 48-83%. 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

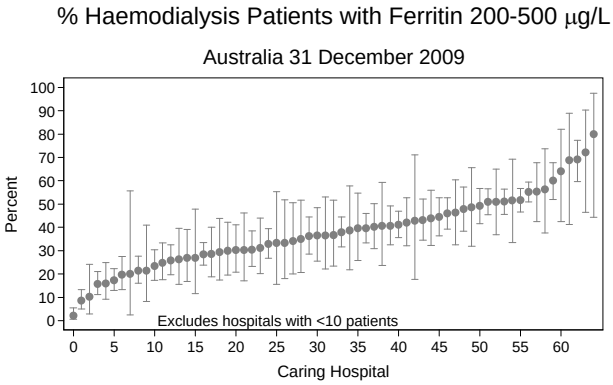
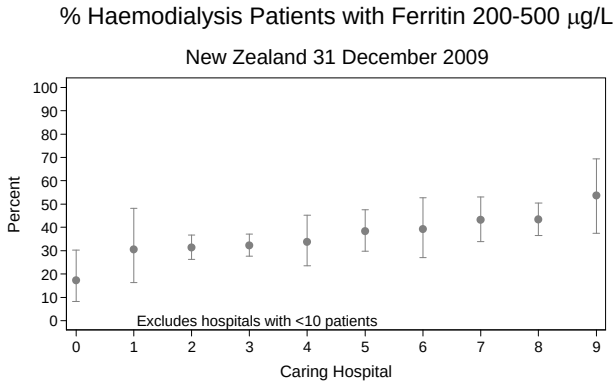


Figure 5.50



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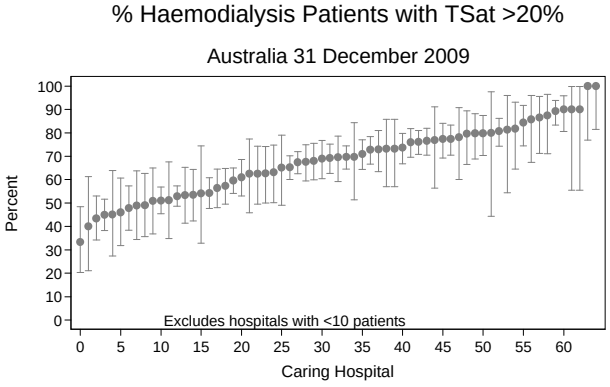
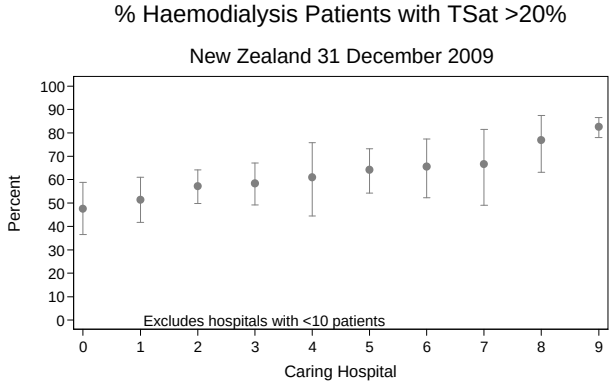


Figure 5.52

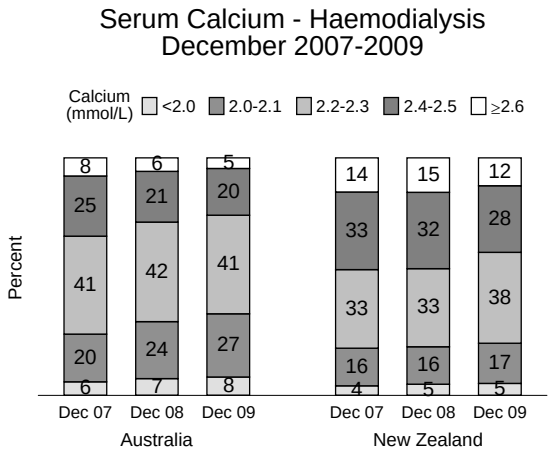


SERUM CALCIUM

Figure 5.53

In both Australia and New Zealand the proportions of patients with proportions with serum calcium ≥ 2.4 mmol/L has continued to decrease, while those with < 2.2 mmol/L have increased in Australia, but remained fairly stable in 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 however that the values in the guidelines were for corrected total calcium, while those in this report are for uncorrected total calcium.

In Australia, the proportions ranged widely between 10-79% for haemodialysis patients, while in New Zealand the corresponding proportions were 47-78%.

Figure 5.54

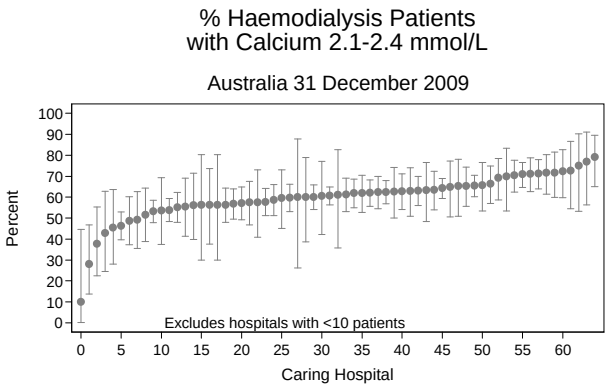
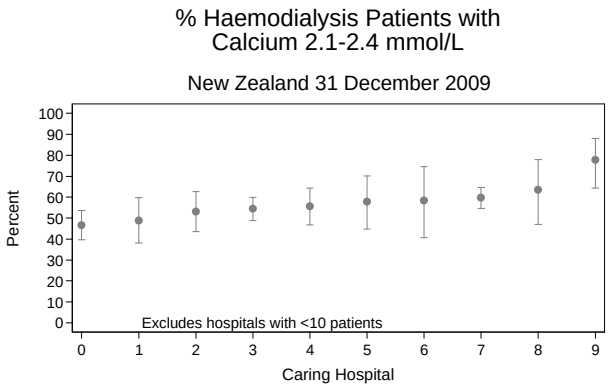


Figure 5.55

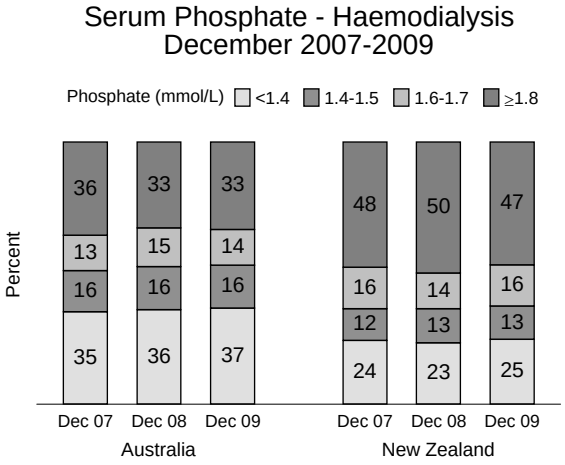


SERUM PHOSPHATE

Figure 5.56

In Australia, the control of serum phosphate has stabilised after a period of steady improvements. In New Zealand, the proportion with serum phosphate > 1.8 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 37-70% for haemodialysis patients and in New Zealand, the corresponding proportions were 29-51%.

Figure 5.57

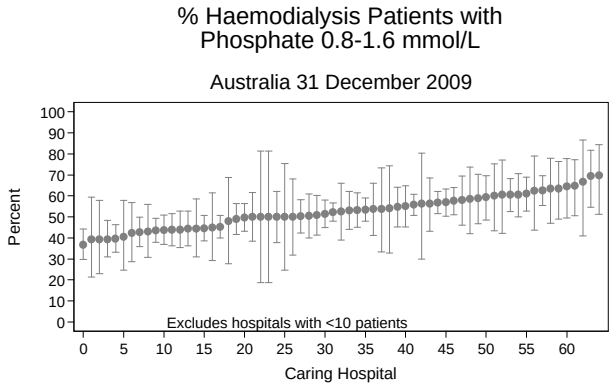
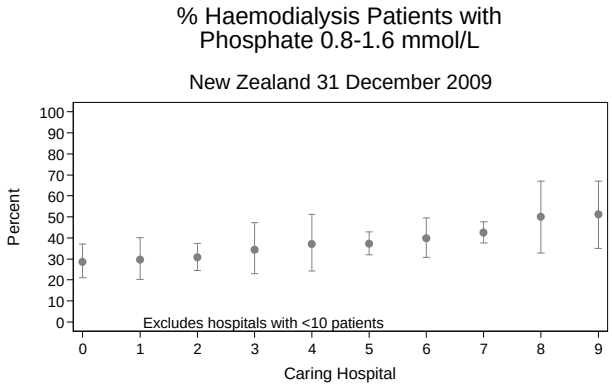


Figure 5.58



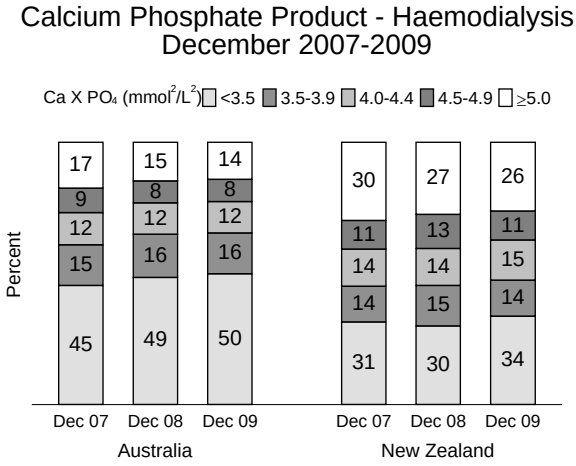
CALCIUM-PHOSPHATE PRODUCT

Figure 5.59

In both Australia and New Zealand, calcium-phosphate product has continued to improve, among haemodialysis patients, with smaller proportions of patients with a product ≥ 5.0 mmol^2/l$^{2.}$

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

Figure 5.59



CALCIUM-PHOSPHATE PRODUCT BY TREATING CENTRE

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 39-87% for haemodialysis patients while in New Zealand, the corresponding proportions were 36-68%.

Figure 5.60

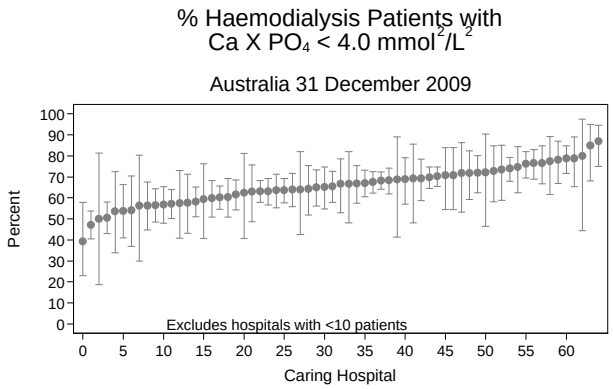
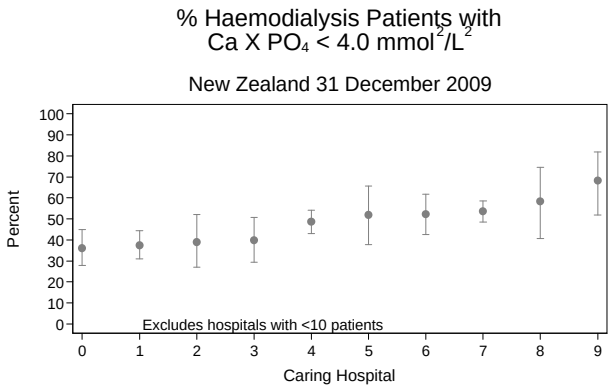


Figure 5.61



UREA REDUCTION RATIO

Figures 5.62 and 5.64

Distributions of URR values have been fairly stable over the past three years. About 9% and 31% 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%, 24% in Australia and 30% in New Zealand had CVC access.

Figure 5.62

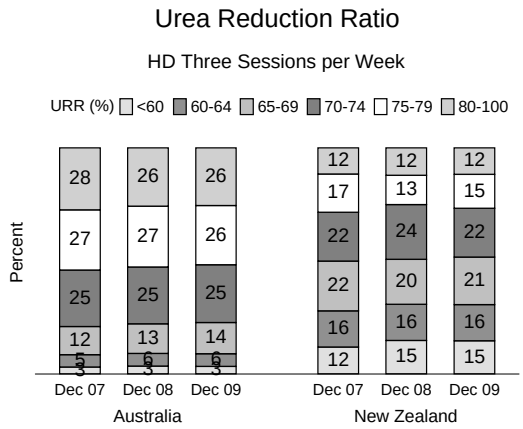


Figure 5.63

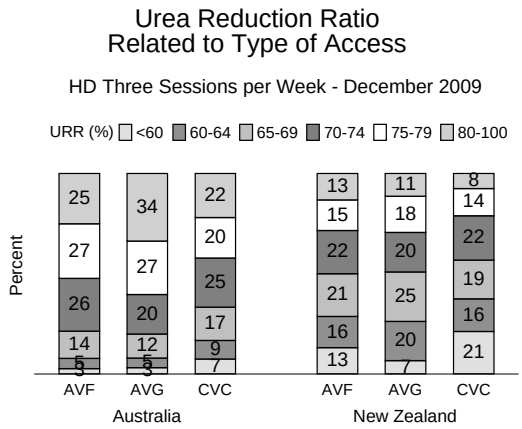


Figure 5.64

Urea Reduction Ratio - Prevalent Patients
Three Sessions per Week - December 2009

Hours per Session	Urea Reduction Ratio %		
	< 65	>=65	Total
Australia			
<4 hours	42 (15.6%)	227 (84.4%)	269 (100%)
4 hours	256 (8.9%)	2606 (91.1%)	2862 (100%)
>4-5 hours	274 (8.1%)	3092 (91.9%)	3366 (100%)
>5 hours	27 (11.9%)	200 (88.1%)	227 (100%)
Total	599 (8.9%)	6125 (91.1%)	6724 (100%)
New Zealand			
<4 hours	11 (44.0%)	14 (56.0%)	25 (100%)
4 hours	143 (31.4%)	313 (68.6%)	456 (100%)
>4-5 hours	167 (29.5%)	399 (70.5%)	566 (100%)
>5 hours	15 (26.3%)	42 (73.7%)	57 (100%)
Total	336 (30.4%)	768 (69.6%)	1104 (100%)

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: 65-85% in Australia and 67-78% in New Zealand. However, the proportions with URR >70% in each unit varied widely, from 28-96% in Australia and 29-81% in New Zealand.

Figure 5.65

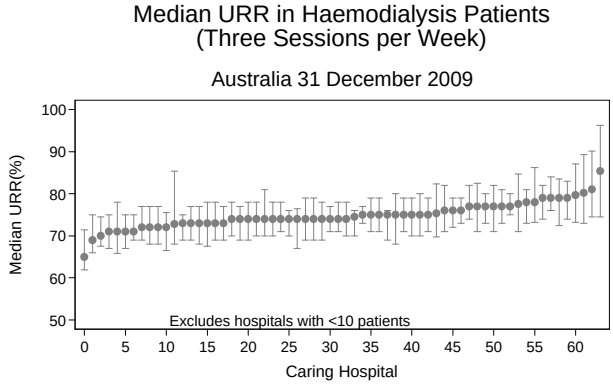


Figure 5.66

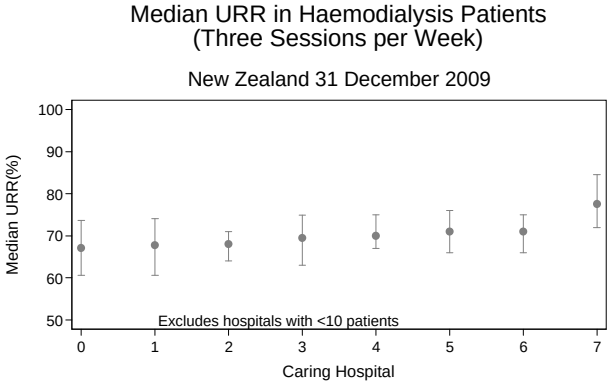


Figure 5.67

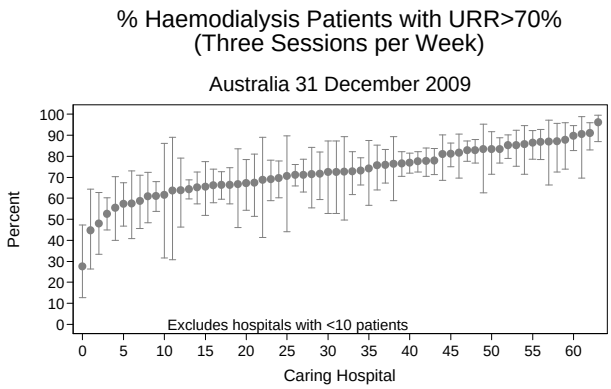
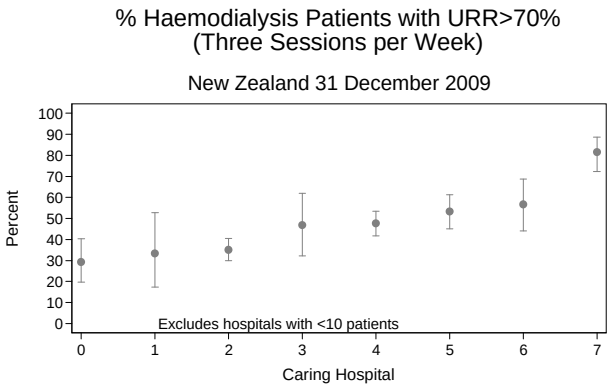


Figure 5.68



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 commence with a catheter.

In Australia, tunnelled catheters were more common than non-tunnelled, but the reverse was true in New Zealand.

Diabetic, female, young (age <25years) patients and 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 increased rates of AVF or AVG at the commencement of dialysis.

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

Figure 5.69

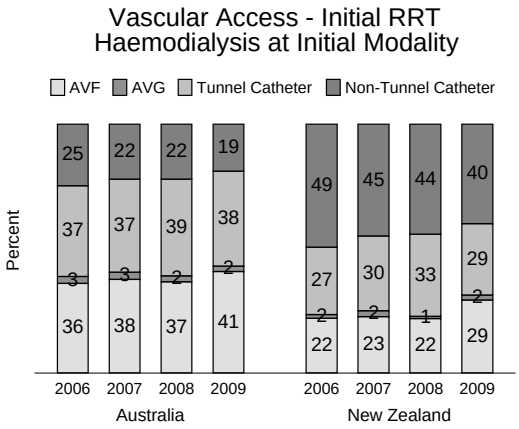


Figure 5.70

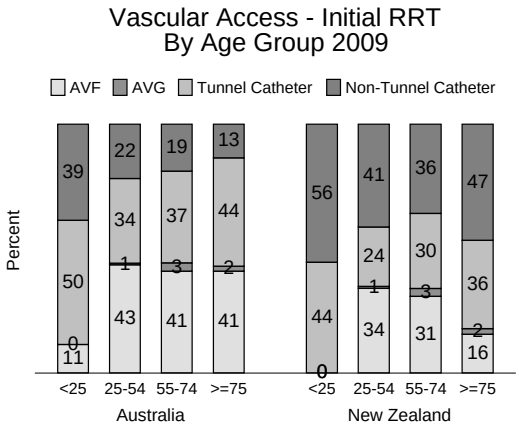


Figure 5.71

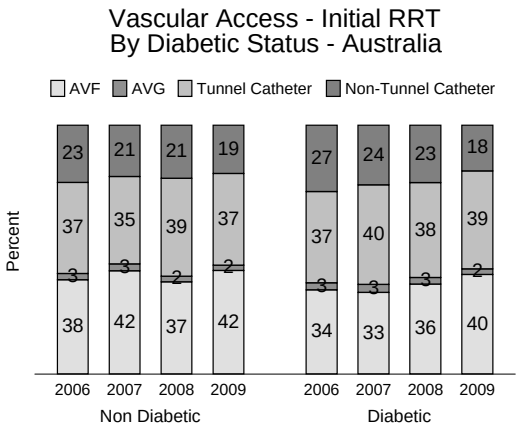
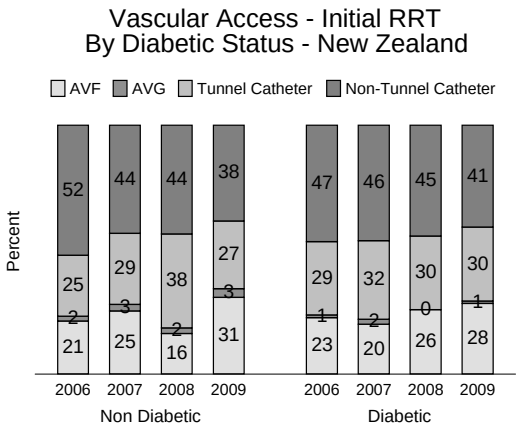


Figure 5.72



VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.73

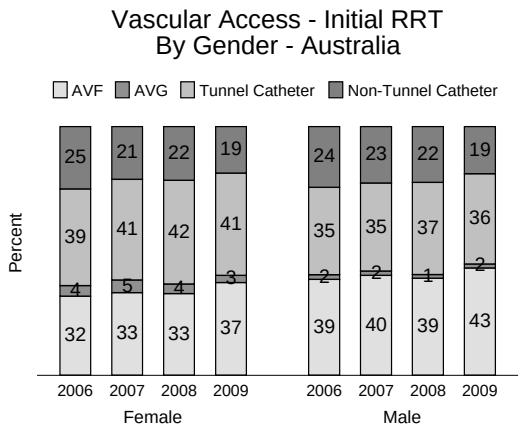


Figure 5.74

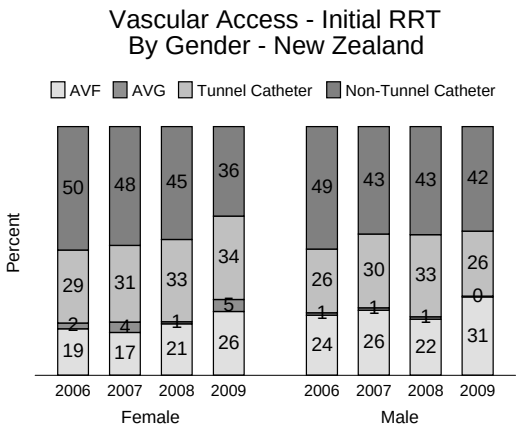


Figure 5.75

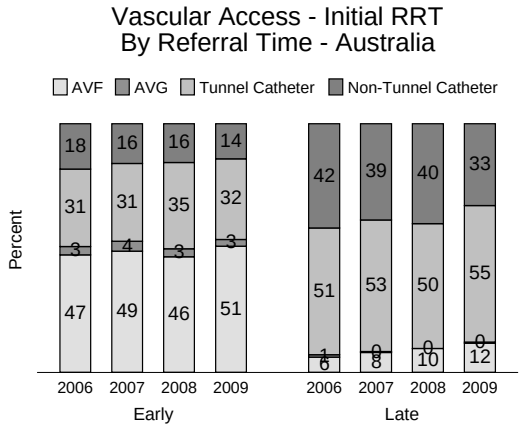


Figure 5.76

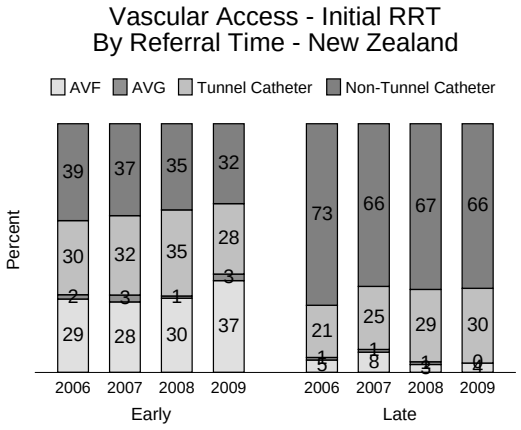


Figure 5.77

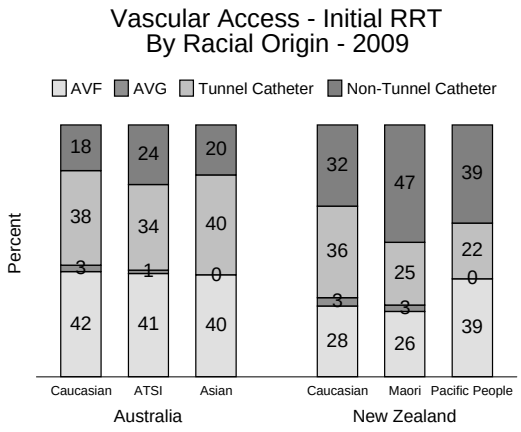
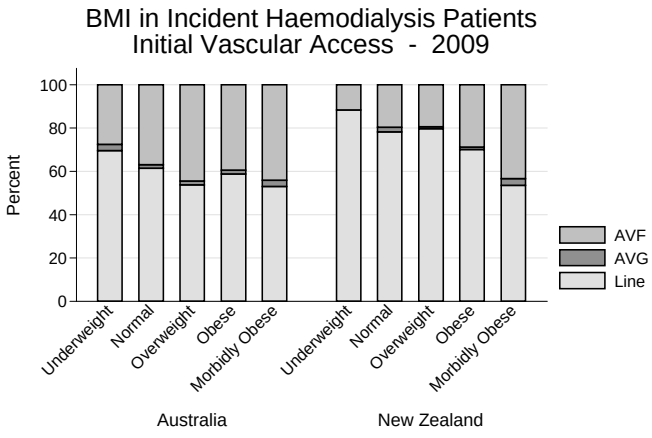


Figure 5.78



VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.79

Vascular Access at First Treatment
Haemodialysis as Initial Modality 1-Jan-2006 to 31-Dec-2009

	2006		2007		2008		2009	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
Queensland	136 (39%)	215 (61%)	151 (42%)	209 (58%)	137 (35%)	250 (65%)	151 (41%)	216 (59%)
NSW/ACT	181 (32%)	393 (68%)	198 (35%)	365 (65%)	185 (33%)	373 (67%)	160 (34%)	304 (66%)
Victoria	205 (48%)	220 (52%)	191 (47%)	217 (53%)	185 (47%)	209 (53%)	208 (49%)	217 (51%)
Tasmania	13 (32%)	28 (68%)	14 (41%)	20 (59%)	12 (35%)	22 (65%)	15 (43%)	20 (57%)
South Australia	69 (51%)	66 (49%)	66 (57%)	49 (43%)	71 (54%)	61 (46%)	85 (62%)	53 (38%)
Northern Territory	25 (34%)	49 (66%)	20 (31%)	44 (69%)	39 (49%)	40 (51%)	27 (46%)	32 (54%)
Western Australia	58 (33%)	117 (67%)	60 (33%)	122 (67%)	66 (34%)	130 (66%)	65 (39%)	101 (61%)
New Zealand								
	77 (23%)	251 (77%)	77 (25%)	232 (75%)	73 (23%)	248 (77%)	109 (31%)	239 (69%)

Figures 5.80 and 5.81 show the proportion of patients of each hospital starting haemodialysis with AVF/AVG, arranged from the lowest to the highest. In Australia, this ranged widely from 19-75%. The corresponding range in New Zealand was 18-75%. This wide variation probably reflects differences in practices, protocols, resources and patient case-mix among centres. However, the patient case-mix is unlikely to explain all of this variation.

Figure 5.80

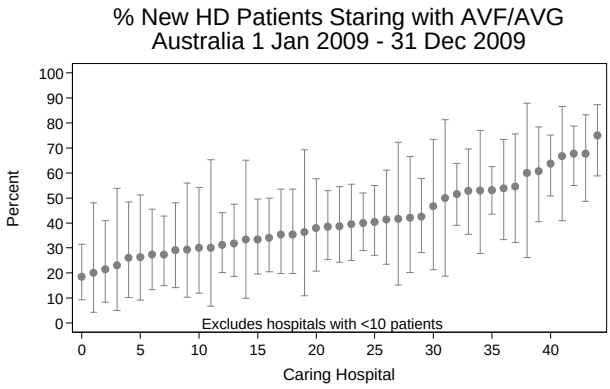
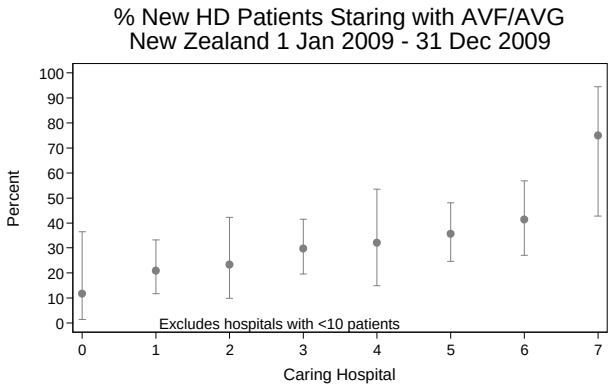


Figure 5.81



PREVALENT HAEMODIALYSIS ACCESS

Figures 5.82 - 5.88

In both Australia and New Zealand, the proportions of patients dialysing with an AV graft are declining, while those dialysing with an AV fistulae are stable. The proportions dialysing with catheters have also stabilised.

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

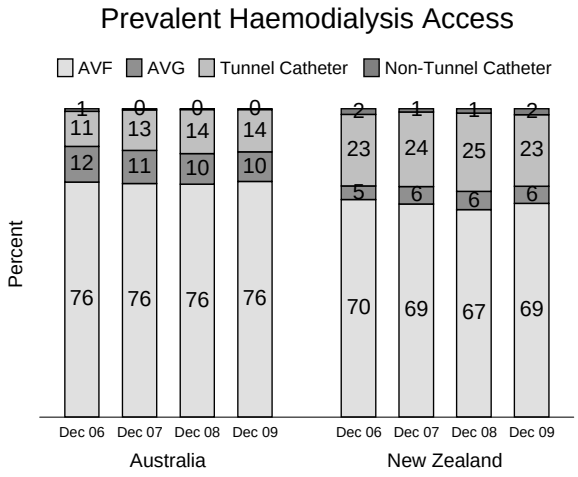
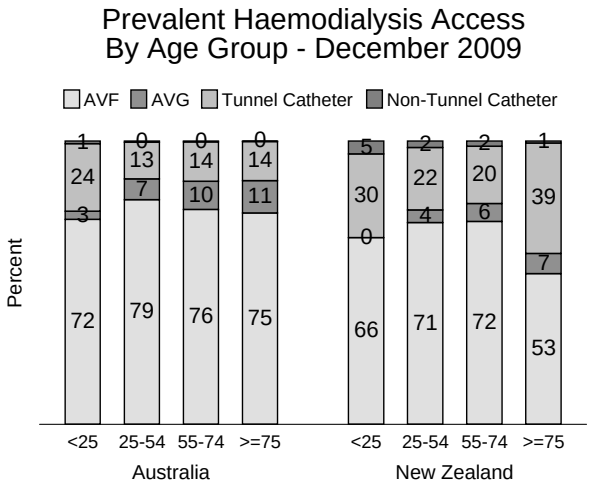


Figure 5.83



PREVALENT HAEMODIALYSIS ACCESS

Figure 5.84

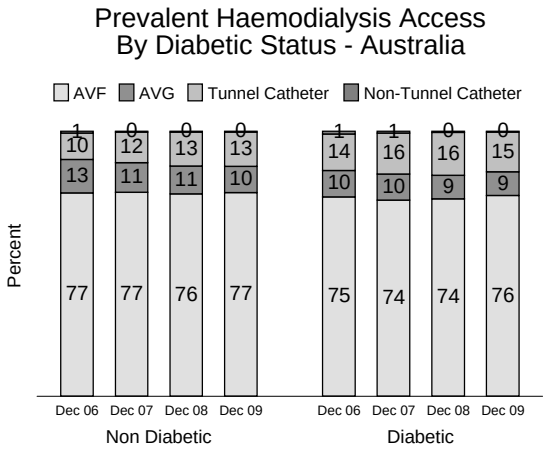


Figure 5.85

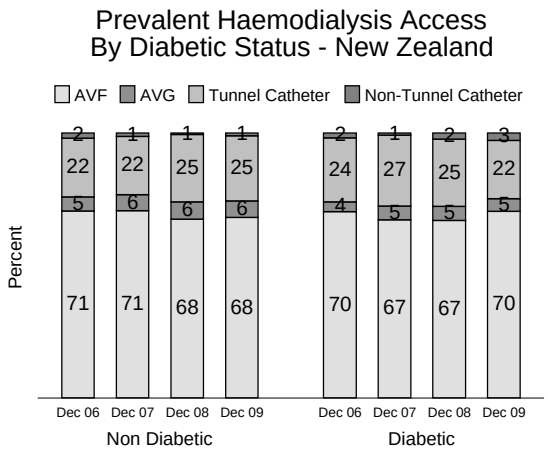


Figure 5.86

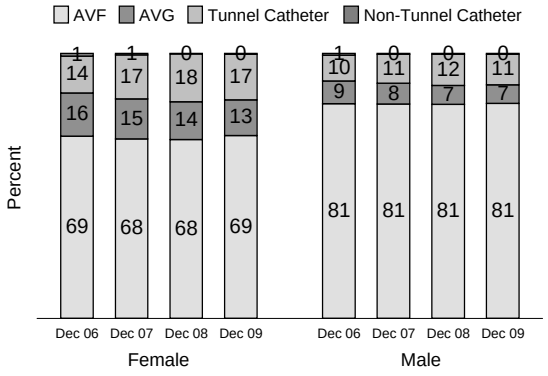


Figure 5.87

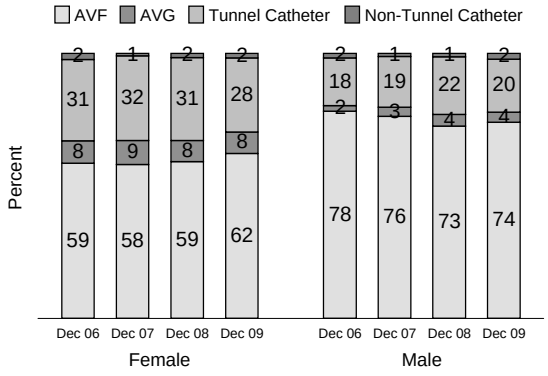
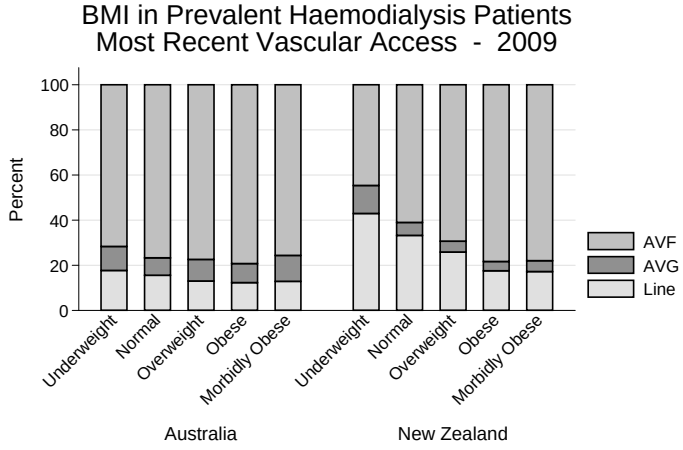


Figure 5.88



PREVALENT HAEMODIALYSIS ACCESS

Figures 5.89 - 5.90

In Australia indigenous people were more likely to dialyse 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

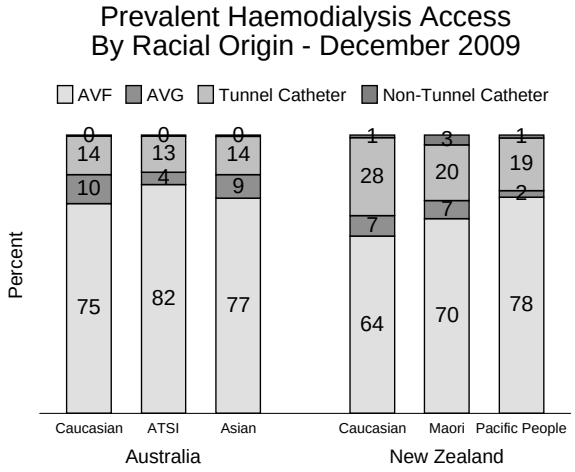
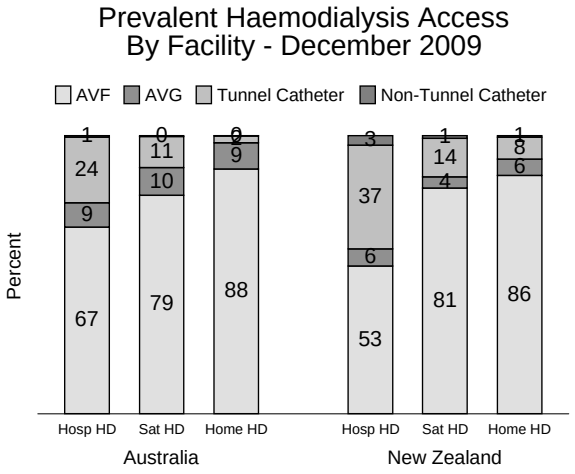


Figure 5.90



PREVALENT HAEMODIALYSIS ACCESS

Figure 5.91

Prevalent Vascular Access at 31-Dec-2009

	Dec 2006		Dec 2007		Dec 2008		Dec 2009	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
Queensland	1162 (90%)	125 (10%)	1230 (89%)	149 (11%)	1278 (87%)	193 (13%)	1362 (88%)	193 (12%)
NSW/ACT	2062 (86%)	337 (14%)	2139 (84%)	394 (16%)	2191 (84%)	421 (16%)	2219 (83%)	444 (17%)
Victoria	1738 (90%)	195 (10%)	1785 (89%)	221 (11%)	1851 (90%)	215 (10%)	1886 (89%)	227 (11%)
Tasmania	99 (79%)	26 (21%)	113 (88%)	16 (12%)	110 (82%)	24 (18%)	117 (80%)	29 (20%)
South Australia	445 (94%)	28 (6%)	436 (90%)	47 (10%)	429 (88%)	61 (12%)	477 (90%)	53 (10%)
Northern Territory	270 (88%)	36 (12%)	297 (89%)	38 (11%)	328 (91%)	33 (9%)	366 (95%)	18 (5%)
Western Australia	553 (81%)	133 (19%)	554 (77%)	164 (23%)	560 (73%)	204 (27%)	589 (76%)	184 (24%)
New Zealand								
	924 (75%)	308 (25%)	990 (75%)	334 (25%)	980 (73%)	360 (27%)	1100 (75%)	370 (25%)

Figures 5.92 - 5.93 show the proportion of haemodialysis patients at each hospital dialysing with an AVF/AVG on 31st December, 2009, arranged from the lowest to the highest.

In Australia, the proportions varied widely from 56-100%. The corresponding range in New Zealand was 44-88%.

The error bars displayed show the 95% confidence intervals.

Figure 5.92

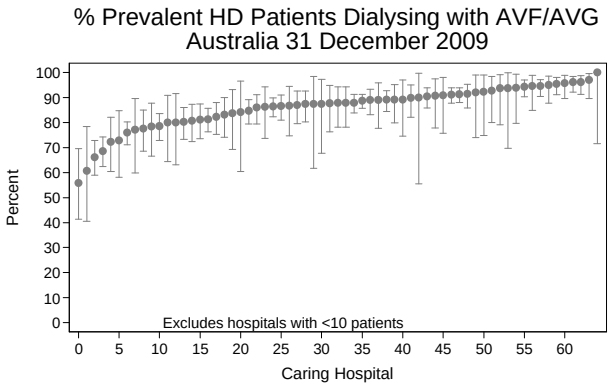
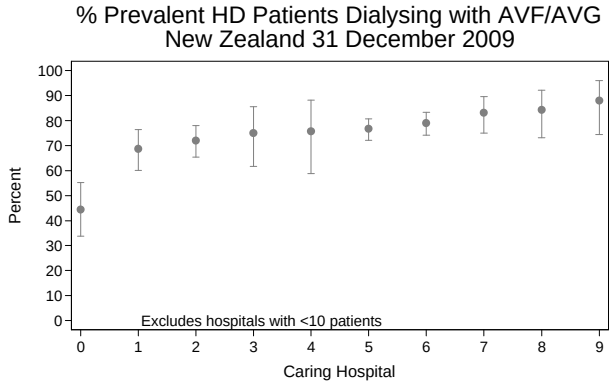


Figure 5.93



OBESITY IN 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 2000 to 2009 in both countries.

As might be expected, patients with diabetes are more likely to be obese or morbidly obese compared to those without diabetes (Figures 5.98 - 5.99).

Figure 5.94

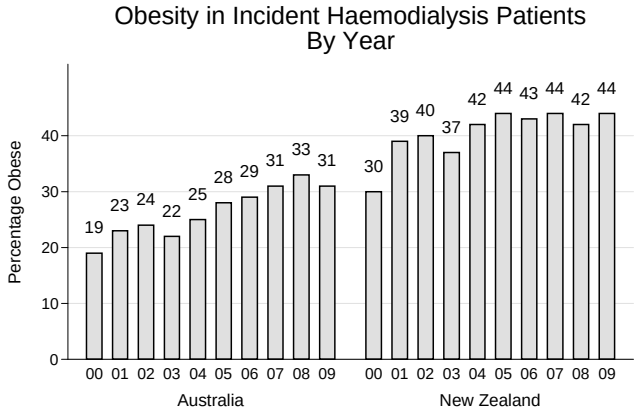


Figure 5.95

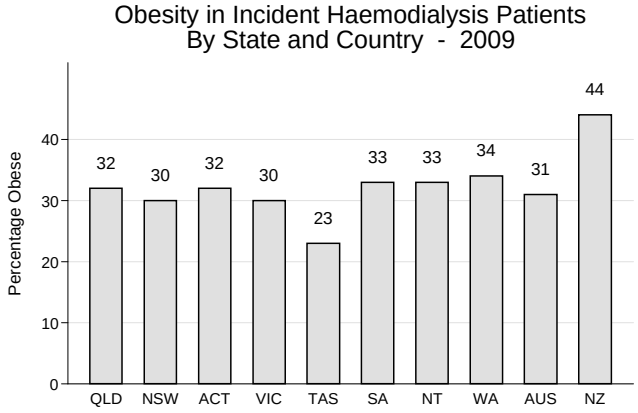
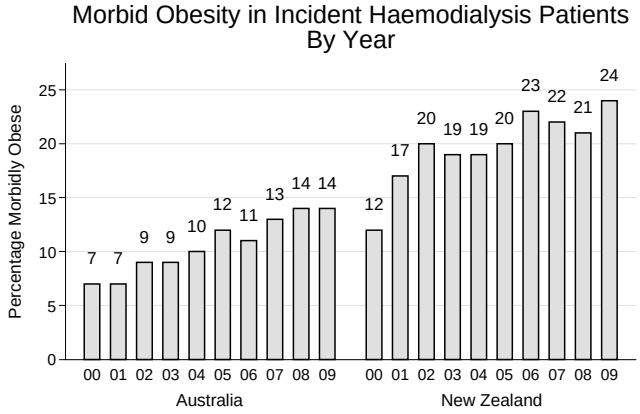


Figure 5.96



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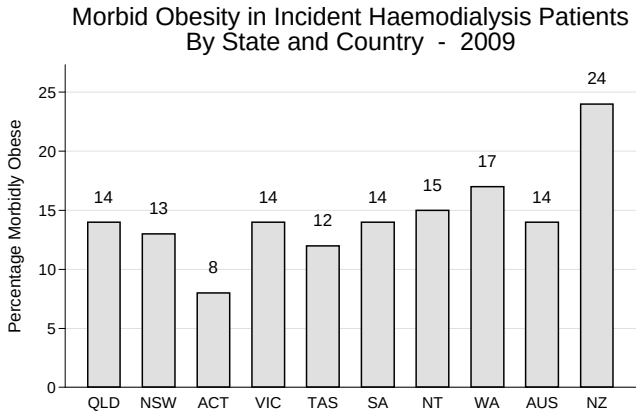


Figure 5.98

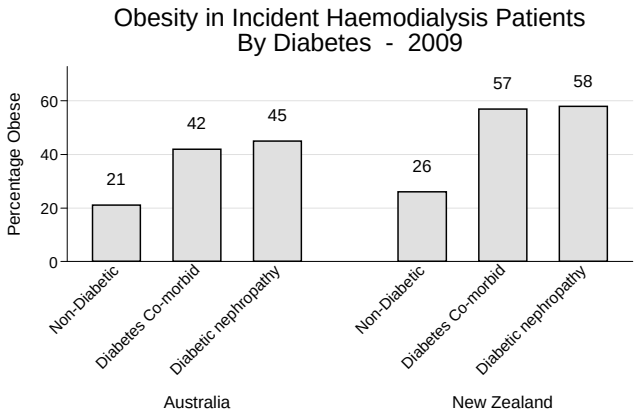
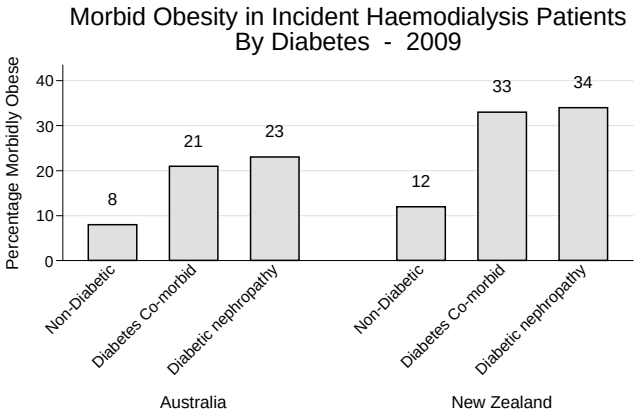


Figure 5.99



OBESITY IN 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. The proportion of morbidly obese patients treated with haemodialysis has nearly doubled from 2000 to 2009 in both countries.

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

Figure 5.100

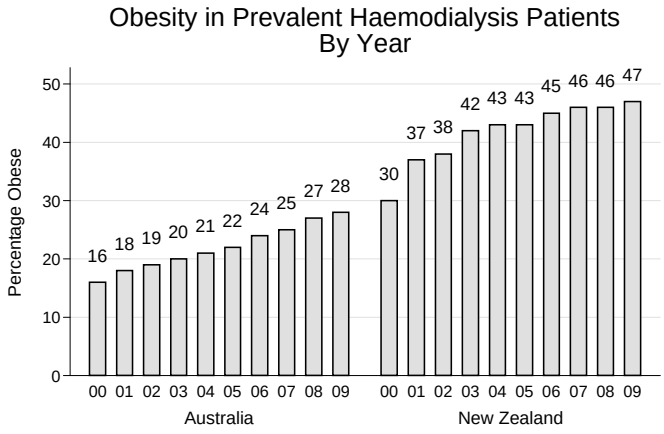


Figure 5.101

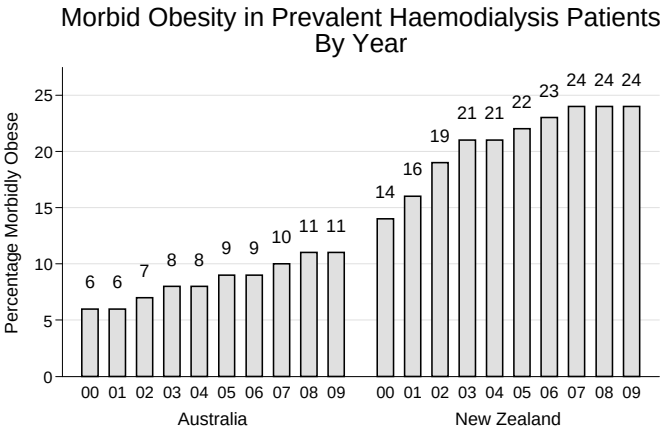


Figure 5.102

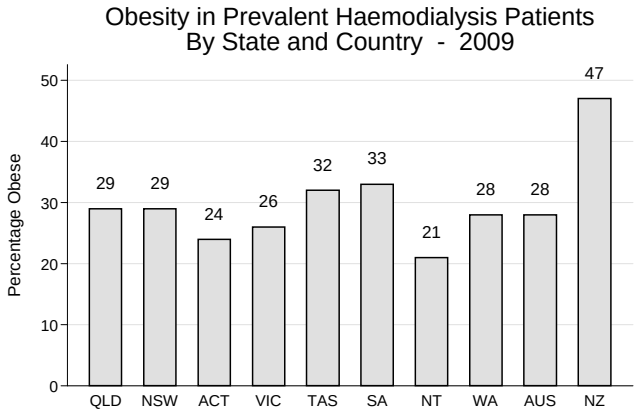


Figure 5.103

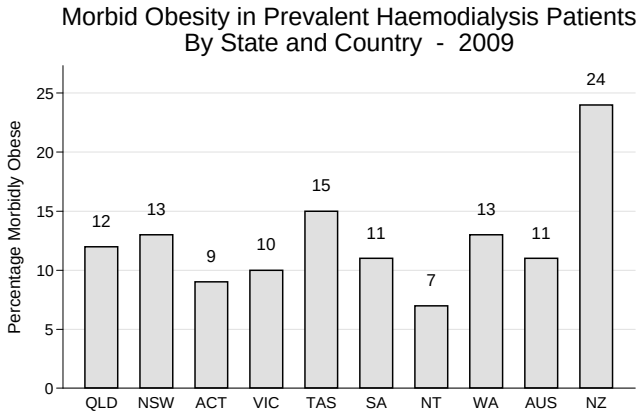


Figure 5.104

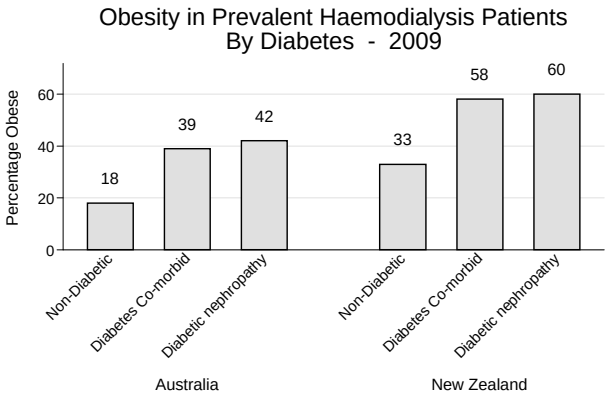


Figure 5.105