CHAPTER 6

PERITONEAL DIALYSIS

John Collins

Figure 6.1

Proportion (%) Peritoneal Dialysis of all Home Patients 1996 - 2000

State	1996	1997	1998	1999	2000
Queensland	91%	91%	94%	86%	84%
New South Wales	60%	61%	59%	58%	58%
Aust.Capital Territory	74%	72%	73%	75%	75%
Victoria	67%	68%	67%	71%	72%
Tasmania	98%	100%	94%	88%	88%
South Australia	70%	79%	81%	79%	83%
Northern Territory	100%	100%	100%	100%	100%
Western Australia	86%	86%	87%	87%	90%
Australia	**71%**	**71%**	**71%**	**70%**	**70%**
New Zealand	**74%**	**75%**	**76%**	**79%**	**78%**

Figure 6.2

Stock and Flow of Peritoneal Dialysis Patients 1996 - 2000

	1996	1997	1998	1999	2000
Australia					
Patients new to PD	698	685	722	756	779
First Dialysis Treatment	395	390	401	415	416
Previous Dialysis (HD)	288	278	307	331	343
Failed Transplant	15	17	14	10	20
Transplanted	120	115	122	92	122
Deaths	300	268	296	309	289
Never Transplanted	288	258	286	293	280
Previous Transplant	12	10	10	16	9
Permanent Transfers Out (>12 months)	236	292	323	321	355
Temporary Transfers (<12 months)	164	138	148	152	119
Patients Dialysing at 31 December	1589	1624	1619	1684	1723
Patients Dialysing at Home 31 December	1537	1573	1570	1626	1691
% of all Home Dialysis Patients	71%	71%	71%	70%	70%
New Zealand					
Patients new to PD	220	222	253	266	260
First Dialysis Treatment	136	129	157	177	139
Previous Dialysis (HD)	78	89	93	83	114
Failed Transplant	6	4	3	6	7
Transplanted	52	42	37	41	41
Deaths	77	96	105	98	140
Never Transplanted	71	92	100	93	139
Previous Transplant	6	4	5	5	1
Permanent Transfers Out (>12 months)	56	78	66	84	89
Temporary Transfers (<12 months)	29	46	40	55	63
Patients Dialysing at 31 December	560	579	634	672	677
Patients Dialysing at Home 31 December	555	572	627	666	673
% of all Home Dialysis Patients	74%	75%	76%	79%	78%

Stock and Flow

Australia

Of the 14,744 patients treated since 1978, 1723 (12%) were still alive on peritoneal dialysis (PD) at 31 December, 2000. CAPD treated 21% (24% 1999) of all dialysis patients and Automated Peritoneal Dialysis (APD) 6% (4% in 1999), together accounting for 70% of all home dialysis. Of the 14,744 patients, 484 patients (3%) had had at least five years of continuous peritoneal dialysis (fig 6.5).

APD had increased 45% from 267 patients in 1999 to 386 patients in 2000.

In relation to age, the proportion of all dialysis patients (65-74 years and 75-84 years) using peritoneal dialysis was 30% and 27% (31% and 30% respectively in 1999); range 21% (35-44 years) to 78% (0-14 years).

The annual stock and flow of patients during the period 1996-2000 is shown in Figures 6.2 and 6.3.

The State prevalence of peritoneal dialysis ranged from 13% (Northern Territory), 19% (Tasmania), 20% (South Australia), 23% (Victoria), 30% (New South Wales), 31% (Queensland and Western Australia) and 36% (ACT).

The proportion of peritoneal dialysis of all home dialysis patients in each State ranged from 58% (New South Wales), 72% (Victoria), 75% (ACT), 83% (South Australia), 84% (Queensland), 88% (Tasmania), 90% (Western Australia) and 100% (Northern Territory) (fig 6.1).

There were 779 new peritoneal dialysis patients in the calendar year 2000, a rise of 3% compared to the previous year; of whom 416 (53%) started dialysis with peritoneal dialysis and 363 (47%) previously had haemodialysis or a failed transplant (fig 6.2).

New patients over the age of 65 decreased 11%, from 350 in 1999 to 316 in 2000. However, there was a 56% increase (61 patients) in 2000 in the age group 25-34 years compared to 39 patients in 1999 and a 30% increase (174 patients) in the age group 55-64 years compared to 134 patients last year.

There were 289 deaths (309 in 1999), (17.3 deaths per 100 patient years; 11.4% of patients at risk); 9% 25-44 years, 19% 45-64 years, 34% 65-84 years) (fig 3.5). For more detail see Appendix II at Website (www.anzdata.org.au).

There were 122 patients receiving a transplant in 2000 compared to 92 in 1999; 7% of all patients treated, 12% of patients <65 years treated during the year (fig 6.2).

Permanent transfer (>12 months) to haemodialysis rose from 321 patients (19% of patients dialysed) to 355 patients (21%) in 2000. Most transfers to haemodialysis were permanent (355/474) (fig 6.2).

The primary renal disease of new patients to peritoneal dialysis was 29% for glomerulonephritis and 25% for diabetic nephropathy (fig 6.8).

Figure 6.3

Stock and Flow of Peritoneal Dialysis Patients
Australia 1994 - 2000

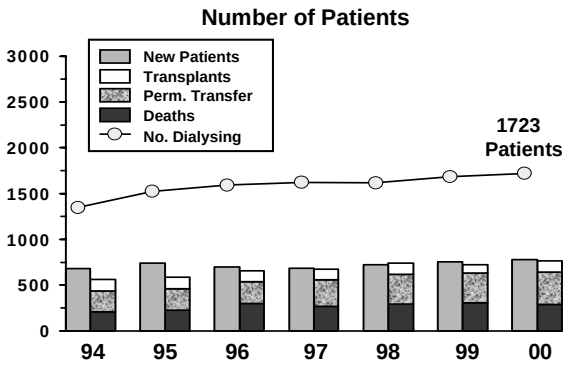


Figure 6.4

Stock and Flow of Peritoneal Dialysis Patients
New Zealand 1994 - 2000

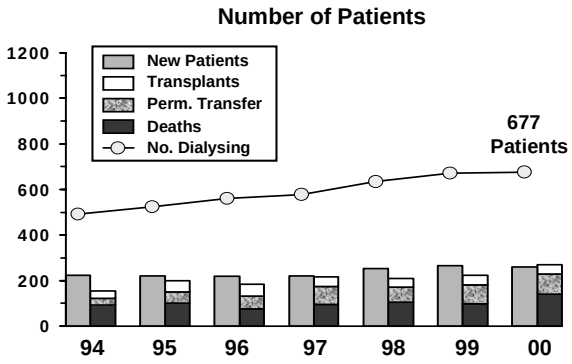


Figure 6.5

Continuous Period of Peritoneal Dialysis at 31 March 2001

	Months													
	0-6	7-12	13-18	19-24	25-30	31-36	37-42	43-48	49-60	61-72	73-84	85-96	97-108	>109
Australia														
1st Treatment 11,898 Pts	3578	2347	1624	1169	969	590	439	361	415	219	96	51	20	20
All Treatments 14,744 Pts	4644	2937	1977	1447	1133	707	522	413	480	262	106	62	25	29
New Zealand														
1st Treatment 3,179 Pts	683	514	434	370	291	238	206	101	172	78	35	32	12	13
All Treatments 3,772 Pts	868	635	522	413	327	275	232	113	190	88	43	32	14	20

Figure 6.6

Age of New PD Patients

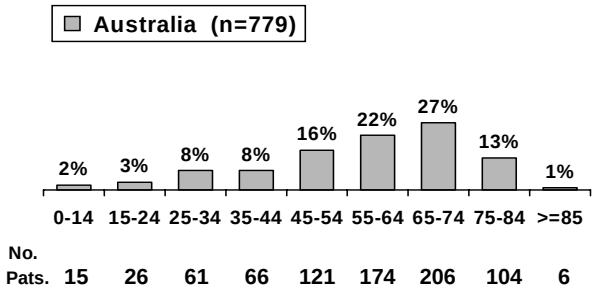


Figure 6.7

Age of Dialysing PD Patients

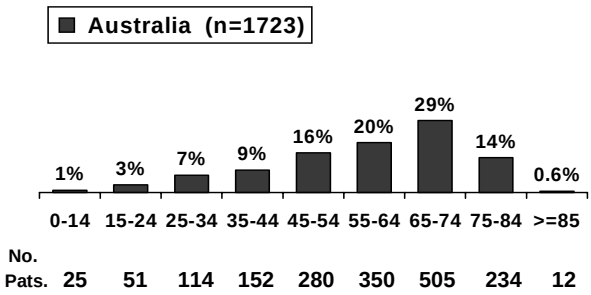


Figure 6.8 **AUSTRALIA**

Stock and Flow of Peritoneal Dialysis 1996 - 2000

Age Groups	1996	1997	1998	1999	2000
New Patients ★					
00-14 years	21 (3%)	19 (3%)	18 (2%)	16 (2%)	15 (2%)
15-24 years	18 (3%)	19 (3%)	21 (3%)	18 (2%)	26 (3%)
25-34 years	45 (6%)	47 (7%)	41 (6%)	39 (5%)	61 (8%)
35-44 years	80 (11%)	70 (10%)	70 (10%)	76 (10%)	66 (8%)
45-54 years	99 (14%)	101 (15%)	109 (15%)	123 (16%)	121 (16%)
55-64 years	160 (23%)	150 (22%)	151 (21%)	134 (18%)	174 (22%)
65-74 years	213 (31%)	207 (30%)	222 (31%)	246 (33%)	206 (27%)
75-84 years	58 (8%)	72 (10%)	88 (12%)	102 (13%)	104 (13%)
≥ 85 years	4 (1%)	0 (0%)	2 (<1%)	2 (<1%)	6 (1%)
Total	**698 (100%)**	**685 (100%)**	**722 (100%**	**756 (100%)**	**779 (100%)**
Patients Dialysing					
00-14 years	22 (1%)	22 (1%)	29 (2%)	23 (1%)	25 (1%)
15-24 years	45 (3%)	44 (3%)	39 (2%)	44 (2%)	51 (3%)
25-34 years	88 (6%)	100 (6%)	90 (6%)	96 (6%)	114 (7%)
35-44 years	176 (11%)	177 (11%)	169 (10%)	160 (10%)	152 (9%)
45-54 years	258 (16%)	265 (16%)	256 (16%)	281 (17%)	280 (16%)
55-64 years	370 (23%)	335 (21%)	335 (21%)	341 (20%)	350 (20%)
65-74 years	485 (31%)	498 (31%)	500 (31%)	503 (30%)	505 (29%)
75-84 years	140 (9%)	181 (11%)	196 (12%)	229 (14%)	234 (14%)
≥ 85 years	5 (<1%)	2 (<1%)	5 (<1%)	7 (<1%)	12 (<1%)
Total	**1589 (100%)**	**1624 (100%)**	**1619 (100%)**	**1684 (100%)**	**1723 (100%)**
Primary Renal Disease ★					
Glomerulonephritis	218 (31%)	220 (32%)	223 (31%)	223 (29%)	222 (29%)
Analgesic Nephropathy	59 (8%)	48 (7%)	52 (7%)	61 (8%)	52 (7%)
Hypertension	95 (14%)	85 (13%)	88 (12%)	73 (10%)	108 (14%)
Polycystic Disease	32 (5%)	38 (6%)	41 (6%)	35 (5%)	42 (5%)
Reflux Nephropathy	31 (4%)	37 (5%)	32 (4%)	25 (3%)	38 (5%)
Diabetic Nephropathy	160 (23%)	166 (24%)	174 (24%)	220 (29%)	197 (25%)
Miscellaneous	60 (9%)	44 (6%)	62 (9%)	68 (9%)	65 (8%)
Uncertain	43 (6%)	47 (7%)	50 (7%)	51 (7%)	55 (7%)
Total	**698 (100%)**	**685 (100%)**	**722 (100%)**	**756 (100%)**	**779 (100%)**

★ New patients receiving first peritoneal dialysis treatment

Figure 6.9

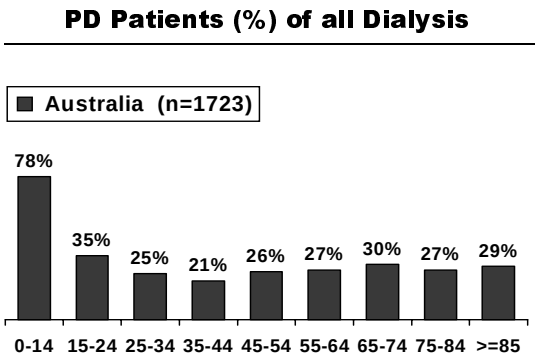


Figure 6.10

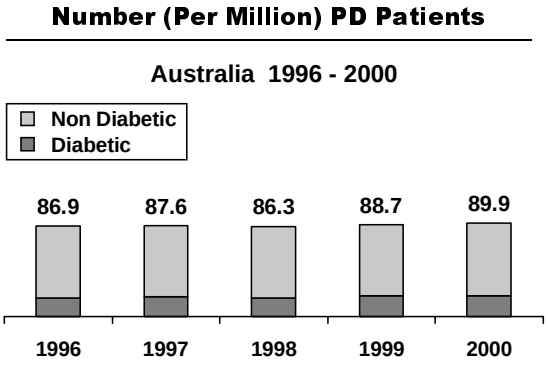


Figure 6.11

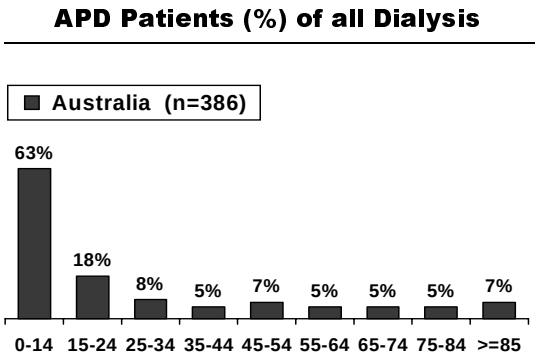


Figure 6.12

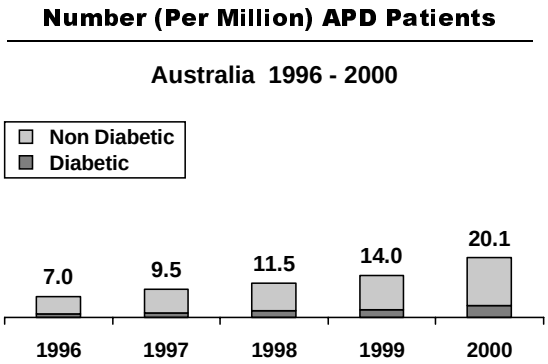


Figure 6.13

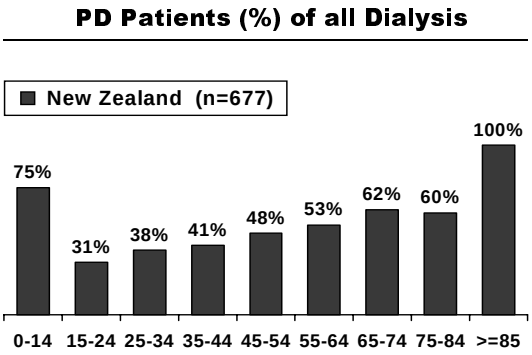


Figure 6.14

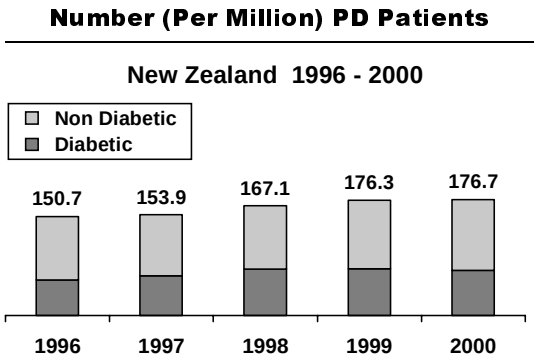


Figure 6.15

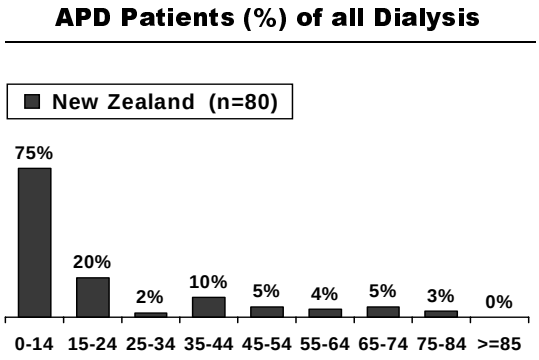
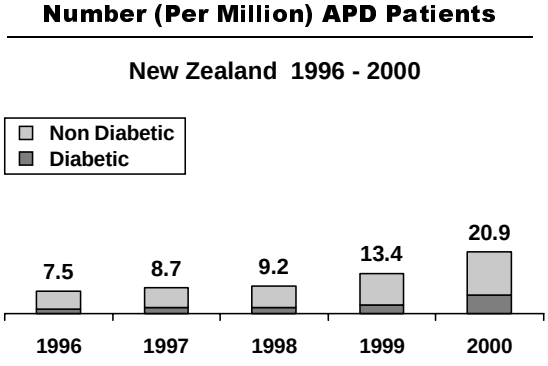


Figure 6.16



New Zealand

The annual stock and flow of patients during the period 1996 to 2000 is shown in Figures 6.2 and 6.4. Of the 3,772 treated since 1978, 677 (18%) were alive at 31 December 2000, 197 (5%) had had more than five years continuous treatment (fig 6.5).

Peritoneal dialysis accounted for 51% of all dialysis patients and 78% of all patients dialysing at home.

Modal age group was 55-64 years (30%), 9% <35 years (10% 1999), 31% >65 years (32% 1999) (fig 6.18 and 6.19).

There were 260 new peritoneal dialysis patients in the calendar year 2000 (266 in 1999), 53% as initial dialysis treatment; 31% were 55-64 years, 8% <35 years, 33% >65 years (fig 6.17 and 6.19). For more detail see Appendix III at Website (www.anzdata.org.au).

There were 140 deaths in 2000 (98 in 1999). 21.0 deaths per 100 patient years, (14.7% of patients at risk; 13% 25-44 years, 21% 45-64 years, 49% 65-84 years) (fig 3.5). For more detail see Appendix III at Website (www.anzdata.org.au).

Forty one patients were transplanted in 2000 (41 in 1999), 6% of patients dialysed, 8% of patients <65 years old (fig 6.2).

The primary renal disease of new patients to peritoneal dialysis was 40% diabetic nephropathy and 23% glomerulonephritis.

The proportion of patients in each group using peritoneal dialysis range from 31% (15-24 years), 38% (25-34 years) to 75% (0-14 years) and 100% (85-94 years) (fig 6.13).

Figure 6.17

Age of New PD Patients

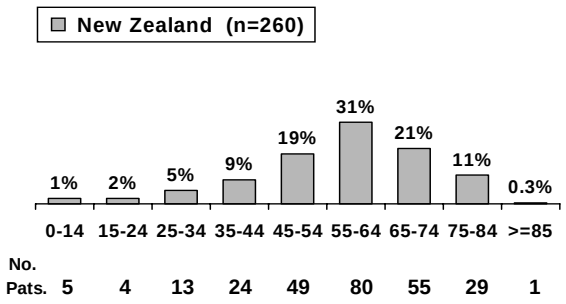


Figure 6.18

Age of Dialysing PD Patients

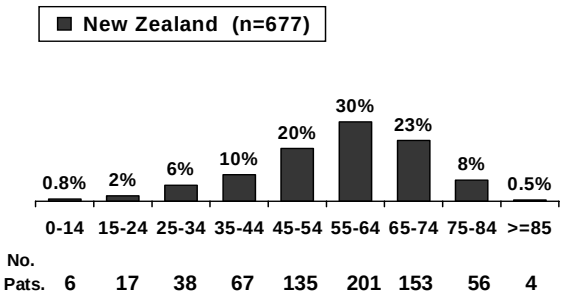


Figure 6.19 **NEW ZEALAND**

Stock and Flow of Peritoneal Dialysis 1996 - 2000

Age Groups	1996	1997	1998	1999	2000
New Patients ★					
00-14 years	6 (3%)	4 (2%)	5 (2%)	5 (2%)	5 (2%)
15-24 years	12 (5%)	7 (3%)	8 (3%)	5 (2%)	4 (2%)
25-34 years	12 (5%)	10 (5%)	19 (8%)	12 (5%)	13 (5%)
35-44 years	27 (12%)	21 (9%)	21 (8%)	23 (9%)	24 (9%)
45-54 years	53 (24%)	46 (21%)	44 (17%)	56 (21%)	49 (19%)
55-64 years	63 (29%)	60 (27%)	82 (32%)	78 (29%)	80 (31%)
65-74 years	44 (20%)	64 (29%)	60 (24%)	61 (23%)	55 (21%)
75-84 years	3 (2%)	9 (4%)	13 (5%)	24 (9%)	29 (11%)
≥ 85 years	0 (0%)	1 (<1%)	1 (<1%)	2 (<1%)	1 (<1%)
Total	**220 (100%)**	**222 (100%)**	**253 (100%)**	**266 (100%)**	**260 (100%)**
Patients Dialysing					
00-14 years	13 (2%)	12 (2%)	9 (2%)	8 (1%)	6 (<1%)
15-24 years	21 (4%)	23 (4%)	23 (4%)	18 (3%)	17 (2%)
25-34 years	40 (7%)	41 (7%)	41 (6%)	39 (6%)	38 (6%)
35-44 years	70 (13%)	65 (11%)	71 (11%)	71 (11%)	67 (10%)
45-54 years	137 (24%)	130 (22%)	129 (20%)	136 (20%)	135 (20%)
55-64 years	161 (29%)	161 (28%)	179 (28%)	188 (28%)	201 (30%)
65-74 years	103 (18%)	121 (21%)	145 (23%)	164 (24%)	153 (23%)
75-84 years	15 (3%)	25 (4%)	34 (5%)	44 (7%)	56 (8%)
≥ 85 years	0 (0%)	1 (<1%)	3 (<1%)	4 (<1%)	4 (<1%)
Total	**560 (100%)**	**579 (100%)**	**634 (100%)**	**672 (100%)**	**677 (100%)**
Primary Renal Disease ★					
Glomerulonephritis	49 (22%)	47 (21%)	44 (17%)	53 (20%)	61 (23%)
Analgesic Nephropathy	0 (0%)	0 (0%)	1 (<1%)	1 (<1%)	0 (0%)
Hypertension	24 (11%)	35 (16%)	37 (15%)	34 (13%)	39 (15%)
Polycystic Disease	16 (7%)	8 (4%)	10 (4%)	15 (6%)	5 (2%)
Reflux Nephropathy	15 (7%)	7 (3%)	9 (4%)	8 (3%)	11 (4%)
Diabetic Nephropathy	87 (40%)	97 (44%)	123 (49%)	114 (43%)	103 (40%)
Miscellaneous	22 (10%)	19 (9%)	15 (6%)	21 (8%)	29 (11%)
Uncertain	7 (3%)	9 (4%)	14 (5%)	20 (7%)	12 (5%)
Total	**220 (100%)**	**222 (100%)**	**253 (100%)**	**266 (100%)**	**260 (100%)**

★ New patients receiving first peritoneal dialysis treatment

Adequacy of Dialysis

BMI on CAPD

There has been debate in the literature regarding the use of peritoneal dialysis in large patients.

In Australia over the period 1990 to 2000, 49.4% of all dialysis patients with a BMI of <20 kg/m^2 are on PD, versus 41.2% of all patients with a BMI of ≥35 kg/m^2. After two years of dialysis in all BMI groups there was a lower percentage on PD ranging from 43.3% in the <20 kg/m^2 group through to 34.4% in the ≥35 kg/m^2 group.

In New Zealand where two thirds of all patients are on PD this trend at two years was not evident. However, as in Australia a lower percentage (57.3%) of all dialysis patients in the ≥35kg/m^2 BMI group were managed with PD.

Figure 6.20

New Patients 1-Jan-1990 to 31-Dec-2000
% PD of All Dialysis Treatment at 90 days and 2 years by BMI

BMI		Qld	NSW	ACT	Vic.	Tas.	SA	NT	WA	AUST.	N.Z.
< 20	90 days	52.6%	56.6%	54.0%	48.2%	47.1%	29.3%	7.2%	52.2%	**49.4%**	**68.2%**
	2 years	48.9%	44.0%	56.7%	39.2%	43.8%	34.9%	12.1%	54.7%	**43.4%**	**67.6%**
20-24.9	90 days	47.2%	45.6%	46.7%	36.3%	57.3%	26.2%	4.5%	54.0%	**41.9%**	**67.1%**
	2 years	45.6%	38.4%	45.2%	30.3%	48.9%	27.5%	14.7%	47.9%	**37.3%**	**72.2%**
25-29.9	90 days	48.2%	44.3%	53.1%	34.1%	52.9%	25.6%	11.8%	47.7%	**41.0%**	**67.2%**
	2 years	38.3%	36.6%	45.5%	26.7%	52.3%	25.4%	16.3%	41.9%	**34.3%**	**66.6%**
30-34.9	90 days	50.4%	45.1%	50.0%	32.7%	48.4%	26.1%	17.6%	49.7%	**42.1%**	**64.1%**
	2 years	40.5%	37.6%	41.2%	23.0%	33.3%	27.0%	27.3%	41.2%	**34.5%**	**62.1%**
≥ 35	90 days	43.9%	41.6%	41.8%	38.8%	73.0%	25.8%	5.4%	52.9%	**41.2%**	**57.3%**
	2 years	36.5%	31.4%	34.5%	34.1%	58.5%	24.7%	0.0%	49.0%	**34.4%**	**59.5%**

PD Litres Per Week

The trend noted in earlier reports showing an increase in percentage of patients on larger weekly volumes of peritoneal dialysis has continued in most BMI groups in both Australia and New Zealand. This may reflect the widely promulgated view up to 2001 that more dialysis promotes a better long term outcome.

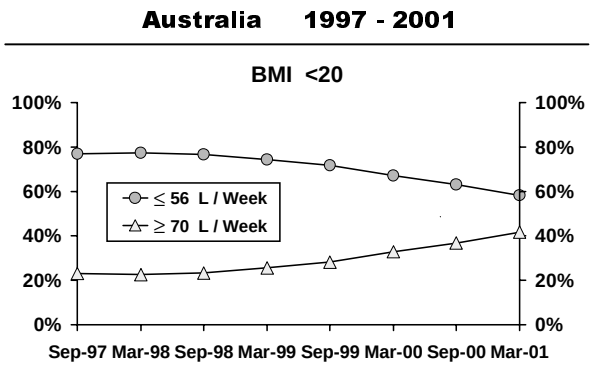
Figure 6.21

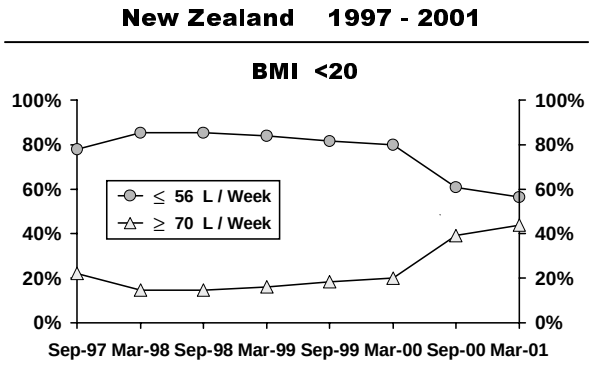
Volume of Dialysate per Week

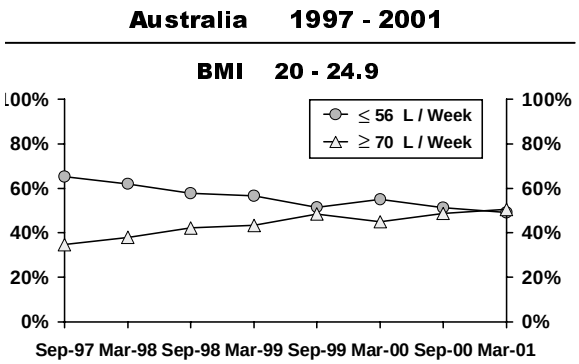
	Age Groups	March 1998					March 2001				
			Litres per Week					Litres per Week			
		No. Pts	42	56	70	84	No. Pts	42	56	70	84
Aust.	45-64	565	3	47	31	18	579	3	41	30	26
	65-74	453	5	56	29	9	463	3	48	27	22
	75-84	176	7	64	22	7	206	3	53	24	20
N.Z.	45-64	283	3	55	31	11	323	3	28	42	28
	65-74	125	3	65	27	5	149	1	42	39	19
	75-84	26	15	62	23	0	49	4	41	43	12

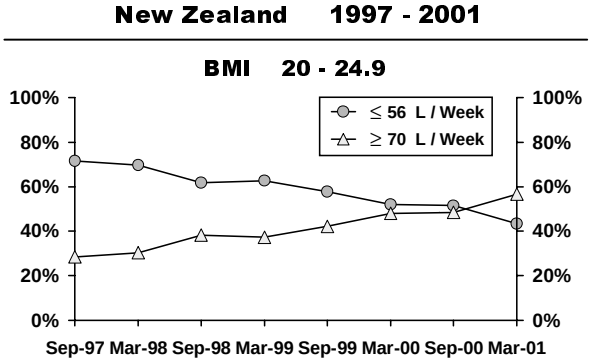
Figure 6.22

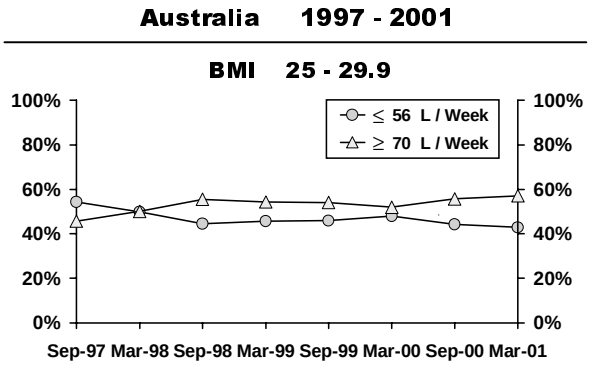
Relationship of BMI to Weekly Dialysate Volume

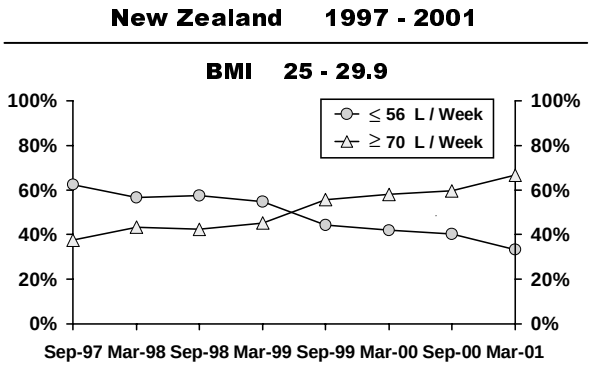


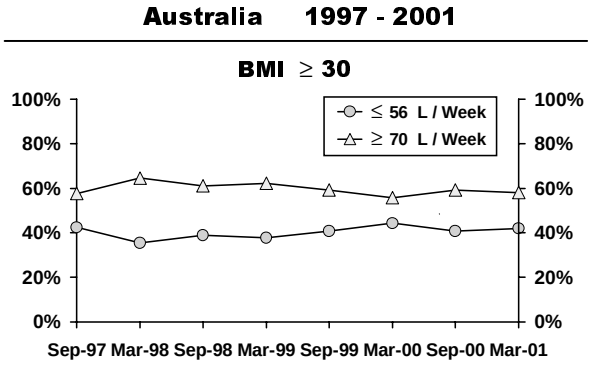


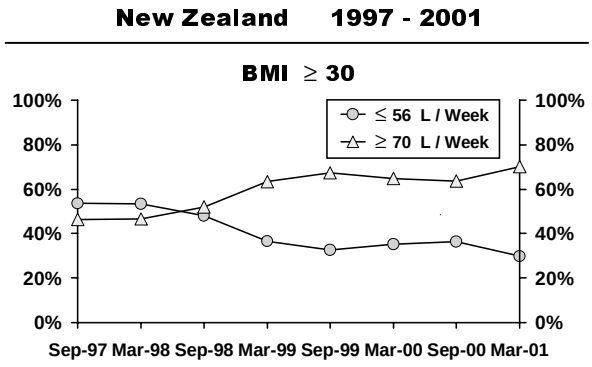












PERITONITIS

Australian median survival peritonitis free has increased at 18.5 months overall, with a growing number (31%) of patients completely free of peritonitis in three years and in New Zealand it was 11.64 months (21% of patients) (fig 6.23). As noted in previous reports there is a strong association between ethnicity and peritonitis free survival (fig 6.25). In this Report, for the first time, we comment on peritonitis free survival in patients on APD (fig 6.25).

While the numbers are still small, peritonitis free survival in this group does appear to be worse than for those patients who are on CAPD. This somewhat surprising result may reflect a tendency based on funding constraints to utilise APD primarily in patients who are dependent on others for some or much of their dialysis care with the attendant risks seen in this group of patients.

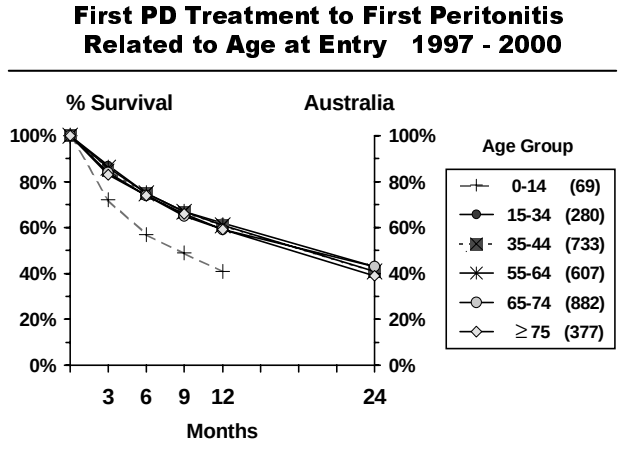
Figure 6.23

First PD Treatment to First Episode of Peritonitis Related to Age at Entry 1997 to 31-Dec-2000

Survival	Age Groups 00-14	15-34	35-54	55-64	65-74	≥ 75	All
Australia	n=69	n=280	n=733	n=607	n=882	n=377	n=2948
3 months	72 ± 5.5 46	87 ± 2.0 233	85 ± 1.3 581	86 ± 1.5 476	84 ± 1.3 669	83 ± 2.0 275	85 ± 0.7 2280
6 months	57 ± 6.2 32	75 ± 2.7 162	75 ± 1.7 432	75 ± 1.9 359	74 ± 1.6 506	74 ± 2.4 209	74 ± 0.9 1700
9 months	49 ± 6.5 20	65 ± 3.1 107	67 ± 1.9 337	67 ± 2.0 273	65 ± 1.8 390	66 ± 2.7 149	66 ± 1.0 1276
1 year	41 ± 6.7 17	59 ± 3.4 81	62 ± 2.0 263	61 ± 2.2 221	59 ± 1.9 307	59 ± 3.0 112	60 ± 1.0 1001
2 years	31 ± 7.3 3	41 ± 4.1 28	43 ± 2.4 83	41 ± 2.6 82	43 ± 2.2 106	39 ± 3.5 39	42 ± 1.2 341
3 years		37 ± 4.6 11	28 ± 3.0 24	31 ± 3.0 23	32 ± 2.7 30	32 ± 4.0 12	31 ± 1.5 101
N. Zealand	n=17	n=75	n=282	n=302	n=239	n=80	n=995
3 months	70 ± 11.3 11	82 ± 4.5 59	85 ± 2.2 230	83 ± 2.2 242	86 ± 2.3 189	87 ± 4.0 61	84 ± 1.2 792
6 months	35 ± 12.4 4	68 ± 5.6 40	69 ± 2.9 162	67 ± 2.8 172	72 ± 3.0 139	71 ± 5.4 42	69 ± 1.5 559
9 months	35 ± 12.4 3	56 ± 6.2 29	59 ± 3.1 119	52 ± 3.1 110	64 ± 3.4 111	64 ± 6.0 30	58 ± 1.7 402
1 year	35 ± 12.4 3	48 ± 6.6 21	50 ± 3.3 89	42 ± 3.2 75	57 ± 3.6 89	55 ± 6.7 22	49 ± 1.8 299
2 years		26 ± 6.7 7	31 ± 3.5 28	27 ± 3.3 26	40 ± 3.9 35	29 ± 7.9 1	31 ± 1.9 97
3 years		21 ± 7.1 2	21 ± 3.9 10	20 ± 3.7 6	24 ± 4.5 7		21 ± 2.1 25

% Survival ± S.E. and Numbers at risk

Figure 6.24



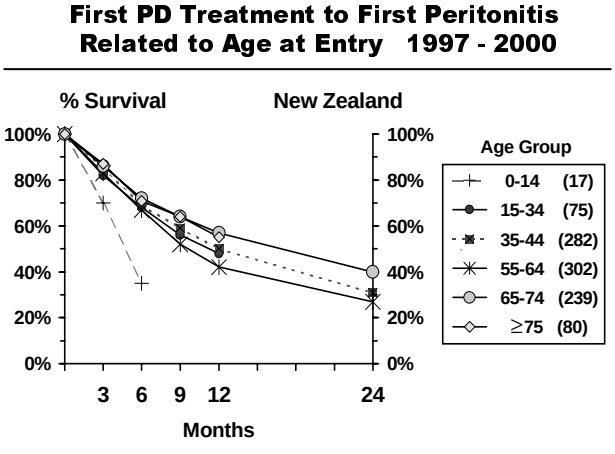


Figure 6.25

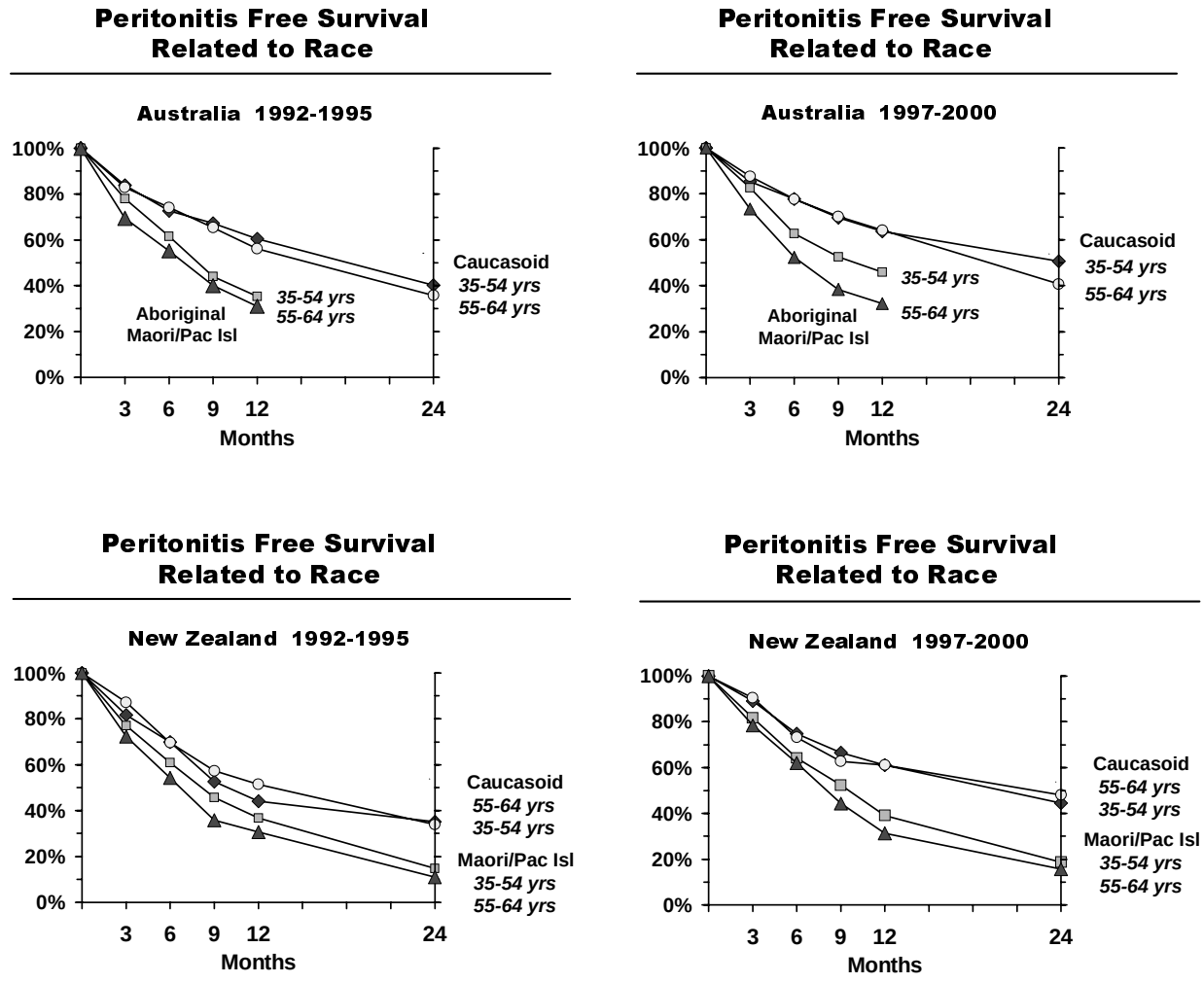


Figure 6.26

First Home APD Treatment to First Episode of Peritonitis Related to Age at Entry 1997 to 31-Dec-2000

Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	≥ 75	
Australia	n=48	n=91	n=154	n=92	n=120	n=49	n=554
1 month	70 ± 6.7 39	82 ± 4.0 86	85 ± 2.9 148	85 ± 3.8 85	82 ± 3.6 108	83 ± 5.5 43	87 ± 1.6 509
3 months	61 ± 7.2 31	72 ± 4.8 71	74 ± 3.7 119	73 ± 4.9 68	70 ± 4.4 89	83 ± 5.5 36	72 ± 1.9 414
6 months	55 ± 7.5 24	63 ± 5.3 58	66 ± 4.0 94	67 ± 5.3 53	67 ± 4.5 66	83 ± 5.5 34	67 ± 2.1 329
9 months	50 ± 7.7 21	59 ± 5.5 43	62 ± 4.2 78	60 ± 5.8 44	64 ± 4.7 57	79 ± 6.2 28	62 ± 2.2 271
1 year	37 ± 8.5 16	47 ± 7.1 26	53 ± 5.0 59	36 ± 7.8 25	49 ± 6.2 43	56 ± 10.8 20	47 ± 2.8 189
N. Zealand	n=16	n=20	n=27	n=15	n=10	n=6	n=94
1 month	62 ± 12.3 14	84 ± 8.4 19	84 ± 7.1 25	93 ± 6.6 13	78 ± 13.8 10	80 ± 17.8 3	81 ± 4.2 84
3 months	25 ± 11.5 9	71 ± 11.0 14	80 ± 7.9 21	72 ± 12.0 13	78 ± 13.8 6	80 ± 17.8 3	67 ± 5.2 66
6 months	25 ± 11.5 3	64 ± 12.1 10	71 ± 9.4 17	72 ± 12.0 10	65 ± 16.5 6	53 ± 24.8 3	60 ± 5.5 49
9 months		55 ± 13.4 8	71 ± 9.4 15	72 ± 12.0 7	65 ± 16.5 5		54 ± 5.8 40
1 year		42 ± 14.9 5	57 ± 14.7 8		65 ± 16.5 4		40 ± 7.5 21

% Survival ± S.E. and Numbers at risk

TECHNIQUE FAILURE
(CENSORED FOR DEATH OR TRANSPLANTATION)

Figure 6.27

Causes of Technique Failure April 1995 to March 1998 Excluding Death, Transplantation, Recovery of Renal Function

Causes of Technique Failure	Australia		New Zealand	
	Primary	Secondary	Primary	Secondary
Recurrent/persistent peritonitis	324	9	100	1
Acute peritonitis	191	5	43	-
Tunnel/exit site infection	128	4	11	-
Total Infective Complications	**643 (42%)**	**18 (29%)**	**154 (43%)**	**1 (14%)**
Inadequate solute clearance	123	4	28	-
Inadequate fluid ultrafiltration	105	5	22	-
Total Dialysis Failure	**228 (15%)**	**9 (15%)**	**50 (14%)**	-
Dialysate leak	112	15	18	1
Catheter block	16	2	8	-
Catheter fell out	7	-	1	-
Hernia	48	4	3	-
Abdominal pain	13	1	4	-
Abdominal surgery	51	2	9	-
Multiple adhesions	3	-	2	-
Hydrothorax	3	-	3	1
Haemoperitoneum	1	1	-	-
Scrotal oedema	1	-	-	-
Total Technical Failure	**255 (17%)**	**25 (40%)**	**48 (13%)**	**2 (29%)**
Unable to manage self care	138	1	19	1
Patient preference	250	9	87	3
Total Social Reasons	**388 (26%)**	**10 (16%)**	**106 (30%)**	**4 (57%)**

Figure 6.28

Causes of Technique Failure April 1998 to March 2001 Excluding Death, Transplantation, Recovery of Renal Function

Causes of Technique Failure	Australia		New Zealand	
	Primary	Secondary	Primary	Secondary
Recurrent/persistent peritonitis	284	8	87	2
Acute peritonitis	274	7	115	5
Tunnel/exit site infection	86	3	11	1
Total Infective Complications	**644 (32%)**	**18 (16%)**	**213 (40%)**	**8 (26%)**
Inadequate solute clearance	245	13	85	5
Inadequate fluid ultrafiltration	174	11	33	3
Total Dialysis Failure	**419 (21%)**	**24 (22%)**	**118 (23%)**	**8 (26%)**
Dialysate leak	138	22	44	7
Catheter block	27	1	5	-
Catheter fell out	8	-	1	-
Hernia	77	4	8	-
Abdominal pain	11	1	2	-
Abdominal surgery	58	4	16	-
Multiple adhesions	2	-	5	-
Hydrothorax	-	-	-	-
Haemoperitoneum	1	-	-	-
Scrotal oedema	-	-	-	-
Total Technical Failure	**322 (16%)**	**32 (30%)**	**81 (15%)**	**7 (22%)**
Unable to manage self care	172	11	28	7
Patient preference	470	23	89	1
Total Social Reasons	**642 (31%)**	**34 (31%)**	**117 (22%)**	**8 (26%)**

Figures 6.27-29, show the causes of technique failure. In comparison to the epoch 1995 to 1998 infective complications as an overall cause of technique failure has reduced in Australia from 42% to 32% and in New Zealand from 43% to 40%. In Australia there has been an increase in the number of patients failing because of inadequate solute clearance or inadequate fluid ultrafiltration rising from 15% to 21% of total failures and a rise in failure for social reasons from 26% to 31%.

A similar change was noted in New Zealand in relationship to dialysis failure and there was also a climb in technique failure secondary to social reasons. These trends may reflect a tendency over the last three years to transfer more patients from PD to haemodialysis because of concerns about inadequate dialysis.

Interestingly, in Australia, patient preference as a cause for transfer has risen dramatically from 250 (16.5%) in the era 1995 to 1998, to 470 (23.2%) in the era 1998-2001. The opposite trend occurred in New Zealand over the same period with 87 (24%) and 89 (16.8%) being recorded in the 2 epochs. These differences may reflect the constraints placed on availability of hospital and satellite haemodialysis in New Zealand in contrast to Australia.

Ethnicity also importantly influences the cause of technique failure. In Australia, 55% of Aborigines fail for infective reasons as opposed to 34% of Caucasians and 32% of Asians. Similarly in New Zealand, 48% of Maori and 49% of Pacific Islanders fail PD for infective reasons as opposed to 33% of Caucasians and 41% of Asians. In contrast social reasons account for only 19% of failures in Australian Aborigines and New Zealand Maori and Pacific Islanders. These failure rates related to infection correlate with the tendency towards early peritonitis in the indigenous populations (fig 6.29).

Figure 6.29

Causes of Technique Failure April 1995 to March 2001

(%)

Causes of Technique Failure	Diab.	Non Diab.	Race						Age Group		Total
			Asian	Abor.	Cauc.	Maori	Pac.Is.	Other	19-54	≥55	
AUSTRALIA											
Infective	312	975	90	165	968	3	49	12	475	772	**1287**
%	(39)	(35)	(32)	(55)	(34)	(38)	(55)	(34)	(36)	(36)	**(36)**
Reduced Solute	64	304	30	9	318	-	6	5	169	192	**368**
%	(8)	(11)	(11)	(3)	(11)		(7)	(14)	(13)	(9)	**(11)**
Inadequate UF	69	210	28	19	225	1	4	2	96	175	**279**
%	(9)	(8)	(10)	(6)	(8)	(12)	(4)	(6)	(7)	(8)	**(8)**
Technical	93	484	42	50	472	-	6	7	215	357	**577**
%	(12)	(18)	(15)	(17)	(17)		(7)	(20)	(16)	(17)	**(16)**
Social	257	773	91	56	846	4	24	9	365	640	**1030**
%	(32)	(28)	(32)	(19)	(30)	(50)	(27)	(26)	(28)	(30)	**(29)**
Total	**795**	**2746**	**281**	**299**	**2829**	**8**	**89**	**35**	**1320**	**2136**	**3541**
NEW ZEALAND											
Infective	147	220	22	-	126	152	66	1	146	217	**367**
%	(42)	(41)	(41)		(33)	(48)	(49)	(100)	(39)	(46)	**(41)**
Reduced Solute	45	68	10	-	48	38	17	-	62	49	**113**
%	(13)	(12)	(18)		(13)	(12)	(13)		(16)	(11)	**(13)**
Inadequate UF	29	26	2	-	25	20	8	-	21	33	**55**
%	(8)	(5)	(4)		(7)	(6)	(6%		(5)	(7)	**(6)**
Technical	50	79	8	-	55	48	18	-	56	71	**129**
%	(14)	(15)	(15)		(14)	(15)	(13)		(15)	(15)	**(15)**
Social	78	145	12	-	126	59	26	-	94	97	**223**
%	(23)	(27)	(22)		(33)	(19)	(19)		(25)	(21)	**(25)**
Total	**349**	**538**	**54**	**-**	**380**	**317**	**135**	**1**	**379**	**467**	**887**

ACHIEVED SOLUTE CLEARANCE

Figure 6.30 **Relationship of Residual GFR to Kt/V**

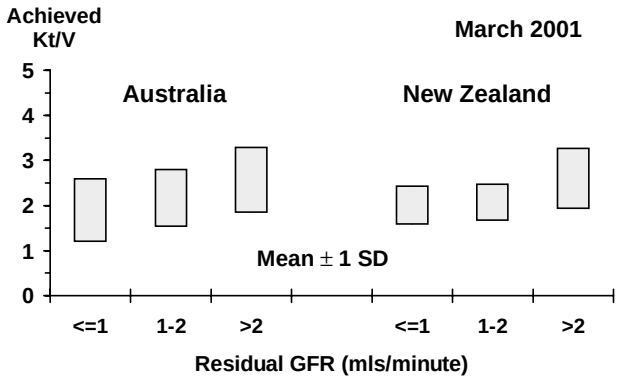
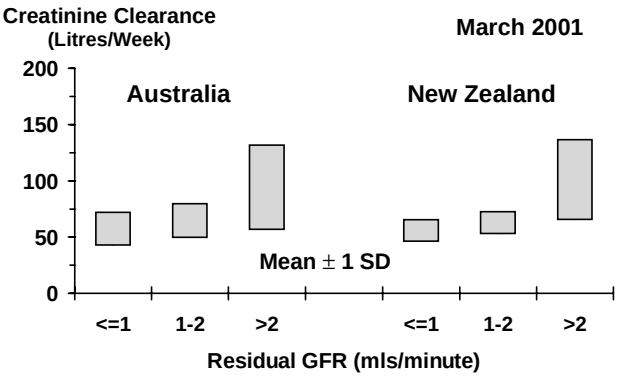


Figure 6.31 **Relationship of Creatinine Clearance to Kt/V**



In Australia, 23% of patients are achieving a total Kt/V of <1.8 (compared with 33% reported in 2000).

In New Zealand there has also been a similar decrease in the percent of patients reporting a total clearance of <1.8, 21% versus 25% in 2000.

These trends are likely to reflect increasing use of larger dialysis volumes on the one hand and an increasing rate of transfer from PD to haemodialysis on the other. This latter contention is borne out from data presented in Figures 6.27-28 showing that dialysis failure as a cause of technique failure has risen in Australia from 15% in the epoch 1995 to 1998 to 21% in the epoch 1998 to 2001. Similar changes have occurred in New Zealand. One hundred and twenty three (8.1%) of all technique failures were due to inadequate solute clearance in 1995 to 1998 compared with 245 (12.1%) in 1998 to 2001.

It is clear from Figure 6.34 that residual GFR plays a significant role in determining the total amount of clearance (Kt/V) that can be achieved. This is even more the case with the association between residual GFR and creatinine clearance.

Figure 6.32

KT/V Related to Volume of Dialysate
Australia March 2001

Prescribed Dialysate Volume	Achieved KT/V (Total) ≤ 1.8	> 1.8
≤ 56 L / week	127 (22.1%)	448 (77.9%)
≥ 70 L / week	168 (24.5%)	517 (75.5%)
	295	965

Figure 6.33

KT/V Related to Volume of Dialysate
New Zealand March 2001

Prescribed Dialysate Volume	Achieved KT/V (Total) ≤ 1.8	> 1.8
≤ 56 L / week	35 (18.1%)	158 (81.9%)
≥ 70 L / week	80 (23.1%)	266 (76.9%)
	115	424

Figure 6.34

Relationship of Residual GFR to KT/V
March 2001

	Residual GFR	KT/V (Total) ± S.E
Aust	≤ 1 ml / min	1.90 ± 0.03
	> 1 ml / min	2.47 ± 0.03
NZ	≤ 1 ml / min	2.01 ± 0.03
	> 1 ml / min	2.48 ± 0.04

Peritoneal Transport Status

The Registry commenced collection of this data in October 1998 in patients new to CAPD with the aim of using these measurements as another predictor of outcome.

Only 1022 patients (Australia) and 360 patients (New Zealand) had data supplied: 65% of all new patients in Australia and 66% of all new patients in New Zealand.

The mean D/P creatinine ratios tend to be higher than proposed international means (Twardowski) with 32% of Australians and an even higher number of New Zealand patients commencing CAPD and being classified in the high transport category with only 3% of Australian patients and 4% of New Zealand patients in the low transport category.

While this data must be viewed in the context of a large group without reported results it would appear that the peritoneal transport status in the New Zealand and Australian populations is systematically higher than that reported elsewhere for reasons that are unclear.

There is a difference between the numbers of patients with significant residual renal function (> or = to ≥5ml/min) in relationship to D/P creatinine. Of those undertaking transport studies in the first 6 months, there were 35% of patients in Australia with significant residual renal function and a D/P creatinine <0.65 compared with 31% of patients with a D/P creatinine ≥0.65. By 6-12 months of those with a high transport status, only 22.4% had mantained significant residual renal function compared to 28.4% of those with a lower transport status. These figures were similar to those in New Zealand where 21% of those with a high transport status maintained a higher residual renal function versus 33% of those with a lower transport status. This association needs further definition.

Figure 6.35

PET D/P Creatinine at Four Hours
New PD Patients from 1-Oct-98

	Australia		New Zealand	
	Diabetic	Non Diabetic	Diabetic	Non Diabetic
Mean + ISD	0.82	0.83	0.87	0.86
Mean	0.70	0.70	0.72	0.72
Mean – ISD	0.58	0.57	0.57	0.58

Figure 6.36

Peritoneal Transport Status
New Patients 1-Oct-1998 to 31-Mar-2001

	Australia		New Zealand	
	Diabetic	Non Diabetic	Diabetic	Non Diabetic
High *(0>=0.8)*	82 (32%)	243 (32%)	64 (47%)	91 (41%)
High Average *(0.65-0.8)*	85 (33%)	263 (34%)	40 (29%)	78 (35%)
Low Average *(0.50-0.64)*	83 (32%)	238 (31%)	26 (19%)	46 (21%)
Low *(<0.5)*	7 (3%)	21 (3%)	7 (5%)	8 (4%)

Figure 6.37

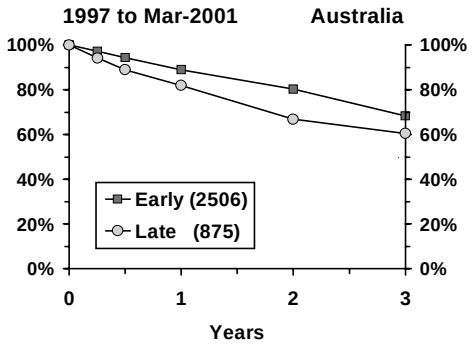
Late Referral < 3 months
New Patients since 1-Apr-1997
Treatment at 90 days
until 31-Dec-2000

Treatment at 90 days	Late	Early
Australia	(1394)	(4049)
PD	37%	38%
HD	63%	62%
New Zealand	(333)	(886)
PD	38%	39%
HD	62%	61%

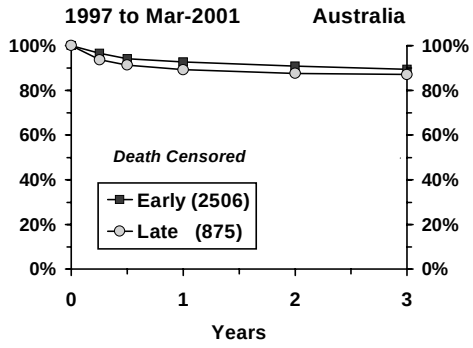
Late Referral Related to Treatment at 90 Days

Figure 6.38

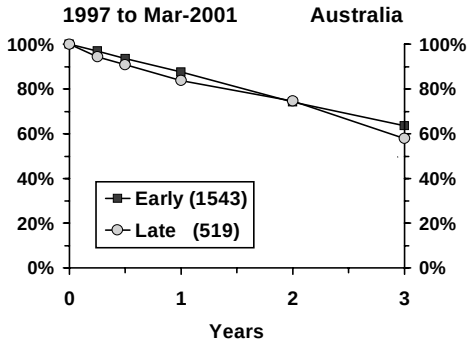
Patient Survival Related to Referral (HD Treatment at 90 days)



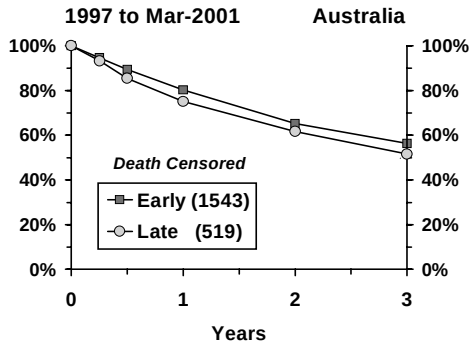
Technique Survival Related to Referral (HD Treatment at 90 days)



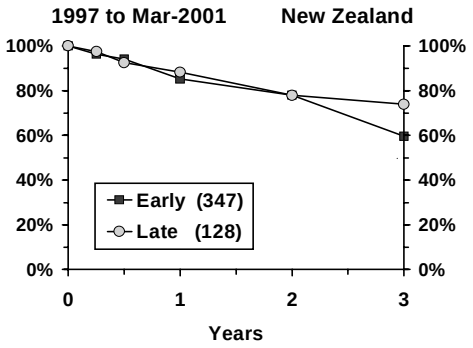
Patient Survival Related to Referral (PD Treatment at 90 days)



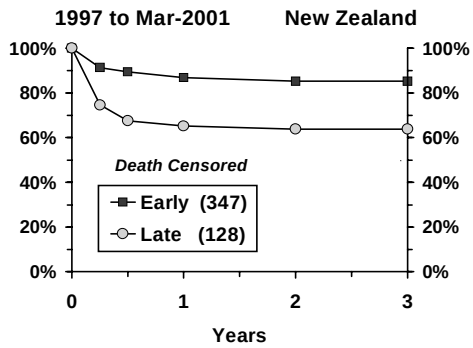
Technique Survival Related to Referral (PD Treatment at 90 days)



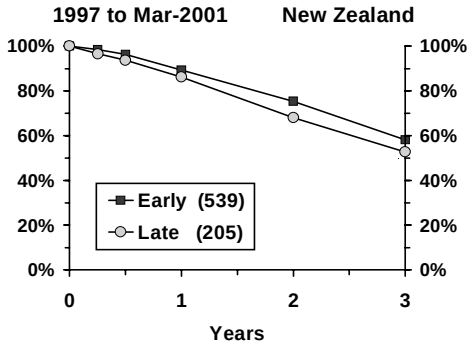
Patient Survival Related to Referral (HD Treatment at 90 days)



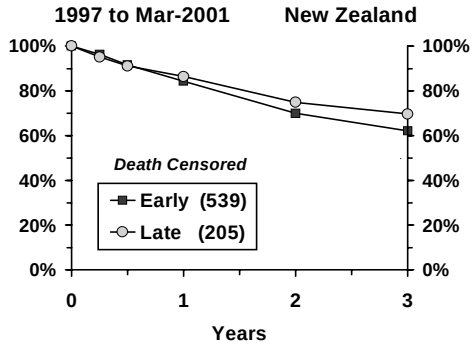
Technique Survival Related to Referral (HD Treatment at 90 days)



Patient Survival Related to Referral (PD Treatment at 90 days)



Technique Survival Related to Referral (PD Treatment at 90 days)



Late Referral Related to Treatment Modality

In Australia there is an increased mortality in patients placed on haemodialysis (and surviving past 90 days) who have been referred to a renal physician less than three months before requiring dialysis. This data does not take account of mortality within the first 90 days. In contrast there is no apparent difference in survival on peritoneal dialysis. Technique survival from 90 days onwards isimilar in both early and late referrals whether or not they were on haemodialysis or peritoneal dialysis.

In New Zealand, (patients who have survived more than 90 days on dialysis) there is no significant difference in mortality for early versus late referrals whether or not they were on PD or haemodialysis. There is however a significant transfer rate of late referral patients from haemodialysis to PD after 90 days in comparison to early referrals. This difference is likely to reflect the high rate of PD utilisation in New Zealand and constraints on hospital and satellite haemodialysis.

Transplantation in PD Patients

In Australia in patients receiving first cadaveric grafts, those who are on haemodialysis had a higher frequency of delayed graft function (22.5%) than those on peritoneal dialysis (13%). (Figure 6.39)

However, this did not have an effect on overall graft survival. (Figure 6.40)

Figure 6.39

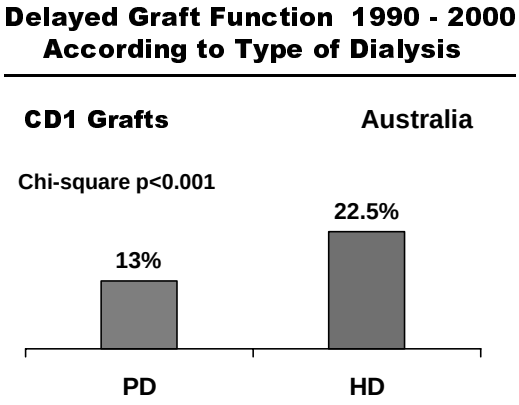


Figure 6.40