



CHAPTER 6

PERITONEAL DIALYSIS

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2013 Annual Report - 36th Edition





STOCK AND FLOW

AUSTRALIA

Peritoneal dialysis was used to treat 19% of all dialysis patients in 2012 (APD-1374, CAPD-853, total 11446). PD accounted for 44% of all home dialysis, a figure which has remained stable for several years (Figure 6.1). Of the 2,227 patients on peritoneal dialysis at December 2012, 185 (8%) 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 12% (Tasmania) to 72% (Western Australia) (Figure 6.1).

The annual stock and flow of patients during the period 2008-2012 is shown in Figures 6.3 and 6.4.

There were 977 new peritoneal dialysis patients in the calendar year 2012; of these 658 patients (67%) started renal replacement therapy with peritoneal dialysis and 319 (33%) had previously been treated with haemodialysis or a transplant (Figure 6.3).

Numbers of new patients over the age of 65 years increased 24%, from 330 to 410 in 2012, following a increase of 8% in 2011 (Figure 6.8). Most age groups increased with the

exception of the 0-14, 15-24 and 45-54 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 0% (≥ 85 years) to 28% (55-64 years).

There were 244 deaths in 2012 compared with 278 in 2011.

For more detail see Appendix II at our website (www.anzdata.org.au/v1/report_2013.html).

The prevalence of automated peritoneal dialysis is stable (61%) (Figure 6.10)

There were 210 peritoneal dialysis patients who received a transplant in 2012 compared with 211 in 2011; this was 9% of all patients treated (Figure 6.3).

Permanent transfers to haemodialysis fell in 2012 (to 450 patients (20%)) from 477 patients (23%) in 2011. (Figure 6.3).

Figure 6.1					
Proportion (%) Peritoneal Dialysis of all Home Dialysis Patients 2008 - 2012					
State	2008	2009	2010	2011	2012
Queensland	52%	50%	48%	44%	41%
New South Wales	44%	42%	40%	40%	42%
Australian Capital Territory	41%	35%	30%	27%	37%
Victoria	47%	44%	42%	40%	42%
Tasmania	36%	35%	32%	24%	12%
South Australia	80%	69%	44%	46%	35%
Northern Territory	37%	33%	44%	38%	38%
Western Australia	82%	78%	73%	73%	72%
Australia	50%	47%	45%	44%	44%
New Zealand	59%	55%	53%	50%	46%

Figure 6.2a

Time on Peritoneal Dialysis

Prevalent PD patients Australia 31 Dec 2012

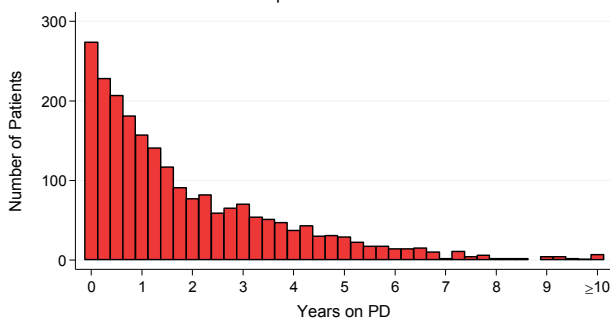


Figure 6.2b

Time on Peritoneal Dialysis

Prevalent PD patients New Zealand 31 Dec 2012

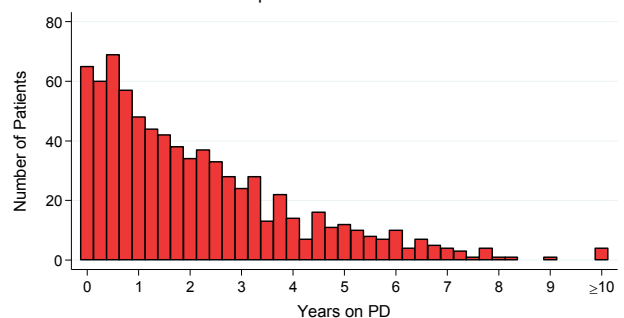


Figure 6.3
**Stock and Flow of Peritoneal Dialysis Patients
2008 - 2012**

State	2008	2009	2010	2011	2012
Australia					
Patients new to PD	997	894	758	830	977
First Dialysis Treatment	657	589	501	549	658
Previous Dialysis (HD)	329	290	250	273	304
Previous Transplant	11	15	7	8	15
Transplanted	177	160	189	211	210
Deaths	321	334	290	278	244
Never Transplanted	305	322	286	271	237
Previously Transplant	16	12	4	7	7
Transfer to Haemodialysis	526	561	506	477	450
Patients Dialysing (PD) at 31 December	2,242	2,202	2,091	2,074	2,227
New Zealand					
Patients new to PD	274	284	275	242	263
First Dialysis Treatment	153	200	163	151	164
Previous Dialysis (HD)	120	82	112	91	95
Previous Transplant	1	2	0	0	4
Transplanted	28	38	45	39	43
Deaths	128	130	117	146	132
Never Transplanted	121	127	111	140	129
Previously Transplant	7	3	6	6	3
Transfer to Haemodialysis	140	134	129	137	138
Patients Dialysing (PD) at 31 December	763	800	832	792	772

These figures are calculated differently to previous years. For example, previous transplant is transplant before PD, and previous HD is HD immediately before PD. Death not include death while on PD and within 30 days of transferring to HD. Transfer to HD is defined as use of HD > 30 days.

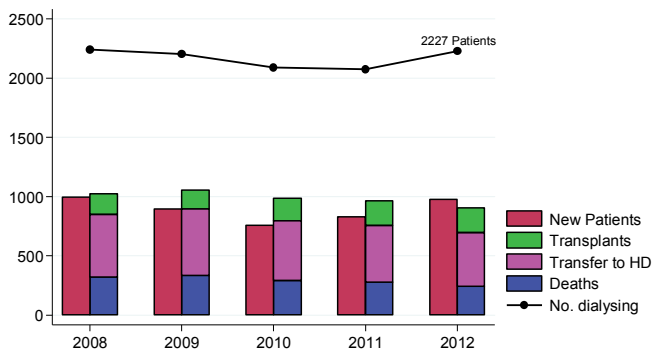
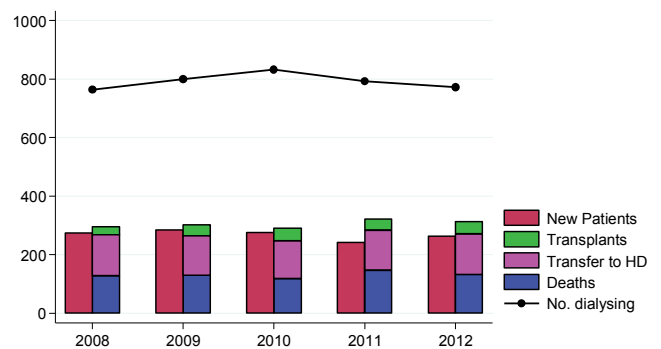
Figure 6.4
**Stock and Flow of Peritoneal Dialysis Patients
Australia 2008-2012**

Figure 6.5
**Stock and Flow of Peritoneal Dialysis Patients
New Zealand 2008-2012**




Figure 6.6

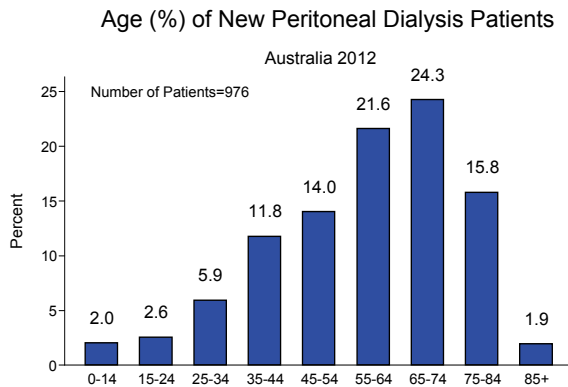


Figure 6.7

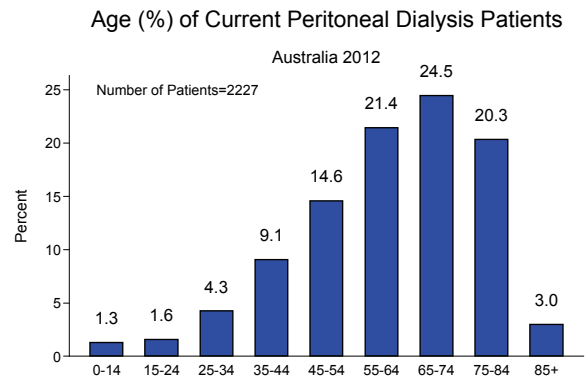


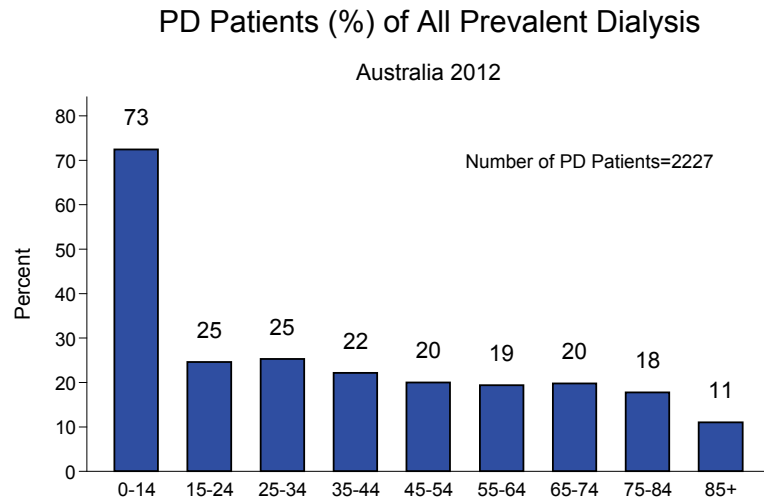
Figure 6.8

Australia

Stock and Flow of Peritoneal Dialysis by Age Groups 2008 - 2012

Age Groups	2008	2009	2010	2011	2012
New Patients *					
00-14 years	14 (1%)	25 (3%)	20 (3%)	22 (3%)	20 (2%)
15-24 years	30 (3%)	23 (3%)	16 (2%)	26 (3%)	25 (3%)
25-34 years	53 (5%)	55 (6%)	42 (6%)	42 (5%)	58 (6%)
35-44 years	93 (9%)	76 (9%)	79 (10%)	86 (10%)	115 (12%)
45-54 years	170 (17%)	121 (14%)	130 (17%)	150 (18%)	137 (14%)
55-64 years	217 (22%)	195 (22%)	165 (22%)	174 (21%)	211 (22%)
65-74 years	225 (23%)	225 (25%)	182 (24%)	178 (21%)	237 (24%)
75-84 years	181 (18%)	151 (17%)	113 (15%)	136 (16%)	154 (16%)
>=85 years	14 (1%)	23 (3%)	11 (1%)	16 (2%)	19 (2%)
Total	997	894	758	830	976
Patients Dialysing					
00-14 years	28 (1%)	32 (1%)	27 (1%)	25 (1%)	29 (1%)
15-24 years	44 (2%)	52 (2%)	40 (2%)	44 (2%)	35 (2%)
25-34 years	84 (4%)	93 (4%)	91 (4%)	91 (4%)	95 (4%)
35-44 years	177 (8%)	171 (8%)	174 (8%)	178 (9%)	202 (9%)
45-54 years	359 (16%)	327 (15%)	292 (14%)	307 (15%)	325 (15%)
55-64 years	492 (22%)	467 (21%)	456 (22%)	439 (21%)	477 (21%)
65-74 years	556 (25%)	571 (26%)	536 (26%)	511 (25%)	545 (24%)
75-84 years	437 (19%)	420 (19%)	409 (20%)	416 (20%)	453 (20%)
>=85 years	65 (3%)	69 (3%)	66 (3%)	63 (3%)	66 (3%)
Total	2,242	2,202	2,091	2,074	2,227
Primary Renal Disease *					
Glomerulonephritis	260 (26%)	252 (28%)	200 (26%)	223 (27%)	244 (25%)
Analgesic Nephropathy	28 (3%)	13 (1%)	13 (2%)	9 (1%)	10 (1%)
Hypertension	118 (12%)	148 (17%)	97 (13%)	112 (13%)	105 (11%)
Polycystic Disease	67 (7%)	55 (6%)	53 (7%)	45 (5%)	51 (5%)
Reflux Nephropathy	40 (4%)	39 (4%)	22 (3%)	23 (3%)	35 (4%)
Diabetic Nephropathy	328 (33%)	266 (30%)	251 (33%)	272 (33%)	309 (32%)
Miscellaneous	80 (8%)	81 (9%)	84 (11%)	95 (11%)	152 (16%)
Uncertain	76 (8%)	40 (4%)	38 (5%)	51 (6%)	70 (7%)
Total	997	894	758	830	976

* New patients receiving first peritoneal dialysis treatment

Figure 6.9

Figure 6.10
Australia
Number (per Million) of Prevalent PD Patients, Australia 2008-2012

	2008	2009	2010	2011	2012
APD/CAPD					
APD	1,271 (59.44)	1,313 (60.30)	1,279 (57.97)	1,283 (57.48)	1,374 (60.82)
CAPD	971 (45.41)	889 (40.82)	812 (36.80)	791 (35.44)	853 (37.76)
Location					
Home	2,206 (103.17)	2,178 (100.02)	2,075 (94.05)	2,050 (91.84)	2,184 (96.68)
Satellite	0	0	0	1 (0.04)	1 (0.04)
Hospital	36 (1.68)	24 (1.10)	16 (0.73)	23 (1.03)	42 (1.86)
Total	2,242 (104.86)	2,202 (101.12)	2,091 (94.78)	2,074 (92.92)	2,227 (98.58)



NEW ZEALAND

Peritoneal dialysis accounted for 31% of all dialysis patients and 98% of all patients dialysing at home.

A substantially lower proportion of patients used automated PD than in Australia. Forty seven percent of all peritoneal dialysis in 2012 was APD compared with 44% in 2011 and 43% in 2009.

The annual stock and flow of patients during the period 2008 to 2012 is shown in Figures 6.3 and 6.5. Of the 772 patients on peritoneal dialysis at December 2012, 82 (10%) had more than five years continuous treatment (Figure 6.2b).

Primary renal disease of new peritoneal dialysis patients is shown in Figure 6.12, and the age distribution of prevalent peritoneal dialysis patients is shown in Figures 6.14 and 6.15.

The most common primary renal disease of new patients to peritoneal dialysis was diabetic nephropathy (45%), a increase of 1% from 2011, followed by glomerulonephritis (22%) and hypertension (8%).

The proportion of patients in each age group treated with peritoneal dialysis ranged from 67% (0-14 years) and 24% (≥85 years) (Figure 6.11).

There were 132 deaths amongst prevalent peritoneal dialysis patients in 2012 compared with 146 in 2011. (Figure 6.3).

For more detail see Appendix III at our website (www.anzdata.org.au/v1/report_2013.html).

There were 43 patients transplanted in 2012 (39 in 2011).

Figure 6.11

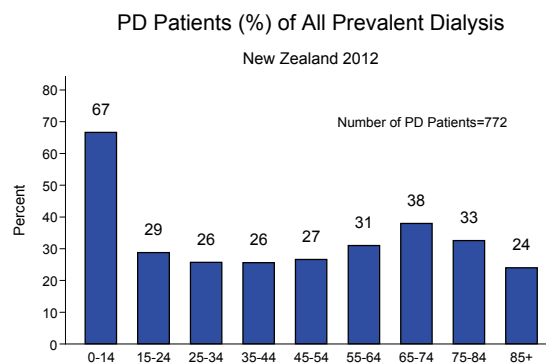
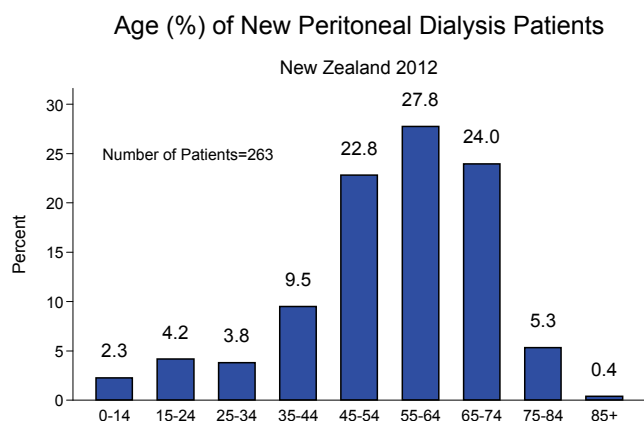
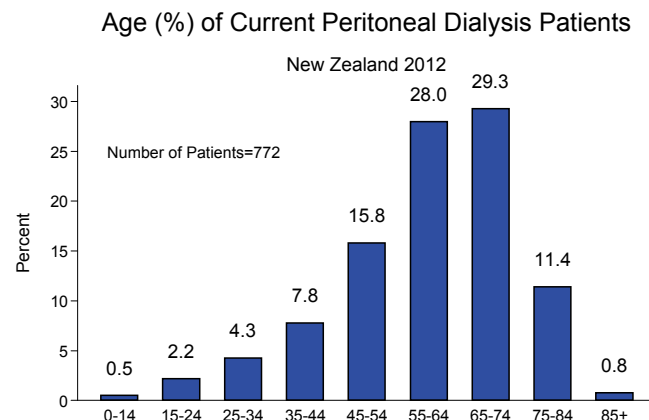


Figure 6.12

Number (per Million) of Prevalent PD Patients New Zealand 2008-2012

	2008	2009	2010	2011	2012
APD / CAPD					
APD	288 (67.47)	337 (78.09)	359 (82.19)	350 (79.45)	366 (82.56)
CAPD	475 (111.27)	463 (107.28)	473 (108.29)	442 (100.34)	406 (91.58)
Location					
Home	758 (177.56)	796 (184.44)	828 (189.57)	788 (178.88)	758 (170.99)
Hospital	5 (1.17)	4 (0.93)	4 (0.92)	4 (0.91)	14 (3.16)
Total	763 (178.74)	800 (185.37)	832 (190.48)	792 (179.79)	772 (174.14)

Figure 6.13

Figure 6.14


New Zealand					
Stock and Flow of Peritoneal Dialysis by Age Groups 2008 - 2012					
Age Groups	2008	2009	2010	2011	2012
New Patients *					
00-14 years	10 (4%)	3 (1%)	3 (1%)	5 (2%)	6 (2%)
15-24 years	13 (5%)	4 (1%)	8 (3%)	4 (2%)	11 (4%)
25-34 years	11 (4%)	9 (3%)	9 (3%)	12 (5%)	10 (4%)
35-44 years	18 (7%)	28 (10%)	21 (8%)	21 (9%)	25 (10%)
45-54 years	58 (21%)	60 (21%)	41 (15%)	38 (16%)	60 (23%)
55-64 years	77 (28%)	63 (22%)	88 (32%)	72 (30%)	73 (28%)
65-74 years	65 (24%)	83 (29%)	70 (25%)	66 (27%)	63 (24%)
75-84 years	22 (8%)	33 (12%)	35 (13%)	23 (10%)	14 (5%)
>=85 years	0 (0%)	1 (0%)	0 (0%)	1 (0%)	1 (0%)
Total	274	284	275	242	263
Patients Dialysing					
00-14 years	13 (2%)	10 (1%)	7 (1%)	9 (1%)	4 (1%)
15-24 years	27 (4%)	26 (3%)	22 (3%)	22 (3%)	17 (2%)
25-34 years	30 (4%)	32 (4%)	29 (3%)	27 (3%)	33 (4%)
35-44 years	58 (8%)	62 (8%)	61 (7%)	58 (7%)	60 (8%)
45-54 years	140 (18%)	149 (19%)	132 (16%)	113 (14%)	122 (16%)
55-64 years	210 (28%)	205 (26%)	240 (29%)	231 (29%)	216 (28%)
65-74 years	183 (24%)	222 (28%)	226 (27%)	223 (28%)	226 (29%)
75-84 years	85 (11%)	83 (10%)	109 (13%)	103 (13%)	88 (11%)
>=85 years	17 (2%)	11 (1%)	6 (1%)	6 (1%)	6 (1%)
Total	763	800	832	792	772
Primary Renal Disease *					
Glomerulonephritis	65 (24%)	57 (20%)	65 (24%)	55 (23%)	59 (22%)
Analgesic Nephropathy	2 (1%)	0 (0%)	3 (1%)	3 (1%)	3 (1%)
Hypertension	35 (13%)	33 (12%)	36 (13%)	29 (12%)	22 (8%)
Polycystic Disease	12 (4%)	18 (6%)	7 (3%)	11 (5%)	13 (5%)
Reflux Nephropathy	4 (1%)	5 (2%)	3 (1%)	4 (2%)	7 (3%)
Diabetic Nephropathy	115 (42%)	128 (45%)	134 (49%)	106 (44%)	118 (45%)
Miscellaneous	27 (10%)	31 (11%)	20 (7%)	23 (10%)	32 (12%)
Uncertain	14 (5%)	12 (4%)	7 (3%)	11 (5%)	9 (3%)
Total	274	284	275	242	263

* New patients receiving first peritoneal dialysis treatment



PERITONEAL DIALYSIS FLUIDS

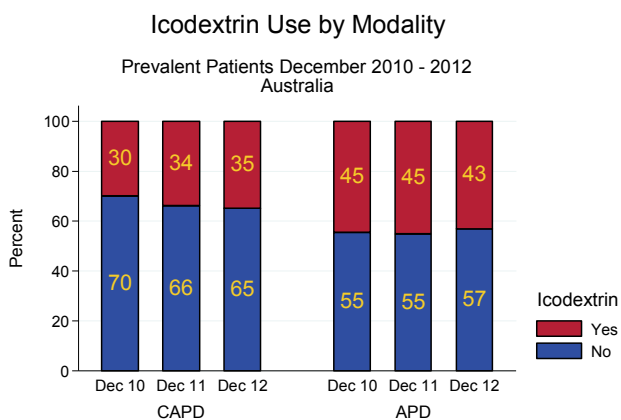
At the end of 2012, 34.23% of CAPD and 42.36% of APD patients were receiving Icodextrin in Australia (Figures 6.16 and 6.17). These proportions were lower for CAPD (29.31%) and higher for APD (68.58%) in New Zealand (Figure 6.18). There was also considerable variation between States in Icodextrin usage rates, with the highest rates seen in the South Australia for CAPD and Tasmania for APD (Figure 6.18, 6.19). Low GDP fluids (whether lactate or bicarbonate based fluids) were used infrequently in 2012, consistent with previous years (Figure 6.20 - 6.25). For figures 6.17 to 6.25, percentages are not graphed if fewer than 10 patients.

Figure 6.16

Icodextrin Usage by Modality Type - December 2012									
Modality Type	Australia				New Zealand				
	No	Yes	NR*	Total	No	Yes	NR*	Total	
CAPD	n	546	292	15	853	286	119	1	406
	%	64.01%	34.23%	1.76%		70.44%	29.31%	0.25%	
APD	n	768	582	24	1374	113	251	2	366
	%	55.90%	42.36%	1.75%		30.87%	68.58%	0.55%	
Total	n	1314	874	39	2227	399	370	3	772
	%	59.00%	39.25%	1.75%		51.68%	47.93%	0.39%	

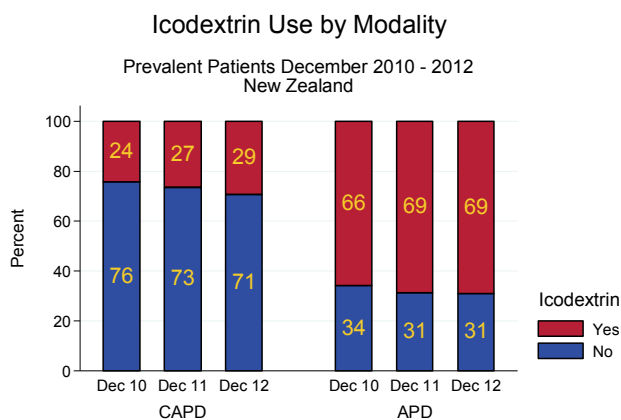
NR* - Not Reported

Figure 6.17



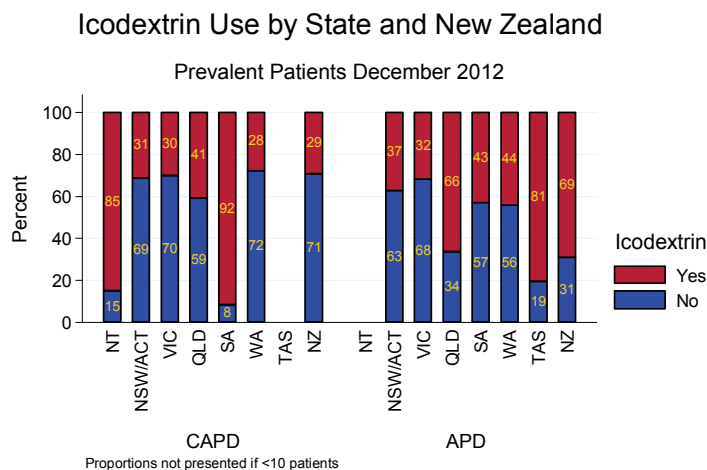
* Percentages are not graphed if fewer than 10 patients.

Figure 6.18



* Percentages are not graphed if fewer than 10 patients.

Figure 6.19



* Percentages are not graphed if fewer than 10 patients.

PERITONEAL DIALYSIS FLUIDS

Figure 6.20

Low GDP - Lactate Usage by Modality Type - December 2012

Modality Type	Australia				New Zealand				
	No	Yes	NR*	Total	No	Yes	NR*	Total	
CAPD	n	775	63	15	853	405	.	1	406
	%	90.86%	7.39%	1.76%		99.75%	.%	0.25%	
APD	n	1303	47	24	1374	355	9	2	366
	%	94.83%	3.42%	1.75%		96.99%	2.46%	0.55%	
Total	n	2078	110	39	2227	760	9	3	772
	%	93.31%	4.94%	1.75%		98.45%	1.17%	0.39%	

NR* - Not Reported

Figure 6.21

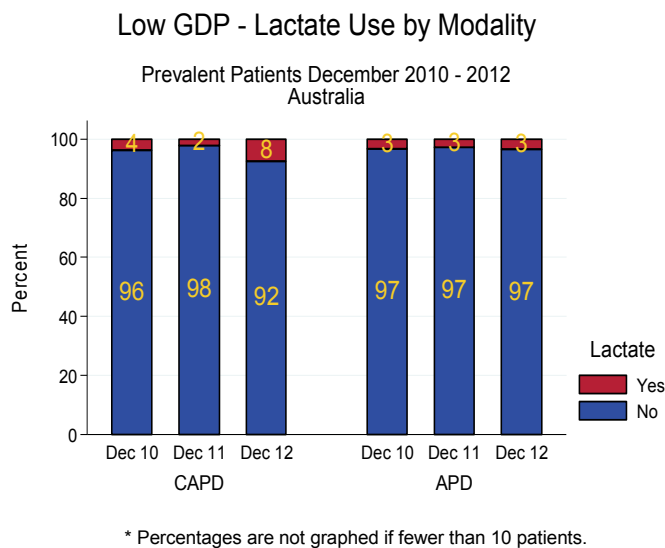
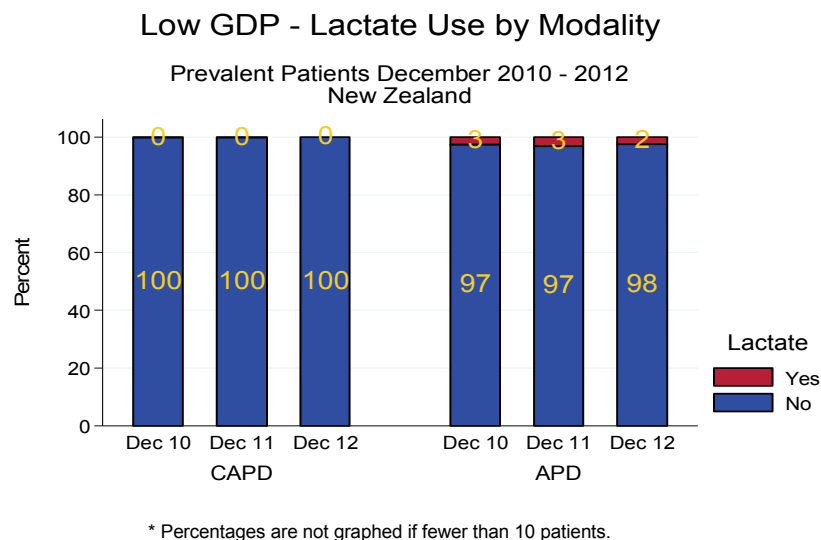


Figure 6.22





PERITONEAL DIALYSIS FLUIDS

Figure 6.23

Low GDP - Bicarb Usage by Modality Type - December 2012									
Modality Type	Australia				New Zealand				
	No	Yes	NR*	Total	No	Yes	NR*	Total	
CAPD	n	822	15	16	853	404	1	1	406
	%	96.37%	1.76%	1.88%		99.51%	0.25%	0.25%	
APD	n	1328	22	24	1374	362	2	2	366
	%	96.65%	1.60%	1.75%		98.91%	0.55%	0.55%	
Total	n	2150	37	40	2227	766	3	3	772
	%	96.54%	1.66%	1.80%		99.22%	0.39%	0.39%	

NR* - Not Reported

Figure 6.24

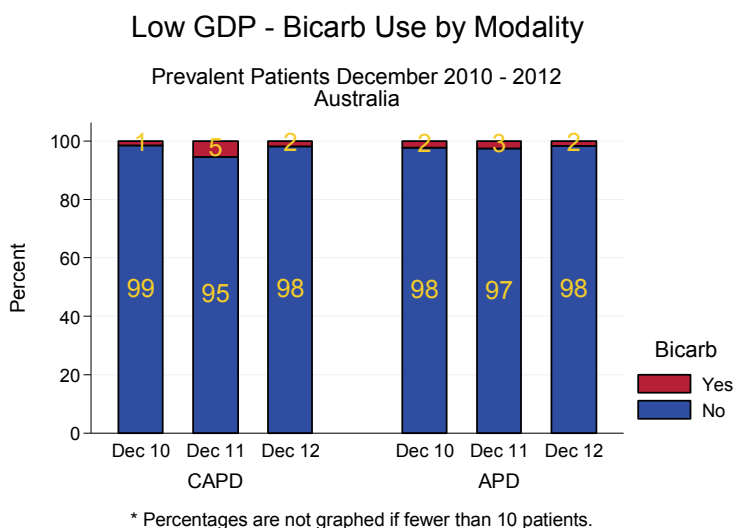
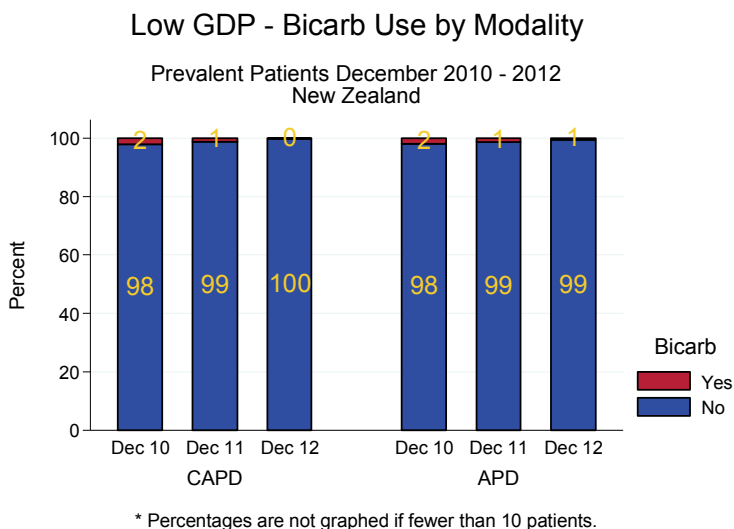


Figure 6.25



OUTCOMES AMONG PERITONEAL DIALYSIS PATIENTS

Figure 6.26

Peritoneal Dialysis at 90 Days Patient Survival 2001-2012, Censored for Transplant % [95% Confidence Interval]					
Year of Starting	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
2001-2003	1923	96 [95, 97]	89 [87, 90]	64 [61, 66]	42 [40, 45]
2004-2006	1968	96 [95, 97]	91 [90, 92]	67 [65, 70]	49 [46, 51]
2005-2009	2094	97 [97, 98]	92 [91, 93]	71 [69, 73]	52 [49, 55]
2010-2012	1950	97 [97, 98]	94 [93, 95]	-	-
New Zealand					
2001-2003	661	96 [95, 98]	87 [84, 89]	58 [54, 62]	37 [33, 41]
2004-2006	635	97 [96, 98]	91 [88, 93]	67 [63, 70]	44 [40, 48]
2005-2009	622	97 [95, 98]	92 [89, 94]	69 [65, 73]	47 [42, 52]
2010-2012	614	97 [96, 98]	92 [90, 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 2000.

In New Zealand PD patient survival has improved slightly for each cohort.

(Figures 6.26 - 6.28).

Diabetic PD patients had lower patient survival at later time points in both Australia and New Zealand (Figures 6.29 - 6.31).

As expected PD patient survival is closely related to age (Figures 6.32 -6.34).

Figure 6.27

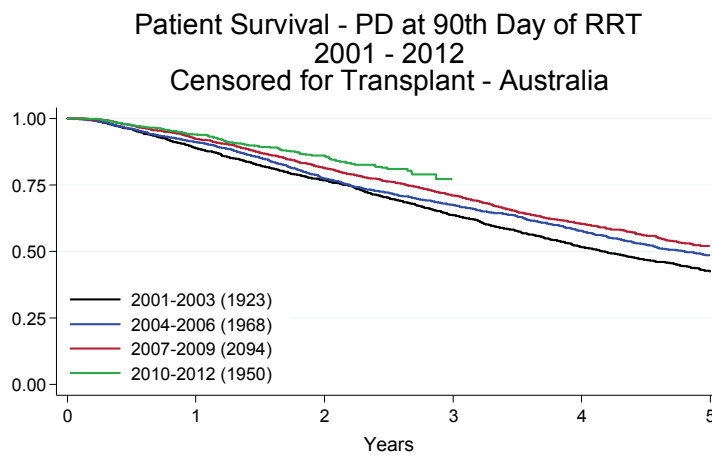


Figure 6.28

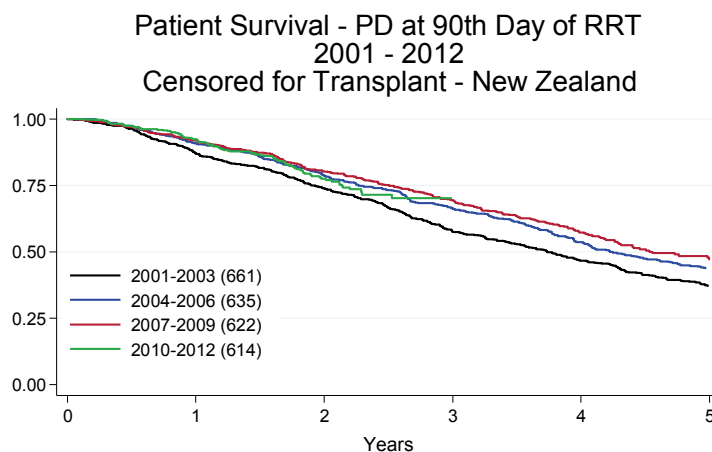




Figure 6.29

**Peritoneal Dialysis at 90 Days
Patient Survival - Diabetic / Non Diabetic
Censored for Transplant Commenced 2001 - 2012
% [95% Confidence Interval]**

	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
Non Diabetic	4730	97 [97, 98]	93 [92, 94]	74 [72, 75]	55 [53, 57]
Diabetic	3203	96 [95, 96]	89 [88, 90]	61 [59, 63]	39 [37, 41]
New Zealand					
Non Diabetic	1301	97 [96, 98]	92 [90, 93]	70 [67, 73]	52 [48, 55]
Diabetic	1231	97 [96, 98]	89 [87, 91]	59 [56, 62]	34 [31, 38]

Diabetic patients are those with diabetes as a comorbidity.
Previous reports categorised diabetics as those with diabetic nephropathy

Figure 6.30

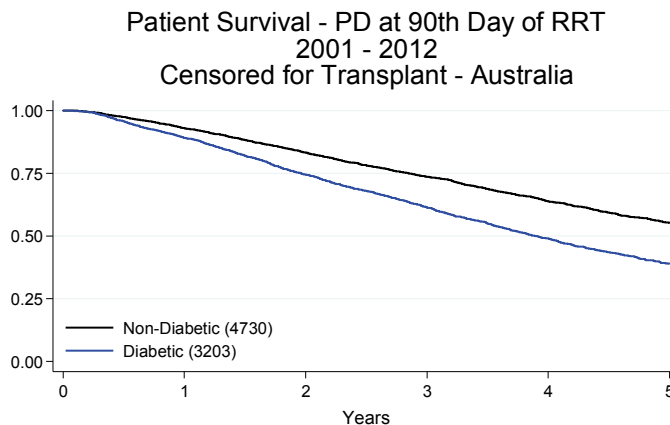


Figure 6.31

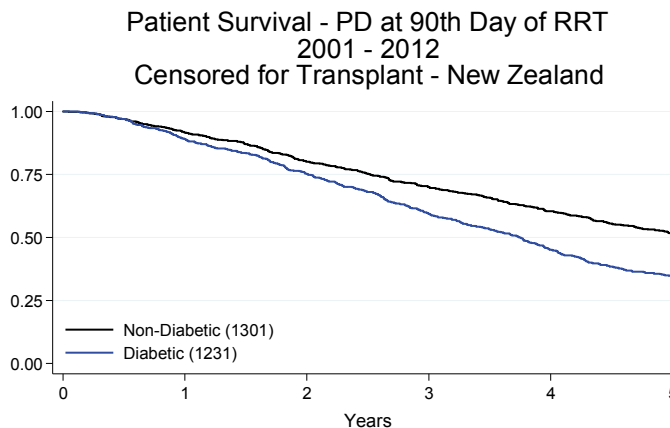
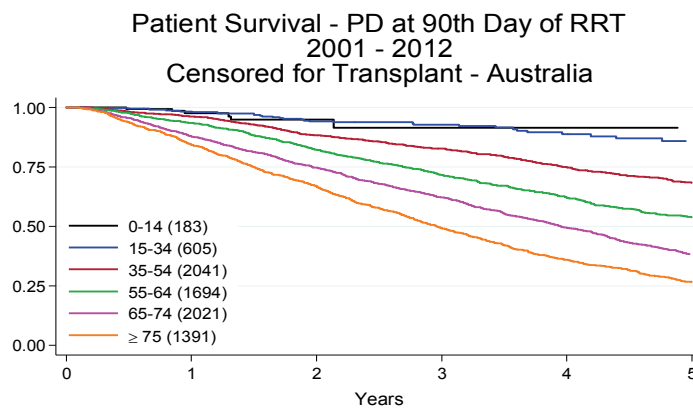
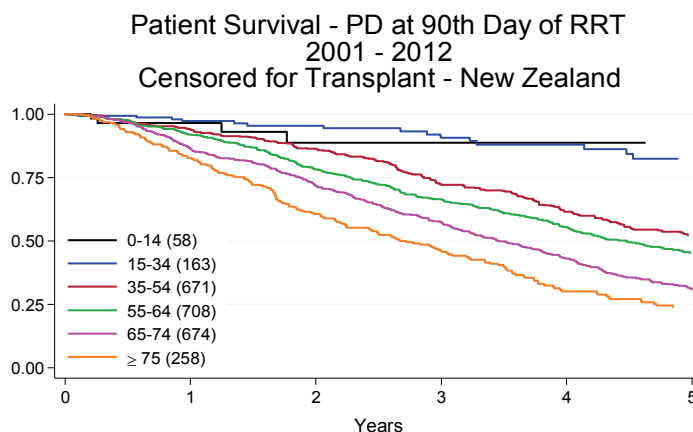


Figure 6.32

**Peritoneal Dialysis at 90 Days
Patient Survival - By Age Group
Censored for Transplant 2001 - 2012
% [95% Confidence Interval]**

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-14	183	99 [96, 100]	98 [93, 99]	91 [79, 97]	91 [79, 97]
15-34	605	99 [98, 100]	98 [97, 99]	93 [89, 95]	86 [80, 90]
35-54	2041	98 [97, 99]	96 [95, 97]	83 [81, 85]	68 [65, 71]
55-64	1694	98 [97, 98]	93 [92, 95]	72 [69, 74]	54 [51, 57]
65-74	2021	96 [95, 96]	88 [86, 89]	62 [60, 64]	38 [36, 41]
>= 75	1391	94 [92, 95]	84 [82, 86]	49 [46, 52]	27 [24, 29]
New Zealand					
0-14	58	96 [87, 99]	96 [87, 99]	89 [71, 96]	89 [71, 96]
15-34	163	99 [96, 100]	97 [93, 99]	91 [83, 95]	82 [72, 89]
35-54	671	97 [96, 98]	94 [92, 96]	72 [68, 76]	52 [47, 57]
55-64	708	98 [96, 99]	92 [90, 94]	66 [62, 70]	45 [41, 50]
65-74	674	97 [95, 98]	86 [83, 89]	57 [53, 61]	31 [27, 35]
>= 75	258	93 [89, 95]	83 [77, 87]	46 [40, 52]	24 [18, 30]

Figure 6.33

Figure 6.34




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 6.35-6.41 show Technical survival for patients receiving peritoneal dialysis. In those analysed, patients are censored at the time of transplantation.

Figure 6.35

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	5130	85 [84, 86]	73 [72, 74]	39 [37, 40]	19 [18, 21]
Diabetic	3501	82 [81, 83]	70 [68, 71]	30 [28, 31]	11 [10, 13]
New Zealand					
Non Diabetic	1378	89 [87, 91]	79 [77, 81]	45 [41, 48]	23 [20, 26]
Diabetic	1311	89 [87, 90]	76 [74, 79]	36 [33, 39]	14 [12, 16]

Figure 6.36

Technique Survival - PD at 90th Day of RRT
2001 - 2012
Censored for Transplant - Australia

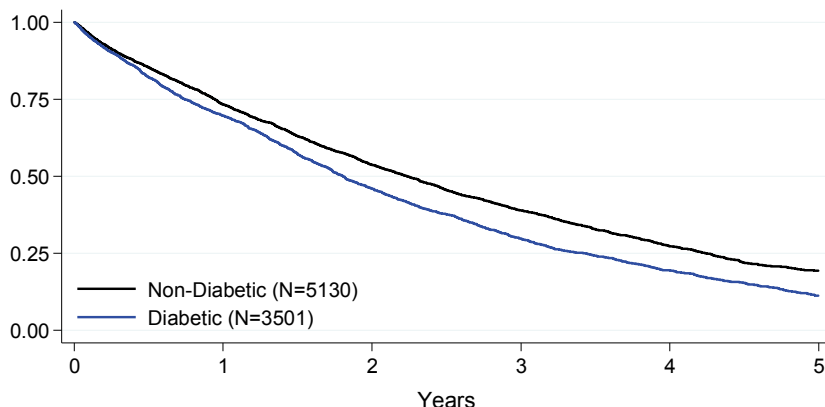


Figure 6.37

Technique Survival - PD at 90th Day of RRT
2001 - 2012
Censored for Transplant - New Zealand

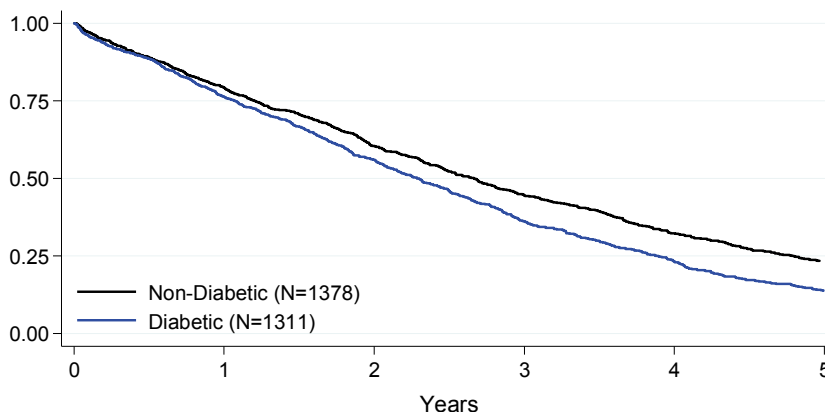
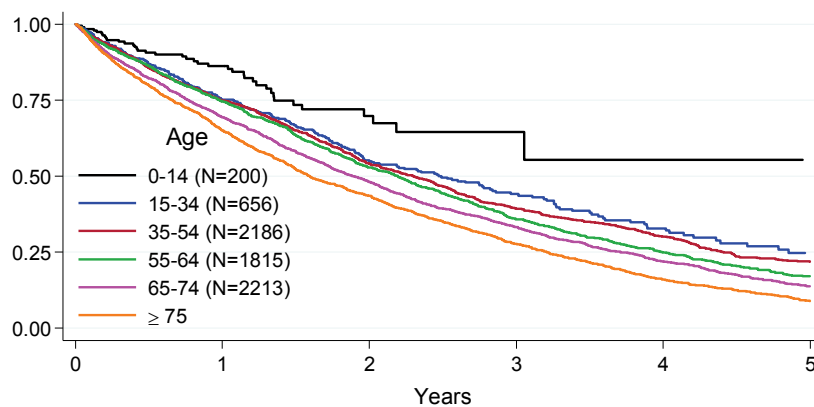


Figure 6.38

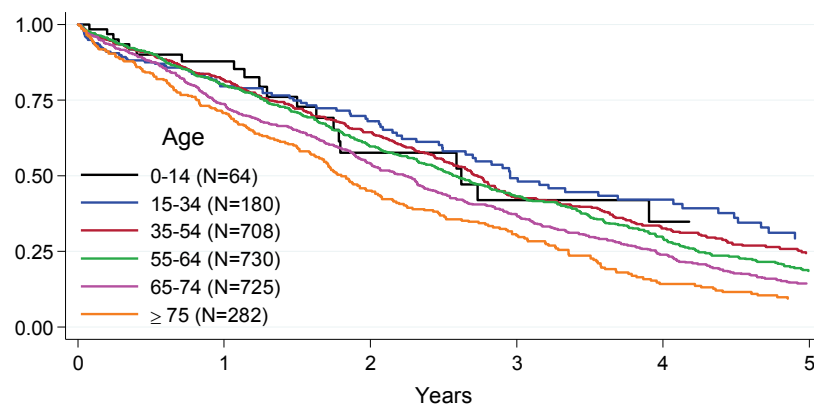
Peritoneal Dialysis at 90 Days Technique Survival - By Age Group Censored for Transplant 2001 - 2012 % [95% Confidence Interval]					
Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
2001-2003	2076	83 [81, 85]	70 [68, 72]	32 [30, 34]	13 [12, 15]
2004-2006	2138	84 [82, 85]	71 [69, 73]	33 [31, 35]	15 [13, 17]
2007-2009	2296	84 [82, 85]	72 [70, 74]	36 [34, 38]	18 [16, 20]
2010-2012	2123	85 [84, 87]	75 [73, 77]	-	-
New Zealand					
2001-2003	690	89 [87, 92]	77 [73, 80]	37 [33, 40]	15 [12, 18]
2004-2006	685	88 [85, 90]	76 [73, 79]	41 [37, 45]	19 [16, 22]
2007-2009	665	89 [86, 91]	79 [75, 82]	42 [38, 46]	21 [17, 25]
2010-2012	649	89 [86, 91]	80 [76, 83]	-	-

Figure 6.39

**Technique Survival - PD at 90th Day of RRT
2001 - 2012
Censored for Transplant - Australia**


Figure 6.40

**Technique Survival - PD at 90th Day of RRT
2001 - 2012
Censored for Transplant - New Zealand**





TECHNIQUE FAILURE (EXCLUDING DEATH OR TRANSPLANTATION)

Technique failure is analysed here as a change from peritoneal dialysis to haemodialysis and was still treated by haemodialysis at 30 days after the transfer date. In Australia, the most common primary cause of technique failure was due to infective causes (generally acute Peritonitis), rather than a technical cause or patient preference.

This accounted for 30% of transfers during 2012 (Figure 6.41).

Technical failures (primarily dialysate leak) were the second most common cause, followed by dialysis failure (generally inadequate solute clearance).

In New Zealand, the most common primary cause of technique failure was also due to infective causes, which accounted for 34% of transfers during 2011/2012 and technical failure of 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 6.41		
Causes of Technique Failure 1-Jan-2012 to 31-Dec-2012 Excluding Death, Transplantation, Recovery of Renal Function		
Causes of Technique Failure	Australia	New Zealand
Abdominal Abscess	4	2
Acute Peritonitis	81	26
Diverticulitis	2	
Recurrent/Persistent Peritonitis	52	18
Tunnel/Exit Site Infection	10	6
Unspecified Peritoneal Infection	6	
Total Infective Causes	155 (30%)	52 (34%)
Catheter Migrated	4	
Evacuation Of Hematoma	1	
Inadequate Fluid Ultrafiltration	26	16
Inadequate Solute Clearance	48	16
Total Dialysis Failure	79 (15%)	32 (21%)
Abdominal Pain	4	1
Cardiovascular Instability	2	1
Catheter Block	17	2
Catheter Fell Out	1	1
Dialysate Leak	34	5
Hernia	25	5
Hydrothorax	3	
Multiple Adhesions		2
Pleural Effusion	4	
Sclerosing Peritonitis	1	3
Scrotal Oedema	6	1
Surgery	24	12
Total Technical Failure	121 (23%)	33 (22%)
Geography-Poor Access Dialysis Service	1	
Patient Preference	25	6
Unable To Manage Self-Care	36	7
Total Patient Preference	63 (12%)	13 (9%)
Acute Pancreatitis	1	
Bronchiectasis	1	
Calciophylaxis	2	
Failure To Thrive	2	
Planned Transfer After Acute PD Start	2	1
Poor Nutrition	2	
Total Other	10 (2%)	1 (1%)
Total Not Reported	90 (17%)	20 (13%)

NB Figures relate to 2012 only. Previous data reflected a 2 year period.

PERITONITIS

Australian median time to first peritonitis was 24 months, with 37% of patients completely free of peritonitis at three years. In New Zealand the time was 21 months (32% of patients free of peritonitis at three years), (Figure 6.42). As noted in previous reports there is a strong association between ethnicity and peritonitis free survival (Figure 6.45).

The median peritonitis-free survival for home automated peritoneal dialysis patients was 32 months in Australia, and 33.7 months in New Zealand. Peritonitis rates in patients treated with APD and CAPD are very similar. This was explored in detail in a recent ANZDATA publication: Lan PG, Johnson DW, McDonald SP, Boudville N, Borlace M, Badve SV, et al. The Association between Peritoneal Dialysis Modality and Peritonitis. Clin J Am Soc Nephrol. 2014 Mar 13.

Figure 6.42

First PD Treatment to First Episode of Peritonitis By Age at First PD 01-Jan-2008 to 31-Dec-2012

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	(n=101)	(n=376)	(n=1187)	(n=987)	(n=1049)	(n=756)	(n=4456)
3 months	79 [69,85]	88 [84,91]	87 [85,89]	88 [85,90]	90 [88,92]	88 [85,90]	88 [87,89]
6 months	68 [57,76]	80 [76,84]	80 [77,82]	81 [78,83]	84 [81,86]	82 [79,85]	81 [80,82]
9 months	60 [48,70]	73 [68,78]	74 [71,77]	73 [70,76]	77 [74,80]	76 [72,79]	74 [73,76]
1 year	54 [41,65]	68 [62,73]	67 [64,70]	68 [64,71]	72 [69,75]	68 [64,72]	69 [67,70]
2 years	36 [20,52]	50 [42,57]	50 [46,54]	47 [43,51]	54 [50,58]	50 [45,55]	50 [48,52]
3 years	24 [6,47]	35 [26,44]	37 [32,42]	35 [30,40]	38 [33,43]	38 [33,44]	37 [34,39]
New Zealand	(n=27)	(n=93)	(n=379)	(n=378)	(n=350)	(n=111)	(n=1338)
3 months	80 [58,91]	92 [84,96]	89 [86,92]	87 [83,90]	85 [81,89]	86 [77,91]	87 [85,89]
6 months	52 [29,70]	83 [73,89]	78 [74,82]	78 [74,82]	77 [72,81]	80 [71,87]	78 [75,80]
9 months	52 [29,70]	72 [60,81]	71 [66,76]	72 [66,76]	70 [65,75]	74 [64,82]	71 [68,73]
1 year	45 [23,65]	68 [56,78]	62 [56,67]	64 [58,69]	63 [57,68]	67 [56,76]	63 [60,66]
2 years	45 [23,65]	40 [24,55]	44 [38,50]	48 [42,55]	44 [37,50]	51 [38,62]	45 [42,49]
3 years	-	25 [9,45]	29 [22,37]	38 [30,45]	28 [21,36]	41 [28,55]	32 [28,36]

% Survival [95% Confidence Interval]

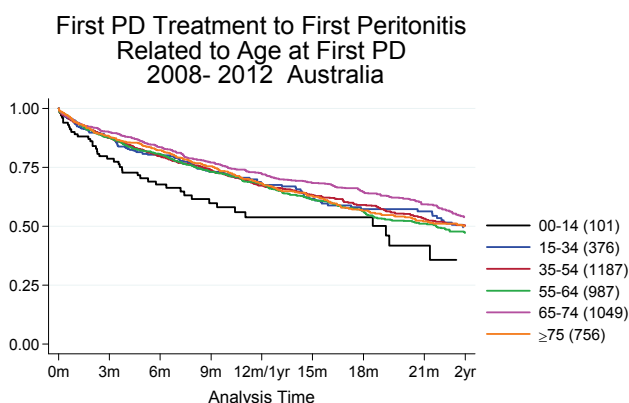
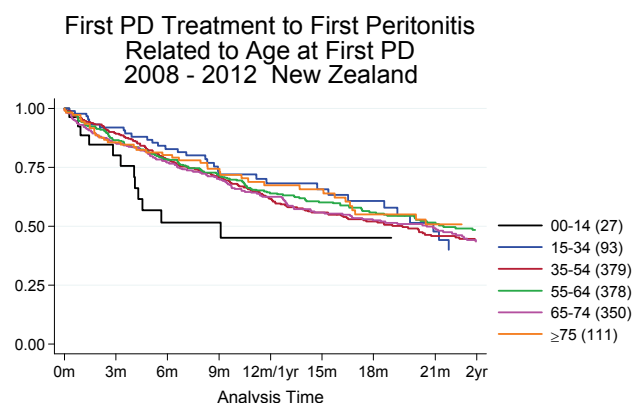
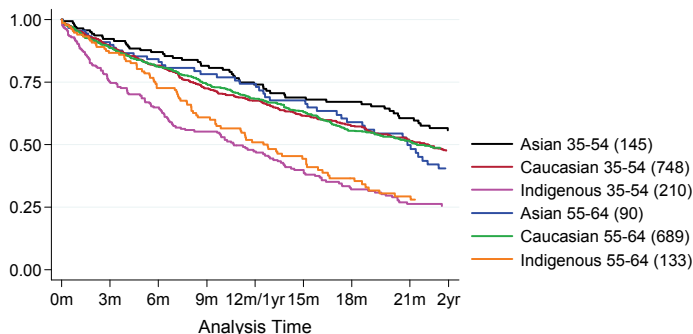
Figure 6.43

Figure 6.44




Figure 6.45

First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2003 - 2007 Australia



First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2008 - 2012 Australia

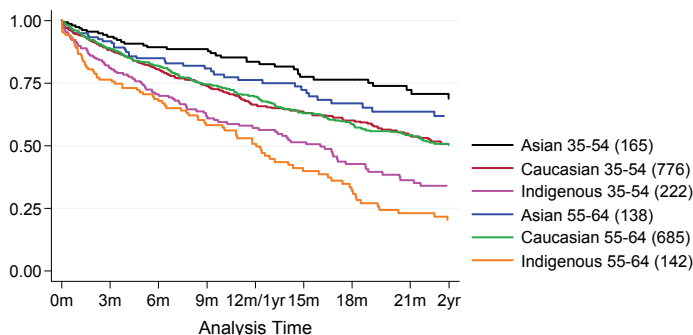
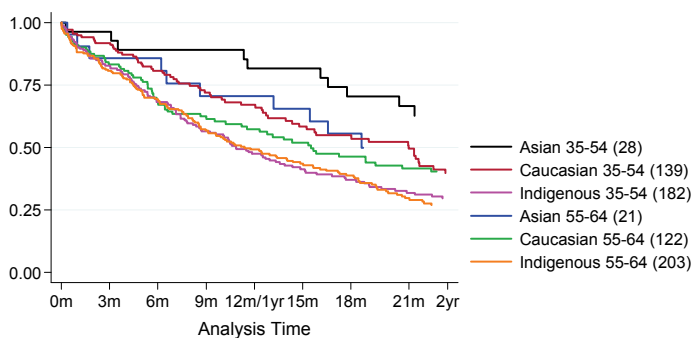


Figure 6.46

First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2003 - 2007 New Zealand



First PD Treatment to First Peritonitis
Related to Race and Age at First PD
2008 - 2012 New Zealand

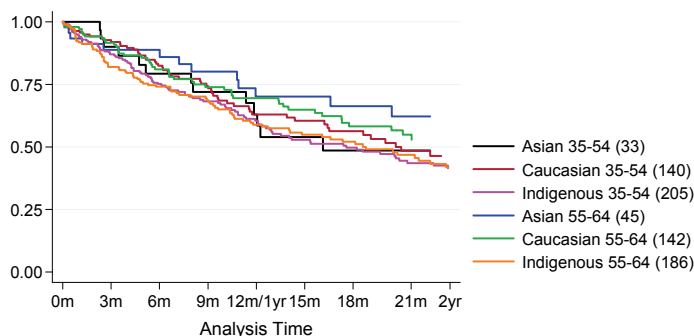


Figure 6.47

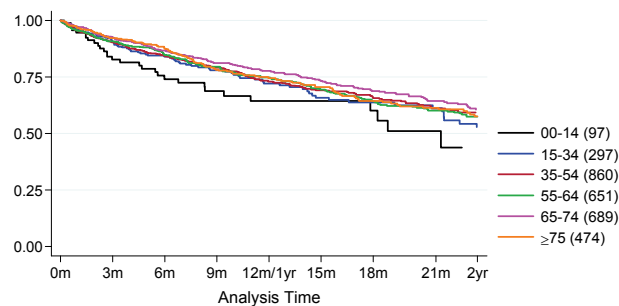
**First Home APD Treatment to First Episode of Peritonitis
By Age at Entry 01-Jan-2008 to 31-Dec-2012**

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	(n=97)	(n=297)	(n=860)	(n=651)	(n=689)	(n=474)	(n=3068)
3 months	83 [73, 89]	90 [86, 93]	90 [88, 92]	91 [88, 93]	93 [90, 94]	92 [89, 94]	91 [90, 92]
6 months	74 [63, 82]	84 [79, 88]	84 [82, 87]	85 [82, 88]	87 [84, 89]	88 [84, 90]	85 [84, 86]
9 months	69 [57, 78]	78 [72, 83]	79 [76, 82]	80 [76, 83]	81 [78, 84]	78 [74, 82]	79 [77, 81]
1 year	64 [51, 75]	72 [65, 78]	73 [69, 76]	75 [71, 79]	78 [74, 81]	75 [70, 79]	74 [72, 76]
2 years	44 [25, 62]	53 [43, 62]	59 [54, 64]	57 [52, 63]	61 [55, 66]	58 [51, 64]	58 [55, 60]
3 years	44 [25, 62]	37 [26, 48]	43 [37, 50]	53 [47, 59]	48 [41, 54]	46 [38, 55]	47 [43, 50]
New Zealand	(n=26)	(n=71)	(n=259)	(n=203)	(n=173)	(n=48)	(n=780)
3 months	88 [67, 96]	88 [77, 94]	89 [84, 92]	95 [91, 97]	92 [86, 95]	98 [85, 100]	92 [89, 93]
6 months	59 [36, 76]	84 [73, 91]	83 [78, 87]	89 [83, 93]	79 [71, 85]	95 [82, 99]	84 [81, 86]
9 months	52 [29, 71]	68 [54, 79]	78 [72, 83]	83 [76, 88]	73 [64, 80]	81 [64, 90]	77 [73, 80]
1 year	52 [29, 71]	66 [51, 77]	72 [65, 78]	75 [67, 81]	68 [59, 75]	71 [53, 84]	71 [67, 74]
2 years	52 [29, 71]	41 [24, 57]	61 [52, 68]	63 [54, 71]	56 [45, 65]	37 [15, 59]	57 [52, 62]
3 years	52 [29, 71]	34 [17, 52]	49 [37, 61]	56 [45, 66]	47 [34, 58]	-	48 [42, 54]

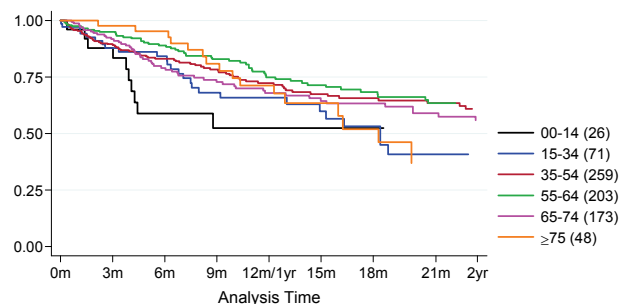
% Survival [95% Confidence Interval]

Figure 6.48

**First Home APD Treatment to First Peritonitis
Related to Age at First Home APD
2008 - 2012 Australia**



**First Home APD Treatment to First Peritonitis
Related to Age at First Home APD
2008 - 2012 New Zealand**





AUSTRALIAN PERITONITIS REGISTRY 1-OCT-2003 TO 31-DEC-2012

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 2012, the number of episodes of peritonitis has followed a continuing trend downwards, similar to previous years (shown in Figure 6.49). This is reflected in the overall rates per person-year (figure 6.50). Figure 6.51 shows the rates for each state of Australia. Although the absolute rates vary between states, the overall trend towards lower rates can be seen in most states.

Figure 6.49	
Number of Peritonitis Episodes	
Year	Number
2003 (from Oct)	250
2004	1,196
2005	1,072
2006	1,116
2007	1,254
2008	1,369
2009	1,345
2010	1,138
2011	927
2012	893
Total	9,647

Figure 6.50

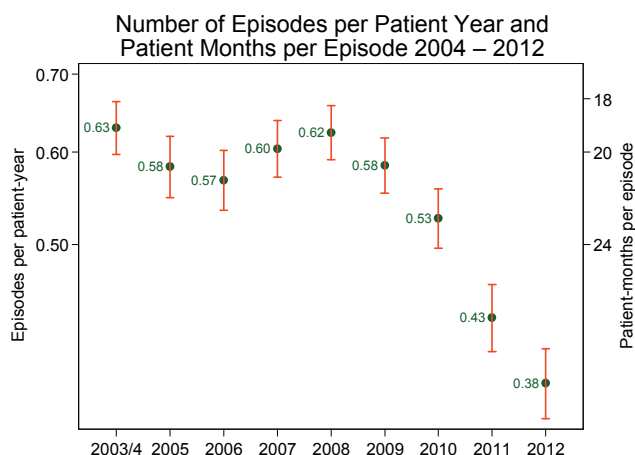
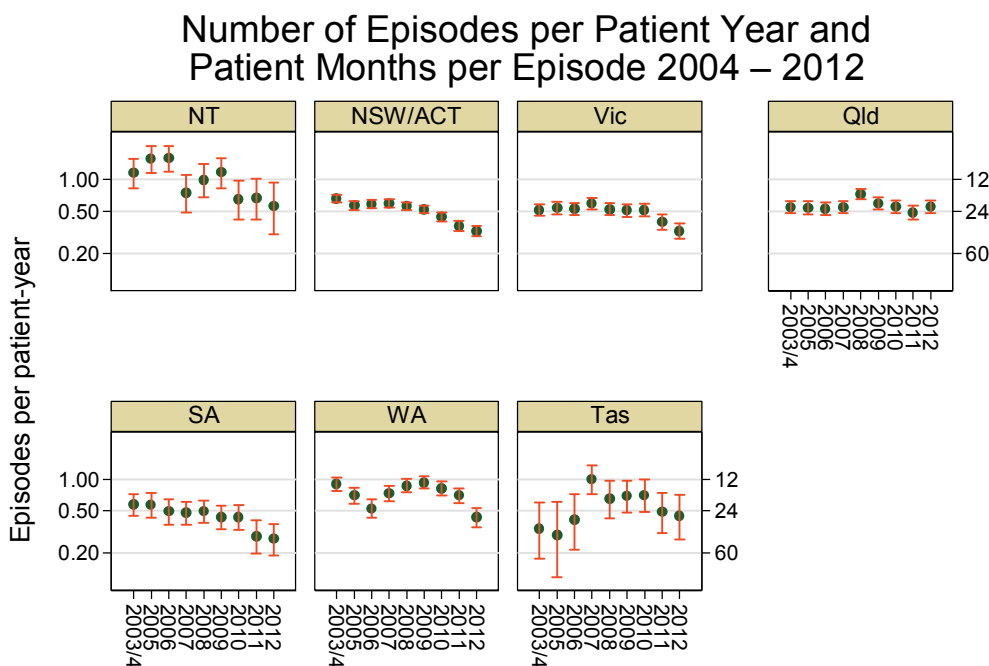


Figure 6.51

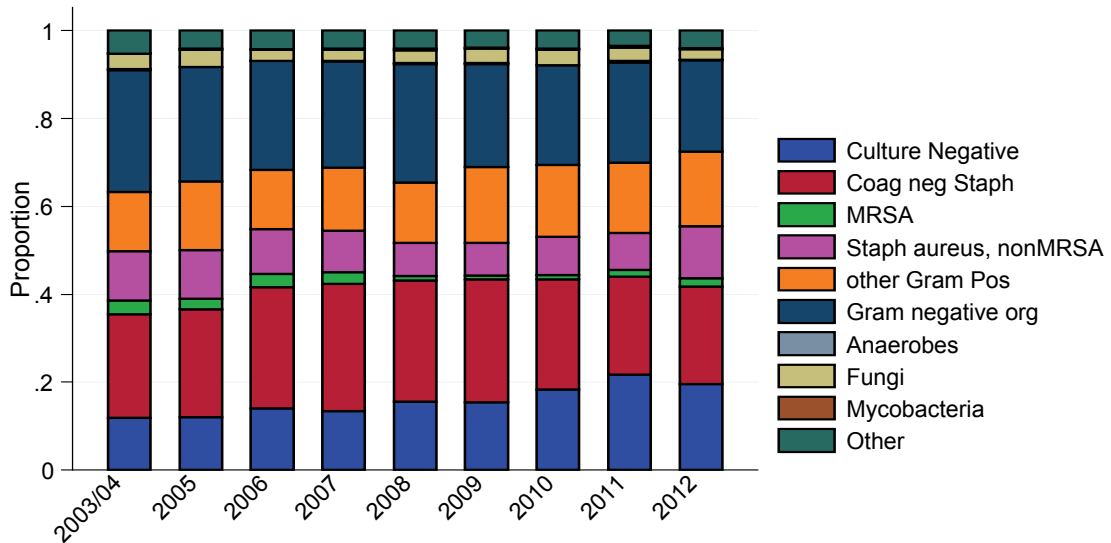


Graphs by Current state

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 decrease in 2012 of culture negative episodes (Figure 6.52). The Registry does not collect data on use of prior antibiotics or laboratory techniques that might influence the rate of culture negative peritonitis.

Figure 6.52

Distribution of Organisms Causing Peritonitis

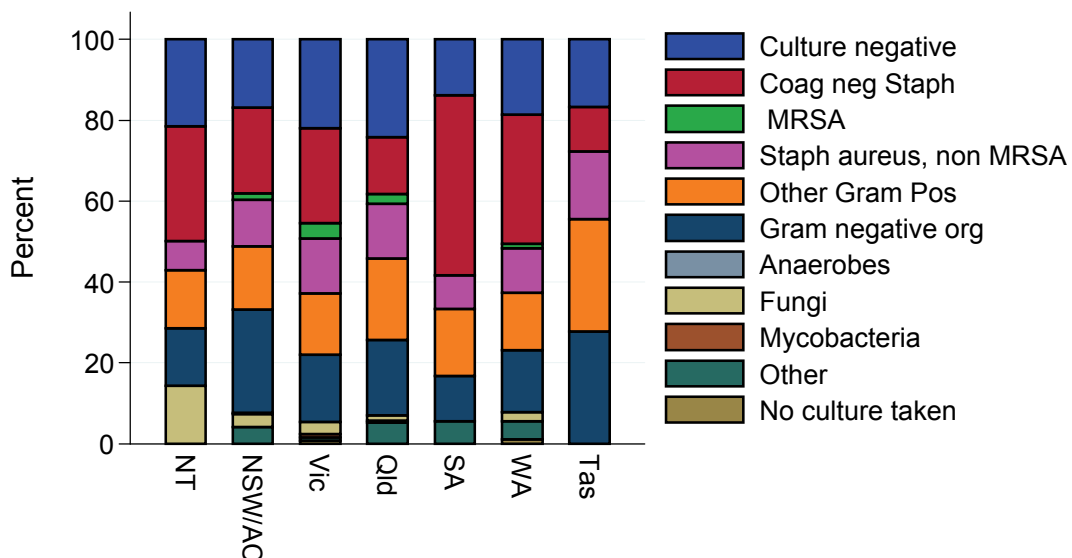


There remains quite widespread variation in the major organisms reported between the different states in Australia (Figure 6.53). We do not collect data about variation in prophylaxis, patient selection processes, PD training or other factors that might account for part or all of this variation.

Figure 6.53

PERITONITIS IN AUSTRALIA

Episodes during 2012

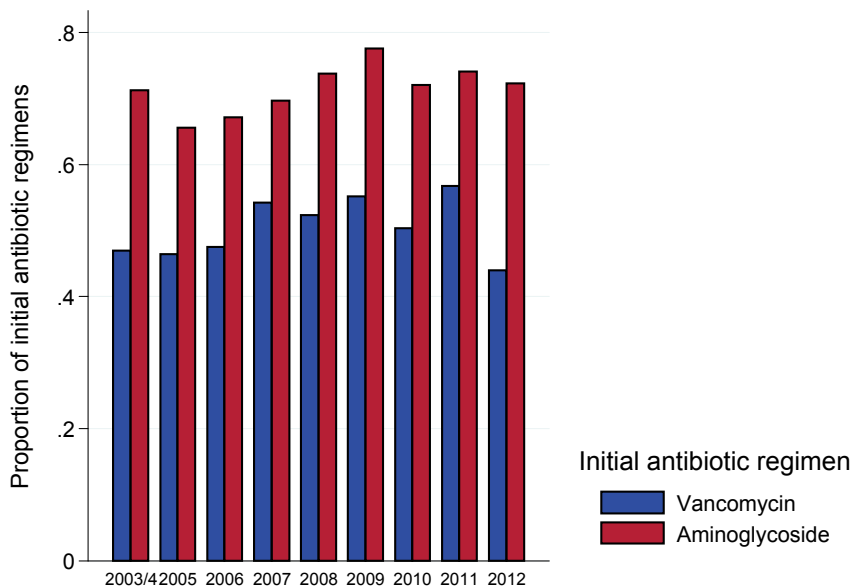




ANTIBIOTIC TREATMENT

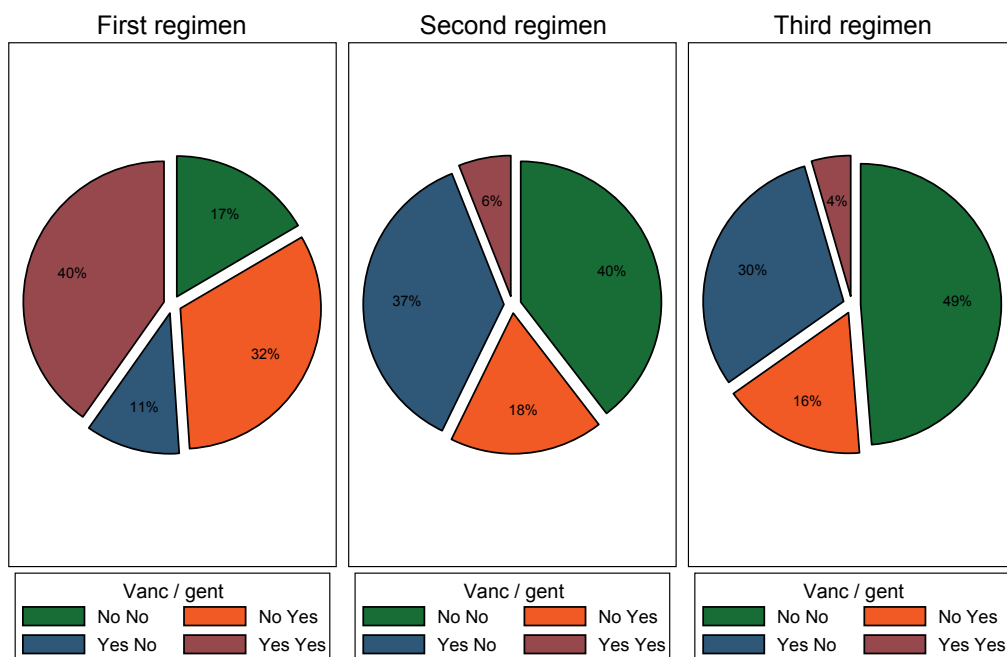
The proportion of episodes which were treated with an aminoglycoside-containing initial regimen has increased slightly over the period 2006-2009 but declined in 2010-2012. Similarly, the proportion treated with a regimen containing vancomycin is slowly increasing, but declined in 2010 and 2012 (Figure 6.54).

Figure 6.54



Among episodes of peritonitis treated during 2012, the proportion of those who received vancomycin in the initial or second antibiotic regimen is shown in Figure 6.55.

Figure 6.55

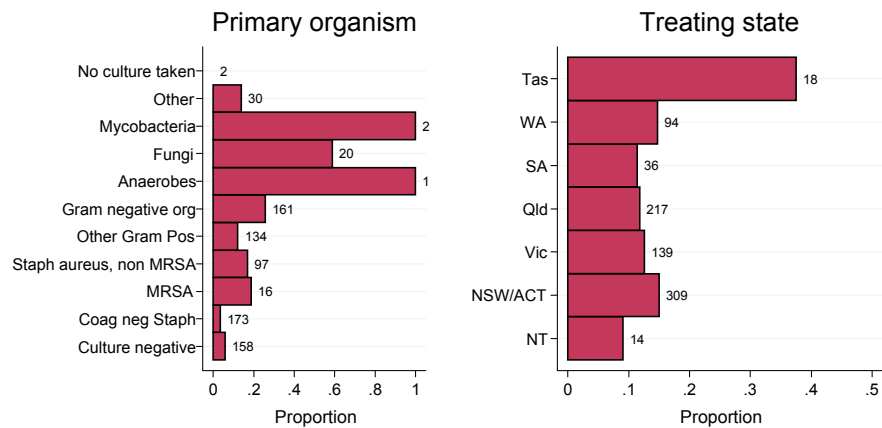


OUTCOMES

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 6.56

Proportion of Episodes Resulting in Permanent Haemodialysis Transfer



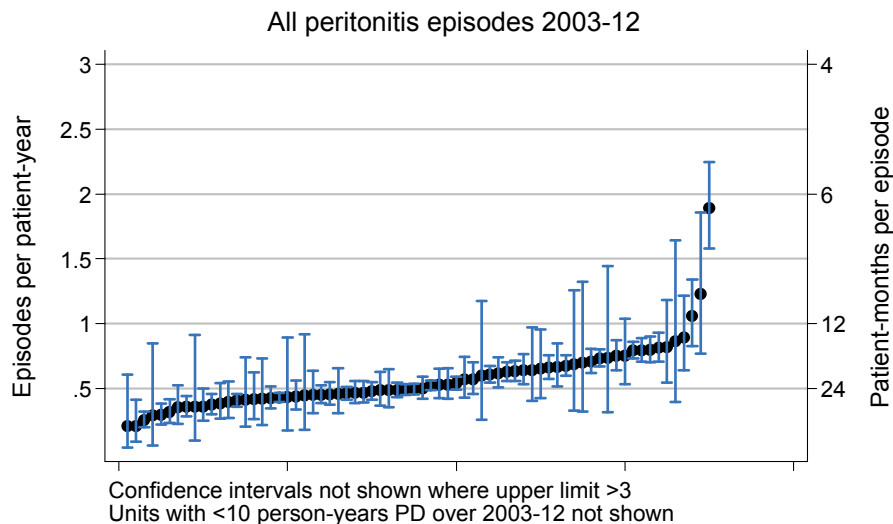
Values are total number of peritonitis episodes reported in 2012

RATES OF PERITONITIS ACROSS INDIVIDUAL UNITS

Figure 6.57 shows the peritonitis rates for all units in Australia over the period 1st October, 2003 to 31st December 2012. 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; this has been a pattern seen for a number of years.

Figure 6.57

Peritonitis rates by treating unit





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 6.58

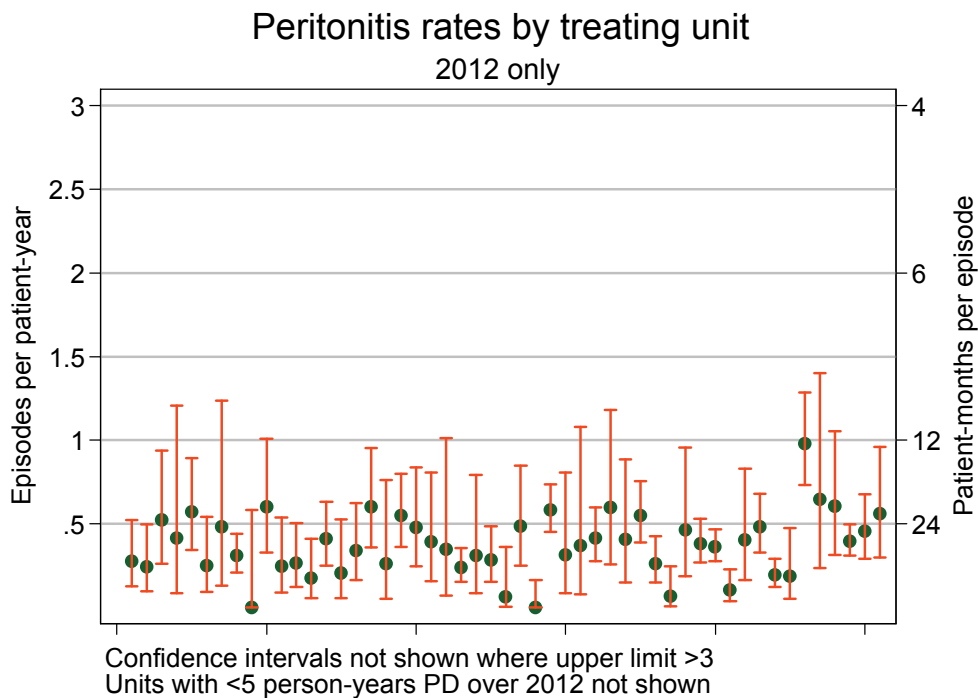
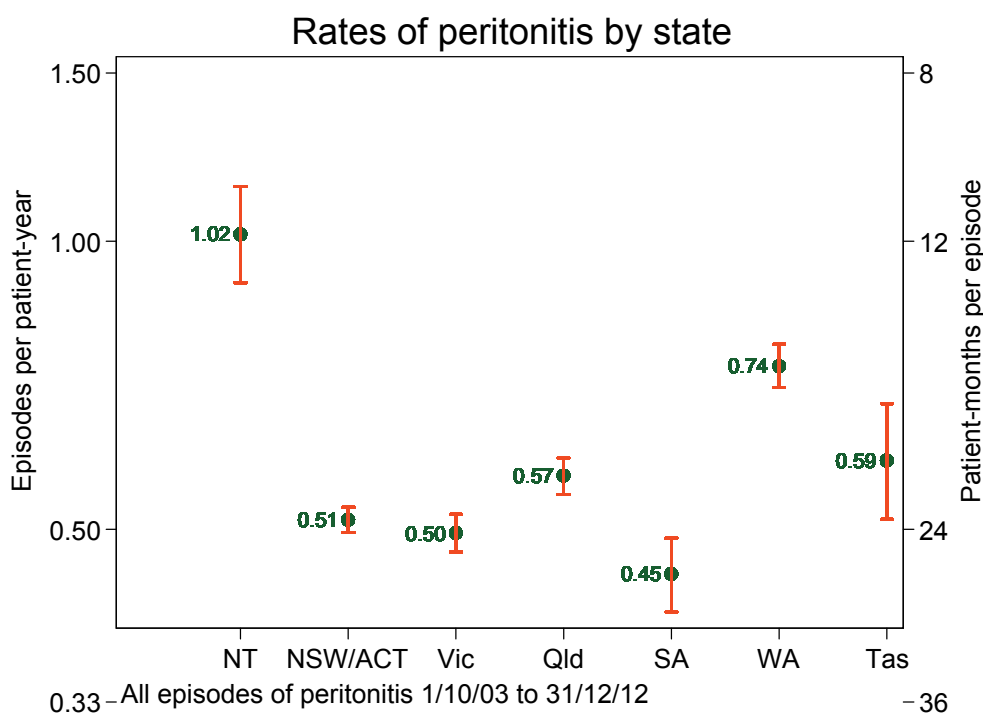


Figure 6.59



HAEMOGLOBIN

In Australia, at the end of 2012, haemoglobin was <110 g/L in 43% between 110-119 g/L in 28% of PD patients, the same as in 2012, and >140 g/L in 4%, which is similar to previous years.

In New Zealand, the corresponding percentages were very similar - 44%, 29% and 4% respectively.

Figure 6.61 shows the Haemoglobin levels in PD patients with proven or likely coronary artery disease .

Figure 6.60

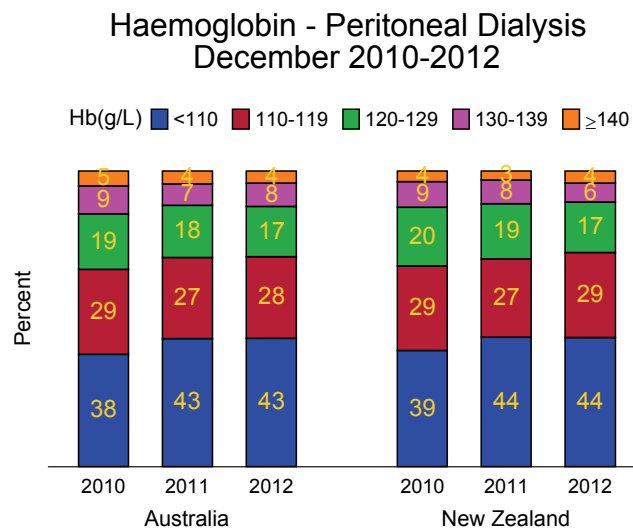
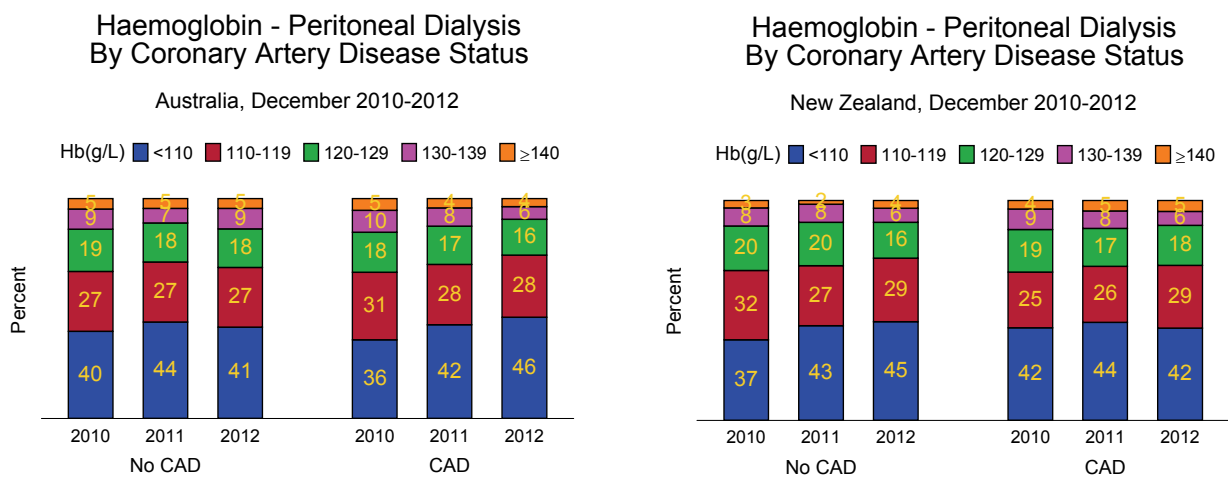


Figure 6.61





HAEMOGLOBIN IN PERITONEAL DIALYSIS PATIENTS BY TREATING CENTRE

Figures 6.62 - 6.65:

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 124 g/L for peritoneal dialysis patients and in New Zealand 104 -118 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 21% to 76% for peritoneal dialysis patients and for New Zealand 29% to 63%. This large variation is likely to reflect differences in practices, protocols and patient case-mix among centres.

Figure 6.62

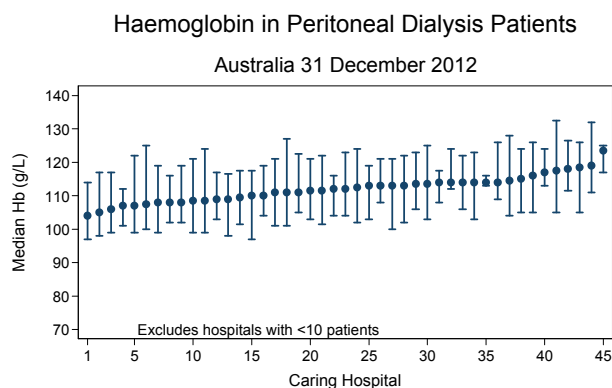


Figure 6.63

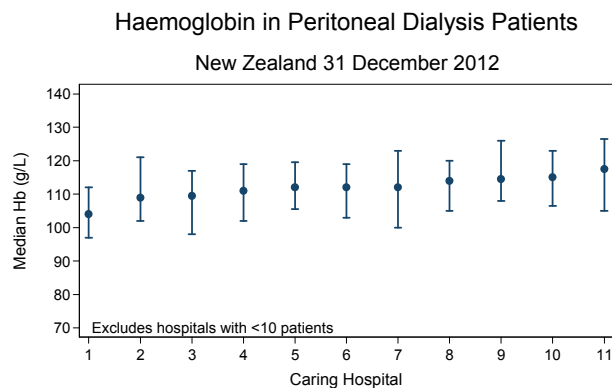


Figure 6.64

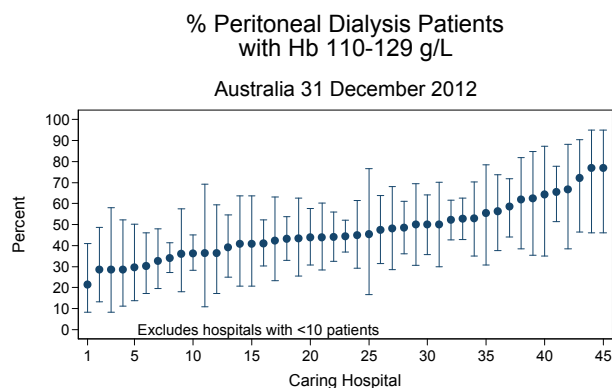
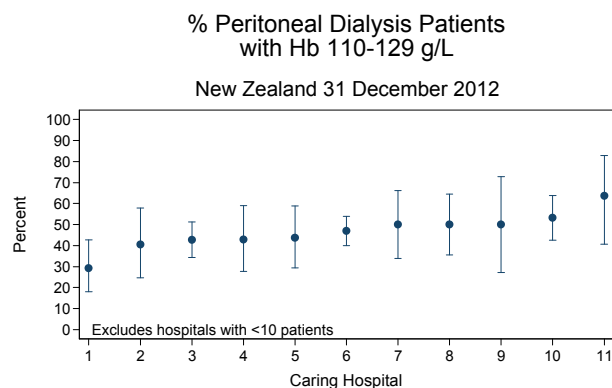


Figure 6.65



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 remained stable for the past three years.

Figure 6.66

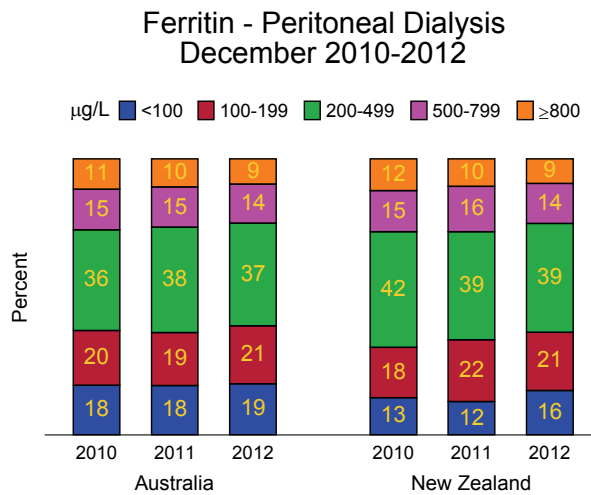
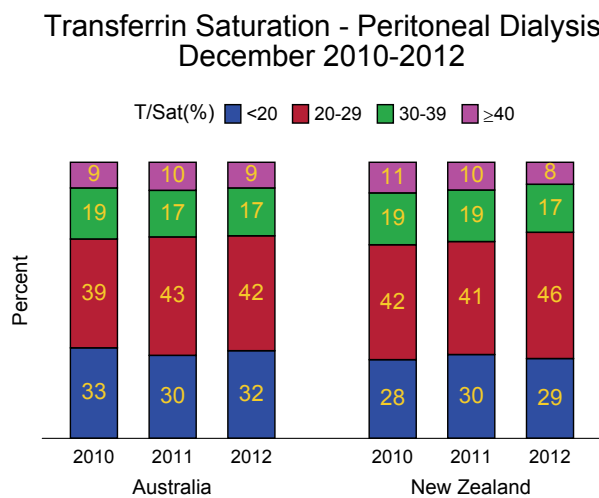


Figure 6.67





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 CARL guidelines, are shown in Figures 6.68-6.71.

In Australia, the proportions of patients with ferritin within this range in each centre varied widely between 8-61% for peritoneal dialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 31-85%. 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 24-48% for peritoneal dialysis patients and for transferrin saturation between 40-84%. In both countries, significant proportions of patients did not have ferritin and transferrin saturation within the recommended ranges.

Figure 6.68

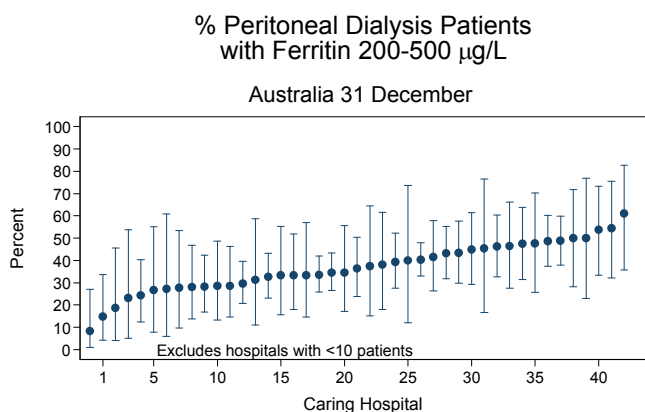


Figure 6.69

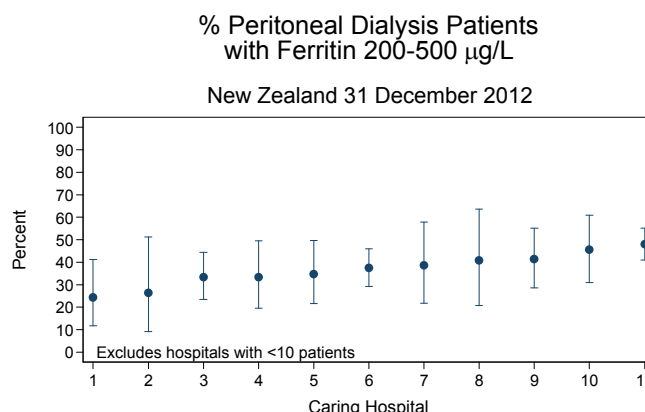


Figure 6.70

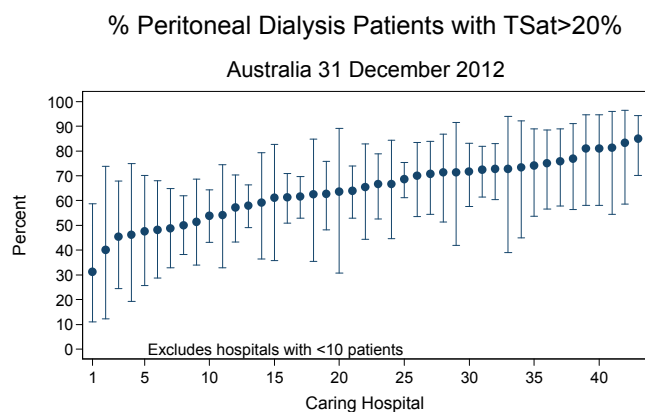
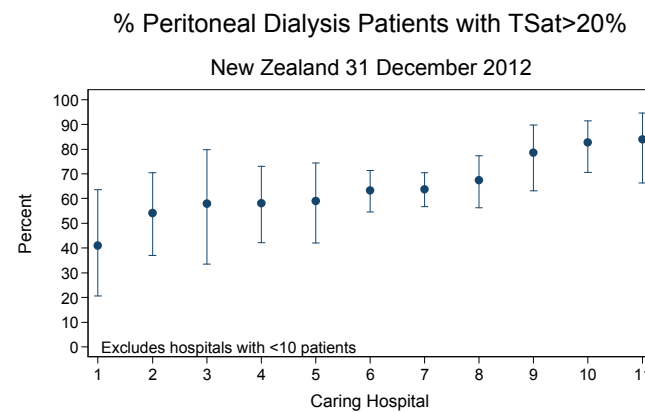


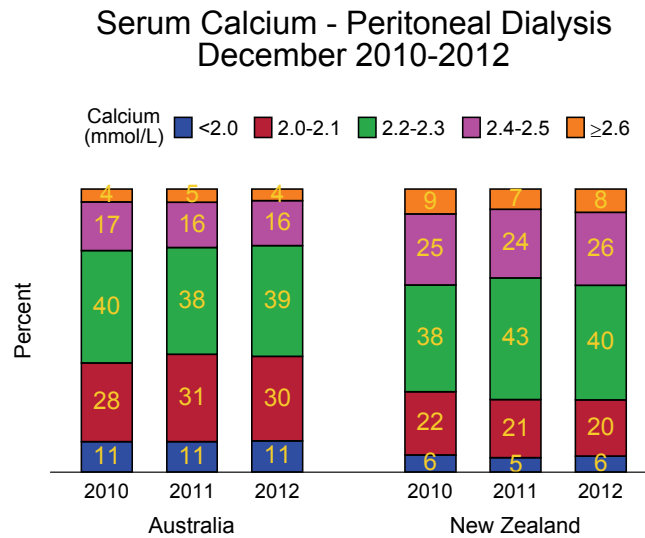
Figure 6.71



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 6.72)

Figure 6.72



SERUM CALCIUM BY TREATING CENTRE

Figures 6.73 and 6.74 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 34-75% for peritoneal dialysis patients, while in New Zealand the corresponding proportions were 52-72%.

Figure 6.73

% Peritoneal Dialysis Patients
with Calcium 2.1-2.4 mmol/L
Australia 31 December 2012

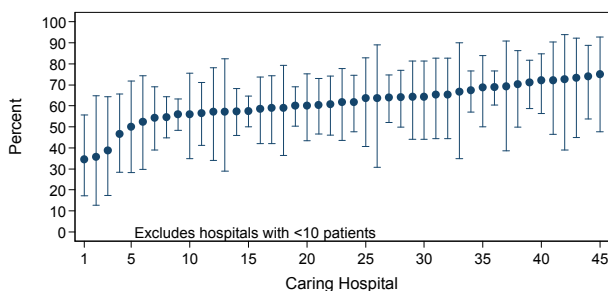
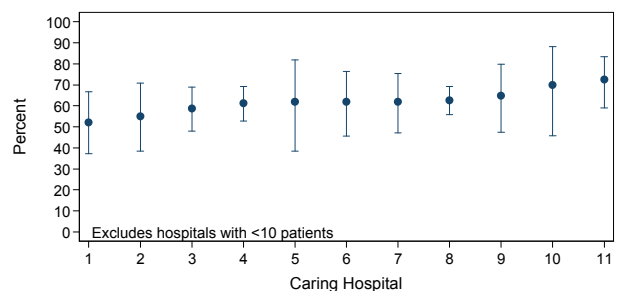


Figure 6.74

% Peritoneal Dialysis Patients
with Calcium 2.1-2.4 mmol/L
New Zealand 31 December 2012



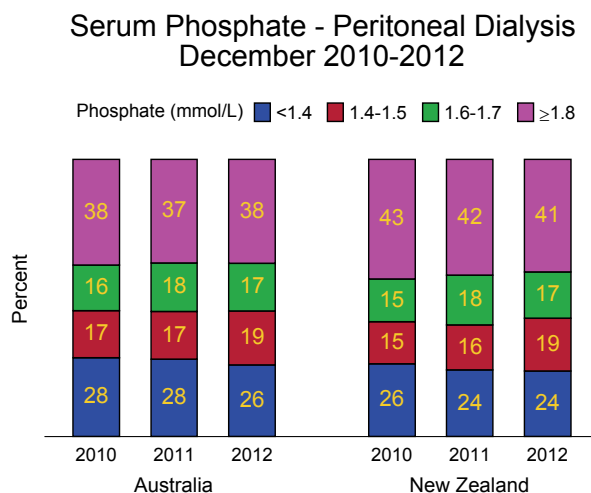


SERUM PHOSPHATE

In Australia, serum phosphate has stabilized over the last three years (reflected in the size of the ≥ 1.8 mmol/L group) (Figure 6.75)

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

Figure 6.75



SERUM PHOSPHATE BY TREATING CENTRE

Figures 6.76 - 6.77 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 8-80% for peritoneal dialysis patients and in New Zealand, the corresponding proportions were 32-55%.

Figure 6.76

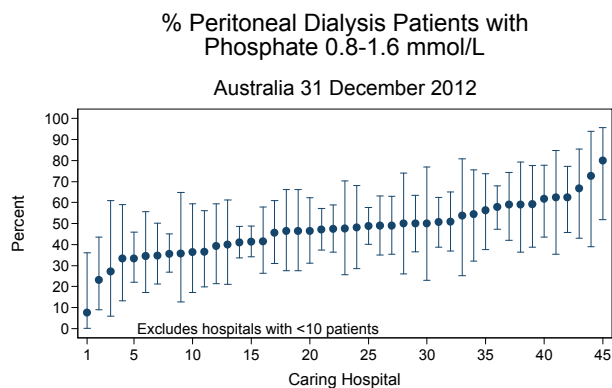
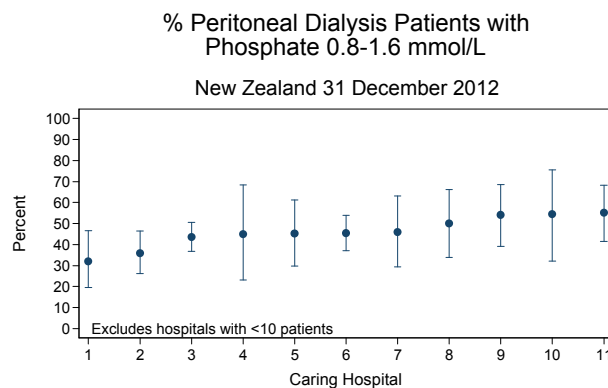


Figure 6.77

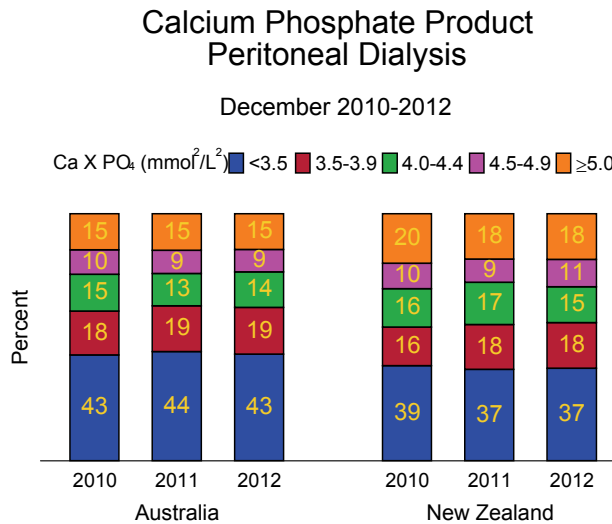


CALCIUM-PHOSPHATE PRODUCT

In both Australia and New Zealand, calcium-phosphate product has remained steady, with smaller proportions of patients with a product ≥ 3.5 mmol²/L² (Figure 6.82).

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

Figure 6.78



CALCIUM-PHOSPHATE PRODUCT BY TREATING CENTRE

Figures 6.79 - 6.80 show the proportions of patients at each centre with calcium-phosphate product <4.0 mmol²/L², as recommended by the CARI guidelines.

In Australia, the proportions ranged widely between 39-93% for peritoneal dialysis patients while in New Zealand, the corresponding proportions were 42-68%.

Figure 6.79

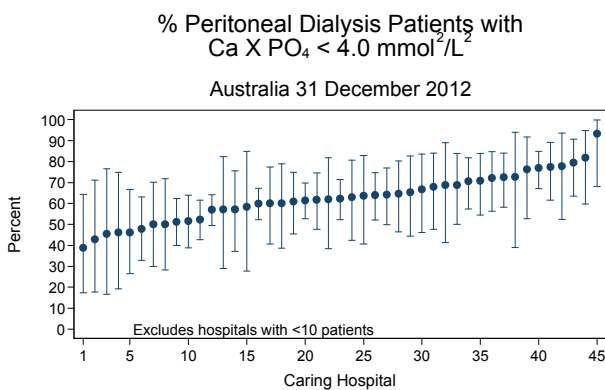


Figure 6.80

