

CHAPTER 6

PERITONEAL DIALYSIS

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STOCK AND FLOW

AUSTRALIA

In 2008, continuous ambulatory peritoneal dialysis was used to treat 9.5% of all dialysis patients (10% in 2007), and automated peritoneal dialysis 12%, the same as 2007. Together, these accounted for 70% of all home dialysis, a figure which has remained stable for a past number of years (Figure 6.1). Of the 22,594 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 50% in the (Australian Capital Territory), to 95% (South Australia) (Figure 6.1).

The prevalence of automated peritoneal dialysis increased 9% in 2008 (1249 patients) after a 16% increase in 2007 (1148 patients) and a 22% increase in 2006 (993 patients).

The annual stock and flow of patients during the period 2004-2008 is shown in Figures 6.3 and 6.4.

There were 965 new peritoneal dialysis patients in the calendar year 2008, an increase of 8% from last year following a decrease of 11% in 2007 after an increase of 21% in 2006. There were 632 patients (65%) who started renal replacement therapy with peritoneal dialysis, (26% of all new dialysis patients in 2008) and 333 (35%) who previously had haemodialysis or a failed transplant (Figure 6.3).

New patients over the age of 65 years increased 9%, from 358 to 392 in 2008, following a decrease of 16% in 2007 (Figure 6.8). The proportion of all dialysis patients receiving PD varied with age (Figure 6.9).

There were increases in all the age groups except the 0-14 year group which decreased (32%) in 2008. The increases were 15-24 years (78%), ≥ 85 years (50%), 25-34 years (14%), 45-54 years (10%), 65-74 years (9%), 75-84 years (8%), 35-44 years (4%) and 55-64 years (3%).

There were 293 deaths (296 in 2007), at a rate of 13.5 deaths per 100 person-years (Figure 3.9). For more detail see Appendix II at Website (www.anzdata.org.au/ANZDATA/AnzdataReport/download.htm).

There were 175 peritoneal dialysis patients who received a transplant in 2008 compared to 142 in 2007; this was 8% of all patients treated and 13% of patients <65 years treated during the year (Figure 6.3). Fifteen patients ≥ 65 years were transplanted.

Permanent transfer (>12 months) to haemodialysis occurred in 463 (21%) and 394 (18%) of patients in 2007. Most transfers to haemodialysis were permanent (463/584) (Figure 6.3).

The number of new patients to peritoneal dialysis with diabetic nephropathy as a primary renal disease increased 13% in 2008, following a 14% decrease in 2007; this group comprised 33% of all new peritoneal dialysis patients, similar to previous years. There was a 6% increase in 2008 in glomerulonephritis from 2007 (247 to 233 patients), following a decrease of 12% from 2006 (Figure 6.8).

Figure 6.1

Proportion (%) Peritoneal Dialysis of all Home Patients 2004 - 2008					
State	2004	2005	2006	2007	2008
Queensland	76%	75%	72%	69%	69%
New South Wales	59%	60%	62%	63%	66%
ACT	75%	73%	65%	60%	50%
Victoria	70%	70%	69%	66%	66%
Tasmania	79%	74%	81%	87%	85%
South Australia	88%	88%	92%	95%	95%
Northern Territory	88%	86%	65%	67%	62%
Western Australia	86%	90%	89%	90%	89%
Australia	69%	69%	69%	69%	70%
New Zealand	74%	71%	70%	69%	70%

Figure 6.2

Continuous Period of Peritoneal Dialysis 2008															
	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	18,555 pts	4969	3546	2543	1918	1531	1044	750	587	755	436	225	123	65	63
All Treatments	22,594 pts	6424	4361	3067	2293	1775	1216	885	677	863	497	248	139	71	78
New Zealand															
1st Treatment	5,283 pts	988	809	672	597	509	425	324	233	350	159	89	64	28	36
All Treatments	6,259 pts	1246	975	821	701	595	483	368	257	382	181	104	71	31	44

Figure 6.3

 Stock and Flow of Peritoneal Dialysis Patients
2004 - 2008

State	2004	2005	2006	2007	2008
Australia					
Patients new to PD	742	834	1009	893	965
First Dialysis Treatment	440	481	583	585	632
Previous Dialysis (HD)	287	344	408	287	301
Failed Transplant	15	9	18	21	32
Transplanted	151	124	136	142	175
Deaths	288	275	290	296	293
Never Transplanted	274	269	282	292	279
Previous Transplant	14	6	8	4	14
Permanent Transfers Out (>12 months)	365	394	411	394	463
Temporary Transfers (<12 months)	131	120	129	136	121
Patients Dialysing (PD) at 31 December	1794	1860	2050	2131	2205
Patients Dialysing (PD) at Home 31 December	1773	1834	2018	2205	2174
% of all Home Dialysis Patients	69%	69%	69%	69%	70%
New Zealand					
Patients new to PD	277	252	298	240	272
First Dialysis Treatment	173	148	160	131	152
Previous Dialysis (HD)	99	101	127	103	114
Failed Transplant	5	3	11	6	6
Transplanted	39	35	23	37	28
Deaths	153	148	152	120	123
Never Transplanted	147	143	149	113	116
Previous Transplant	6	5	3	7	7
Permanent Transfers Out (>12 months)	114	99	83	106	116
Temporary Transfers (<12 months)	37	30	53	42	31
Patients Dialysing (PD) at 31 December	745	719	767	745	762
Patients Dialysing (PD) at Home 31 December	742	714	759	741	757
% of all Home Dialysis Patients	74%	71%	71%	69%	70%

Figure 6.4

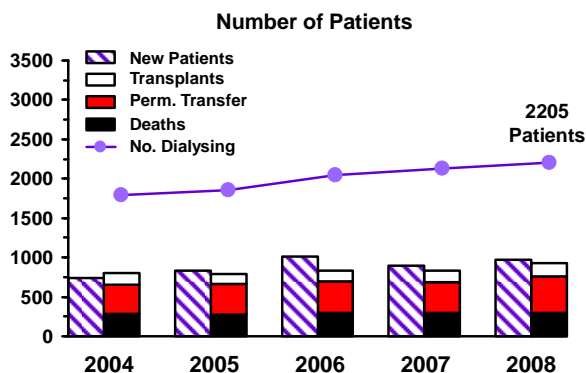
 Stock and Flow of Peritoneal Dialysis Patients
Australia 2004 - 2008


Figure 6.5

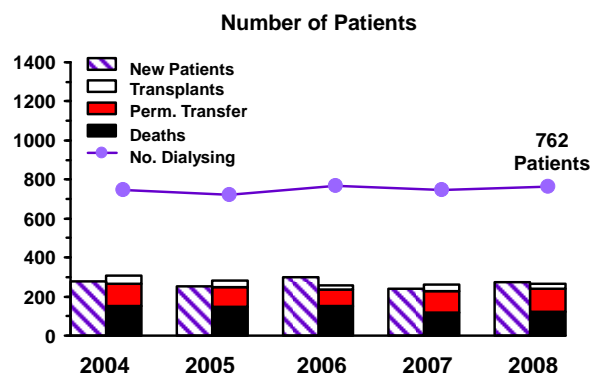
 Stock and Flow of Peritoneal Dialysis Patients
New Zealand 2004 - 2008




Figure 6.6

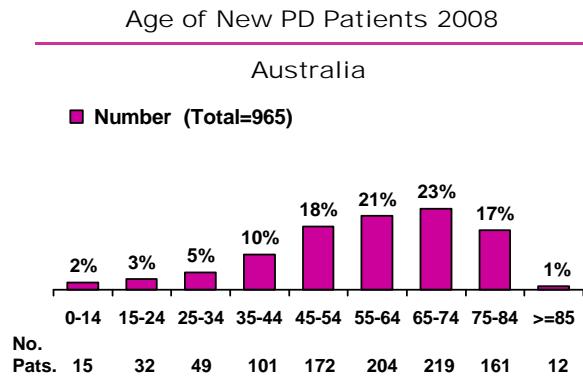


Figure 6.7

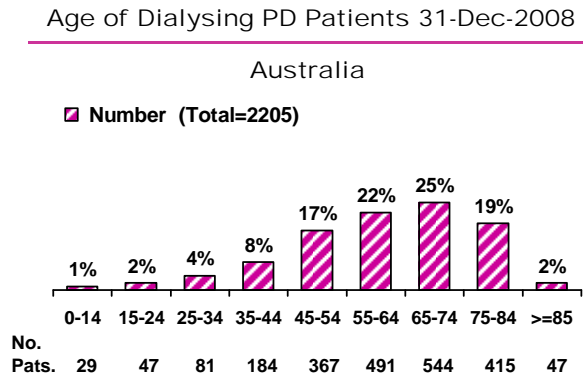


Figure 6.8

Australia

Stock and Flow of Peritoneal Dialysis by Age Groups 2004 - 2008

Age Groups	2004	2005	2006	2007	2008
New Patients *					
00-14 years	16 (2%)	10 (1%)	16 (1%)	22 (2%)	15 (2%)
15-24 years	19 (3%)	20 (2%)	20 (2%)	18 (2%)	32 (3%)
25-34 years	33 (5%)	43 (5%)	60 (6%)	43 (5%)	49 (5%)
35-44 years	77 (10%)	89 (11%)	97 (10%)	97 (11%)	101 (10%)
45-54 years	127 (17%)	114 (14%)	170 (17%)	157 (17%)	172 (18%)
55-64 years	156 (21%)	189 (23%)	218 (22%)	198 (22%)	204 (21%)
65-74 years	204 (27%)	215 (26%)	250 (25%)	201 (23%)	219 (23%)
75-84 years	102 (14%)	141 (17%)	169 (17%)	149 (17%)	161 (17%)
≥ 85 years	8 (1%)	13 (1%)	9 (<1%)	8 (1%)	12 (1%)
Total	742 (100%)	834 (100%)	1009 (100%)	893 (100%)	965 (100%)
Patients Dialysing					
00-14 years	27 (1%)	18 (1%)	22 (1%)	34 (2%)	29 (1%)
15-24 years	29 (2%)	29 (2%)	27 (1%)	25 (1%)	47 (2%)
25-34 years	75 (4%)	67 (3%)	86 (4%)	76 (3%)	81 (4%)
35-44 years	179 (10%)	182 (10%)	192 (9%)	202 (9%)	184 (8%)
45-54 years	269 (15%)	264 (14%)	310 (15%)	334 (15%)	367 (17%)
55-64 years	375 (21%)	421 (23%)	464 (23%)	478 (23%)	491 (22%)
65-74 years	512 (29%)	499 (27%)	531 (26%)	548 (26%)	544 (25%)
75-84 years	311 (17%)	354 (19%)	385 (19%)	402 (19%)	415 (19%)
≥ 85 years	17 (1%)	26 (1%)	33 (2%)	32 (2%)	47 (2%)
Total	1794 (100%)	1860 (100%)	2050 (100%)	2131 (100%)	2205 (100%)
Primary Renal Disease *					
Glomerulonephritis	204 (27%)	204 (24%)	265 (26%)	233 (26%)	247 (26%)
Analgesic Nephropathy	18 (3%)	31 (4%)	26 (3%)	17 (2%)	28 (3%)
Hypertension	105 (15%)	117 (14%)	138 (14%)	130 (15%)	114 (12%)
Polycystic Disease	46 (6%)	52 (6%)	52 (5%)	46 (5%)	63 (6%)
Reflux Nephropathy	18 (3%)	29 (4%)	42 (4%)	30 (3%)	39 (4%)
Diabetic Nephropathy	233 (31%)	274 (33%)	325 (32%)	280 (31%)	317 (33%)
Miscellaneous	80 (10%)	70 (8%)	110 (11%)	99 (11%)	77 (8%)
Uncertain	38 (5%)	57 (7%)	51 (5%)	58 (7%)	80 (8%)
Total	742 (100%)	834 (100%)	1009 (100%)	893 (100%)	965 (100%)

* New patients receiving first peritoneal dialysis treatment

Figure 6.9

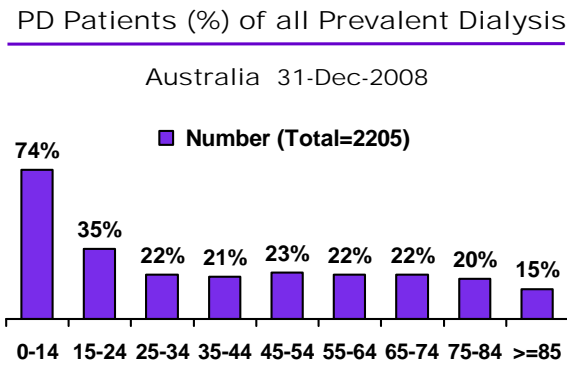


Figure 6.10

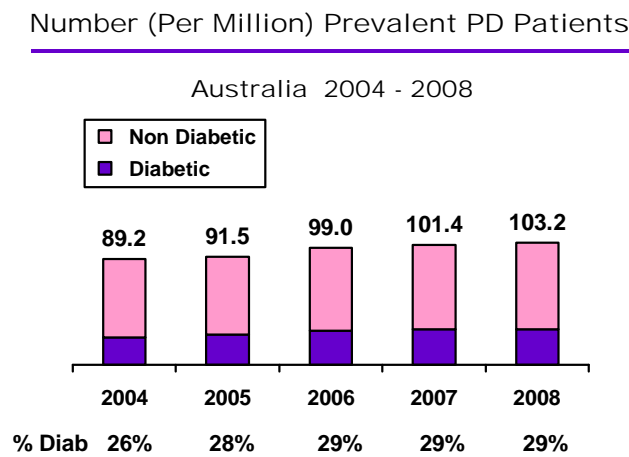


Figure 6.11

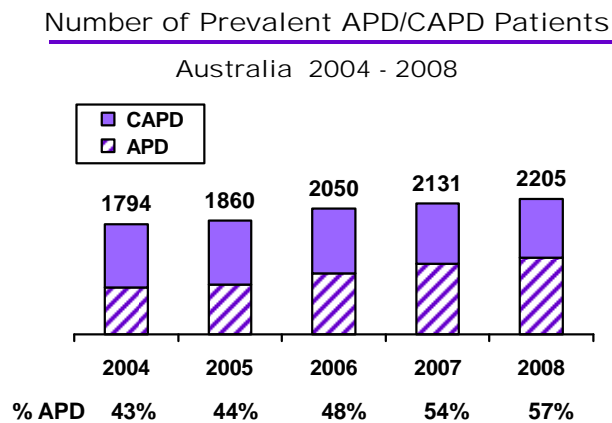




Figure 6.12

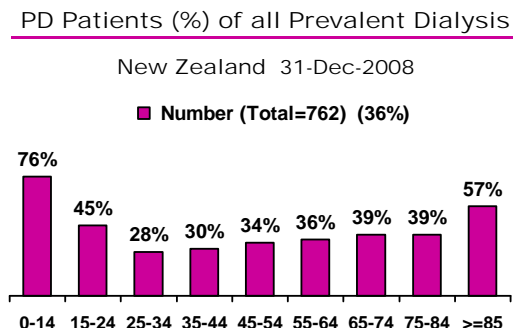


Figure 6.13

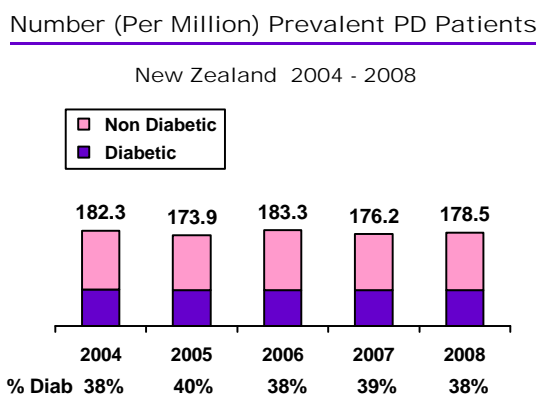
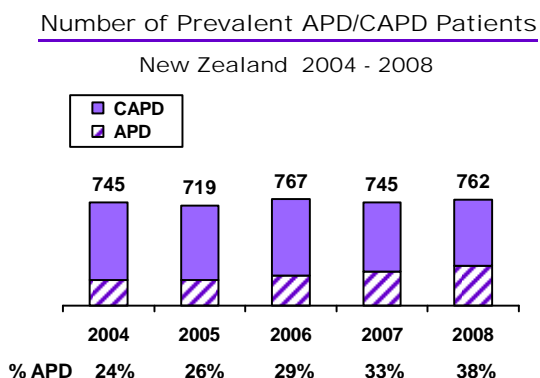


Figure 6.14



NEW ZEALAND

The annual stock and flow of patients during the period 2004 to 2008 is shown in Figures 6.3 and 6.5. Of the 6,259 patients treated since 1978, 762 (12%) were alive at 31st December, 2008; 431 (7%) had more than five years continuous treatment (Figure 6.2).

Peritoneal dialysis accounted for 36% of all dialysis patients and 70% of all patients dialysing at home. A substantially lower proportion of patients used automated PD than in Australia. Thirty eight percent of all peritoneal dialysis in 2008 was automated compared with 33% in 2007 and 29% in 2006.

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

There were 272 new peritoneal dialysis patients in calendar year 2008, an increase of 13% from 2007 (240 patients), after a decrease of 19% from 2006 (298 patients). For 56%, peritoneal dialysis was the initial dialysis treatment (Figures 6.15 and 6.17).

For more detail see Appendix III at Website (www.anzdata.org.au/ANZDATA/AnzdataReport/download.htm).

There were 123 deaths amongst prevalent peritoneal dialysis patients in 2008 (120 in 2007), at a rate of 16.2 deaths per 100 person-years (Figure 3.11).

For more detail see Appendix III at Website (www.anzdata.org.au/ANZDATA/AnzdataReport/download.htm).

There were 28 patients transplanted in 2008 (37 in 2007), 4% of patients dialysed; 6% of patients <65 years treated during the year (Figure 6.3). One patient ≥ 65 years was transplanted.

The most common primary renal disease of new patients to peritoneal dialysis was diabetic nephropathy (42%), followed by glomerulonephritis (23%). Hypertension accounted for 13% of all new patients, an increase of 38% from 2007 (36 patients from 26 patients in 2007).

The proportion of patients in each group treated with peritoneal dialysis ranged from 28% (35-44 years), 30% (25-34 years) to 57% (≥ 85 years) and 76% (0-14 years) (Figure 6.12).

Figure 6.15

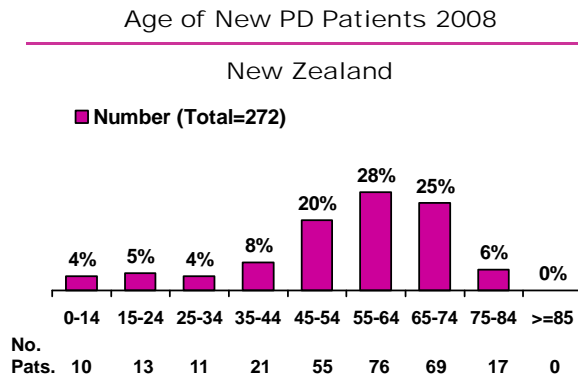


Figure 6.16

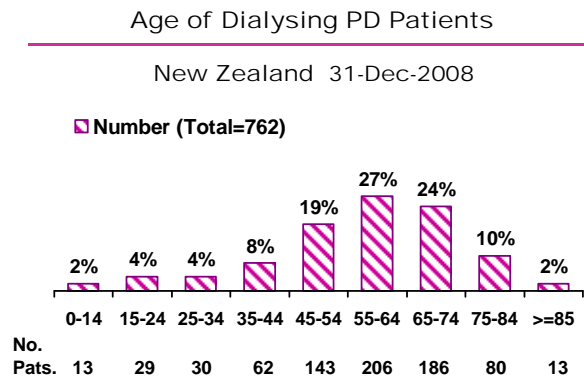


Figure 6.17

New Zealand

Stock and Flow of Peritoneal Dialysis by Age Groups 2004 - 2008

Age Groups	2004	2005	2006	2007	2008
New Patients *					
00-14 years	4 (2%)	5 (2%)	4 (1%)	5 (2%)	10 (4%)
15-24 years	4 (2%)	3 (1%)	16 (6%)	5 (2%)	13 (5%)
25-34 years	15 (5%)	8 (3%)	11 (4%)	18 (8%)	11 (4%)
35-44 years	22 (8%)	17 (6%)	30 (10%)	21 (9%)	21 (8%)
45-54 years	44 (15%)	44 (18%)	60 (20%)	43 (18%)	55 (20%)
55-64 years	62 (22%)	75 (30%)	70 (24%)	73 (30%)	76 (28%)
65-74 years	80 (29%)	74 (29%)	66 (22%)	54 (23%)	69 (25%)
75-84 years	42 (15%)	24 (10%)	389 (13%)	18 (7%)	17 (6%)
≥ 85 years	4 (2%)	2 (1%)	2 (<1%)	3 (1%)	0 (0%)
Total	277 (100%)	2532 (100%)	298 (100%)	240 (100%)	272 (100%)
Patients Dialysing					
00-14 years	7 (<1%)	9 (1%)	8 (1%)	8 (1%)	13 (2%)
15-24 years	22 (3%)	14 (2%)	21 (3%)	23 (3%)	29 (4%)
25-34 years	42 (6%)	31 (5%)	35 (5%)	36 (5%)	30 (4%)
35-44 years	72 (10%)	58 (8%)	69 (9%)	64 (9%)	62 (8%)
45-54 years	117 (16%)	115 (16%)	130 (16%)	120 (16%)	143 (19%)
55-64 years	188 (25%)	182 (25%)	185 (24%)	194 (26%)	206 (27%)
65-74 years	193 (26%)	202 (28%)	199 (26%)	187 (25%)	186 (24%)
75-84 years	96 (13%)	99 (14%)	112 (15%)	99 (13%)	80 (10%)
≥ 85 years	8 (1%)	9 (1%)	8 (1%)	14 (2%)	13 (2%)
Total	745 (100%)	719 (100%)	767 (100%)	745 (100%)	762 (100%)
Primary Renal Disease *					
Glomerulonephritis	56 (20%)	56 (23%)	67 (23%)	54 (23%)	63 (23%)
Analgesic Nephropathy	1 (<1%)	1 (<1%)	1 (<1%)	0 (0%)	2 (1%)
Hypertension	53 (19%)	30 (12%)	44 (14%)	26 (11%)	36 (13%)
Polycystic Disease	11 (4%)	13 (5%)	24 (8%)	11 (4%)	12 (4%)
Reflux Nephropathy	7 (3%)	7 (3%)	10 (3%)	9 (4%)	4 (2%)
Diabetic Nephropathy	105 (38%)	112 (44%)	115 (39%)	106 (44%)	114 (42%)
Miscellaneous	29 (11%)	23 (9%)	24 (8%)	27 (11%)	27 (10%)
Uncertain	15 (5%)	10 (4%)	13 (4%)	7 (3%)	14 (5%)
Total	277 (100%)	252 (100%)	298 (100%)	240 (100%)	272 (100%)

* New patients receiving first peritoneal dialysis treatment



OUTCOMES AMONG PERITONEAL DIALYSIS PATIENTS

Figure 6.18

Peritoneal Dialysis at 90 Days		Patient Survival Censored for Transplant % [95% Confidence Interval]			
Year of Starting	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
1997-1999	1733	92 [91, 93]	86 [85, 88]	60 [57, 62]	38 [35, 40]
2000-2002	1901	93 [92, 94]	87 [85, 88]	59 [57, 61]	40 [37, 42]
2003-2005	1838	94 [93, 95]	88 [87, 90]	65 [62, 66]	45 [42, 48]
2006-2008	2149	95 [94, 96]	90 [89, 92]	63 [56, 69]	-
New Zealand					
1997-1999	608	96 [94, 97]	89 [86, 91]	56 [52, 60]	37 [32, 41]
2000-2002	681	93 [91, 95]	85 [82, 87]	58 [54, 62]	35 [31, 39]
2003-2005	618	93 [91, 95]	87 [84, 90]	59 [55, 63]	38 [33, 44]
2006-2008	611	96 [94, 97]	90 [87, 93]	-	-

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.

Patients are censored at first transplant and at most recent follow up regardless of dialysis modality changes.

Patient Survival

On univariate analyses, there has been some improvement in patient survival in Australia, in three and five year patient outcomes.

Survival has been unchanged up to 2005, but has improved for the 2006-2008 cohort in New Zealand (Figures 6.18 - 6.20).

Among patients with diabetes, survival was substantially lower (Figures 6.21 - 6.23).

As expected, patient survival is closely related to age (Figures 6.24 - 6.26).

Figure 6.19

Patient Survival - Peritoneal Dialysis at 90 Days Censored for Transplant - Australia

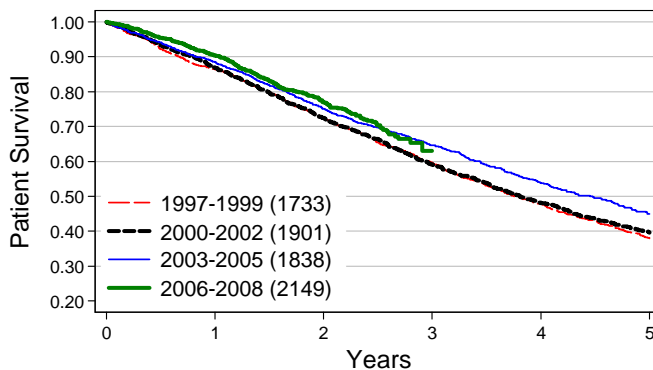


Figure 6.20

Patient Survival - Peritoneal Dialysis at 90 Days Censored for Transplant - New Zealand

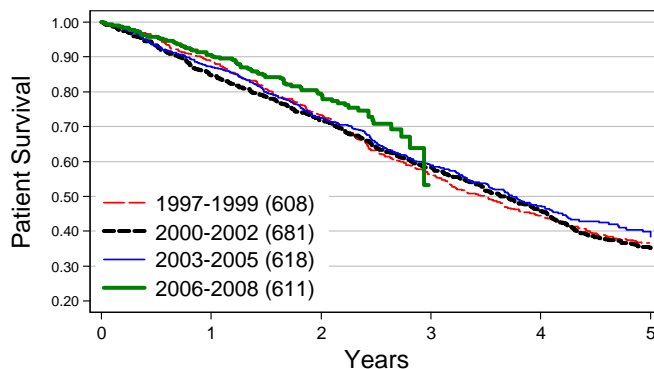


Figure 6.21

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

	Survival			
	6 months	1 year	3 years	5 years
Australia				
Non Diabetic (5398)	95 [94, 95]	89 [89, 90]	65 [64, 67]	45 [44, 47]
Diabetic (2223)	92 [91, 93]	85 [83, 86]	54 [51, 56]	31 [28, 34]
New Zealand				
Non Diabetic (1434)	95 [93, 96]	89 [87, 90]	63 [60, 66]	44 [41, 48]
Diabetic (1084)	94 [92, 95]	86 [84, 88]	54 [50, 57]	29 [26, 33]

Figure 6.22

Patient Survival - Peritoneal Dialysis at 90 Days
Censored for Transplant - Australia

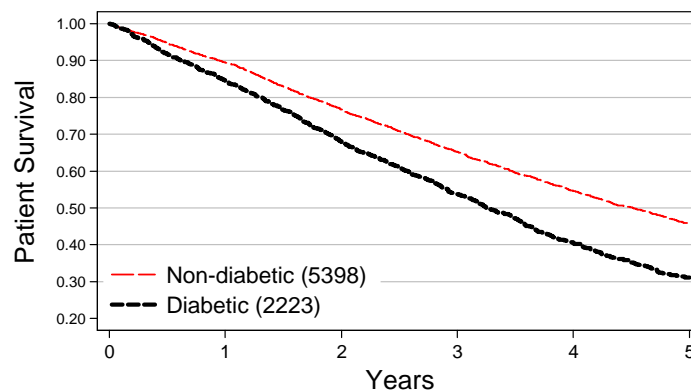


Figure 6.23

Patient Survival - Peritoneal Dialysis at 90 Days
Censored for Transplant - New Zealand

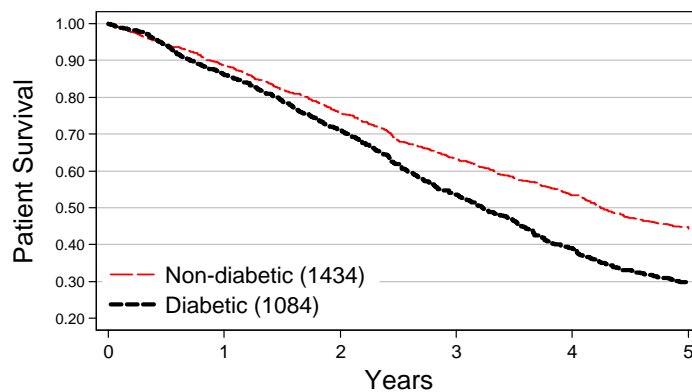




Figure 6.24

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

Age Groups	No. of Patients	Survival			
		6 months	1 year	3 years	5 years
Australia					
0-39 years	1070	99 [98, 99]	98 [96, 99]	87 [84, 90]	75 [70, 79]
40-59 years	2308	96 [95, 97]	93 [91, 94]	75 [73, 77]	59 [56, 61]
60-74 years	2991	93 [92, 94]	86 [84, 87]	56 [54, 58]	34 [32, 36]
75 and over	1252	89 [87, 91]	78 [76, 80]	40 [37, 43]	17 [15, 20]
New Zealand					
0-39 years	320	99 [97, 100]	95 [91, 97]	86 [81, 91]	74 [66, 81]
40-59 years	924	96 [94, 97]	91 [89, 93]	66 [62, 69]	45 [41, 49]
60-74 years	1017	93 [92, 95]	85 [82, 87]	52 [48, 55]	28 [24, 31]
75 and over	257	87 [83, 91]	78 [72, 82]	39 [33, 46]	19 [13, 25]

Figure 6.25

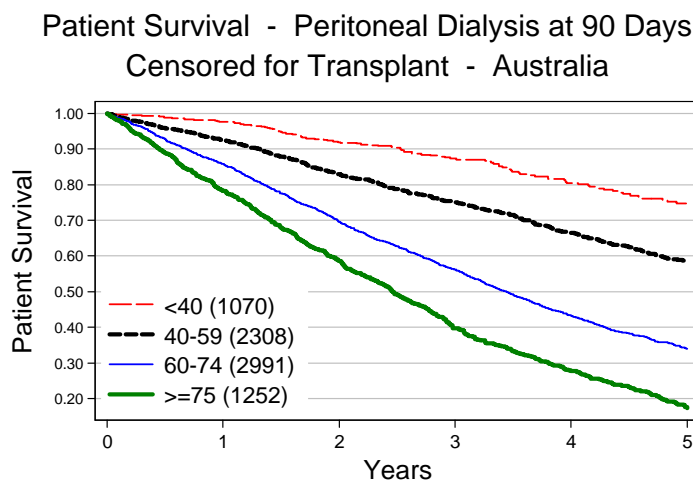
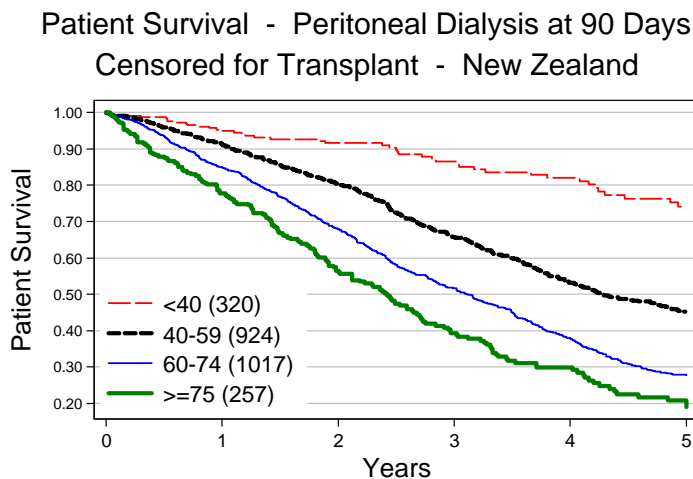


Figure 6.26



Figures 6.27 - 6.28 show survival curves for patients treated with peritoneal dialysis at day 90, adjusted to a median age of 62.6 years for Australia and 58.5 years for New Zealand; non diabetic primary renal disease; caucasoid race; female gender and no comorbid conditions (lung disease, coronary heart disease, peripheral vascular disease or cerebrovascular disease).

Figure 6.27

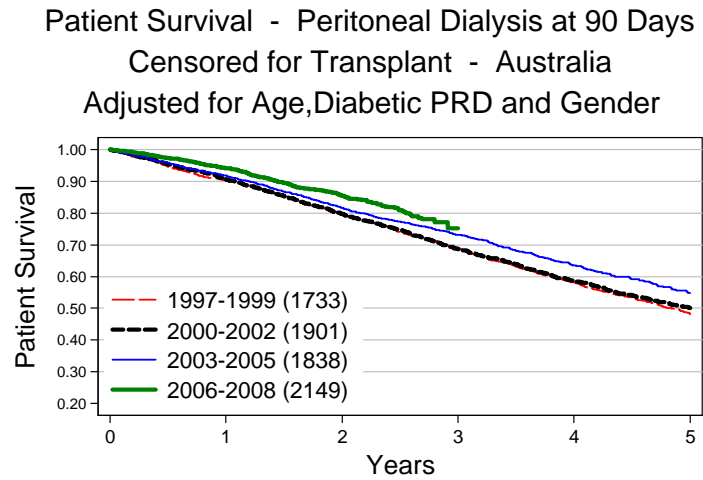
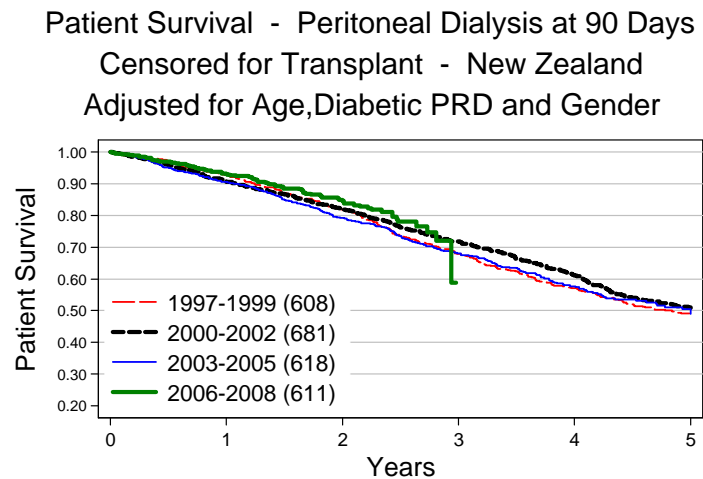


Figure 6.28





HAEMOGLOBIN

In Australia, at the end of 2008, haemoglobin was <110 g/L in about 35% of peritoneal dialysis patients, higher than in previous years and ≥ 140 g/L in about 6%, which is slightly lower than previous years. Similar trends were seen for Australian haemodialysis patients.

In New Zealand, the corresponding percentages are about 35% and 5% respectively, although there was little suggestion of a change over time.

Figure 6.30 shows the proportion of patients with proven or likely cardiovascular disease achieving the clinical target of haemoglobin ≤ 120 g/L.

Figure 6.29

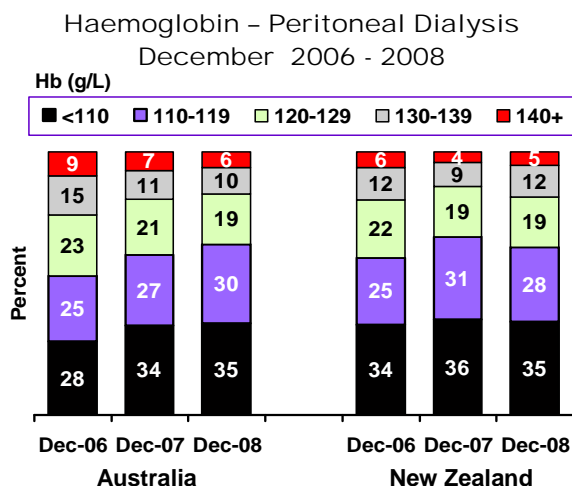
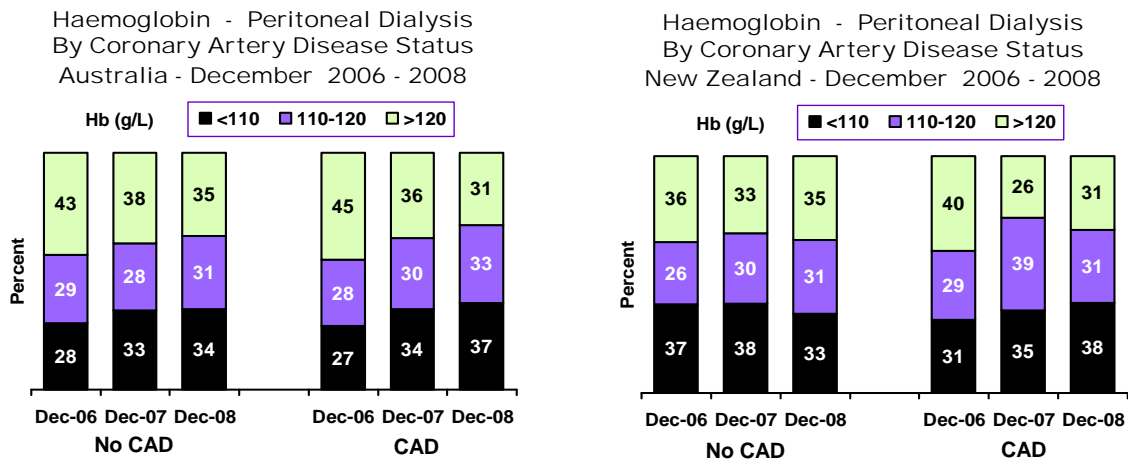


Figure 6.30



HAEMOGLOBIN IN PERITONEAL DIALYSIS PATIENTS BY TREATING CENTRE

Figures 6.31- 6.34

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

In Australia, median haemoglobin for each centre ranged from 103 to 124 g/L for peritoneal dialysis patients and in New Zealand 111-120 g/L.

The proportion of patients in Australia with a haemoglobin of 110-129 g/L in each centre ranged from 27% to 71% for peritoneal dialysis patients and for New Zealand 39% to 54%. This large variation probably reflects differences in practices, protocols and patient case-mix among centres.

Figure 6.31

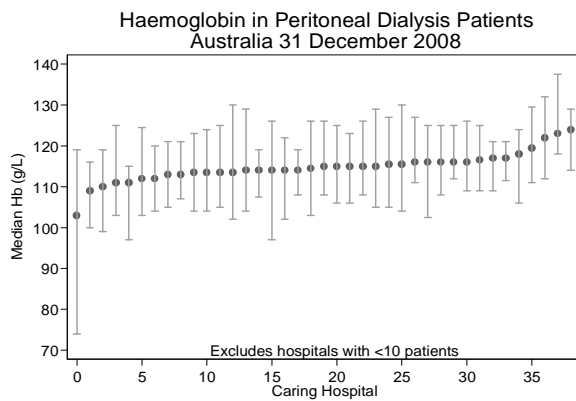


Figure 6.32

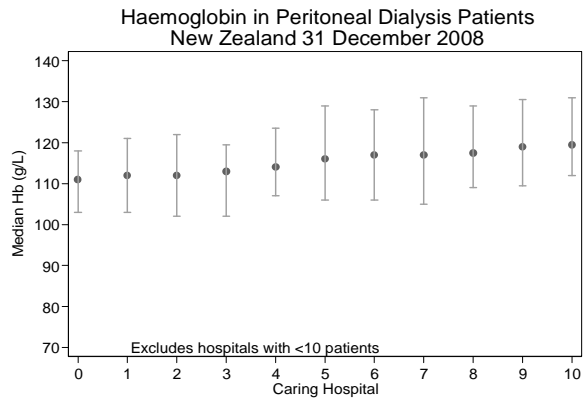


Figure 6.33

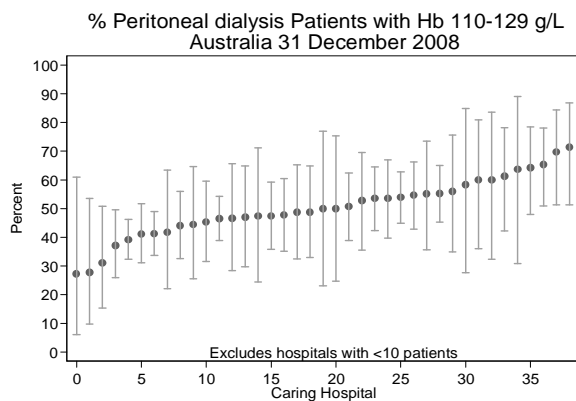
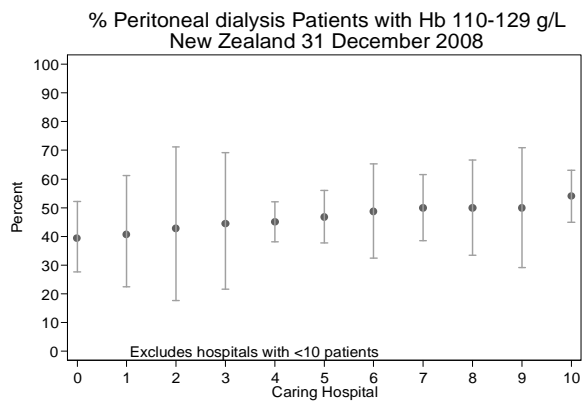


Figure 6.34





FERRITIN AND TRANSFERRIN SATURATION

Figures 6.35 - 6.36

In Australia and New Zealand the proportions of peritoneal dialysis patients with ferritin < 200 mcg/L have increased, while those with ferritin ≥ 500 mcg/L have decreased. .

In both Australia and New Zealand, distributions of transferrin saturation have been unchanged for the past three years, although in 2008 there was an increase in the proportion of peritoneal dialysis patients with transferrin saturation < 20% in Australia.

Figure 6.35

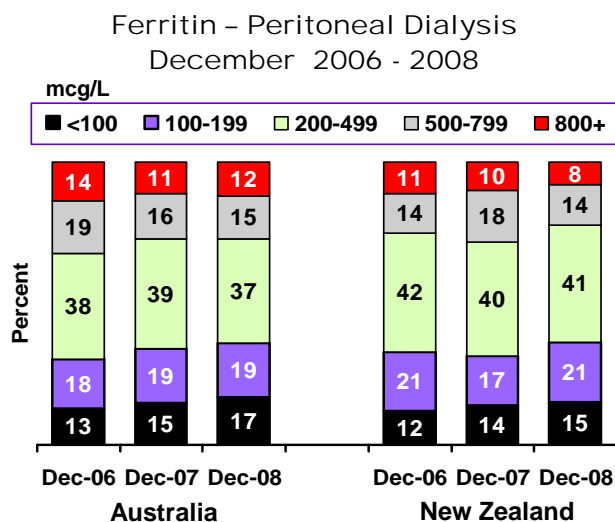
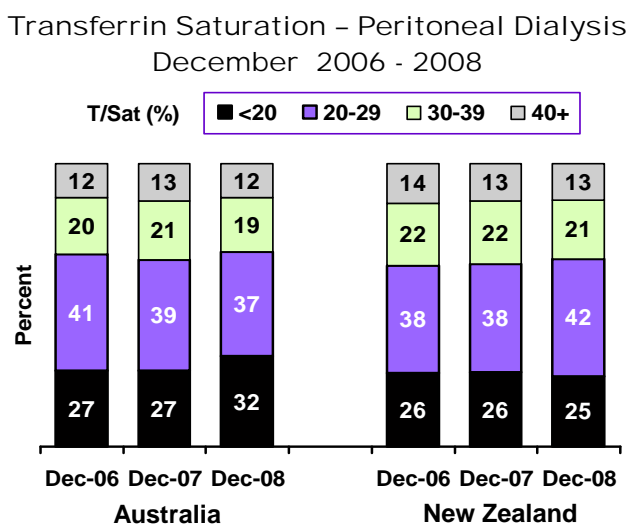


Figure 6.36



FERRITIN BY TREATING CENTRE

Figures 6.37 - 6.40

These figures show the proportions of patients in each centre with ferritin of 200-500 mcg/L and transferrin saturation of >20% respectively, as recommended by the CARI guidelines.

In Australia, the proportions of patients with ferritin within this range in each centre varied widely between 18-54% for peritoneal dialysis patients. Similarly large variations between centres were seen for transferrin saturation, between 30-89%. Again, this large variation probably reflects differences in practices, protocols and patient case-mix among centres.

In New Zealand, the corresponding figures for ferritin were between 26-51% for peritoneal dialysis patients and for transferrin saturation between 64-85%. In both countries, significant proportions of patients did not have ferritin and transferrin saturation within the recommended ranges, even in the “best performing” centres.

Figure 6.37

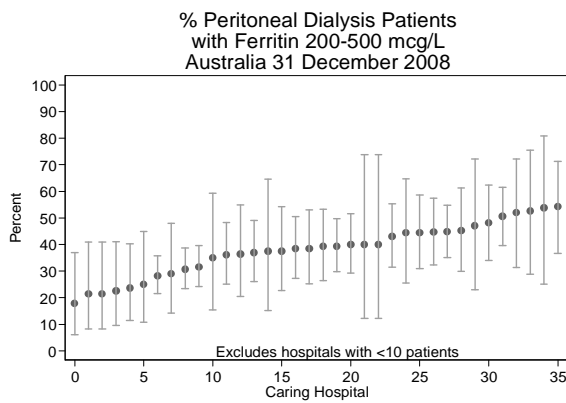


Figure 6.38

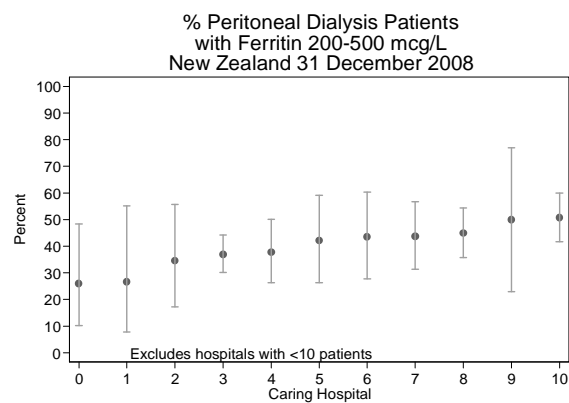


Figure 6.39

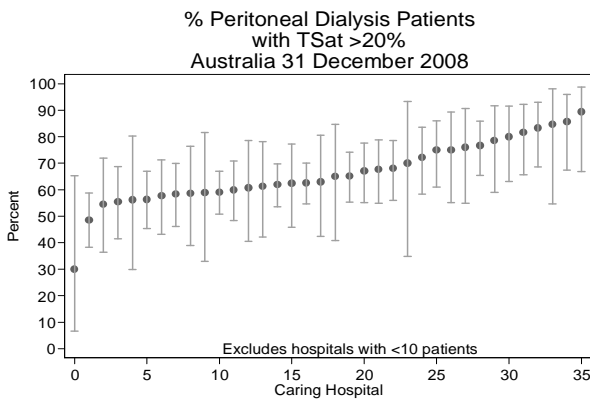
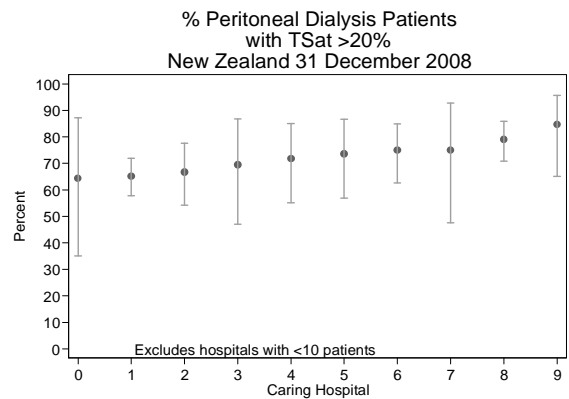


Figure 6.40



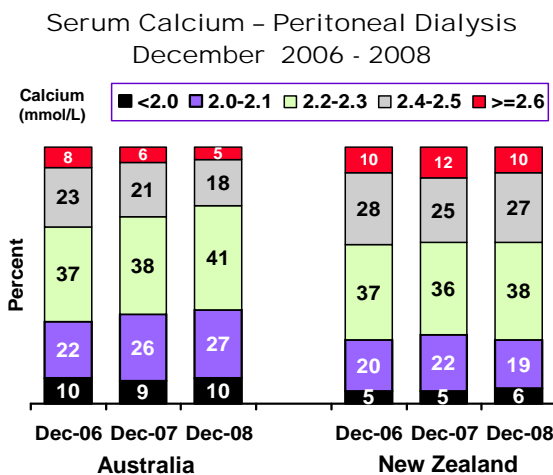


SERUM CALCIUM

Figure 6.41

In both Australia and New Zealand the proportions of patients with proportions with serum calcium ≥ 2.4 mmol/L have decreased over the past three years, while those with < 2.2 mmol/L have increased in Australia, but remained fairly stable in New Zealand.

Figure 6.41



SERUM CALCIUM BY TREATING CENTRE

Figures 6.42 and 6.43 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 38-78% for peritoneal dialysis patients, while in New Zealand the corresponding proportions were 36-71%.

Figure 6.42

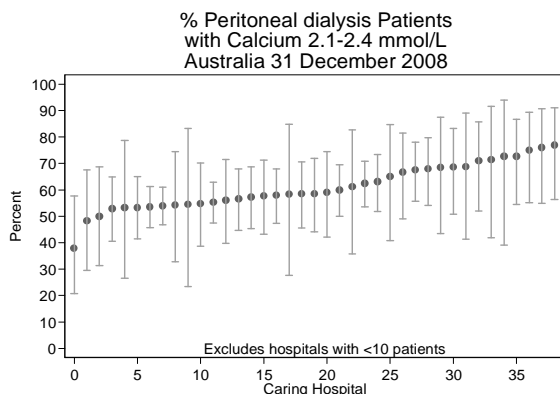
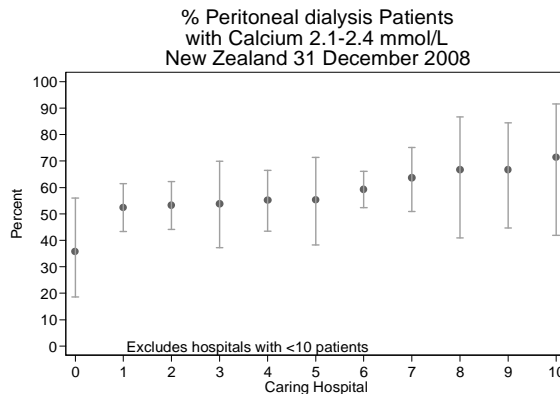


Figure 6.43



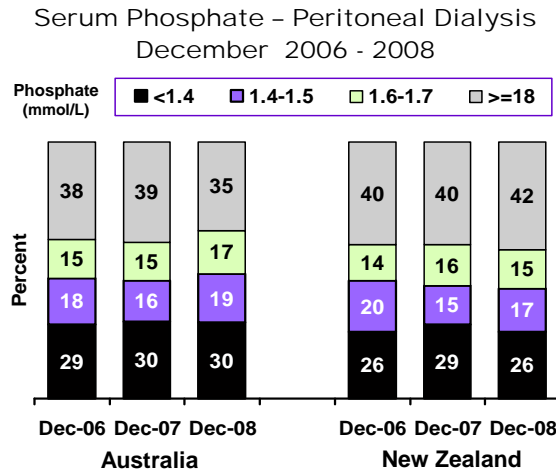
SERUM PHOSPHATE

Figure 6.44

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

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

Figure 6.44



SERUM PHOSPHATE BY TREATING CENTRE

Figures 6.45 - 6.46 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 33-100% for peritoneal dialysis patients and in New Zealand, the corresponding proportions were 29-49%.

Figure 6.45

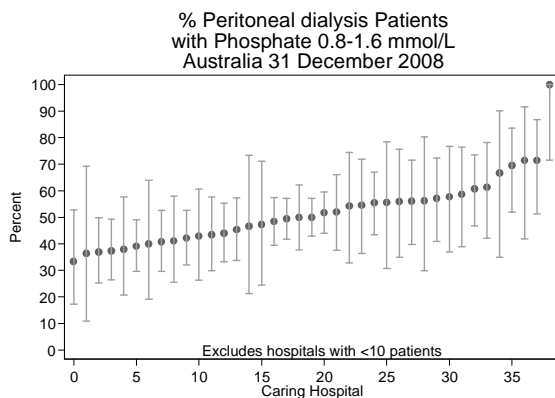
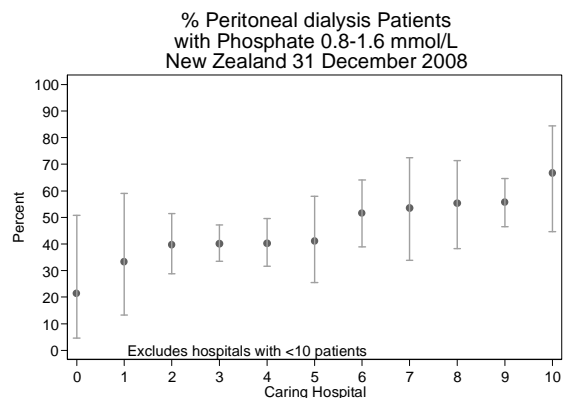


Figure 6.46





CALCIUM-PHOSPHATE PRODUCT

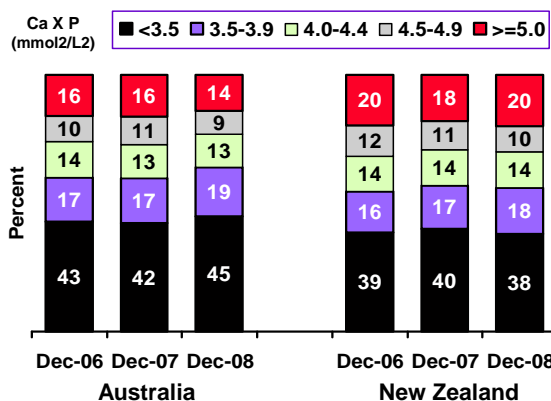
Figure 6.47

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

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

Figure 6.47

Calcium Phosphate Product – Peritoneal Dialysis
December 2006 - 2008



CALCIUM-PHOSPHATE PRODUCT BY TREATING CENTRE

Figures 6.48 - 6.49 show the proportions of patients at each centre with calcium-phosphate product $<4.0 \text{ mmol}^2/\text{L}^2$, as recommended by the CARI guidelines.

In Australia, the proportions ranged widely between 36-100% for peritoneal dialysis patients while in New Zealand, the corresponding proportions were 36-61%.

Figure 6.48

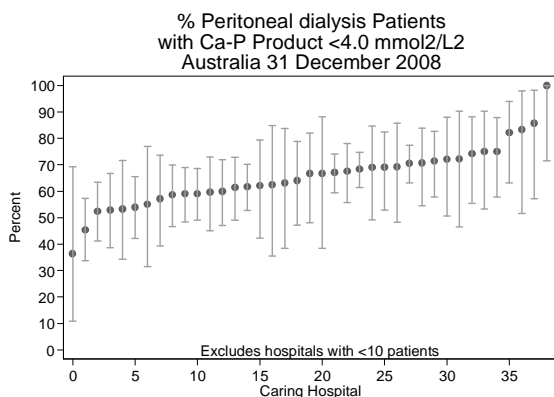
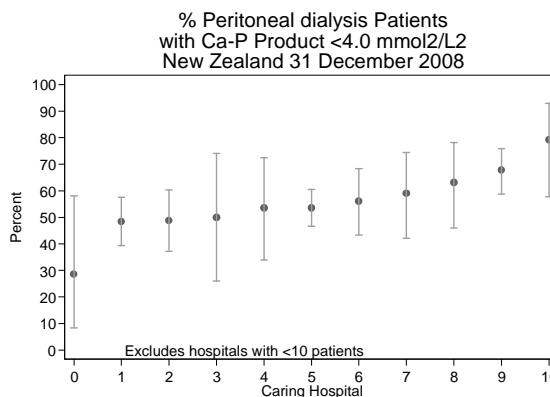


Figure 6.49



TECHNIQUE FAILURE (CENSORED FOR DEATH OR TRANSPLANTATION)

From 2007, the data collection method changed and we now collect reason for transfer from any form of PD.

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 45% of transfers during 2007/2008 (Figure 6.50).

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 33% of transfers during 2007/2008 and infections 27% (Figure 6.50).

Figure 6.50

Causes of Technique Failure 1-Jan-2007 to 31-Dec-2008
Excluding Death, Transplantation, Recovery of Renal Function

Causes of Technique Failure	Australia	New Zealand
Recurrent/persistent peritonitis	194	65
Acute peritonitis	305	78
Tunnel/exit site infection	44	10
Total Infective Causes	543 (26%)	153 (27%)
Inadequate solute clearance	223	92
Inadequate fluid ultrafiltration	83	51
Excessive fluid ultrafiltration	3	1
Total Dialysis Failure	309 (15%)	144 (25%)
Dialysate leak	55	21
Hydrothorax	10	3
Scrotal oedema	15	-
Catheter block	30	7
Catheter fell out	3	-
Hernia	67	19
Abdominal pain	10	4
Abdominal surgery	32	12
Other surgery	25	2
Haemoperitoneum	-	1
Sclerosing Peritonitis	2	4
Miscellaneous	40	10
Multiple Adhesions	3	4
Total Technical Failure	292 (14%)	87 (15%)
Unable to manage self care	135	37
Patient preference	782	147
Transfer outside Australia/NZ	2	2
Total Social Reasons	919 (45%)	186 (33%)



PERITONITIS

Australian median time to first peritonitis has decreased to 19.1 months overall, with 29% of patients completely free of peritonitis at three years. In New Zealand the time was 15.0 months (22% of patients free of peritonitis at three years), (Figure 6.51). As noted in previous reports there is a strong association between ethnicity and peritonitis free survival (Figure 6.54).

The median peritonitis-free survival for home automated peritoneal dialysis patients was 20.3 months in Australia, and 12.7 months in New Zealand.

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

Figure 6.51

First PD Treatment to First Episode of Peritonitis
Related to Age at Entry 2004 to 31-Dec-2008

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	n= 79	n= 337	n= 1201	n= 965	n= 1089	n= 772	n= 4443
3 months	84 [74, 91]	86 [82, 89]	86 [84, 88]	88 [86, 90]	86 [84, 88]	85 [82, 87]	86 [85, 87]
6 months	70 [58, 79]	76 [70, 80]	79 [76, 81]	80 [77, 82]	78 [75, 80]	74 [71, 77]	77 [76, 79]
9 months	55 [42, 66]	72 [66, 77]	70 [67, 73]	71 [68, 74]	69 [66, 72]	66 [62, 70]	69 [68, 71]
1 year	55 [42, 66]	65 [59, 71]	64 [61, 68]	64 [61, 68]	61 [58, 64]	59 [55, 63]	63 [61, 64]
2 years	42 [28, 56]	43 [35, 51]	45 [41, 49]	42 [37, 46]	42 [38, 46]	40 [35, 45]	42 [40, 44]
3 years	28 [08, 53]	27 [17, 38]	32 [27, 37]	27 [22, 32]	30 [25, 34]	26 [21, 32]	29 [26, 31]
New Zealand	n= 28	n= 104	n= 357	n= 356	n= 343	n= 151	n= 1339
3 months	74 [53, 87]	83 [74, 89]	88 [84, 91]	84 [79, 87]	85 [80, 88]	88 [82, 92]	85 [83, 87]
6 months	57 [35, 73]	73 [63, 81]	75 [70, 79]	72 [67, 77]	76 [70, 80]	78 [70, 84]	74 [71, 76]
9 months	26 [09, 48]	61 [50, 71]	64 [59, 70]	62 [56, 67]	65 [59, 70]	66 [57, 73]	63 [60, 66]
1 year	09 [01, 31]	56 [44, 66]	57 [51, 63]	56 [50, 61]	56 [50, 62]	58 [49, 66]	56 [53, 59]
2 years	-	48 [36, 60]	38 [32, 45]	35 [29, 41]	37 [31, 44]	32 [24, 41]	36 [33, 40]
3 years	-	34 [20, 48]	23 [15, 32]	25 [18, 32]	19 [13, 27]	19 [12, 29]	22 [19, 26]

% Survival [95% Confidence Interval]

Figure 6.52

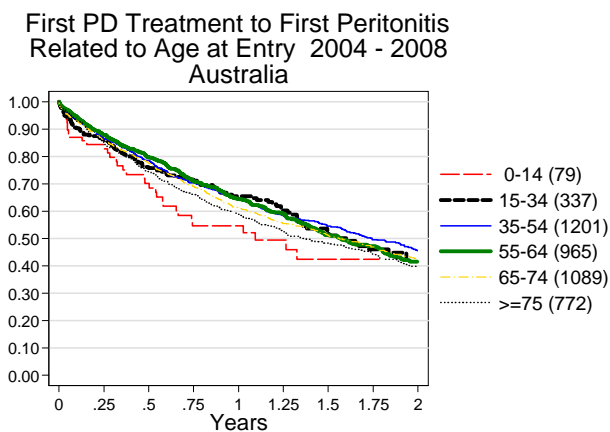


Figure 6.53

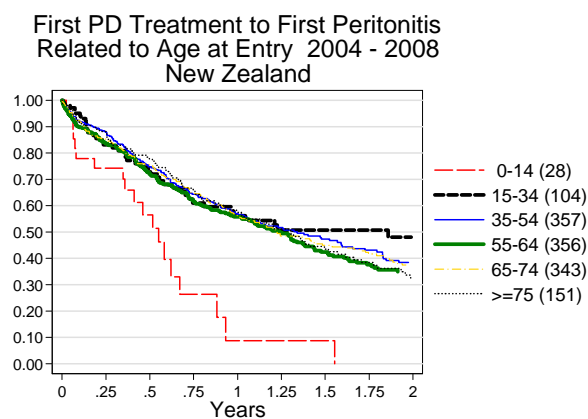


Figure 6.54

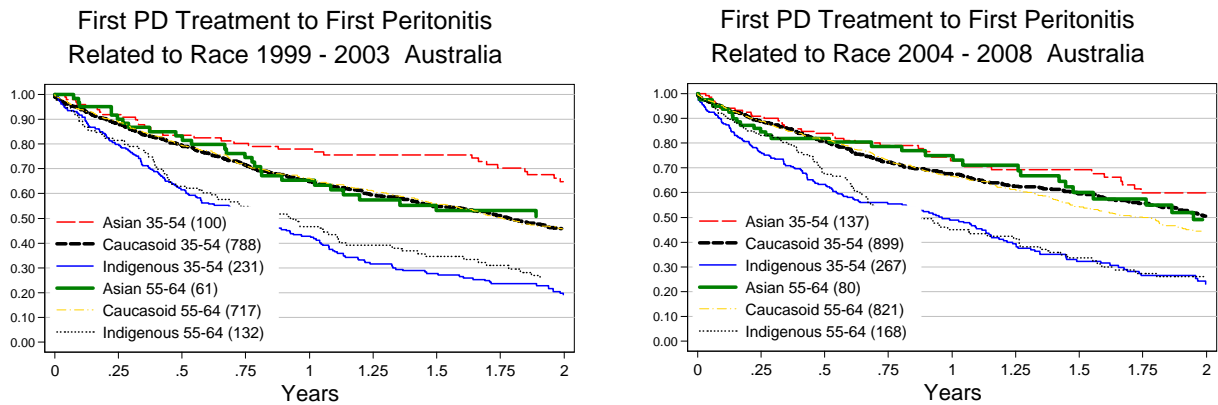


Figure 6.55

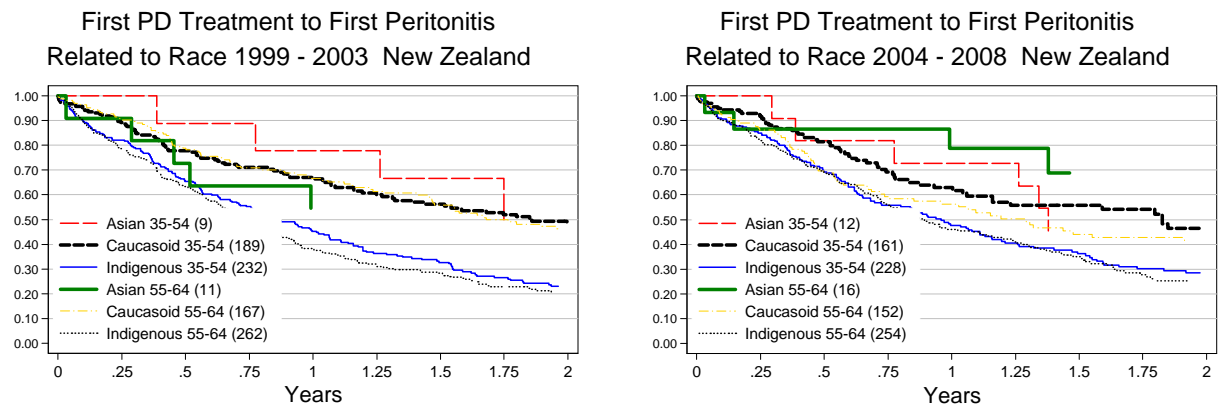


Figure 6.56

First Home APD Treatment to First Episode of Peritonitis Related to Age at Entry 2004 to 31-Dec-2008							
Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	>=75	
Australia	n= 65	n= 229	n= 706	n= 527	n= 502	n= 344	n= 2373
1 month	97 [88, 99]	91 [87, 94]	95 [93, 96]	96 [94, 97]	96 [94, 97]	96 [93, 98]	95 [94, 96]
3 months	87 [75, 93]	85 [79, 88]	86 [83, 88]	91 [88, 93]	87 [84, 90]	91 [87, 93]	88 [86, 89]
6 months	76 [62, 85]	81 [75, 86]	77 [73, 80]	83 [79, 86]	76 [72, 80]	83 [78, 87]	79 [77, 81]
9 months	61 [47, 73]	74 [67, 80]	70 [66, 74]	75 [70, 79]	69 [64, 73]	74 [68, 79]	72 [69, 74]
1 year	58 [44, 71]	71 [63, 77]	65 [61, 69]	66 [62, 71]	64 [58, 68]	66 [60, 72]	66 [63, 68]
2 years	47 [31, 62]	33 [22, 44]	44 [39, 50]	42 [36, 48]	45 [39, 51]	48 [40, 55]	44 [41, 47]
New Zealand	n= 25	n= 57	n= 133	n= 104	n= 77	n= 44	n= 440
1 month	83 [62, 93]	98 [88, 100]	94 [88, 97]	95 [89, 98]	97 [90, 99]	95 [83, 99]	95 [92, 97]
3 months	79 [57, 91]	85 [72, 92]	88 [81, 93]	87 [79, 92]	92 [83, 96]	78 [62, 88]	87 [83, 90]
6 months	53 [30, 72]	76 [61, 86]	72 [63, 80]	76 [66, 84]	80 [68, 87]	63 [46, 76]	73 [68, 77]
9 months	29 [09, 53]	60 [44, 72]	60 [50, 69]	64 [53, 74]	69 [56, 79]	49 [33, 64]	60 [55, 65]
1 year	10 [01, 34]	52 [36, 65]	54 [43, 63]	55 [43, 66]	60 [46, 71]	41 [25, 56]	52 [46, 57]

% Survival [95% Confidence Interval]



PERITONEAL DIALYSIS FLUIDS

For the first time in 2007, information was collected about the type of PD fluid used in addition to the fluid volumes. Given the differences in dwell time and cycle length between automated and continuous ambulatory peritoneal dialysis, these results are presented separately.

At the end of 2008, about 23% of CAPD and 43% of APD patients were receiving Icodextrin; these proportions were a little lower in New Zealand than Australia; there was also considerable variation between States in Icodextrin usage rates. Low GDP fluids (whether lactate or bicarbonate based fluids) were used much less frequently than Icodextrin.

Figure 6.57

Icodextrin Usage by Modality Type - December 2008						
Modality Type	Australia			New Zealand		
	No	Yes	Total	No	Yes	Total
CAPD	870 (75.26%)	286 (24.74%)	1156	457 (79.07%)	121 (20.93%)	578
APD	878 (57.24%)	656 (42.76%)	1534	183 (53.67%)	158 (46.33%)	341
Total	1748 (64.98%)	942 (35.02%)	2690	640 (69.64%)	279 (30.36%)	991

Figure 6.58

Prevalent Patients - December 2008
Icodextrin Usage by Modality

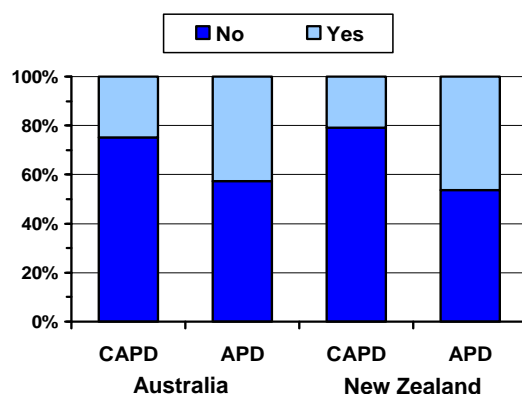
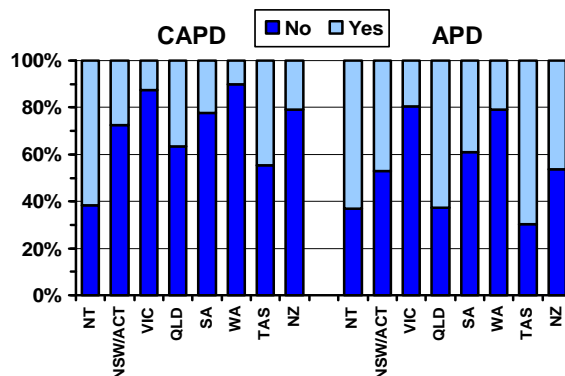


Figure 6.59

Prevalent Patients - December 2008
Icodextrin Usage by State and New Zealand



PERITONEAL DIALYSIS FLUIDS

Figure 6.60

Low GDP - Lactate Usage by Modality Type - December 2008						
Modality Type	Australia			New Zealand		
	No	Yes	Total	No	Yes	Total
CAPD	1073 (92.82%)	83 (7.18%)	1156	572 (98.96%)	6 (1.04%)	578
APD	1471 (95.89%)	63 (4.11%)	1534	318 (93.26%)	23 (6.74%)	341
Total	2544 (94.57%)	146 (5.43%)	2690	890 (96.84%)	29 (3.16%)	991

Figure 6.61

Low GDP - Bicarb Usage by Modality Type - December 2008						
Modality Type	Australia			New Zealand		
	No	Yes	Total	No	Yes	Total
CAPD	1122 (97.06%)	34 (2.94%)	1156	566 (97.92%)	12 (2.08%)	578
APD	1510 (98.44%)	24 (1.56%)	1534	327 (95.89%)	14 (4.11%)	341
Total	2632 (97.84%)	58 (2.16%)	2690	893 (97.17%)	26 (2.83%)	919

Figure 6.62

Prevalent Patients - December 2008
Low GDP - Lactate Usage by Modality

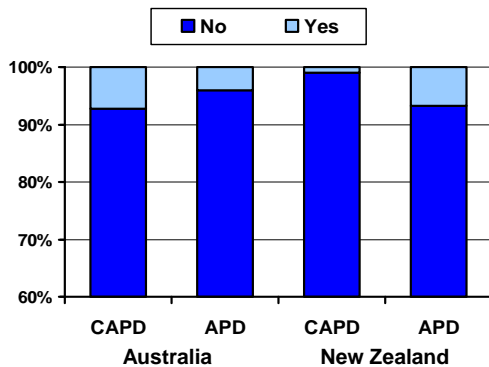
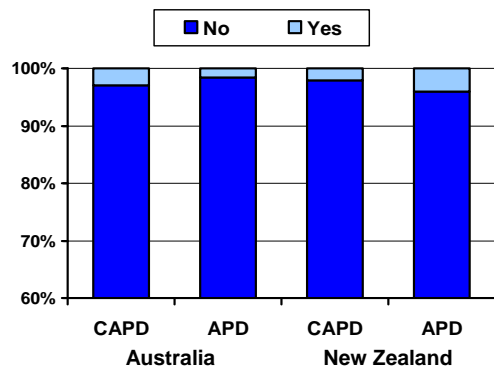


Figure 6.63

Prevalent Patients - December 2008
Low GDP - Bicarb Usage by Modality





AUSTRALIAN PERITONITIS REGISTRY

1-OCT-2003 TO 31-DEC-2008

Details of the organism and treatment for episodes of peritonitis within Australia collected by ANZDATA. Similar information for patients in New Zealand is collected separately by the New Zealand Peritonitis Registry (reported separately).

During 2008, the number of episodes of peritonitis continued to increase (shown in Figure 6.64).

Figure 6.64	
Number of Peritonitis Episodes	
Year	Frequency
2003	250 (3 months data only)
2004	1,196
2005	1,072
2006	1,120
2007	1,255
2008	1,359
Total	6,252

Rates of peritonitis do vary, although it is unclear whether there was an improvement over 2004-2006 followed by a decline, or simply random variation (Figure 6.65).

Figure 6.65

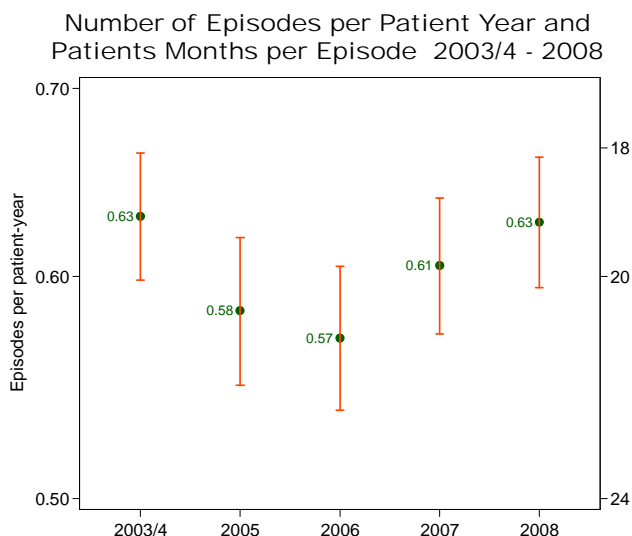
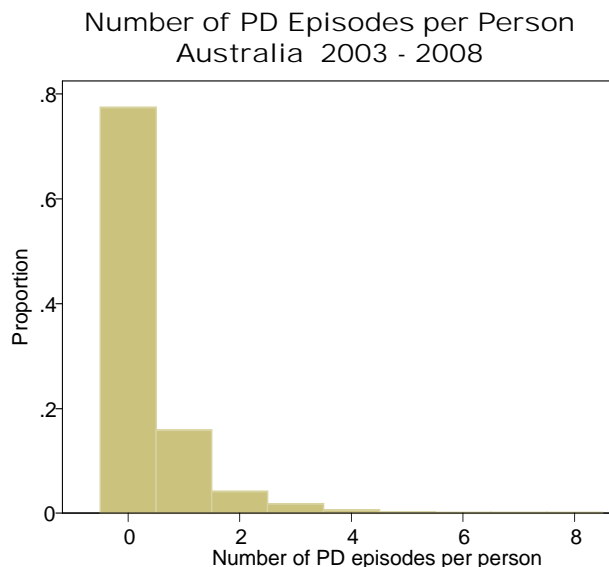
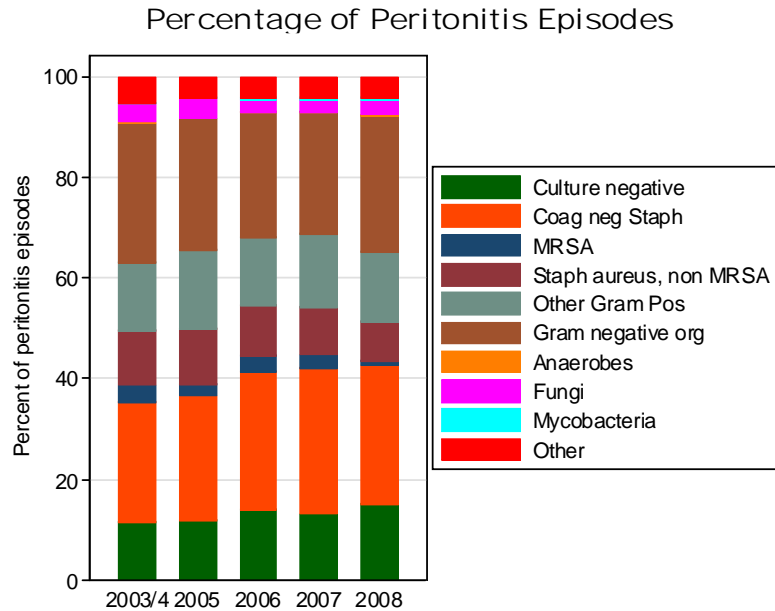


Figure 6.66



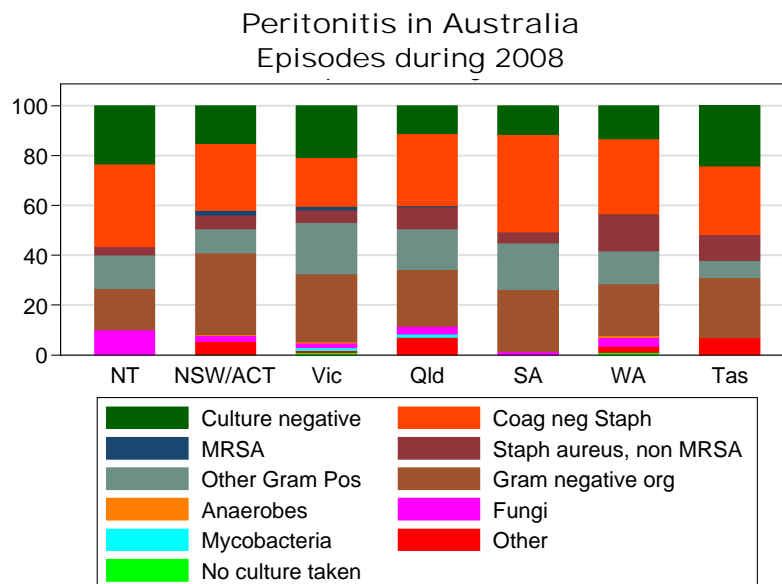
There has been a gradual trend over this time towards a lower proportion of episodes attributable to gram negative organisms and non-MRSA staph aureus, with a greater proportion of culture negative episodes and those attributed to coagulase negative staphylococci (Figure 6.67).

Figure 6.67



There remains quite widespread variation in the major organisms reported between the different states in Australia (Figure 6.68). We do not collect data about variation in prophylaxis, patient selection processes or PD training or other factors which might account for part or all of this variation.

Figure 6.68

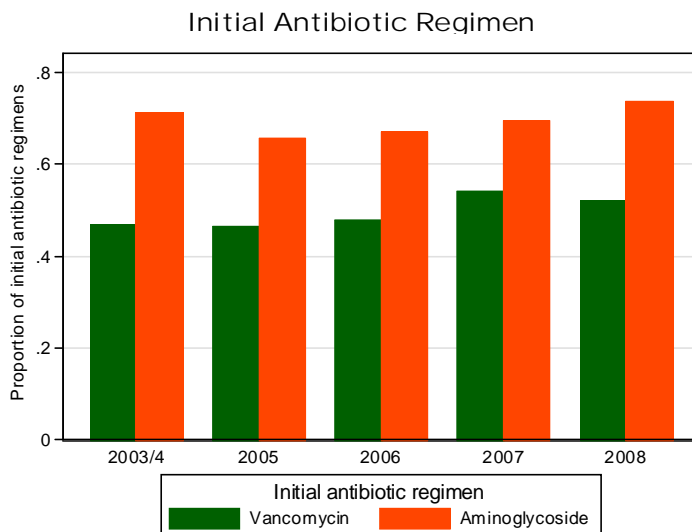




ANTIBIOTIC TREATMENT

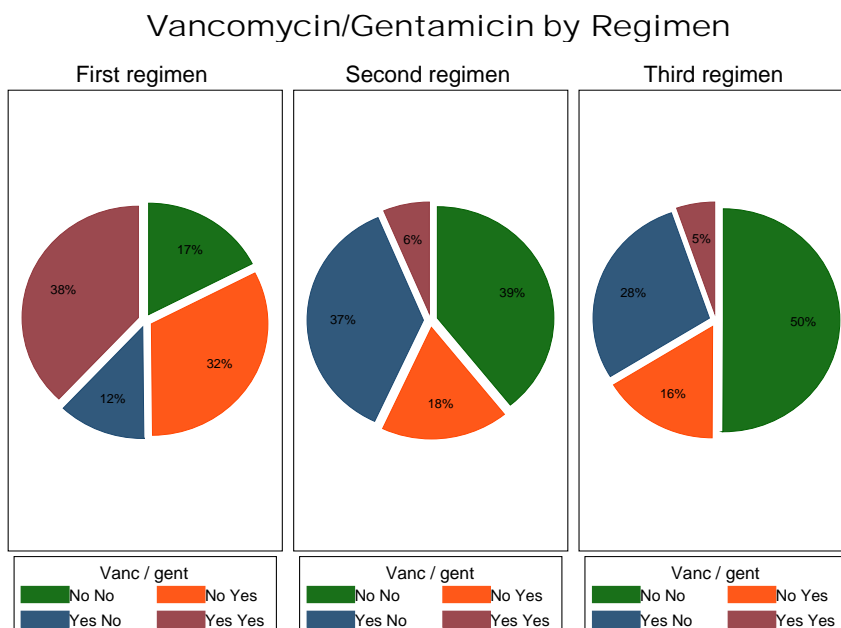
The proportion of episodes which were treated with an aminoglycoside initial regimen has remained stable, but the proportion treated with a regimen containing vancomycin is slowly increasing (Figure 6.69).

Figure 6.69



Among episodes of peritonitis treated during 2008, the proportion of those who received vancomycin in the initial or second antibiotic regimen is shown in Figure 6.70.

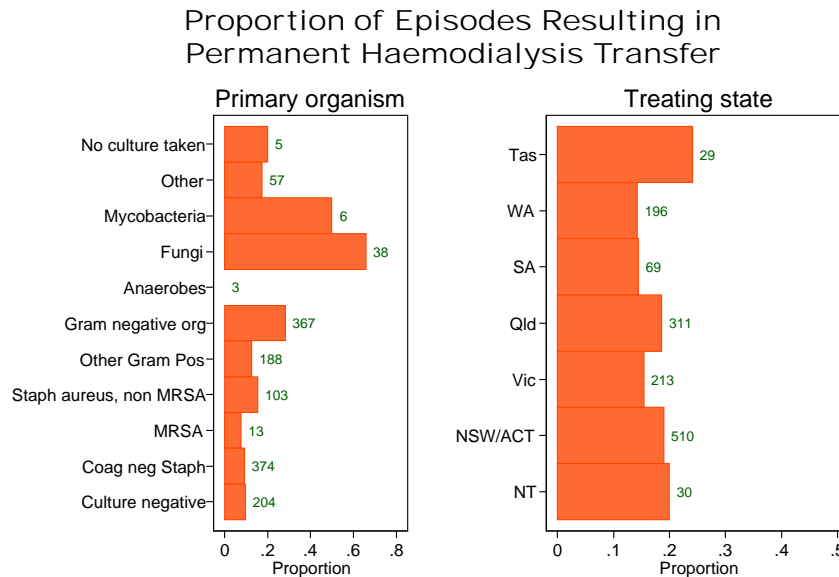
Figure 6.70



OUTCOMES

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

Figure 6.71



Values are total number of peritonitis episodes reported 1/1/08-31/12/08

RATES OF PERITONITIS ACROSS INDIVIDUAL UNITS

Figure 6.72 shows the peritonitis rates for all units in Australia over the period 1st October, 2003 to 31st December 2008. 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. The extent to which this is accounted for patient characteristics is not shown, but is likely to explain only part of the variation. Similarly, when rates are examined during 2008 only, there remains considerable variation between units (Figure 6.73), and between States (Figure 6.74).

Figure 6.72

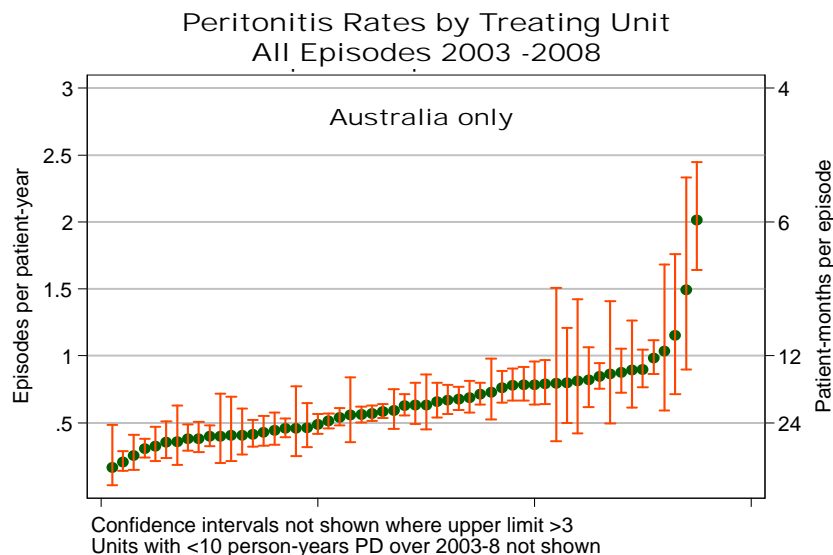




Figure 6.73

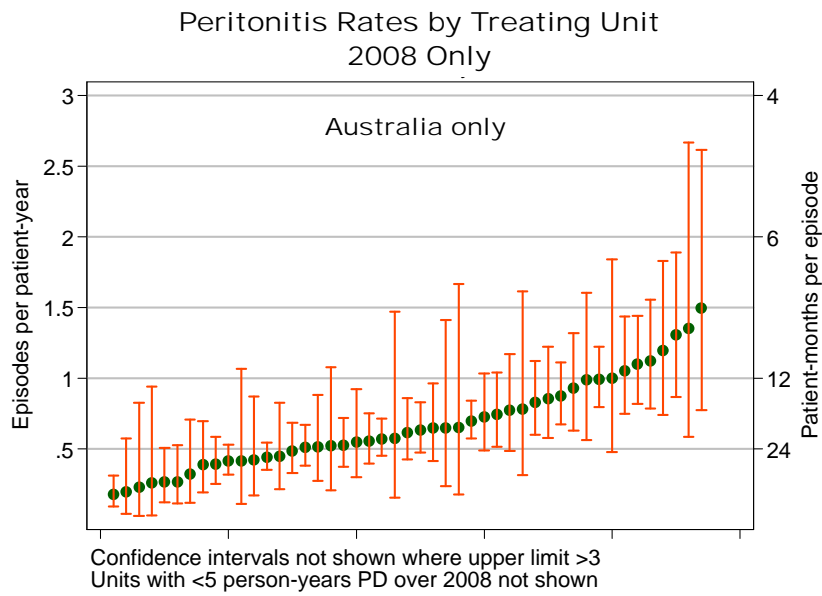


Figure 6.74

