

CHAPTER 5

HAEMODIALYSIS

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Definitions

CARI guidelines	Caring for Australasians with Renal Impairment guidelines
Quotidian HD	≥ 5 HD treatments per week
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)

STOCK AND FLOW

AUSTRALIA

The annual stock and flow of HD patients during the period 2004-2008 is shown in Figures 5.1, 5.2 and 5.3.

There were 7,857 patients (368 per million) receiving HD treatment at 31st December 2008, an increase of 4%; of these 30% were hospital based, the same as in 2007, 58% were in satellite centres (57% in 2007) and 12% at home (13% in 2007).

The proportion of all HD patients who were using home HD in each State was 14% for New South Wales, 10% Queensland and the ACT, 8% Victoria, 5% Tasmania and the Northern Territory, 3% Western Australia and 1% for South Australia. These proportions were lower among older people (Figure 5.6).

A total of 2,096 patients received HD for the first time during the year, an increase of 4% from 2007. There was a 4% increase from 2007 to 2008 (2,006 to 2,096 patients) following a 3% decrease from 2006 to 2007.

The proportion of all HD patients in each age group is shown in Figure 5.8. There were 1,933 people \geq 75 years receiving haemodialysis, including 266 people \geq 85 years, a rise of 25% from 2007.

There were 535 transplant operations, a 32% increase from 2007 (405 operations), representing 7% of all HD patients dialysing and 12% of those patients $<$ 65 years. There were 41 patients aged \geq 65 years transplanted.

There were 1,189 deaths, at a rate of 16.6 deaths per 100 person-years (Figure 3.9).

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 2004 - 2008

	2004	2005	2006	2007	2008
Australia					
Patients new to HD	1729	2026	2068	2006	2096
First Dialysis Treatment	1454	1731	1781	1716	1744
Previous Dialysis (PD)	238	258	255	267	313
Failed Transplant	37	37	32	23	39
Transplanted	437	415	427	405	535
Deaths	920	927	1036	1163	1189
Never Transplanted	853	859	962	1084	1126
Previous Transplant	67	68	74	79	63
Permanent Transfers out (>12 months)	207	256	312	309	398
Temporary Transfers (12 months)	130	135	152	116	93
Patients Dialysing (HD) at 31 December	6213	6777	7209	7570	7857
Patients Dialysing (HD) at Home 31 December	801	822	896	950	948
% of all Home Dialysis (HD and PD) Patients	31%	31%	31%	31%	30%
New Zealand					
Patients new to HD	355	387	406	378	389
First Dialysis Treatment	275	299	326	309	316
Previous Dialysis (PD)	78	73	70	57	65
Failed Transplant	2	15	10	12	8
Transplanted	54	44	51	60	69
Deaths	153	150	181	176	233
Never Transplanted	142	136	166	166	216
Previous Transplant	11	14	15	10	17
Permanent Transfers out (>12 months)	87	87	114	118	138
Temporary Transfers (<12 months)	26	17	43	27	24
Patients Dialysing (HD) at 31 December	1034	1159	1229	1323	1337
Patients Dialysing (HD) at Home 31 December	264	297	320	328	328
% of all Home Dialysis (HD and PD) Patients	26%	29%	30%	31%	30%

NEW ZEALAND

The annual stock and flow of HD patients during the period 2004-2008 is shown in Figures 5.1, 5.4 and 5.5.

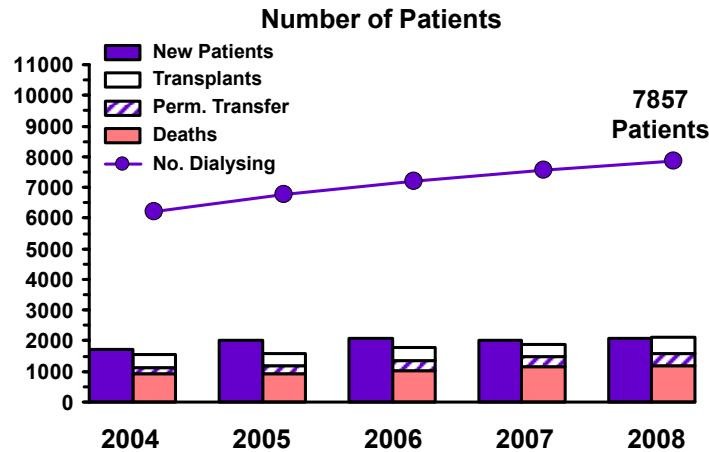
There were 1,337 patients (313 per million) receiving treatment at 31st December 2008, a 1% increase from 2007, after an 8% increase in 2006.

Hospital based HD remained similar to last year 47%, while satellite HD and home HD remained the same, 29% and 25% respectively.

New Zealand is continued on page 5-6.

Figure 5.2

Stock and Flow of Haemodialysis Patients Australia 2004 - 2008


Figure 5.3

Stock and Flow of Haemodialysis Patients Australia 2004 - 2008 Number (%)

Age Groups	2004	2005	2006	2007	2008
New Patients *					
00-14 years	11 (<1%)	15 (<1%)	13 (<1%)	9 (<1%)	13 (<1%)
15-24 years	46 (3%)	41 (2%)	34 (2%)	46 (2%)	43 (2%)
25-34 years	84 (5%)	107 (5%)	78 (4%)	94 (5%)	100 (5%)
35-44 years	168 (10%)	175 (9%)	199 (9%)	189 (9%)	164 (8%)
45-54 years	259 (15%)	315 (16%)	298 (14%)	311 (16%)	337 (16%)
55-64 years	346 (20%)	430 (21%)	456 (22%)	430 (21%)	435 (21%)
65-74 years	455 (26%)	528 (26%)	533 (26%)	485 (24%)	529 (25%)
75-84 years	331 (19%)	378 (19%)	412 (20%)	398 (20%)	422 (20%)
>=85 years	29 (2%)	37 (1%)	45 (2%)	44 (2%)	53 (3%)
Total	1729 (100%)	2026 (100%)	2068 (100%)	2006 (100%)	2096 (100%)
Patients Dialysing					
00-14 years	6 (<1%)	7 (<1%)	7 (<1%)	5 (<1%)	10 (<1%)
15-25 years	106 (2%)	97 (1%)	94 (1%)	98 (1%)	89 (1%)
25-34 years	340 (5%)	351 (5%)	302 (4%)	304 (4%)	289 (4%)
35-44 years	634 (10%)	668 (10%)	695 (10%)	734 (10%)	685 (8%)
45-54 years	1038 (17%)	1105 (16%)	1140 (16%)	1205 (16%)	1262 (16%)
55-64 years	1291 (21%)	1427 (21%)	1566 (22%)	1609 (21%)	1701 (22%)
65-74 years	1490 (24%)	1626 (24%)	1753 (24%)	1807 (24%)	1888 (24%)
75-84 years	1194 (19%)	1350 (20%)	1468 (20%)	1595 (21%)	1667 (21%)
>=85 years	114 (2%)	146 (2%)	184 (3%)	213 (3%)	266 (3%)
Total	6213 (100%)	6777 (100%)	7209 (100%)	7570 (100%)	7857 (100%)
Primary Renal Disease *					
Glomerulonephritis	445 (26%)	473 (23%)	465 (22%)	478 (24%)	448 (21%)
Analgesic Nephropathy	47 (3%)	57 (3%)	48 (2%)	46 (2%)	43 (2%)
Hypertension	230 (13%)	311 (15%)	309 (15%)	320 (16%)	312 (15%)
Polycystic Disease	97 (6%)	146 (7%)	131 (6%)	124 (6%)	122 (6%)
Reflux Nephropathy	56 (3%)	52 (3%)	62 (3%)	56 (3%)	59 (3%)
Diabetic Nephropathy	526 (30%)	636 (32%)	681 (33%)	632 (31%)	732 (35%)
Miscellaneous	207 (12%)	232 (11%)	257 (13%)	217 (11%)	225 (11%)
Uncertain	121 (7%)	119 (6%)	115 (6%)	130 (7%)	155 (7%)
Total	1729 (100%)	2026 (100%)	2068 (100%)	2006 (100%)	2096 (100%)

* New patients receiving first haemodialysis treatment



Figure 5.4

**Stock and Flow of Haemodialysis Patients
New Zealand 2004 - 2008**

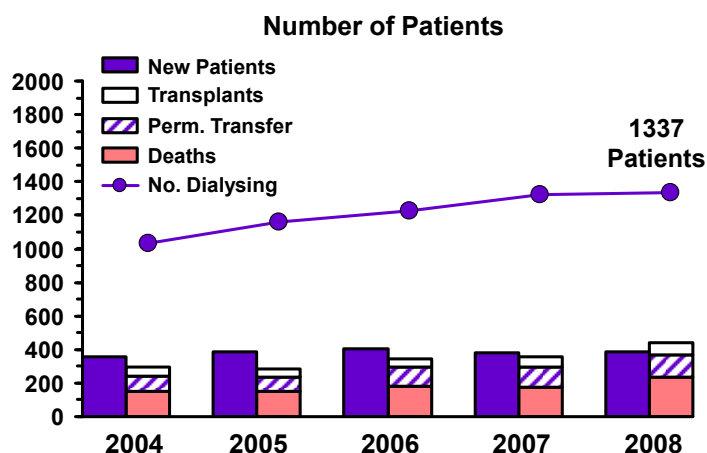


Figure 5.5

**Stock and Flow of Haemodialysis Patients
New Zealand 2004 - 2008
Number (%)**

Age Groups	2004	2005	2006	2007	2008
New Patients *					
00-14 years	1 (<1%)	2 (<1%)	3 (1%)	3 (<1%)	5 (1%)
15-24 years	10 (3%)	12 (3%)	15 (4%)	21 (6%)	18 (5%)
25-34 years	23 (7%)	14 (4%)	30 (7%)	17 (4%)	15 (4%)
35-44 years	45 (12%)	44 (11%)	33 (8%)	45 (12%)	31 (8%)
45-54 years	78 (22%)	79 (21%)	91 (22%)	63 (17%)	83 (21%)
55-64 years	97 (27%)	119 (31%)	95 (23%)	98 (26%)	116 (30%)
65-74 years	70 (20%)	90 (23%)	95 (23%)	89 (24%)	88 (23%)
75-84 years	26 (7%)	23 (6%)	40 (11%)	38 (10%)	32 (8%)
>=85 years	5 (1%)	4 (1%)	4 (1%)	4 (1%)	1 (<1%)
Total	355 (100%)	387 (100%)	406 (100%)	378 (100%)	389 (100%)
Patients Dialysing					
00-14 years	1 (<1%)	2 (<1%)	2 (<1%)	3 (<1%)	4 (<1%)
15-25 years	33 (3%)	32 (3%)	32 (3%)	39 (3%)	36 (3%)
25-34 years	74 (7%)	82 (7%)	88 (7%)	80 (6%)	76 (6%)
35-44 years	139 (13%)	152 (13%)	150 (12%)	161 (12%)	148 (11%)
45-54 years	221 (21%)	244 (21%)	246 (20%)	261 (20%)	274 (20%)
55-64 years	287 (28%)	324 (28%)	345 (28%)	360 (27%)	373 (28%)
65-74 years	208 (20%)	242 (21%)	270 (22%)	299 (23%)	290 (22%)
75-84 years	68 (7%)	76 (7%)	87 (7%)	107 (8%)	126 (9%)
>=85 years	3 (<1%)	5 (<1%)	9 (<1%)	13 (1%)	10 (1%)
Total	1034 (100%)	1159 (100%)	1229 (100%)	1323 (100%)	1337 (100%)
Primary Renal Disease *					
Glomerulonephritis	90 (26%)	96 (26%)	91 (22%)	87 (23%)	68 (17%)
Analgesic Nephropathy	1 (<1%)	- (-)	1 (<1%)	3 (<1%)	1 (<1%)
Hypertension	43 (12%)	39 (10%)	40 (10%)	44 (12%)	34 (8%)
Polycystic Disease	20 (5%)	29 (7%)	21 (5%)	15 (4%)	13 (3%)
Reflux Nephropathy	12 (3%)	9 (2%)	7 (2%)	8 (2%)	9 (2%)
Diabetic Nephropathy	155 (43%)	160 (41%)	184 (45%)	161 (43%)	201 (52%)
Miscellaneous	18 (5%)	36 (9%)	33 (8%)	48 (13%)	46 (13%)
Uncertain	16 (5%)	18 (5%)	29 (7%)	12 (3%)	17 (4%)
Total	355 (100%)	387 (100%)	406 (100%)	378 (100%)	389 (100%)

* New patients receiving first haemodialysis treatment

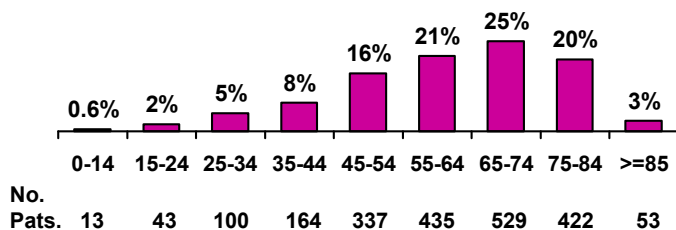
Figure 5.6

Proportion (%) of Prevalent Patients aged ≥ 65 years Treated with Home Haemodialysis 2004 - 2008

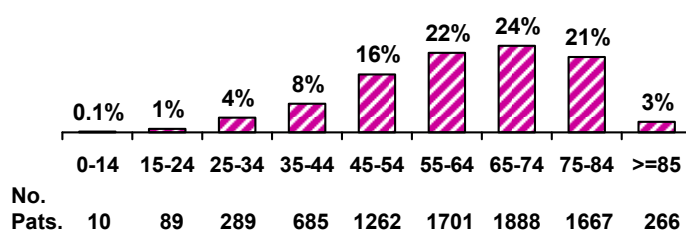
State	2004	2005	2006	2007	2008
Queensland	2%	3%	4%	4%	4%
New South Wales	7%	6%	5%	5%	5%
Australian Capital Territory	5%	3%	4%	4%	4%
Victoria	2%	2%	2%	3%	3.5%
Tasmania	-	1%	3%	3%	3%
South Australia	2%	1%	-	-	-
Northern Territory	-	-	2%	2%	2%
Western Australia	<1%	<1%	<1%	-	1%
Australia	3%	3%	3%	3.5%	3.8%
New Zealand	5%	5%	6%	8%	8%

Figure 5.7
Age of New Haemodialysis Patients 2008
Australia

■ Number (Total=2096)


Figure 5.8
Age of Current Haemodialysis Patients
Australia 31-Dec-2008

▨ Number (Total=7857)





NEW ZEALAND (continued from page 5-2)

There were 389 patients who received HD for the first time, a 3% increase in number from 2007, following a decrease of 7% from 2006. Seventeen percent of these were previously dialysing with peritoneal dialysis, 2% failed transplants and 81% having their initial dialysis treatment.

The modal age group for new HD patients was 55-64 years (30%), 10% were <35 years and 31% ≥ 65 years (Figures 5.5 and 5.9). The age distribution of the prevalent HD population was 55-64 years (28%), 9% were <35 years and 32% were ≥ 65 years (Figure 5.10).

There were 69 HD patients who received transplants in 2008 (60 in 2007), representing 5% of all HD patients dialysing and 7% of those patients < 65 years. Three patients ≥ 65 years were transplanted.

There were 233 deaths, a rate of 17.4 deaths per 100 person-years of treatment (Figure 3.11).

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

Figure 5.9

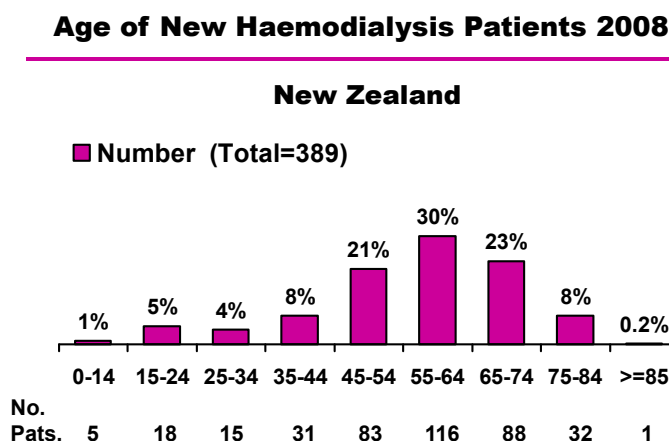
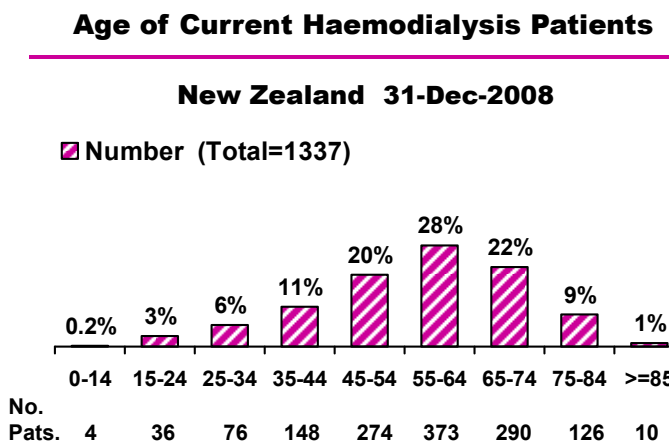


Figure 5.10



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 79% in 2008, from 76% in 2007. Only 5% (397 patients) were prescribed less than 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) 2004 - 2008								
Country	No. Pts	Mls/Minute						
		<200	200-249	250-299	300-349	350-399	>400	
Aust	December 2008	7857	1%	4%	16%	55%	20%	4%
	* December 2007	7536	<1%	5%	18%	53%	19%	4%
	* December 2006	7160	<1%	5%	19%	52%	19%	4%
	December 2005	6717	<1%	5%	19%	53%	18%	4%
	December 2004	6206	<1%	5%	18%	55%	18%	4%
NZ	December 2008	1337	<1%	8%	32%	41%	17%	2%
	December 2007	1323	<1%	7%	29%	41%	21%	2%
	December 2006	1207	<1%	7%	27%	44%	20%	2%
	December 2005	1134	<1%	9%	24%	43%	22%	2%
	December 2004	1031	1%	10%	25%	42%	20%	2%

NEW ZEALAND

In December 2008, 60% of patients were prescribed 300 mls/minute or higher compared to 64% in December 2007 and 66% in December 2006. There were 8% using < 250 mls/minute, (7% in 2007) compared to 11% in December 2004; many of these were receiving long hour HD.

Figure 5.12

Blood Flow Rate by Type of Access December 2008						
Blood Flow Rate	Australia			New Zealand		
	AVF	AVG	CVC *	AVF	AVG	CVC
<200	34 (<1%)	4 (<1%)	13 (1%)	1 (<1%)	-	6 (2%)
200-249	213 (4%)	23 (3%)	110 (10%)	64 (7%)	5 (6%)	32 (9%)
250-299	811 (14%)	131 (17%)	336 (30%)	198 (22%)	40 (51%)	186 (52%)
300-349	3274 (55%)	487 (62%)	545 (48%)	401 (45%)	29 (37%)	121 (34%)
350-399	1322 (22%)	118 (15%)	127 (11%)	211 (23%)	5 (6%)	13 (4%)
>=400	286 (5%)	18 (2%)	5 (<1%)	24 (3%)	-	1 (<1%)
Total	5940 (100%)	781 (100%)	1136 (100%)	899 (100%)	79 (100%)	359 (100%)

* One patient having C.V.V. HD as at 31-Dec-2006 not included
 * Two patients having C.V.V. HD as at 31-Dec-2007 not included

Figure 5.13

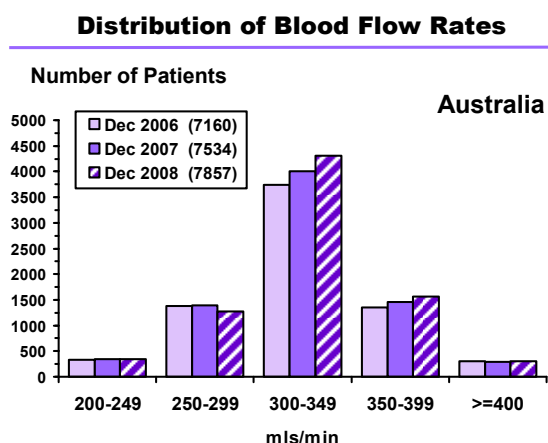


Figure 5.14

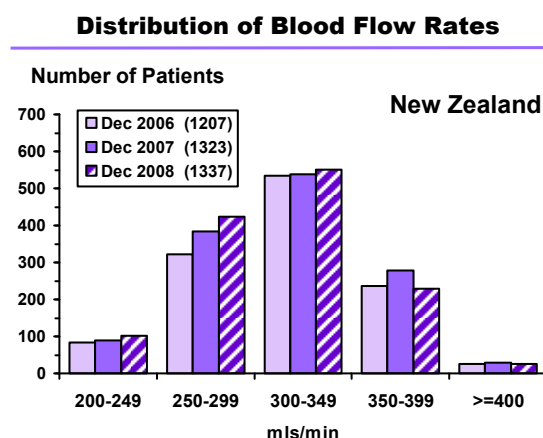




Figure 5.15

Duration and Number of Sessions Per Week December 2008						
Sessions Per week	Hours of Each Treatment					Total
	<4	4-4.4	4.5-4.9	5-5.4	≥ 5.5	
Australia						
≤ 3	359 (5%)	3101 (43%)	1390 (19%)	2079 (29%)	274 (4%)	7203
3.5-4.5	28 (6%)	70 (14%)	42 (8%)	100 (20%)	265 (52%)	505
≥ 5	82 (55%)	24 (16%)	5 (3%)	-	38 (26%)	149
Total	469 (6%)	3195 (41%)	1437 (18%)	2179 (28%)	577 (7%)	7857
New Zealand						
≤ 3	33 (3%)	519 (43%)	243 (20%)	337 (28%)	74 (6%)	1206
3.5-4.5	6 (6%)	18 (19%)	7 (7%)	34 (35%)	32 (33%)	97
≥ 5	16 (47%)	14 (41%)	-	2 (6%)	2 (6%)	34
Total	55 (4%)	551 (41%)	250 (19%)	373 (28%)	108 (8%)	1337

FREQUENT AND LONG HAEMODIALYSIS

The recent trend of the increasing proportions of those dialysing >3 times per week in Australia may have reached a plateau in terms of numbers. In percentage terms, the proportion with very frequent treatment (five or more per week) has dropped in Australia (but increased in New Zealand, Figure 5.19).

In New Zealand the proportion dialysing more than three times per week continues to increase (Figures 5.15 - 5.23).

The proportions dialysing ≥ 4.5 hours per session is steady. As a result, the proportions dialysing more than the “standard” 12 hours per week have stabilised, particularly in Australia.

In 2008, 55% and 58% of HD patients were dialysing ≥ 13.5 hours per week in Australia and New Zealand respectively.

Figure 5.16

**Haemodialysis Frequency (Per Week)
December 2006 - 2008**

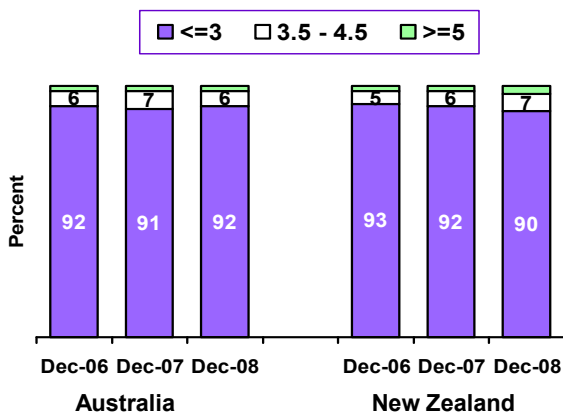


Figure 5.17

**Haemodialysis Session Length (Hours)
December 2006 - 2008**

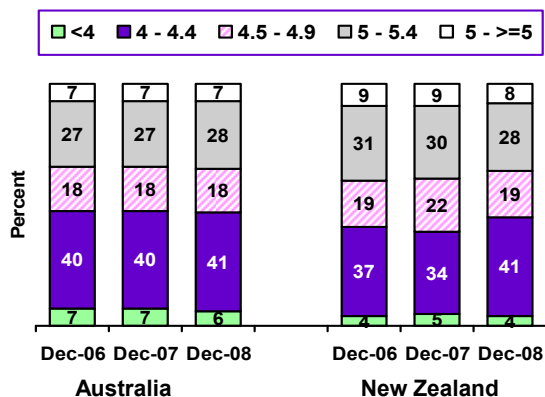


Figure 5.18

**Haemodialysis Duration (Hours per Week)
December 2006 - 2008**

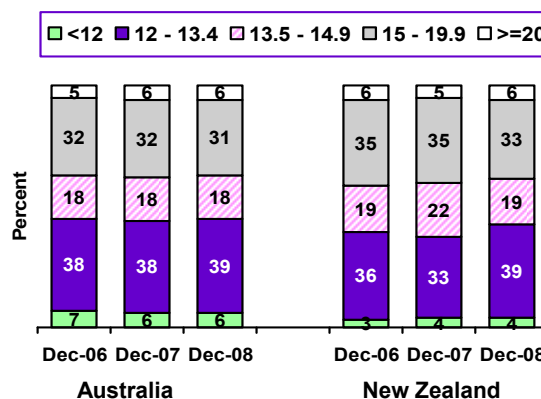


Figure 5.19

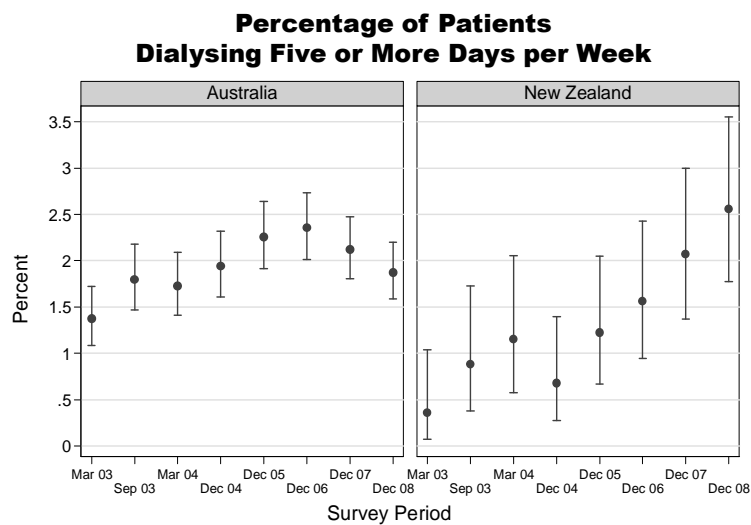


Figure 5.20

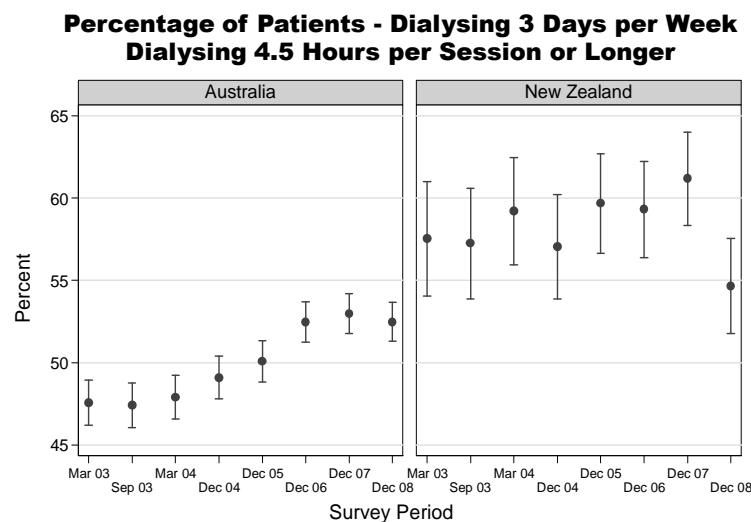
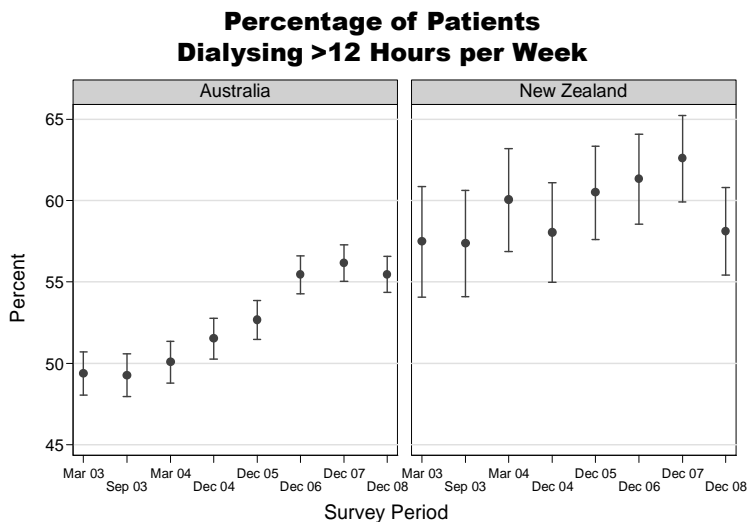


Figure 5.21



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 05	54 (4%)	23 (2%)	48 (3%)	3 (2%)	10 (2%)	1 (<1%)	14 (2%)	14 (1%)
Dec 06	51 (4%)	33 (1%)	56 (3%)	3 (2%)	14 (3%)	3 (1%)	12 (2%)	20 (2%)
Dec 07	58 (4%)	25 (1%)	52 (3%)	1 (<1%)	9 (2%)	-	14 (2%)	27 (2%)
Dec 08	52 (4%)	25 (1%)	46 (2%)	2 (2%)	11 (2%)	1 (<1%)	12 (2%)	34 (3%)

Figure 5.23

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

	Australia							New Zealand
	Qld	NSW/ACT	Vic	Tas	SA	NT	WA	
Dec 05	477 (46%)	1536 (75%)	565 (35%)	34 (29%)	111 (25%)	236 (85%)	133 (21%)	632 (60%)
Dec 06	620 (57%)	1653 (76%)	575 (33%)	43 (39%)	116 (27%)	243 (84%)	150 (24%)	648 (59%)
Dec 07	677 (59%)	1665 (74%)	606 (34%)	46 (41%)	118 (27%)	276 (86%)	184 (27%)	729 (61%)
Dec 08	715 (58%)	1722 (74%)	641 (35%)	54 (45%)	105 (23%)	279 (79%)	177 (25%)	645 (55%)

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 05	600 (49%)	1657 (75%)	719 (40%)	46 (35%)	138 (29%)	237 (84%)	164 (25%)	696 (60%)
Dec 06	769 (60%)	1827 (76%)	753 (39%)	54 (44%)	143 (30%)	250 (83%)	186 (28%)	733 (61%)
Dec 07	845 (62%)	1880 (75%)	802 (40%)	55 (43%)	152 (32%)	272 (86%)	223 (31%)	825 (62%)
Dec 08	882 (60%)	1938 (74%)	839 (41%)	63 (48%)	132 (27%)	286 (79%)	216 (29%)	775 (58%)

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 1997 - 2008					
% [95% Confidence Interval]					
	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
1997-1999	2726	93 [91, 93]	87 [86, 88]	65 [63, 67]	49 [47, 51]
2000-2002	3220	93 [92, 94]	87 [85, 88]	66 [64, 68]	47 [45, 49]
2003-2005	3818	93 [92, 93]	87 [86, 88]	64 [63, 66]	45 [43, 47]
2006-2008	4528	93 [92, 94]	87 [86, 88]	67 [63, 70]	-
New Zealand					
1997-1999	352	92 [89, 94]	85 [81, 89]	55 [49, 61]	43 [37, 49]
2000-2002	579	95 [92, 96]	89 [86, 91]	64 [60, 68]	43 [38, 47]
2003-2005	665	94 [92, 96]	87 [85, 90]	66 [62, 69]	43 [38, 48]
2006-2008	740	94 [92, 96]	86 [83, 89]	62 [52, 71]	-

Figure 5.26

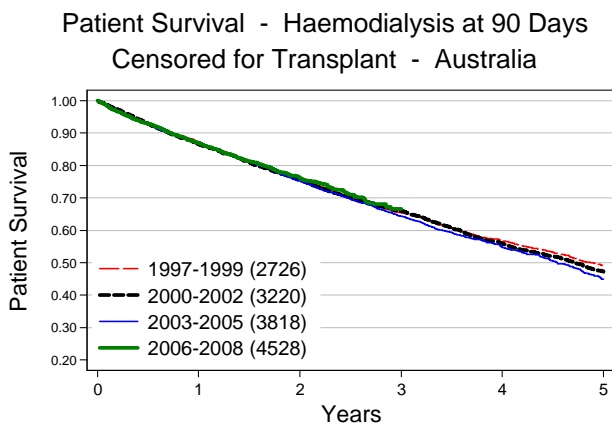
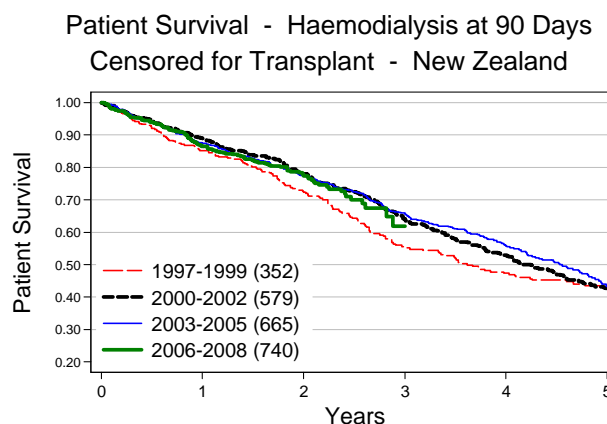


Figure 5.27





Figures 5.28- 5.29

These figures show survival curves for patients treated with haemodialysis at day 90, adjusted to a median age of 62.6 years for Australia and 56.6 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

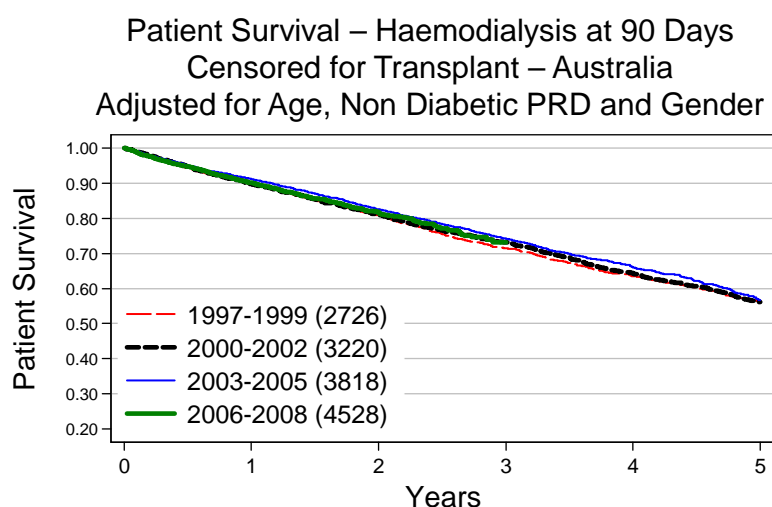


Figure 5.29

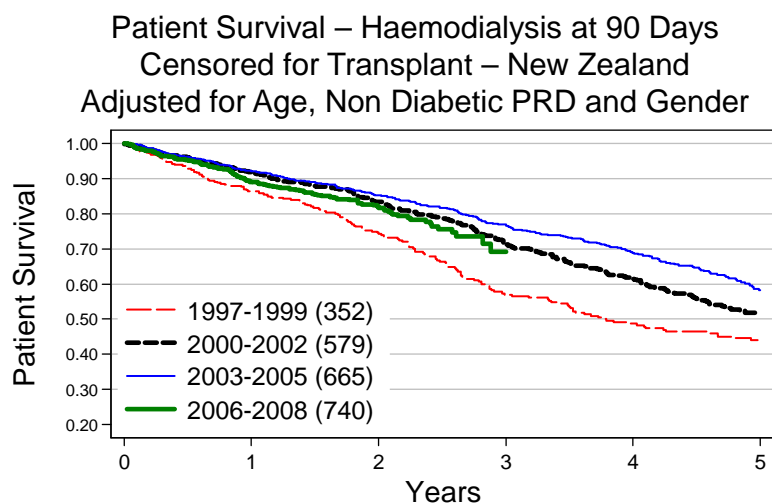


Figure 5.30

**Haemodialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant 1997 - 2008
% [95% Confidence Interval]**

	Survival			
	6 months	1 year	3 years	5 years
Australia				
Non Diabetic (10,282)	93 [92, 93]	87 [87, 88]	67 [66, 68]	50 [49, 51]
Diabetic (4010)	93 [92, 94]	86 [85, 87]	62 [60, 63]	41 [38, 43]
New Zealand				
Non Diabetic (1332)	94 [92, 95]	87 [85, 89]	66 [63, 69]	51 [47, 55]
Diabetic (1004)	94 [92, 95]	87 [85, 89]	59 [55, 62]	35 [31, 39]

Figure 5.31

Patient Survival - Haemodialysis at 90 Days
Censored for Transplant - Australia

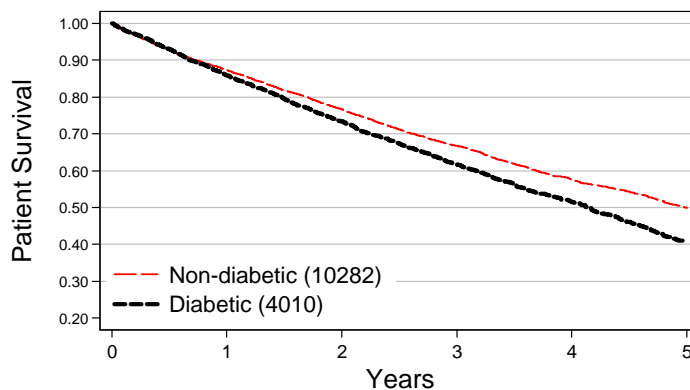


Figure 5.32

Patient Survival - Haemodialysis at 90 Days
Censored for Transplant - New Zealand

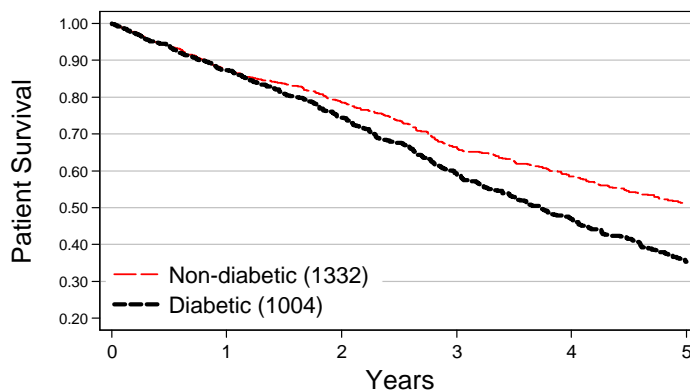




Figure 5.33

**Haemodialysis at 90 Days
Patient Survival - By Age Group
Censored for Transplant 1997 - 2008
% [95% Confidence Interval]**

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	1732	98 [97, 98]	95 [93, 96]	86 [84, 88]	79 [76, 82]
40-59 years	4652	96 [95, 96]	92 [91, 93]	77 [75, 78]	62 [60, 64]
60-74 years	5128	91 [90, 92]	84 [83, 85]	61 [60, 63]	42 [40, 43]
75 and over	2780	88 [86, 89]	79 [77, 80]	45 [43, 48]	24 [22, 26]
New Zealand					
0-39 years	378	98 [96, 99]	94 [91, 96]	79 [73, 84]	68 [60, 74]
40-59 years	1008	95 [94, 96]	90 [88, 92]	70 [66, 73]	49 [45, 53]
60-74 years	779	92 [90, 94]	85 [83, 88]	55 [51, 59]	35 [30, 39]
75 and over	171	85 [79, 90]	65 [58, 72]	33 [25, 41]	16 [10, 25]

Figure 5.34

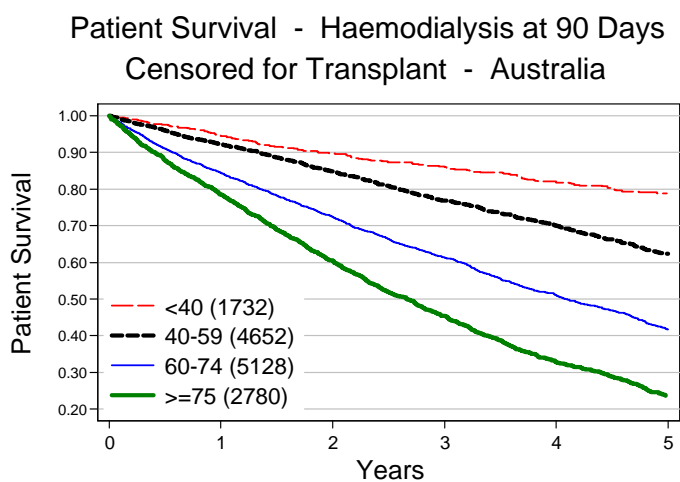
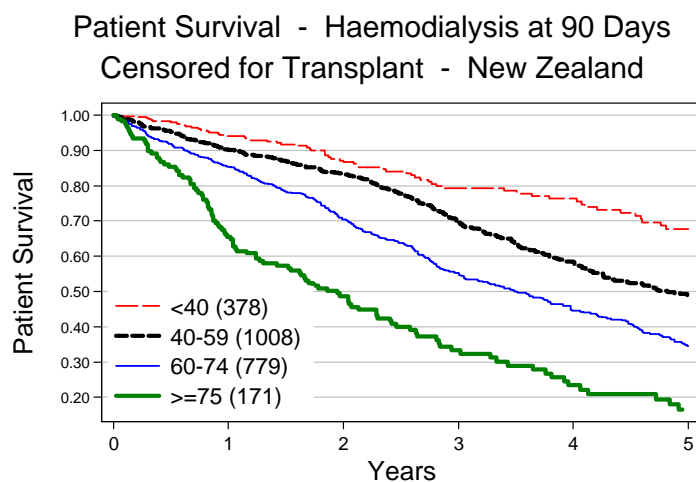


Figure 5.35



MEMBRANE TYPE AND SURFACE AREAS

AUSTRALIA

Figures 5.36 - 5.38.

Usage of low flux polysulfone dialysers continued to decrease (5% in December 2008 from 7% in 2007 and 16% in 2006), while use of high flux polysulfone also decreased to 1.5% in 2008 from 7% in both 2007 and 2006, 9% in 2005 and 39% in 2004. High flux Polysulphone-Helixone increased to 49% in December 2008 from 39% in 2007, 34% in 2006 and 27% in 2005. High flux Polyamix increased to 26% this year from 20% last year and 16% in 2006.

Eighty one percent of patients received dialysis with high flux dialysers (72% in 2007, 64% in 2006 and 57% in 2005). Haemophan was used for only two patients at December 2008.

Ten patients were receiving haemofiltration and 284 haemodiafiltration across all States and the ACT.

NEW ZEALAND

Figures 5.36 and 5.38.

Low flux polysulphone decreased to 24% in December 2008, from 38% and 48% in December 2007 and 2006 respectively. No patients were using haemophan.

There were 52% (701 patients) reported as receiving dialysis with high flux dialysers in December 2008, an increase from 29% (382 patients) in 2007 and 22% (260 patients) in 2006.

One hundred and sixty one patients were receiving haemodiafiltration at December 2008. There were no patients receiving these treatments at December 2007.

Figure 5.36

Haemodialyser Membrane Types by Surface Area 31-Dec-2008

Dialyser Membrane Type	Flux	Square Metres					Total
		<1.0	1.0-1.4	1.5-1.7	1.8-1.9	>1.9	
Australia							
Acrylonitrile SMSC	High	-	-	-	-	1	1
Cellulose Acetate	Low	-	-	1	-	-	1
Cellulose Triacetate	High	-	-	5	13	61	79
Diacetate	Low	-	-	2	-	4	6
Haemophan	Low	-	-	-	-	2	2
Polyamix	High	-	44	747	-	1222	2013
Polyamix	Low	-	114	598	-	350	1062
Polyethersulfone	High	-	-	5	116	183	304
Polysulphone	High	1	22	-	44	52	119
Polysulphone	Low	5	27	2	177	206	417
Polysulphone-Helixone	High	-	1000	-	2456	395	3851
Polysynthane	Low	-	-	1	-	1	2
Total		6	1207	1361	2806	2477	7857
New Zealand							
Polyamix	High	-	-	53	-	204	257
Polyamix	Low	-	13	102	-	200	315
Polysulphone	High	-	2	-	82	-	84
Polysulphone	Low	2	11	-	189	119	321
Polysulphone-Helixone	High	-	331	-	27	2	360
Total		2	357	155	298	525	1337

Figure 5.37

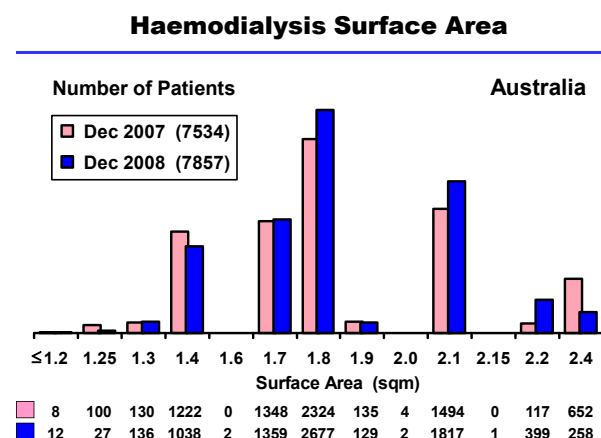
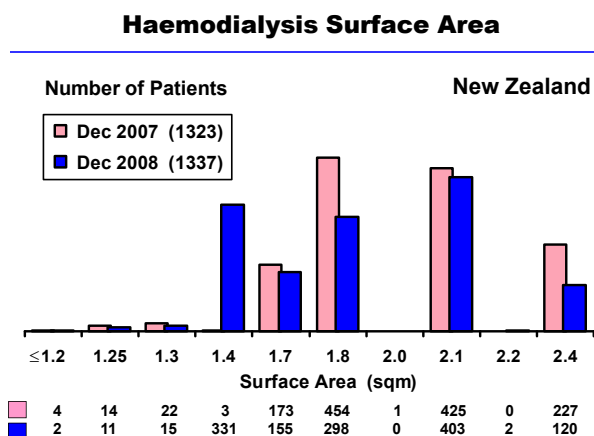


Figure 5.38





ANAEMIA

In Australia, mean haemoglobin has fallen slightly while erythropoietic agent use has stabilised. Haemodialysis patients had higher erythropoietic agent usage and lower mean haemoglobin than peritoneal dialysis patients.

In New Zealand, mean haemoglobin has stabilised at about 115 g/L. The increase in erythropoietic agent usage seen over 2003-2005 has reached a plateau.

Figures 5.39 and 5.40 refer to all dialysis patients (PD and HD); it can be seen peritoneal dialysis patients tend to have slightly lower haemoglobin values, but also lower erythropoietin agent usage.

Figure 5.39

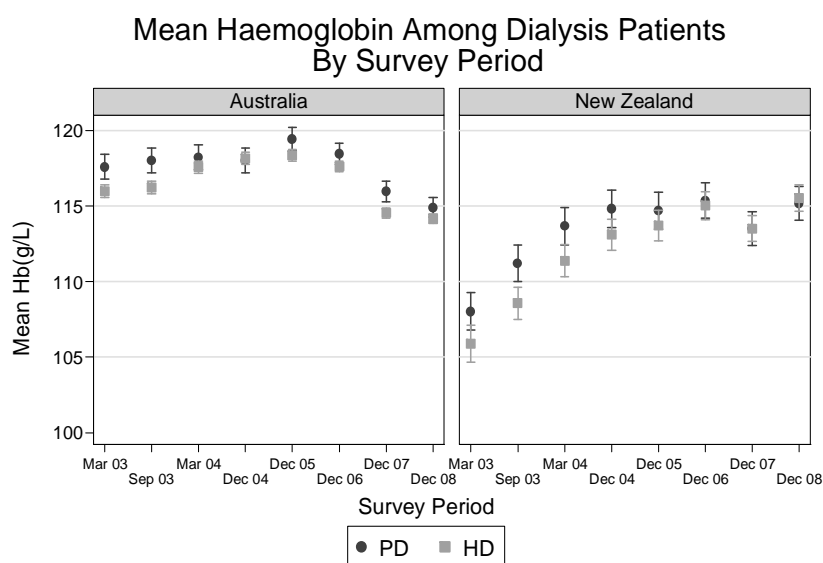
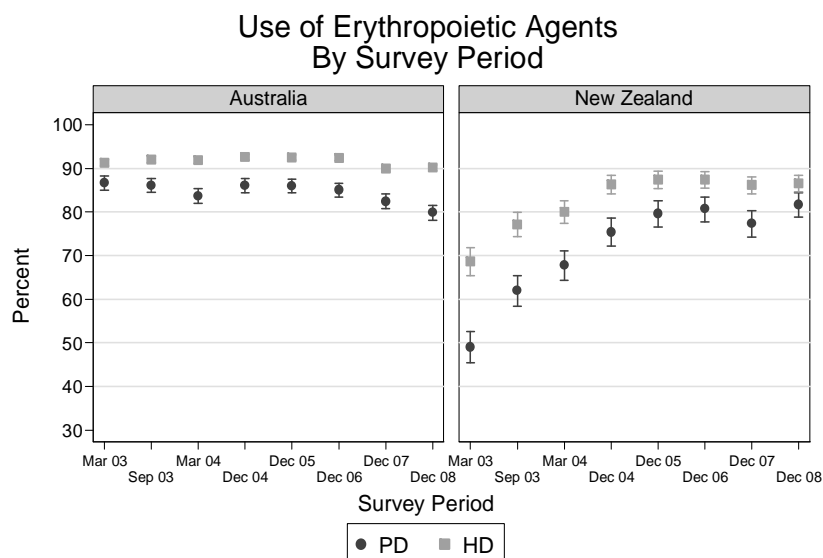


Figure 5.40



HAEMOGLOBIN

In Australia, haemoglobin is <110 g/L in about 35% of haemodialysis patients, higher than in previous years and ≥ 140 g/L in about 4%, which is slightly lower than previous years.

In New Zealand, the corresponding percentages are about 34% and 6% 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

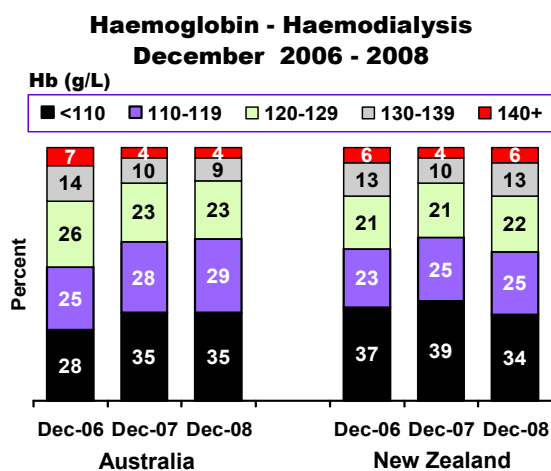
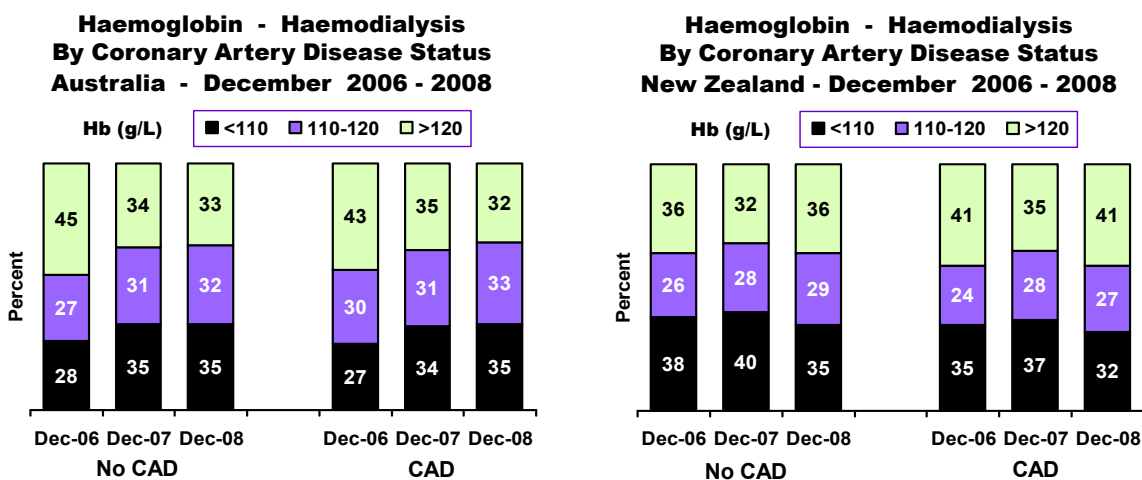


Figure 5.42





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 109-120 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 24% to 80% for haemodialysis patients and for New Zealand 31% to 59%.

Figure 5.43

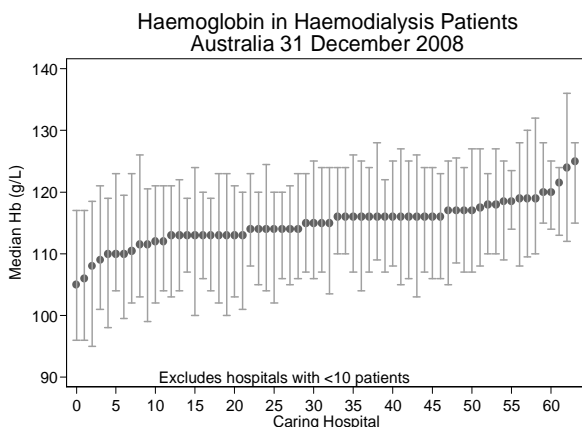


Figure 5.44

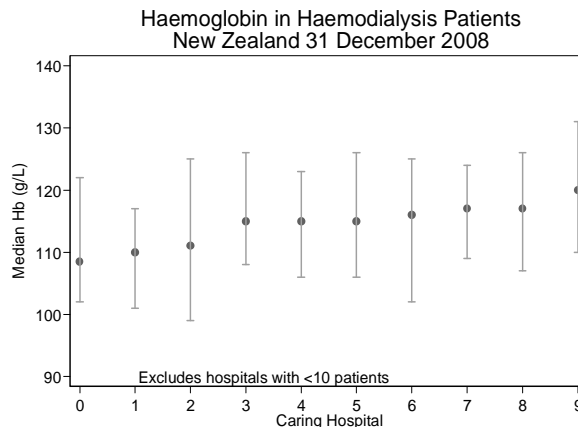


Figure 5.45

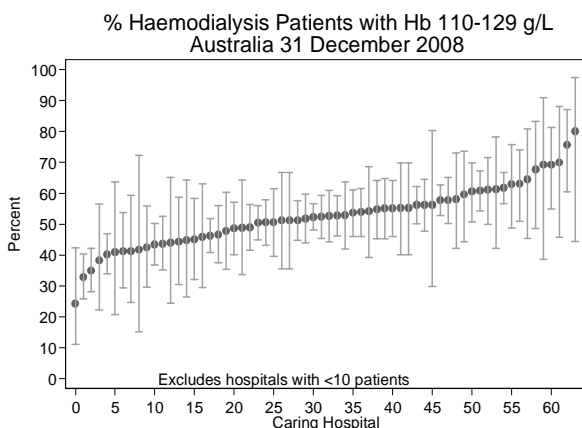
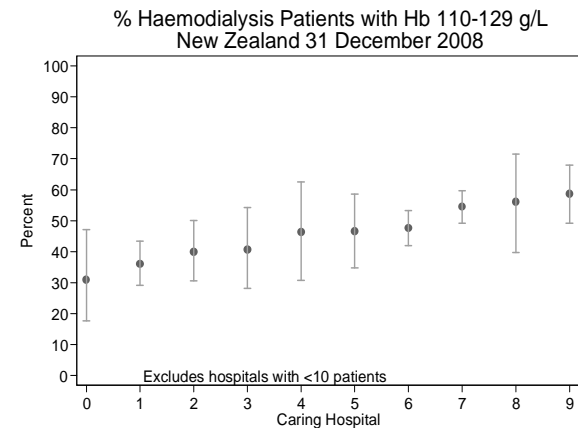


Figure 5.46



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 stable.

In both Australia and New Zealand, distributions of transferrin saturation have been unchanged for the past three years.

Figure 5.47

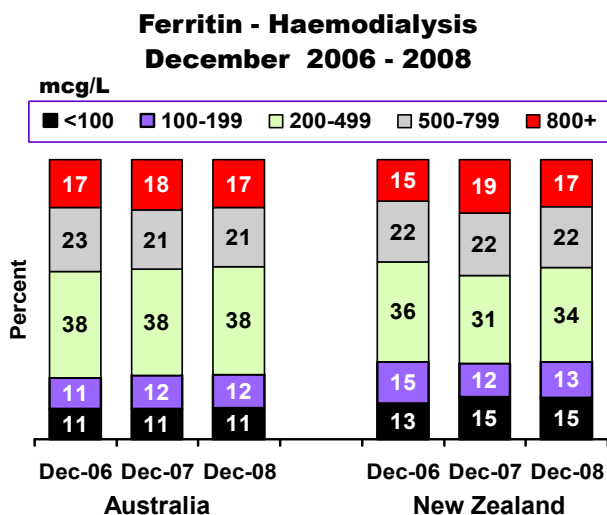
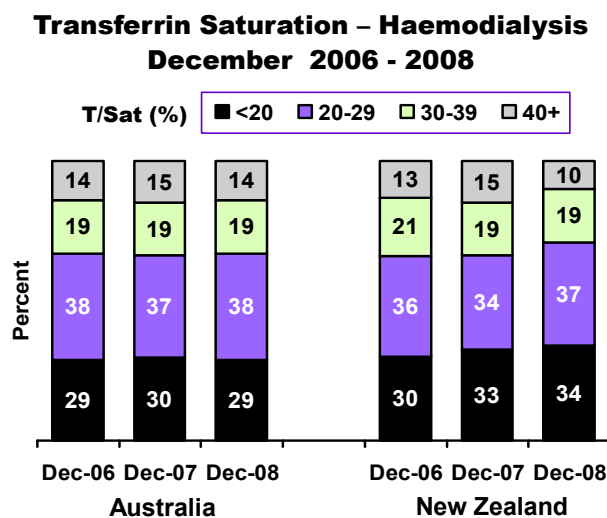


Figure 5.48





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 0-75% for haemodialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 35-100%. 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 17-58% for haemodialysis patients and the corresponding figures for transferrin saturation were between 45-81%. 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

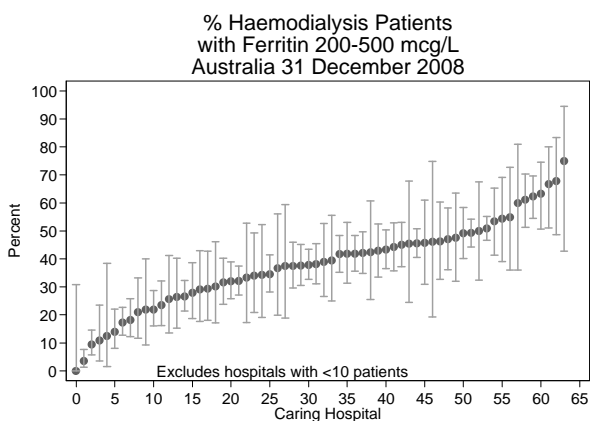


Figure 5.50

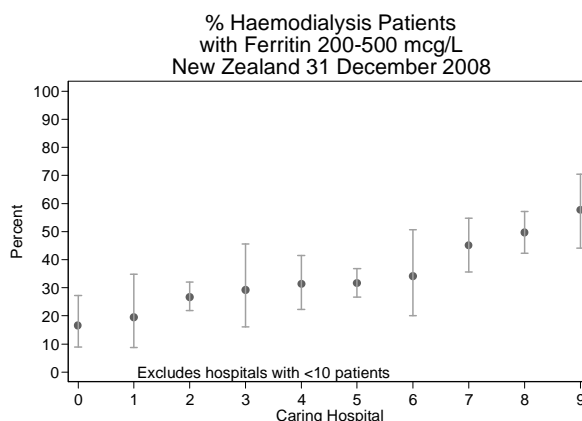


Figure 5.51

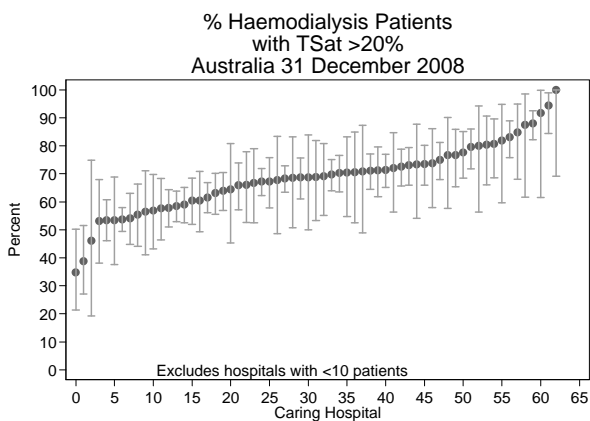
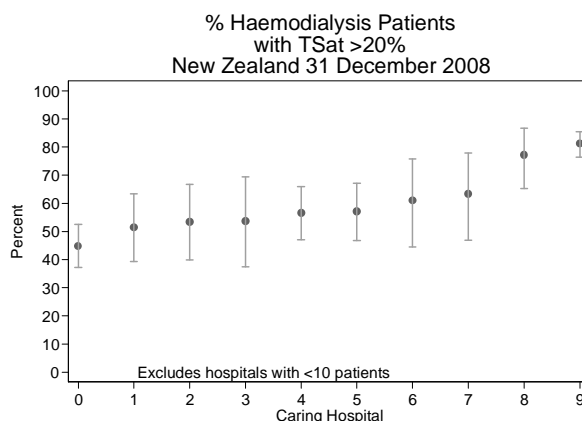


Figure 5.52

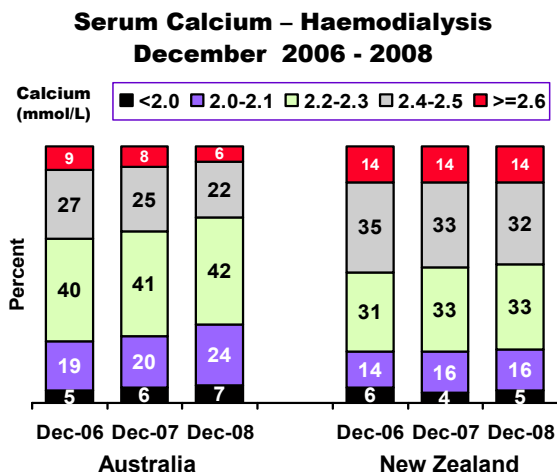


SERUM CALCIUM

Figure 5.53

In both Australia and New Zealand the proportions of patients with proportions with serum calcium ≥ 2.4 mmol/L have decreased over the past three years, 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 37-85% for haemodialysis patients, while in New Zealand the corresponding proportions were 39-73%.

Figure 5.54

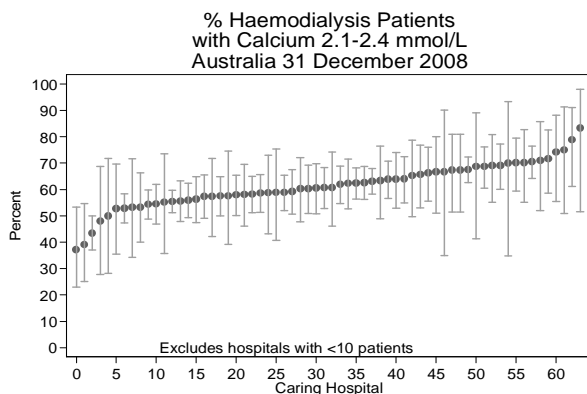
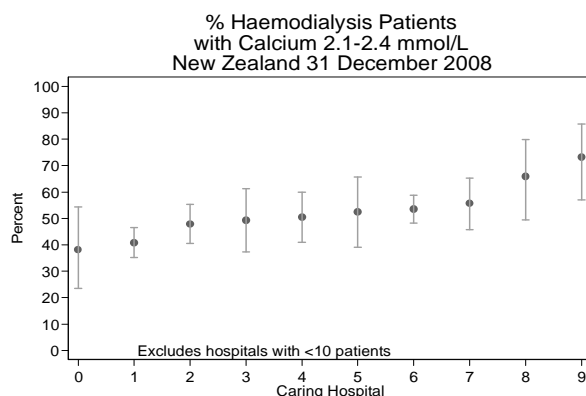


Figure 5.55





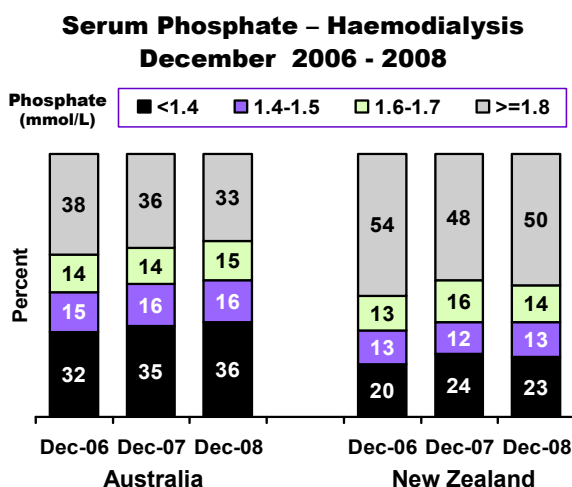
SERUM PHOSPHATE

Figure 5.56

In Australia, control of serum phosphate improved consistently over the last three years.

In New Zealand, the proportions with serum phosphate ≥ 1.8 mmol/L have 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 32-81% for haemodialysis patients and in New Zealand, the corresponding proportions were 21-67%.

Figure 5.57

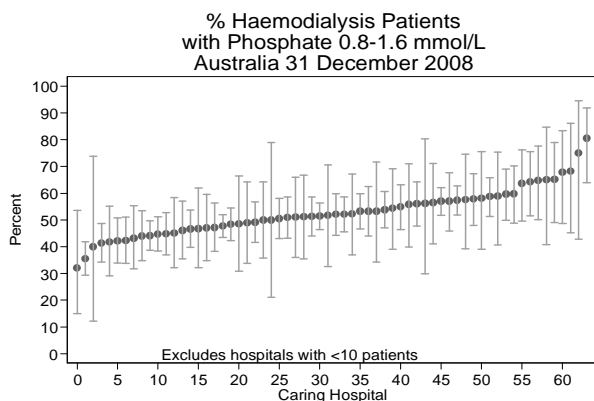
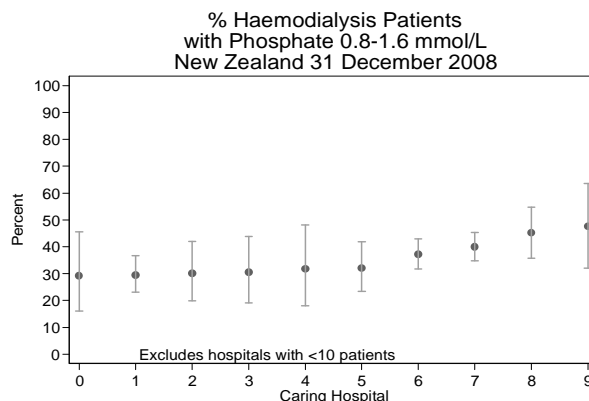


Figure 5.58



CALCIUM-PHOSPHATE PRODUCT

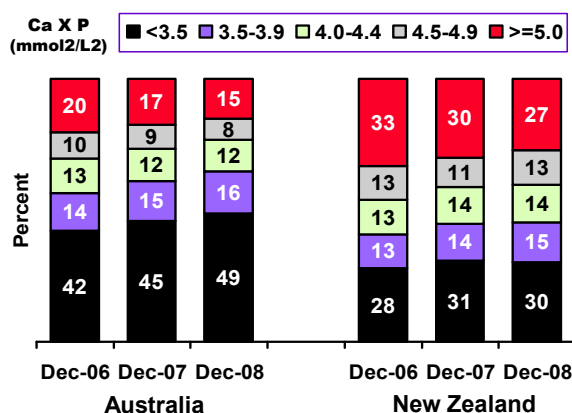
Figure 5.59

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

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

Figure 5.59

Calcium Phosphate Product – Haemodialysis December 2006 - 2008



CALCIUM-PHOSPHATE PRODUCT BY TREATING CENTRE

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

In Australia, the proportions ranged widely between 41-86% for haemodialysis patients while in New Zealand, the corresponding proportions were 29-79%.

Figure 5.60

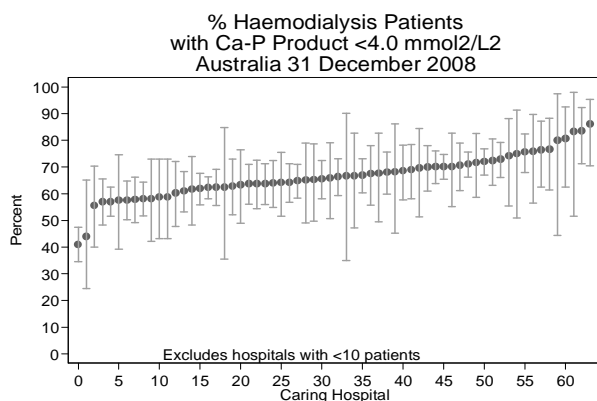
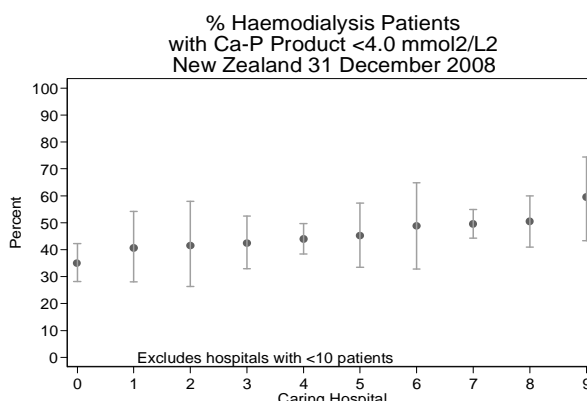


Figure 5.61





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.

Of those with URR < 65%, 29% in Australia and 39% in New Zealand had CVC access.

Figure 5.62

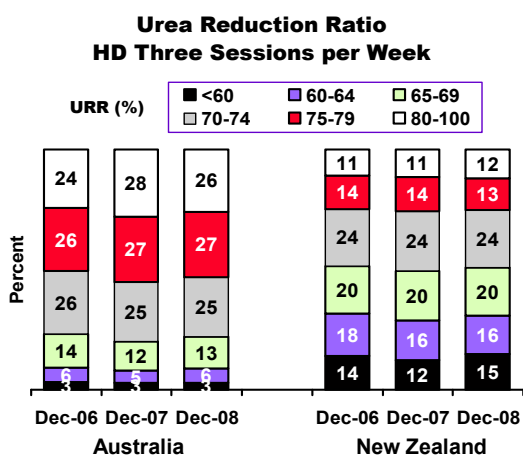


Figure 5.63

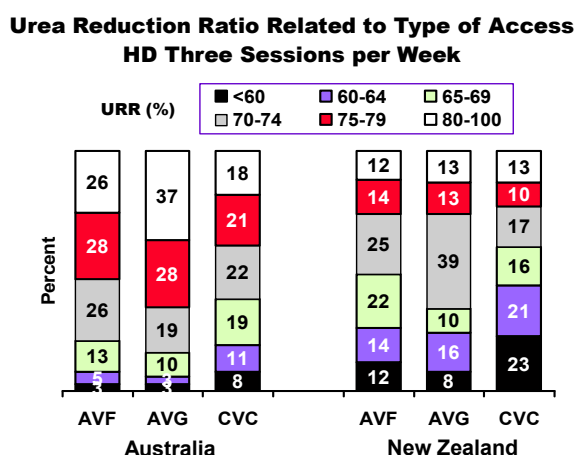


Figure 5.64

Urea Reduction Ratio - Prevalent Patients Three Sessions per Week - December 2008			
Hours per Session	Urea Reduction Ratio %		
	< 65	>=65	Total
Australia			
<4 hours	34 (11.2%)	268 (88.7%)	302 (100%)
4 hours	268 (9.8%)	2457 (90.1%)	2725 (100%)
>4-5 hours	247 (7.8%)	2906 (92.1%)	3153 (100%)
>5 hours	17 (9.0%)	170 (90.9%)	187 (100%)
Total	566 (8.8%)	5801 (91.1%)	6367 (100%)
New Zealand			
<4 hours	8 (34.7%)	15 (65.2%)	23 (100%)
4 hours	156 (34.7%)	293 (65.2%)	449 (100%)
>4-5 hours	137 (28.4%)	344 (71.5%)	481 (100%)
>5 hours	7 (14.5%)	41 (85.4%)	48 (100%)
Total	308 (30.7%)	693 (69.2%)	1001 (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: 70-84% in Australia and 65-78% in New Zealand. However, the proportions with URR >70% in each unit varied widely, from 45-96% in Australia and 25-83% in New Zealand.

Figure 5.65

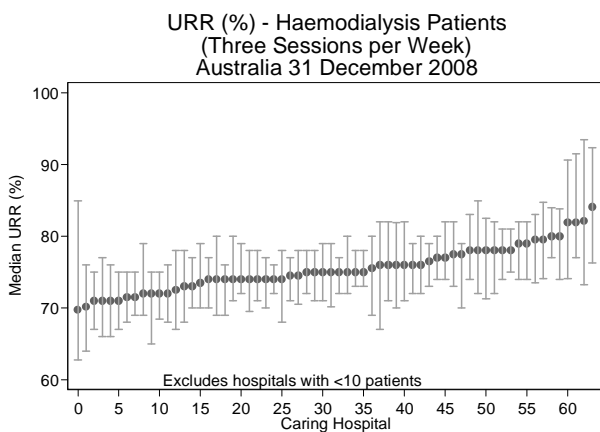


Figure 5.66

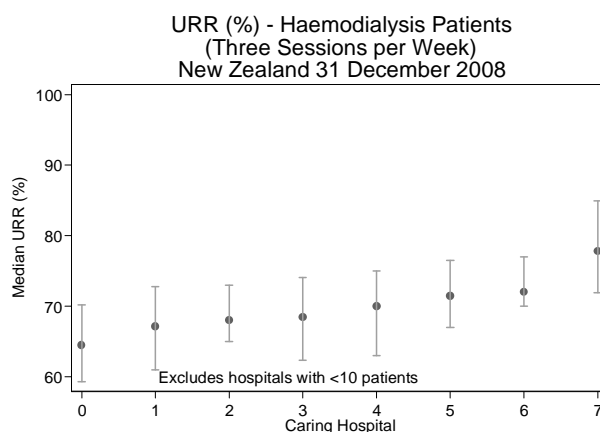


Figure 5.67

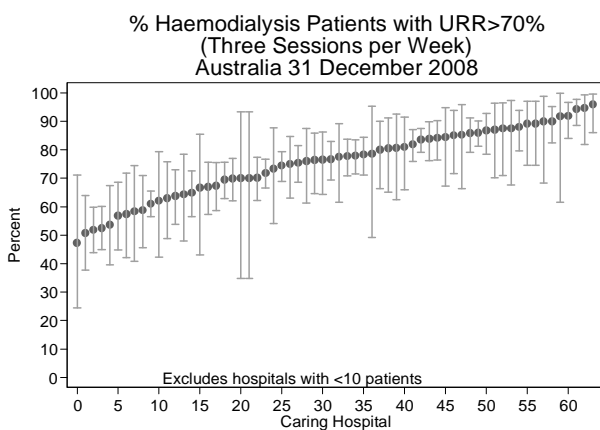
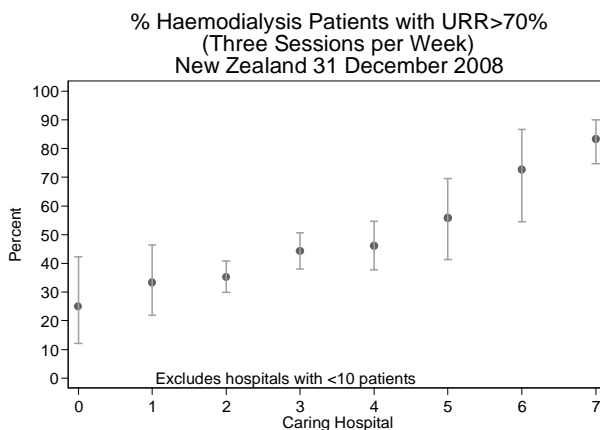


Figure 5.68





VASCULAR ACCESS AT FIRST TREATMENT

Figures 5.69 to 5.77

The decreasing trend in the proportion of patients starting haemodialysis with an AVF or AVG has stabilized at about 38% in Australia and at 23% in New Zealand.

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 Australia indigenous people were not less likely to commence with an AVF or AVG while in New Zealand Maori and Pacific People were less likely to commence with permanent vascular access.

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

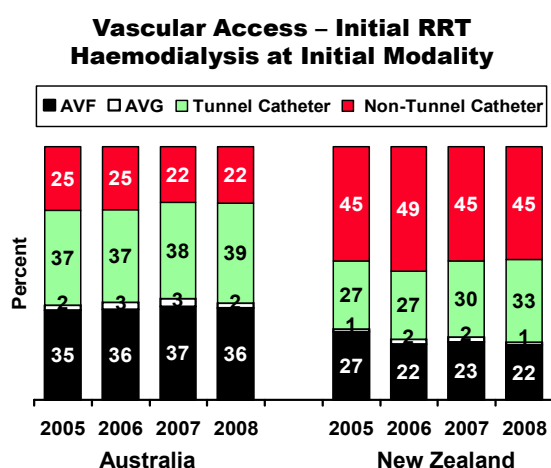


Figure 5.70

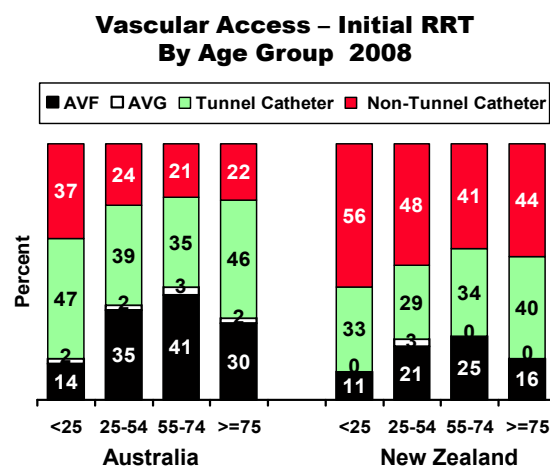


Figure 5.71

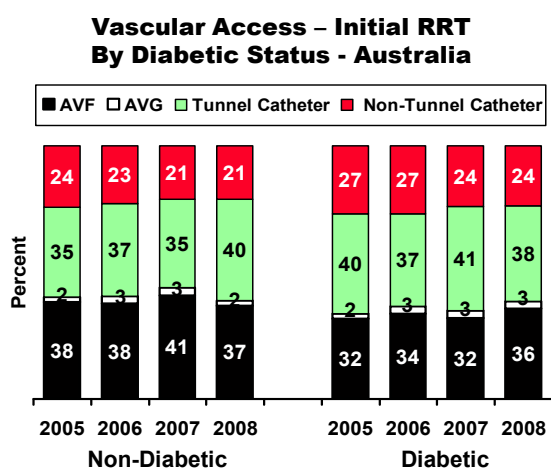
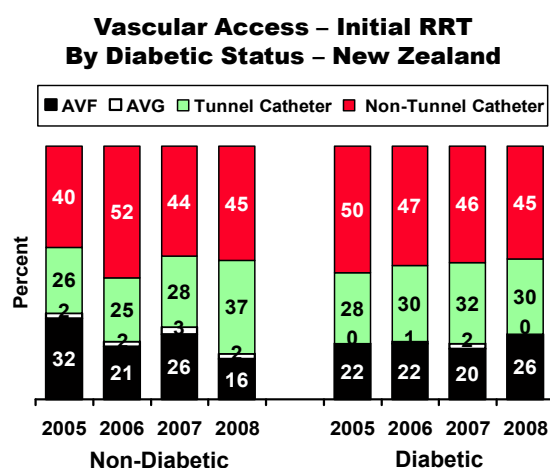


Figure 5.72



VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.73

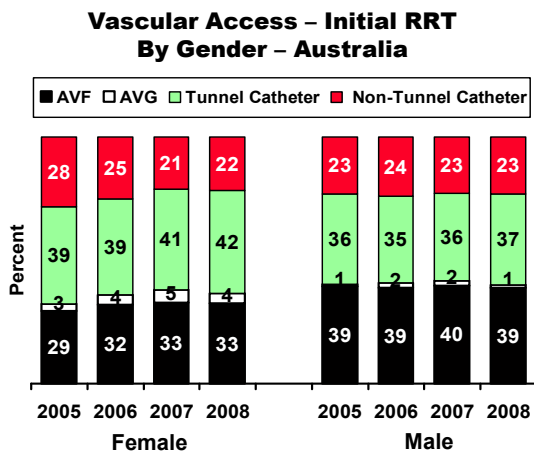


Figure 5.74

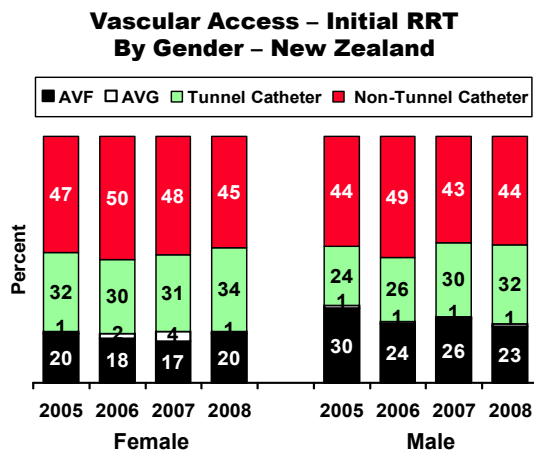


Figure 5.75

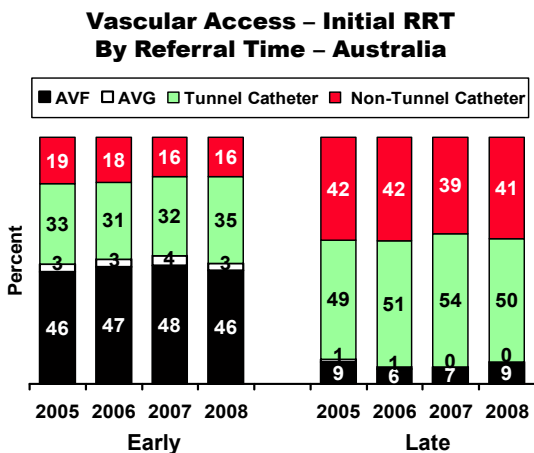


Figure 5.76

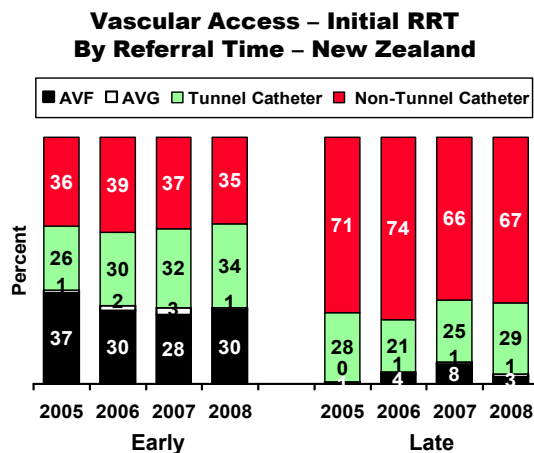
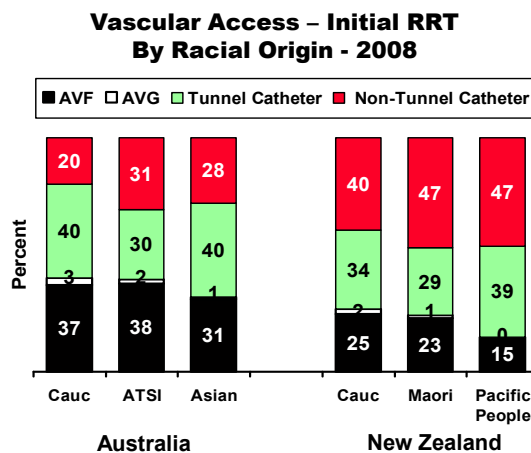


Figure 5.77





VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.78

Vascular Access at First Treatment Haemodialysis as Initial Modality 1-Jan-2005 to 31-Dec-2008								
	2005		2006		2007		2008	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
Queensland	128 (38%)	207 (62%)	136 (38%)	216 (62%)	147 (41%)	209 (59%)	133 (35%)	242 (65%)
NSW/ACT	187 (33%)	384 (67%)	182 (32%)	394 (68%)	195 (35%)	366 (65%)	179 (32%)	372 (68%)
Victoria	171 (44%)	218 (56%)	205 (48%)	222 (52%)	188 (46%)	218 (54%)	182 (47%)	204 (53%)
Tasmania	13 (43%)	17 (57%)	13 (32%)	28 (68%)	14 (41%)	20 (59%)	10 (31%)	22 (69%)
South Australia	74 (52%)	67 (48%)	70 (51%)	66 (49%)	64 (57%)	49 (43%)	71 (54%)	60 (46%)
Northern Territory	24 (29%)	59 (71%)	25 (34%)	49 (66%)	20 (31%)	44 (69%)	30 (49%)	40 (51%)
Western Australia	53 (29%)	129 (71%)	58 (33%)	117 (67%)	60 (33%)	122 (67%)	64 (34%)	126 (66%)
New Zealand								
	84 (28%)	215 (72%)	76 (23%)	250 (77%)	77 (25%)	232 (75%)	72 (23%)	244 (77%)

Figures 5.79 and 5.80 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 5-69%. The corresponding range in New Zealand was 10-35%. 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 5.79

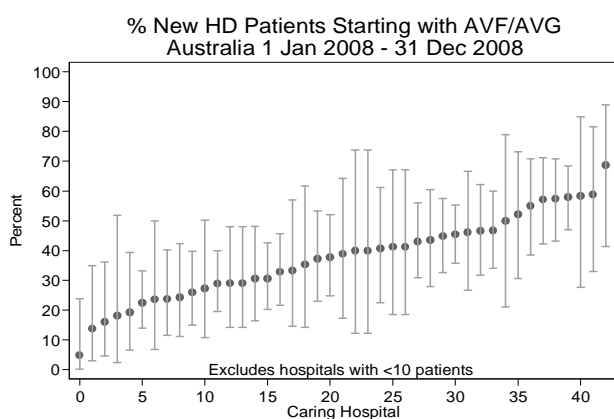
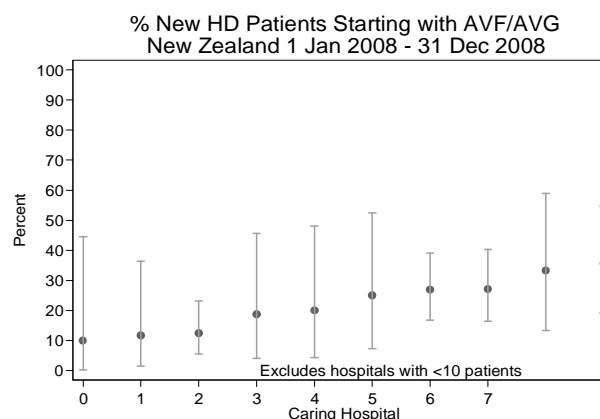


Figure 5.80



PREVALENT HAEMODIALYSIS ACCESS

Figures 5.81 - 5.86

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.

Diabetic and 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 5.81

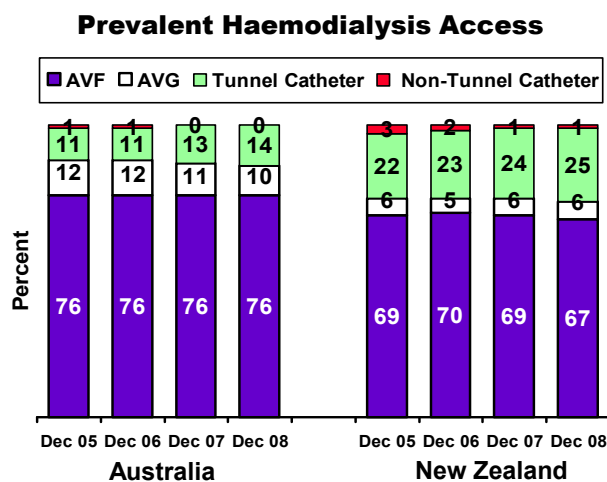
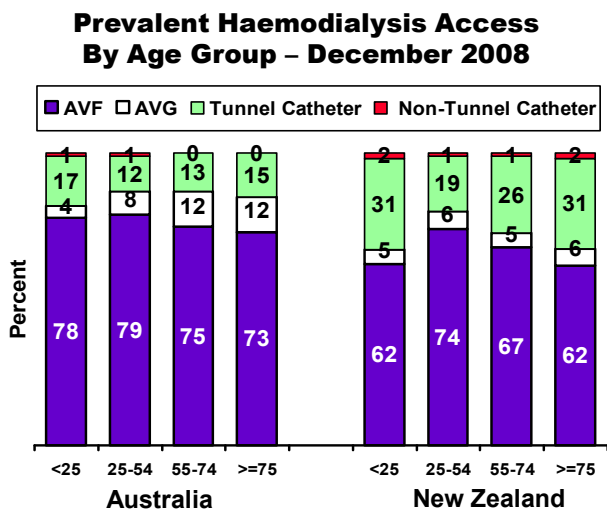


Figure 5.82





PREVALENT HAEMODIALYSIS ACCESS

Figure 5.83

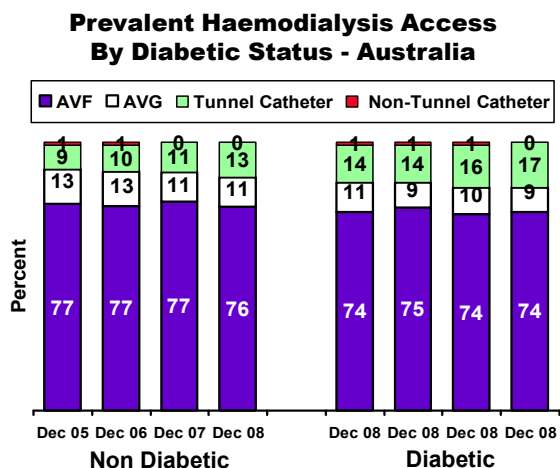


Figure 5.84

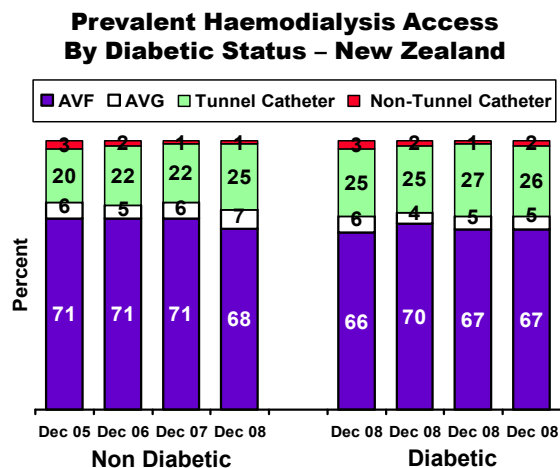


Figure 5.85

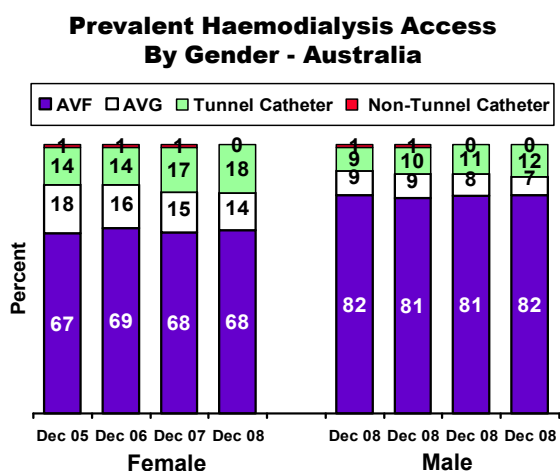
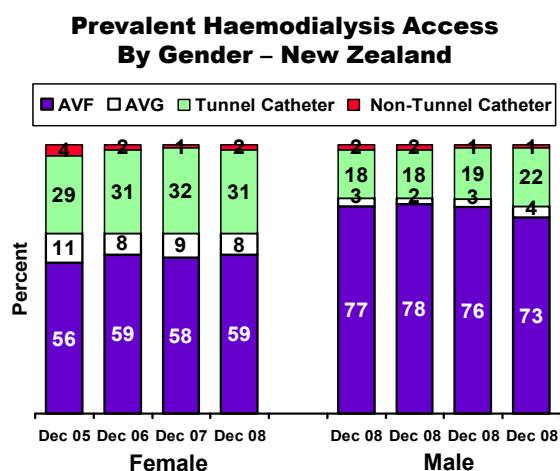


Figure 5.86



PREVALENT HAEMODIALYSIS ACCESS

Figures 5.87 - 5.88

In Australia indigenous people were more likely to dialyse with an AVF. In New Zealand, Maori People had a similar proportion of AVF use while 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 5.87

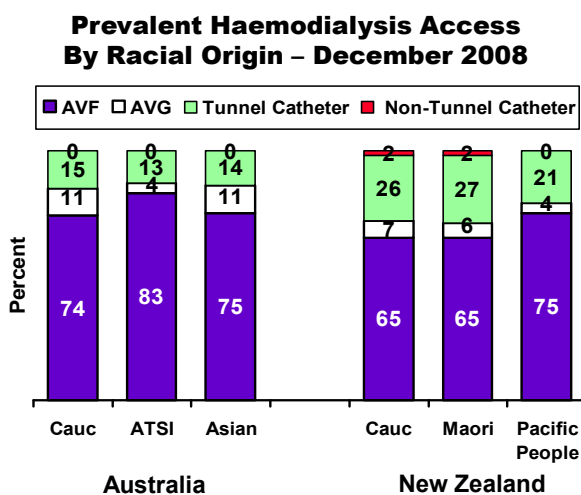
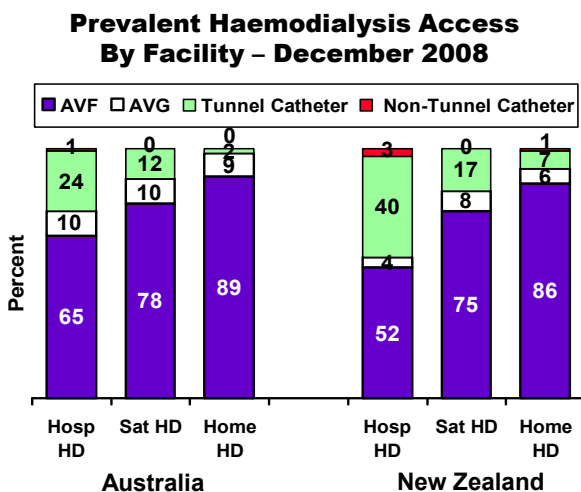


Figure 5.88





PREVALENT HAEMODIALYSIS ACCESS

Figure 5.89

Prevalent Vascular Access at 31-Dec-2008								
	Dec 2005		Dec 2006		Dec 2007		Dec 2008	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
Queensland	1093 (90%)	124 (10%)	1162 (90%)	125 (10%)	1227 (89%)	149 (11%)	1274 (87%)	185 (13%)
NSW/ACT	1949 (88%)	264 (12%)	2062 (86%)	336 (14%)	2134 (84%)	393 (16%)	2184 (84%)	422 (16%)
Victoria	1615 (90%)	176 (10%)	1738 (90%)	195 (10%)	1783 (89%)	222 (11%)	1843 (90%)	214 (10%)
Tasmania	113 (86%)	18 (14%)	99 (79%)	26 (21%)	113 (88%)	16 (12%)	108 (82%)	24 (18%)
South Australia	450 (95%)	24 (5%)	445 (94%)	28 (6%)	434 (90%)	47 (10%)	426 (88%)	60 (12%)
Northern Territory	247 (88%)	35 (12%)	270 (88%)	36 (12%)	297 (89%)	38 (11%)	329 (91%)	33 (9%)
Western Australia	521 (78%)	149 (22%)	553 (80%)	134 (20%)	554 (77%)	163 (23%)	557 (74%)	198 (26%)
New Zealand								
	867 (75%)	292 (25%)	922 (75%)	307 (25%)	989 (75%)	334 (25%)	978 (73%)	359 (27%)

Figures 5.90 - 5.91 show the proportion of haemodialysis patients at each hospital dialysing with an AVF/AVG on 31st December, 2008, arranged from the lowest to the highest.

In Australia, the proportions varied widely from 62-100%. The corresponding range in New Zealand was 49-88%.

The error bars displayed show the 95% confidence intervals.

Figure 5.90

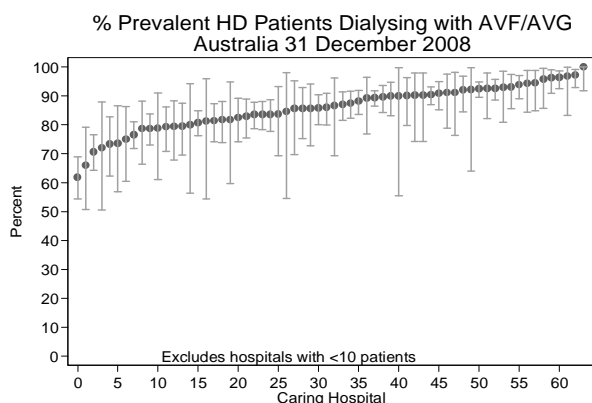


Figure 5.91

