CHAPTER 6

PERITONEAL DIALYSIS

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2012 Annual Report—35th Edition

STOCK AND FLOW

AUSTRALIA

Peritoneal dialysis was used to treat 19% of all dialysis patients in 2011 (APD-1283,CAPD-786,total 10998). PD accounted for 68% of all home dialysis, a figure which has remained stable for several years (Figure 6.1).Of the 26,970 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 38% (Australian Capital Territory) to 86% (South Australia) (Figure 6.1).

The annual stock and flow of patients during the period 2007 -2011 is shown in Figures 6.3 and 6.4.

There were 820 new peritoneal dialysis patients in the calendar year 2011; of these 543 patients (66%) started renal replacement therapy with peritoneal dialysis and 277 (34%) had previously been treated with haemodialysis or a transplant (Figure 6.3).

Numbers of new patients over the age of 65 years increased 8%, from 292 to 316 in 2011, following a decrease of 7% in 2010 (Figure 6.8). Most age groups increased with the exception of the 25-34 and 65-74 year age groups which decreased slightly.

The proportion of people with diabetic nephropathy has been stable over the last 5 years.

The proportion of patients in each age group treated with peritoneal dialysis ranged from 2% (≥ 85 years) to 22% (56-74 years).

There were 257 deaths in 2011 compared with 265 in 2010.

For more detail see Appendix II at our website (www.anzdata.org.au/v1/report_2011.html).

The prevalence of automated peritoneal dialysis is stable (62%) (Figure 6.11)

There were 205 peritoneal dialysis patients who received a transplant in 2011 compared with 186 in 2010; this was 10% of all patients treated (Figure 6.3).

Permanent transfers to haemodialysis fell substantially in 2011 (to 331 patients (16%) from 403 patients (20%) in 2010. (Figure 6.3).

Figure 6.1

Proportion (%) Peritoneal Dialysis of all Home Dialysis Patients 2007 - 2011

State	2007	2008	2009	2010	2011
Queensland	70%	68%	66%	67%	66%
New South Wales	63%	67%	66%	66%	66%
Australian Capital Territory	60%	49%	46%	40%	38%
Victoria	66%	67%	66%	66%	67%
Tasmania	87%	83%	82%	78%	81%
South Australia	95%	95%	93%	88%	86%
Northern Territory	67%	63%	57%	59%	51%
Western Australia	89%	89%	87%	83%	81%
Australia	**69%**	**70%**	**69%**	**68%**	**68%**
New Zealand	**69%**	**70%**	**68%**	**66%**	**64%**

Figure 6.2

Continuous Period of Peritoneal Dialysis 1963 - 2011

	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=22,285)	6530	3956	2858	2209	1756	1227	942	728	932	558	268	146	87	88
All Treatments (n=26,970)	8216	4890	3457	2651	2029	1423	1103	841	1072	631	297	161	93	106
New Zealand														
1st Treatment (n=6,107)	1106	915	788	706	575	462	368	282	415	213	122	69	41	45
All Treatments (n=7,271)	1425	1113	958	826	670	527	419	313	464	240	139	76	45	56

Figure 6.3

Stock and Flow of Peritoneal Dialysis Patients
2007 - 2011

State	2007	2008	2009	2010	2011
Australia					
Patients new to PD	897	997	892	751	820
First Dialysis Treatment	588	657	587	496	543
Previous Dialysis (HD)	288	308	282	234	258
Failed Transplant	21	32	23	21	19
Transplanted	142	175	154	186	205
Deaths	296	293	312	265	257
Never Transplanted	292	279	302	261	250
Previous Transplant	4	14	10	4	7
Transfer to Haemodialysis	422	482	506	471	331
Patients Dialysing (PD) at 31 December	2137	2242	2200	2082	2069
Patients Dialysing (PD) at Home at 31 December	2111	2206	2177	2067	2043
New Zealand					
Patients new to PD	241	274	283	275	239
First Dialysis Treatment	131	153	199	163	149
Previous Dialysis (HD)	104	115	80	111	87
Failed Transplant	6	6	4	1	3
Transplanted	37	28	35	46	40
Deaths	120	124	126	114	139
Never Transplanted	113	117	124	109	133
Previous Transplant	7	7	2	5	6
Transfer to Haemodialysis	124	124	116	113	99
Patients Dialysing (PD) at 31 December	746	763	799	833	790
Patients Dialysing (PD) at Home at 31 December	742	758	795	828	783

Figure 6.4

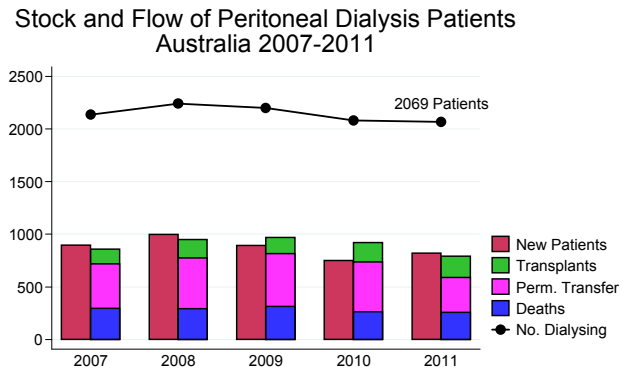


Figure 6.5

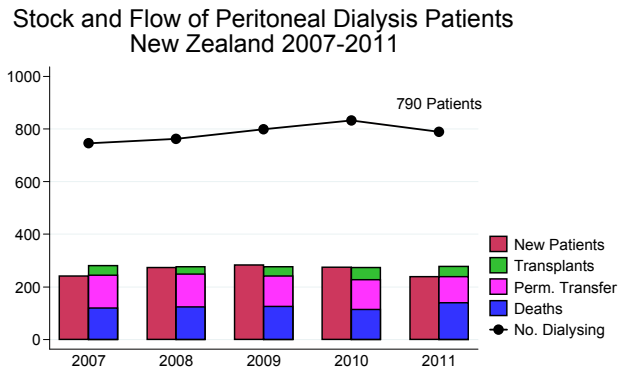


Figure 6.6

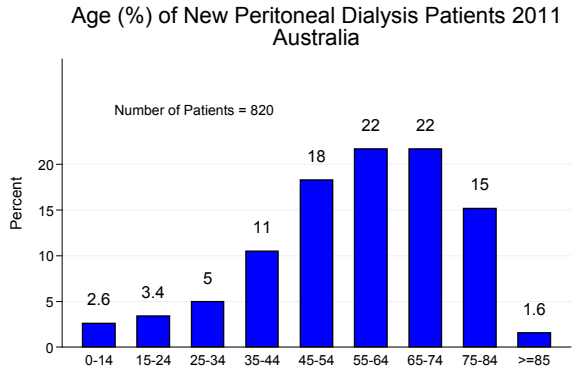


Figure 6.7

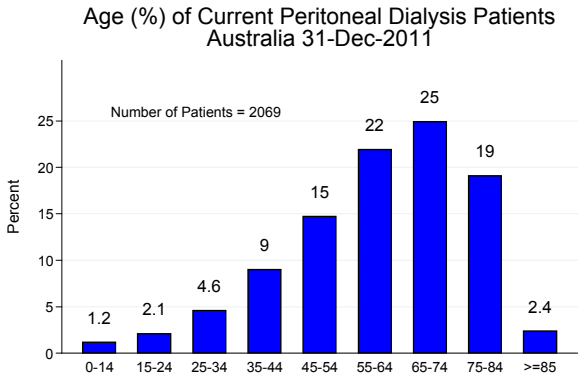


Figure 6.8 Australia

Stock and Flow of Peritoneal Dialysis by Age Groups 2007 - 2011

Age Groups	2007	2008	2009	2010	2011
New Patients *					
00-14 years	22 (2%)	14 (1%)	25 (3%)	20 (3%)	21 (3%)
15-24 years	18 (2%)	32 (3%)	26 (3%)	17 (2%)	28 (3%)
25-34 years	43 (5%)	51 (5%)	54 (6%)	42 (6%)	41 (5%)
35-44 years	93 (10%)	99 (10%)	75 (8%)	79 (11%)	86 (10%)
45-54 years	161 (18%)	175 (18%)	128 (14%)	133 (18%)	150 (18%)
55-64 years	199 (22%)	217 (22%)	197 (22%)	168 (22%)	178 (22%)
65-74 years	203 (23%)	229 (23%)	226 (25%)	179 (24%)	178 (22%)
75-84 years	150 (17%)	168 (17%)	143 (16%)	105 (14%)	125 (15%)
>=85 years	8 (1%)	12 (1%)	18 (2%)	8 (1%)	13 (2%)
Total	**897 (100%)**	**997 (100%)**	**892 (100%)**	**751 (100%)**	**820 (100%)**
Patients Dialysing					
00-14 years	34 (2%)	28 (1%)	32 (1%)	29 (1%)	24 (1%)
15-24 years	25 (1%)	47 (2%)	52 (2%)	39 (2%)	44 (2%)
25-34 years	76 (4%)	84 (4%)	97 (4%)	90 (4%)	96 (5%)
35-44 years	199 (9%)	183 (8%)	171 (8%)	180 (9%)	187 (9%)
45-54 years	339 (16%)	371 (17%)	338 (15%)	301 (14%)	304 (15%)
55-64 years	480 (22%)	507 (23%)	480 (22%)	458 (22%)	453 (22%)
65-74 years	549 (26%)	553 (25%)	579 (26%)	557 (27%)	515 (25%)
75-84 years	403 (19%)	422 (19%)	398 (18%)	376 (18%)	396 (19%)
>=85 years	32 (1%)	47 (2%)	53 (2%)	52 (2%)	50 (2%)
Total	**2137 (100%)**	**2242 (100%)**	**2200 (100%)**	**2082 (100%)**	**2069 (100%)**
Primary Renal Disease *					
Glomerulonephritis	231 (26%)	260 (26%)	252 (28%)	199 (26%)	220 (27%)
Analgesic Nephropathy	17 (2%)	28 (3%)	13 (1%)	14 (2%)	9 (1%)
Hypertension	131 (15%)	118 (12%)	148 (17%)	96 (13%)	112 (14%)
Polycystic Disease	50 (6%)	67 (7%)	54 (6%)	53 (7%)	45 (5%)
Reflux Nephropathy	29 (3%)	40 (4%)	39 (4%)	22 (3%)	23 (3%)
Diabetic Nephropathy	285 (32%)	328 (33%)	266 (30%)	247 (33%)	271 (33%)
Miscellaneous	96 (11%)	80 (8%)	81 (9%)	82 (11%)	89 (11%)
Uncertain	58 (6%)	76 (8%)	39 (4%)	38 (5%)	51 (6%)
Total	**897 (100%)**	**997 (100%)**	**892 (100%)**	**751 (100%)**	**820 (100%)**

* New patients receiving first peritoneal dialysis treatment

Figure 6.9

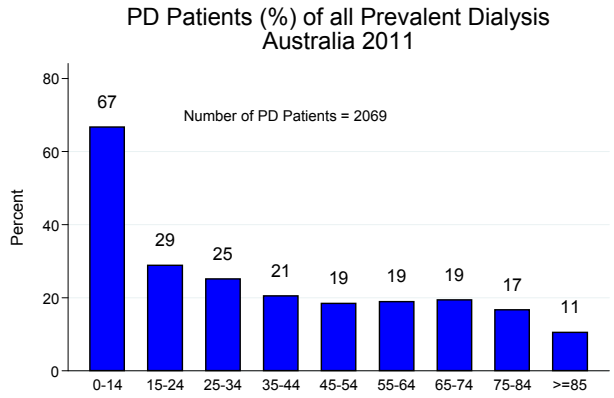


Figure 6.10

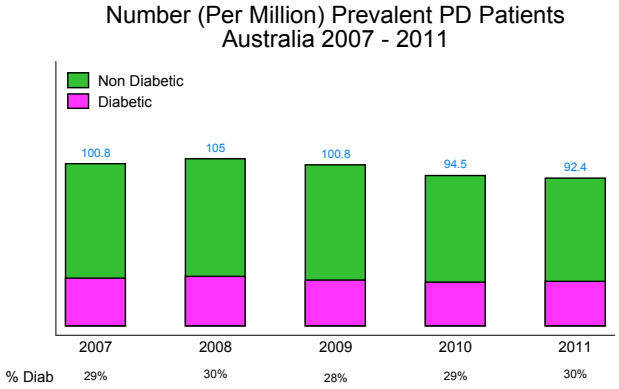
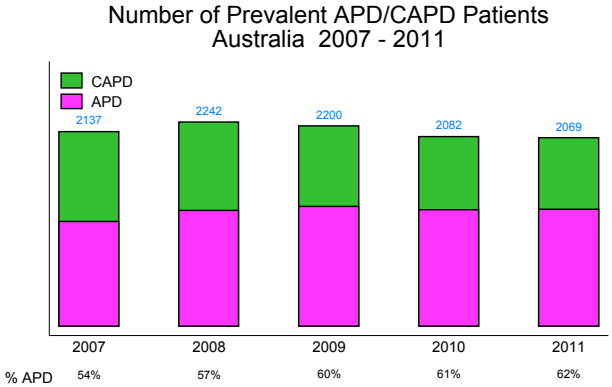


Figure 6.11



NEW ZEALAND

Figure 6.12

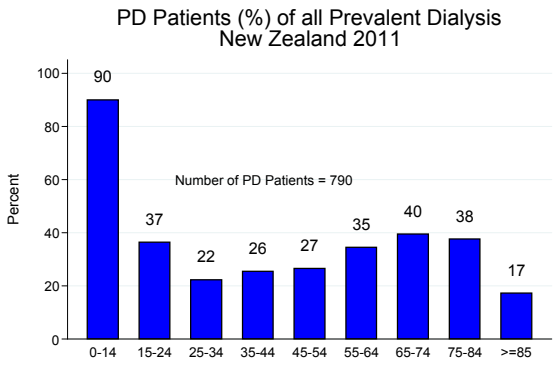


Figure 6.13

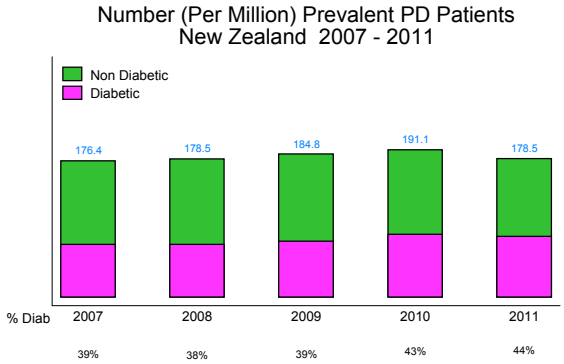
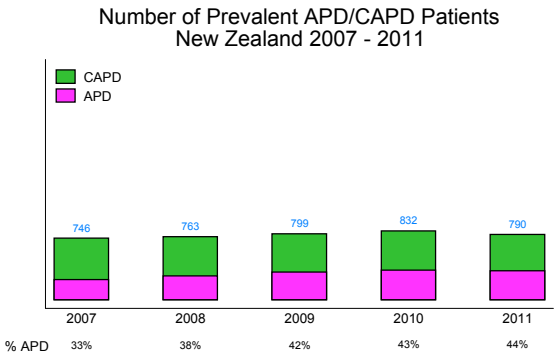


Figure 6.14



Peritoneal dialysis accounted for 33% of all dialysis patients and 64% of all patients dialysing at home.

A substantially lower proportion of patients used automated PD than in Australia. Forty four percent of all peritoneal dialysis in 2011 was APD compared with 43% in 2010 and 42% in 2009.

The annual stock and flow of patients during the period 2007 to 2011 is shown in Figures 6.3 and 6.5. Of the 7,271 patients treated since 1963, 790 (11%) were alive at 31st December, 2011 and 556 (8%) had more than five years continuous treatment (Figure 6.2).

Primary renal disease of new peritoneal dialysis patients is shown in Figure 6.13, and 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 (47%), a decrease of 6% from 2010, followed by glomerulonephritis (23%) and hypertension (12%).

The proportion of patients in each age group treated with peritoneal dialysis ranged from 35% (55-64 years) and 17%
(≥85 years) (Figure 6.12).

There were 139 deaths amongst prevalent peritoneal dialysis patients in 2011 compared with 114 in 2010. (Figure 6.3).

For more detail see Appendix III at our website (www.anzdata.org.au/v1/report_2011.html).

There were 40 patients transplanted in 2011 (46 in 2010).

Figure 6.15

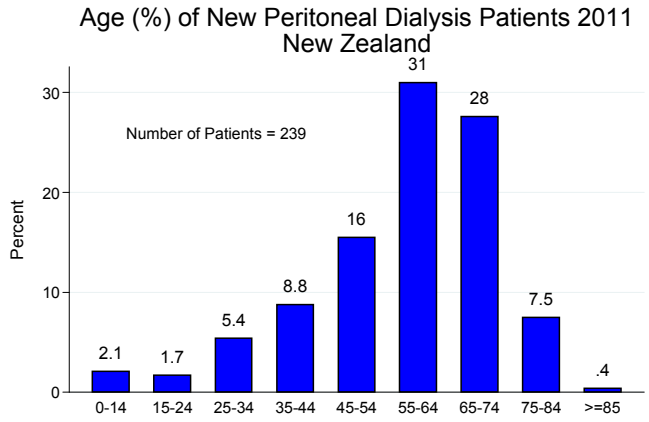


Figure 6.16

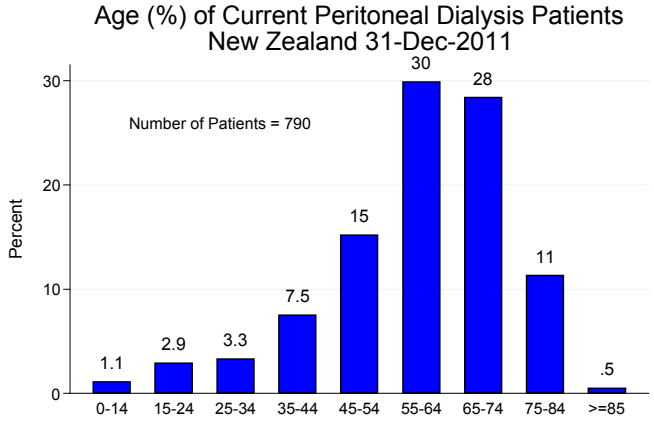


Figure 6.17 New Zealand

Stock and Flow of Peritoneal Dialysis by Age Groups 2007 - 2011

Age Groups	2007	2008	2009	2010	2011
New Patients *					
00-14 years	5 (2%)	10 (4%)	3 (1%)	3 (1%)	5 (2%)
15-24 years	5 (2%)	13 (5%)	4 (1%)	8 (3%)	4 (2%)
25-34 years	18 (7%)	11 (4%)	10 (4%)	9 (3%)	13 (5%)
35-44 years	21 (9%)	21 (8%)	31 (11%)	22 (8%)	21 (9%)
45-54 years	43 (18%)	55 (20%)	59 (21%)	43 (16%)	37 (15%)
55-64 years	73 (30%)	78 (28%)	62 (22%)	88 (32%)	74 (31%)
65-74 years	55 (23%)	69 (25%)	86 (30%)	70 (25%)	66 (28%)
75-84 years	18 (7%)	17 (6%)	27 (10%)	32 (12%)	18 (8%)
>=85 years	3 (1%)		1 (0%)		1 (0%)
Total	**241 (100%)**	**274 (100%)**	**283 (100%)**	**275 (100%)**	**239 (100%)**
Patients Dialysing					
00-14 years	8 (1%)	13 (2%)	10 (1%)	7 (1%)	9 (1%)
15-24 years	23 (3%)	28 (4%)	27 (3%)	22 (3%)	23 (3%)
25-34 years	36 (5%)	30 (4%)	33 (4%)	30 (4%)	26 (3%)
35-44 years	63 (8%)	62 (8%)	62 (8%)	67 (8%)	59 (7%)
45-54 years	121 (16%)	141 (18%)	157 (20%)	140 (17%)	120 (15%)
55-64 years	195 (26%)	209 (27%)	212 (27%)	235 (28%)	236 (30%)
65-74 years	186 (25%)	186 (24%)	216 (27%)	231 (28%)	224 (28%)
75-84 years	100 (13%)	81 (11%)	72 (9%)	98 (12%)	89 (11%)
>=85 years	14 (2%)	13 (2%)	10 (1%)	3 (0%)	4 (1%)
Total	**746 (100%)**	**763 (100%)**	**799 (100%)**	**833 (100%)**	**790 (100%)**
Primary Renal Disease *					
Glomerulonephritis	55 (23%)	65 (24%)	57 (20%)	65 (24%)	55 (23%)
Analgesic Nephropathy		2 (1%)		3 (1%)	3 (1%)
Hypertension	26 (11%)	35 (13%)	33 (12%)	36 (13%)	28 (12%)
Polycystic Disease	11 (5%)	12 (4%)	18 (6%)	7 (3%)	10 (4%)
Reflux Nephropathy	9 (4%)	4 (1%)	5 (2%)	3 (1%)	4 (2%)
Diabetic Nephropathy	105 (44%)	115 (42%)	127 (45%)	134 (49%)	103 (43%)
Miscellaneous	27 (11%)	27 (10%)	31 (11%)	20 (7%)	24 (10%)
Uncertain	8 (3%)	14 (5%)	12 (4%)	7 (3%)	12 (5%)
Total	**241 (100%)**	**274 (100%)**	**283 (100%)**	**275 (100%)**	**239 (100%)**

* New patients receiving first peritoneal dialysis treatment

PERITONEAL DIALYSIS FLUIDS

At the end of 2011, 33% of CAPD and 45% of APD patients were receiving Icodextrin in Australia (Figures 6.18 and 6.19) These proportions were lower for CAPD (27%) and higher for APD (69%) in New Zealand (Figure 6.20). There was also considerable variation between States in Icodextrin usage rates, with the highest rates seen in the South Australia for CAPD and Tasmania for APD (Figure 6.18, 6.21). Low GDP fluids (whether lactate or bicarbonate based fluids) were used infrequently in 2011, consistent with previous years (Figure 6.22 - 6.27).

Figure 6.18

Icodextrin Usage by Modality Type - December 2011

Modality Type		Australia				New Zealand			
		No	Yes	NR*	Total	No	Yes	NR*	Total
CAPD	n	512	261	15	788	321	116	2	439
	%	64.97%	33.12%	1.90%	.	73.12%	26.42%	0.46%	.
APD	n	701	576	4	1281	108	243		351
	%	54.72%	44.96%	0.31%	.	30.77%	69.23%		.
Total	**n**	**1213**	**837**	**19**	**2069**	**429**	**359**	**2**	**790**
	%	**58.63%**	**40.45%**	**0.92%**	**.**	**54.30%**	**45.44%**	**0.25%**	**.**

NR* - Not Reported

Figure 6.19

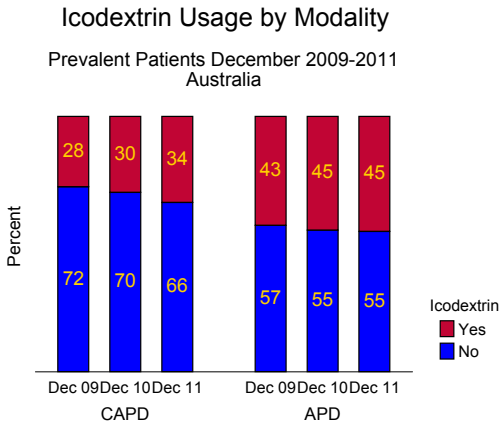


Figure 6.20

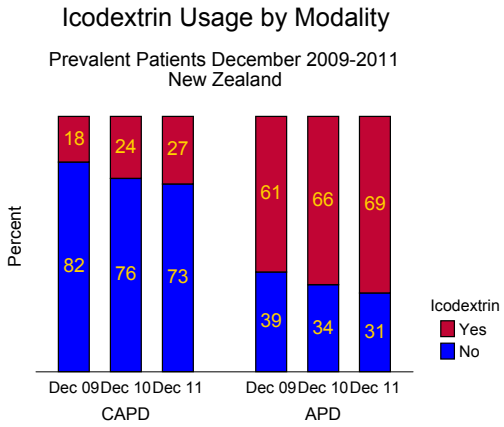
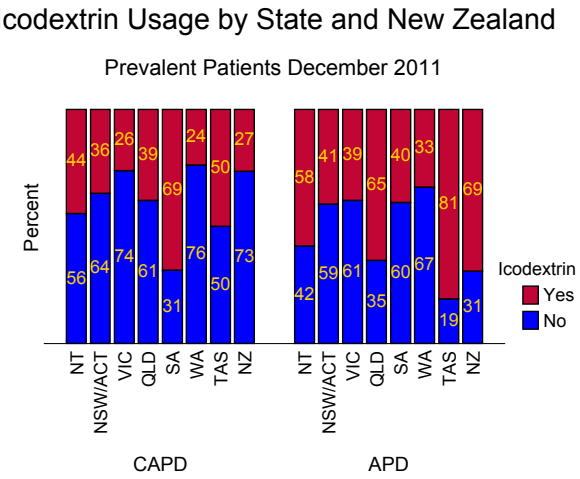


Figure 6.21



PERITONEAL DIALYSIS FLUIDS

Figure 6.22

Low GDP - Lactate Usage by Modality Type - December 2011

Modality Type		Australia				New Zealand			
		No	Yes	NR*	Total	No	Yes	NR*	Total
CAPD	n	756	16	16	788	436	1	2	439
	%	95.94%	2.03%	2.03%	.	99.32%	0.23%	0.46%	.
APD	n	1243	34	4	1281	339	11	1	351
	%	97.03%	2.65%	0.31%	.	96.58%	3.13%	0.28%	.
Total	**n**	**1999**	**50**	**20**	**2069**	**775**	**12**	**3**	**790**
	%	**96.62%**	**2.42%**	**0.97%**	**.**	**98.10%**	**1.52%**	**0.38%**	**.**

NR* - Not Reported

Figure 6.23

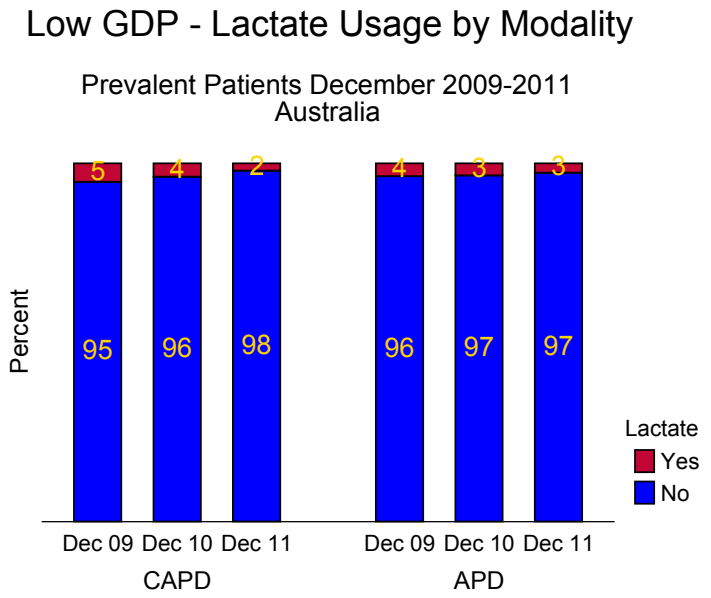
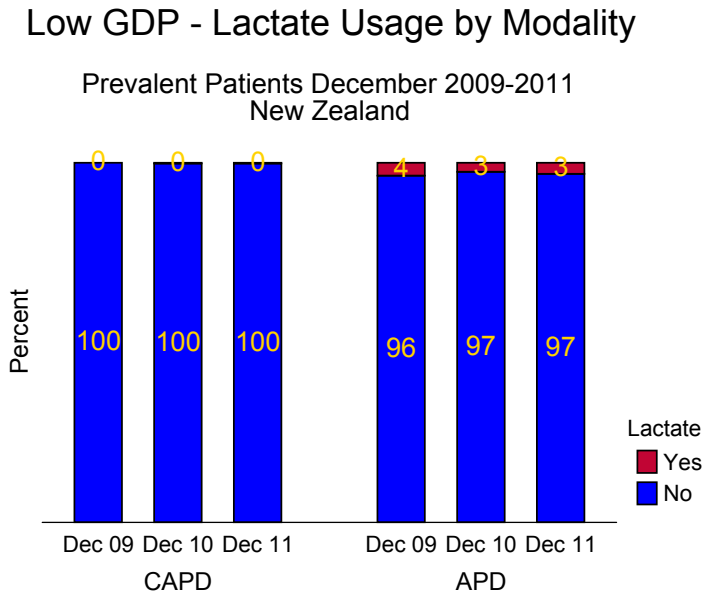


Figure 6.24



PERITONEAL DIALYSIS FLUIDS

Figure 6.25

Low GDP - Bicarb Usage by Modality Type - December 2011

Modality Type		Australia				New Zealand			
		No	Yes	NR*	Total	No	Yes	NR*	Total
CAPD	n	728	44	16	788	432	5	2	439
	%	92.39%	5.58%	2.03%	.	98.41%	1.14%	0.46%	.
APD	n	1244	33	4	1281	345	5	1	351
	%	97.11%	2.58%	0.31%	.	98.29%	1.42%	0.28%	.
Total	**n**	**1972**	**77**	**20**	**2069**	**777**	**10**	**3**	**790**
	%	**95.31%**	**3.72%**	**0.97%**	**.**	**98.35%**	**1.27%**	**0.38%**	**.**

NR* - Not Reported

Figure 6.26

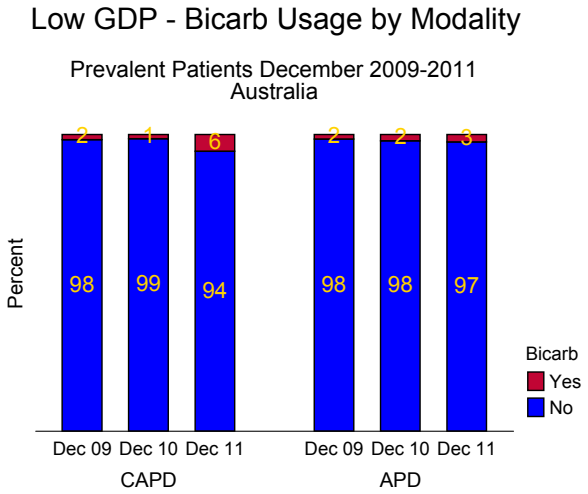
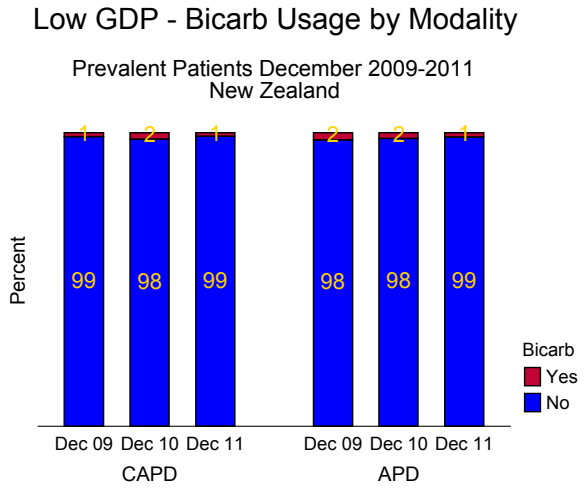


Figure 6.27



OUTCOMES AMONG PERITONEAL DIALYSIS PATIENTS

Figure 6.28

Peritoneal Dialysis at 90 Days Patient Survival 2000-2011, Censored for Transplant
% [95% Confidence Interval]

Year of Starting	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
2000-2002	1267	98 [97, 99]	92 [90, 93]	63 [60, 66]	42 [39, 45]
2003-2005	1285	97 [96, 98]	92 [91, 94]	69 [66, 71]	47 [44, 50]
2006-2008	1660	99 [98, 99]	94 [93, 95]	73 [71, 75]	54 [50, 57]
2009-2011	1303	98 [97, 99]	94 [92, 95]	-	-
New Zealand					
2000-2002	455	98 [96, 99]	91 [88, 93]	62 [57, 67]	40 [35, 44]
2003-2005	435	98 [96, 99]	91 [87, 93]	63 [58, 68]	41 [36, 46]
2006-2008	412	98 [96, 99]	94 [91, 96]	77 [72, 81]	50 [43, 56]
2009-2011	454	100 [98, 100]	95 [92, 97]	-	-

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 2000.

In New Zealand PD patient survival has been unchanged up to 2005, but has improved for the 2006-2011 cohort

(Figures 6.28 - 6.30).

Diabetic PD patients had lower patient survival at later 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

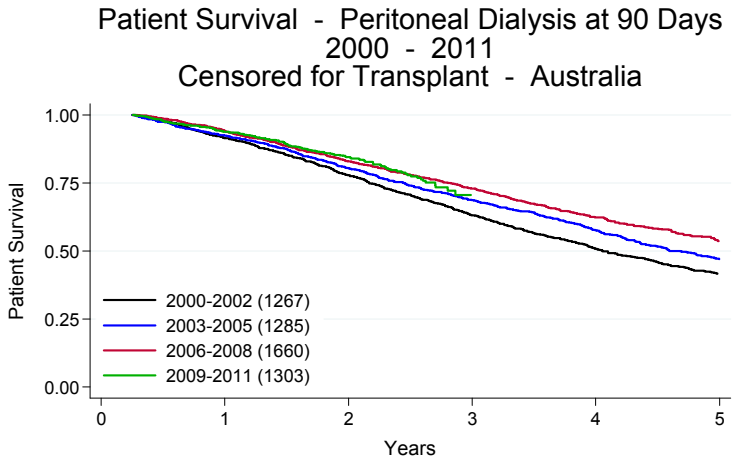


Figure 6.30

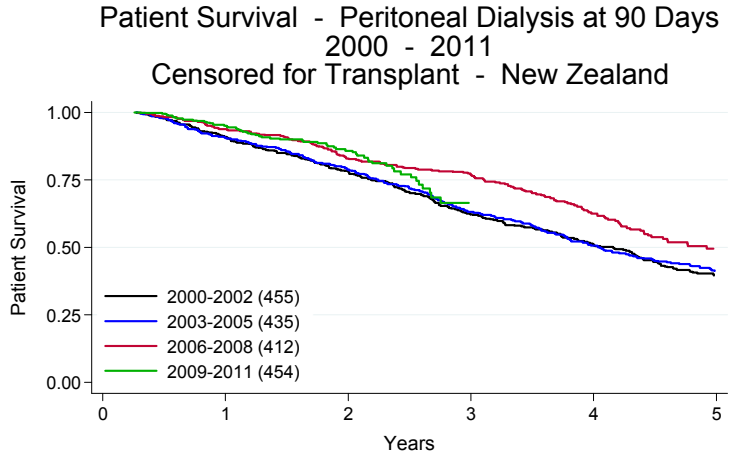


Figure 6.31

Peritoneal Dialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant Commenced 2000 - 2011
% [95% Confidence Interval]

	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
Non Diabetic	3857	98 [98, 99]	94 [93, 95]	73 [71, 74]	54 [52, 56]
Diabetic	1658	97 [96, 98]	91 [89, 92]	62 [59, 64]	36 [33, 39]
New Zealand					
Non Diabetic	1033	98 [97, 99]	94 [92, 95]	71 [67, 74]	51 [47, 55]
Diabetic	723	99 [98, 99]	91 [89, 93]	63 [59, 67]	34 [30, 39]

Figure 6.32

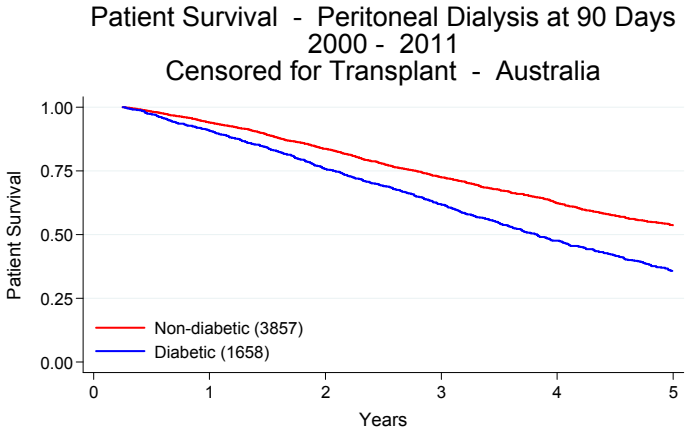


Figure 6.33

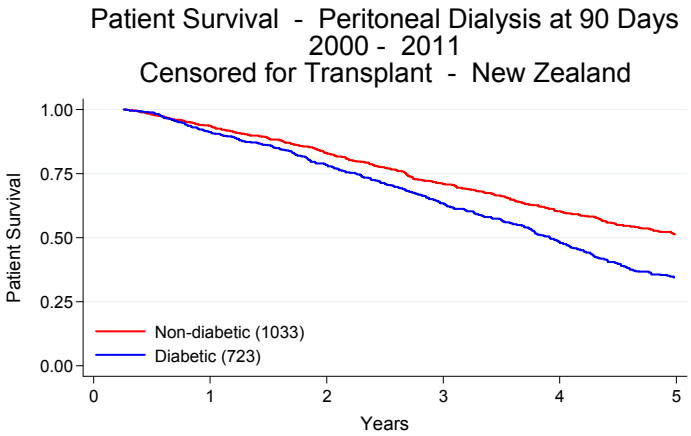


Figure 6.34

Peritoneal Dialysis at 90 Days
Patient Survival - By Age Group
Censored for Transplant 2000 - 2011
% [95% Confidence Interval]

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	766	99 [99, 100]	99 [97, 99]	90 [86, 93]	80 [74, 85]
40-59 years	1662	98 [98, 99]	96 [95, 97]	81 [79, 83]	66 [63, 69]
60-74 years	2066	98 [97, 98]	92 [90, 93]	66 [63, 68]	42 [39, 45]
>=75 years	1021	96 [95, 97]	87 [85, 89]	51 [47, 54]	27 [24, 30]
New Zealand					
0-39 years	199	99 [96, 100]	98 [95, 99]	89 [81, 94]	78 [66, 85]
40-59 years	589	99 [98, 100]	95 [93, 97]	74 [70, 78]	54 [48, 59]
60-74 years	745	98 [97, 99]	91 [89, 93]	64 [60, 68]	37 [32, 41]
>=75 years	223	95 [91, 97]	85 [79, 89]	49 [42, 56]	24 [18, 30]

Figure 6.35

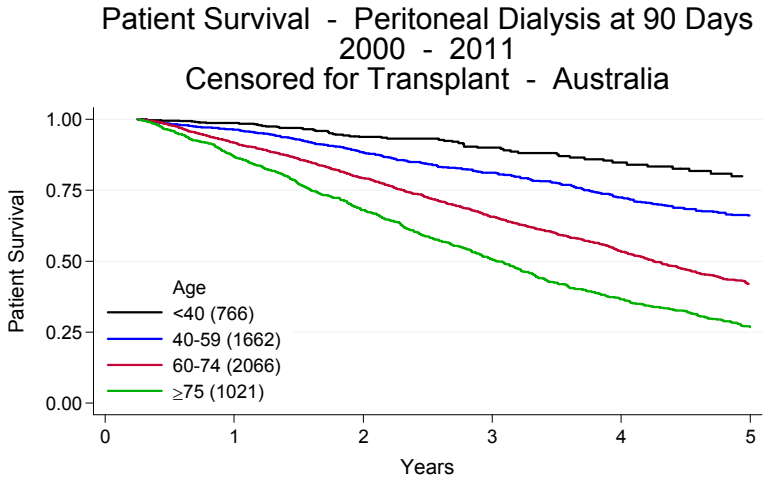
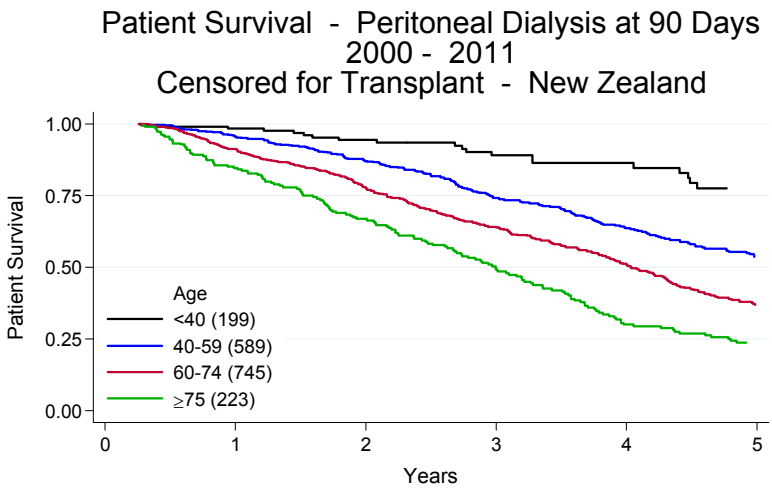


Figure 6.36



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; Caucasian race; female sex and no comorbid conditions (lung disease, coronary heart disease, peripheral vascular disease or cerebrovascular disease).

In Australia the patient survival has steadily improved since 2000 (Figure 6.37).

In New Zealand there has seen an improvement in the 2008-2011 time (Figure 6.38),although this trend is most apparent after the second year. In both countries patient survival has improved over time.

Figure 6.37

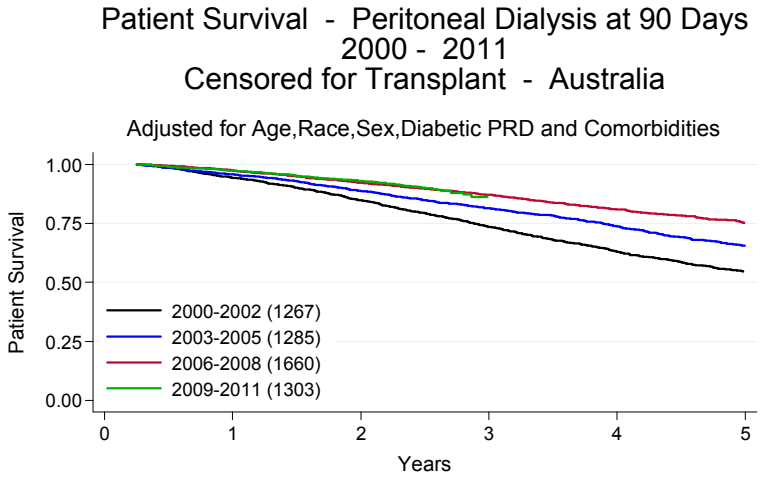
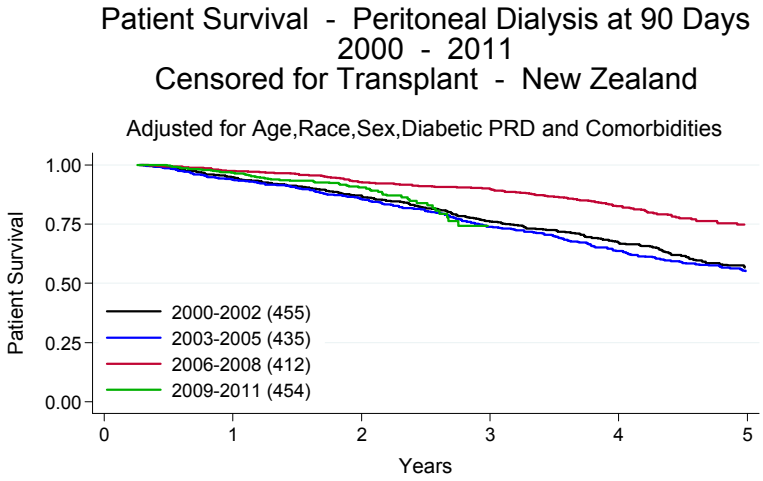


Figure 6.38



* 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 2000- 2011
% [95% Confidence Interval]

	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
Non Diabetic	3857	95 [94, 96]	85 [83, 86]	55 [53, 57]	37 [34, 39]
Diabetic	1658	94 [93, 95]	85 [83, 87]	54 [51, 57]	36 [32, 40]
New Zealand					
Non Diabetic	1033	96 [95, 97]	90 [88, 92]	66 [62, 70]	46 [41, 51]
Diabetic	723	98 [97, 99]	92 [90, 94]	67 [63, 71]	43 [36, 49]

Figure 6.40

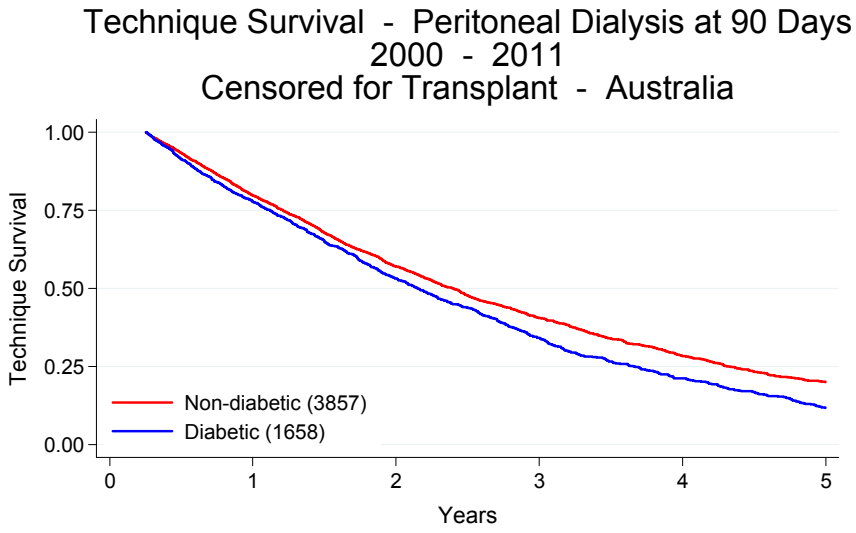


Figure 6.41

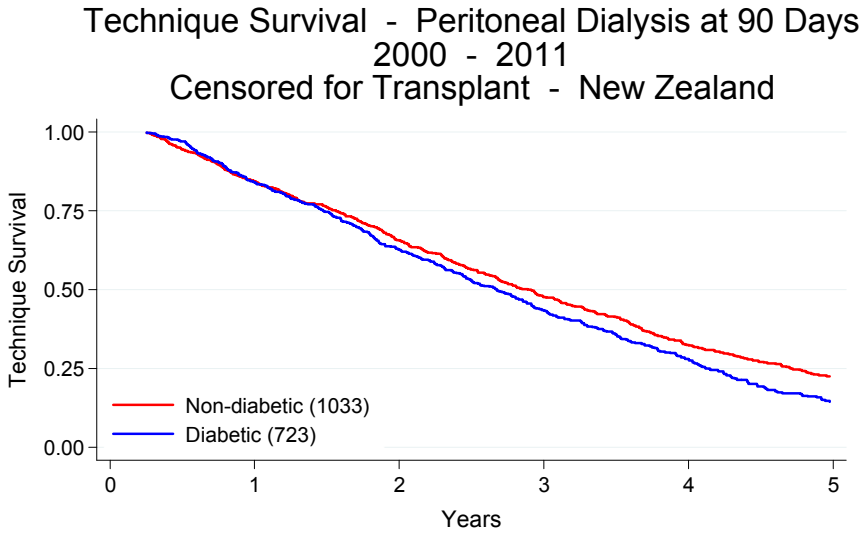


Figure 6.42

Peritoneal Dialysis at 90 Days
Technique Survival - By Age Group
Censored for Transplant 2000 - 2011
% [95% Confidence Interval]

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	766	94 [92, 96]	82 [79, 85]	48 [43, 53]	28 [22, 35]
40-59 years	1662	93 [91, 94]	80 [78, 82]	41 [38, 44]	22 [20, 25]
60-74 years	2066	93 [92, 94]	80 [78, 81]	38 [36, 41]	16 [14, 19]
>=75 years	1021	91 [90, 93]	74 [71, 77]	31 [28, 34]	10 [8, 12]
New Zealand					
0-39 years	199	95 [91, 97]	87 [81, 91]	51 [41, 60]	28 [18, 39]
40-59 years	589	97 [95, 98]	88 [85, 90]	48 [43, 53]	24 [19, 29]
60-74 years	745	96 [94, 97]	82 [79, 85]	46 [42, 50]	17 [13, 20]
>=75 years	223	92 [87, 95]	79 [73, 84]	36 [29, 43]	10 [6, 15]

Figure 6.43

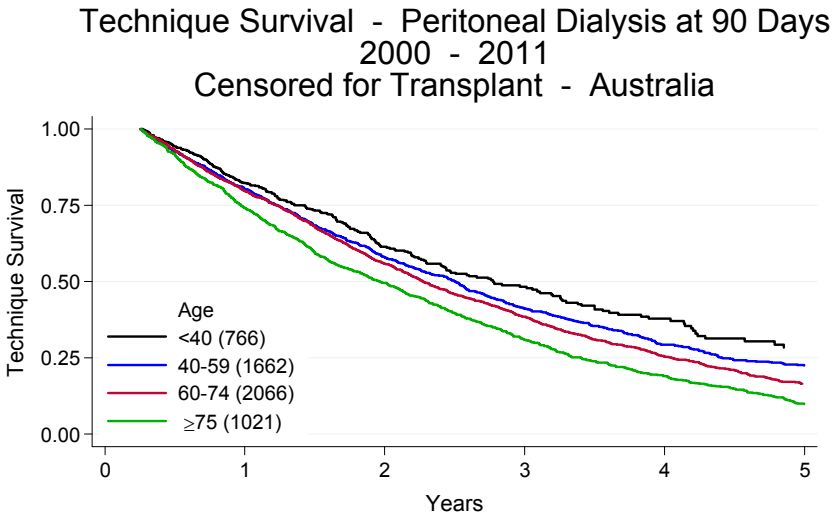
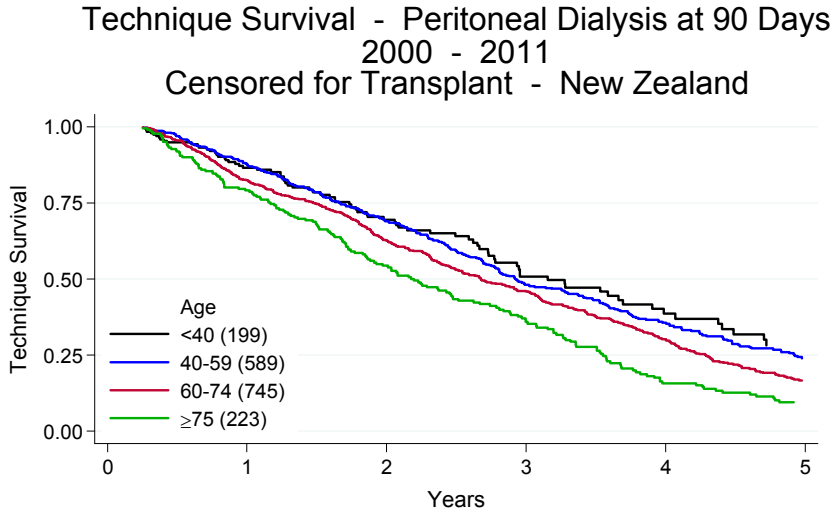


Figure 6.44



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 44% of transfers during 2010/2011 (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 36% of transfers during 2010/2011 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-2010 to 31-Dec-2011
Excluding Death, Transplantation, Recovery of Renal Function

Causes of Technique Failure	Australia	New Zealand
Recurrent/persistent peritonitis	138	80
Acute peritonitis	230	50
Tunnel/exit site infection	38	7
Total Infective Causes	**406 (21%)**	**137 (22%)**
Inadequate solute clearance	231	86
Inadequate fluid ultrafiltration	104	53
Excessive fluid ultrafiltration	5	3
Total Dialysis Failure	**340 (17%)**	**142 (23%)**
Dialysate leak	46	30
Hydrothorax	2	
Scrotal oedema	16	3
Catheter block	40	13
Catheter fell out	5	2
Hernia	55	22
Abdominal pain	18	2
Abdominal surgery	39	13
Other surgery	29	4
Haemoperitoneum		1
Sclerosing peritonitis	1	2
Miscellaneous	88	18
Multiple adhesions	5	5
Total Technical Failure	**344 (18%)**	**115 (19%)**
Unable to manage self care	97	30
Patient preference	750	186
Transfer outside Australia/NZ	6	3
Total Social Reasons	**853 (44%)**	**219 (36%)**

PERITONITIS

Australian median time to first peritonitis was 22 months, with 34% of patients completely free of peritonitis at three years. In New Zealand the time was 19.4 months (31% 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 months in Australia, and 12.8 months in New Zealand.

Figure 6.46

First PD Treatment to First Episode of Peritonitis
Related to Age at Entry 01-Jan-2007 to 31-Dec-2011

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	**(n=102)**	**(n=352)**	**(n=1179)**	**(n=959)**	**(n=1015)**	**(n=750)**	**(n=4357)**
3 months	80 [71,87]	87 [83,90]	86 [84,88]	88 [86,90]	88 [86,90]	86 [84,89]	87 [86,88]
6 months	70 [59,78]	80 [76,84]	79 [77,82]	80 [77,82]	81 [79,84]	79 [76,82]	80 [78,81]
9 months	59 [48,69]	73 [67,78]	73 [70,75]	71 [68,74]	75 [72,78]	71 [68,75]	72 [71,74]
1 year	54 [42,65]	69 [63,75]	67 [63,70]	66 [62,69]	69 [66,72]	64 [60,68]	66 [65,68]
2 years	31 [16,47]	52 [45,59]	47 [43,51]	46 [41,50]	49 [45,53]	46 [41,51]	47 [45,49]
3 years	12 [1,37]	41 [32,50]	32 [27,36]	35 [30,40]	32 [27,37]	38 [33,43]	34 [32,36]
New Zealand	**(n=26)**	**(n=95)**	**(n=353)**	**(n=375)**	**(n=346)**	**(n=117)**	**(n=1312)**
3 months	76 [54,88]	87 [78,93]	90 [86,92]	83 [79,87]	86 [82,89]	85 [77,91]	86 [84,88]
6 months	50 [29,68]	79 [68,87]	79 [74,83]	74 [69,78]	77 [72,81]	79 [70,86]	76 [74,79]
9 months	44 [23,63]	67 [55,76]	70 [64,74]	67 [62,72]	68 [63,73]	69 [59,77]	68 [65,70]
1 year	35 [14,57]	63 [51,73]	63 [57,68]	60 [54,65]	61 [55,67]	62 [51,71]	61 [58,64]
2 years	35 [14,57]	40 [26,54]	45 [38,51]	43 [36,49]	43 [37,50]	43 [31,55]	43 [40,46]
3 years	-	19 [7,35]	31 [23,39]	37 [30,44]	31 [24,39]	27 [13,42]	31 [27,35]

% Survival [95% Confidence Interval]

Figure 6.47

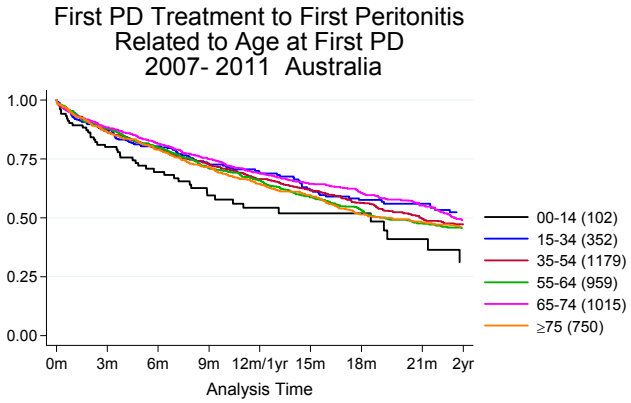


Figure 6.48

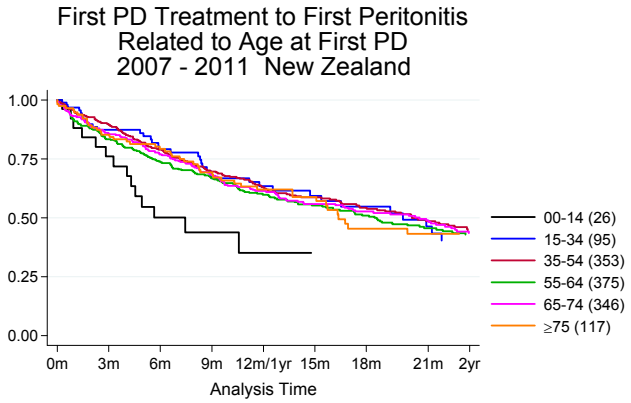
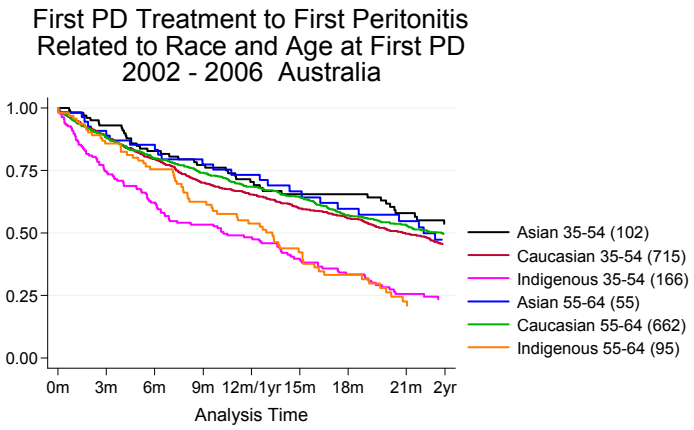


Figure 6.49



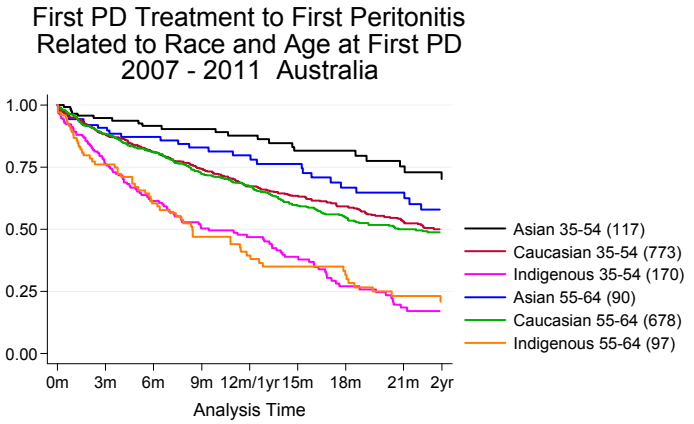
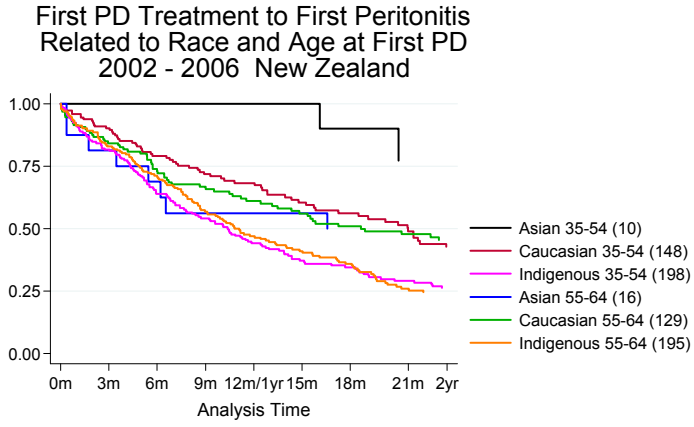


Figure 6.50



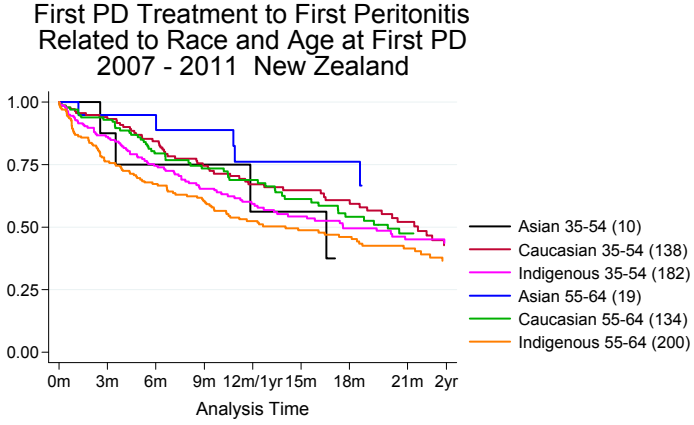


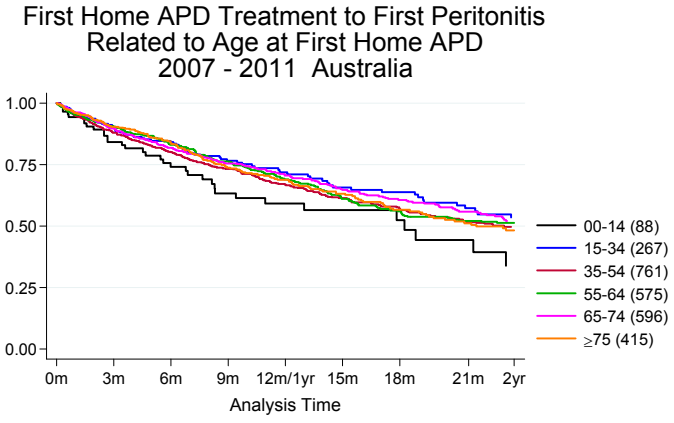
Figure 6.51

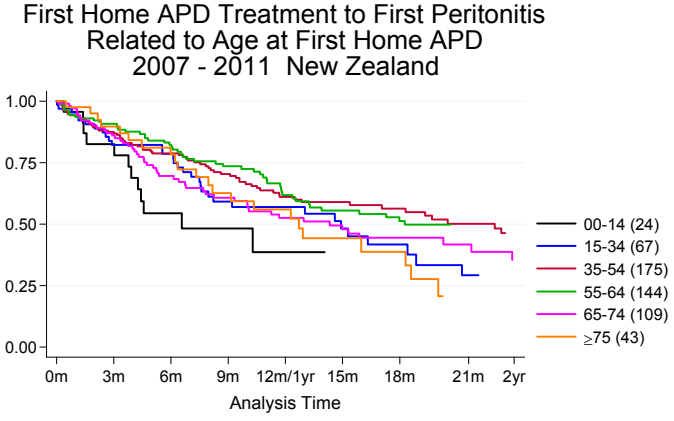
First Home APD Treatment to First Episode of Peritonitis
Related to Age at Entry 01-Jan-2007 to 31-Dec-2011

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	**(n=88)**	**(n=267)**	**(n=761)**	**(n=575)**	**(n=596)**	**(n=415)**	**(n=2702)**
3 months	84 [74, 91]	90 [85, 93]	88 [85, 90]	91 [88, 93]	90 [87, 92]	90 [87, 93]	89 [88, 90]
6 months	74 [63, 82]	84 [79, 88]	80 [77, 83]	83 [79, 86]	82 [78, 85]	83 [79, 87]	82 [80, 83]
9 months	63 [51, 74]	77 [70, 82]	73 [70, 77]	76 [72, 80]	75 [71, 79]	74 [69, 78]	74 [73, 76]
1 year	59 [46, 70]	72 [65, 78]	67 [63, 71]	69 [64, 73]	71 [66, 75]	69 [63, 74]	69 [67, 71]
2 years	34 [17, 51]	53 [44, 62]	50 [45, 55]	51 [46, 56]	52 [46, 57]	48 [42, 55]	50 [48, 53]
3 years	14 [1, 40]	40 [30, 51]	32 [26, 38]	39 [32, 46]	35 [29, 42]	45 [38, 52]	36 [33, 40]
New Zealand	**(n=24)**	**(n=67)**	**(n=175)**	**(n=144)**	**(n=109)**	**(n=43)**	**(n=562)**
3 months	83 [60, 93]	82 [70, 90]	87 [81, 91]	91 [85, 95]	86 [77, 91]	90 [75, 96]	87 [84, 90]
6 months	54 [32, 72]	79 [66, 87]	79 [72, 84]	82 [74, 88]	70 [59, 78]	78 [61, 89]	77 [73, 80]
9 months	48 [26, 68]	59 [45, 71]	70 [62, 77]	74 [64, 81]	61 [50, 70]	63 [44, 76]	66 [62, 70]
1 year	39 [16, 61]	57 [43, 69]	61 [52, 69]	62 [52, 70]	52 [41, 63]	56 [38, 71]	58 [53, 62]
2 years	39 [16, 61]	29 [15, 45]	46 [36, 56]	50 [39, 60]	36 [23, 48]	-	40 [35, 46]
3 years	-	18 [6, 36]	32 [20, 45]	36 [23, 49]	21 [8, 38]	-	27 [20, 34]

% Survival [95% Confidence Interval]

Figure 6.52





AUSTRALIAN PERITONITIS REGISTRY

1-OCT-2003 TO 31-DEC-2011

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 2011, 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 (2003-2011) (Figure 6.54).

Figure 6.53

Number of Peritonitis Episodes

Year	Freq.	Percent	Cum.
2003	250	2.59	2.59
2004	1,196	12.4	14.99
2005	1,072	11.11	26.1
2006	1,116	11.57	37.67
2007	1,254	13	50.67
2008	1,369	14.19	64.86
2009	1,345	13.94	78.8
2010	1,138	11.8	90.6
2011	907	9.4	100
Total	**9,647**	**100**	

Figure 6.54

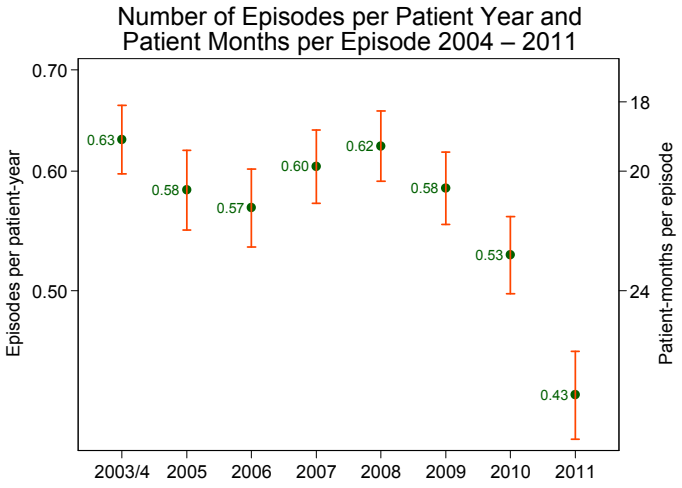
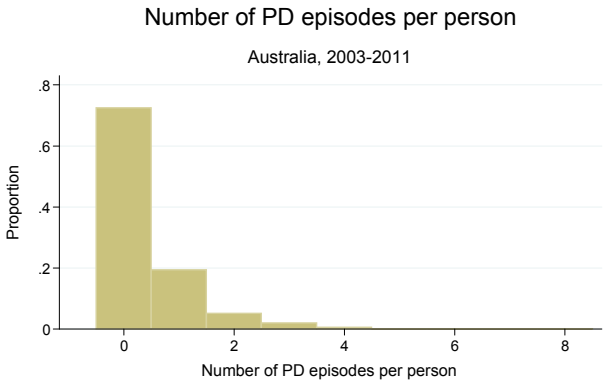
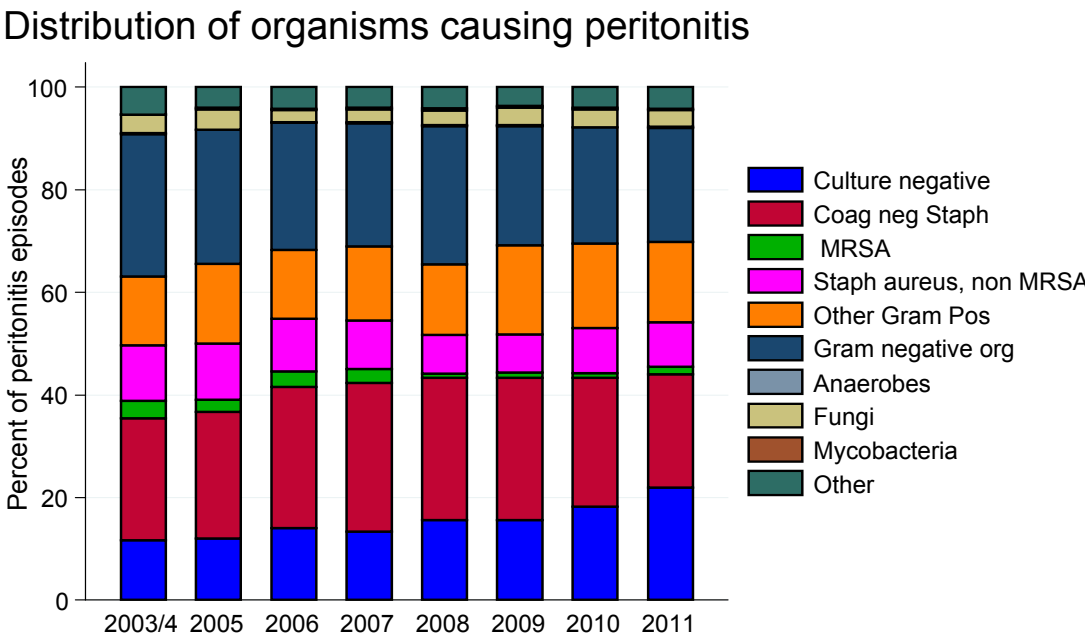


Figure 6.55



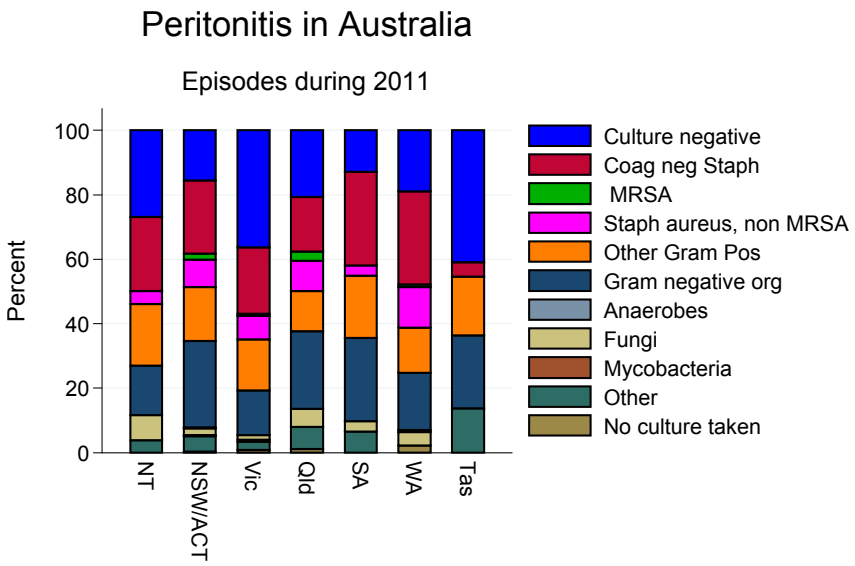
There has been a gradual trend over this time towards a lower proportion of episodes attributable to gram negative organisms and non-MRSA *S. aureus*, with a greater proportion of culture negative episodes (Figure 6.56). The Registry does not collect data on use of prior antibiotics or laboratory techniques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

Figure 6.56



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, PD training or other factors that might account for part or all of this variation.

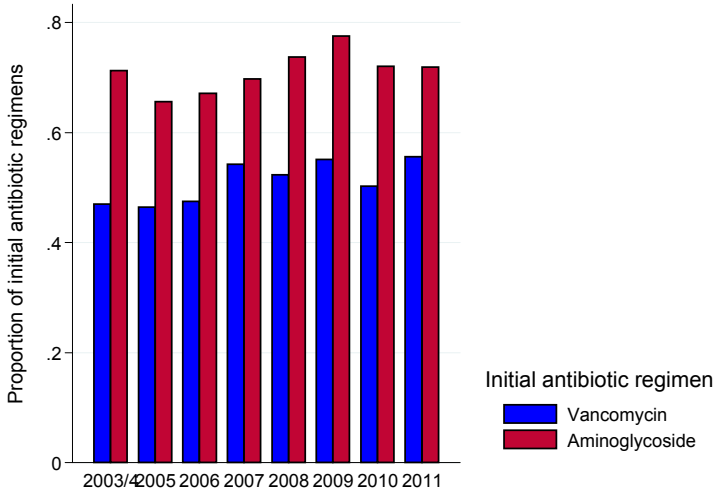
Figure 6.57



ANTIBIOTIC TREATMENT

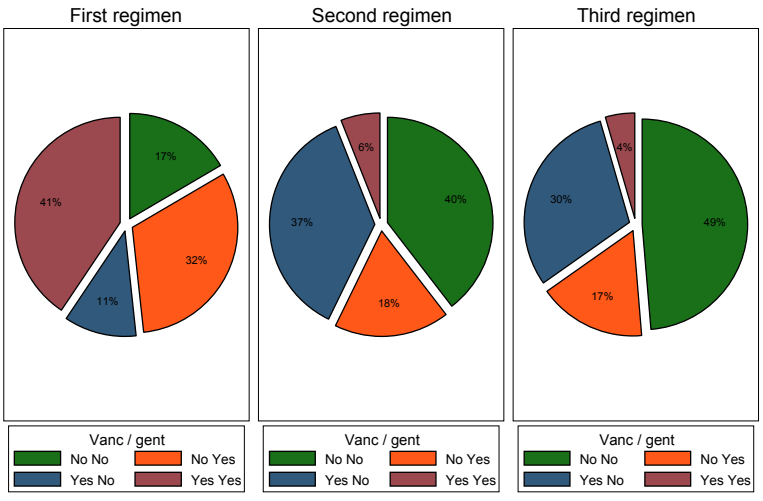
The proportion of episodes which were treated with an aminoglycoside-containing initial regimen has increased slightly over the period 2006-2009 but declined in 2010-2011, as has the proportion treated with a regimen containing vancomycin is slowly increasing, but declined in 2010 (Figure 6.58).

Figure 6.58



Among episodes of peritonitis treated during 2011, the proportion of those who received vancomycin in the initial or second antibiotic regimen is shown in Figure 6.59.

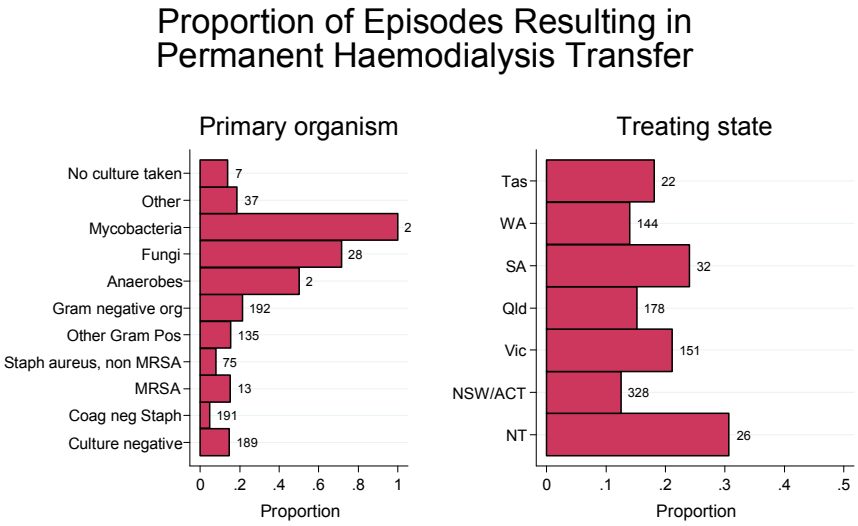
Figure 6.59



OUTCOMES

There is a strong relationship between the type of organism and the proportion of transfer to permanent haemodialysis. After fungal, mycobacterial or gram negative peritonitis, there is a considerably higher proportion of permanent transfers to HD than with other, more common, causes of peritonitis.

Figure 6.60

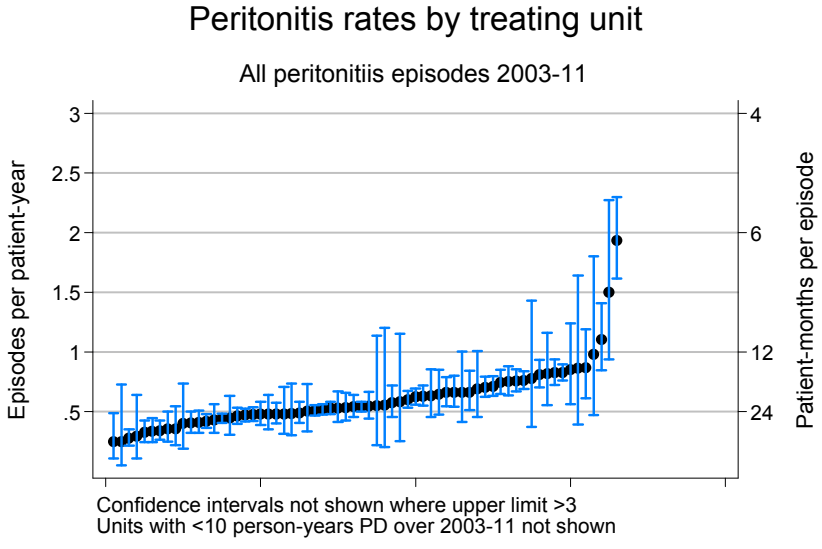


Values are total number of peritonitis episodes reported 1/1/11-31/12/11

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 2011. 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



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

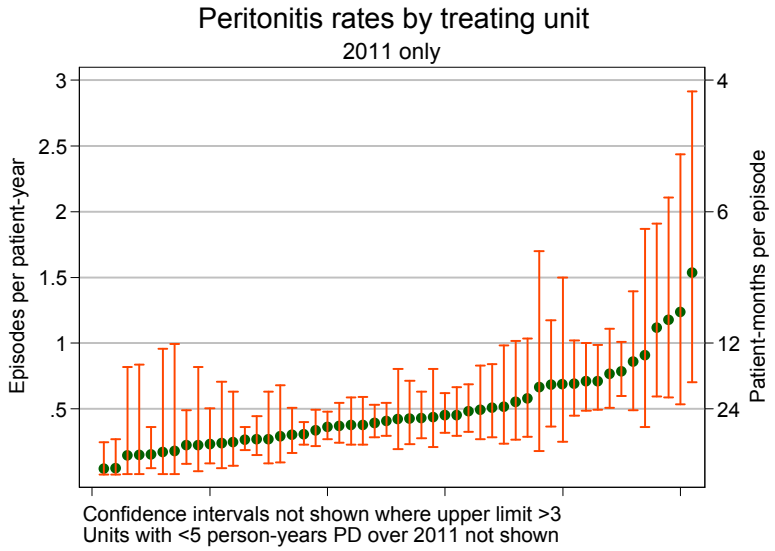
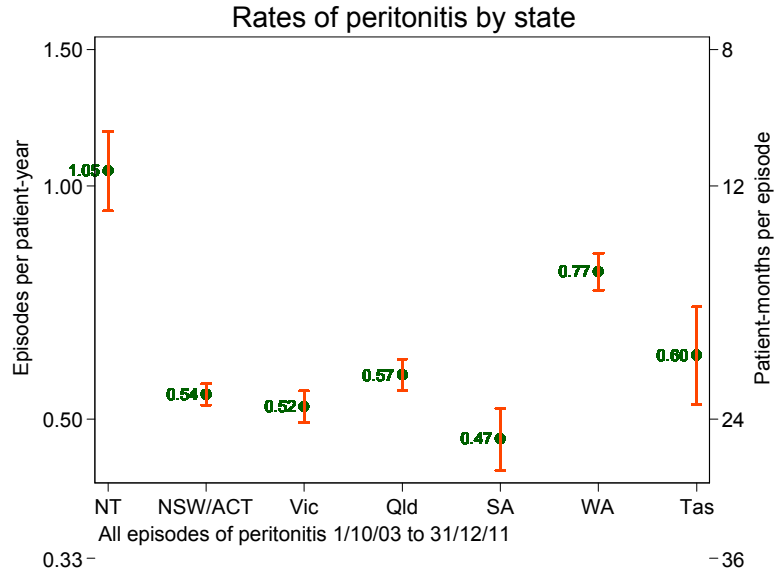


Figure 6.63



HAEMOGLOBIN

In Australia, at the end of 2011, haemoglobin was <110 g/L in 43% between 110-119 g/L in 28% of PD patients, , higher than in previous years, and >140 g/L in 4%, which is similar to previous years.

In New Zealand, the corresponding percentages were very similar - 26%, 44% and 3% respectively.

Figure 6.65 shows the Hb levels in PD patients with proven or likely coronary artery disease .

Figure 6.64

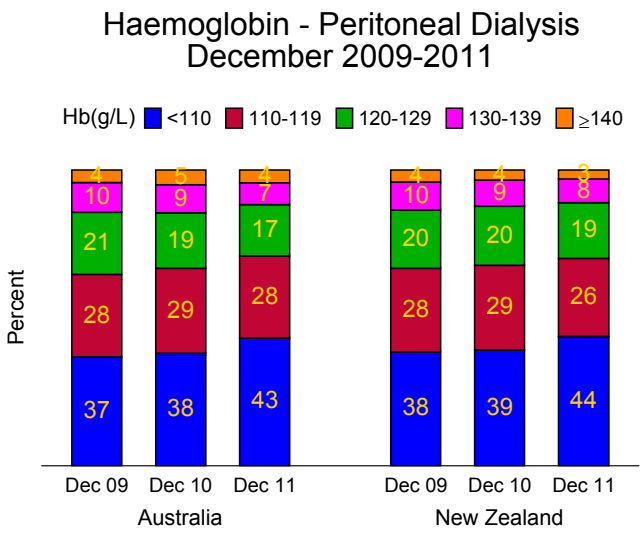
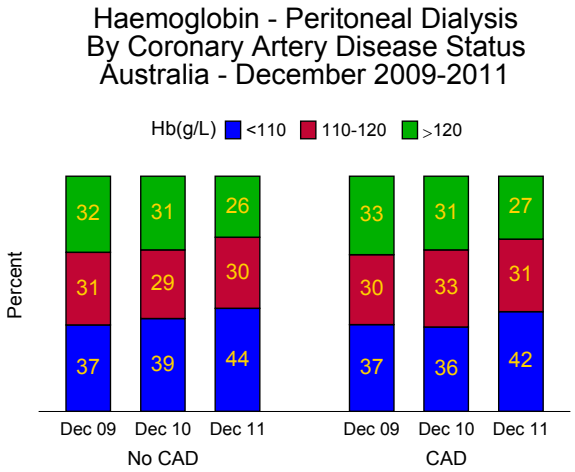
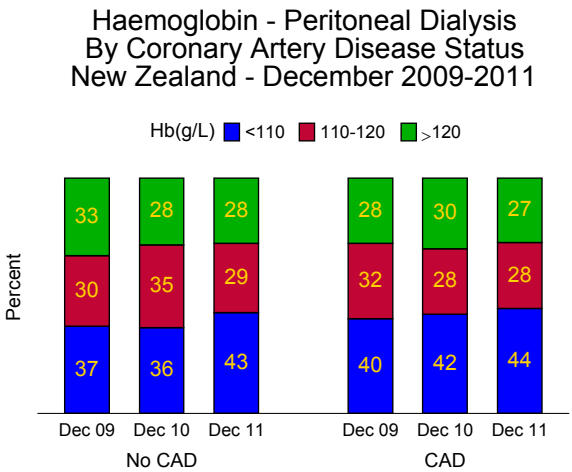


Figure 6.65





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 107-122 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 25% to 65% for peritoneal dialysis patients and for New Zealand 32% to 72%. This large variation is likely to reflect differences in practices, protocols and patient case-mix among centres.

Figure 6.66

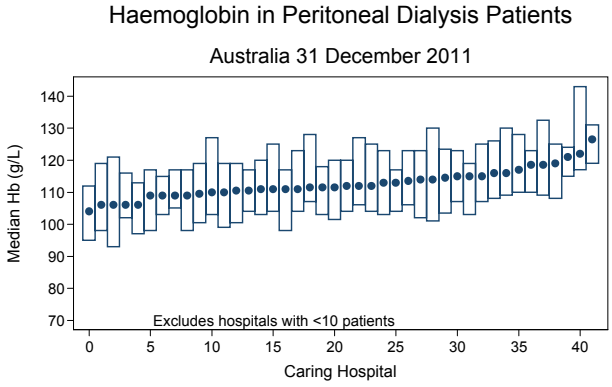


Figure 6.67

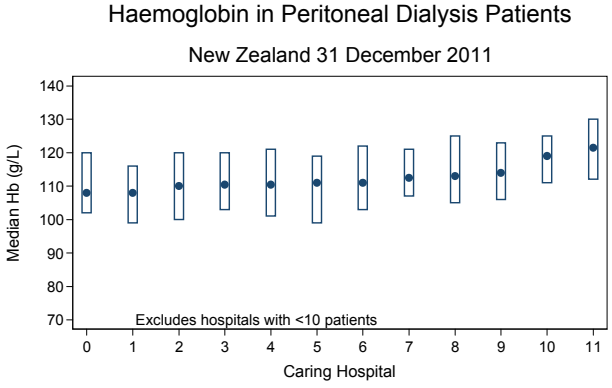


Figure 6.68

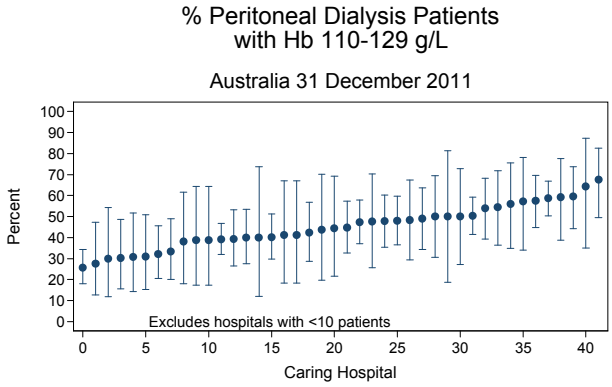
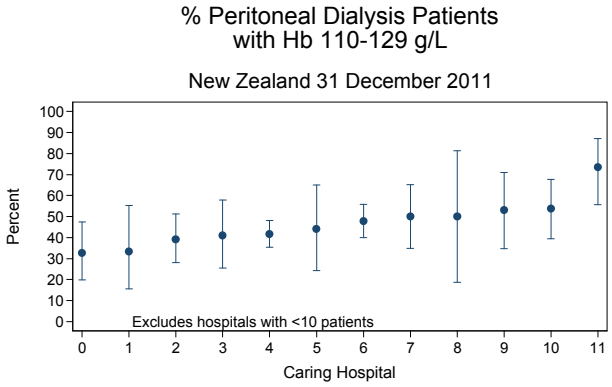


Figure 6.69



FERRITIN AND TRANSFERRIN SATURATION

Overall there are no remarkable trends in this area.

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

Figure 6.70

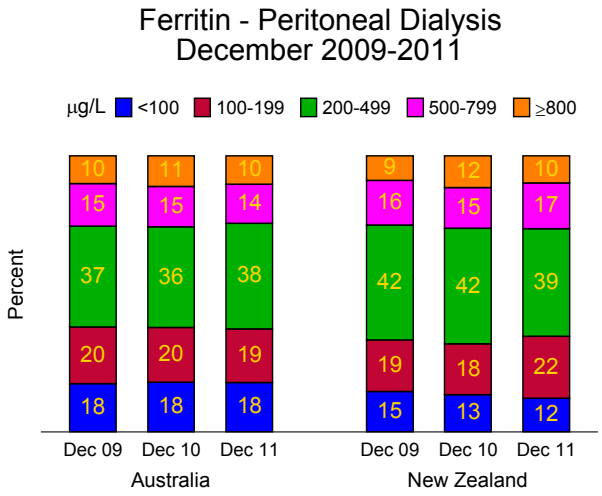
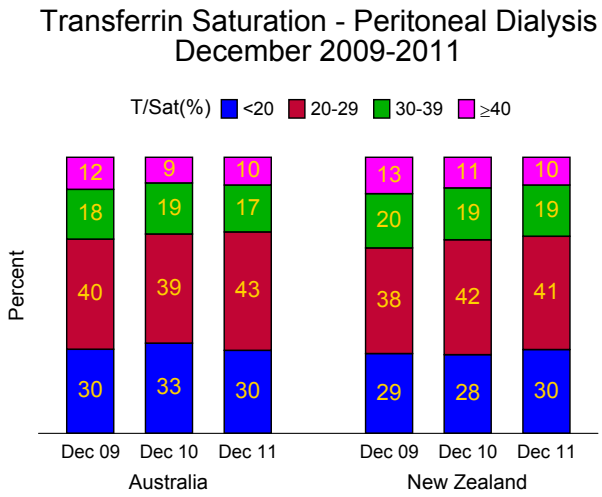


Figure 6.71



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 12-65% for peritoneal dialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 30-95%. 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 28-60% for peritoneal dialysis patients and for transferrin saturation between 52-90%. In both countries, significant proportions of patients did not have ferritin and transferrin saturation within the recommended ranges.

Figure 6.72

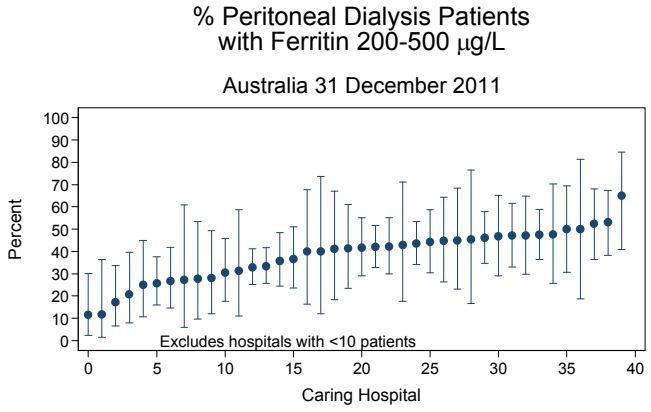


Figure 6.73

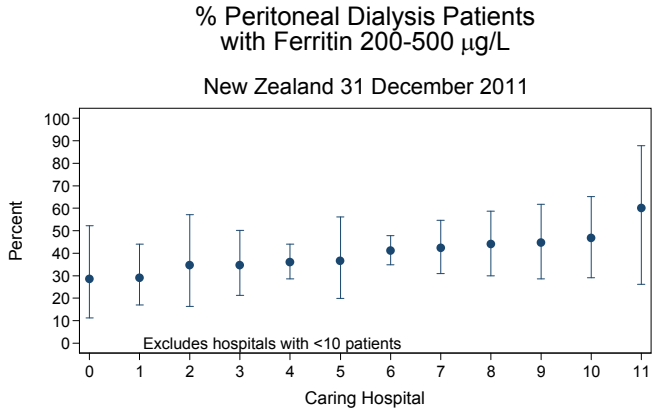


Figure 6.74

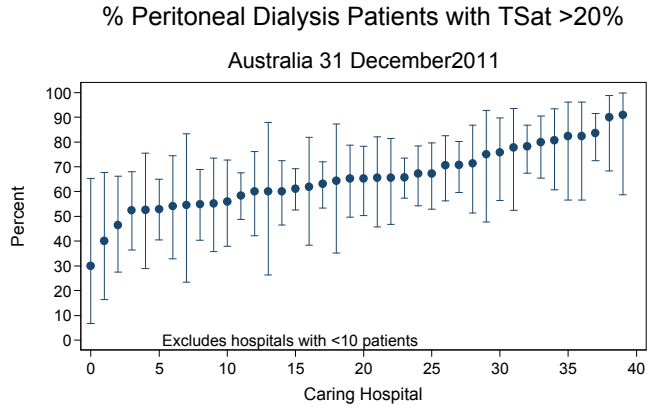
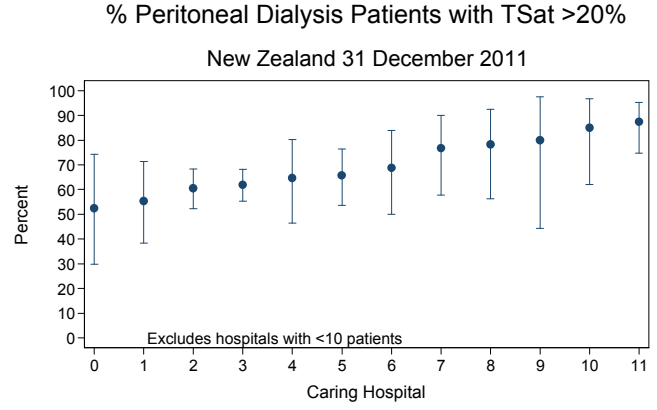


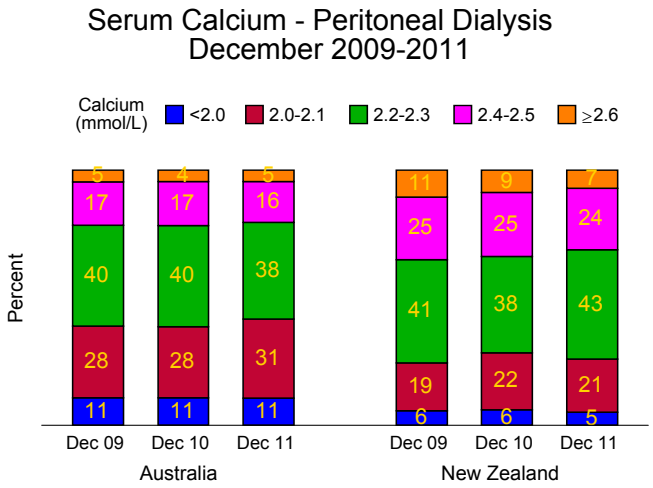
Figure 6.75



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 CARI guidelines. Note however that the values in the guidelines were for corrected total calcium, while those in this report are for uncorrected total calcium.

In Australia, the proportions ranged widely between 42-80% for peritoneal dialysis patients, while in New Zealand the corresponding proportions were 55-79%.

Figure 6.77

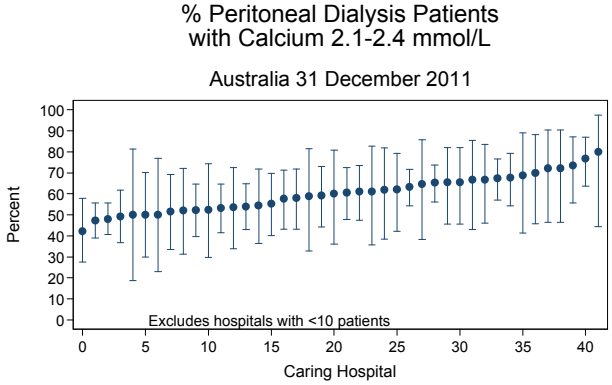
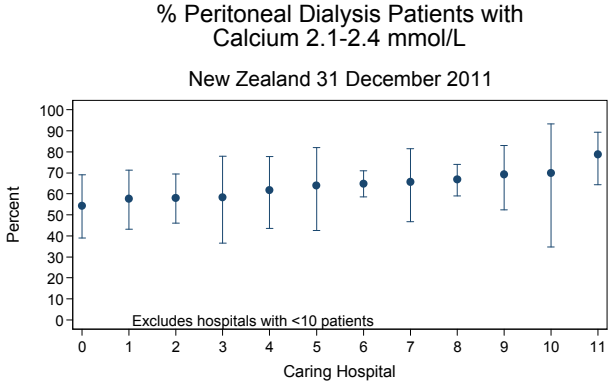


Figure 6.78

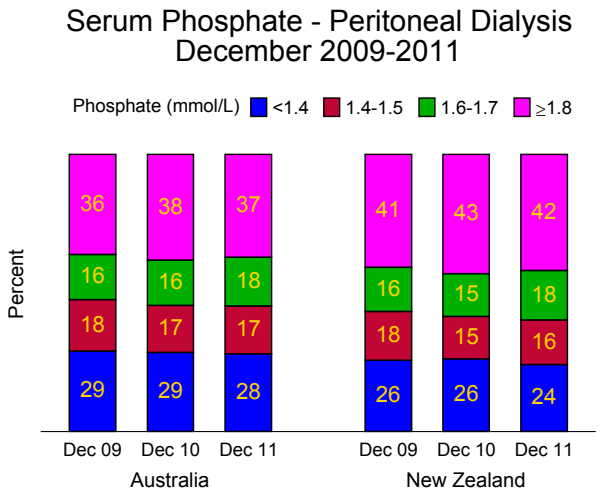


SERUM PHOSPHATE

In Australia, serum phosphate has stabilized 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 CARI guidelines.

In Australia, the proportions ranged widely between 18-80% for peritoneal dialysis patients and in New Zealand, the corresponding proportions were 35-66%.

Figure 6.80

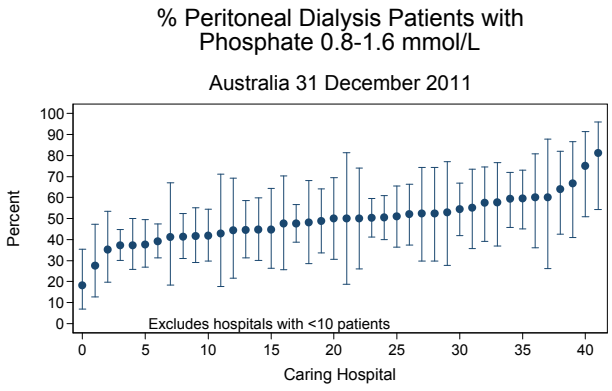
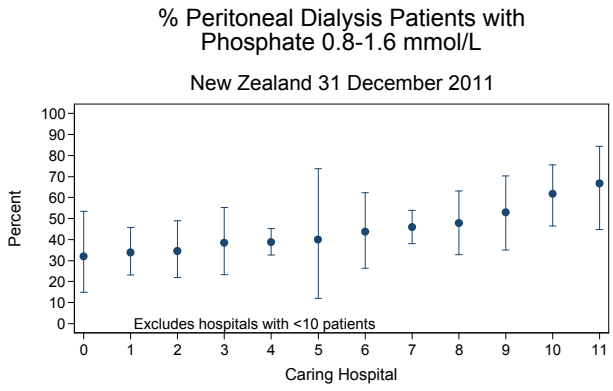


Figure 6.81

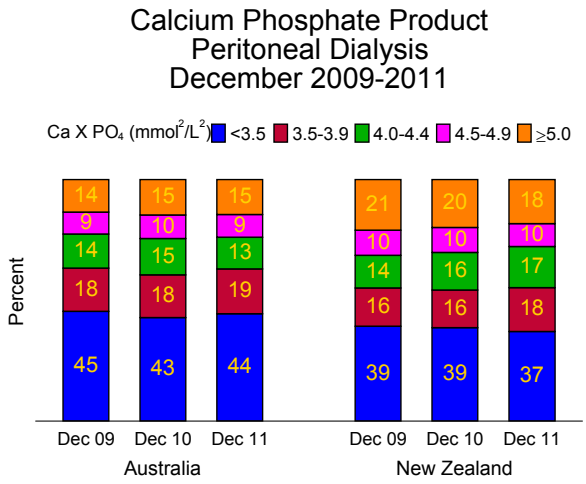


CALCIUM-PHOSPHATE PRODUCT

In both Australia and New Zealand, calcium-phosphate product has remained steady, with smaller proportions of patients with a product ≥ 3.5 mmol^2/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 mmol^2/L^2, as recommended by the CARI guidelines.

In Australia, the proportions ranged widely between 45-82% for peritoneal dialysis patients while in New Zealand, the corresponding proportions were 29-70%.

Figure 6.83

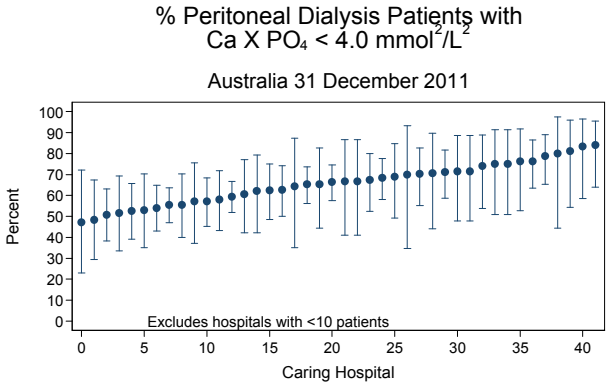


Figure 6.84