

CHAPTER 6

PERITONEAL DIALYSIS

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STOCK AND FLOW

AUSTRALIA

Peritoneal dialysis was used to treat 19% of all dialysis patients in 2010 (APD-1261,CAPD-797,total 10590). PD accounted for 68% of all home dialysis, a figure which has remained stable for several years (Figure 6.1).Of the 25,940 patients who have ever received peritoneal dialysis, 5% had experienced at least five years of continuous peritoneal dialysis (Figure 6.2).

The proportion of all home dialysis patients on peritoneal dialysis in each State ranged from 40% (Australian Capital Territory) to 88% (South Australia) (Figure 6.1).

The annual stock and flow of patients during the period 2006-2010 is shown in Figures 6.3 and 6.4.

The prevalence of automated peritoneal dialysis is stable (61%) (Figure 6.11)

There were 730 new peritoneal dialysis patients in the calendar year 2010; of these 480 patients (66%) started renal replacement therapy with peritoneal dialysis, (23% of all new dialysis patients in 2010) and 250 (12%) previously had been treated with haemodialysis or a transplant (Figure 6.3).

Numbers of new patients over the age of 65 years decreased 7%, from 379 to 283 in 2010, following an increase of 6% in 2009 (Figure 6.8). There were decreases in all age groups in 2010 except 35-54 which increased slightly.

The number of new patients to peritoneal dialysis with diabetic nephropathy as a primary renal disease decreased 1% in 2010, following a 10% increase in 2009; this group comprised 18% of all new peritoneal dialysis patients compared to 15% in 2009.

There was a 2% decrease in glomerulonephritis in 2010 (197 patients) compared to an decrease of 4% (250 patients) from 2008 to 2009 (Figure 6.8).

The proportion of patients in each group treated with peritoneal dialysis ranged from 12% (≥ 85 years) to 74% (<15 years)

There were 263 deaths in 2010 compared to 312 in 2009.

For more detail see Appendix II at our website (www.anzdata.org.au/v1/report_2010.html).

There were 186 peritoneal dialysis patients who received a transplant in 2010 compared to 154 in 2009; this was 9% of all patients treated and 12% of patients <65 years treated during the year (Figure 6.3). Thirteen patients ≥ 65 years were transplanted.

Permanent transfers to haemodialysis in 2010 occurred in 403 patients (20%) and 506 patients (23%) in 2009. (Figure 6.3).

Figure 6.1

Proportion (%) Peritoneal Dialysis of all Home Dialysis Patients 2006 - 2010

State	2006	2007	2008	2009	2010
Queensland	72%	70%	68%	66%	67%
New South Wales	62%	63%	67%	66%	66%
Australian Capital Territory	65%	60%	49%	46%	40%
Victoria	69%	66%	67%	67%	66%
Tasmania	81%	87%	83%	82%	79%
South Australia	92%	95%	95%	93%	88%
Northern Territory	65%	67%	63%	57%	59%
Western Australia	89%	90%	89%	87%	83%
Australia	69%	69%	70%	69%	68%
New Zealand	70%	69%	70%	68%	66%

Figure 6.2

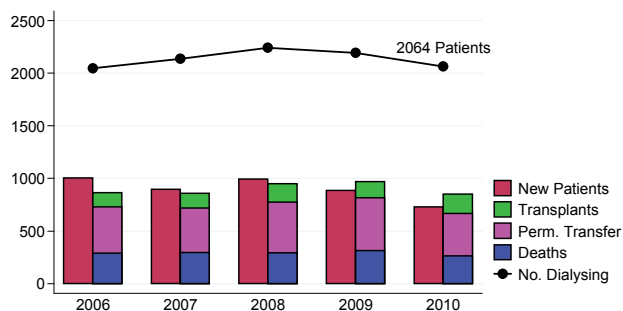
Continuous Period of Peritoneal Dialysis 1963 - 2010

	Months													
	0-<6	6-11	12-17	18-23	24-29	30-35	36-41	42-47	48-59	60-71	72-83	84-95	96-107	≥108
Australia														
1st Treatment (n=21,436)	6286	3828	2808	2151	1696	1177	878	661	909	489	251	145	79	78
All Treatments (n=25,940)	7918	4720	3390	2577	1965	1359	1030	770	1036	557	277	161	84	96
New Zealand														
1st Treatment (n=5,867)	1107	880	747	685	529	449	361	259	405	194	106	64	41	40
All Treatments (n=6,968)	1401	1078	905	796	614	515	421	287	445	218	121	72	45	50

Figure 6.3
**Stock and Flow of Peritoneal Dialysis Patients
2006 - 2010**

State	2006	2007	2008	2009	2010
Australia					
Patients new to PD	1005	896	996	887	730
First Dialysis Treatment	582	587	657	582	480
Previous Dialysis (HD)	405	288	307	282	229
Failed Transplant	18	21	32	23	21
Transplanted	136	142	175	154	186
Deaths	289	296	293	312	263
Never Transplanted	281	292	279	302	259
Previous Transplant	8	4	14	10	4
Transfer to Haemodialysis	439	422	481	506	403
Patients Dialysing (PD) at 31 December	2047	2137	2242	2195	2064
Patients Dialysing (PD) at Home at 31 December	2015	2111	2206	2173	2050
% of all Home Dialysis Patients	69%	69%	70%	69%	68%
New Zealand					
Patients new to PD	297	242	274	283	273
First Dialysis Treatment	159	132	153	199	161
Previous Dialysis (HD)	127	104	115	80	111
Failed Transplant	11	6	6	4	1
Transplanted	23	37	28	35	46
Deaths	152	120	124	126	114
Never Transplanted	149	113	117	124	109
Previous Transplant	3	7	7	2	5
Transfer to Haemodialysis	103	124	124	116	95
Patients Dialysing (PD) at 31 December	766	746	763	799	834
Patients Dialysing (PD) at Home at 31 December	758	742	758	795	829
% of all Home Dialysis Patients	70%	69%	70%	68%	66%

Figure 6.4

 Stock and Flow of Peritoneal Dialysis Patients
Australia 2006-2010

Figure 6.5

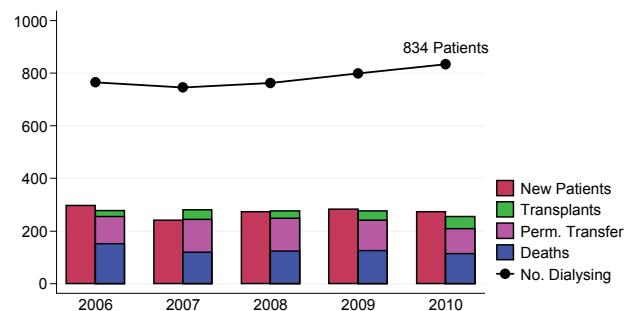
 Stock and Flow of Peritoneal Dialysis Patients
New Zealand 2006-2010




Figure 6.6

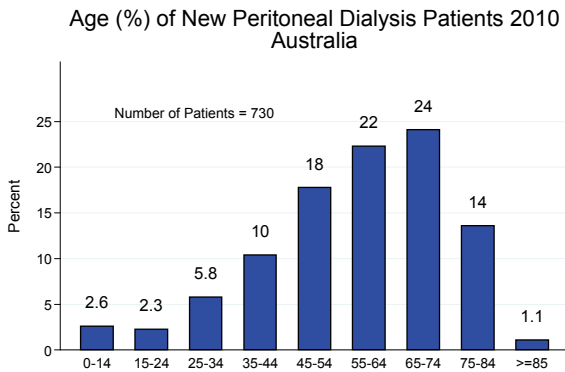


Figure 6.7

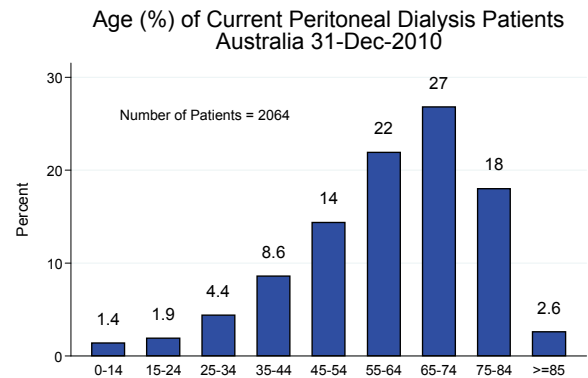


Figure 6.8

Australia

Stock and Flow of Peritoneal Dialysis by Age Groups 2006 - 2010

Age Groups	2006	2007	2008	2009	2010
New Patients *					
00-14 years	16 (2%)	22 (2%)	14 (1%)	25 (3%)	19 (3%)
15-24 years	20 (2%)	18 (2%)	32 (3%)	26 (3%)	17 (2%)
25-34 years	60 (6%)	43 (5%)	51 (5%)	54 (6%)	42 (6%)
35-44 years	96 (10%)	93 (10%)	99 (10%)	74 (8%)	76 (10%)
45-54 years	170 (17%)	161 (18%)	175 (18%)	127 (14%)	130 (18%)
55-64 years	217 (22%)	198 (22%)	217 (22%)	196 (22%)	163 (22%)
65-74 years	249 (25%)	203 (23%)	229 (23%)	224 (25%)	176 (24%)
75-84 years	168 (17%)	150 (17%)	167 (17%)	143 (16%)	99 (14%)
>=85 years	9 (1%)	8 (1%)	12 (1%)	18 (2%)	8 (1%)
Total	1005 (100%)	896 (100%)	996 (100%)	887 (100%)	730 (100%)
Patients Dialysing					
00-14 years	22 (1%)	34 (2%)	28 (1%)	32 (1%)	29 (1%)
15-24 years	27 (1%)	25 (1%)	47 (2%)	52 (2%)	39 (2%)
25-34 years	86 (4%)	76 (4%)	84 (4%)	97 (4%)	90 (4%)
35-44 years	191 (9%)	199 (9%)	183 (8%)	170 (8%)	177 (9%)
45-54 years	310 (15%)	339 (16%)	371 (17%)	337 (15%)	298 (14%)
55-64 years	464 (23%)	479 (22%)	506 (23%)	478 (22%)	453 (22%)
65-74 years	529 (26%)	550 (26%)	554 (25%)	578 (26%)	554 (27%)
75-84 years	385 (19%)	403 (19%)	422 (19%)	398 (18%)	371 (18%)
>=85 years	33 (2%)	32 (1%)	47 (2%)	53 (2%)	53 (3%)
Total	2047 (100%)	2137 (100%)	2242 (100%)	2195 (100%)	2064 (100%)
Primary Renal Disease *					
Glomerulonephritis	266 (26%)	231 (26%)	260 (26%)	250 (28%)	197 (27%)
Analgesic Nephropathy	26 (3%)	17 (2%)	28 (3%)	13 (1%)	14 (2%)
Hypertension	137 (14%)	131 (15%)	118 (12%)	147 (17%)	92 (13%)
Polycystic Disease	53 (5%)	50 (6%)	66 (7%)	53 (6%)	52 (7%)
Reflux Nephropathy	43 (4%)	29 (3%)	40 (4%)	38 (4%)	22 (3%)
Diabetic Nephropathy	324 (32%)	284 (32%)	327 (33%)	266 (30%)	238 (33%)
Miscellaneous	106 (11%)	96 (11%)	80 (8%)	82 (9%)	78 (11%)
Uncertain	50 (5%)	58 (6%)	77 (8%)	38 (4%)	37 (5%)
Total	1005 (100%)	896 (100%)	996 (100%)	887 (100%)	730 (100%)

* New patients receiving first peritoneal dialysis treatment

Figure 6.9

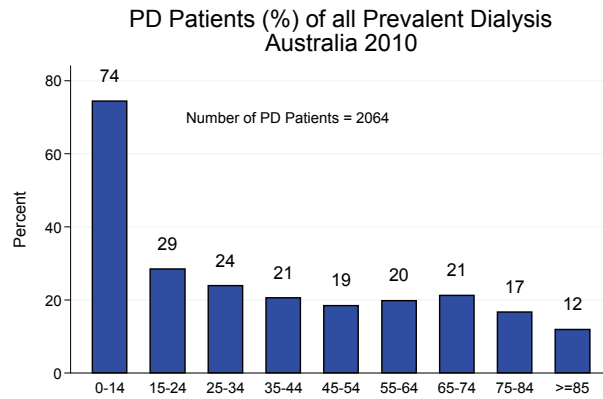


Figure 6.10

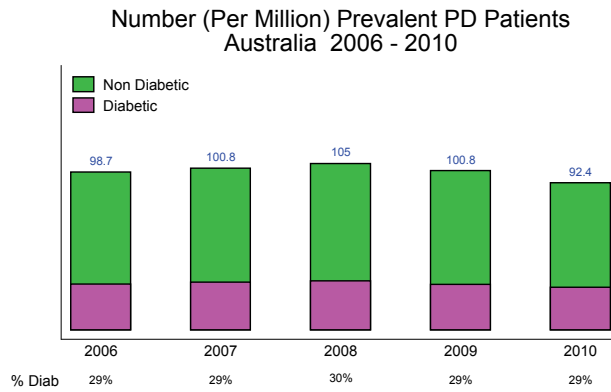


Figure 6.11

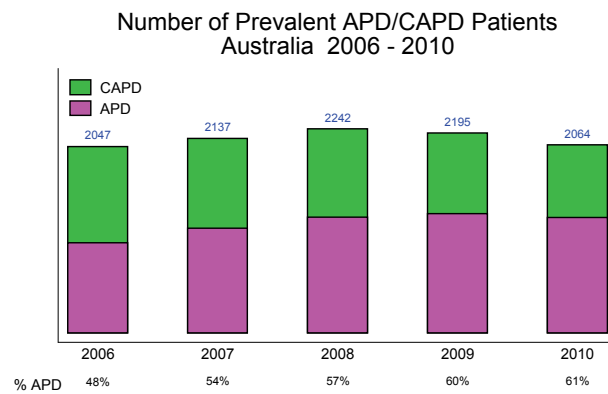




Figure 6.12

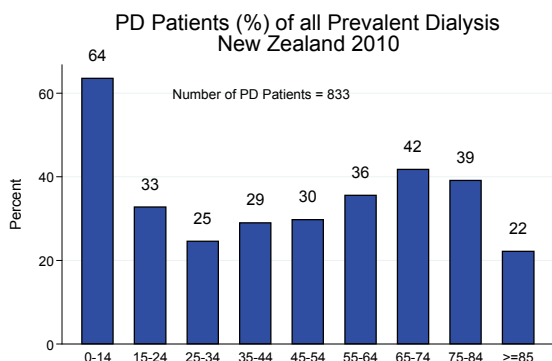


Figure 6.13

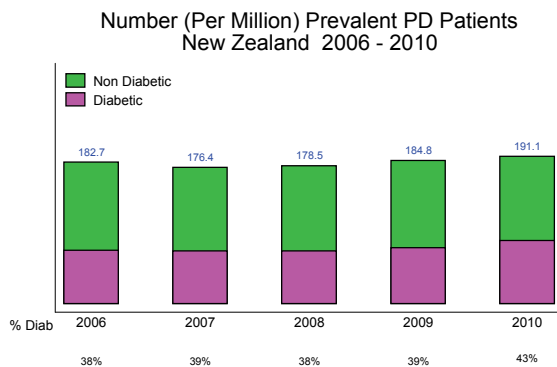
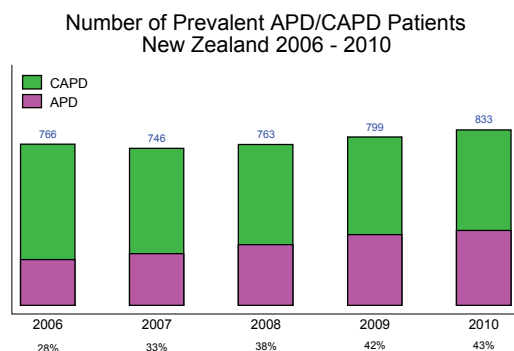


Figure 6.14



NEW ZEALAND

Peritoneal dialysis accounted for 35% of all dialysis patients and 66% of all patients dialysing at home.

A substantially lower proportion of patients used automated PD than in Australia. Forty three percent of all peritoneal dialysis in 2010 was automated compared with 42% in 2009 and 38% in 2008.

The annual stock and flow of patients during the period 2006 to 2010 is shown in Figures 6.3 and 6.5. Of the 6,968 patients treated since 1963, 834 (11%) were alive at 31st December, 2010 and 506 (7%) had more than five years continuous treatment (Figure 6.2).

There were 273 new peritoneal dialysis patients in calendar year 2010, a decrease of 4% from 2009 (283 patients). For (59%), peritoneal dialysis was the initial dialysis treatment compared to (70%) in 2009 (Figures 6.15 and 6.17).

The age distribution of prevalent peritoneal dialysis patients is shown in Figures 6.16 and 6.17.

The most common primary renal disease of new patients to peritoneal dialysis was diabetic nephropathy (49%), an increase of 6% from 2009, followed by glomerulonephritis (23%) and hypertension (13%).

The proportion of patients in each group treated with peritoneal dialysis ranged from 28% (55-64 years), 53% (35-64 years) to 0% (≥ 85 years) and 1% (0-14 years) (Figure 6.12).

There were 114 deaths amongst prevalent peritoneal dialysis patients in 2010 compared to 126 in 2009. (Figure 3.8).

For more detail see Appendix III at our website (www.anzdata.org.au/v1/report_2010.html).

There were 46 patients transplanted in 2010 (35 in 2009), 6% of patients dialysed, (Figure 6.3). Four patients ≥ 65 years were transplanted.

Figure 6.15

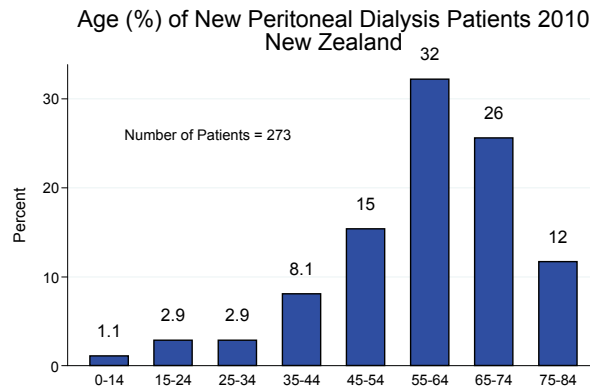


Figure 6.16

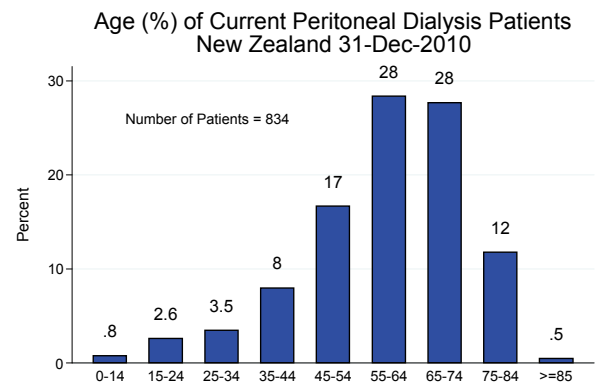


Figure 6.17

New Zealand

Stock and Flow of Peritoneal Dialysis by Age Groups 2006 - 2010

Age Groups	2006	2007	2008	2009	2010
New Patients *					
00-14 years	4 (1%)	5 (2%)	10 (4%)	3 (1%)	3 (1%)
15-24 years	16 (5%)	5 (2%)	13 (5%)	4 (1%)	8 (3%)
25-34 years	11 (4%)	18 (7%)	11 (4%)	10 (4%)	8 (3%)
35-44 years	30 (10%)	21 (9%)	21 (8%)	31 (11%)	22 (8%)
45-54 years	59 (20%)	43 (18%)	55 (20%)	59 (21%)	42 (15%)
55-64 years	70 (24%)	74 (31%)	78 (28%)	62 (22%)	88 (32%)
65-74 years	66 (22%)	55 (23%)	69 (25%)	86 (30%)	70 (26%)
75-84 years	39 (13%)	18 (7%)	17 (6%)	27 (10%)	32 (12%)
>=85 years	2 (1%)	3 (1%)		1 (0%)	
Total	297 (100%)	242 (100%)	274 (100%)	283 (100%)	273 (100%)
Patients Dialysing					
00-14 years	8 (1%)	8 (1%)	13 (2%)	10 (1%)	7 (1%)
15-24 years	21 (3%)	23 (3%)	28 (4%)	27 (3%)	22 (3%)
25-34 years	35 (5%)	36 (5%)	30 (4%)	33 (4%)	29 (3%)
35-44 years	68 (9%)	63 (8%)	62 (8%)	62 (8%)	67 (8%)
45-54 years	131 (17%)	121 (16%)	141 (18%)	157 (20%)	139 (17%)
55-64 years	185 (24%)	195 (26%)	209 (27%)	212 (27%)	237 (28%)
65-74 years	198 (26%)	186 (25%)	186 (24%)	216 (27%)	231 (28%)
75-84 years	112 (15%)	100 (13%)	81 (11%)	72 (9%)	98 (12%)
>=85 years	8 (1%)	14 (2%)	13 (2%)	10 (1%)	4 (0%)
Total	766 (100%)	746 (100%)	763 (100%)	799 (100%)	834 (100%)
Primary Renal Disease *					
Glomerulonephritis	67 (23%)	55 (23%)	65 (24%)	57 (20%)	64 (23%)
Analgesic Nephropathy	1 (0%)		2 (1%)		3 (1%)
Hypertension	43 (14%)	26 (11%)	35 (13%)	33 (12%)	36 (13%)
Polycystic Disease	25 (8%)	11 (5%)	12 (4%)	18 (6%)	7 (3%)
Reflux Nephropathy	10 (3%)	9 (4%)	4 (1%)	5 (2%)	3 (1%)
Diabetic Nephropathy	115 (39%)	106 (44%)	115 (42%)	127 (45%)	134 (49%)
Miscellaneous	23 (8%)	27 (11%)	27 (10%)	31 (11%)	20 (7%)
Uncertain	13 (4%)	8 (3%)	14 (5%)	12 (4%)	6 (2%)
Total	297 (100%)	242 (100%)	274 (100%)	283 (100%)	273 (100%)

* New patients receiving first peritoneal dialysis treatment



PERITONEAL DIALYSIS FLUIDS

At the end of 2010, 30% of CAPD and 45% of APD patients were receiving Icodextrin in Australia (Figures 6.18,6.19) These proportions were lower for CAPD (24%) and higher for APD (66%) in New Zealand (Figure 6.20). There was also considerable variation between States in Icodextrin usage rates, with the highest rates seen in the Northern Territory for CAPD and Tasmania for APD (Figure 6.21). Low GDP fluids (whether lactate or bicarbonate based fluids) were used infrequently in 2010, with a slightly higher percentage of lactate based fluids compared with bicarbonate based (Figure 6.22 - 6.27).

Figure 6.18

Icodextrin Usage by Modality Type - December 2010

Modality Type	Australia			New Zealand		
	No	Yes	Total	No	Yes	Total
CAPD	559	238	797	361	117	478
	70%	30%	.	76%	24%	.
APD	700	564	1264	121	234	355
	55%	45%	.	34%	66%	.
Total	1259	802	2061	482	351	833
	61%	39%	.	58%	42%	.

Figure 6.19

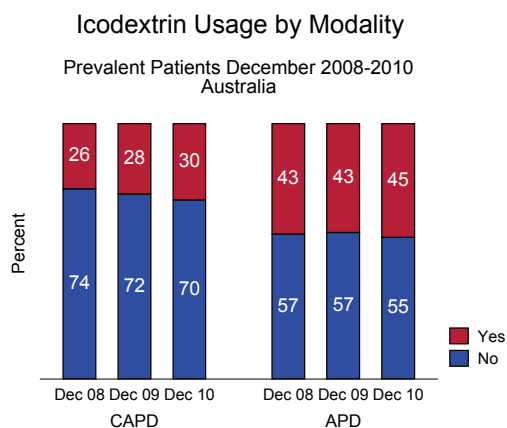


Figure 6.20

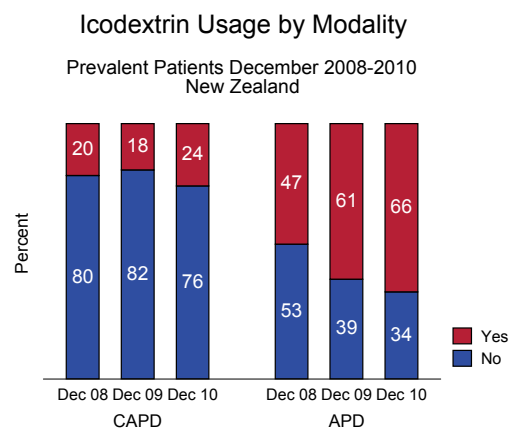
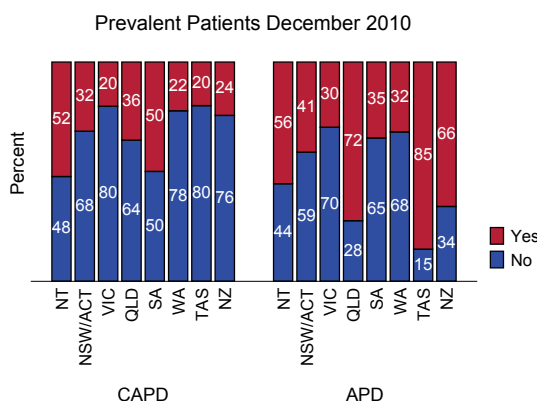


Figure 6.21

Icodextrin Usage by State and New Zealand



PERITONEAL DIALYSIS FLUIDS

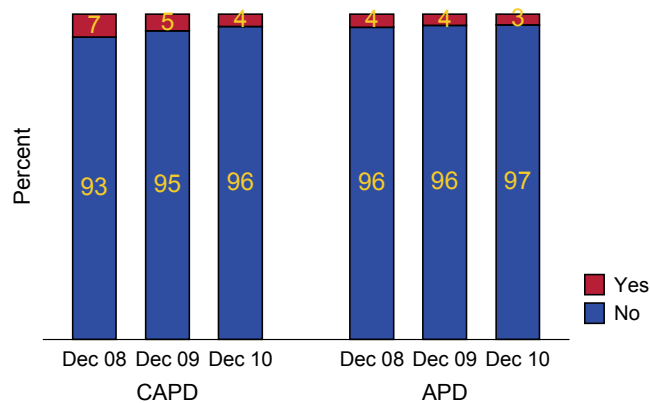
Figure 6.22

Low GDP - Lactate Usage by Modality Type - December 2010						
Modality Type	Australia			New Zealand		
	No	Yes	Total	No	Yes	Total
CAPD	766	31	797	477	1	478
	96%	4%	.	100%	<1%	.
APD	1222	42	1264	346	9	355
	97%	3%	.	97%	3%	.
Total	1988	73	2061	823	10	833
	96%	4%	.	99%	1%	.

Figure 6.23

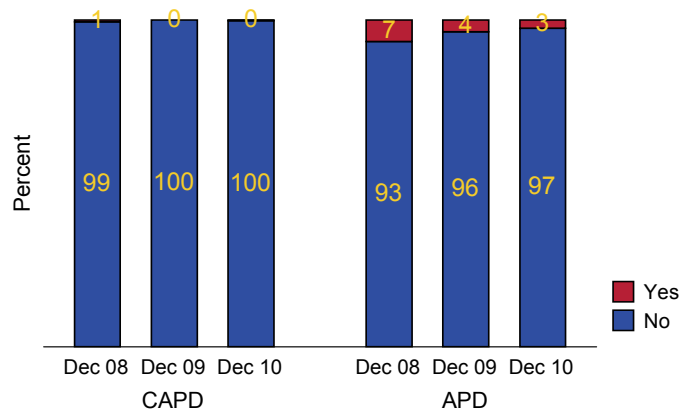
Low GDP - Lactate Usage by Modality

Prevalent Patients December 2008-2010
Australia


Figure 6.24

Low GDP - Lactate Usage by Modality

Prevalent Patients December 2008-2010
New Zealand





PERITONEAL DIALYSIS FLUIDS

Figure 6.25

Low GDP - Bicarb Usage by Modality Type - December 2010

Modality Type	Australia			New Zealand		
	No	Yes	Total	No	Yes	Total
CAPD	785	12	797	468	10	478
	98.8%	1.5%	.	98%	2%	.
APD	1236	28	1264	348	7	355
	98%	2%	.	98%	2%	.
Total	2021	40	2061	816	17	833
	98%	2%	.	98%	2%	.

Figure 6.26

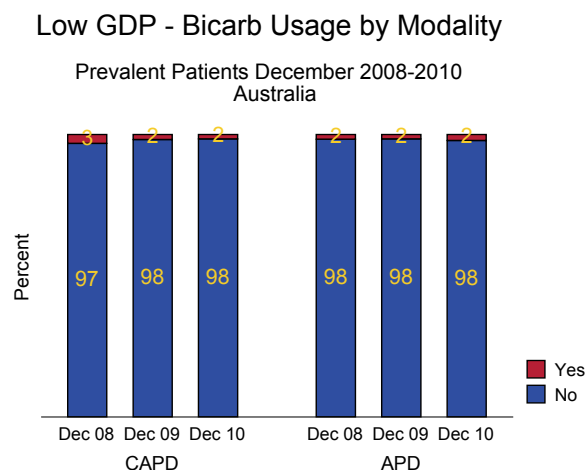
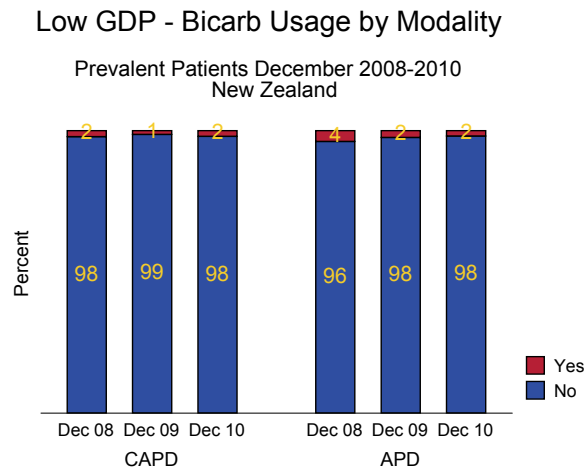


Figure 6.27



OUTCOMES AMONG PERITONEAL DIALYSIS PATIENTS

Figure 6.28

Peritoneal Dialysis at 90 Days Patient Survival Censored for Transplant % [95% Confidence Interval]					
Year of Starting	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
1999-2001	1355	95 [94, 96]	89 [87, 91]	63 [60, 65]	42 [39, 45]
2002-2004	1453	95 [94, 96]	90 [88, 92]	66 [64, 69]	45 [42, 48]
2005-2007	1668	97 [96, 98]	92 [90, 93]	71 [68, 73]	50 [47, 54]
2008-2010	1724	96 [95, 97]	92 [91, 94]	-	-
New Zealand					
1998-2001	499	96 [94, 98]	89 [86, 92]	63 [58, 67]	38 [34, 43]
2002-2004	488	97 [95, 98]	89 [86, 92]	60 [56, 65]	38 [34, 43]
2005-2007	439	97 [95, 99]	92 [89, 94]	70 [66, 75]	50 [44, 56]
2008-2010	522	97 [95, 98]	92 [89, 94]	-	-

Patient Survival

On univariate analyses, there has been some slight improvement in PD patient survival in Australia at six months and one, three and five years from 1998.

In New Zealand PD patient survival has been unchanged up to 2005, but has improved for the 2005-2010 cohort (Figures 6.28 - 6.30).

(Figures 6.28 - 6.30).

Diabetic PD patients had lower patient survival at all time points in both Australia and New Zealand (Figures 6.31 - 6.33).

As expected PD patient survival is closely related to age (Figures 6.34 -6.36).

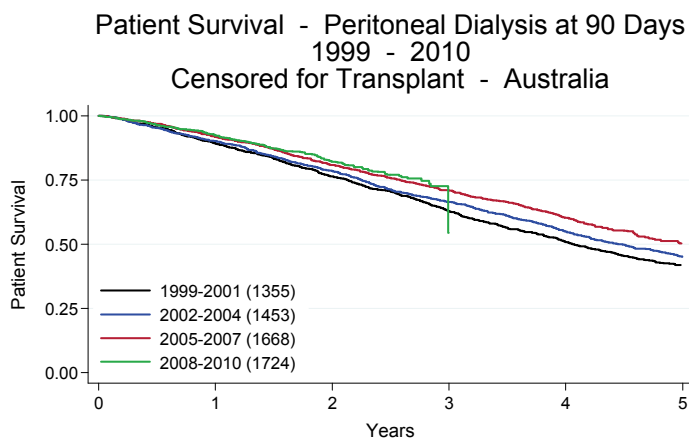
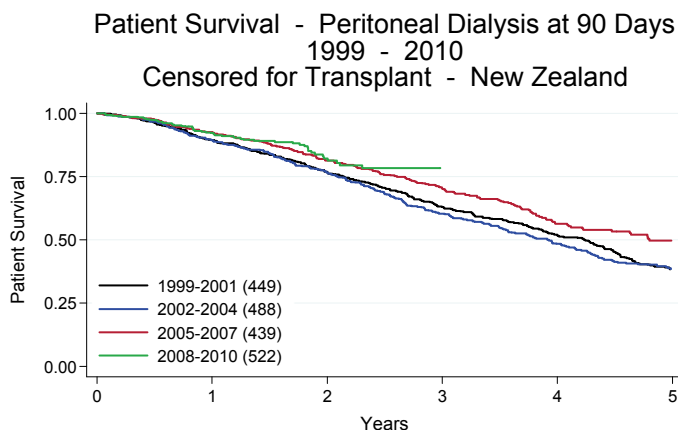
Figure 6.29

Figure 6.30




Figure 6.31

**Peritoneal Dialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant Commenced 1999 - 2010
% [95% Confidence Interval]**

	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
Non Diabetic	4351	97 [96, 97]	92 [91, 93]	71 [69, 72]	52 [50, 54]
Diabetic	1849	95 [94, 96]	89 [87, 90]	61 [58, 63]	35 [32, 38]
New Zealand					
Non Diabetic	1134	96 [95, 97]	92 [90, 93]	69 [66, 72]	49 [45, 53]
Diabetic	814	98 [96, 99]	90 [87, 92]	60 [57, 64]	33 [29, 37]

Figure 6.32

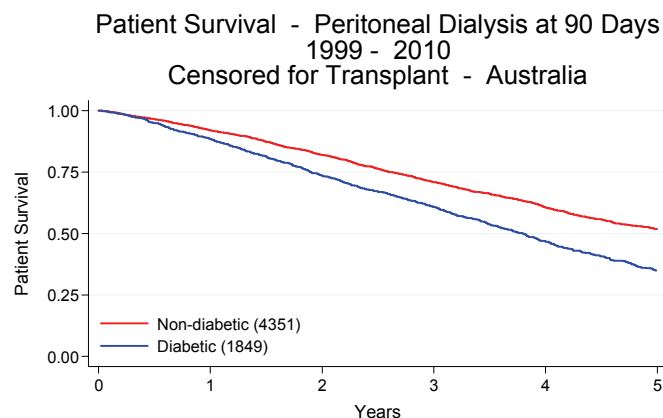


Figure 6.33

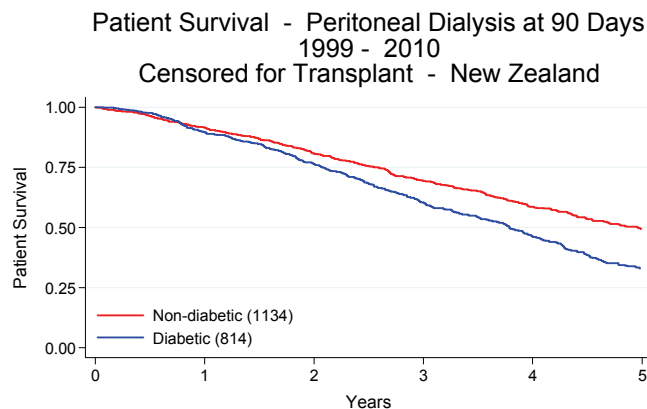
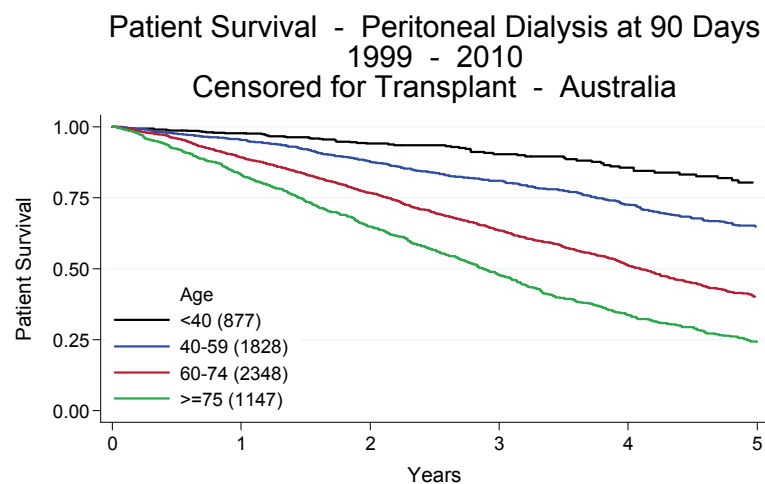
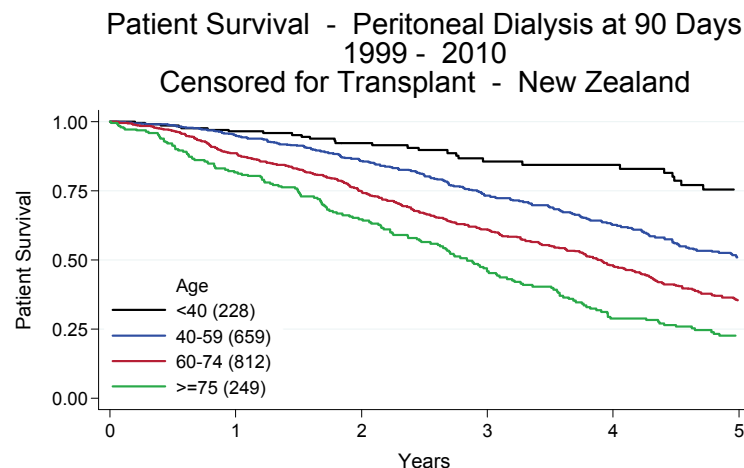


Figure 6.34

Peritoneal Dialysis at 90 Days Patient Survival - By Age Group Censored for Transplant 1999 - 2010 % [95% Confidence Interval]					
Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	877	99 [98, 99]	98 [96, 99]	90 [87, 93]	80 [75, 85]
40-59 years	1828	98 [97, 98]	95 [94, 96]	81 [79, 83]	65 [62, 68]
60-74 years	2348	96 [95, 97]	89 [88, 90]	64 [61, 66]	40 [38, 43]
>=75 years	1147	92 [91, 94]	83 [81, 85]	48 [44, 51]	24 [21, 27]
New Zealand					
0-39 years	228	99 [96, 100]	96 [93, 98]	86 [78, 91]	76 [65, 83]
40-59 years	659	99 [98, 99]	95 [93, 96]	73 [69, 77]	51 [46, 56]
60-74 years	812	97 [95, 98]	89 [86, 91]	61 [57, 65]	35 [31, 40]
>=75 years	249	91 [87, 94]	82 [76, 86]	46 [39, 53]	23 [17, 29]

Figure 6.35

Figure 6.36




Figures 6.37 - 6.38 show survival curves for patients treated with peritoneal dialysis at day 90, adjusted to a median age of 62.6 years for Australia and 60.4 years for New Zealand; non diabetic primary renal disease; caucasoid race; female gender and no comorbid conditions (lung disease, coronary heart disease, peripheral vascular disease or cerebrovascular disease).

In Australia the patient survival continues to improve from 1999 (Figure 6.37).

In New Zealand there is an improvement in the 2008-2010 time period (Figure 6.38), although this trend is most apparent after the second year.

Figure 6.37

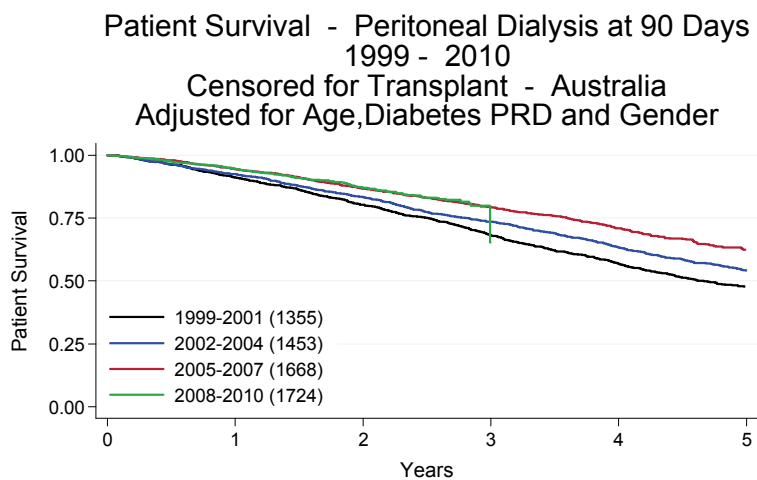
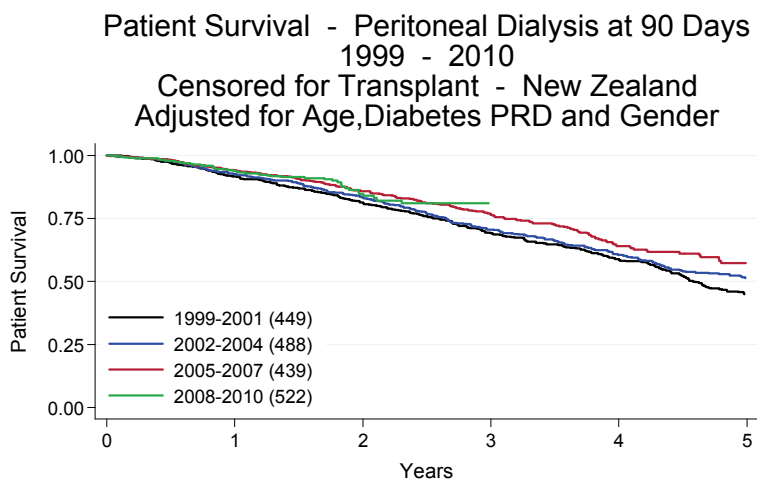


Figure 6.38



* PRD = primary renal disease

PERITONEAL DIALYSIS TECHNIQUE SURVIVAL

Methods

Survivals are calculated using the Kaplan-Meier technique. Patients are followed from the 90th day after first treatment for those on peritoneal dialysis at that time point and not transplanted during those first 90 days.

For patient survival patients are censored at first transplant and at most recent follow up regardless of dialysis modality changes.

For technique survival, failure is defined as a change from peritoneal dialysis to haemodialysis or death.

Figures 6.39-6.44 show Technical survival for patients receiving peritoneal dialysis. In those analysed, patients are censored at the time of transplantation.

Figure 6.39

Peritoneal Dialysis at 90 Days Technique Survival - Diabetic / Non Diabetic Censored for Transplant Commenced 1999 - 2010 % [95% Confidence Interval]					
	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
Non Diabetic	4351	86 [84, 87]	73 [71, 74]	37 [35, 39]	18 [16, 19]
Diabetic	1849	82 [80, 84]	70 [68, 72]	31 [28, 33]	10 [9, 13]
New Zealand					
Non Diabetic	1134	90 [88, 92]	80 [78, 83]	46 [42, 49]	22 [19, 26]
Diabetic	814	90 [87, 92]	77 [74, 80]	40 [36, 43]	13 [10, 16]

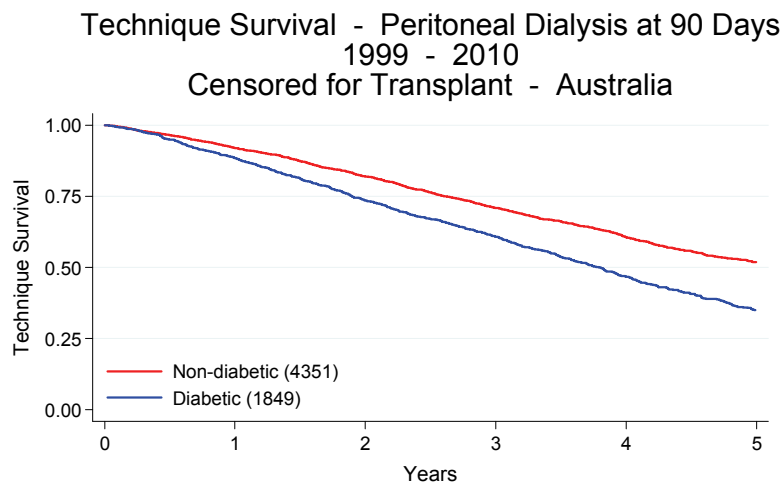
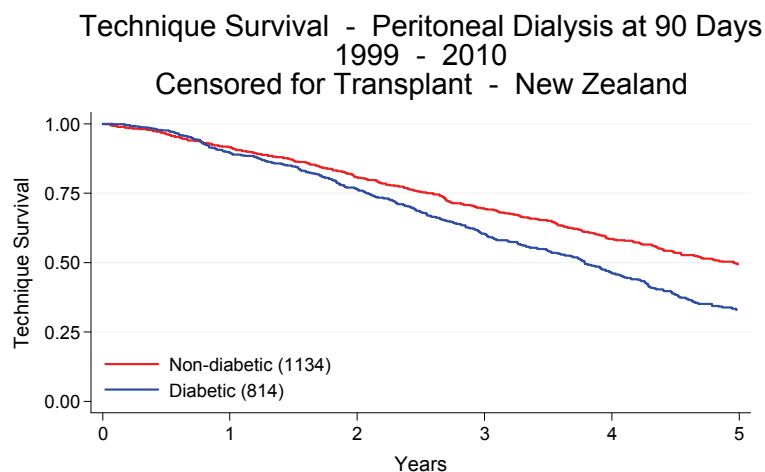
Figure 6.40

Figure 6.41




Figure 6.42

Peritoneal Dialysis at 90 Days Technique Survival - By Age Group Censored for Transplant 1999 - 2010 % [95% Confidence Interval]					
Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	877	89 [87, 91]	78 [75, 81]	46 [41, 51]	28 [22, 35]
40-59 years	1828	86 [84, 88]	75 [73, 77]	38 [35, 41]	20 [18, 23]
60-74 years	2348	83 [82, 85]	71 [69, 73]	34 [32, 37]	15 [13, 17]
>=75 years	1147	81 [78, 83]	65 [62, 68]	26 [24, 29]	8 [6, 10]
New Zealand					
0-39 years	228	91 [87, 94]	82 [76, 87]	49 [40, 58]	27 [18, 37]
40-59 years	659	91 [89, 93]	83 [79, 85]	46 [42, 51]	22 [18, 27]
60-74 years	812	89 [87, 91]	76 [73, 79]	42 [38, 46]	15 [12, 19]
>=75 years	249	85 [80, 89]	73 [67, 78]	33 [27, 40]	10 [6, 15]

Figure 6.43

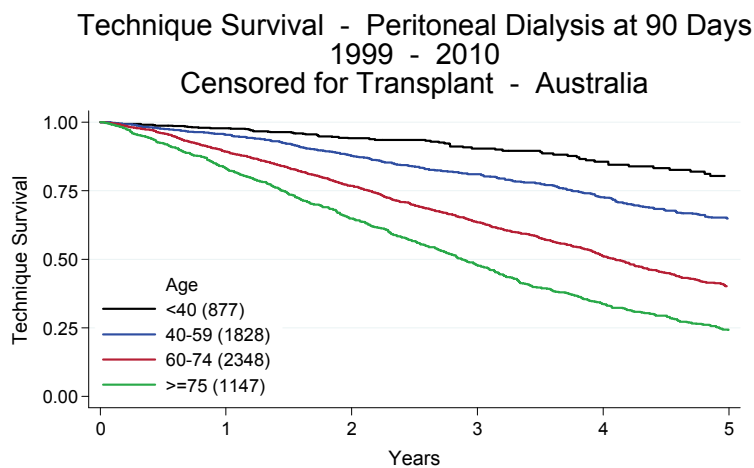
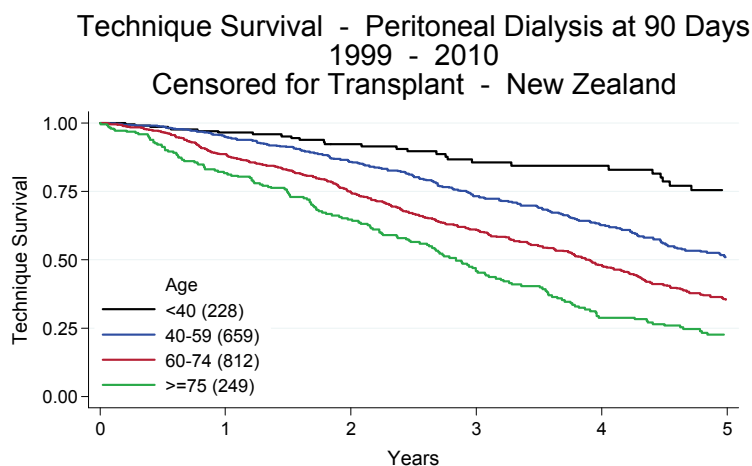


Figure 6.44



TECHNIQUE FAILURE (EXCLUDING DEATH OR TRANSPLANTATION)

In Australia, the most common primary cause of technique failure was a social reason (generally patient preference), rather than a technical cause.

This accounted for 42% of transfers during 2009/2010 (Figure 6.45).

Infections (primarily peritonitis) were the second commonest cause, followed by inadequate dialysis and mechanical/technical complications.

In New Zealand, the most common primary cause of technique failure was also a “social reason”, which accounted for 34% of transfers during 2009/2010 and infections 22% (Figure 6.45). It is recognised that these are broad categories, and there are likely to be multiple contributors (medical and social) in many individual cases.

Figure 6.45		
Causes of Technique Failure 1-Jan-2009 to 31-Dec-2010 Excluding Death, Transplantation, Recovery of Renal Function		
Causes of Technique Failure	Australia	New Zealand
Recurrent/persistent peritonitis	188	80
Acute peritonitis	284	54
Tunnel/exit site infection	40	5
Total Infective Causes	512 (25%)	139 (22%)
Inadequate solute clearance	242	106
Inadequate fluid ultrafiltration	90	64
Excessive fluid ultrafiltration	5	5
Total Dialysis Failure	337 (16%)	175 (28%)
Dialysate leak	75	30
Hydrothorax	7	
Scrotal oedema	13	2
Catheter block	53	13
Catheter fell out	5	2
Hernia	58	11
Abdominal pain	17	7
Abdominal surgery	37	14
Other surgery	19	4
Haemoperitoneum		2
Sclerosing peritonitis	1	3
Miscellaneous	68	8
Multiple adhesions	3	5
Total Technical Failure	356(17%)	101 (16%)
Unable to manage self care	116	31
Patient preference	752	184
Transfer outside Australia/NZ	8	1
Total Social Reasons	876 (42%)	216 (34%)



PERITONITIS

Australian median time to first peritonitis was 21.6 months, with 30% of patients completely free of peritonitis at three years. In New Zealand the time was 21 months (28% of patients free of peritonitis at three years), (Figure 6.46). As noted in previous reports there is a strong association between ethnicity and peritonitis free survival (Figure 6.49).

The median peritonitis-free survival for home automated peritoneal dialysis patients was 21.0 months in Australia, and 12.8 months in New Zealand.

Patients are followed from the date of their first peritoneal dialysis until the date of their first episode of peritonitis regardless of changes in dialysis modality or transplant. Those who never had peritonitis are censored at transplant or change of dialysis modality.

Figure 6.46

**First PD Treatment to First Episode of Peritonitis
Related to Age at Entry 01-Jan-2006 to 31-Dec-2010**

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	(n=96)	(n=363)	(n=1201)	(n=991)	(n=1081)	(n=782)	(n=4514)
3 months	80 [70,87]	86 [82,89]	86 [84,88]	87 [85,89]	88 [86,90]	87 [84,89]	87 [86,88]
6 months	69 [59,78]	78 [73,82]	78 [76,81]	79 [76,82]	81 [78,83]	79 [75,81]	79 [78,80]
9 months	57 [46,67]	71 [66,76]	71 [69,74]	71 [67,73]	73 [70,76]	72 [68,75]	71 [70,73]
1 year	56 [44,66]	66 [60,71]	65 [62,68]	64 [61,68]	67 [64,70]	64 [60,68]	65 [64,67]
2 years	34 [19,49]	48 [41,55]	46 [43,50]	44 [40,48]	47 [43,51]	45 [40,50]	46 [44,47]
3 years	19 [5,40]	31 [22,40]	30 [26,34]	32 [27,37]	29 [25,34]	31 [26,37]	30 [28,32]
New Zealand	(n=25)	(n=104)	(n=383)	(n=372)	(n=346)	(n=139)	(n=1369)
3 months	70 [47,85]	84 [75,90]	89 [85,92]	83 [79,87]	85 [81,89]	89 [82,93]	86 [84,88]
6 months	47 [26,66]	77 [67,84]	78 [73,82]	72 [67,77]	77 [72,81]	83 [75,89]	76 [73,78]
9 months	35 [16,55]	63 [51,72]	68 [62,73]	65 [59,70]	66 [60,71]	70 [61,78]	66 [63,68]
1 year	28 [10,49]	60 [48,70]	61 [55,66]	59 [53,64]	58 [52,64]	64 [54,73]	59 [56,62]
2 years	28 [10,49]	40 [28,52]	39 [32,45]	41 [35,47]	43 [36,50]	35 [24,47]	40 [36,43]
3 years	-	17 [7,31]	29 [23,36]	32 [25,39]	31 [23,38]	21 [10,34]	28 [25,32]

% Survival [95% Confidence Interval]

Figure 6.47

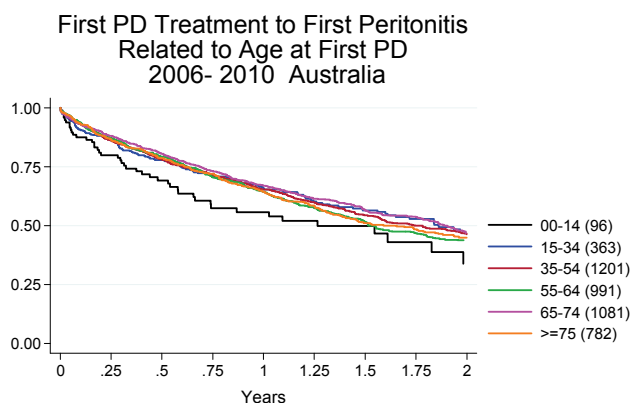


Figure 6.48

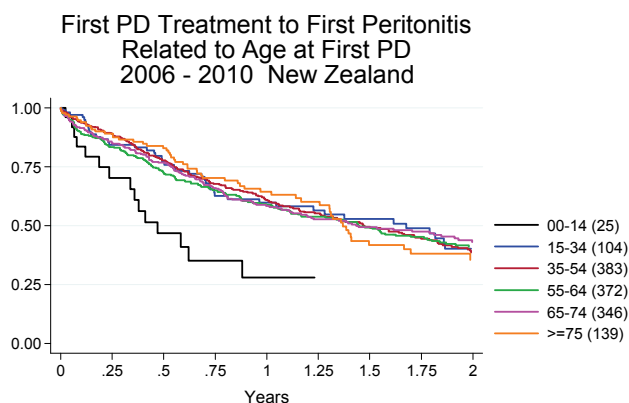
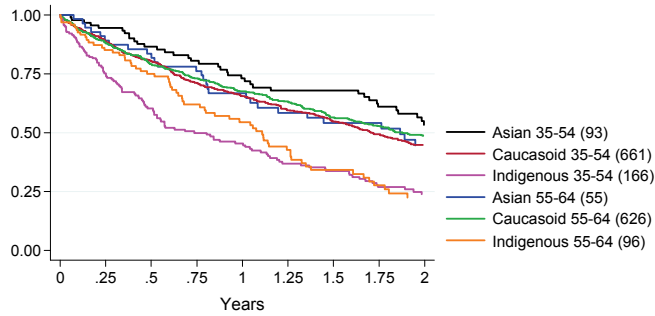


Figure 6.49

First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2001 - 2005 Australia



First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2006 - 2010 Australia

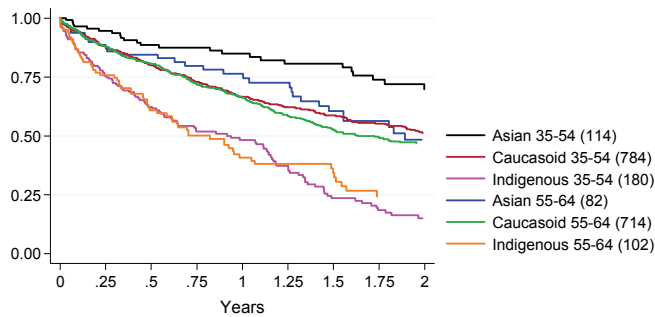
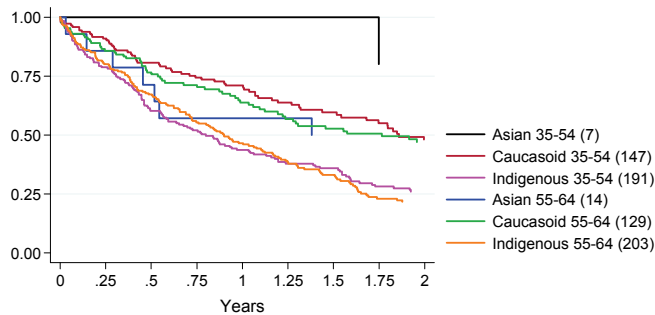


Figure 6.50

First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2001 - 2005 New Zealand



First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2006 - 2010 New Zealand

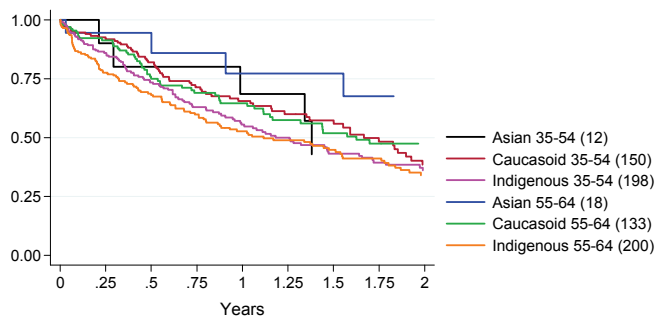




Figure 6.51

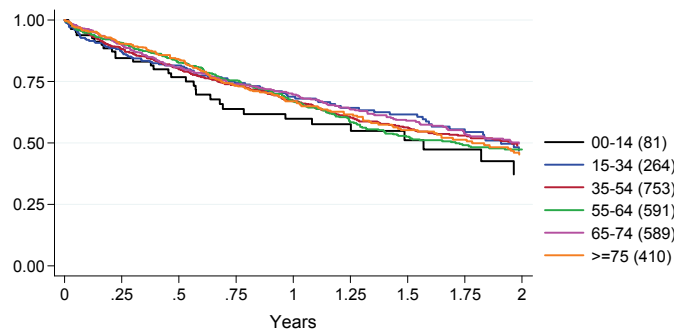
**First Home APD Treatment to First Episode of Peritonitis
Related to Age at Entry 01-Jan-2006 to 31-Dec-2010**

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	(n=140)	(n=424)	(n=1225)	(n=932)	(n=1004)	(n=645)	(n=4370)
3 months	81 [73, 87]	88 [84, 90]	87 [85, 89]	90 [88, 92]	90 [88, 91]	90 [88, 92]	89 [88, 90]
6 months	71 [62, 78]	81 [76, 84]	78 [75, 80]	83 [80, 85]	80 [78, 83]	83 [80, 86]	80 [79, 82]
9 months	61 [51, 69]	74 [69, 78]	71 [68, 73]	76 [72, 78]	73 [70, 76]	74 [70, 78]	73 [71, 74]
1 year	57 [47, 66]	68 [63, 73]	65 [62, 68]	68 [64, 71]	68 [65, 72]	67 [63, 71]	67 [65, 68]
2 years	38 [26, 50]	43 [36, 50]	45 [42, 49]	48 [44, 52]	49 [45, 53]	47 [42, 52]	47 [45, 49]
3 years	25 [12, 40]	34 [27, 42]	31 [27, 36]	33 [29, 38]	35 [30, 39]	35 [29, 41]	33 [31, 35]
New Zealand	(n=49)	(n=100)	(n=266)	(n=192)	(n=157)	(n=77)	(n=841)
3 months	79 [65, 88]	82 [73, 89]	87 [82, 90]	89 [83, 92]	87 [80, 91]	85 [74, 91]	86 [83, 88]
6 months	59 [44, 72]	76 [66, 84]	76 [70, 81]	80 [73, 85]	72 [64, 79]	76 [64, 84]	75 [72, 78]
9 months	49 [33, 63]	62 [51, 72]	65 [59, 71]	68 [60, 75]	63 [54, 71]	62 [49, 73]	64 [60, 67]
1 year	41 [26, 56]	57 [45, 67]	59 [53, 66]	57 [48, 65]	53 [44, 61]	52 [39, 64]	56 [52, 59]
2 years	31 [15, 48]	35 [24, 46]	42 [34, 49]	40 [31, 49]	32 [23, 41]	22 [10, 37]	36 [32, 41]
3 years	12 [1, 36]	21 [11, 33]	28 [20, 36]	27 [18, 38]	16 [8, 27]	18 [7, 33]	23 [19, 28]

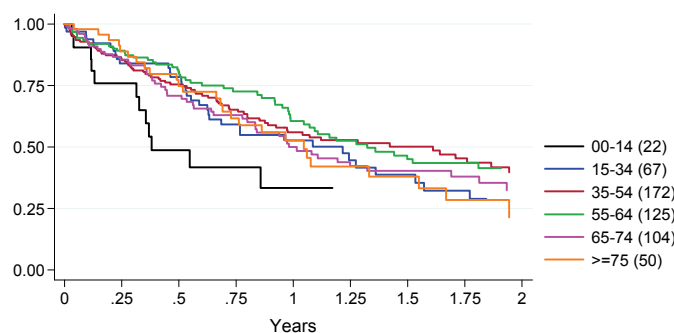
% Survival [95% Confidence Interval]

Figure 6.52

**First Home APD Treatment to First Peritonitis
Related to Age at First Home APD
2006 - 2010 Australia**



**First Home APD Treatment to First Peritonitis
Related to Age at First Home APD
2006 - 2010 New Zealand**



AUSTRALIAN PERITONITIS REGISTRY

1-OCT-2003 TO 31-DEC-2010

This section contains details of the organism and treatment for episodes of peritonitis within Australia collected by ANZDATA. A more detailed collection of data about peritonitis was started in late 2003.

Similar information for patients in New Zealand is collected separately by the New Zealand Peritonitis Registry (reported separately).

During 2010, the number of episodes of peritonitis remained similar to previous years (shown in Figure 6.53), although there was a slight decrease in overall rates per person-year (figure 6.54).

Rates of peritonitis have fluctuated, with a trend to lower rates over the past two years (2003-2010) (Figure 6.54).

Figure 6.53	
Number of Peritonitis Episodes	
Year	Number
2003	250 (3 months data only)
2004	1,196
2005	1,072
2006	1,116
2007	1,254
2008	1,369
2009	1,344
2010	1,135
Total	8,736

Figure 6.54

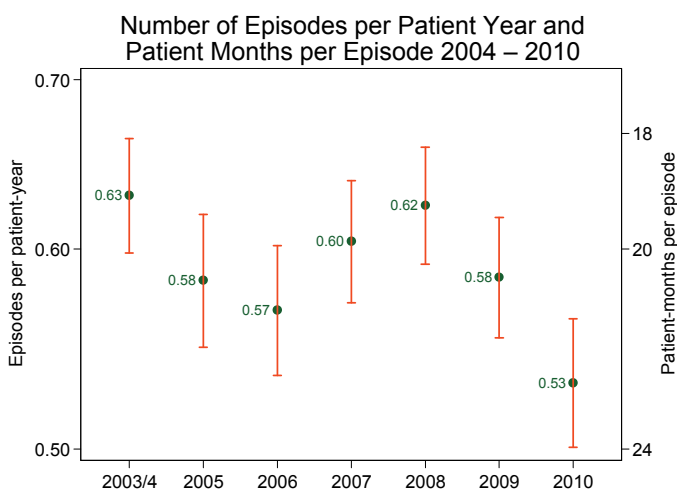
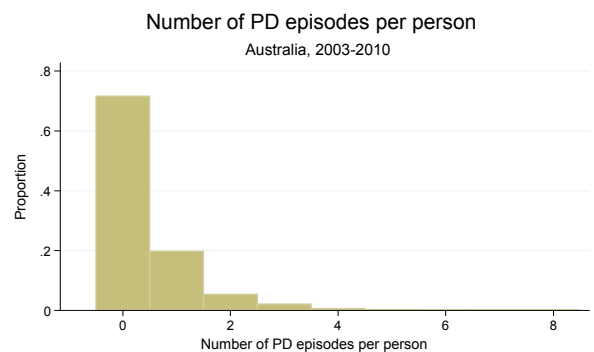


Figure 6.55

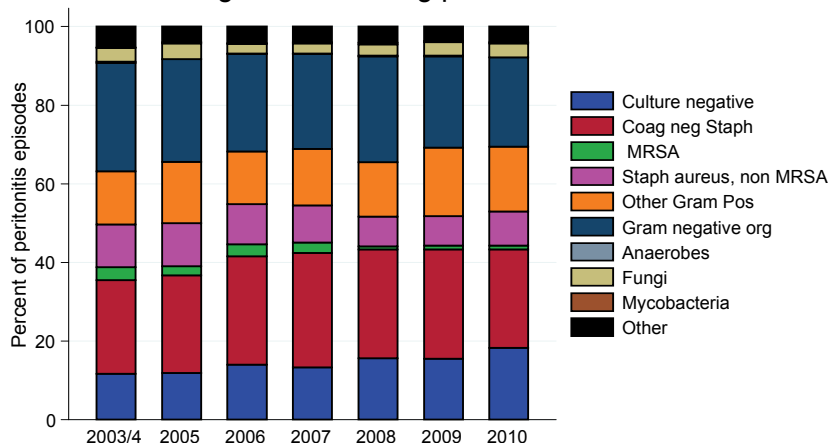




There has been a gradual trend over this time towards a lower proportion of episodes attributable to gram negative organisms and non-MRSA *S. aureus*, with a greater proportion of culture negative episodes (Figure 6.56). The Registry does not collect data on use of prior antibiotics or laboratory techniques which might influence the rate of culture negative peritonitis.

Figure 6.56

Distribution of organisms causing peritonitis

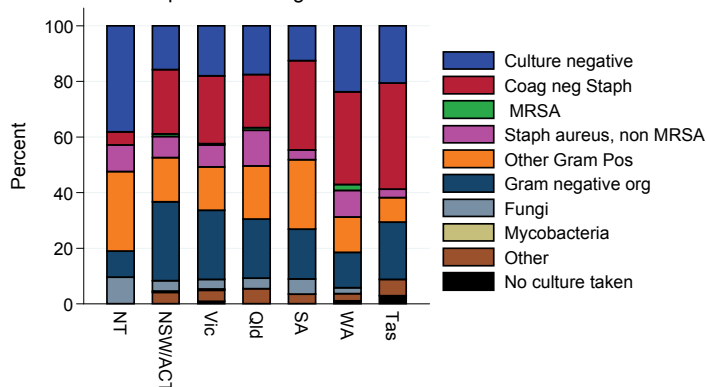


There remains quite widespread variation in the major organisms reported between the different states in Australia (Figure 6.57). We do not collect data about variation in prophylaxis, patient selection processes or PD training or other factors which might account for part or all of this variation.

Figure 6.57

Peritonitis in Australia

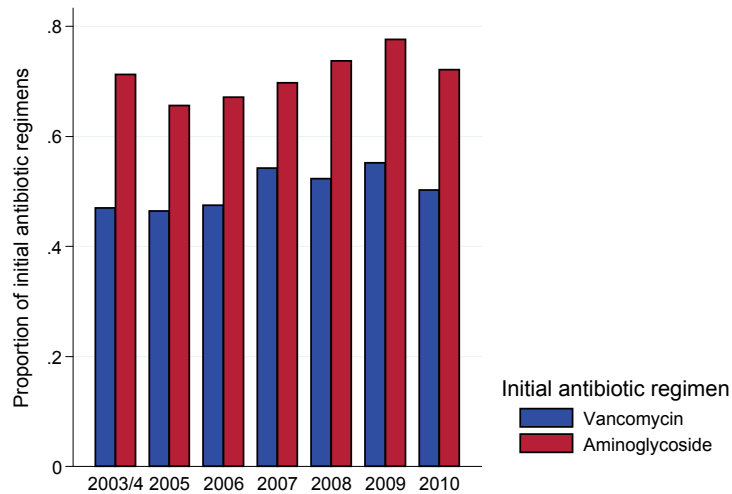
Episodes during 2010



ANTIBIOTIC TREATMENT

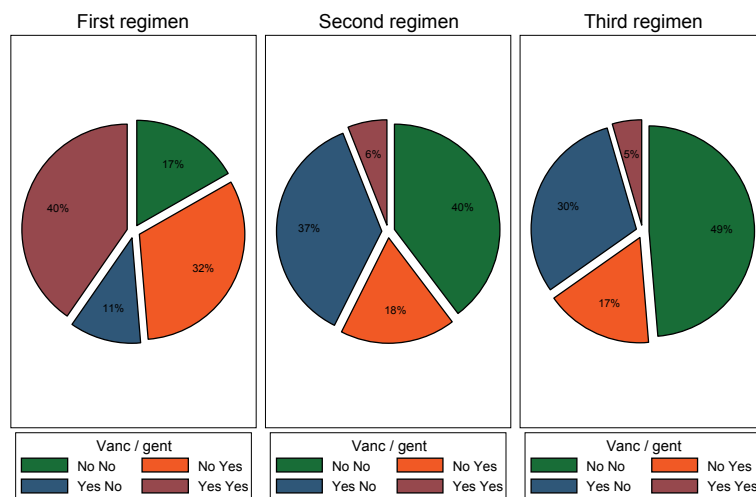
The proportion of episodes which were treated with an aminoglycoside-containing initial regimen has increased slightly over the period 2006-2009 but declined in 2010, as has the proportion treated with a regimen containing vancomycin is slowly increasing but also declined in 2010 (Figure 6.58).

Figure 6.58



Among episodes of peritonitis treated during 2010, the proportion of those who received vancomycin in the initial or second antibiotic regimen is shown in Figure 6.59.

Figure 6.59



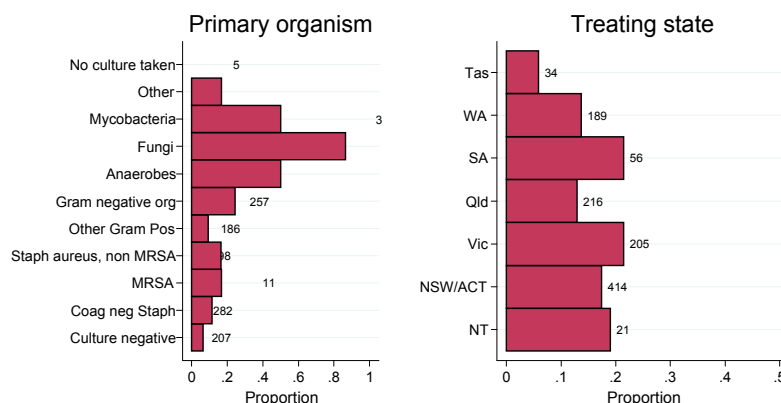


OUTCOMES

There is a strong relationship between the type of organism and the rate of transfer to permanent haemodialysis. After fungal, mycobacterial or gram negative peritonitis, there is a considerably higher rate of permanent transfers to HD.

Figure 6.60

Proportion of Episodes Resulting in Permanent Haemodialysis Transfer



Values are total number of peritonitis episodes reported 1/1/09-31/12/09

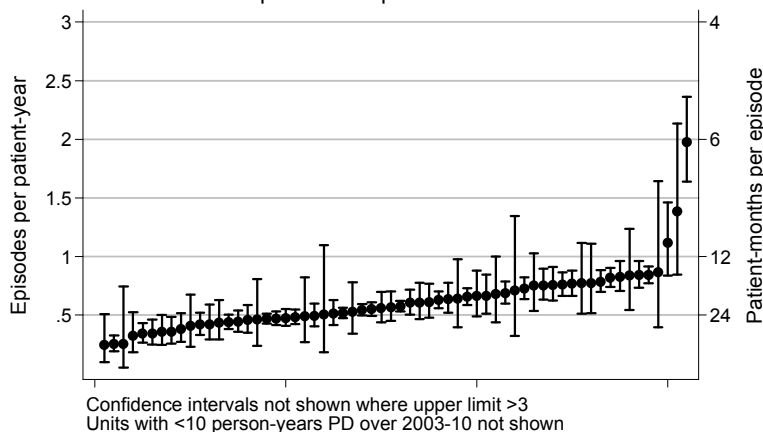
RATES OF PERITONITIS ACROSS INDIVIDUAL UNITS

Figure 6.61 shows the peritonitis rates for all units in Australia over the period 1st October, 2003 to 31st December 2010. Only units who averaged at least ten patient-years of peritonitis treatment per year over that period are included. There is substantial variation in the rates between units.

Figure 6.61

Peritonitis rates by treating unit

All peritonitis episodes 2003-10



As demonstrated in Figure 6.62 there remains over a threefold variation in peritonitis rates between units. There are a number of individual characteristics which predict the occurrence of peritonitis, including older age, diabetes, cigarette smoking (but not centre size) and Aboriginal racial origin. These are covered in greater detail in a manuscript in Peritoneal Dialysis International (Ghali et al Perit Dial Inter 2011: 31 (6):651-62). Similarly, there remains considerable variation between units (Figure 6.62), and between States (Figure 6.63).

Figure 6.62

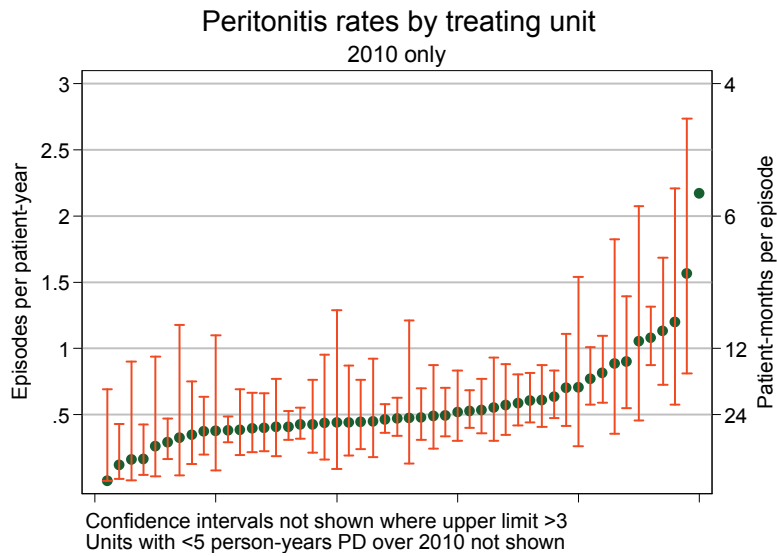
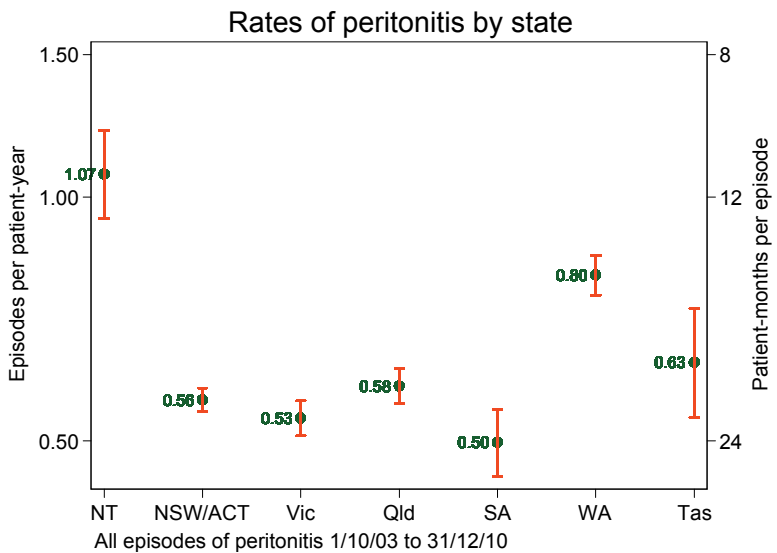


Figure 6.63





HAEMOGLOBIN

In Australia, at the end of 2010, haemoglobin was between 110-119 in 29% of PD patients, <110 g/L in 38%, higher than in previous years, and >140 g/L in 5%, which is similar to previous years.

In New Zealand, the corresponding percentages are very similar - 29%, 39% and 4% respectively.

Figure 6.65 shows the Hb levels in PD patients with proven or likely coronary artery disease or not.

Figure 6.64

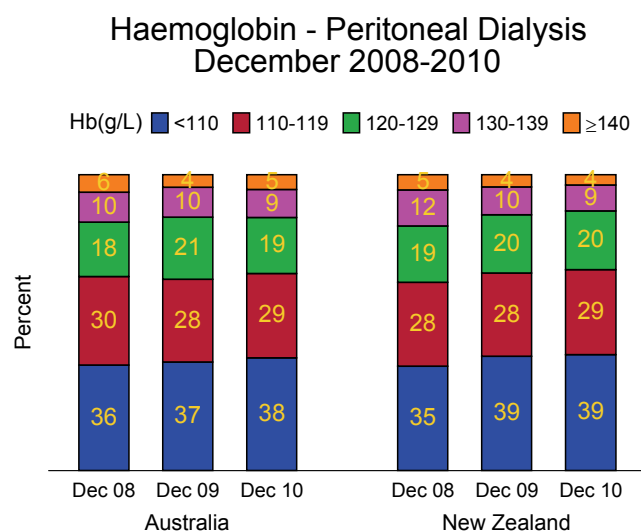
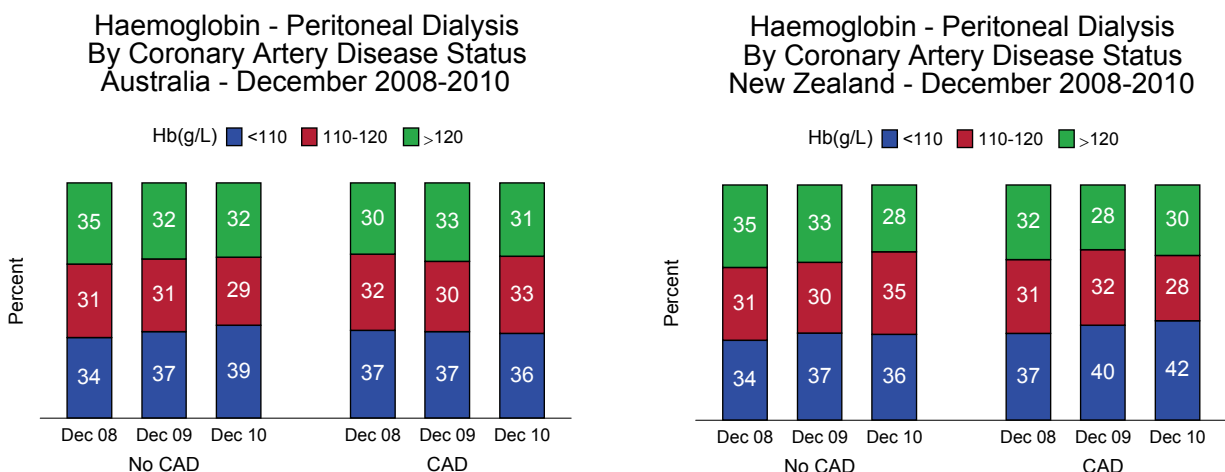


Figure 6.65



HAEMOGLOBIN IN PERITONEAL DIALYSIS PATIENTS BY TREATING CENTRE

Figures 6.66 - 6.69:

These figures show the median haemoglobin (with inter-quartile range) for individual centres, arranged from lowest to highest (Figures 6.66 and 6.67). Also shown are the proportion of patients in each centre with a haemoglobin of 110-129 g/L (Figures 6.68 and 6.69).

In Australia, median haemoglobin for each centre ranged from 104 to 125 g/L for peritoneal dialysis patients and in New Zealand 107-119 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 25% to 60% for peritoneal dialysis patients and for New Zealand 30% to 70%. This large variation is likely to reflect differences in practices, protocols and patient case-mix among centres.

Figure 6.66

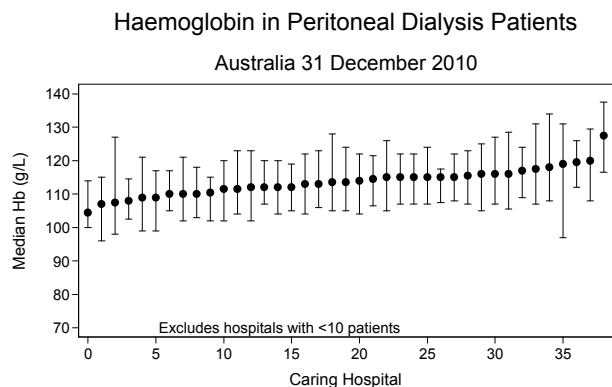


Figure 6.67

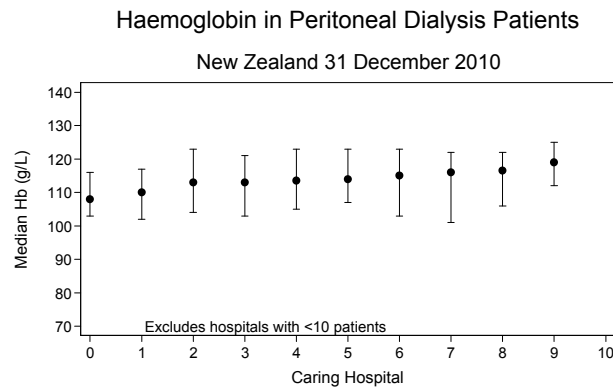


Figure 6.68

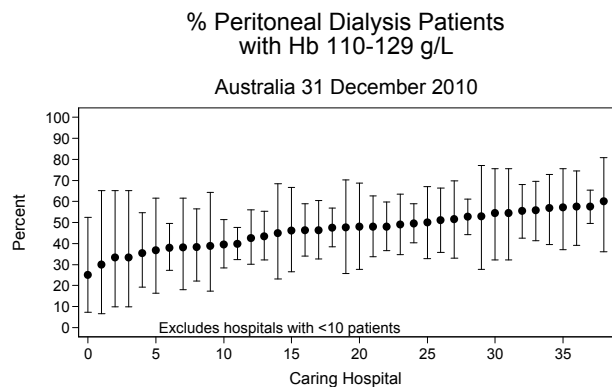
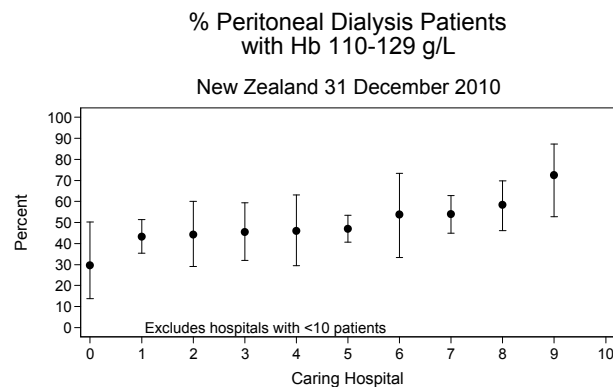


Figure 6.69





FERRITIN AND TRANSFERRIN SATURATION

Overall there are no remarkable trends in this area.

In Australia and New Zealand the proportions of peritoneal dialysis patients with ferritin < 200 mcg/L have slightly increased to 36% in Australia and decreased to 14% in New Zealand, while those with ferritin ≥ 500 mcg/L are 15% in Australia and in New Zealand (Figures 6.70).

In both Australia and New Zealand, distributions of transferrin saturation have been unchanged for the past three years, although in 2010 there was a slight increase in the proportion of peritoneal dialysis patients with transferrin saturation < 20% in Australia to 33% and a decrease to 28% in New Zealand (Figure 6.71).

Figure 6.70

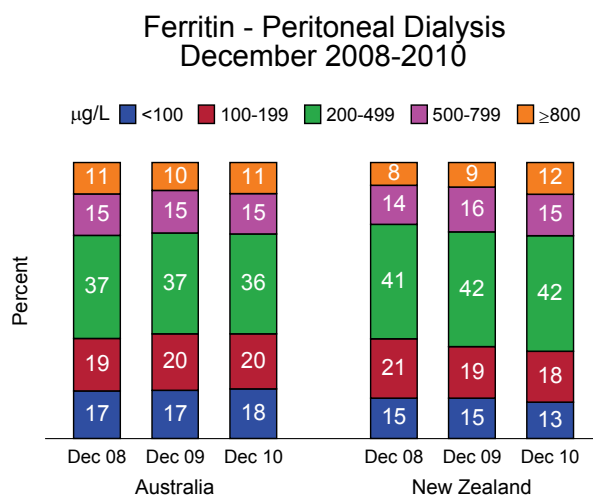
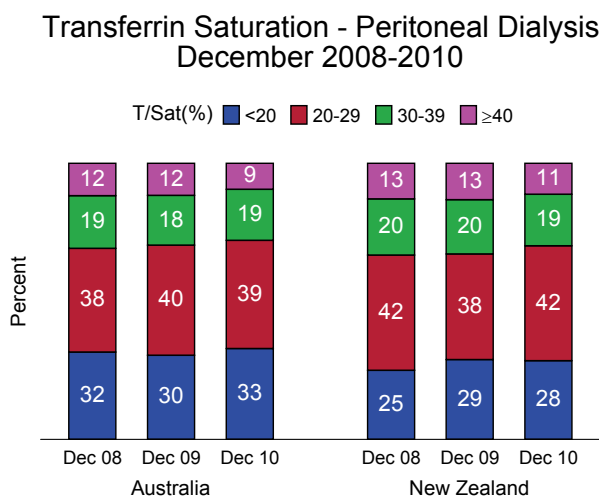


Figure 6.71



FERRITIN BY TREATING CENTRE

The proportions of patients in each centre with ferritin between 200-500 mcg/L and transferrin saturation of >20% respectively, as recommended by the CARI guidelines, are shown in Figures 6.72-6.75.

In Australia, the proportions of patients with ferritin within this range in each centre varied widely between 18-65% for peritoneal dialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 40-95%. Again, this large variation may reflect differences in practices, protocols and patient case-mix among centres.

In New Zealand, the corresponding figures for ferritin were between 24-51% for peritoneal dialysis patients and for transferrin saturation between 58-95%. In both countries, significant proportions of patients did not have ferritin and transferrin saturation within the recommended ranges.

Figure 6.72

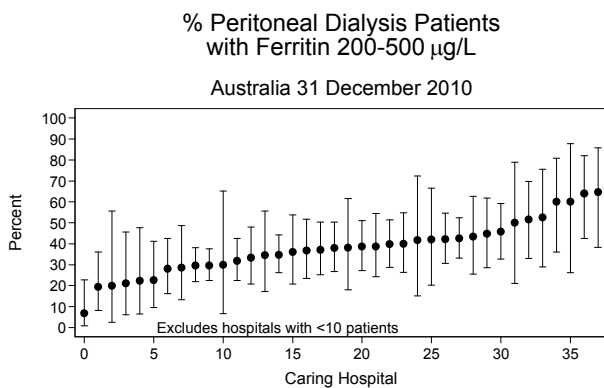


Figure 6.73

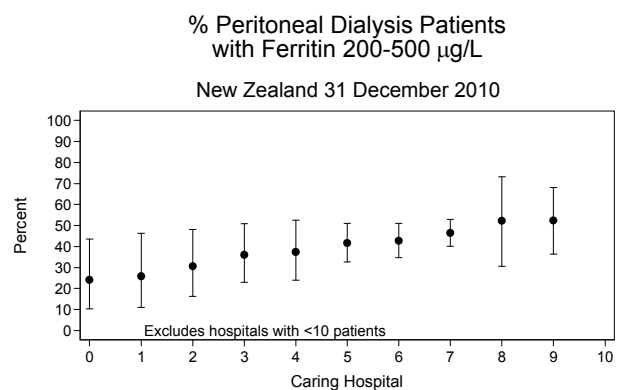


Figure 6.74

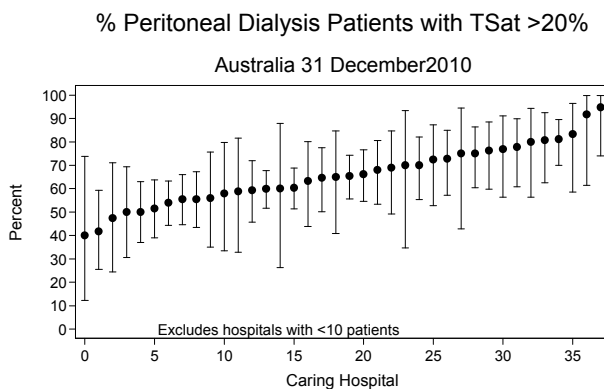
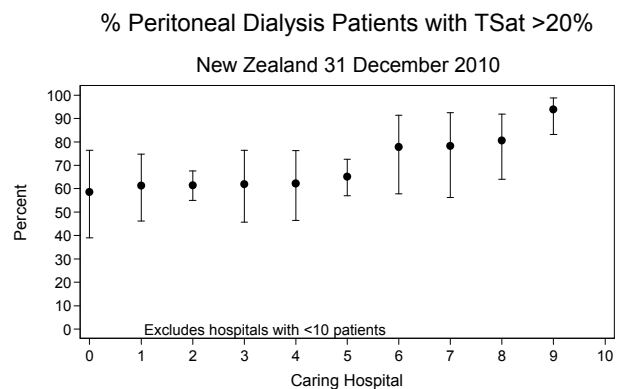


Figure 6.75

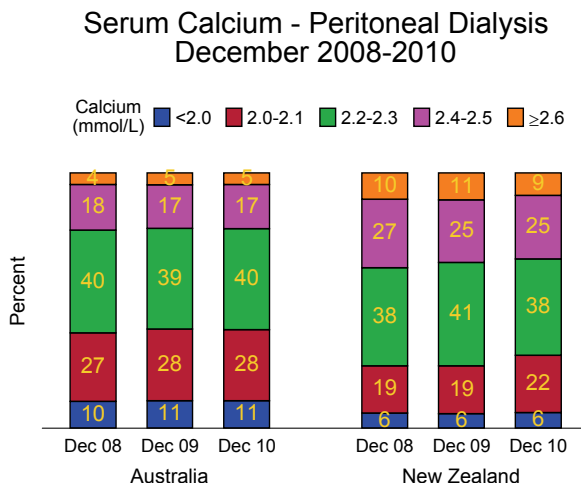




SERUM CALCIUM

In both Australia and New Zealand the proportions of patients with proportions with serum calcium ≥ 2.4 mmol/L and < 2.2 mmol/L have remained fairly stable (Figure 6.76)

Figure 6.76



SERUM CALCIUM BY TREATING CENTRE

Figures 6.77 and 6.78 show the proportions of patients at each centre with serum calcium 2.1-2.4 mmol/L, as recommended by the CARL 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 45-75% for peritoneal dialysis patients, while in New Zealand the corresponding proportions were 42-79%.

Figure 6.77

% Peritoneal Dialysis Patients with Calcium 2.1-2.4 mmol/L

Australia 31 December 2010

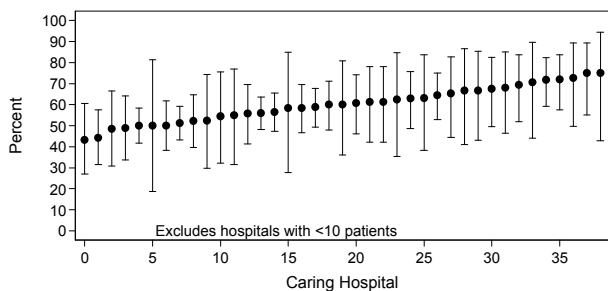
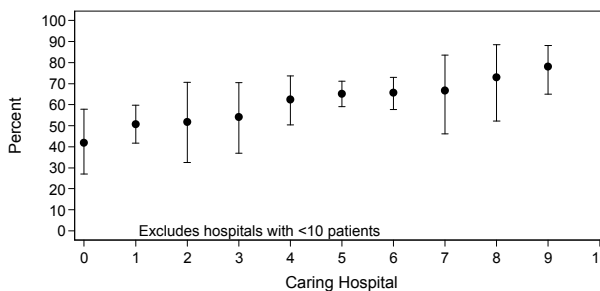


Figure 6.78

% Peritoneal Dialysis Patients with Calcium 2.1-2.4 mmol/L

New Zealand 31 December 2010

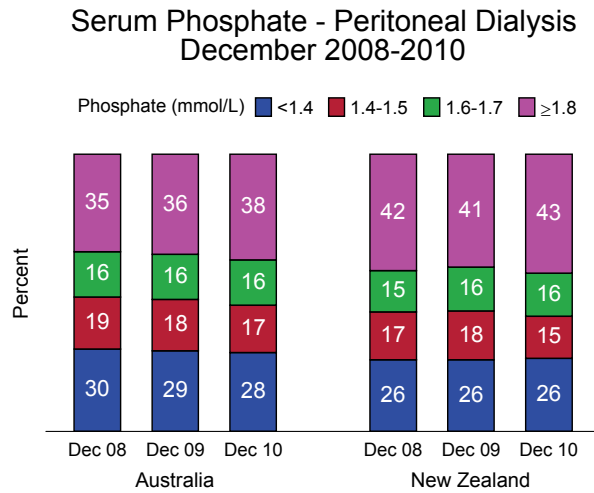


SERUM PHOSPHATE

In Australia, serum phosphate has increased slightly over the last three years (reflected in the size of the ≥ 1.8 mmol/L group) (Figure 6.79)

In New Zealand, the proportions with serum phosphate ≥ 1.8 mmol/L have remained stable.

Figure 6.79



SERUM PHOSPHATE BY TREATING CENTRE

Figures 6.80 - 6.81 show the proportions of patients at each centre with serum phosphate 0.8-1.6 mmol/L, as recommended by the CARL guidelines.

In Australia, the proportions ranged widely between 16-80% for peritoneal dialysis patients and in New Zealand, the corresponding proportions were 35-58%.

Figure 6.80

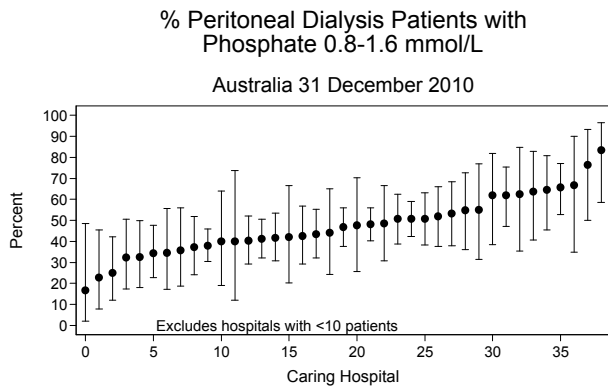
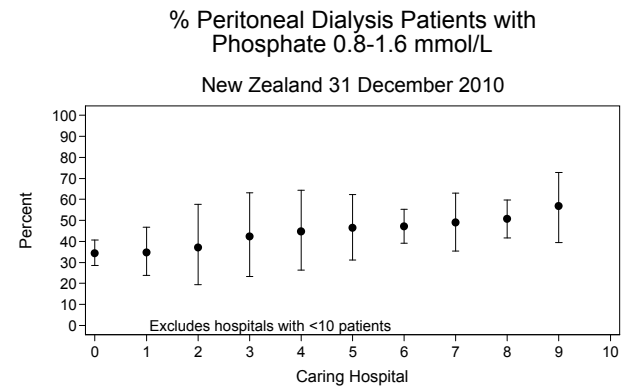


Figure 6.81



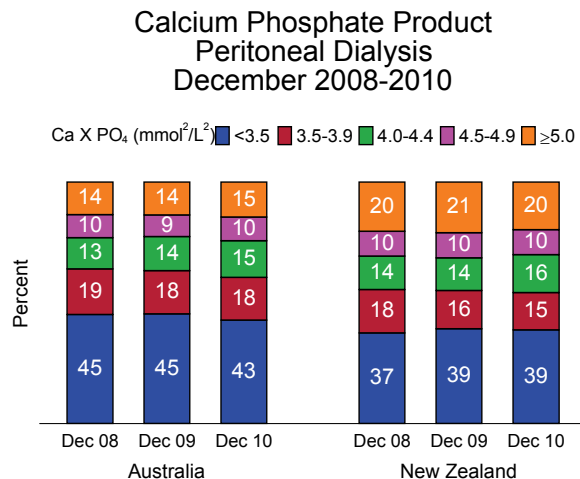


CALCIUM-PHOSPHATE PRODUCT

In both Australia and New Zealand, calcium-phosphate product has remained steady, with smaller proportions of patients with a product $\geq 3.5 \text{ mmol}^2/\text{L}^2$. (Figure 6.82).

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

Figure 6.82



CALCIUM-PHOSPHATE PRODUCT BY TREATING CENTRE

Figures 6.83 - 6.84 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 35-90% for peritoneal dialysis patients while in New Zealand, the corresponding proportions were 37-70%.

Figure 6.83

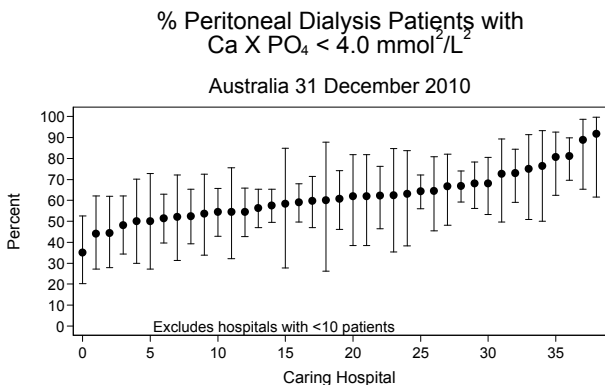


Figure 6.84

