

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 2002-2006 is shown in Figures 5.1, 5.2 and 5.3.

There were 7,161 patients (348 per million) receiving HD treatment at 31st December 2006, an increase of 6%; of these 33% were hospital based (34% in 2005), 55% were in satellite centres (54% in 2005) and 12% at home, the same as last year.

The proportion of all HD patients who were using home HD in each State was 15% for New South Wales, 10% the ACT, 9% Queensland, 8% Victoria, 6% Tasmania, 4% Northern Territory and 2% for the other States. These proportions were lower among older people (Figure 5.6).

A total of 2,030 patients received HD for the first time during the year, only a 1% increase from 2005. There was a 16% increase from 2004 to 2005 (1,734 to 2,015 patients).

The proportion of all HD patients in each age group is shown in Figure 5.8. There were 1,644 people ≥ 75 years receiving haemodialysis, including 185 people > 85 years.

There were 427 transplant operations, a 3% increase from 2005, representing 6% of all HD patients dialysing and 10% of those patients < 65 years. Thirty one patients aged ≥ 65 years were transplanted.

There were 1,034 deaths, at a rate of 15.05 deaths per 100 person-years (Figure 3.8).

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 2002 - 2006

	2002	2003	2004	2005	2006
Australia					
Patients new to HD	1563	1689	1734	2015	2030
First Dialysis Treatment	1336	1431	1460	1723	1746
Previous Dialysis (PD)	200	228	237	258	251
Failed Transplant	27	30	37	34	33
Transplanted	394	372	437	414	427
Deaths	714	831	920	927	1034
Never Transplanted	653	756	853	859	960
Previous Transplant	61	75	67	68	74
Permanent Transfers Out (>12 months)	171	199	240	315	468
Temporary Transfers (12 months)	115	98	130	134	82
Patients Dialysing (HD) at 31 December	5478	5880	6215	6767	7161
Patients Dialysing (HD) at Home 31 December	779	778	798	814	876
% of all Home Dialysis (HD and PD) Patients	31%	30%	31%	31%	30%
New Zealand					
Patients new to HD	339	366	352	383	388
First Dialysis Treatment	291	300	272	296	311
Previous Dialysis (PD)	41	61	78	72	68
Failed Transplant	7	5	2	15	9
Transplanted	61	64	54	44	51
Deaths	109	133	153	150	178
Never Transplanted	99	116	142	136	164
Previous Transplant	10	17	11	14	14
Permanent Transfers Out (>12 months)	93	96	96	111	162
Temporary Transfers (<12 months)	30	20	26	17	21
Patients Dialysing (HD) at 31 December	829	947	1031	1153	1207
Patients Dialysing (HD) at Home 31 December	230	240	263	295	319
% of all Home Dialysis (HD and PD) Patients	23%	24%	26%	29%	30%

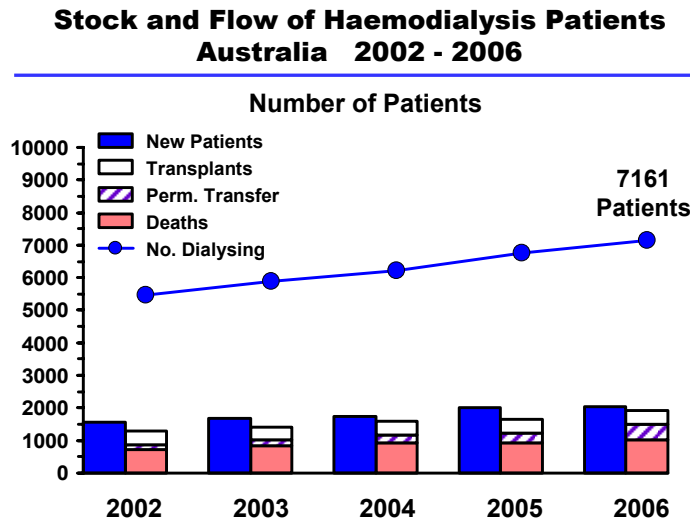
NEW ZEALAND

The annual stock and flow of HD patients during the period 2002-2006 is shown in Figures 5.1, 5.4 and 5.5.

There were 1,207 patients (292 per million) receiving treatment at 31st December 2006, a 5% increase compared to 2005.

Hospital based HD decreased from last year to 46% (48% in 2005), satellite HD increased from 26% to 28% in 2006, while home HD remained at 26% the same as in 2005.

New Zealand is continued on page 5-6.

Figure 5.2

Figure 5.3

Stock and Flow of Haemodialysis Patients Australia 2002 - 2006					
Number (%)					
Age Groups	2002	2003	2004	2005	2006
New Patients *					
00-14 years	11 (<1%)	9 (<1%)	11 (<1%)	15 (<1%)	13 (<1%)
15-24 years	37 (3%)	48 (3%)	46 (3%)	39 (2%)	33 (2%)
25-34 years	85 (5%)	90 (5%)	85 (5%)	106 (5%)	77 (4%)
35-44 years	134 (9%)	161 (10%)	166 (10%)	173 (9%)	188 (9%)
45-54 years	266 (17%)	278 (16%)	260 (15%)	311 (15%)	292 (14%)
55-64 years	321 (20%)	321 (19%)	346 (20%)	429 (21%)	452 (22%)
65-74 years	4218 (27%)	414 (24%)	458 (26%)	528 (26%)	526 (26%)
75-84 years	270 (17%)	349 (21%)	333 (19%)	377 (19%)	404 (20%)
>=85 years	21 (1%)	19 (1%)	29 (2%)	37 (2%)	45 (2%)
Total	1563 (100%)	1689 (100%)	1734 (100%)	2015 (100%)	2030 (100%)
Patients Dialysing					
00-14 years	11 (<1%)	3 (<1%)	6 (<1%)	7 (<1%)	7 (<1%)
15-25 years	103 (2%)	101 (2%)	106 (2%)	96 (1%)	92 (1%)
25-34 years	346 (6%)	340 (6%)	340 (5%)	351 (5%)	300 (4%)
35-44 years	568 (10%)	609 (10%)	632 (10%)	664 (10%)	681 (9%)
45-54 years	947 (17%)	1000 (17%)	1037 (17%)	1100 (16%)	1129 (16%)
55-64 years	1159 (21%)	1225 (21%)	1291 (21%)	1426 (21%)	1561 (22%)
65-74 years	1401 (26%)	1465 (25%)	1492 (24%)	1628 (24%)	1747 (24%)
75-84 years	885 (16%)	1062 (18%)	1197 (19%)	1348 (20%)	1459 (20%)
>=85 years	58 (1%)	75 (1%)	114 (2%)	147 (2%)	185 (3%)
Total	5478 (100%)	5880 (100%)	6215 (100%)	6767 (100%)	7161 (100%)
Primary Renal Disease *					
Glomerulonephritis	415 (27%)	451 (27%)	446 (26%)	470 (23%)	456 (22%)
Analgesic Nephropathy	65 (4%)	68 (4%)	47 (3%)	56(3%)	45 (2%)
Hypertension	241 (16%)	267 (16%)	234 (13%)	311 (15%)	305 (15%)
Polycystic Disease	90 (6%)	80 (5%)	97 (6%)	146 (7%)	127 (6%)
Reflux Nephropathy	57 (3%)	61 (4%)	54 (3%)	51 (3%)	62 (3%)
Diabetic Nephropathy	425 (27%)	442 (26%)	525 (30%)	630 (32%)	664 (33%)
Miscellaneous	179 (11%)	204 (12%)	210 (12%)	231 (11%)	256 (13%)
Uncertain	91 (6%)	116 (6%)	121 (7%)	120 (6%)	115 (6%)
Total	1563 (100%)	1689 (100%)	1734 (100%)	2015 (100%)	2030 (100%)

* New patients receiving first haemodialysis treatment



Figure 5.4

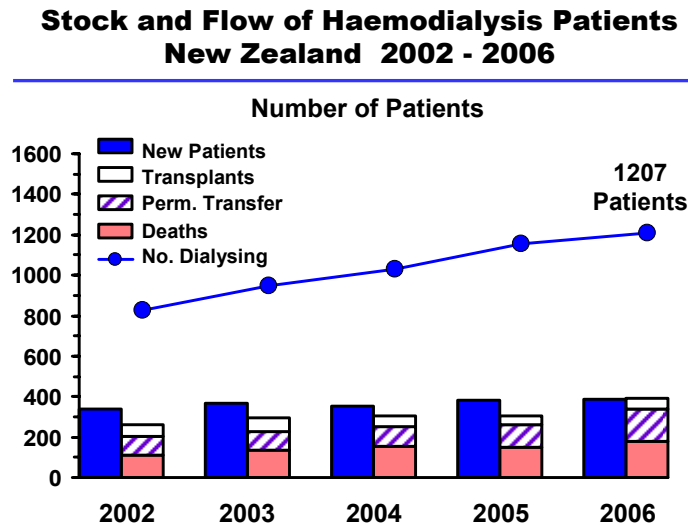


Figure 5.5

Stock and Flow of Haemodialysis Patients New Zealand 2002 - 2006 Number (%)

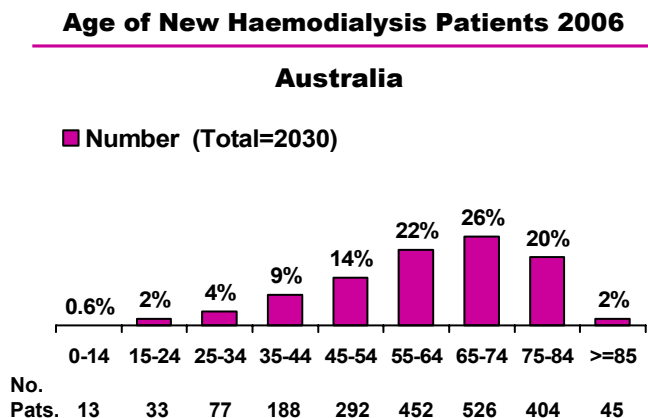
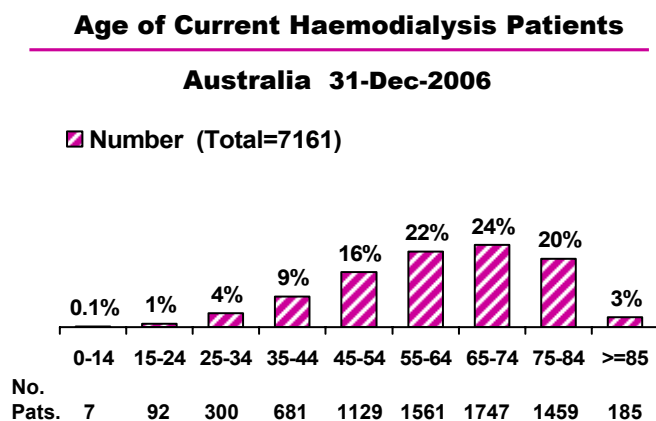
Age Groups	2002	2003	2004	2005	2006
New Patients *					
00-14 years	1 (<1%)	- (-)	1 (<1%)	2 (<1%)	3 (<1%)
15-24 years	13 (4%)	21 (6%)	10 (3%)	13 (3%)	16 (4%)
25-34 years	20 (6%)	14 (4%)	23 (7%)	14 (4%)	28 (7%)
35-44 years	33 (10%)	38 (10%)	45 (12%)	43 (11%)	32 (8%)
45-54 years	75 (22%)	70 (19%)	78 (22%)	79 (21%)	87 (22%)
55-64 years	113 (34%)	94 (26%)	95 (27%)	117 (31%)	89 (23%)
65-74 years	66 (19%)	91 (25%)	69 (20%)	88 (23%)	88 (23%)
75-84 years	16 (5%)	38 (10%)	26 (7%)	23 (6%)	41 (11%)
>=85 years	2 (<1%)	- (-)	5 (1%)	4 (1%)	4 (1%)
Total	339 (100%)	366 (100%)	352 (100%)	383 (100%)	388 (100%)
Patients Dialysing					
00-14 years	2 (<1%)	- (-)	1 (<1%)	2 (<1%)	2 (<1%)
15-25 years	29 (3%)	33 (3%)	33 (3%)	33 (3%)	32 (3%)
25-34 years	63 (8%)	64 (7%)	74 (7%)	82 (7%)	85 (7%)
35-44 years	116 (14%)	119 (12%)	139 (13%)	151 (13%)	148 (12%)
45-54 years	188 (23%)	214 (23%)	221 (21%)	245 (21%)	246 (20%)
55-64 years	230 (28%)	262 (28%)	285 (28%)	321 (28%)	336 (28%)
65-74 years	161 (19%)	194 (20%)	207 (20%)	238 (21%)	261 (22%)
75-84 years	40 (5%)	61 (6%)	68 (7%)	76 (7%)	88 (7%)
>=85 years	- (-)	- (-)	3 (<1%)	5 (<1%)	9 (<1%)
Total	829 (100%)	947 (100%)	1031 (100%)	1153 (100%)	1207 (100%)
Primary Renal Disease *					
Glomerulonephritis	79 (23%)	88 (24%)	90 (26%)	98 (26%)	88 (23%)
Analgesic Nephropathy	- (-)	- (-)	1 (<1%)	- (-)	1 (<1%)
Hypertension	32 (10%)	39 (11%)	43 (12%)	39 (10%)	38 (10%)
Polycystic Disease	13 (4%)	14 (4%)	19 (5%)	29 (8%)	21 (5%)
Reflux Nephropathy	11 (3%)	3 (<1%)	12 (3%)	8 (2%)	7 (2%)
Diabetic Nephropathy	156 (46%)	157 (43%)	153 (43%)	156 (40%)	174 (45%)
Miscellaneous	37 (11%)	39 (11%)	18 (5%)	36 (9%)	32 (8%)
Uncertain	11 (3%)	26 (7%)	16 (5%)	18 (5%)	27 (7%)
Total	339 (100%)	366 (100%)	352 (100%)	383 (100%)	388 (100%)

* New patients receiving first haemodialysis treatment

Figure 5.6

Proportion (%) of Prevalent Patients aged ≥ 65 years Treated with Home Haemodialysis 2002 - 2006

State	2002	2003	2004	2005	2006
Queensland	2%	2%	2%	3%	3%
New South Wales	6%	7%	7%	6%	5%
Aust. Capital Territory	7%	7%	5%	3%	4%
Victoria	2%	2%	2%	2%	2%
Tasmania	-	-	-	1%	3%
South Australia	2%	<1%	2%	1%	-
Northern Territory	-	-	-	-	2%
Western Australia	<1%	<1%	<1%	<1%	<1%
Australia	4%	4%	3%	3%	3%
New Zealand	5%	5%	5%	5%	6%

Figure 5.7

Figure 5.8




NEW ZEALAND (continued from page 5-2)

There were 388 patients who received HD for the first time, only a 1% increase in number from 2005. Eighteen percent of these were previously dialysing with peritoneal dialysis, 2% failed transplants and 80% having their initial dialysis treatment. The modal age group was 55-64 years (23%), 12% were <35 years and 34% >=65 years (Figures 5.5 and 5.9). The age distribution was younger than in Australia, with only 8% of the prevalent HD population >=75 years.

Fifty one HD patients received transplants in 2006 (44 in 2005), representing 4% of all HD patients dialysing and 4% of those patients < 65 years. Five patients ≥ 65 years were transplanted.

There were 178 deaths, a rate of 14.76 deaths per 100 person-years of treatment (Figure 3.10).

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

Figure 5.9

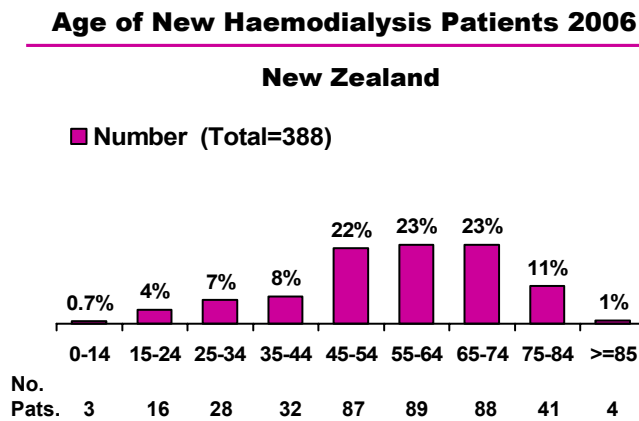
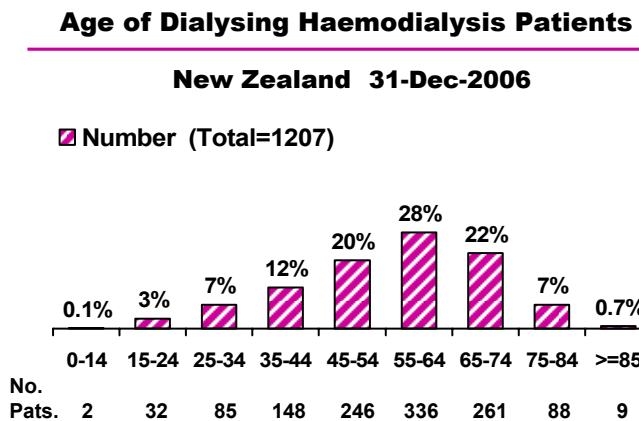


Figure 5.10



AUSTRALIA

The previous trend towards a prescribed blood flow rate of 300 mls/minute or higher has remained the same in 2006 as in 2005 (75%), compared to 77% of all patients in December 2004. In March 2001 it was 69%. Only 5% were prescribed less than 250 mls/minute (361 patients).

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) 2001 - December 2006								
Country	No. Pts	Mls/Minute						
		<200	200-249	250-299	300-349	350-399	>400	
Aust	* 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%
	March 2004	5924	<1%	6%	18%	55%	17%	4%
	March 2003	5502	<1%	6%	18%	57%	16%	3%
	March 2002	5128	<1%	6%	20%	56%	15%	3%
	March 2001	4717	<1%	7%	23%	55%	11%	3%
NZ	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%
	March 2004	938	<1%	8%	21%	45%	23%	3%
	March 2003	826	<1%	10%	23%	43%	23%	1%
	March 2002	761	<1%	15%	30%	37%	17%	1%
	March 2001	679	1%	13%	34%	36%	15%	1%

NEW ZEALAND

In December 2006, 66% of patients were prescribed 300 mls/minute or higher compared to 67% in December 2005 and 64% in December 2004. There were 7% using <250 mls/minute, compared to 10% in December 2005, many of these receiving long hour HD.

Figure 5.12

Blood Flow Rate by Type of Access December 2006						
Blood Flow Rate	Australia			New Zealand		
	AVF	AVG	CVC *	AVF	AVG	CVC
<200	14 (<1%)	-	17 (2%)	2 (<1%)	-	3 (1%)
200-249	192 (4%)	28 (3%)	110 (13%)	52 (6%)	6 (11%)	26 (9%)
250-299	907 (17%)	152 (18%)	325 (38%)	165 (19%)	24 (43%)	132 (44%)
300-349	2891 (53%)	506 (61%)	348 (40%)	387 (45%)	22 (39%)	126 (42%)
350-399	1168 (21%)	130 (16%)	61 (7%)	219 (26%)	4 (7%)	13 (4%)
>=400	290 (5%)	20 (2%)	1 (<1%)	26 (3%)	-	-
Total	5462 (100%)	836 (100%)	862 (100%)	851 (100%)	56 (100%)	300 (100%)

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

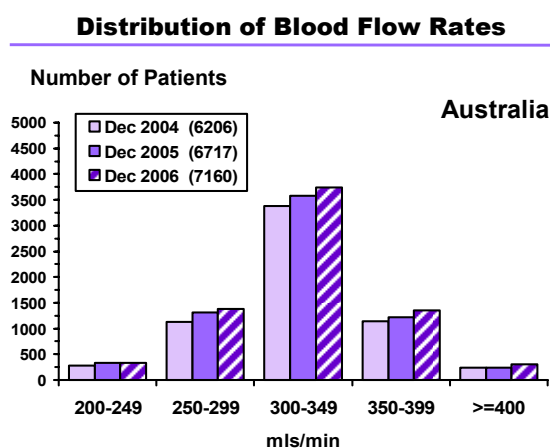
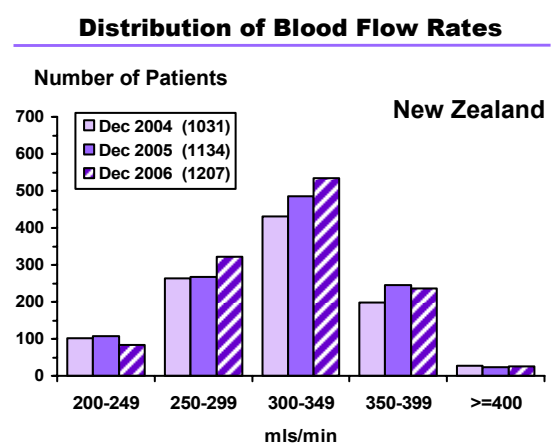
Figure 5.13

Figure 5.14




Figure 5.15

Duration and Number of Sessions Per Week December 2006						
Sessions Per week	Hours of Each Treatment					Total
	<4	4-4.4	4.5-4.9	5-5.4	>=5.5	
Australia						
<=3	368 (6%)	2779 (42%)	1268 (19%)	1883 (29%)	283 (4%)	6581
3.5-4.5	42 (10%)	57 (14%)	50 (10%)	69 (17%)	199 (49%)	407
>=5	119 (69%)	6 (3%)	1 (<1%)	2 (1%)	44 (26%)	172
Total	529 (7%)	2842 (40%)	1309 (18%)	1954 (27%)	526 (7%)	7160
New Zealand						
<=3	30 (3%)	439 (39%)	225 (20%)	351 (31%)	79 (7%)	1124
3.5-4.5	4 (6%)	9 (14%)	2 (3%)	20 (32%)	28 (44%)	63
>=5	14 (70%)	-	1 (5%)	4 (20%)	1 (5%)	20
Total	48 (4%)	448 (37%)	228 (19%)	375 (31%)	108 (9%)	1207

FREQUENT AND LONG HAEMODIALYSIS

While the proportions dialysing > 3 times per week remains below 10%, it has been increasing, particularly in Australia. (Figures 5.15 - 5.23)

The proportions dialysing >=4.5 hours per session is also increasing. As a result, the proportions dialysing more than the “standard” 12 hours per week have been increasing, particularly in Australia.

In 2006, 56% and 61% of HD patients were dialysing > 12 hours per week in Australia and New Zealand respectively.

Figure 5.16

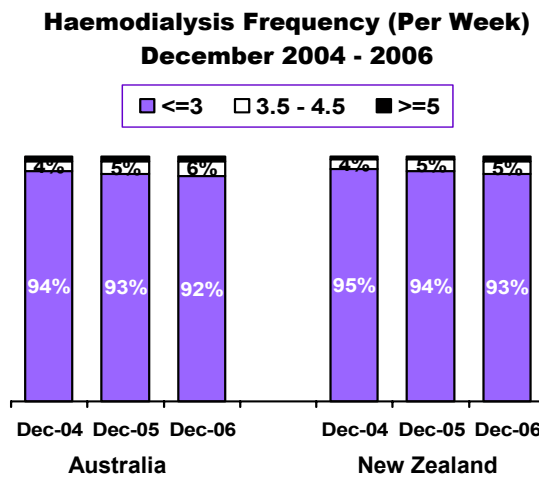


Figure 5.17

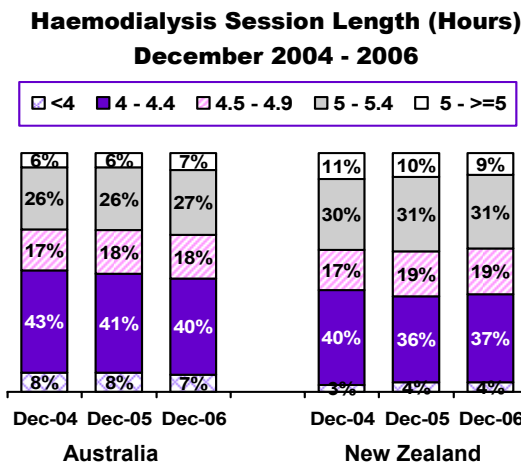


Figure 5.18

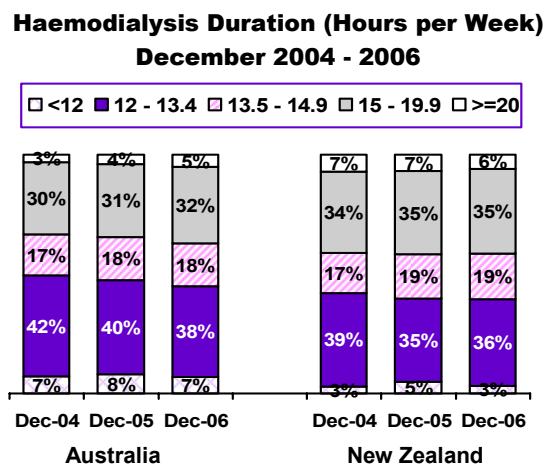


Figure 5.19

**Proportion of Patients
Dialysing Five or More Days per Week**

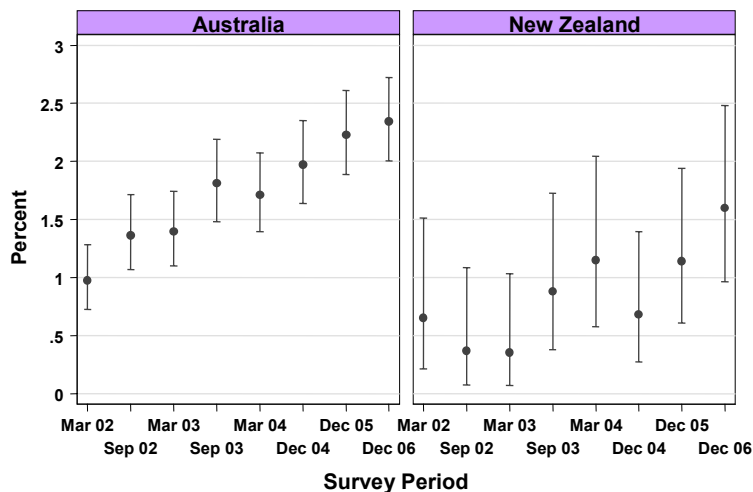


Figure 5.20

**Proportion of Patients – Dialysing 3 Times/Week
Dialysing 4.5 Hours per Session or Longer**

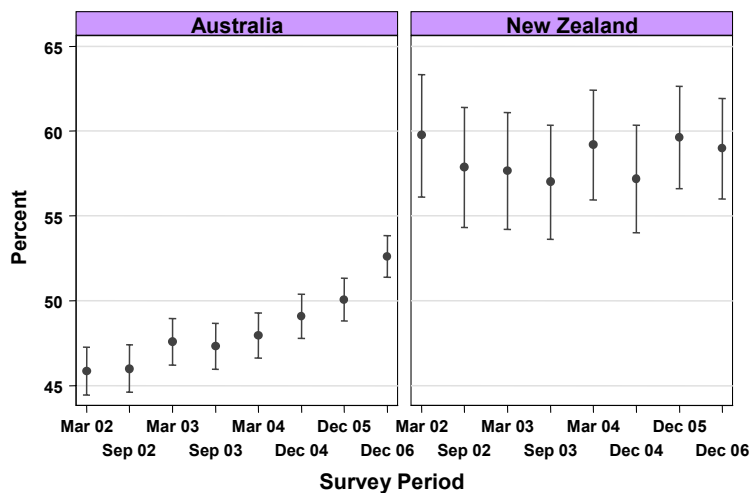
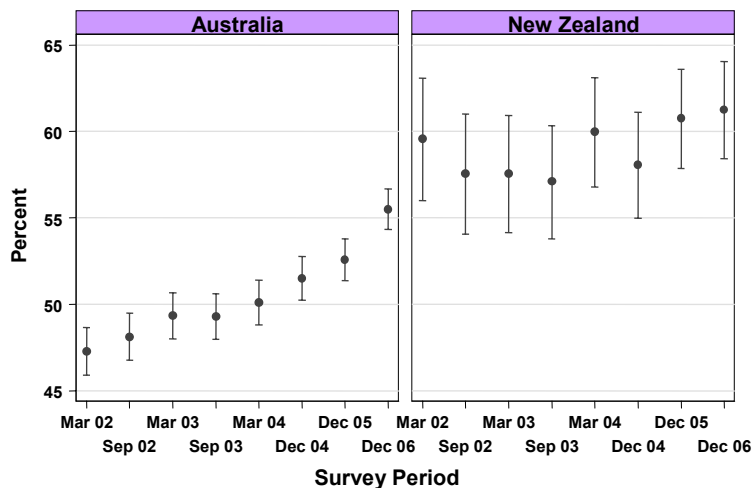


Figure 5.21

**Proportion of Patients
Dialysing >12 Hours per Week**





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).

In most States there is a trend to longer hours (per week) over the three most recent surveys.

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 04	39 (4%)	10 (<1%)	39 (2%)	2 (2%)	11 (3%)	4 (2%)	17 (3%)	7 (<1%)
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%)

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 04	382 (40%)	1450 (76%)	539 (35%)	29 (25%)	95 (25%)	191 (79%)	143 (23%)	552 (57%)
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%)

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 04	484 (44%)	1535 (76%)	650 (39%)	36 (30%)	132 (32%)	197 (79%)	171 (27%)	597 (58%)
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%)

OUTCOME AMONG HD 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)

Figure 5.25					
Haemodialysis at 90 Days Patient Survival Censored for Transplant 1994 - 2006					
% [95% Confidence Interval]					
	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
1994-1996	2126	95 [94, 96]	89 [88, 91]	69 [67, 71]	50 [47, 52]
1997-1999	2726	93 [91, 93]	87 [86, 88]	65 [63, 67]	49 [47, 51]
2000-2002	3221	93 [92, 94]	87 [85, 88]	66 [64, 68]	48 [46, 50]
2003-2005	3826	93 [92, 93]	87 [86, 88]	66 [63, 67]	-
New Zealand					
1994-1996	208	93 [89, 96]	89 [84, 93]	59 [51, 66]	37 [29, 46]
1997-1999	352	92 [89, 94]	85 [81, 89]	55 [49, 61]	43 [37, 49]
2000-2002	582	95 [92, 96]	89 [86, 91]	64 [60, 68]	42 [38, 47]
2003-2005	659	94 [92, 95]	87 [84, 90]	65 [60, 70]	-

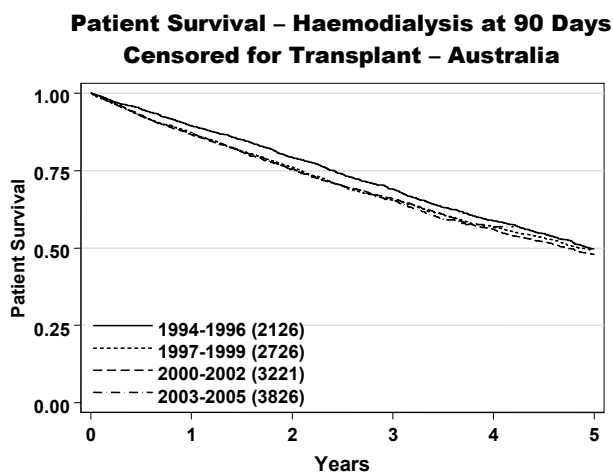
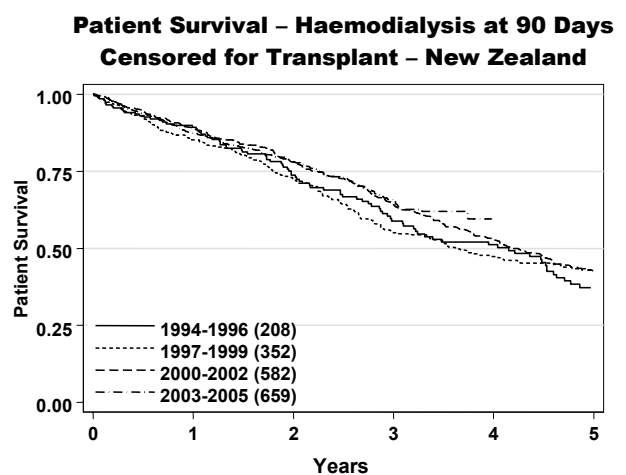
Figure 5.26

Figure 5.27




Figure 5.28

**Haemodialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant 1994 - 2005
% [95% Confidence Interval]**

	Survival			
	6 months	1 year	3 years	5 years
Australia				
Non Diabetic (9094)	93 [93, 94]	88 [87, 89]	68 [67, 69]	51 [50, 52]
Diabetic (2805)	93 [92, 94]	86 [84, 87]	60 [58, 62]	40 [38, 43]
New Zealand				
Non Diabetic (1093)	94 [93, 95]	88 [86, 90]	67 [63, 70]	51 [46,55]
Diabetic (708)	93 [91, 94]	86 [84, 89]	56 [52, 60]	34 [29, 38]

Figure 5.29

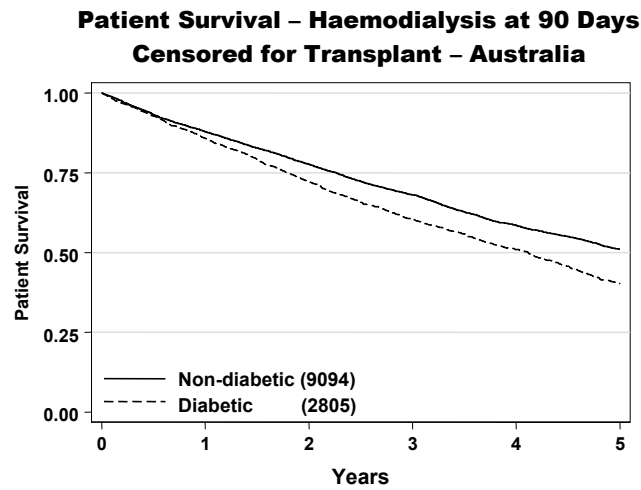


Figure 5.30

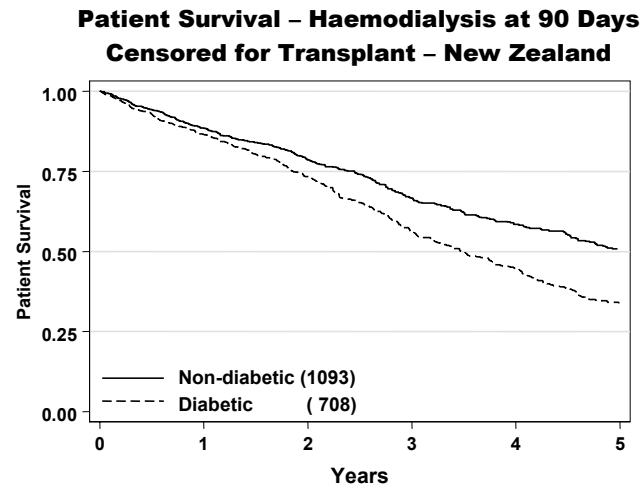


Figure 5.31

**Haemodialysis at 90 Days
Patient Survival - By Age Group
Censored for Transplant 1994 - 2005
% [95% Confidence Interval]**

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	1766	98 [97, 98]	95 [93, 96]	86 [84, 88]	79 [76, 81]
40-59 years	4013	96 [95, 96]	92 [91, 93]	76 [75, 78]	62 [60, 64]
60-74 years	4266	91 [91, 92]	85 [84, 86]	61 [60, 63]	41 [39, 43]
75 and over	1854	87 [85, 88]	78 [76, 80]	45 [42, 47]	24 [21, 26]
New Zealand					
0-39 years	310	98 [96, 99]	94 [91, 96]	79 [72, 84]	68 [60, 75]
40-59 years	808	95 [94, 97]	91 [88, 92]	68 [64, 72]	48 [43, 52]
60-74 years	572	91 [88, 93]	84 [81, 87]	53 [48, 57]	33 [28, 38]
75 and over	111	86 [78, 91]	67 [58, 75]	29 [20, 39]	14 [7, 24]

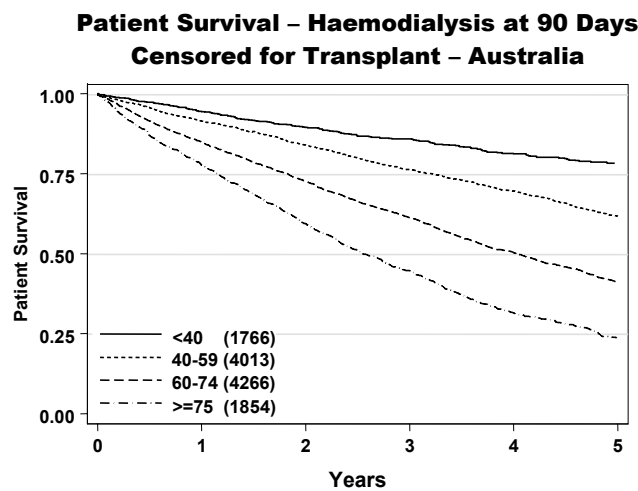
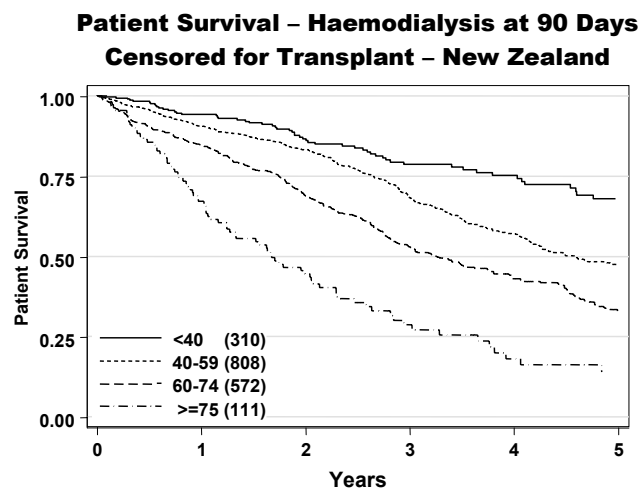
Figure 5.32

Figure 5.33




Figure 5.34

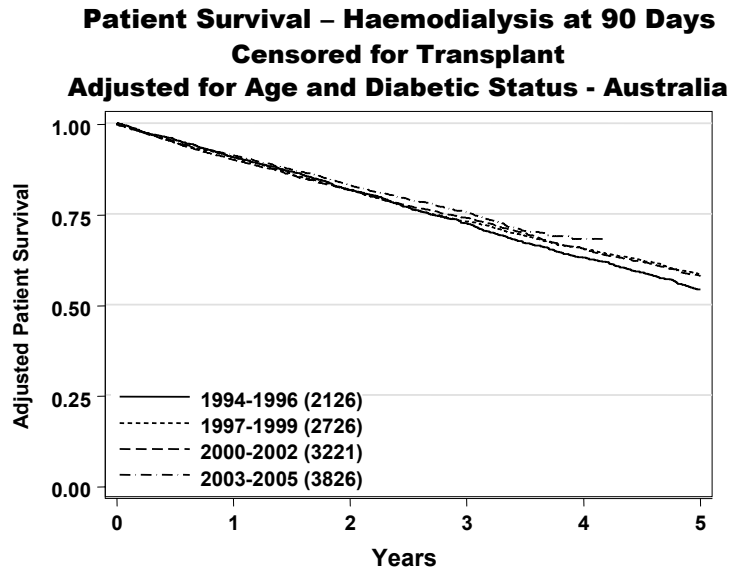
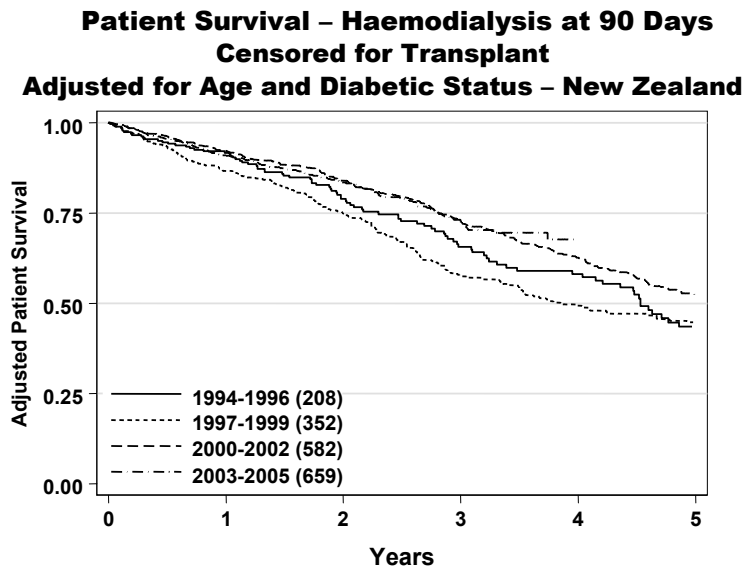


Figure 5.35



MEMBRANE TYPE AND SURFACE AREAS

AUSTRALIA

Figures 5.36 - 5.38.

Usage of low flux polysulfone dialysers continued to decrease (16% in December 2006 from 19% in 2005 and 26% in 2004), while use of high flux polysulphone decreased to 7% in December 2006 from 9% in December 2005 and 39% in 2004). High flux Polysulphone-Helixone increased to 34% in December 2006 from 27% in 2005 and 1% in 2004. High flux Polyamix increased to 16% this year from 15% in 2005 and 6% in 2004.

Sixty four percent of patients received dialysis with high flux dialysers (57% in 2005 and 46% in 2004). Use of haemophan continues to decrease; only nine patients at December 2006.

Thirteen patients were receiving haemofiltration and 164 haemodiafiltration.

NEW ZEALAND

Figures 5.36 and 5.38.

Haemophan decreased to >1% in December 2006 from 1% in 2005 and 18% in 2004, while low flux polysulphone remained at 48% for the past three years.

There were 22% (260 patients) reported as receiving dialysis with high flux dialysers in December 2006, an increase from 20% in 2005 and 15% in 2004.

No patients were receiving haemofiltration or haemodiafiltration.

Figure 5.36

Haemodialyser Membrane Types by Surface Area 31-Dec-2006							
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	-	-	3	-	-	3
Cellulose Triacetate	High	-	-	85	176	166	427
Diacetate	Low	-	3	15	-	96	114
Exebrane	High	-	-	1	-	-	1
Haemophan	Low	-	-	3	-	6	9
Polyamide Haemodiafilt.	High	-	2	-	-	-	2
Polyamix	High	-	40	529	-	611	1180
Polyamix	Low	-	150	786	-	318	1254
Polyethersulfone	High	-	-	-	37	1	38
Polysulphone	High	2	50	-	202	259	513
Polysulphone	Low	9	103	1	598	469	1180
Polysulphone-Helixone	High	-	1255	-	1150	19	2424
Polysynthane	Low	-	-	5	-	10	15
Total		11	1603	1428	2163	195	7160
New Zealand							
Cellulose Acetate	Low	2	-	-	-	-	2
Haemophan	Low	-	1	-	-	2	3
Polyamide Haemodiafilt.	High	-	-	-	-	1	1
Polyamix	High	-	3	22	-	115	140
Polyamix	Low	-	17	170	-	178	365
Polycarbonate/Poly/Cop.	Low	-	-	-	1	-	1
Polysulphone	High	-	3	-	115	-	118
Polysulphone	Low	-	28	-	340	208	576
Polysulphone-Helixone	High	-	-	-	-	1	1
Total		2	52	192	456	505	1207

Figure 5.37

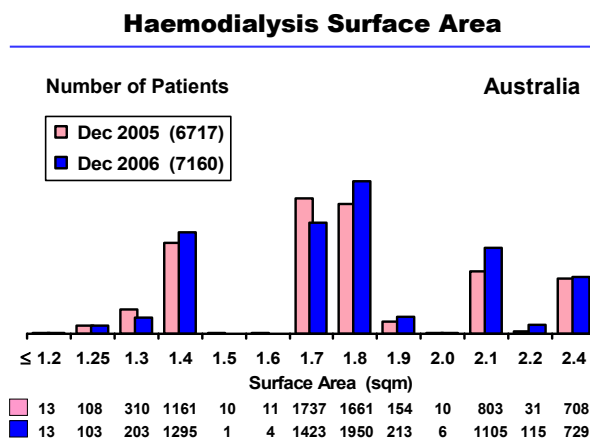
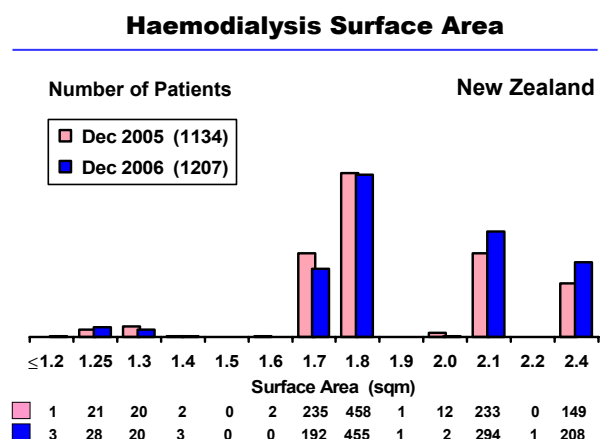


Figure 5.38





ANAEMIA

In Australia, mean haemoglobin and usage of erythropoietin agents has stabilised over recent surveys. Haemodialysis patients had higher erythropoietic agent usage and lower mean haemoglobin than patients receiving peritoneal dialysis.

In New Zealand, mean haemoglobin of peritoneal dialysis patients has stabilised at about 115 g/L while that of haemodialysis patients is still increasing. Usage levels remain slightly lower than in Australia.

Figure 5.39

**Mean Haemoglobin Among Dialysis Patients
By Survey Period**

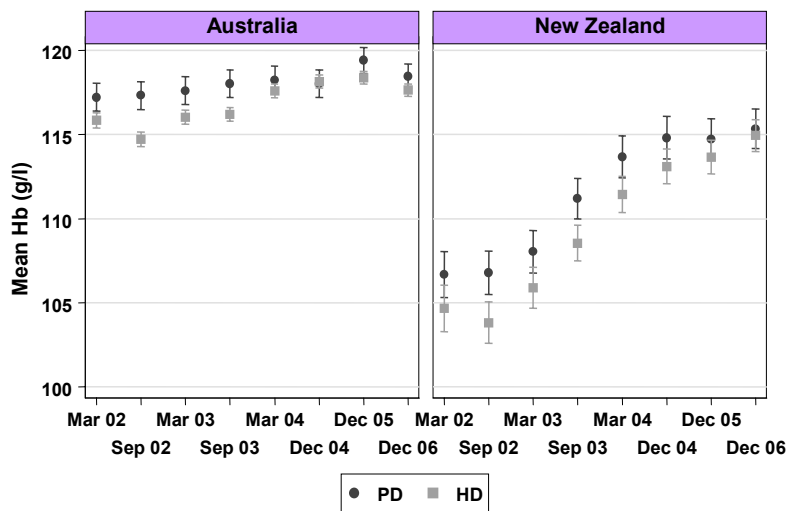
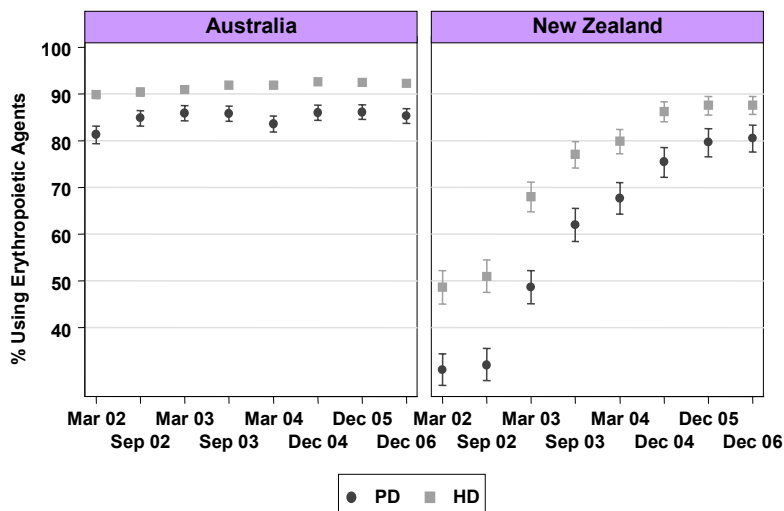


Figure 5.40

**Use of Erythropoietic Agents
By Survey Period**



HAEMOGLOBIN

In Australia, haemoglobin was <110 g/L in about 28% of dialysis patients and ≥ 140 g/L in about 9%. These figures have been stable in the past three years.

In New Zealand, the corresponding percentages are about 36% and 6% respectively.

The proportions with haemoglobin <110 g/L have decreased over the past three years.

Figure 5.42 shows the proportion of patients with proven or likely cardiovascular disease achieving the clinical target of haemoglobin ≤ 120 g/L as recommended in the CARI guidelines. (<http://www.cari.org.au/Haemoglobin>, currently under revision).

Figure 5.41

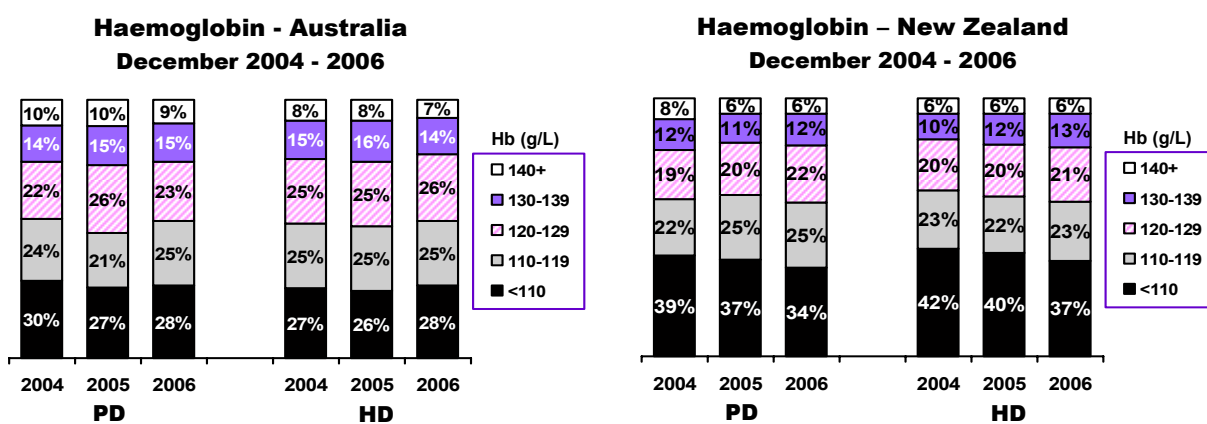
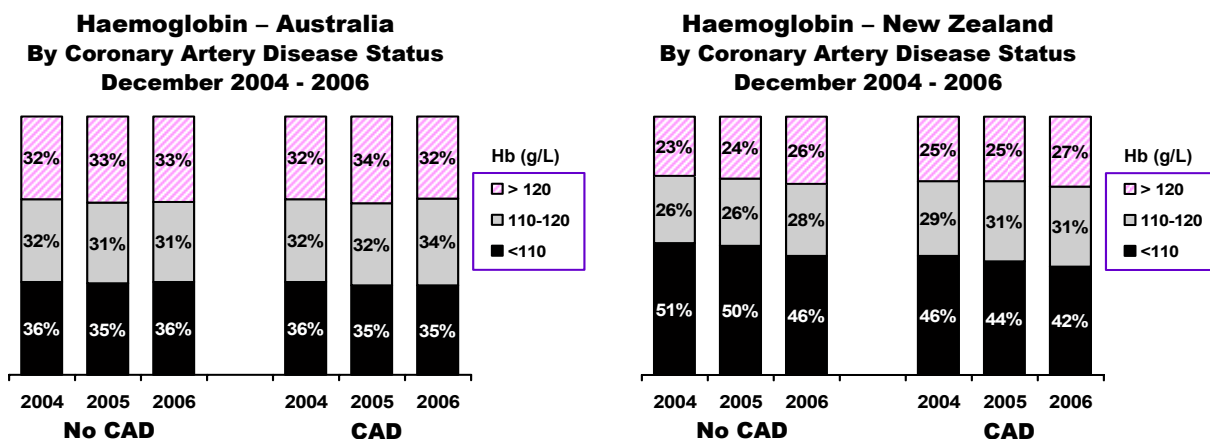


Figure 5.42





HAEMOGLOBIN IN DIALYSIS PATIENTS

Figures 5.43 - 5.50.

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 110 to 131 g/L for haemodialysis patients and 112-126 g/L for peritoneal dialysis patients.

Corresponding figures for New Zealand were 110-122 g/L for haemodialysis patients and 112-123 g/L for peritoneal dialysis patients.

HAEMODIALYSIS

Figure 5.43

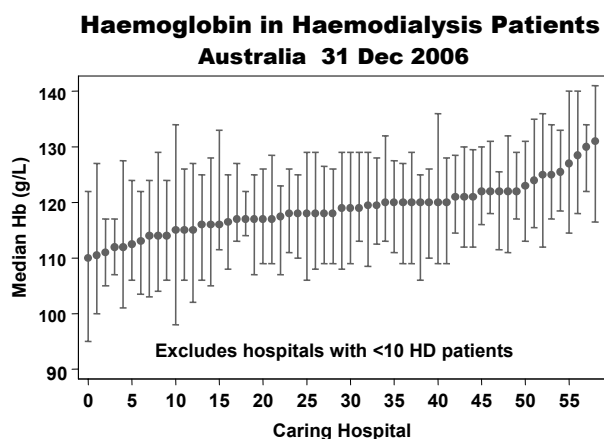


Figure 5.44

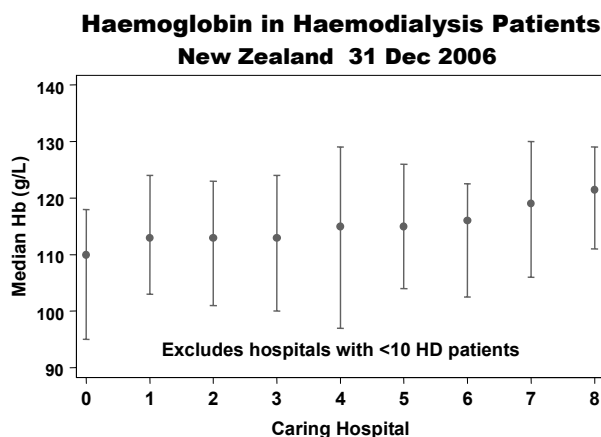


Figure 5.45

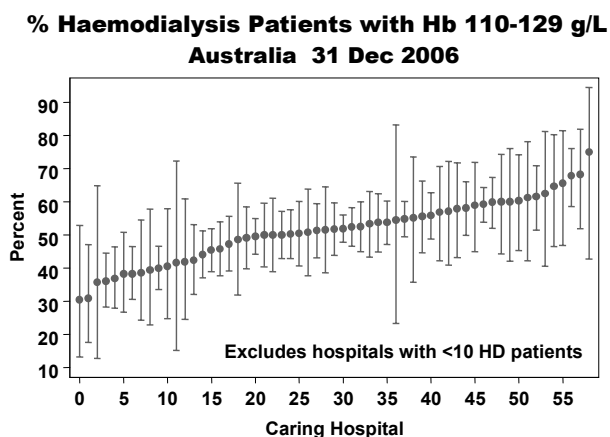
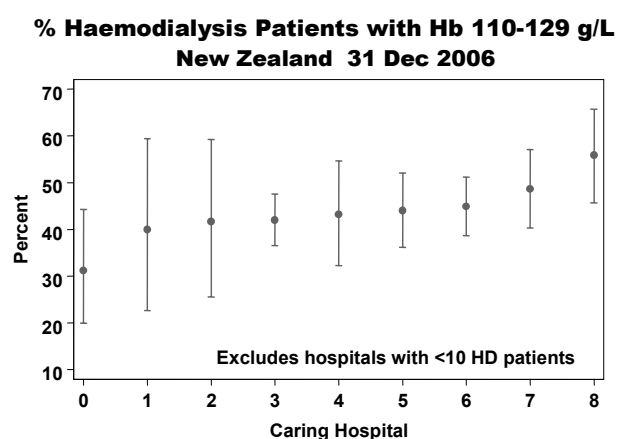


Figure 5.46



HAEMOGLOBIN IN DIALYSIS PATIENTS

In Australia, the proportion of patients with a haemoglobin of 110-129 g/L in each centre ranged from 30% to 75% for haemodialysis patients and 25% to 82% for peritoneal dialysis patients.

This large variation probably reflects differences in practices, protocols and patient case-mix among centres.

Corresponding figures for New Zealand were 31% to 56% for haemodialysis patients and 36% to 68% for peritoneal dialysis patients.

PERITONEAL DIALYSIS

Figure 5.47

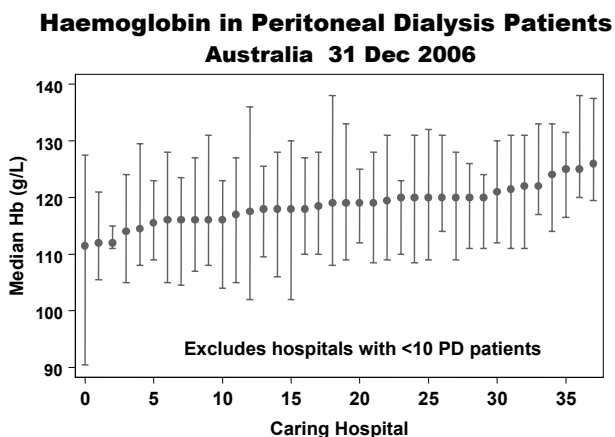


Figure 5.48

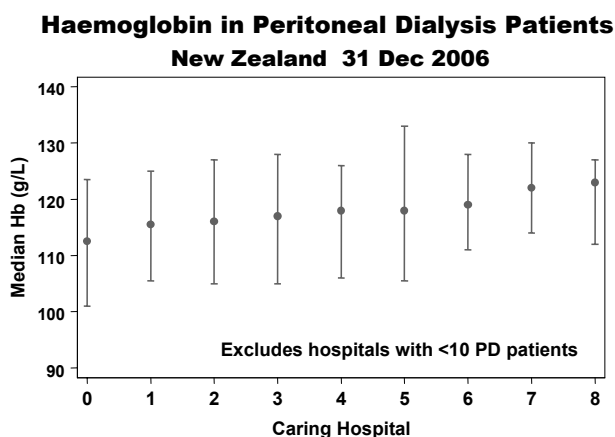


Figure 5.49

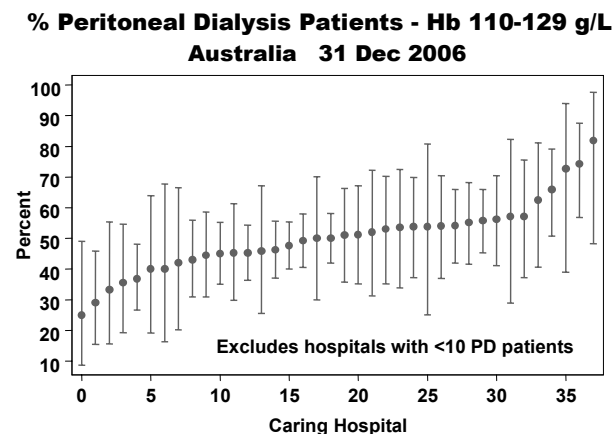
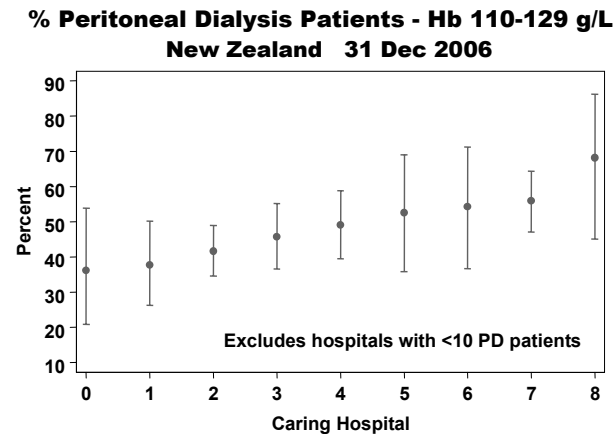


Figure 5.50





FERRITIN AND TRANSFERRIN SATURATION

Figures 5.51 - 5.54.

In Australia, the proportions of patients with ferritin <200 mcg/L have steadily decreased, while those with ferritin ≥500 mcg/L have increased.

In New Zealand, the proportions of patients with ferritin ≥500 mcg/L have increased only in haemodialysis patients, while those <200 mcg/L have decreased in both peritoneal and haemodialysis groups.

Figure 5.51

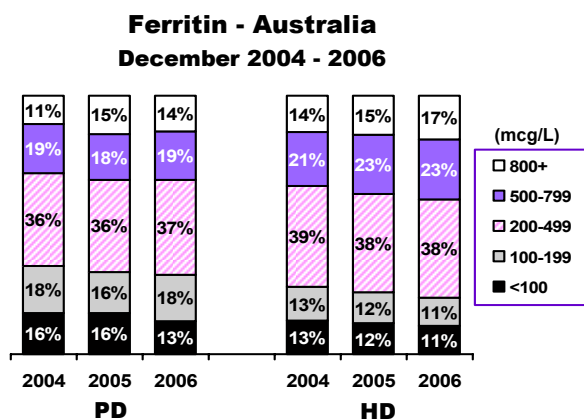


Figure 5.52

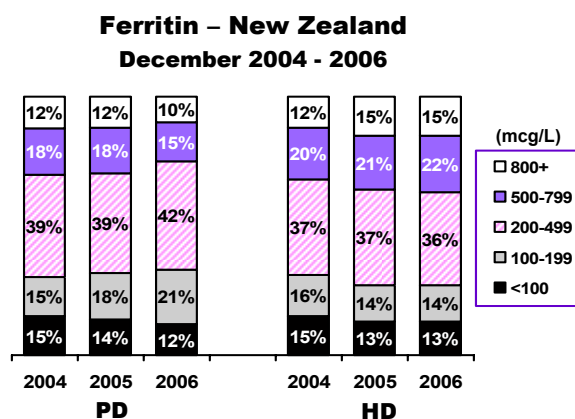


Figure 5.53

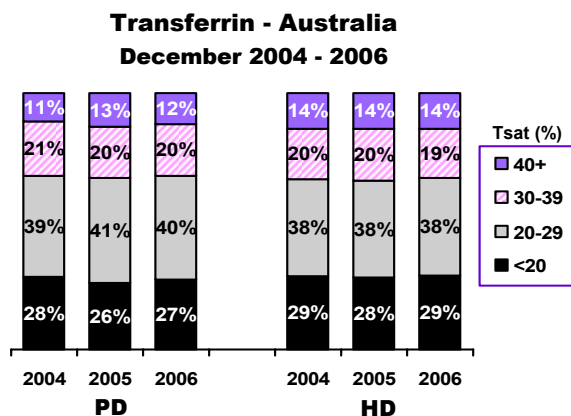
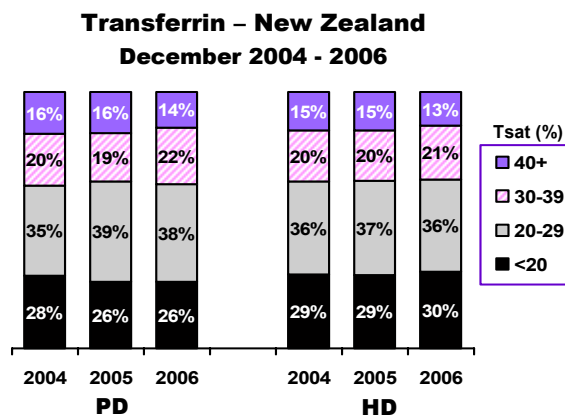


Figure 5.54



FERRITIN BY TREATING CENTRE

Figures 5.55 - 5.62.

These figures show the proportion of patients in each centre with ferritin of 200-500 mcg/L and transferrin saturation of >20% respectively, as recommended by the CARI guidelines. (<http://www.cari.org.au/Iron.pdf>).

In Australia, the proportion of patients with ferritin within this range in each centre varied widely (8-80% for haemodialysis patients and 8-70% for peritoneal dialysis patients). Similarly large variations between centres were seen for transferrin saturation (7-50% for haemodialysis patients, 0-36% for peritoneal dialysis patients). Again, this large variation probably reflects differences in a number of factors including patient mix, erythropoietic agents and iron protocols.

In New Zealand, the corresponding figures for ferritin were 22-45% for haemodialysis and 37-61% for peritoneal dialysis respectively. The corresponding figures for transferrin saturation were 0-32% for haemodialysis and 14-37% for peritoneal dialysis respectively. 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 5.55

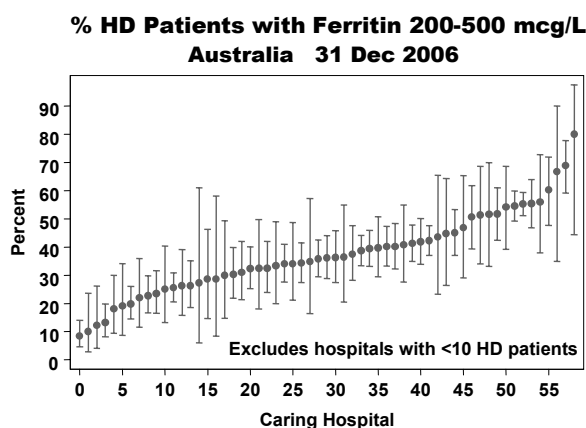


Figure 5.56

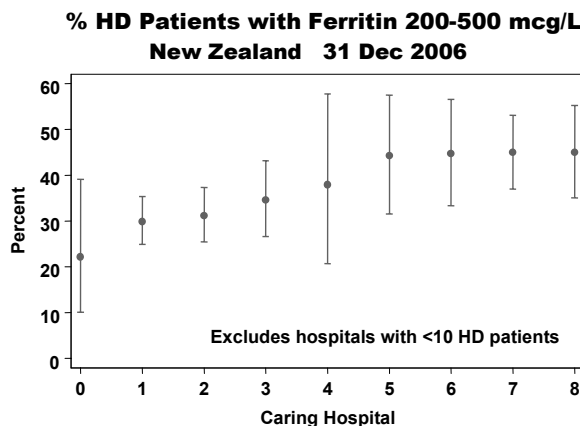


Figure 5.57

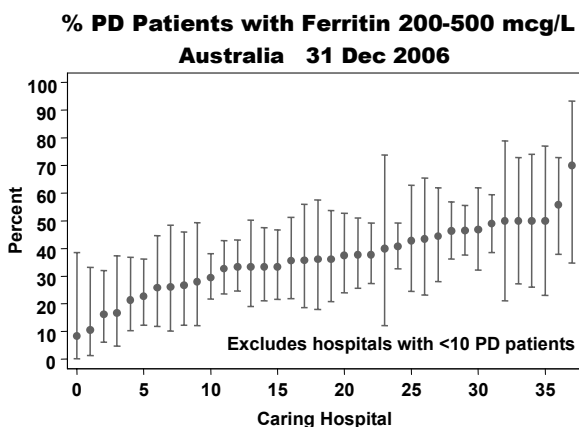


Figure 5.58

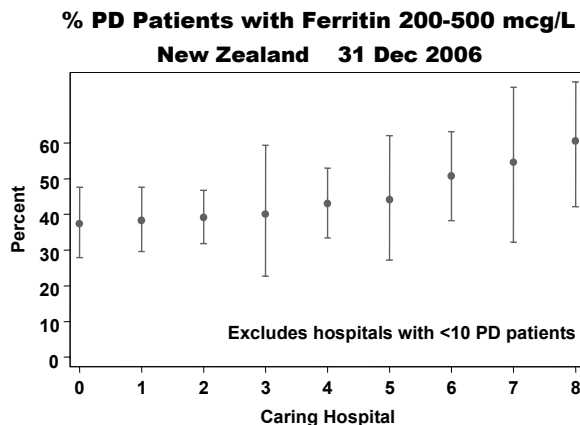




Figure 5.59

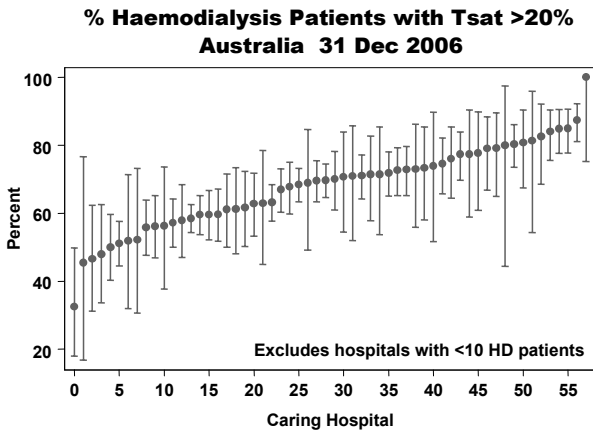


Figure 5.60

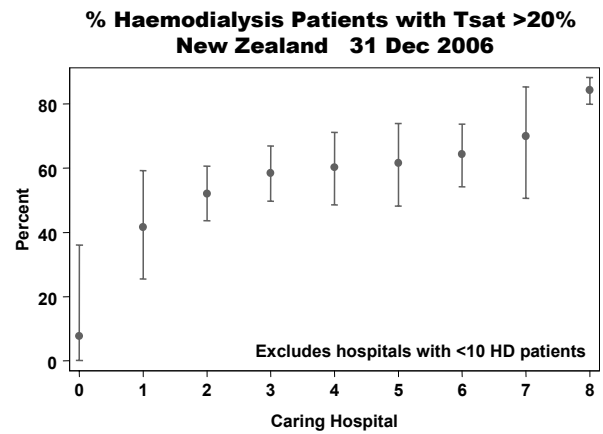


Figure 5.61

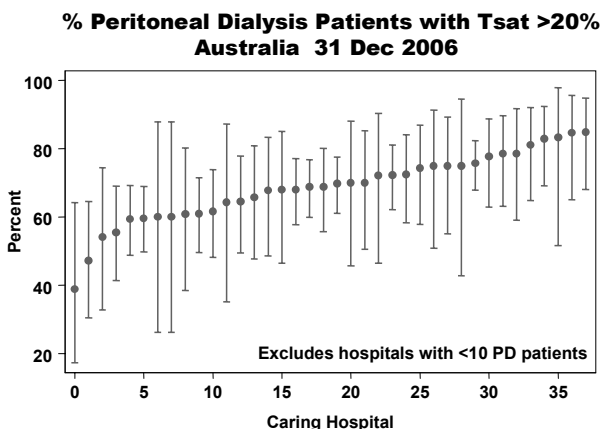
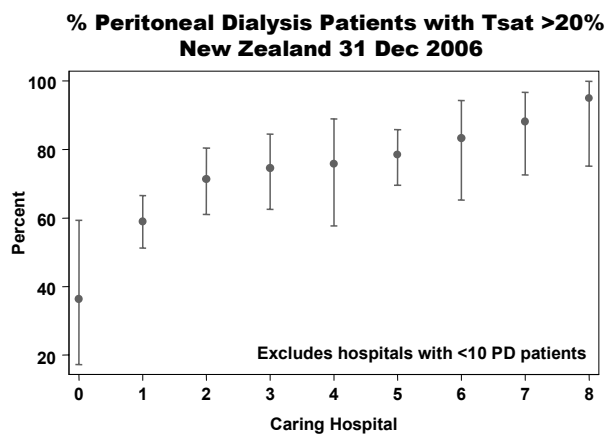


Figure 5.62



SERUM CALCIUM

Figures 5.63 - 5.64.

In both Australia and New Zealand there has been a fall in serum calcium concentration. The proportions of patients with serum calcium ≥ 2.4 mmol/L have decreased over the past three years, while those with < 2.2 mmol/L have increased.

Haemodialysis patients tended to have higher serum calcium than peritoneal dialysis patients.

Figure 5.63

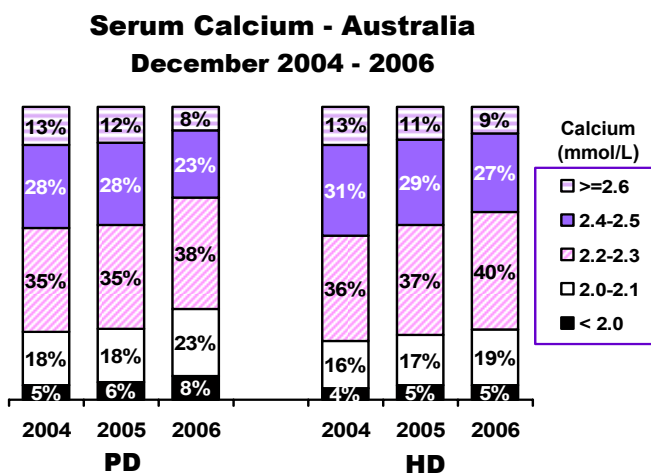
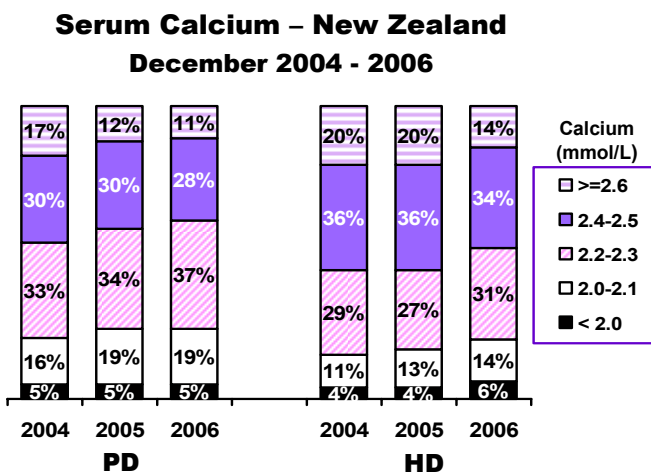


Figure 5.64





SERUM CALCIUM BY TREATING CENTRE

Figures 5.65 to 5.68 show the proportions of patients at each centre with serum calcium 2.1-2.4 mmol/L, as recommended by the CARI guidelines. (<http://www.cari.org.au/Calcium.pdf>). 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: 30-85% for haemodialysis patients and 35-74% for peritoneal dialysis patients.

In New Zealand, the corresponding proportions were 33-56% for haemodialysis patients and 37-73% for peritoneal dialysis patients.

Figure 5.65

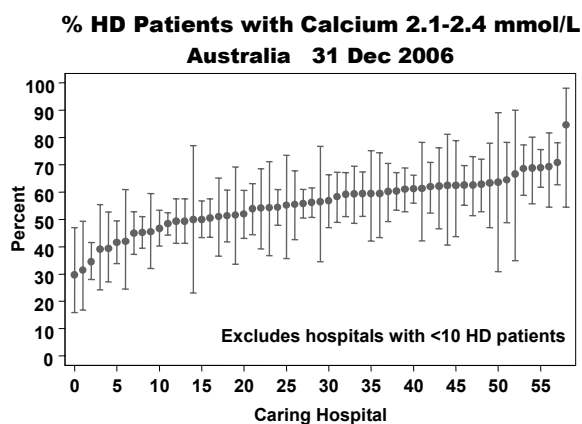


Figure 5.66

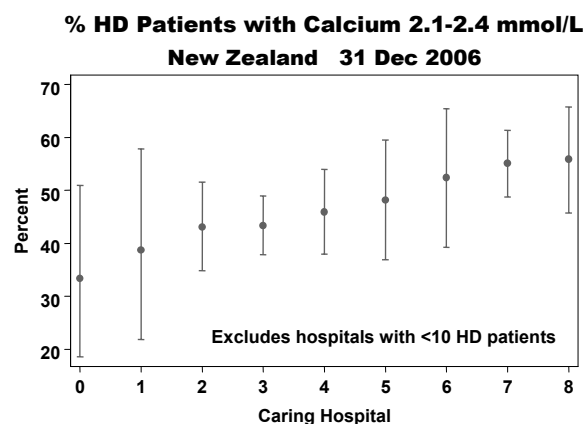


Figure 5.67

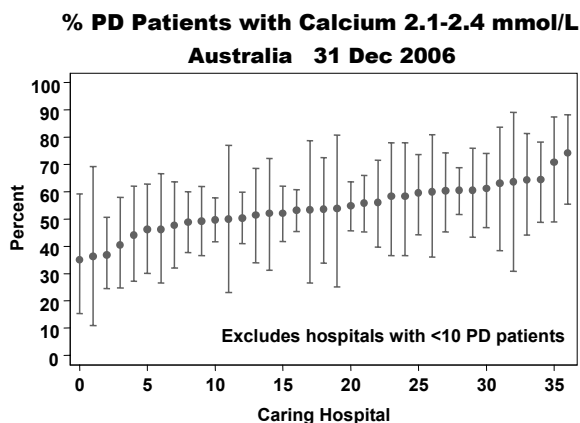
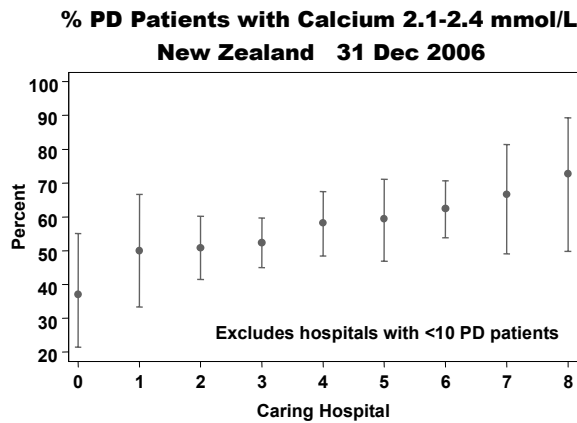


Figure 5.68



SERUM PHOSPHATE

Figures 5.69 - 5.70.

In Australia, overall reported serum phosphate concentrations have been stable, and did not differ between haemodialysis and peritoneal dialysis patients.

In New Zealand, the proportion with serum phosphate ≥ 1.8 mmol/L has decreased, and serum phosphate was higher in the haemodialysis group.

Figure 5.69

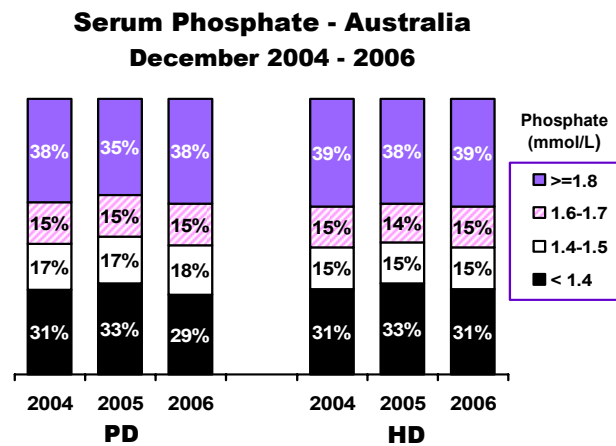
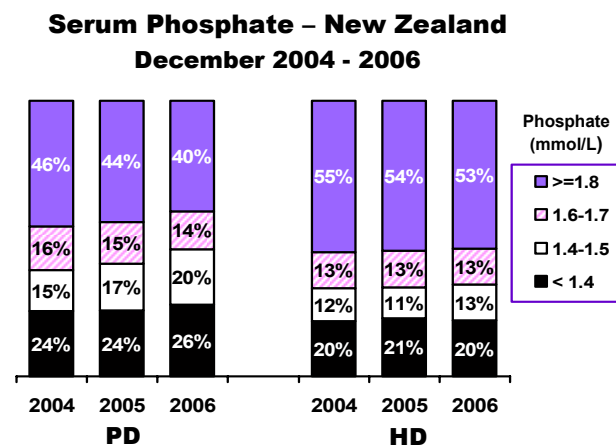


Figure 5.70





SERUM PHOSPHATE BY TREATING CENTRE

Figures 5.71 - 5.74 show the proportions of patients at each centre with serum phosphate 0.8-1.6 mmol/L, as recommended by the CARI guidelines.

(<http://www.cari.org.au/Recommended%20target%20for%20Serum%20Phosphate.pdf>).

In Australia, the proportions ranged widely: 30-60% for haemodialysis patients and 26-73% for peritoneal dialysis patients.

In New Zealand, the corresponding proportions were 24-44% for haemodialysis patients and 38-63% for peritoneal dialysis patients.

Figure 5.71

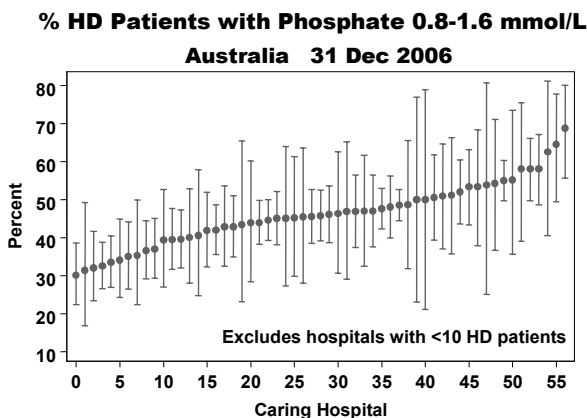


Figure 5.72

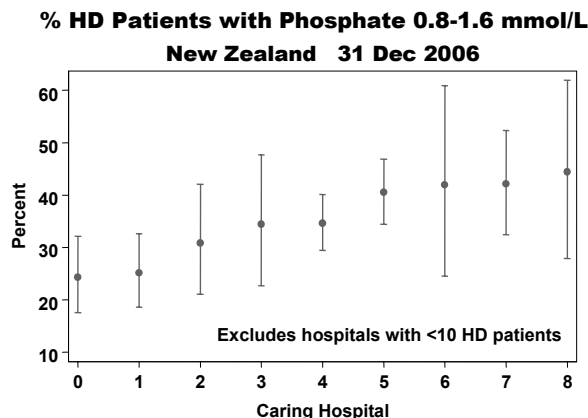


Figure 5.73

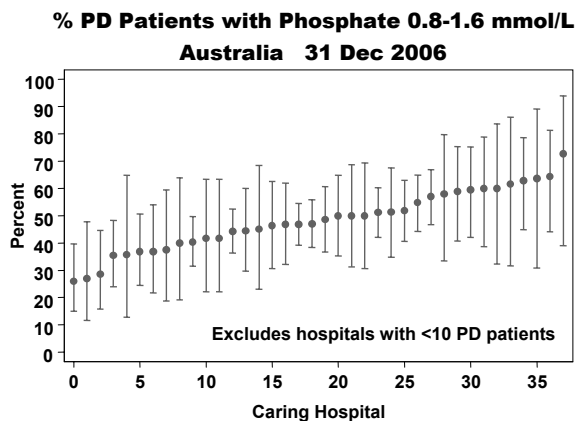
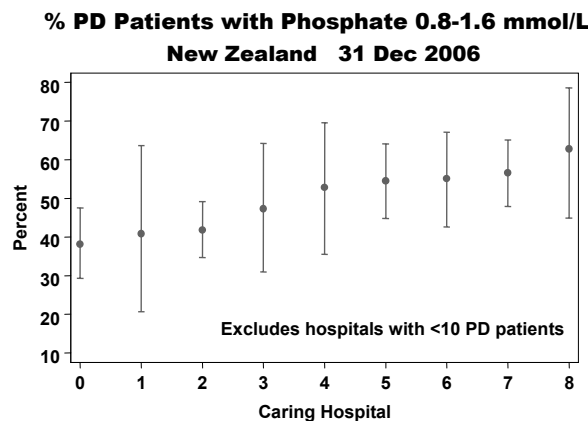


Figure 5.74



CALCIUM-PHOSPHATE PRODUCT

Figures 5.75 - 5.76.

Calcium-phosphate product has improved in both haemodialysis and peritoneal dialysis patients, with fewer people in the ≥ 5.0 mmol^2/L^2 .

Overall, the number of people with high Ca-P product was higher in New Zealand than Australia, and higher on haemodialysis than peritoneal dialysis.

Figure 5.75

**Calcium-Phosphate Product - Australia
December 2004 - 2006**

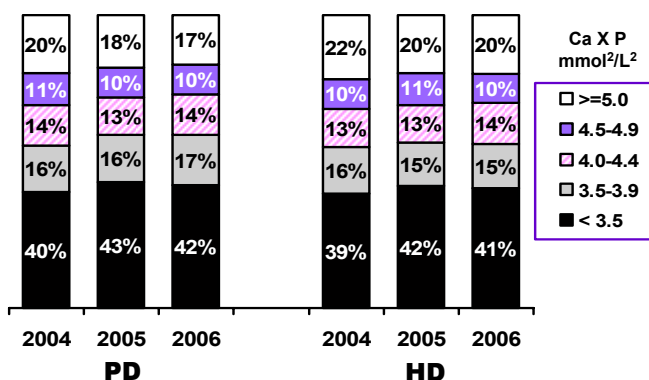
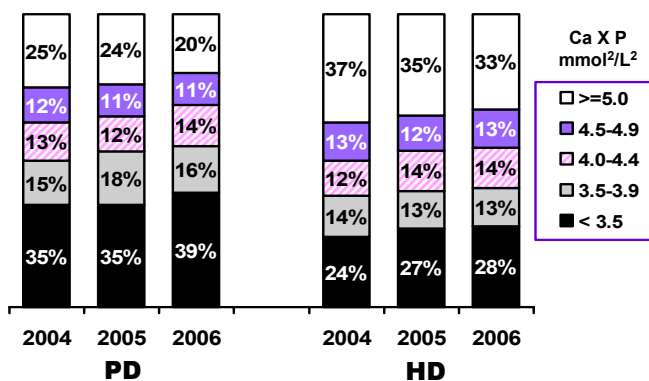


Figure 5.76

**Calcium-Phosphate Product - New Zealand
December 2004 - 2006**





CALCIUM-PHOSPHATE PRODUCT BY TREATING CENTRE

Figures 5.77 - 5.80 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. (<http://www.cari.org.au/Calcium%20and%20phosphate%20product.pdf>).

In Australia, the proportions ranged widely: 37-77% for haemodialysis patients and 38-82% for peritoneal dialysis patients. In New Zealand, the corresponding proportions were 31-55% for haemodialysis patients and 36-66% for peritoneal dialysis patients.

Figure 5.77

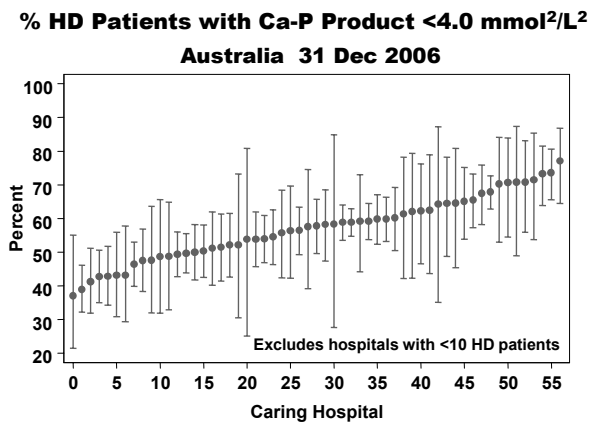


Figure 5.78

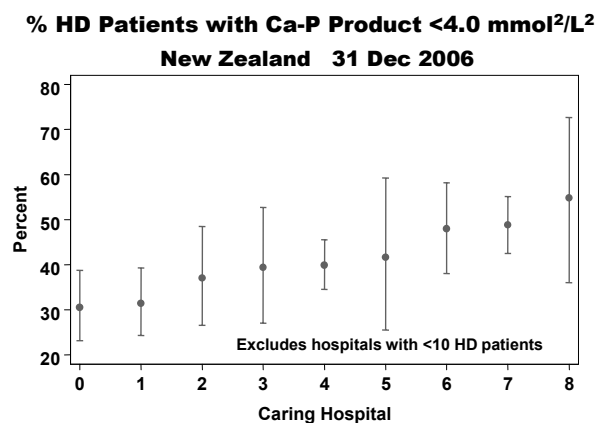


Figure 5.79

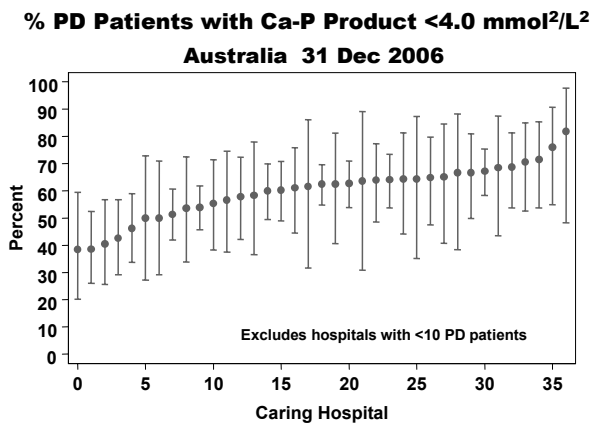
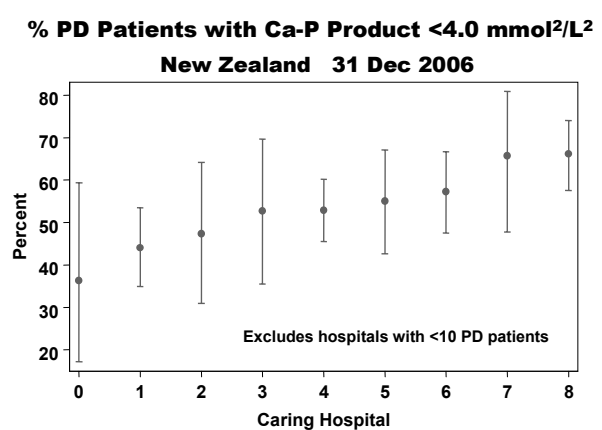


Figure 5.80



UREA REDUCTION RATIO

Figures 5.81 and 5.83.

Distributions of URR values have been fairly stable over the past three years. About 10% and 20% 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%, 24% in Australia and 35% in New Zealand had CVC Access.

Figure 5.81

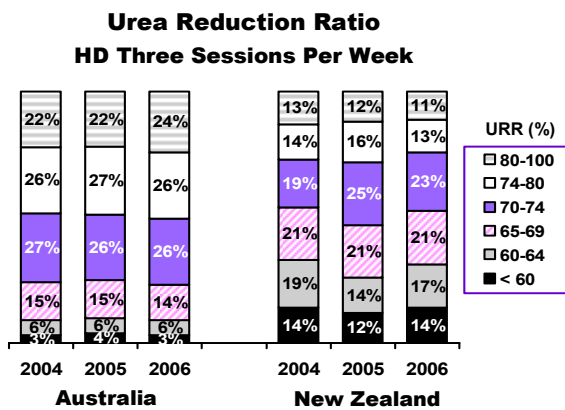


Figure 5.82

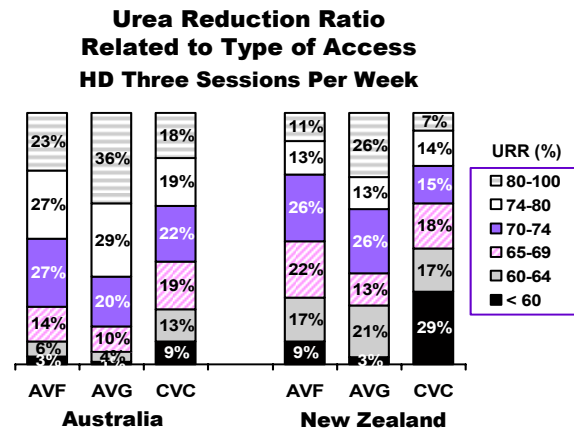


Figure 5.83

**Urea Reduction Ratio - Prevalent Patients
Three Sessions per Week - December 2006**

Hours per Session	Urea Reduction Ratio %		
	< 65	>=65	Total
Australia			
<4 hours	45 (13%)	291 (87%)	336 (100%)
4 hours	240 (9%)	2438 (91%)	2678 (100%)
>4-5 hours	256 (8%)	2896 (92%)	3152 (100%)
>5 hours	17 (6%)	267 (94%)	284 (100%)
Total	558 (9%)	5892 (91%)	6450 (100%)
New Zealand			
<4 hours	5 (19%)	22 (81%)	27 (100%)
4 hours	124 (29%)	306 (71%)	430 (100%)
>4-5 hours	157 (27%)	416 (73%)	573 (100%)
>5 hours	8 (10%)	69 (90%)	77 (100%)
Total	294 (27%)	813 (73%)	1107 (100%)



UREA REDUCTION RATIO BY TREATING CENTRE

Figures 5.84 to 5.87 show the median URR and the proportions of haemodialysis patients in each hospital with URR >70%, the target recommended by the CARI guidelines. (http://www.cari.org.au/dose_of_hemodialysis_jul_2005.pdf).

Median URR values in the respective countries vary within a 10% range. However, the proportions in each unit varied widely, from 49-97% in Australia and 36-73% in New Zealand.

Figure 5.84

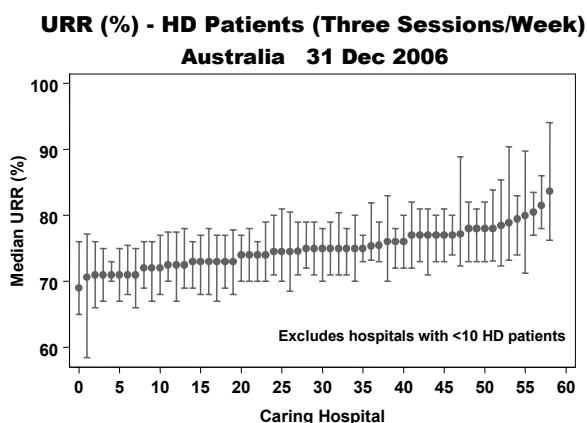


Figure 5.85

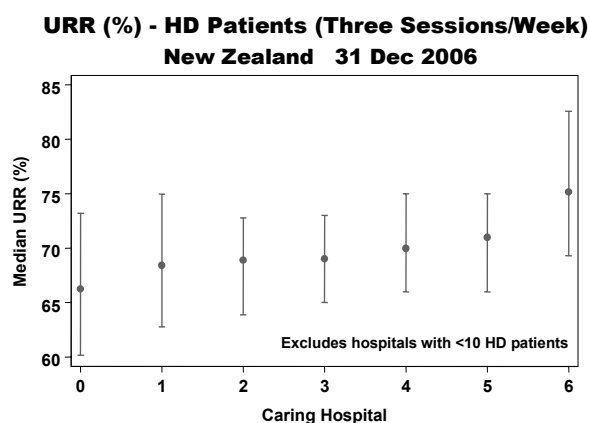


Figure 5.86

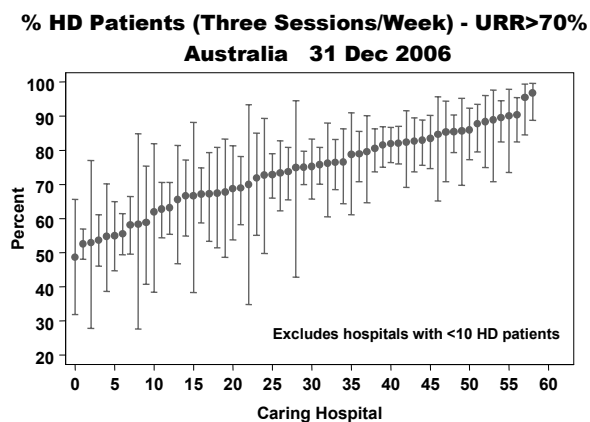
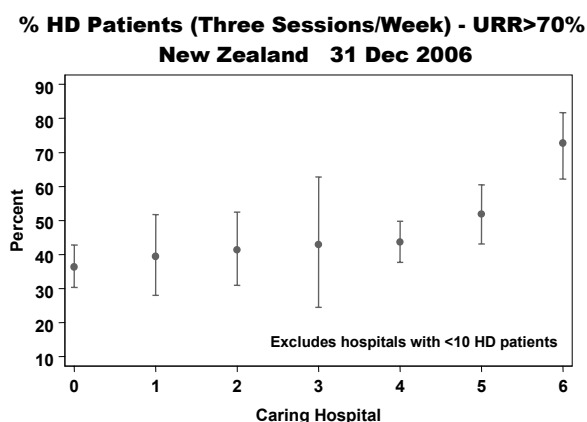


Figure 5.87



VASCULAR ACCESS AT FIRST TREATMENT

Figures 5.88 to 5.91.

In Australia, the decreasing trend in the proportion of patients starting haemodialysis with an AVF or AVG has stabilised at about 38%. In New Zealand, the decreasing trend continued, with less than 25% of patients starting haemodialysis with an AVF or AVG in 2006.

This worrying trend was seen even in patients who were referred early to nephrologists. Diabetic, female, young (age < 25 years) or old (age >=75 years) 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.

Figure 5.88

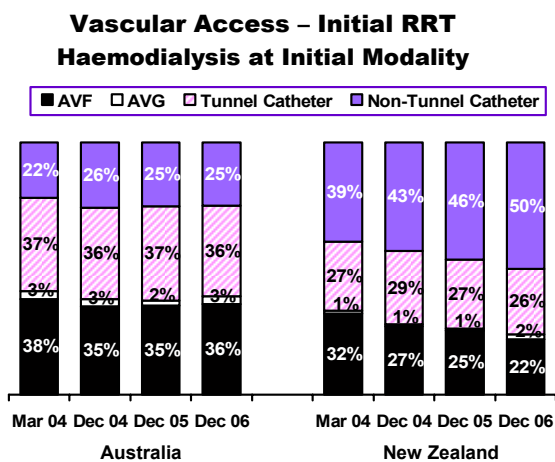


Figure 5.89

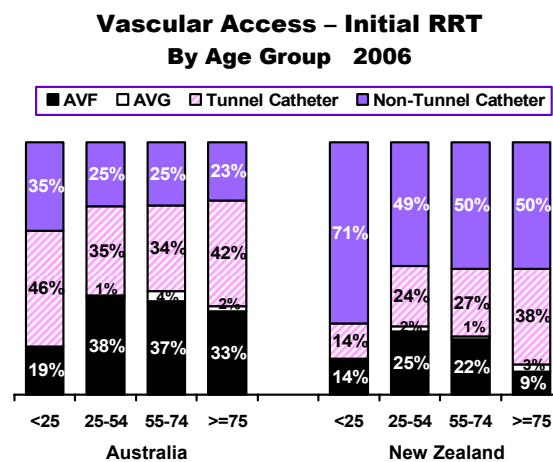


Figure 5.90

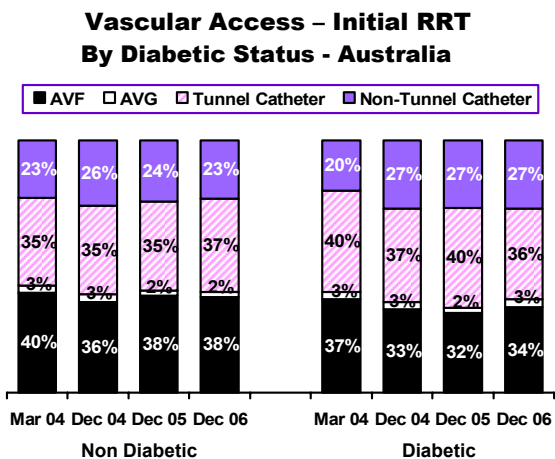
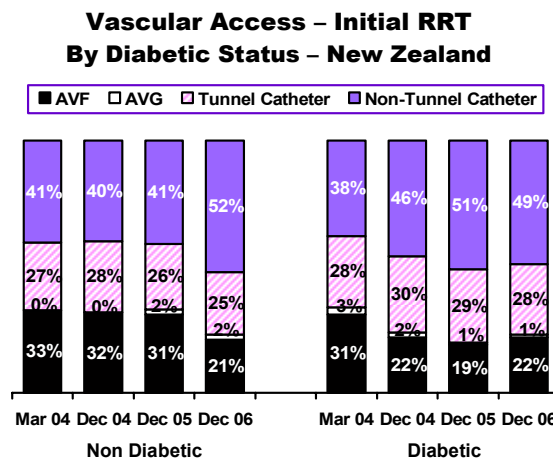


Figure 5.91





VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.92

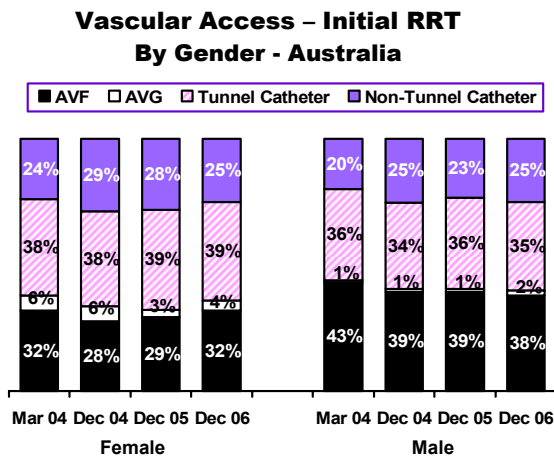


Figure 5.93

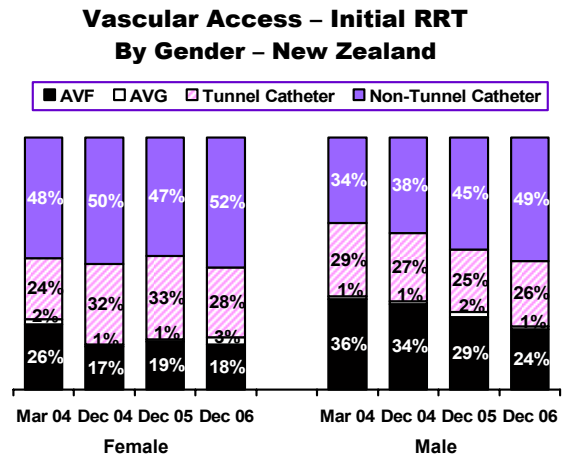


Figure 5.94

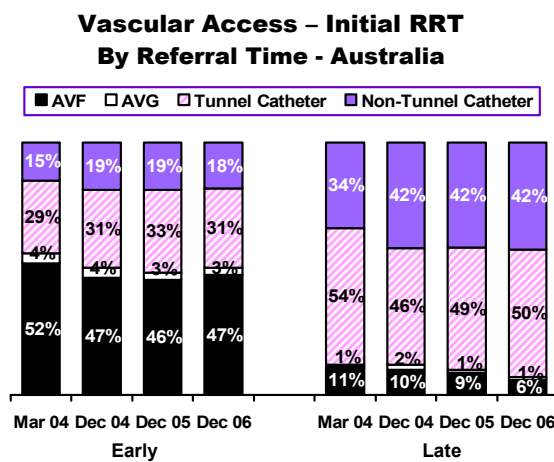
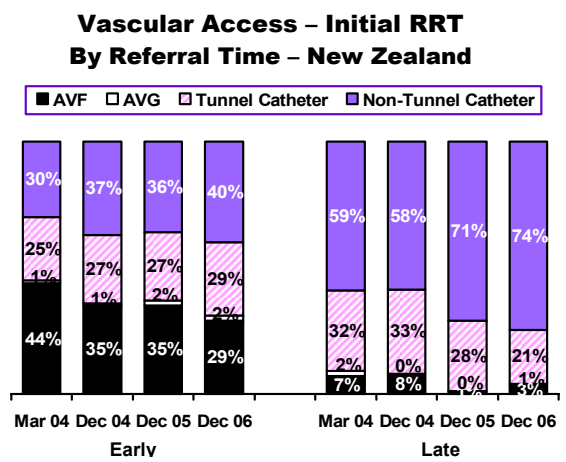


Figure 5.95

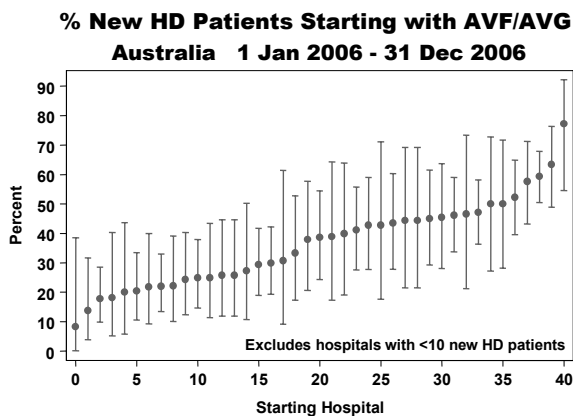
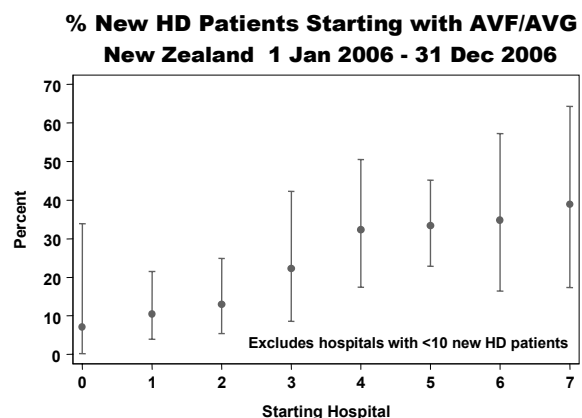


VASCULAR ACCESS AT FIRST TREATMENT

Figure 5.96

Vascular Access at First Treatment Haemodialysis as Initial Modality 1-Oct-2003 to 31-Dec-2006								
	Mar 04		Dec 04		Dec 05		Dec 06	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
Queensland	61 (44%)	77 (56%)	87 (37%)	146 (63%)	126 (38%)	208 (62%)	128 (37%)	215 (63%)
NSW/ACT	70 (32%)	150 (68%)	116 (35%)	218 (65%)	187 (33%)	381 (67%)	183 (32%)	393 (68%)
Victoria	89 (49%)	91 (51%)	110 (41%)	153 (59%)	170 (44%)	217 (56%)	202 (48%)	216 (52%)
Tasmania	1 (14%)	6 (86%)	7 (35%)	13 (65%)	13 (45%)	16 (55%)	12 (30%)	28 (70%)
South Australia	36 (57%)	27 (43%)	42 (47%)	46 (53%)	73 (53%)	67 (47%)	71 (52%)	65 (48%)
Northern Territory	14 (42%)	19 (58%)	24 (42%)	34 (58%)	22 (27%)	59 (73%)	22 (32%)	47 (68%)
Western Australia	21 (33%)	45 (67%)	40 (30%)	91 (70%)	53 (28%)	130 (72%)	57 (35%)	107 (65%)
New Zealand								
	46 (34%)	91 (66%)	60 (29%)	152 (71%)	79 (28%)	217 (72%)	72 (23%)	239 (77%)

Figures 5.97 to 5.98 show the proportion of each hospital starting haemodialysis with AVF/AVG, arranged from the lowest to the highest. In Australia, this ranged widely from 8-77%. The corresponding range in New Zealand was 7-39%. This wide variation probably reflects differences in practices, protocols, resources and patient case-mix among centres. However, the patient case-mix is extremely unlikely to explain this variation.

Figure 5.97

Figure 5.98




PREVALENT HAEMODIALYSIS ACCESS

Figures 5.98 - 5.104.

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 increasing. The proportions dialysing with catheters have stabilised.

Diabetic, female, young (age < 25 years) or old (age >=75 years) patients were less likely to be dialysing with an AVF or AVG.

Figure 5.99

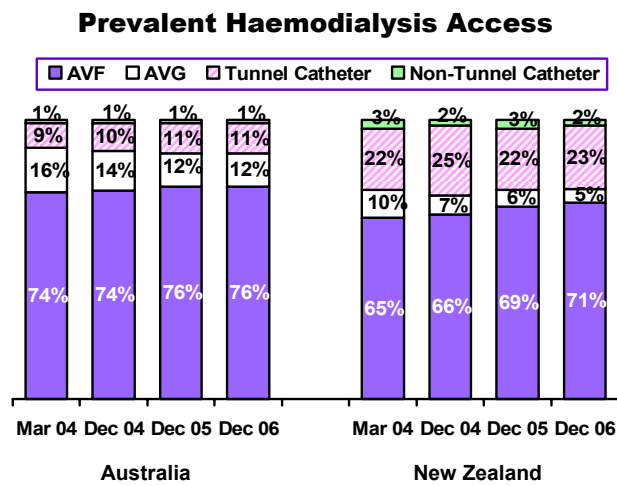
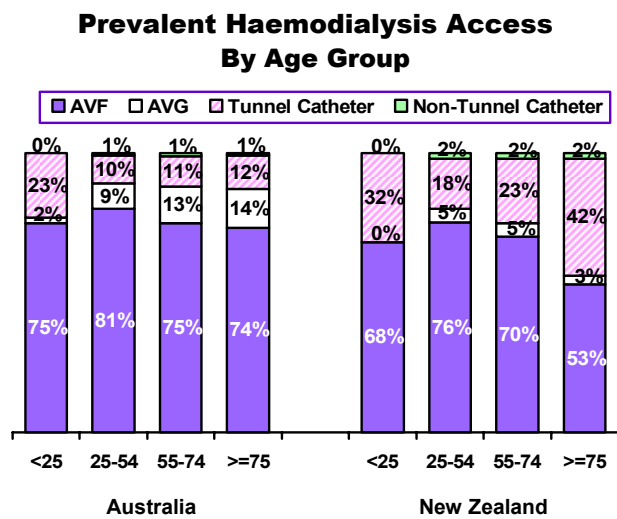


Figure 5.100



PREVALENT HAEMODIALYSIS ACCESS

Figure 5.101

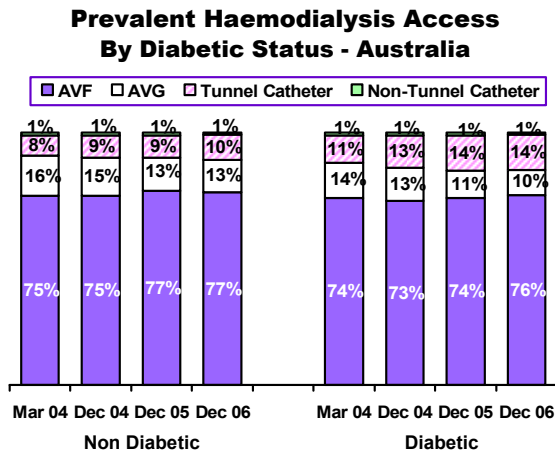


Figure 5.102

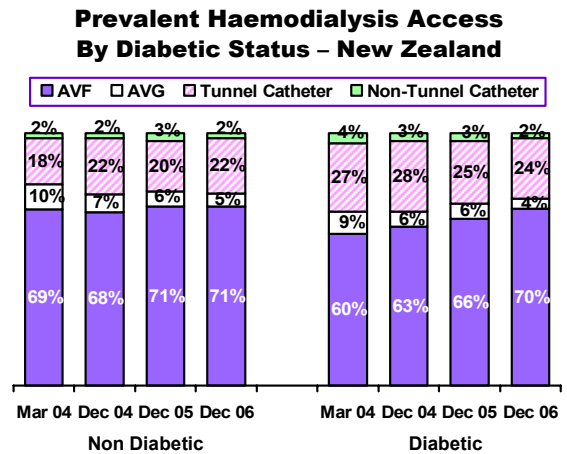


Figure 5.103

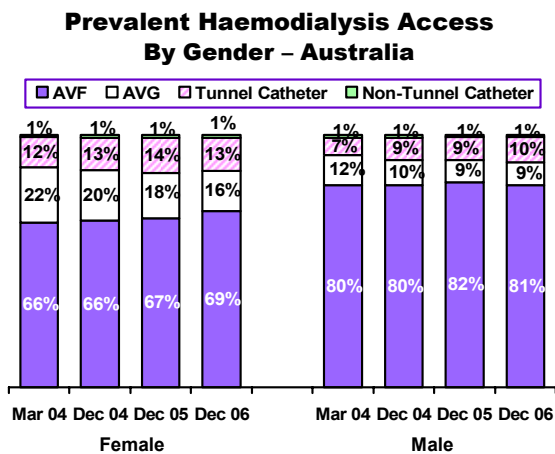
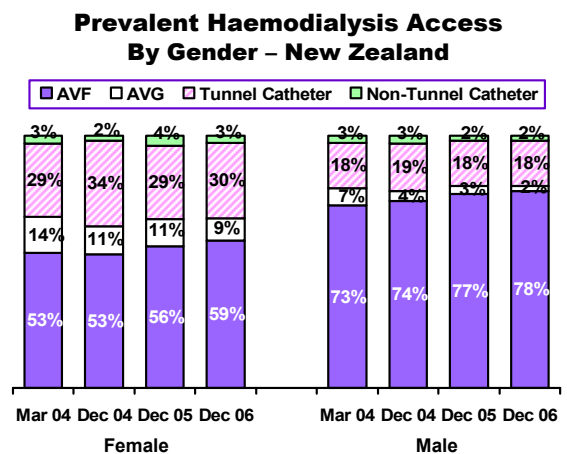


Figure 5.104





PREVALENT HAEMODIALYSIS ACCESS

Figure 5.105

Prevalent Vascular Access at 31-Dec-2006

	Mar 04		Dec 04		Dec 05		Dec 06	
	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC	AVF or AVG	CVC
Australia								
Queensland	922 (90%)	98 (10%)	963 (88%)	133 (12%)	1091 (90%)	125 (10%)	1155 (90%)	126 (10%)
NSW/ACT	1757 (89%)	224 (11%)	1775 (88%)	250 (12%)	1947 (88%)	264 (12%)	2059 (86%)	336 (14%)
Victoria	1519 (94%)	105 (6%)	1535 (92%)	132 (8%)	1613 (90%)	175 (10%)	1729 (90%)	190 (10%)
Tasmania	101 (83%)	20 (17%)	103 (85%)	18 (15%)	113 (87%)	17 (13%)	98 (80%)	25 (20%)
South Australia	395 (97%)	14 (3%)	389 (94%)	25 (6%)	449 (95%)	24 (5%)	443 (94%)	28 (6%)
Northern Territory	197 (88%)	27 (12%)	221 (89%)	27 (11%)	246 (88%)	35 (12%)	265 (88%)	35 (12%)
Western Australia	492 (82%)	109 (18%)	522 (81%)	123 (19%)	520 (78%)	149 (22%)	549 (82%)	123 (18%)
New Zealand								
	725 (75%)	239 (25%)	750 (73%)	281 (27%)	862 (75%)	291 (25%)	907 (75%)	300 (25%)

Figures 5.106 - 5.107 show the proportion of haemodialysis patients at each hospital dialysing with an AVF/AVG on 31st December, 2006, arranged from the lowest to the highest.

In Australia, the proportions varied widely from 70-100%. The corresponding range in New Zealand was 55-89%.

This wide variation probably reflects differences in practices, protocols, resources and patient case-mix among centres.

Figure 5.106

**% Prevalent HD Patients Dialysing with AVF/AVG
Australia 31 Dec 2006**

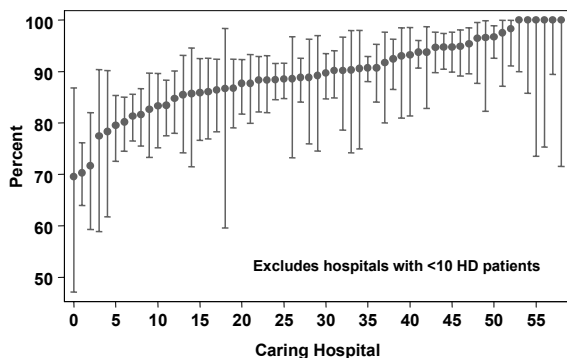


Figure 5.107

**% Prevalent HD Patients Dialysing with AVF/AVG
New Zealand 31 Dec 2006**

