The Twenty Second Report

AUSTRALIA AND NEW ZEALAND DIALYSIS AND TRANSPLANT REGISTRY

1999

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Paediatric Report - Associate Professor Rowan Walker

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Statistical Methods

Actuarial and Kaplan-Meier survivals have been produced using the procedure contained in SPSS ® for Windows ™ Release 6.1 SPSS Inc.

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Publications based upon ANZDATA Registry information reported here or supplied upon request, must include the citation as noted above and the following notice:

> The data reported here have been supplied by the Australia and New Zealand Dialysis and Transplant Registry. The interpretation and reporting of these data are the responsibility of the Editors and in no way should be seen as an official policy or interpretation of the Australia and New Zealand Dialysis and Transplant Registry.

Participating Hospitals

Queensland
Allamanda Private Hospital
Bundaberg Base Hospital
Cairns Base Hospital
Goldcoast Hospital
Greenslopes Private Hospital
Hervey Bay Hospital
Mackay Base Hospital
Nambour Hospital
Princess Alexandra Hospital
Rockhampton Base Hospital
Royal Brisbane Hospital
Toowoomba Hospital
Townsville General Hospital
Wesley Private Hospital

New South Wales / Australian Capital Territory (ACT)
Dubbo Base Hospital
Gosford Hospital
John Hunter Hospital
Lismore Hospital
Mater Misericordiae Hospital
New Children's Hospital
Prince of Wales Hospital
Royal North Shore Hospital
St. George Hospital
St. Vincent's Hospital
South West Sydney Renal Service
Bankstown Hospital
Liverpool Hospital
Statewide Renal Services
Concord Hospital
Royal Prince Alfred Hospital
Sydney Adventist Hospital
Sydney Children's Hospital (*Prince of Wales)*
Tamworth Hospital
The Canberra Hospital (ACT)
Westmead Hospital
Wollongong Hospital

Victoria
Alfred Hospital
Austin and Repatriation Medical Centre
Epworth Hospital
Geelong Hospital
Monash Medical Centre – Adult
Monash Medical Centre – Paediatric
Royal Children's Hospital
North West Health Care
Royal Melbourne Hospital
Western Hospital
St. Vincent's Hospital

Tasmania
Launceston General Hospital
Royal Hobart Hospital

South Australia
Flinders Medical Centre
The Queen Elizabeth Hospital
Royal Adelaide Hospital
Women's and Children's Hospital

Northern Territory
Royal Darwin Hospital
Alice Springs Hospital

Western Australia
Fremantle Hospital
Princess Margaret Hospital for Children
Royal Perth Hospital
Sir Charles Gairdner Hospital

New Zealand
Auckland Hospital
Starship Children's Hospital
Christchurch Hospital
Dunedin Hospital
Middlemore Hospital
Palmerston North Hospital
Waikato Hospital
Wellington Hospital
Whangarei Area Hospital

Satellite Haemodialysis Units

Queensland
Atherton Satellite - Cairns Base Hospital
Calvary Hospital
Home Hill Satellite – Townsville General Hospital
Keperra – Royal Brisbane Hospital
Logan Satellite – Princess Alexandra Hospital
Mater Children's Hospital
Royal Children's Hospital
Sandgate Satellite – Royal Brisbane Hospital
Vincent Satellite – Townsville General Hospital

New South Wales (ACT)
Ballina Satellite – Lismore Hospital
Bankstown Hospital - S.W.Sydney Renal Serv.
Bathurst - St. Vincent's Hospital
Bourke Hospital
Brewarrina Hospital
Canberra Community Dialysis Centre (ACT)
Chatswood Satellite
Coffs Harbour Base Hospital
Dame Eadith Walker - Statewide Renal Services
Dubbo Base Hospital
Eora Cottage – Prince Henry Hospital
Grafton Hospital
Kempsey Hospital
Lanceley Cottage – Royal North Shore Hospital
Liverpool Community Hospital
– Sth.West Sydney Renal Service
Nita Reed House - Taree
Norfolk Island Hospital
Orange Base Hospital – Westmead Hospital
Shellharbour – Wollongong Hospital
Singleton Satellite – John Hunter Hospital
Sydney Adventist Hospital
Sydney Dialysis Centre
Urana Hospital
Wagga Wagga Base Hospital
Wansey Satellite – John Hunter Hospital
Westmead Hospital

Victoria
Angliss Hospital
Apollo Bay Hospital
Ararat Hospital
Austin Training Satellite
Bacchus Marsh Hospital
Bairnsdale Hospital
Ballarat Hospital
Bendigo Hospital
Berwick Hospital
Birchip Hospital
Broadmeadows Hospital
Brunswick Satellite
Burwood Satellite
Casterton Hospital
Caulfield Satellite
Cohuna Hospital
Colac Hospital
Daylesford Hospital
Diamond Valley Hospital
Echuca Hospital
Edenhope Hospital
Epworth Hospital
Essendon Satellite
Frankston Satellite
Geelong Hospital
Goulburn Valley Hospital
Hamilton Hospital

Victoria cont...
Hastings Hospital
Heidelberg – Repatriation Dialysis Unit
Kilmore Hospital
Kingsford Satellite
Koo Wee Rup Hospital
La Trobe Regional Satellite
Lorne Hospital
Maryborough Hospital
Mildura Hospital
Mitcham Hospital
Moorabbin Satellite
Myrtleford Hospital
Nauru (overseas) – Alfred Hospital
Nauru (overseas) – Austin & Repatriation
Nauru (overseas) – Monash Med. Centre Adult
Nauru (overseas) – North West Health Care
North East Kidney Service (Austin & Repat.)
Orbost Hospital
Peter James Centre
Portland Hospital
Robinvale Hospital
St. Arnaud Hospital
Sale Hospital
Sandringham Satellite
Sealakes District Health Centre
Seymour Hospital
Sunshine Hospital
Swan Hill Hospital
Walwa Hospital
Wangaratta Hospital
Warnnambool Hospital
Werribee Hospital
Western Gippsland Hospital
Wodonga Hospital
Wonthaggi Hospital
Yarawonga District Hospital
Yarram Hospital

Tasmania
Royal Hobart Hospital

South Australia
College Grove Private Hospital
Hartley Private Hospital
North Adelaide Satellite Centre
Port Augusta Hospital
Wayville Satellite Centre

Northern Territory
Bathurst Island Hospital
Community Health Centre
– Alice Springs Hospital
Nightcliff Community Centre
– Royal Darwin Hospital

Western Australia
Armadale Satellite
Geraldton Hospital
Joondalup Satellite Unit
Kalgoorlie Hospital
Peel Health Campus
Royal Perth Rehabilitation Hospital
– Royal Perth Hospital

New Zealand
Greenlane Hospital
Middlemore Hospital

Introduction

This 22nd Report from Anzdata Registry is another excellent effort by all those involved. At a stage in health care delivery when outcome assessment is increasingly the focus of attention, the Australian Nephrology world can hold its head high. The detailed account given in this Report of the number, the demographics and the outcome analyses of patients presenting for dialysis and transplantation in Australia and New Zealand provides exactly the type of data sought by consumers and the decision makers within the Health Care System. This data together with the Individual Hospital Reports which are separately issued, give us powerful tools to use in improving the quality of patient care and in planning the future.

Underlying the strength of Anzdata Registry is the 100% reporting. All patients from all units providing dialysis and transplantation in Australia and New Zealand are believed to be documented in full by the Registry. The difficulty in maintaining this outstanding performance increases each year as the numbers increase and the financial pressures in the public health care system continue to worsen.

Most of us believe that it is high time for Registry reporting to move to an electronic basis. There are substantial gains to be made in efficiency, and online reporting would allow the Registry to provide a much more timely turn around of information such as contained in this annual report.

The Registry Committee is actively involved in assessing the best means by which a move to electronic reporting might occur. WEB based technology appears the most attractive way to go. It is hoped that this capacity will be offered to participating units for data entry commencing in 2001.

The steady increase in the number of patients registered with Anzdata, the increasing complexity of analyses requested and the need to allocate time and resource to develop new technology now exceeds the capacity of the current staff. It is urgent for additional resource to be obtained if the current output is to be maintained and any development is to occur. The Australian Kidney Foundation have generously increased their allocation by 20% for the coming calendar year but the contribution from the Federal and State Governments (through the Department of Human Services and Health) has been frozen for the financial year 2000/01.

The Registry is the responsibility of a "Registry Committee" which is a Subcommittee of the Dialysis and Transplant Committee of the ANZ Society of Nephrology and The Australian Kidney Foundation. This Committee meets annually and currently consists of

Dr. J. Collins (Advisor/CAPD)
Dr. A. Disney
Mrs. L. Excell
Dr. M. Falk
Dr. A. Gillin
Dr. D. Harris
Ms K. Herbertt (Advisor/Organ Procurement)
Dr. P. Kerr (Advisor/Haemodialysis)
Dr. J. Knight (AKF Representative)
Dr. K. Lynn (NZ Representative)
Dr. T. Mathew
Dr L. McMahon
Dr. B. Murphy
Dr. D. Nicol
Dr. H. Rhodes
Dr. G. Russ (Co-ordinator Transplant Data)
Prof. A. Sheil (Advisor/Cancer)
Dr. M. Suranyi
Assoc.Prof. R. Walker (Advisor/Paediatrics)

The Committee will be meeting in July 2000. If you have any problems with any aspect of the Registry please let the Executive Staff in Adelaide know, or contact a Registry Committee member.

The publication of the annual report continues to be a low cost in-house exercise. Steady progress has been made in improving layout and readability. We have consistently chosen to maintain this approach rather than go for a more expensive glossy production.

Special sections this year have been written by
John Collins, Karen Herbertt, Peter Kerr, Graeme Russ, Ross Sheil and Rowan Walker.

The magnificent staff at the Registry Headquarters in Adelaide are unchanged. Lee Excell continues to have prime responsibility for maintaining the database and overview of analyses. She is assisted by Brian Livingston, computer programmer and analyst, and Lis Steinmetz who attends to administration and secretarial support.

The report is posted to a large mailing list in Australia, New Zealand and overseas. Should you know of anyone who would like to join the mailing list, please let us know.

Timothy H. Mathew
Chairman

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Appendix I

SUMMARY - AUSTRALIA

Patients Treated 31 December 1998: 10403 patients (555 per million), a 6% increase: 4880 (260 per million) functioning transplants, 5523 (295 per million) were dialysis dependent.

New Patients 1998: 1589 patients (85 per million). State intake ranged from Tasmania (61 per million), South Australia (77 per million), New South Wales (80 per million), Western Australia (82 per million), Queensland (83 per million), Victoria (92 per million) and Northern Territory (247 per million). Caucasoid 82%, Aboriginal 7.5% and Asian 6%. 59% of patients were male.

Co-morbid Factors 1995-1998: coronary artery disease 38.2%, peripheral vascular disease 26.4%.

Age of New Patients: 38% were 65 years or older. Main feature was the increase in the age group 75-84 years. Age range 7.2 months to 91.1 years. Median age was 59.5 years and mean age 56.5 years.

Primary Renal Disease: glomerulonephritis 22% (400/507 were biopsy proven), diabetic nephropathy (70/350 biopsy proven) 22%, hypertension 12% and analgesic nephropathy 6%. Diabetic nephropathy was classified as type 1 in 23% of cases (19% in 1997).

Renal Function at First Treatment: Median creatinine clearance 7 mls/min of 1515 patients (Australia) and 7 mls/min of 313 patients (New Zealand). Diabetic 8 mls/min, non diabetic 7 mls/min. Higher clearance for diabetics, young adults and males.

Awaiting Transplantation: of patients <65 years, 43% were on the waiting list, 14% awaiting assessment and 4% temporarily off the list. Range 71% patients (5-14 years) to 28% (55-64 years).

Only 24% in the Northern Territory were on the waiting list; (24%) were awaiting assessment and (7%) temporarily off the list.

For patients <55 years on the list, New South Wales/ ACT 66%, Victoria 53%, Tasmania 50%, Western Australia 49%, South Australia 45%, Queensland 41%, and Northern Territory 31%.

Death Rates (per 100 patient years): overall dialysis dependent patient death rate was 16.6 and for those with a functioning transplant was 2.4.

Cause of Death: 42% of 892 dialysis patient deaths were due to a cardiac cause (11% myocardial infarction), 15% due to infection and 18% withdrawal from treatment (70% were >65 years old).

6.5% of deaths were attributed to malignancy. Twenty three (40%) of these dialysis patients had malignancy at first dialysis and a further 12% within nine months.

Thirteen cases were myeloma.

30% of 117 functioning transplant patient deaths were due to cardiac cause, 32% due to malignancy and 12% to infection.

There were two melanoma, two Merkel Cell, three skin SCC and six lymphomas amongst the transplant malignancy deaths.

Dialysis Treatment 1998: There was a 6% increase in all States except South Australia and Tasmania. Hospital based haemodialysis patients increased 3%, satellite based haemodialysis 19% and home haemodialysis 3%.

Peritoneal dialysis decreased from 1623 to1608 patients. Continuous ambulatory peritoneal dialysis decreased by 3% while CCPD increased 20%. Overall PD 29%.

In relation to age; 75% of patients 15-54 years old and 69% of patients >55 years old used haemodialysis; 82% of patients <15 years old used peritoneal dialysis.

The majority of peritoneal dialysis patients were using ≥ 70L/week.

Haemodialysis: blood flow rate increased further; 51%, 300 ml/min. Hours of treatment remained similar: 44% 4-4.4 hours, 16% 4.5-4.9 hours, 26% 5 hours and 31% >5 hours.

Most patients were using polysulphone low flux 37%, followed by haemophan 25%, cellulose acetate and cuprophan both 11%. Only 10% used mid/high flux dialysers.

Urea Reduction Ratio (URR) The proportion of patients achieving a URR ≥ 65% rose from 68% in 1998 to 75% in 1999.

Data was not reported on 17% of patients.

The 18 month patient survival was related signficantly to urea reduction.

SUMMARY - AUSTRALIA

Transplantation 1998

There were 517 operations which represented a 3% increase over 1997. The transplant rate was 28 per million. 85% were for primary recipients.

7.4% of dialysing patients were transplanted.
12.2% of dialysing patients were transplanted between 15 and 59 years of age.

31% of grafts were from living donors.

South Australia/ Northern Territory had the highest transplant rate at 50 per million. New South Wales had a rate of 24 per million.

For primary cadaveric grafts performed in 1997 the 12 month patient and graft survival was 96% and 89% respectively; the five year cadaver graft survival for operations performed in 1992 was 72% with 83% patient survival.

For second and subsequent cadaver grafts, the one year survival for patients transplanted between 1996 and 1998 was 83% and patient survival was 97%.

Functioning Transplants at 31 December 1998: there were 4880 functioning grafts at a rate of 251 patients per million. This represented a 5% increase over 1997. Patients with functioning grafts were in excess of those dependent on dialysis in only South Australia (62%) and Queensland (53%).

The modal age for transplant dependent patients was 45-54 years with a mean of 47.5 and a median of 48.4 years. 25% of grafts had been functioning for more than 10 years and 5% more than 20 years.

20% of functioning grafts were from living donors and the modal age group for living donor recipients was 35-44 years.

Living Donor Transplants: 31% of all transplant operations were from living donors, the largest proportion ever performed in Australia. The number of unrelated living donors increased from 19 in 1997 to 35 in 1998. 56% of living donors in 1998 were female. 17% of living donor transplants were performed without the recipient receiving dialysis therapy.

Factors Affecting Graft Outcome

Rejection Episodes:

The incidence of rejection in the first month post transplant for CD1 was 24%, for CD2 38%. There was a lower incidence of rejection in recipients aged >=55 years with a rate of 15% compared to 28% for recipients aged 30-54 years.

There is a greater rate of rejection including multiple episodes of rejection with greater degrees of HLA mismatch.

Rejection in the first month was also more common in:
1 Recipients with diabetic nephropathy,
2 Higher degrees of sensitisation, and
3 Steroid sparing immunosuppressive regimens

There was no difference in rejection rates according to:
1 The use of Cyclosporin sparing agents,
2 The age of donor, and
3 Total ischaemia time

The presence of vascular rejection in biopsy proven rejection in the first month is associated with a significantly lower graft survival at one and two years.

Donor Organ Report: the number of cadaver donors remained at 10 per million. The median age of donors in 1997 was 43.1 years (range 2.5 -76.1 years) and again there was a predominance of male donors. 46% of donors died from cerebrovascular disease and 29% from road trauma.

SUMMARY - NEW ZEALAND

Patients Treated 31 December 1998: 2051 patients (541 per million). Functioning transplants 934 (246 per million) and dialysis dependent 1117 (295 per million). The minority (46%) were transplant dependent.

New Patients 1998: 363 patients (96 per million), an increase of 13%.

46% Caucasoid, 35% Maori, 13% Pacific Islander and 6% Asian. 60% of patients were male.

Co-morbid Factors 1995-1998: coronary artery disease 34.7%, peripheral vascular disease 26.4%.

Age of New Patients: 57% were 55 years or older. Median 57.0 years, mean 54 years, range 10.2 years - 86.6 years.

Primary Renal Disease: glomerulonephritis 20% and diabetic nephropathy 44% (88% of diabetic nephropathy were type 2, non insulin and insulin requiring).

Awaiting Transplantation: 27% were on the waiting list, 16% awaiting assessment, 3% temporarily off the list. Patients <65 years, 34% on list, 18% awaiting assessment and 4% temporarily off the list.

Death Rates: overall dialysis dependent death rate was 16.5 deaths per 100 patient years and for those with a functioning transplant 2.7 deaths per 100 patient years.

Cause of Death: 59% of dialysis patient deaths were due to cardiac causes (16% myocardial infarction), 12% due to infection. 25 transplant dependent patients died: cardiac 10 and malignancy 8 cases.

Dialysis Dependent patients: 1117 patients (295 per million), an increase 9.4% from the previous year. 74% of all home dialysis patients, (72% home CAPD). The decrease in CAPD continued 54% to 53%. Home haemodialysis remained steady at 24% of all home dialysis. Hospital haemodialysis decreased from 23% to 21% of all dialysis patients.

Transplantation 1998: there were 106 transplant operations at a rate of 28 per million. This is a decrease of 6% from 1997. The percentage of living donors was 29%.

90% were primary grafts..

The median age of recipients in 1998 was 43 years (46 years in 1997).

7.5% of all dialysed patients were transplanted in 1998.

Functioning Transplants: there were 934 grafts functioning (246 per million) at 31 December 1998, a 6% increase from 1997.

80% of functioning transplants were Caucasoids, 10% Maoris, 4% Pacific Islanders, 3% Asians and <1% other.

The longest surviving grafts had reached 31 years and 35 grafts had functioned for more than 20 years.

Survival Following Primary Cadaveric Graft

Transplantation 1997: patient survival was 96% and graft survival was 85% at 12 months.

Figure 1 **Australia**

Stock of Patients 1993 to 31-Dec-98

	1993	1994	1995	1996	1997	1998
No. Functioning Transplants #	3853 (218)	4044 (227)	4206 (233)	4409 (241)	4648 (251)	4880 (260)
No. Dialysis Patients	3707 (210)	4103 (230)	4537 (251)	4897 (268)	5195 (280)	5523 (295)
Proportion Home	49%	47%	46%	45%	42%	40%
Proportion Satellite	20%	23%	25%	27%	28%	31%
Proportion CAPD	32%	31%	32%	30%	28%	25%

Patient Flow Summary

	1993	1994	1995	1996	1997	1998
No. New Patients	1160 (66)	1316 (74)	1382 (77)	1431 (78)	1487 (80)	1589 (85)
No. New Transplants	457 (26)	440 (25)	441 (24)	475 (26)	502 (27)	517 (28)
Living Donor Transplants	64	103	93	115	144	160
Non Primary Transplants	74	56	71	59	58	75
No. Deaths	670	708	769	846	908	1009
Dialysis Patients	553	597	649	732	797	892
Transplant Patients	117	111	120	114	111	117

( ) Number of patients per million population
Patients lost to follow up are not included

Figure 2 **Australia**

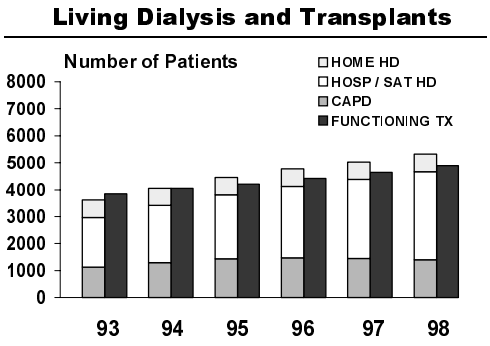
National and State Stock and Flow 1-Jan-98 to 31-Dec-98

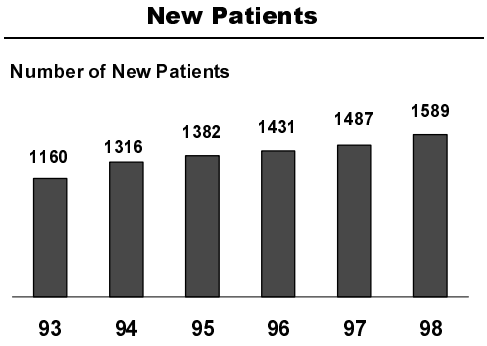
State	New Patients	Transplant Operations (Caring State)	Dialysis Deaths	Transplant Deaths	Dialysis Dependent	Functioning Transplants # +	Total
Australia	**1589 (1487)**	**516 (502)**	**892 (797)**	**117 (111)**	**5523 (5195)**	**4897 (4663)**	**10420 (9858)**
Queensland	287 (273)	98 (96)	163 (130)	25 (26)	874 (809)	991 (945)	**1865 (1754)**
NSW/ACT	532 (527)	153 (176)	339 (321)	41 (45)	2074 (1996)	1642 (1592)	**3716 (3588)**
Victoria	430 (362)	118 (120)	218 (161)	21 (14)	1447 (1326)	1165 (1100)	**2612 (2426)**
Tasmania	29 (30)	14 (10)	27 (15)	1 (0)	101 (109)	109 (99)	**210 (208)**
South Australia	114 (97)	73 (50)	50 (63)	19 (12)	325 (317)	522 (491)	**847 (808)**
North Territory	47 (57)	11 (17)	25 (25)	1 (2)	156 (146)	53 (46)	**209 (192)**
West. Australia	150 (141)	49 (33)	70 (82)	9 (12)	546 (492)	415 (390)	**961 (882)**
New Zealand	**363 (320)**	**107 (112)**	**178 (157)**	**25 (26)**	**1117 (1021)**	**917 (867)**	**2034 (1888)**

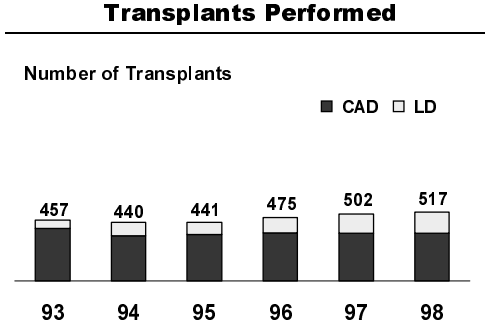
( ) 1997 December figures
Patients lost to follow up are not included
+ Functioning transplants by Caring State / Country

Figure 3

Stock and Flow Australia 1993 - 1998







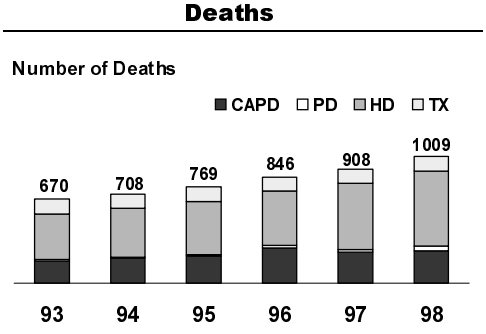


Figure 4 **New Zealand**

Stock of Patients 1993 to 31-Dec-98

	1993	1994	1995	1996	1997	1998
No. Functioning Transplants #	704 (198)	730 (203)	782 (214)	823 (221)	882 (234)	934 (246)
No. Dialysis Patients	723 (203)	787 (218)	853 (233)	938 (252)	1021 (271)	1117 (295)
Proportion Home	81%	84%	81%	80%	75%	74%
Proportion Satellite	<1%	<1%	<1%	<1%	1%	4%
Proportion CAPD	57%	62%	59%	57%	54%	53%

Patient Flow Summary

	1993	1994	1995	1996	1997	1998
No. New Patients	232 (65)	248 (69)	288 (79)	290 (78)	320 (85)	363 (96)
No. New Transplants	84 (24)	83 (23)	94 (26)	96 (26)	112 (30)	106 (28)
Living Donor Transplants	20	20	24	26	31	31
Non Primary Transplants	15	13	10	8	11	11
No. Deaths	155	157	168	161	183	203
Dialysis Patients	138	136	154	133	157	178
Transplant Patients	17	21	14	28	26	25

( ) Number of patients per million population
Patients lost to follow up are not included

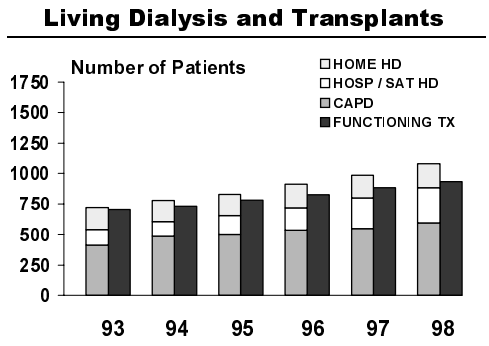
Figure 5 **New Zealand**

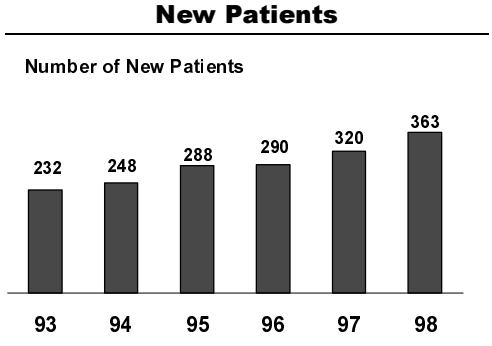
Stock and Flow 1987 - 1998

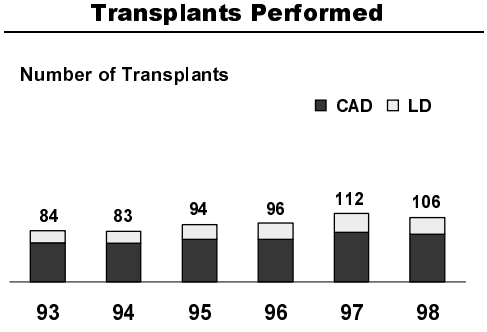
	New Patients	New Transplants		Dialysis Deaths	Transplant Deaths	Dialysis Dependent	Funct.Tx (Tx. in NZ)	Total
		Tx. Country	Caring Country					
1987	151	79	79	66	23	438	450	**888**
1988	152	78	78	57	18	482	482	**964**
1989	174	83	83	68	13	528	528	**1056**
1990	179	102	101	83	21	557	575	**1132**
1991	215	77	77	88	20	632	604	**1236**
1992	246	115	115	122	13	677	673	**1350**
1993	232	84	85	138	17	723	704	**1427**
1994	248	83	84	136	21	787	730	**1517**
1995	288	94	94	154	14	853	782	**1635**
1996	290	96	96	133	28	938	823	**1761**
1997	320	112	112	157	26	1021	882	**1903**
1998	363	106	107	178	25	1117	934	**2051**

Figure 6

Stock and Flow New Zealand 1993 - 1998







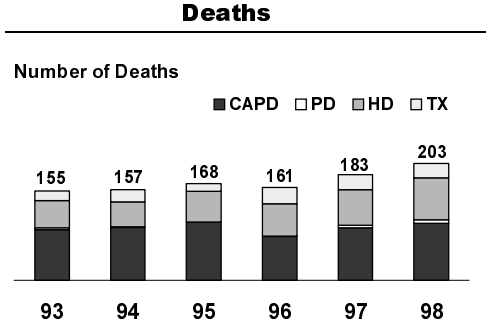


Figure 7

Patients Alive: Functioning Transplant or Dialysis 1988 - 1998

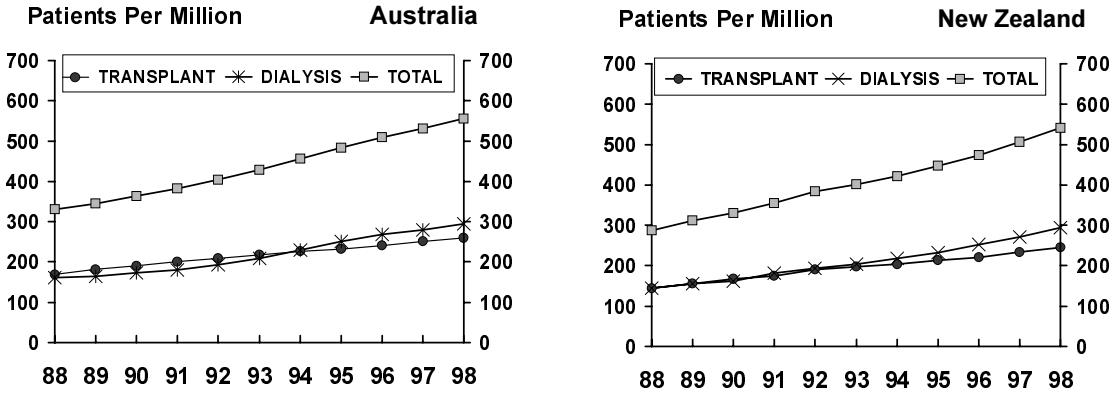


Figure 8 **Australia**

Transplant and Dialysis Patients 1988 - 1998

	Transplant #	Per Million	Dialysis	Per Million	Total	Per Million
1988	2795	169	2683	162	5478	331
1989	3051	182	2752	164	5801	345
1990	3263	191	2959	173	6222	364
1991	3485	201	3140	181	6625	382
1992	3688	210	3389	193	7077	404
1993	3853	218	3707	210	7560	428
1994	4044	227	4103	230	8147	456
1995	4206	233	4537	251	8743	484
1996	4409	241	4897	268	9306	509
1997	4648	251	5195	280	9843	531
1998	4880	260	5523	295	10403	555

Patients lost to follow up are not included

Figure 9 **New Zealand**

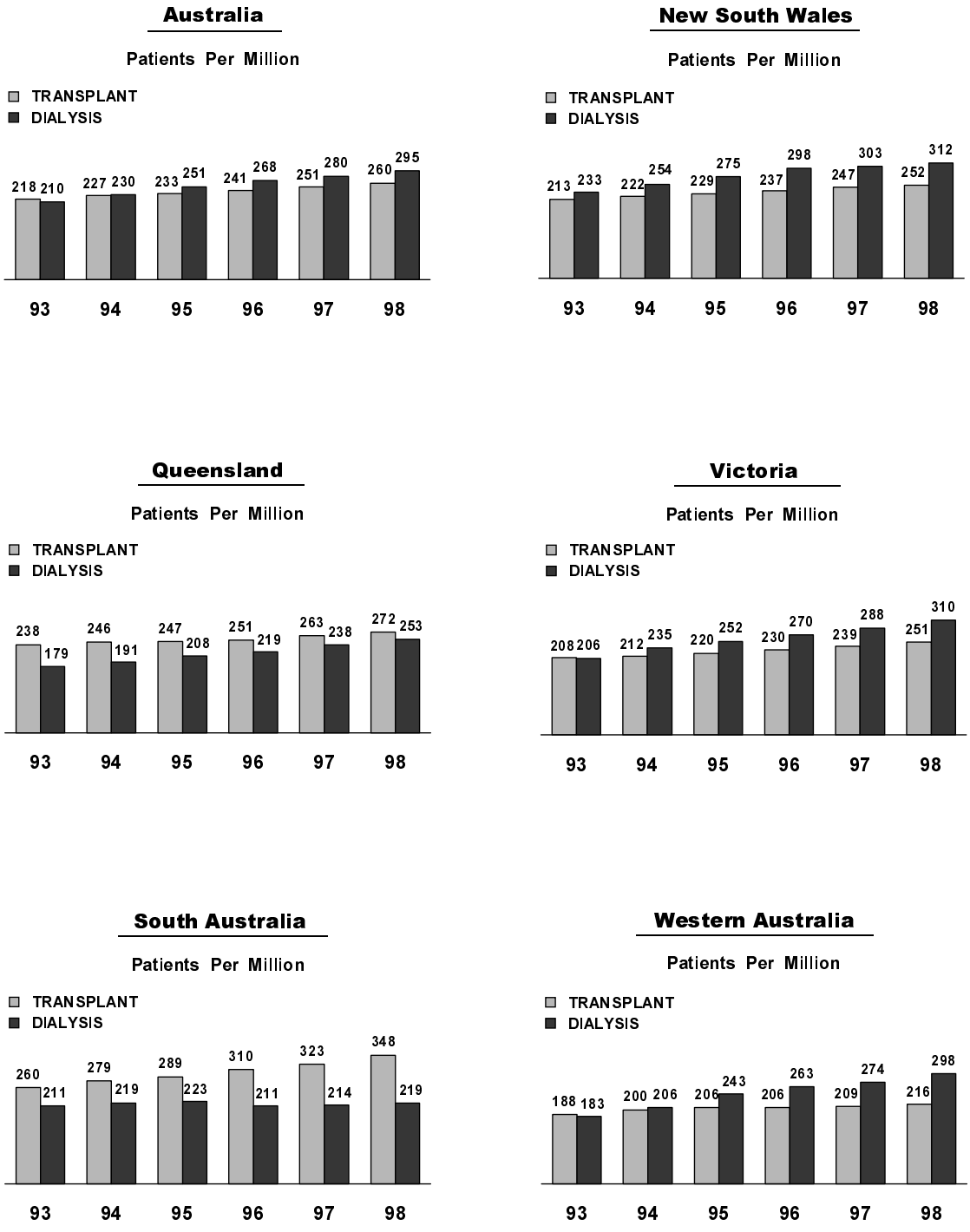
Transplant and Dialysis Patients 1988 - 1998

	Transplant #	Per Million	Dialysis	Per Million	Total	Per Million
1988	482	144	482	144	964	287
1989	528	156	528	156	1056	312
1990	575	168	557	162	1132	330
1991	604	174	632	182	1236	355
1992	673	191	677	193	1350	384
1993	704	198	723	203	1427	401
1994	730	203	787	218	1517	421
1995	782	214	853	233	1635	447
1996	823	221	938	252	1761	474
1997	882	234	1021	271	1903	506
1998	934	246	1117	295	2051	541

Patients lost to follow up are not included

Figure 10

Comparison of Transplant and Dialysis Dependent Patients 1993 - 1998



Transplanted patients "Lost to follow up" have been excluded from the totals in each State.

Patients from Tasmania were transplanted in Victoria
and from the Northern Territory in South Australia.

For calculation of population related totals for functioning transplant patients
the populations of these States were amalgamated.

Figure 11

Treatment of Aboriginal Patients
Australia 1991 - 1998

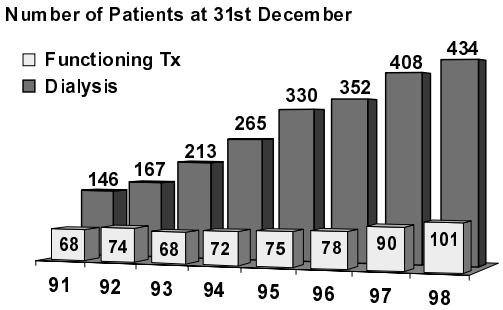


Figure 12

Treatment of Maori Patients
New Zealand 1991 - 1998

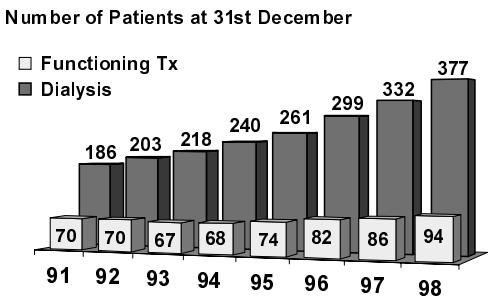


Figure 13

Treatment of Pacific Islander Patients
New Zealand 1991 - 1998

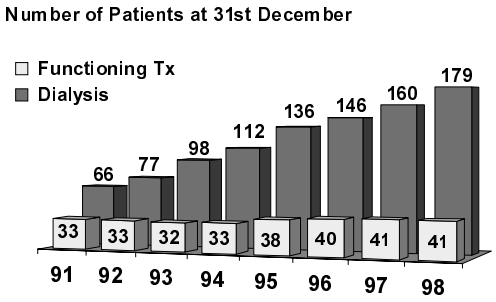


Figure 14

Prevalence and Incidence 1991 - 1998
Aboriginals - Australia

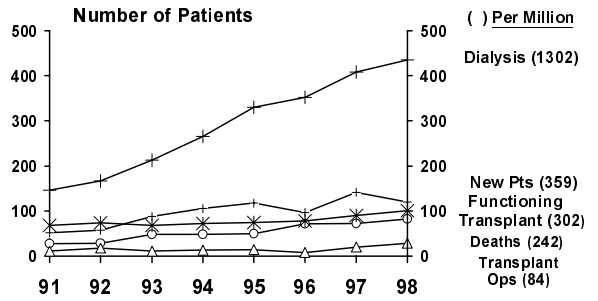


Figure 15

Prevalence and Incidence 1991 - 1998
Maoris - New Zealand

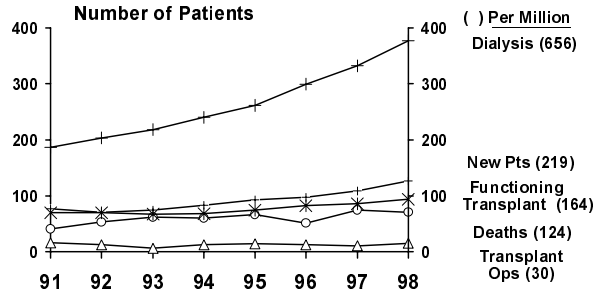
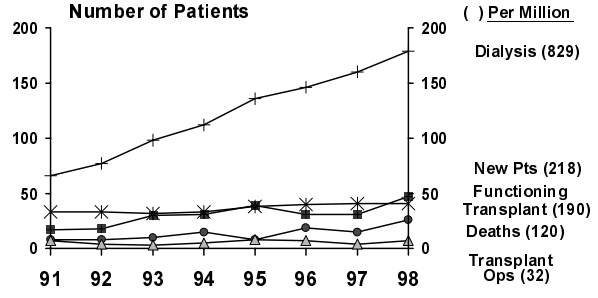


Figure 16

Prevalence and Incidence 1991 - 1998
Pacific Islanders - New Zealand



NEW PATIENTS

COMMENCING TREATMENT IN 1998

AUSTRALIA See Figures 18-20, 24-29.

The new patient profile for the past year 1998 reflected the trend towards more in the elderly 75-84 year age group. Overall the number commencing treatment increased by 7%; the last few years saw only a 3% annual rise. This change was composed of a 10% rise in the Caucasoid and a fall in the Aboriginal and Asian groups. The State numbers showed a notable increase in the elderly group in Victoria, a surprising fall in the total for the Northern Territory, and a continuation of the low rates in South Australia and Tasmania.

The incident rate is still well below that of North America and Europe.

The number of new patients rose steadily over the past seven years from 1086 patients (62 per million) to 1589 patients (85 per million). Caucasoid patients have increased to 82% (1998), from 79% (1997). In relation to the general population in each age group, those 75-84 years increased in 1998 to 246 per million (183 per million 1997). Males comprised 59% of patients (57% in 1997).

The median age of all patients was slowly increasing to 59.5 years (58.7 years males, 60.4 years females). Modal age group was 65-74 years (males and females). Mean age was 54 years. Age range was from 7.2 months to 91.1 years.

The age group specific new patient rates confirm the lack of further increase in the middle aged groups which was previously reported in the last two years: shown in Figure 20.

Most patients (82%) were Caucasoid ; 7.5% were Aboriginal, 6% Asian, 3% Pacific Islander and 1% Other.

AUSTRALIAN STATES

A marked increase in new patients occurred in Victoria, a moderate increase in South Australia and Queensland and a fall in the Northern Territory. The lowest rates were in South Australia (77per million) and Tasmania (61 per million).The South Australian rate has been below the Australian average for the last five years but increased 18% in 1998. Excluding analgesic nephropathy the highest intakes were in Northern Territory (247per million) and Victoria (90 per million).

In the modal age group (65-74 years except Northern Territory 45-54 years) the lowest rate was in South Australia (170 per million), the highest in Victoria (359 per million) and Northern Territory (1151 per million).

The median, mean ages and age range are shown in Figure 25. While there have been fluctuations in each State over the last seven years, the median age in Victoria steadily increased from 54.9 years to 60.2 years as shown in Figure 25. The gender and age data for each State is shown in Figure 26.

The racial distribution in each State is shown in Figure 28: Aboriginals in Northern Territory (72%), Western Australia (23%), Asians in New South Wales/ACT (13%), and Victoria (11%). Males predominated in all except Aboriginals in which the previous female domination continued.

NEW ZEALAND See Figures 21-29.

Over the last few years a notable increase in incident patients occurred: 13% in the past year, 39% in the last 5 years. In the current year (1998) the population related figure was markedly higher than in Australia. In the middle aged group (45-64 years) the age group related incident rate was considerably higher. Much of the increase reflected more Pacific Islanders and Caucasoid patients.

The number of incident patients had risen 13% from 320 patients (1997) to 363 patients (1998): 85 to 96 per million respectively. Non-Caucasoid patients represented 55% (1998), 49% (1997). Males comprised 60% of patients (60% 1997).

The median age was 57 years: 57.7 years for males and 56.4 years for females. The modal age group was 55-64 years for both males and females. Mean age had risen to 54 years, from 53 years (1997). Age range was from 10.2 years to 86.6 years.

Less than half the patients (46%) were Caucasoid; 35% were Maori, 13% Pacific Islander, 6% Asian and 1% Other.

The comparative annual rates of treatment in relation to race show a 2-4 fold excess in the Maori and Pacific Islanders compared to the Caucasoid group.

Figure 17 **Australia and New Zealand**

Co-Morbid Conditions at Entry to Program 1-Jan-95 to 31-Dec-98

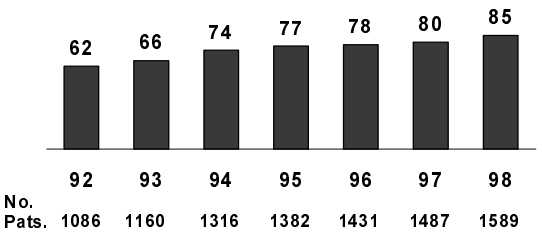
	Coronary Artery Dis.	Peripheral Vasc. Dis.	Cerebrovasc. Dis.	Chronic Lung Dis.
Australia (5889)				
Suspected	10% (591)	7.8% (458)	5.6% (327)	5.2% (307)
Yes	28% (1660)	18.7% (1101)	9.8% (576)	10.9% (642)
Total	**38.2% (2251)**	**26.4% (1559)**	**15.3% (903)**	**16.1% (949)**
New Zealand (1261)				
Suspected	13.8% (174)	8% (101)	3.4% (43)	4.3% (54)
Yes	20.9% (264)	18.5% (233)	7.5% (95)	8.9% (112)
Total	**34.7% (438)**	**26.4% (334)**	**10.9% (138)**	**13.1% (166)**

( ) = Number of Patients

New Patients - Australia

Figure 18

New Patients (Per Million)
Australia 1992 - 1998



New Patients (Per Million)
Australian States 1998

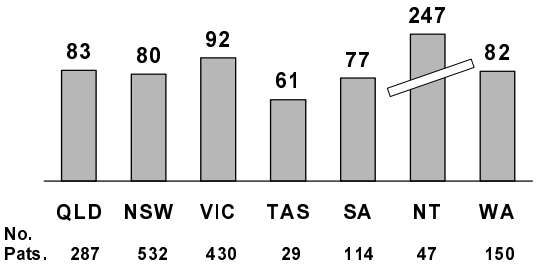


Figure 19

Age of New Patients - Australia 1998

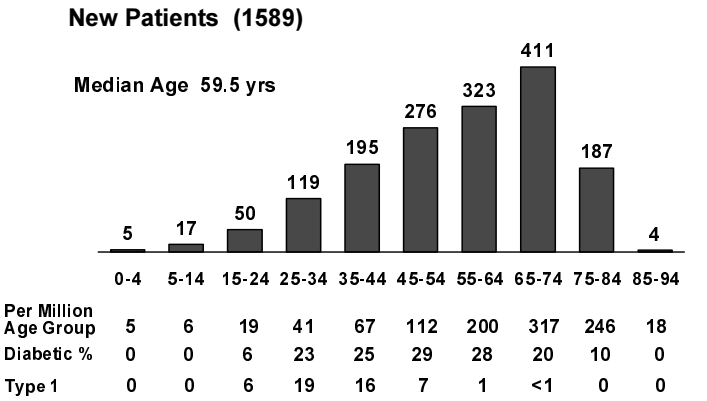
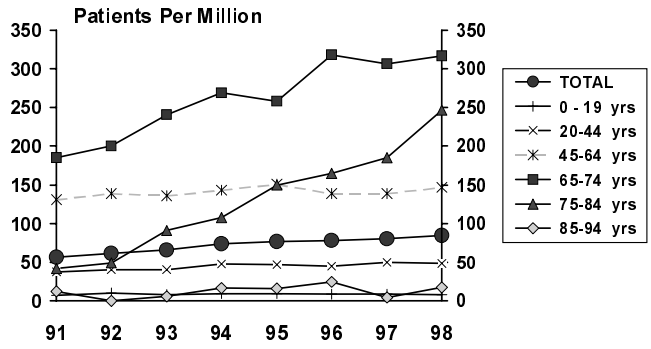


Figure 20

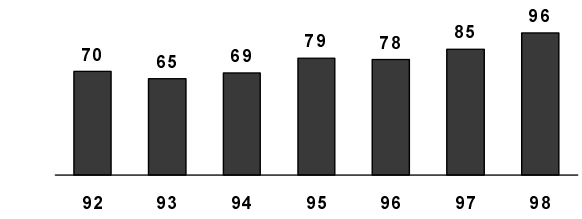
Acceptance of New Patients 1991 - 1998
Age Specific Rates - Australia



New Patients - New Zealand

Figure 21

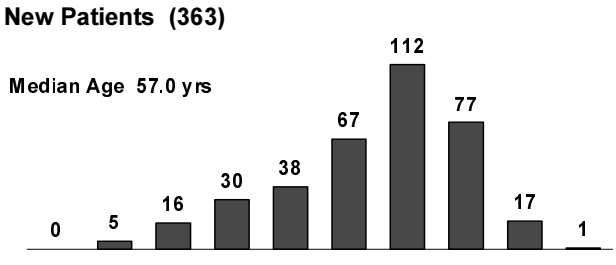
New Patients (Per Million)
New Zealand 1992 - 1998



	92	93	94	95	96	97	98
No. Pats.	246	232	248	288	290	320	363

Figure 22

Age of New Patients - New Zealand 1998



	0-4	5-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94
Per Million Age Group	0	9	30	52	65	142	354	307	115	23
Diabetic %	0	0	0	23	42	55	63	35	12	0
Type 1	0	0	0	17	26	3	2	0	0	0

Figure 23

Acceptance of New Patients 1991 - 1998
Age Specific Rates - New Zealand

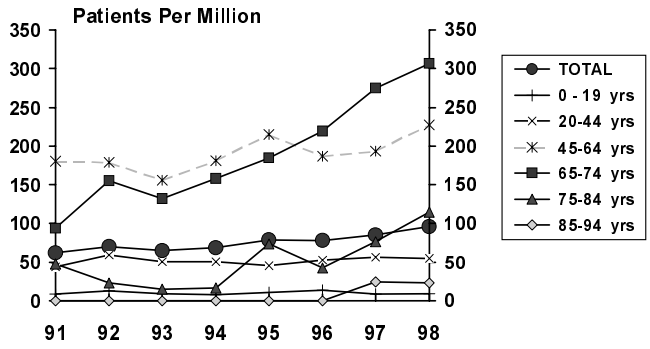


Figure 24 **Australia and New Zealand**

Acceptance of Elderly New Patients 1994 - 1998

	Age Groups	1994	1995	1996	1997	1998
Australia	60-64 years	147 (209)	179 (255)	164 (234)	176 (244)	172 (234)
	65-69 years	185 (268)	201 (290)	226 (327)	213 (310)	214 (314)
	70-74 years	156 (270)	131 (221)	186 (309)	184 (302)	197 (320)
	75-79 years	58 (147)	87 (214)	97 (227)	113 (254)	143 (305)
	80-84 years	13 (49)	15 (55)	20 (70)	23 (80)	44 (152)
	> 85 years	3 (16)	3 (16)	5 (25)	1 (5)	3 (13)
	Total	**562 (203)**	**616 (216)**	**698 (240)**	**710 (239)**	**773 (256)**
New Zealand	60-64 years	39 (276)	38 (273)	29 (211)	44 (318)	52 (369)
	65-69 years	29 (216)	31 (230)	36 (267)	36 (268)	45 (339)
	70-74 years	10 (89)	15 (131)	19 (164)	33 (283)	32 (271)
	75-79 years	1 (13)	9 (111)	6 (72)	6 (69)	16 (178)
	80-84 years	1 (19)	1 (18)	0 (0)	5 (87)	1 (17)
	85-89 years	0 (0)	0 (0)	0 (0)	1 (34)	1 (33)
	Total	**80 (144)**	**94 (167)**	**90 (159)**	**125 (217)**	**147 (252)**

( ) Per million population

Figure 25 **Australia and New Zealand**

Median, Mean and Age Range of New Patients 1998

	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
Female	(n=124)	(n=208)	(n=169)	(n=9)	(n=53)	(n=19)	(n=67)	**(n=649)**	**(n-144)**
Median	61.6	63.3	56.8	56.5	58.5	52.3	59.4	**60.4**	**56.4**
Mean	58.3	59.2	55.6	58.4	53.5	51.8	54.4	**56.9**	**52.9**
Range	12.3-84.5	7.6-91.1	1.2-84.6	43.4-75.0	17.6-79.0	21.1-80.6	0.6-85.8	**0.6-91.1**	**10.2-81.8**
Male	(n=163)	(n=324)	(n=261)	(n=20)	(m=61)	(n=28)	(n=83)	**(n=940)**	**(n=219)**
Median	55.6	59.7	62.6	64.2	52.9	49.5	55.9	**58.7**	**57.7**
Mean	53.8	56.7	58.1	58.1	54.2	51.7	55.9	**56.2**	**54.7**
Range	14.9-82.6	8.4-86.8	10.0-84.5	24.6-82.9	4.0-81.5	33.4-78.1	19.2-88.7	**0.7-88.7**	**11.6-86.6**
All	(n=287)	(n=532)	(n=430)	(n=29)	(n=114)	(n=47)	(n=150)	**(n=1589)**	**(n=363)**
Median	58.0	61.1	60.2	61.9	55.3	50.3	57.4	**59.5**	**57.0**
Mean	55.8	57.7	57.1	58.2	53.9	51.7	55.2	**56.5**	**54.0**
Range	12.3-84.5	8.4-91.1	1.2-84.6	24.6-82.9	4.0-81.5	21.1-80.6	0.6-88.7	**0.6-91.1**	**10.2-86.6**

n = Number of Patients

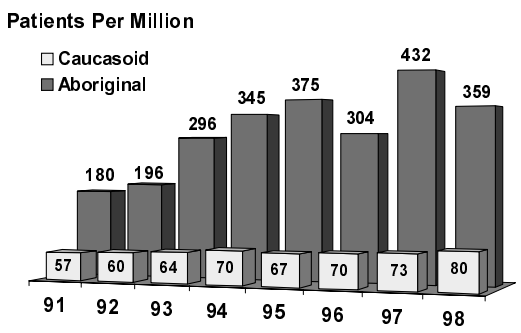
Figure 26 **Australia and New Zealand**

Age and Gender of New Patients 1-Jan-98 to 31-Dec-98

Age Groups	Qld (n=287)		NSW/ACT (n=532)		Vic. (n=430)		Tas. (n=29)		SA (n=114)		NT (n=47)		WA (n=150)		Aust. (n=1589)		N.Z. (n=363)	
	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M
00-04 yrs	0	0	0	3	2	0	0	0	0	1	0	0	1	0	**3**	**4**	**0**	**0**
05-14 yrs	1	1	2	5	1	4	0	0	0	1	0	0	2	0	**6**	**11**	**4**	**1**
15-24 yrs	4	12	5	6	6	4	0	1	2	4	1	0	4	1	**22**	**28**	**7**	**9**
25-34 yrs	8	17	9	18	14	25	0	3	8	4	0	1	7	5	**46**	**73**	**11**	**19**
35-44 yrs	9	18	23	50	15	28	1	2	12	6	4	8	5	14	**69**	**126**	**15**	**23**
45-54 yrs	21	30	30	58	35	31	3	1	1	17	7	12	10	20	**107**	**169**	**26**	**41**
55-64 yrs	33	30	45	60	37	55	2	3	13	8	6	0	15	16	**151**	**172**	**45**	**67**
65-74 yrs	33	39	71	76	42	78	3	6	12	8	0	5	17	21	**178**	**233**	**31**	**46**
75-84 yrs	15	16	22	47	17	36	0	4	5	12	1	2	5	5	**65**	**122**	**5**	**12**
85-94 yrs	0	0	1	1	0	0	0	0	0	0	0	0	1	1	**2**	**2**	**0**	**1**
Total	**124**	**163**	**208**	**324**	**169**	**261**	**9**	**20**	**53**	**61**	**19**	**28**	**67**	**83**	**649**	**940**	**144**	**219**

Figure 27

New Acceptances by Race
Australia 1991 - 1998



New Acceptances by Race
New Zealand 1991 - 1998

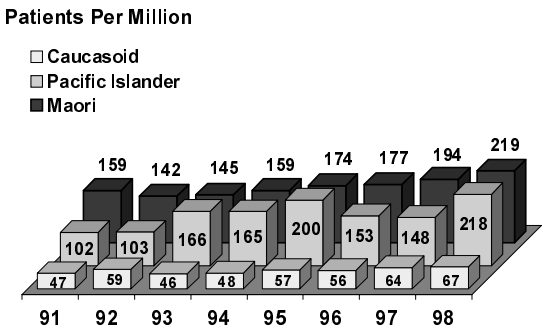


Figure 28

Australia and New Zealand

Number of New Patients by Race 1998

	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
Female									
Aboriginal	11	10	2	0	4	15	19	**61**	**0**
Caucasoid	96	172	148	9	45	1	46	**517**	**52**
Asian	4	14	14	0	4	2	2	**40**	**11**
Maori	0	2	0	0	0	0	0	**2**	**58**
Pacific Is.	10	9	4	0	0	0	0	**23**	**23**
Other	3	1	1	0	0	1	0	**6**	**0**
Total Female	**124**	**208**	**169**	**9**	**53**	**19**	**67**	**649**	**144**
Male									
Aboriginal	13	7	0	0	5	19	15	**59**	**0**
Caucasoid	133	279	237	19	54	6	63	**791**	**115**
Asian	6	27	16	0	1	2	4	**56**	**11**
Maori	1	2	0	0	1	0	0	**4**	**68**
Pacific Is.	7	5	5	0	0	1	1	**19**	**24**
Other	3	4	3	1	0	0	0	**11**	**1**
Total Male	**163**	**324**	**261**	**20**	**61**	**28**	**83**	**940**	**219**
Total	**287**	**532**	**430**	**29**	**114**	**47**	**150**	**1589**	**363**

Figure 29

Australia

Aboriginals as Proportion of Annual Intake of New Patients 1990 - 1998

State	1990	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	8%	10%	4%	12%	8%	11%	9%	9%	8%
New South Wales/ACT	2%	1%	3%	3%	2%	3%	2%	3%	3%
Victoria	0%	1%	<1%	1%	<1%	<1%	1%	1%	<1%
Tasmania	0%	0%	0%	0%	0%	0%	0%	0%	0%
South Australia	4%	5%	5%	4%	7%	9%	3%	6%	8%
Northern Territory	84%	82%	91%	83%	95%	95%	82%	81%	72%
Western Australia	12%	11%	12%	16%	22%	21%	15%	30%	23%
Australia	**5%**	**5%**	**5%**	**8%**	**8%**	**8%**	**7%**	**9%**	**8%**

Renal Function at Initiation of Dialysis

Australia and New Zealand

During the 12 months to 31st March 1999, the serum creatinine level preceding the first dialysis was recorded for 1556 of the 1574 new patients over 20 years old. The creatinine clearance was estimated by the Cockroft-Gault formula standardised to body surface area 1.73m^2 from data listing height, weight, age and gender. The equations utilised were:

~{(140-age)*lean body wt}/{814*(creatinine/1000)} males: females multiply by 0.85

~lean body weight:{50+(0.9*[ht-152])} males :{45.5+(0.9*[ht-152])} females.

The 58 patients who died, were transplanted or recovered function within 90 days of first treatment, were excluded from the analysis: this allowed review of the peritoneal or haemodialysis groups once the preferred mode of dialysis had been chosen. The Australian experience shows many transfers, usually to peritoneal dialysis, after the first treatment.

Serum Creatinine

The median level for the whole group (1498) was 790umols/L: males (857) 840umols/L, females (641) 728umols/L; age and racial data in Figures 31 and 32. The level decreased with age from 952umols/L (20-24yrs) to 708umols/L (> 75yrs).

Creatinine Clearance

The median clearance was 7.14 mls/min: males (852) 8.04 mls/min, females (639) 5.91 mls/min. Age, race, dialysis mode, primary renal disease and late referral data are shown in Figures 33-41. There was an impression that females, elderly, analgesics and late referral patients commenced at lower clearance levels which may reflect a focus on serum creatinine levels rather than estimated clearances. Diabetic patients seemed to commence at higher clearance levels than other forms of renal disease.

Once sufficient data is available survival analyses in relation to these variables can be performed; the results may contribute to assessment of the optimal timing for initiation of dialysis treatment.

Figure 30

New Patients Creatinine at Entry
April 1998 - March 1999

	Australia	New Zealand
Treatment at 90 days ≥ 20 years	(1516)	(313)
Median	790	760
25-75%	623 - 980	602 - 980
Mean ± SD	830 (314)	831 (332)

Figures 31 and 32

Median Creatinine Clearance mls/min
April 1998 - March 1999

Australia (Treatment at 90 days)			
All	7	QLD	7
Female	6	NSW	7
Male	8	VIC	7
Diabetic	8	TAS	8
Non Diabetic	7	SA	7
Age 25-54	8	NT	7
55-64	7	WA	7
65-74	7	Aboriginal	7
75-84	6	Caucasoid	7
		Asian	6

Median Creatinine Clearance mls/min
April 1998 - March 1999

New Zealand (Treatment at 90 days)			
All	7		
Female	6	Diabetic	8
Male	8	Non Diabetic	7
Age 25-54	8	Caucasoid	7
55-64	8	Maori	8
65-74	7	Pacific Islander	7
75-84	6	Asian	6

Figure 33

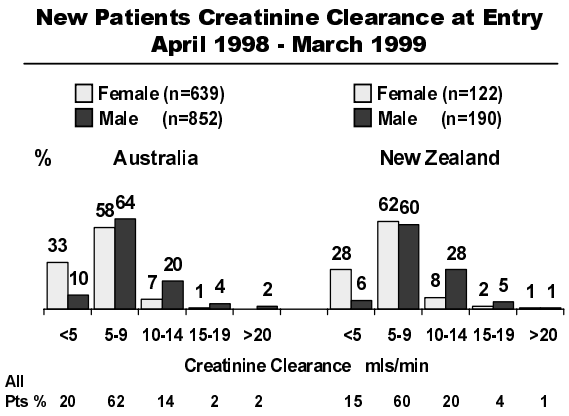


Figure 34

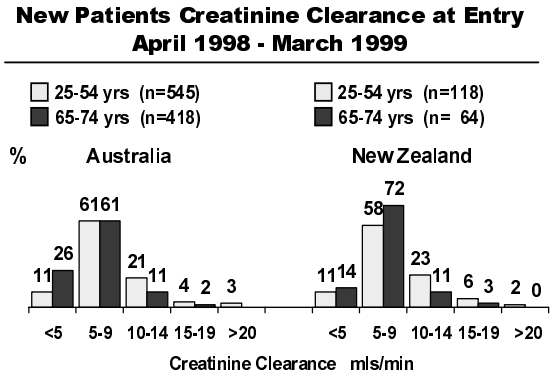


Figure 35

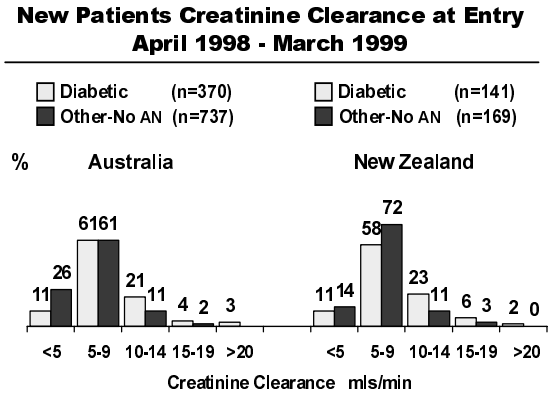


Figure 36

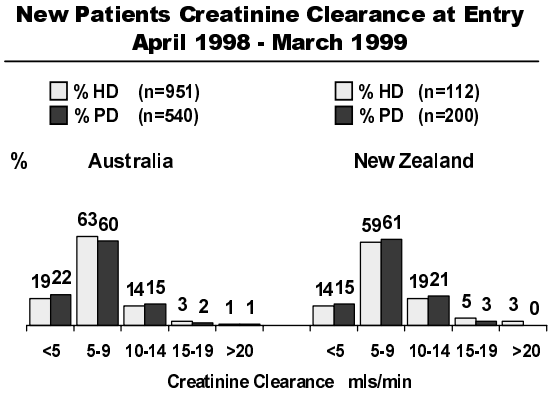


Figure 37

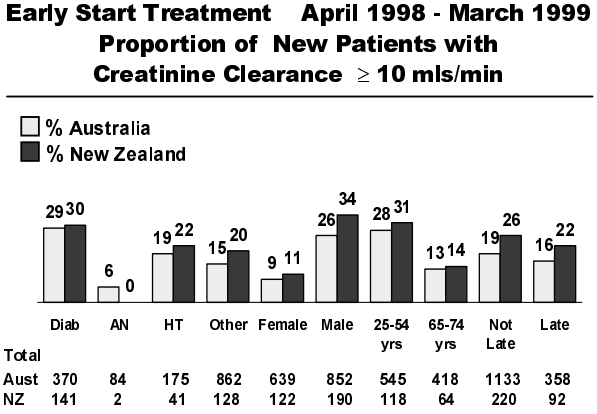


Figure 38 **Australia**

Serum Creatinine and Creatinine Clearance at Entry to Program
New Patients 1-Apr-1998 to 31-Mar-1999

Category			No. of Pts.	Serum Creatinine Mean		Std. Dev.	Median	Creatinine Clearance Mean		Std.Dev.	Median
All Patients			1498	830	+	314	790	7.9	+	4.7	7.1
Age		20-24 years	29	1209	+	709	952	7.9	+	2.9	8.3
		25-34 years	104	940	+	426	910	10.7	+	8.4	9.0
		35-44 years	165	924	+	327	875	9.4	+	7.6	8.0
		45-54 years	279	852	+	277	832	8.6	+	4.3	7.9
		55-64 years	324	831	+	271	800	7.4	+	3.3	6.7
		65-74 years	421	761	+	263	740	7.1	+	3.2	6.5
		>=75 years	176	745	+	271	708	6.6	+	2.5	6.1
Gender	HD	Female	379	770	+	281	740	6.6	+	2.6	5.9
		Male	577	898	+	343	856	9.0	+	5.9	8.0
	PD	Female	262	767	+	305	704	6.5	+	3.0	5.8
		Male	280	833	+	272	808	8.8	+	4.3	8.1
Race	HD	Aboriginal	83	930	+	405	831	7.2	+	2.9	6.8
		Asian	37	891	+	294	855	6.7	+	2.3	6.4
		Caucasoid	793	826	+	305	790	8.3	+	5.4	7.3
		Maori	6	1155	+	325	1090	6.2	+	1.3	6.0
		Other	19	1086	+	564	1000	6.8	+	2.6	6.7
		Pacific Islander	18	942	+	332	825	7.2	+	3.2	6.9
	PD	Aboriginal	40	924	+	363	830	6.9	+	2.5	6.8
		Asian	43	859	+	361	830	6.9	+	3.1	6.5
		Caucasoid	431	777	+	251	750	7.8	+	4.1	7.1
		Maori	1	503	+	0	503	11.6	+	0.0	11.6
		Other	13	768	+	366	673	7.7	+	3.3	6.4
		Pacific Islander	14	1043	+	570	970	6.5	+	2.9	6.5
All Haemodialysis			956	847	+	326	803	8.0	+	5.0	7.2
All Peritoneal Dialysis			542	801	+	290	760	7.7	+	3.9	6.9
Diabetic			370	0	+	0	0	8.9	+	4.6	7.8
Non Diabetic		Analgesic	84	0	+	0	0	6.1	+	2.6	5.5
		Hypertension	175	0	+	0	0	7.7	+	3.2	7.2
		Other	869	0	+	0	0	7.7	+	4.9	7.0
Late Referral		No	1133	0	+	0	0	7.9	+	3.6	7.2
		Yes	358	0	+	0	0	8.0	+	7.1	6.7

Figure 39 **New Zealand**

Serum Creatinine and Creatinine Clearance at Entry to Program
New Patients 1-Apr-1998 to 31-Mar-1999

Category			No. of Pts.	Serum Creatinine Mean		Std. Dev.	Median	Creatinine Clearance Mean		Std.Dev.	Median
All Patients			313	831	+	332	760	8.2	+	3.5	7.5
Age		20-24 years	8	1066	+	338	1062	7.3	+	2.4	7.0
		25-34 years	18	878	+	319	834	10.0	+	4.7	8.3
		35-44 years	37	889	+	470	765	9.3	+	3.6	9.2
		45-54 years	64	907	+	366	800	8.2	+	3.5	7.4
		55-64 years	104	778	+	280	724	8.5	+	3.5	7.9
		65-74 years	64	772	+	269	743	7.4	+	2.9	6.9
		>=75 years	18	803	+	274	740	6.3	+	2.5	5.8
Gender	HD	Female	31	805	+	356	750	7.1	+	3.8	6.4
		Male	82	951	+	443	825	9.0	+	4.2	8.3
	PD	Female	91	787	+	268	730	6.7	+	2.6	6.6
		Male	109	785	+	247	740	9.2	+	2.9	8.9
Race	HD	Asian	2	865	+	92	865	5.7	+	1.5	5.7
		Caucasoid	69	839	+	382	795	9.2	+	4.6	8.3
		Maori	31	959	+	445	770	7.9	+	3.2	7.1
		Other	2	1725	+	1096	1725	6.3	+	4.8	6.3
		Pacific Islander	9	1127	+	334	1200	5.8	+	2.2	5.2
	PD	Asian	7	878	+	284	783	6.4	+	2.0	5.8
		Caucasoid	84	782	+	265	724	8.0	+	3.3	7.3
		Maori	76	803	+	270	750	8.3	+	3.0	7.9
		Other	7	690	+	133	740	7.8	+	1.6	7.4
		Pacific Islander	26	747	+	198	715	8.2	+	2.6	8.3
All Haemodialysis			113	911	+	424	800	8.5	+	4.2	7.4
All Peritoneal Dialysis			200	786	+	256	739	8.1	+	3.0	7.5
Diabetic			141	0	+	0	0	8.7	+	3.5	7.9
Non Diabetic		Analgesic	2	0	+	0	0	4.9	+	1.0	4.9
		Hypertension	41	0	+	0	0	7.9	+	2.8	8.1
		Other	129	0	+	0	0	7.9	+	3.6	7.1
Late Referral		No	220	0	+	0	0	8.4	+	3.5	7.6
		Yes	92	0	+	0	0	7.8	+	3.3	7.2

Figure 40 **Australia**

Creatinine Clearance at Entry to Program
New Patients 1-Apr-1998 to 31-Mar-1999

Category		No. of Pts.	Mls / Minute					
			0-4	5-9	10-14	15-20	20-24	> 25
All Patients		1491	20.0%	61.6%	14.3%	2.5%	0.7%	0.8%
Age	20-24 years	29	24.1%	51.7%	24.1%	0%	0%	0%
	25-34 years	104	7.7%	53.8%	26.0%	5.8%	2.9%	3.8%
	35-44 years	164	9.1%	64.6%	17.7%	5.5%	1.2%	1.8%
	45-54 years	277	14.4%	60.6%	20.6%	2.5%	1.1%	0.7%
	55-64 years	323	19.8%	66.9%	10.2%	2.2%	0.3%	0.6%
	65-74 years	418	26.1%	60.5%	10.8%	1.9%	0.5%	0.2%
	>=75 years	176	31.3%	59.7%	8.5%	0.6%	0%	0%
Gender	Female	639	33.0%	58.2%	7.4%	1.1%	0.2%	0.2%
	Male	852	10.2%	64.2%	19.5%	3.6%	1.2%	1.3%
Race	Aboriginal	122	26.2%	60.7%	11.5%	1.6%	0%	0%
	Asian	80	28.7%	61.3%	8.8%	1.3%	0%	0%
	Caucasoid	1219	18.5%	62.0%	14.8%	2.8%	0.9%	1.0%
	Maori	7	14.3%	71.4%	14.3%	0%	0%	0%
	Other	32	18.8%	65.6%	12.5%	3.1%	0%	0%
	Pacific Islander	31	35.5%	45.2%	19.4%	0%	0%	0%
Diabetic		370	14.1%	56.8%	22.2%	4.3%	1.1%	1.6%
Non Diabetic	Analgesic Nephropathy	84	39.3%	54.8%	4.8%	0%	1.2%	0%
	Hypertension	175	18.3%	62.9%	16.6%	1.7%	0.6%	0%
	Other	862	21.0%	64.2%	11.4%	2.2%	0.6%	0.7%
All Haemodialysis		951	18.8%	62.8%	13.7%	3.2%	0.7%	0.8%
All Peritoneal Dialysis		540	22.0%	59.6%	15.4%	1.5%	0.7%	0.7%
State	Queensland	271	23.2%	63.8%	9.2%	2.2%	1.1%	0.4%
	New South Wales/ACT	487	19.5%	58.1%	17.7%	2.7%	1.0%	1.0%
	Victoria	390	17.2%	62.1%	15.6%	3.3%	0.8%	1.0%
	Tasmania	29	17.2%	55.2%	24.1%	3.4%	0%	0%
	South Australia	123	18.7%	66.7%	13.0%	0.8%	0%	0.8%
	Northern Territory	46	21.7%	56.5%	17.4%	4.3%	0%	0%
	Western Australia	145	24.1%	66.9%	6.9%	1.4%	0%	0.7%
Late Referral	No	1133	17.9%	63.0%	15.1%	2.6%	0.7%	0.7%
	Yes	358	26.5%	57.3%	11.7%	2.5%	0.8%	1.1%

Figure 41 **New Zealand**

Creatinine Clearance at Entry to Program
New Patients 1-Apr-1998 to 31-Mar-1999

Category		No. of Pts.	Mls / Minute				
			0-4	5-9	10-14	15-20	20-24
All Patients		312	14.7%	60.3%	20.2%	3.8%	1.0%
Age	20-24 years	8	12.5%	75.0%	12.5%	0%	0%
	25-34 years	17	0%	58.8%	29.4%	5.9%	5.9%
	35-44 years	37	13.5%	48.6%	29.7%	8.1%	0%
	45-54 years	64	12.5%	64.1%	17.2%	4.7%	1.6%
	55-64 years	104	17.3%	53.8%	25.0%	2.9%	1.0%
	65-74 years	64	14.1%	71.9%	10.9%	3.1%	0%
	>=75 years	18	27.8%	61.1%	11.1%	0%	0%
Gender	Female	122	27.9%	61.5%	8.2%	1.6%	0.8%
	Male	190	6.3%	59.5%	27.9%	5.3%	1.1%
Race	Asian	9	33.3%	66.7%	0%	0%	0%
	Caucasoid	153	13.7%	58.2%	20.3%	5.9%	2.0%
	Maori	106	13.2%	62.3%	21.7%	2.8%	0%
	Other	9	11.1%	77.8%	11.1%	0%	0%
	Pacific Islander	35	20.0%	57.1%	22.9%	0%	0%
Diabetic		141	12.8%	56.7%	24.8%	4.3%	1.4%
Non Diabetic	Analgesic Nephropathy	2	50.0%	50.0%	0%	0%	0%
	Hypertension	41	9.8%	68.3%	19.5%	2.4%	0%
	Other	128	18.0%	61.7%	15.6%	3.9%	0.8%
All Haemodialysis		112	14.3%	58.9%	18.8%	5.4%	2.7%
All Peritoneal Dialysis		200	15.0%	61.0%	21.0%	3.0%	0%
Late Referral	No	220	14.1%	59.5%	21.4%	4.1%	0.9%
	Yes	92	16.3%	62.0%	17.4%	3.3%	1.1%

PRIMARY RENAL DISEASE

AUSTRALIA

Glomerulonephritis (32%) remained the most common cause of renal failure (of these GN cases 21% were diagnosed without biopsy). Diabetic nephropathy (excludes diabetics with renal failure due to other causes) was the second most common condition (22%) followed by "hypertension" (12%) and polycystic kidney disease (7%), analgesic nephropathy (6%). See Figure 42.

The incidence of **analgesic nephropathy** was unchanged. The number of patients (97) and incidence rate (5.1/million) were similar to last year. In New South Wales, after a fall in 1997, the incidence rose to 10% of new patients (7.6 per million) in 1998. See Figures 49-50.

IgA mesangial proliferative glomerulonephritis (28%) was the most common histologically proven form of glomerulonephritis (36% of biopsy proven glomerulonephritis), followed by **systemic disease** (16%) and **focal sclerosing glomerulonephritis** (15%). See Figure 43. As noted in previous years, the label "glomerulonephritis" has been recorded for many elderly patients, without biopsy confirmation.

The cases attributed to **"hypertension"** continued the steady increase of recent years, reflecting the increasing age of many new patients (in which it was the most common cause of renal failure). The modal age for hypertension was 65-74 years. "Hypertension" is a diagnosis frequently without clear definition or proof. It represents a varied group with hypertension as a concomitant observation, but not necessarily the prime causative factor. Vascular disease or atherosclerotic renal disease may be more suitable terms to employ. Certainly no meaningful comment can be based on changes in the reported incidence of hypertensive renal failure amongst the middle aged and elderly patients.

Diabetic nephropathy has increased over the past five years, from 17% in 1994 to 22%, as a proportion of all new patients. The majority of cases (77%) were reported to be Type II (268 of 350 patients) with 93 of these 268 patients insulin requiring. There was a much higher racial incidence of diabetic nephropathy amongst non-Caucasoid patients, particularly Aboriginals, Maoris and Pacific Islanders, many of whom had Type II diabetes. Unfortunately the diagnosis has rarely been based on renal biopsy: 27% of Type I, 18% of Type II. While many cases will have been accurately assigned to diabetic nephropathy there must be concern regarding the reported incidence of the condition amongst Australian patients; the proportion more appropriately classified as "uncertain" is unknown. Any definitive discussion relating to changes in prevalence of diabetic nephropathy must note this *caveat.* Present biopsy rates in this group suggest the true prevalence will not be known without a large biopsy study of all diabetics. In regard to indigenous groups the purported prevalence of diabetic nephropathy as a cause of renal failure is uncommonly biopsy based.

Amongst the **miscellaneous diseases,** interstitial nephritis , multiple myeloma, renal calculi, obstructive nephropathy, haemolytic uraemia/post partum nephropathy, amyloid and renal malignancy were prominent. Again as in 1997, there were five cases of lithium toxicity reported in the past year. Cyclosporin toxicity was reported in 4 cases. See Figure 44. For detail of age and primary renal disease see Appendix II at Website (www.anzdata.org.au).

NEW ZEALAND

Diabetic nephropathy (44%) was again the most common cause of renal failure followed by **glomerulonephritis** (20%) and **hypertension** (13%). See Figure 42. **Diabetes Type II** (non insulin and insulin requiring) represented 88% of diabetic nephropathy; as in Australia, this diagnosis was not based on biopsy in most cases. Biopsy proof was lacking for 24% of glomerulonephritis cases.

IgA mesangioproliferative glomerulonephritis (15%) represented 20% of biopsy proven glomerulonephritis. See Figure 43. Miscellaneous causes of primary renal disease are shown in Figure 44.

Figure 42 **Australia and New Zealand**

Primary Renal Disease 1996 - 1998

Primary Renal Disease	Australia			New Zealand		
	1996	1997	1998	1996	1997	1998
Glomerulonephritis	34% (481)	34% (505)	32% (507)	26% (74)	24% (78)	20% (71)
Analgesic Nephropathy	7% (96)	5% (78)	6% (97)	<1% (1)	0% (0)	<1% (2)
Polycystic Kidney Disease	7% (97)	6% (87)	7% (105)	7% (20)	5% (17)	6% (21)
Reflux Nephropathy	4% (63)	5% (82)	4% (74)	5% (15)	4% (15)	3% (13)
Hypertension	12% (177)	12% (175)	12% (191)	12% (35)	13% (40)	13% (47)
Diabetic Nephropathy	19% (275)	22% (321)	22% (350)	36% (104)	40% (127)	44% (159)
Miscellaneous	11% (151)	10% (145)	10% (161)	9% (27)	10% (31)	7% (26)
Uncertain Diagnosis	6% (91)	6% (94)	7% (104)	5% (14)	4% (12)	7% (24)
Total	**100% (1431)**	**100% (1487)**	**100% (1589)**	**100% (290)**	**100% (320)**	**100% (363)**

( ) Number of Patients

Figure 43 **Australia and New Zealand**

Types of Glomerulonephritis 1-Jan-98 to 31-Dec-98
(Australia 507 patients) (New Zealand 71 patients)

	Australia	New Zealand		Australia	New Zealand
No Biopsy	21% (107)	24% (17)	GN with Systemic Disease	0	1.5% (1)
Focal Sclerosing	15% (77)	10% (7)	Goodpasture's Syndrome	1% (6)	1.5% (1)
MCGN - Type I	3% (15)	6% (4)	Anti GBM (no haemoptysis)	1% (4)	1.5% (1)
MCGN - Type II	<1% (3)	1% (1)	Systemic Lupus	5% (26)	7% (5)
Membranous GN	6% (28)	7% (5)	Henoch-Schonlein Purpura	1% (4)	3% (2)
Rapidly Progressive GN	2% (11)	1.5% (1)	Wegener's Granulomatosis	3% (16)	4% (3)
Mesangioproliferative IgA +	28% (144)	15% (11)	Microscopic Polyarteritis	2% (11)	3% (2)
Mesangioproliferative IgA -	1% (7)	4% (3)	Scleroderma	2% (7)	1.5% (1)
Mesangioproliferative No I.F.	<1% (2)	0	GN Other	1% (5)	0
Focal and Segmental Proliferative GN	3% (15)	1.5% (1)	Familial GN (including Alports)	2% (7)	3% (2)
Advanced GN (end-stage type)	2% (12)	4% (3)			

Figure 44 **Australia and New Zealand**

Miscellaneous Causes of Primary Renal Disease
1-Jan-98 to 31-Dec-98
(Australia 161 patients) (New Zealand 26 patients)

	Australia	New Zealand		Australia	New Zealand
Interstitial Nephritis	33	4	Calculi	11	2
Lithium Toxicity	5	1	Medullary Cystic Disease	5	3
Cyclosporin Nephrotoxicity	4	0	Gout	3	0
Oxalosis	2	0	Cystinosis	2	0
Sarcoidosis	2	0	Tuberous Sclerosis	1	0
Lead Nephropathy	1	0	Congenital Renal Hypoplasia & Dysplasia	9	2
Renal Tuberculosis	1	0	Amyloid	8	0
Renal Tubular Acidosis	1	0	Denys Drash Syndrome	1	0
Sickle Cell Disease	1	0	Multiple Myeloma	13	1
Sjogren's Disease	1	0	Renal Cell Carcinoma	6	2
			Transitional Cell Carcinoma	6	1
Obstructive Nephropathy	10	3	Radiation Nephritis	0	1
Ureteric Obstructive Nephropathy	5	0	Bilateral Wilm's Tumour	1	0
Bladder Neck Obstruction	3	0	Lymphoma Kidneys	1	0
Posterior Urethral Valves	3	0	Nephrocalcinosis	0	1
Lower Urinary Tract Abnormalities	2	2	Haemolytic Uraemic Syndrome	9	1
Ectopia Vesicae (2)			Cortical Necrosis	4	2
Prune Belly Syndrome (1)			Post Partum Nephropathy	3	0
Thalidomide during pregnancy (1)			Loss Single Kidney (Trauma/Surgery)	1	0
Neuropathic Bladder	2	0	Post Cardiogenic Shock	1	0

Figure 45 **Australia and New Zealand**

Glomerulonephritis and Diabetic Nephropathy
No Biopsy Performed 1998

Disease	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
GN	(89) 21%	(174) 25%	(148) 16%	(4) 25%	(32) 14%	(16) 44%	(44) 34%	**(507)** **22%**	**(71)** **27%**
Diabetes	(51) 84%	(104) 76%	(98) 77%	(10) 80%	(21) 81%	(21) 81%	(45) 91%	**(350)** **80%**	**(159)** **96%**

Figure 46 **Australia and New Zealand**

Glomerulonephritis
No Biopsy Performed 1992 - 1998

No Biopsy	1992	1993	1994	1995	1996	1997	1998
Australia	(414) 22%	(379) 26%	(458) 26%	(483) 24%	(481) 25%	(505) 26%	(507) 21%
New Zealand	(74) 23%	(62) 19%	(64) 31%	(82) 28%	(74) 23%	(78) 23%	(71) 24%

Figure 47 **Australia and New Zealand**

Biopsy of New Patients 1998

Biopsy	Primary Renal Disease	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
Yes	Analgesic	1	5	3	0	0	0	0	**9**	**0**
	Diabetes 1 - Insulin	0	11	6	2	2	1	0	**22**	**0**
	Diabetes 2 - Insulin Req.	1	6	7	0	0	0	0	**14**	**2**
	Diabetes 2 - Non Insulin	7	8	10	0	2	3	4	**34**	**4**
	Glomerulonephritis	69	128	123	3	27	9	28	**387**	**52**
	Hypertension	7	15	14	3	2	1	6	**48**	**11**
	Miscellaneous	6	27	20	0	8	2	6	**69**	**9**
	Reflux	0	3	5	0	1	0	0	**9**	**1**
	Uncertain	0	3	2	1	2	0	0	**8**	**2**
	Sub Total	**91**	**206**	**190**	**9**	**44**	**16**	**44**	**600**	**81**
No	Analgesic	22	46	7	0	7	0	6	**88**	**2**
	Diabetes 1 - Insulin	10	22	13	4	6	1	4	**60**	**19**
	Diabetes 2 - Insulin Req.	8	30	30	1	4	1	5	**79**	**53**
	Diabetes 2 - Non Insulin	25	27	32	3	7	15	32	**141**	**81**
	Glomerulonephritis	20	46	25	1	5	7	16	**120**	**19**
	Hypertension	24	50	41	4	10	1	13	**143**	**36**
	Miscellaneous	19	32	28	1	4	2	6	**92**	**17**
	Polycystic	28	37	23	0	8	0	9	**105**	**21**
	Reflux	11	17	18	2	8	0	9	**65**	**12**
	Uncertain	29	19	23	4	11	4	6	**96**	**22**
	Sub Total	**196**	**326**	**240**	**20**	**70**	**31**	**106**	**989**	**282**
	Total	**287**	**532**	**430**	**29**	**114**	**47**	**150**	**1589**	**363**

Figure 48 **Australia and New Zealand**

Biopsy Rate of New Patients with Diabetic Nephropathy 1-Jan-98 to 31-Dec-98

	Biopsy	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
Diabetes Type 1	No	10	22	13	6	1	4	4	**60**	**19**
	Yes	0	11	6	2	1	0	2	**22**	**0**
	Total	**10**	**33**	**19**	**8**	**2**	**4**	**6**	**82**	**19**
Diabetes Type 2 Insulin Requiring	No	25	27	32	7	15	32	3	**141**	**81**
	Yes	7	8	10	2	3	4	0	**34**	**4**
	Total	**32**	**35**	**42**	**9**	**18**	**36**	**3**	**175**	**85**
Diabetes Type 2 Non Insulin Requ.	No	8	30	30	4	1	5	1	**79**	**53**
	Yes	1	6	7	0	0	0	0	**14**	**2**
	Total	**9**	**36**	**37**	**4**	**1**	**5**	**1**	**93**	**55**

Figure 49 **Australia**

Analgesic Nephropathy 1991 - 1998

Number of New Patients

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	25	22	34	20	24	17	23	23
New South Wales/ACT	71	61	71	65	56	68	43	51
Victoria	8	6	10	5	4	5	6	10
Tasmania	0	0	0	1	0	0	0	0
South Australia	11	7	5	4	3	0	1	7
Northern Territory	0	0	0	0	1	2	0	0
Western Australia	4	4	4	1	7	4	5	6
Australia	**119**	**100**	**124**	**96**	**95**	**96**	**78**	**97**

Percentage of New Patients

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	16%	12%	17%	9%	10%	7%	8%	8%
New South Wales/ACT	20%	15%	16%	14%	11%	12%	8%	10%
Victoria	3%	2%	4%	2%	1%	1%	2%	2%
Tasmania	0%	0%	0%	4%	0%	0%	0%	0%
South Australia	12%	8%	7%	4%	3%	0%	1%	6%
Northern Territory	0%	0%	0%	0%	3%	4%	0%	0%
Western Australia	5%	4%	4%	1%	5%	3%	4%	4%
Australia	**12%**	**9%**	**11%**	**7%**	**7%**	**7%**	**5%**	**6%**

Patients per million Population

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	8.4	7.2	10.9	6.2	7.3	5.0	6.7	6.6
New South Wales/ACT	11.4	9.7	11.2	10.2	8.7	10.4	6.5	7.6
Victoria	1.8	1.3	2.2	1.1	0.8	1.1	1.3	2.1
Tasmania	0	0	0	2.1	0	0	0	0
South Australia	7.5	4.7	3.4	2.7	2.0	0	0.6	4.7
Northern Territory	0	0	0	0	5.7	11.2	0	0
Western Australia	2.4	2.4	2.3	0.5	4.0	2.2	2.7	3.2
Australia	**6.8**	**5.7**	**7.0**	**5.3**	**5.2**	**5.2**	**4.1**	**5.1**

Figure 50 **Australia**

Analgesic Nephropathy 1992 - 1998

	1992	1993	1994	1995	1996	1997	1998
Analgesic	100 (6)	124 (7)	96 (5)	95 (5)	96 (5)	78 (4)	97 (5)
Non Analgesic	985 (56)	1036 (59)	1220 (69)	1287 (72)	1335 (73)	1409 (76)	1492 (80)
Total	**1085 (62)**	**1160 (66)**	**1316 (74)**	**1382 (77)**	**1431 (78)**	**1487 (80)**	**1589 (85)**

Australian States 1998

	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA
Analgesic	23 (7)	51 (8)	10 (2)	0 (0)	7 (5)	0 (0)	6 (3)
Non Analgesic	264 (76)	481 (72)	420 (90)	29 (61)	107 (72)	47 (247)	144 (79)
Total	**287 (83)**	**532 (80)**	**430 (92)**	**29 (61)**	**114 (77)**	**47 (247)**	**150 (82)**

( ) Per million population in each State

LIKELIHOOD OF TRANSPLANTATION

31 March 1999

AUSTRALIA

The proportion of all dialysis patients who are on the transplant list has steadily declined from 36% (1995) to 28% (1999) which reflects the ageing of the dialysis population. But, amongst those <65 years old, the majority were on the active list, temporarily off it, or, were awaiting assessment shown in Figure 52. The highest proportion "on the list" was reported in the home haemodialysis group and the lowest in the hospital haemodialysis group as shown in Figure 53. Patient refusal was higher amongst those using home haemodialysis. Poor general health was more common amongst hospital haemodialysis and CAPD patients

The waiting list ratios are shown in Figure 53 for each State and Australia: range Northern Territory 24%, New South Wales 54%. If those awaiting assessment or temporarily off the list are included then the range is Northern Territory 55%, South Australia 72%. Several States have a high proportion still awaiting assessment which suggests their transplant status was not determined before dialysis commenced.

The age related waiting list ratios for States and for Australia are shown in Figures 56-57. As expected, the majority of those <45 years were "on the list" but only 44% and 29% in the 45-54 and 55-64 year age groups respectively. The State ratios are influenced in part by the variation in the proportion not yet assessed. This is an area requiring more detailed evaluation.

Only 28% of all 5633 patients were reported to be on the active waiting list. The majority of patients dialysed at 31st March were not likely to be transplanted because of poor general health, non-renal disease, malignancy, or age. Of those considered for the waiting list, a small group were temporarily off the list (2%), and a larger group were awaiting assessment for the list (10%). See Figure 51.

However, in the age group <65 years, the majority of the 3456 patients were on the active waiting list (43%), temporarily off the list (4%), or awaiting assessment (14%). A small group (4%) were reported to have refused the option of transplantation: 4% of those not transplanted, 8% of those previously transplanted. See Figure 52.

As expected, most young dialysis patients were likely to be transplanted. The proportion of middle aged patients (45-54 years) likely to be transplanted ranged from 25% (Northern Territory) to 59% (New South Wales/ACT) and for those 55-64 years ranged from 17% (Tasmania) to 36% (New South Wales/ACT). Few elderly patients were likely to be transplanted: 11% New South Wales/ACT and Queensland.

NEW ZEALAND

Of 1130 patients dialysing at 31st March, (27%) were awaiting transplantation; <55 years old, there were 254 of 550 patients (46%). Three percent were temporarily off the list and 16% were awaiting assessment. Of patients <65 years, 27% were unfit (hospital haemodialysis 40%, satellite haemodialysis 19% and CAPD 28%). See Figures 54-59.

Figure 51 **Australia**

Likelihood of Transplantation 31-Mar-99

Likelihood of Transplantation			Peritoneal Dialysis				Haemodialysis		
			PD			CAPD			
			Hosp.	Home	Sat.		Hosp.	Home	Sat.
On Waiting List	1588	28%	2	73	0	312	312	390	499
Temporarily Off List	134	2%	0	4	0	27	37	22	44
Awaiting Assessment	547	10%	4	21	0	139	179	41	163
Patient Refusal	205	4%	0	4	0	66	44	42	49
Medically Unfit	1401	25%	10	48	0	353	489	84	417
Malignancy	149	2%	0	1	0	23	49	28	48
Age	1493	27%	5	41	0	445	445	37	520
Other Reasons	116	2%	0	3	0	23	35	8	47
Total	**5633**	**100%**	**21**	**195**	**0**	**1388**	**1590**	**652**	**1787**

Figure 52 **Australia**

Likelihood of Transplantation: Age <65 years 31-Mar-99

Related to Previous Transplantation

Category	No Previous Transplant	Previous Unsuccessful Transplant	Total
	(2847)	(609)	(3456)
On Waiting List	43%	43%	**43%**
Temporarily Off List	3%	6%	**4%**
Awaiting Assessment	15%	12%	**14%**
Patient Refusal	4%	8%	**4%**
Medically Unfit	26%	22%	**26%**
Malignancy	3%	5%	**3%**
Age	3%	<1%	**3%**
Other	3%	4%	**3%**

Related to Site and Method of Dialysis

PD	CAPD	Hosp.HD	Home HD	Sat. HD
(141)	(764)	(861)	(565)	(1225)
49%	38%	31%	67%	42%
2%	3%	4%	4%	4%
17%	16%	18%	7%	14%
3%	6%	3%	7%	4%
26%	29%	34%	10%	25%
0%	2%	4%	3%	3%
1%	3%	2%	1%	4%
2%	3%	4%	1%	4%

Figure 53 **Australia**

Likelihood of Transplantation: Age <65 years 31-Mar-99
Related to Site and Method of Dialysis - Australian States

	PD	CAPD	Hosp. HD	Home HD	Sat. HD	Total
Queensland	**(31)**	**(145)**	**(265)**	**(23)**	**(67)**	**(531)**
On Waiting List	42%	36%	31%	39%	37%	**34%**
Temporarily Off List	3%	7%	5%	9%	6%	**5%**
Awaiting Assessment	26%	19%	20%	22%	12%	**19%**
Patient Refusal	3%	8%	4%	13%	1%	**5%**
Medically Unfit	23%	26%	32%	13%	36%	**30%**
Malignancy	0%	2%	3%	0%	2%	**2%**
Age	0%	<1%	<1%	0%	0%	**<1%**
Other	3%	2%	5%	4%	6%	**4%**
New South Wales / ACT	**(66)**	**(286)**	**(255)**	**(381)**	**(272)**	**(1260)**
On Waiting List	58%	40%	44%	72%	53%	**54%**
Temporarily Off List	1%	2%	1%	3%	1%	**2%**
Awaiting Assessment	9%	8%	10%	4%	10%	**8%**
Patient Refusal	3%	6%	4%	6%	5%	**5%**
Medically Unfit	29%	36%	33%	10%	23%	**24%**
Malignancy	0%	2%	4%	3%	4%	**3%**
Age	0%	3%	1%	1%	1%	**1%**
Other	0%	3%	3%	1%	3%	**3%**
Victoria	**(18)**	**(172)**	**(130)**	**(117)**	**(453)**	**(890)**
On Waiting List	22%	35%	25%	60%	42%	**40%**
Temporarily Off List	0%	5%	5%	6%	3%	**4%**
Awaiting Assessment	22%	19%	18%	9%	13%	**15%**
Patient Refusal	0%	6%	<1%	4%	3%	**3%**
Medically Unfit	39%	24%	43%	13%	24%	**25%**
Malignancy	0%	2%	2%	5%	3%	**3%**
Age	11%	6%	5%	2%	9%	**7%**
Other	6%	3%	2%	1%	3%	**3%**
Tasmania	**(1)**	**(17)**	**(32)**	**(5)**	**(7)**	**(62)**
On Waiting List	100%	53%	22%	60%	43%	**35%**
Temporarily Off List	0%	0%	9%	0%	0%	**5%**
Awaiting Assessment	0%	18%	13%	40%	0%	**16%**
Patient Refusal	0%	6%	9%	0%	14%	**8%**
Medically Unfit	0%	17%	35%	0%	29%	**26%**
Malignancy	0%	0%	6%	0%	14%	**5%**
Age	0%	6%	3%	0%	0%	**3%**
Other	0%	0%	3%	0%	0%	**2%**
South Australia	**(5)**	**(25)**	**(52)**	**(14)**	**(103)**	**(199)**
On Waiting List	60%	20%	15%	36%	47%	**35%**
Temporarily Off List	20%	0%	6%	0%	7%	**6%**
Awaiting Assessment	20%	44%	42%	36%	22%	**31%**
Patient Refusal	0%	0%	4%	14%	2%	**3%**
Medically Unfit	0%	28%	25%	7%	18%	**20%**
Malignancy	0%	4%	4%	0%	2%	**2%**
Age	0%	4%	2%	0%	0%	**1%**
Other	0%	0%	2%	7%	2%	**2%**
Northern Territory	**(5)**	**(9)**	**(10)**	**(0)**	**(111)**	**(135)**
On Waiting List	20%	78%	20%	0%	20%	**24%**
Temporarily Off List	0%	0%	0%	0%	8%	**7%**
Awaiting Assessment	20%	0%	30%	0%	26%	**24%**
Patient Refusal	20%	0%	0%	0%	3%	**3%**
Medically Unfit	20%	22%	20%	0%	34%	**32%**
Malignancy	0%	0%	10%	0%	0%	**<1%**
Age	0%	0%	0%	0%	0%	**0%**
Other	20%	0%	20%	0%	9%	**10%**
Western Australia	**(15)**	**(110)**	**(117)**	**(25)**	**(112)**	**(379)**
On Waiting List	67%	41%	25%	60%	42%	**39%**
Temporarily Off List	0%	2%	6%	0%	6%	**4%**
Awaiting Assessment	13%	23%	21%	0%	7%	**16%**
Patient Refusal	0%	<4%	3%	24%	7%	**6%**
Medically Unfit	20%	23%	33%	8%	27%	**26%**
Malignancy	0%	<4%	6%	8%	2%	**4%**
Age	0%	0%	1%	0%	1%	**<1%**
Other	0%	<4%	5%	0%	8%	**5%**

( ) Number of Patients

Figure 54 **New Zealand**

Likelihood of Transplantation 31-Mar-99

Likelihood of Transplantation			Peritoneal Dialysis				Haemodialysis		
			PD			CAPD			
			Hosp.	Home	Sat.		Hosp.	Home	Sat.
On Waiting List	305	27%	0	16	0	128	29	104	28
Temporarily Off List	32	3%	0	2	0	11	7	9	3
Awaiting Assessment	182	16%	2	5	0	105	48	15	7
Patient Refusal	119	11%	0	4	0	77	23	11	4
Medically Unfit	372	33%	1	7	0	201	116	36	11
Malignancy	17	1%	0	1	0	7	3	5	1
Age	67	6%	0	0	0	46	19	2	0
Other Reasons	36	3%	0	0	0	16	5	10	5
Total	**1130**	**100%**	**3**	**35**	**0**	**591**	**250**	**192**	**59**

Figure 55 **New Zealand**

Likelihood of Transplantation: Age <65 years 31-Mar-99

Related to Previous Transplantation

Category	No Previous Transplant	Previous Unsuccessful Transplant	Total
	(722)	(132)	(854)
On Waiting List	33%	44%	**34%**
Temporarily Off List	3%	10%	**4%**
Awaiting Assessment	20%	12%	**18%**
Patient Refusal	11%	8%	**10%**
Medically Unfit	29%	17%	**27%**
Malignancy	1%	3%	**2%**
Age	<1%	0%	**1%**
Other	3%	6%	**4%**

Related to Site and Method of Dialysis

PD	CAPD	Hosp.HD	Home HD	Sat. HD
(37)	(408)	(180)	(171)	(58)
43%	30%	16%	59%	48%
5%	3%	4%	5%	5%
19%	21%	25%	7%	12%
11%	13%	11%	5%	7%
19%	28%	40%	16%	19%
3%	1%	2%	2%	2%
0%	<1%	<1%	0%	0%
0%	4%	2%	6%	7%

Figure 56 **Australia and New Zealand**

Patients Awaiting Transplant
Age Related 31-Mar-99

State	Age Groups								Total
	00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	
Queensland	0	2	9	25	49	44	52	28	**209**
New South Wales/ACT	2	8	45	85	168	216	158	63	**745**
Victoria	0	3	11	66	85	107	81	6	**359**
Tasmania	0	0	2	7	5	5	3	1	**23**
South Australia	0	0	3	20	11	20	15	3	**72**
Northern Territory	0	0	1	5	7	12	7	1	**33**
Western Australia	2	4	7	32	36	37	28	1	**147**
Australia	**4**	**17**	**78**	**240**	**361**	**441**	**344**	**103**	**1588**
New Zealand	**1**	**4**	**26**	**50**	**84**	**66**	**63**	**11**	**305**

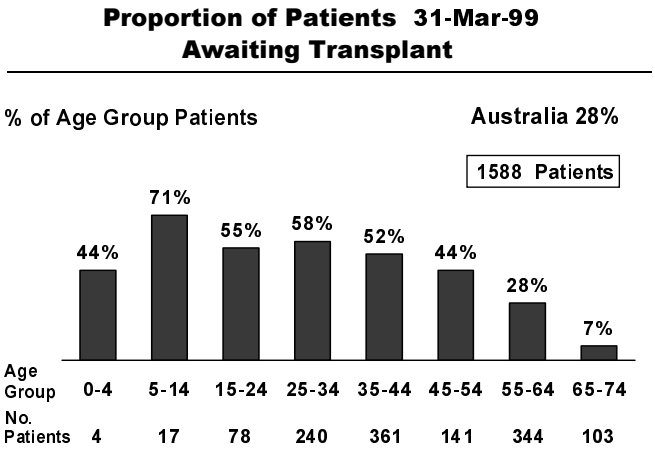
Figure 57 **Australia and New Zealand**

Proportion (%) of Dialysis Patients Awaiting Transplant
Age Related 31-Mar-99

State	No. of Pts.	Age Groups								Total
		00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	
Queensland	n=897	0%	67%	33%	36%	46%	30%	29%	11%	**23%**
New South Wales/ACT	n=2091	100%	73%	71%	70%	65%	59%	36%	11%	**36%**
Victoria	n=1472	0%	60%	39%	62%	50%	43%	25%	1%	**24%**
Tasmania	n=101	0%	0%	67%	64%	42%	28%	17%	4%	**23%**
South Australia	n=356	0%	0%	33%	54%	37%	34%	24%	3%	**20%**
Northern Territory	n=157	0%	0%	50%	38%	18%	25%	21%	6%	**21%**
Western Australia	n=559	67%	80%	78%	56%	44%	34%	25%	1%	**26%**
Australia	**n=5633**	**44%**	**71%**	**55%**	**58%**	**52%**	**44%**	**28%**	**7%**	**28%**
New Zealand	**n=1130**	**50%**	**40%**	**54%**	**59%**	**50%**	**28%**	**21%**	**5%**	**27%**

n = Number of Patients

Figure 58



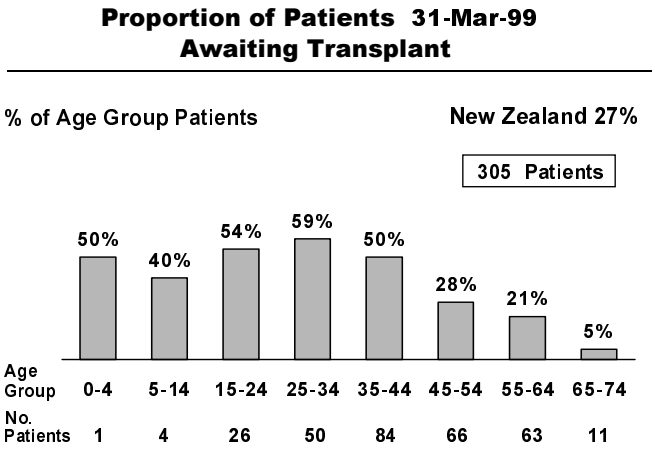
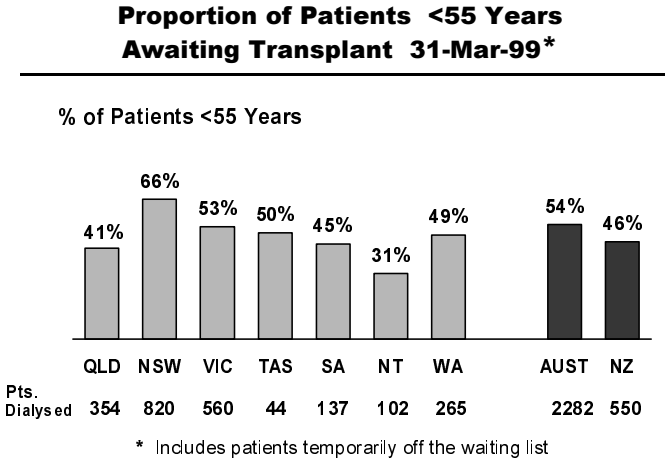


Figure 59



* Includes patients temporarily off the waiting list

DEATHS

Introduction

Death rate is reported as number of patients died/ total number of months of treatment of all patients treated at any time during the year. It is expressed as deaths per 100 patient years [pt yrs] at risk.

For this report, as in previous years, death is attributed to the dialysis modality at the time of death.

This report contains two forms of reporting the incidence of death:

- Rate related to number of treatment years,
- Proportion of all patients treated.

Australia

Dialysis Dependent

Death rates per 100 patient years [pt yrs]

The number of deaths increased 12% compared to the previous year. There were 892 deaths (16.6 deaths per 100 pt yrs at risk), representing 12.9% of patients treated at any time during the past year; 58% of patients were 65 years or older. Continuous peritoneal dialysis (18.3 deaths per 100 pt yrs at risk) 11.9% of patients dialysed, haemodialysis (15.9 deaths per 100 pt yrs at risk) 11.3% of patients dialysed. See Figures 64 and 69.

This death rate increased considerably both for diabetics and non-diabetics. The peritoneal dialysis death rate has been somewhat higher than for haemodialysis in the last few years (18.3, 15.9 per 100 pt yrs respectively). The diabetic rate was 45% higher than for non-diabetics (22.5, 15.5 per 100 pt yrs respectively) but this was seen only in those <65 years. See Figures 70-73.

With regard to age, mode of dialysis and diabetic status the death rate amongst non-diabetic patients <65 years was slightly higher in haemodialysis compared to peritoneal dialysis. The situation was reversed in those >64 years. The rate amongst diabetics has fluctuated, due in part to the small number of patients treated, with the past year showing a much higher rate in those <45 years treated by haemodialysis at death. In the diabetics >64 years the haemodialysis death rate was considerably lower than for peritoneal dialysis. See Figure 74.

The dialysis patient death rates have fluctuated more in some States than others; Queensland had a higher rate than most States for the past year in the age group 45-64 years. See Figure 61. In 1996 South Australia reached a markedly higher level than the other States but has shown an improvement towards the "norm" in the last 2 years. See Figure 60.

Death as a Proportion of Dialysis Treated Patients

The relative incidence of death in each age group in relation to mode of dialysis treatment at death and number of patients treated at any time during the year is shown in Figure 68 and 78.

Transplant Dependent

There were 117 deaths (2.4 deaths per 100 pt yrs at risk) of patients with a functioning transplant; 2.5% of patients with a functioning graft during the year. The cadaver donor recipient death rate was 2.8 per 100 pt yrs, the living donor rate 0.7 per 100 pt yrs. These results were similar to those last year. The death rate in relation to age is shown in Figure 65 and 69.

New Zealand

Dialysis Dependent

Death Rate per 100 Patient Years [pt yrs]

There were 178 deaths (16.5 deaths per 100 pt yrs at risk) see Figure 66; 12.7% of patients dialysed, see Figure 69; haemodialysis (15.6 deaths per 100 pt yrs at risk) 9.7% of patients dialysed, CAPD (17.2 deaths per 100 pt yrs at risk) 12.1% of patients dialysed. See Figure 68 and 78, and Appendix III at Website (www.anzdata.org.au).

Deaths as a Proportion of Treated Dialysis Patients

There was a slight rise in the deaths as a proportion of patients dialysing during last year. See Figure 68 and 78.

Transplant Dependent

There was a decrease in the number of deaths (2.7 deaths per 100 pt yrs at risk) see Figure 67: 25 deaths (2.5% at risk) see Figure 69. The low death rate continued, there being no particular change in rates in regard to age or diabetic status. Cadaver donor recipient death rate was 3.2 per 100 pt yrs, living donor 1.3 per 100 pt yrs.

Figure 60 **Australia and New Zealand**

Death Rates by States
All Dialysis Patients 1994 - 1998

Year	Qld	NSW/ACT	Vic.	SA	WA	Aust.	N.Z.
1994	20.1	13.9	13.9	13.7	14.7	**15.2**	**18.0**
1995	16.8	13.6	15.4	16.0	13.1	**14.9**	**18.8**
1996	17.6	14.3	14.0	23.2	14.6	**15.6**	**14.7**
1997	16.5	16.3	12.5	20.3	17.2	**15.7**	**15.8**
1998	19.4	16.6	15.7	15.7	13.4	**16.6**	**16.5**

Figure 61 **Australia and New Zealand**

Death Rates by States
Dialysis Modality & Age Groups 1998

	Qld	NSW/ACT	Vic.	SA	WA	Aust.	N.Z.
Age 45-64 yrs							
All Patients	19.0	11.9	14.2	12.2	8.2	**13.5**	**20.9**
CAPD	15.3	10.6	14.4	9.4	9.8	**12.2**	**20.1**
Haemodialysis	19.7	12.0	14.6	13.1	6.6	**13.7**	**22.1**
Age 65-84 yrs							
All Patients	23.7	27.1	22.3	22.9	24.8	**25.2**	**22.4**
CAPD	27.0	30.9	27.9	10.5	25.6	**28.4**	**20.2**
Haemodialysis	34.1	25.3	19.7	25.7	25.2	**23.7**	**26.3**

Cause of Death

Australia See Figure 62

Dialysis patients

Cardiac events (42%) were the most common cause of death followed by infection, vascular and "social" causes. Myocardial infarction (21%) and "cardiac arrest" (15%) formed the majority of the cardiac group. These results are similar to those during the previous year. The site of infection was most commonly in the lung followed by the peritoneum; septicaemia of unspecified source was reported without an identified organism in many cases. Gram positive bacteria were slightly more frequently reported than gram negative as the responsible organism. Death due to peritoneal infection was more common in peritoneal dialysis patients. The detail of the site and identity of the organisms can be found at Website (www.anzdata.org.au).

Withdrawal of treatment was responsible for nearly 20% of deaths; as expected most were in the older age group. Patient initiated withdrawal was equally common as that initiated by the caring team. The number of cases in the age group 75-84 years doubled in the past three years. Four patients under 35 years withdrew from treatment.

The number of deaths from malignancy rose reaching 6.5% of all deaths. One death due to sclerosing peritonitis, one due to immune deficiency.

Transplant patients

Malignancy was the most common cause of death again last year: 32% of 117 deaths, most in the age group 55-74 years. There were 14 deaths due to infection, usually in the lung and usually non-bacterial.

Death of Young Adults 15-24, 25-34 years of age

There were five deaths in the age group **15-24 years**, the youngest being 20 years; three males and two females, three Caucasoid and two Aboriginal. Two had a functioning transplant and three were having haemodialysis. Causes of death were: two cardiac arrests, one lung infection, one following convulsions with aspiration and one due to chronic respiratory failure.

There were 27 deaths in the age group **25-34 years**: nine males and eighteen females. Twenty four were Caucasoid, two Aboriginal and one Pacific Islander. Fourteen had glomerulonephritis and six had diabetic nephropathy. Six of the 27 patients had been transplanted; three died with a functioning transplant. Fifteen deaths were hospital haemodialysis patients. Causes of death were: eight cardiac, seven infection, five refused further treatment, two haemorrhage, one each malignancy, treatment withdrawn, status epilepticus, cerebrovascular accident and pancreatitis.

New Zealand See Figure 63

Dialysis patients

The notable trends seen last year were a doubling of the cardiac deaths, and a one third reduction in infectious deaths. Overall there was a 14% increase in the number of deaths.

Transplant patients

Cardiac and malignant conditions remained the most frequent causes of death.

Figure 62 **Australia**

Cause of Death - Dialysis and Transplant Dependent 1998

	Dialysis	Transplant		Dialysis	Transplant
Cardiac			**Vascular**		
Cardiac Arrest	135	10	Bowel Infarction	15	0
Hyperkalaemia	12	0	Cerebrovascular Accident	58	9
Hypertensive Cardiac Failure	6	0	Gastrointestinal Haemorrhage	11	2
Myocardial Infarction	101	12	Haemorrhage Dialysis Access Site	3	0
Myocardial Infarction (presumed)	92	10	Haemorrhage from elsewhere	4	1
Other causes of Cardial Failure	21	2	Pulmonary Embolus	6	0
Pulmonary Oedema	11	1	Ruptured Aortic Aneurysm	7	1
Total	**287 (42%)**	**35 (30%)**	**Total**	**104 (12%)**	**14 (12%)**
			Social		
			Accidental	3	1
Infection			Patient refused further treatment	80	1
CNS - bacterial	1	1	Suicide	1	1
CNS - viral	1 (a)	1 (f)	Therapy ceased	81	1
Lung - bacterial	13	2	**Total**	**165 (18%)**	**4 (3%)**
Lung - viral	1 (b)	2 (g/h)	**Miscellaneous**		
Lung - fungal	3 (c)	1 (i)	Bone Marrow Depression	2	1
Lung - other	14 (d)	2 (d)	Cachexia	18	2
Wound - bacterial	9	1	Chronic Respiratory Failure	11	1
Wound - fungal	0	1 (j)	Hepatic Failure	4	1
Peritoneum - bacterial	13	0	Immunodeficiency - Infection	1	0
Peritoneum - fungal	6 (c/e)	0	Malignancy	58	38
Peritoneum - other	4 (d)	0	Other	8	2
Septicaemia - bacterial	29	1	Pancreatitis	2	0
Septicaemia - viral	1 (a)	0	Perforation Abdominal Viscus	6	3
Septicaemia - fungal	1 (c)	1 (c)	Sclerosing Peritonitis	1	0
Septicaemia - other	17 (d)	1 (d)	Unknown	5	1
Other Site - bacterial	16	0	Uraemia - graft failure	0	1
Total	**126 (15%)**	**14 (12%)**	**Total**	**116 (13%)**	**50 (43%)**
			Total Deaths	**892 (100%)**	**117 (100%)**

(a) Herpes (b) CMV (c) Aspergillus (d) Organism not isolated (e) Candida (Albicans and Parapsilosis)
(f) Papova (g) Influenza (h) Varicella (i) Mucormycos (j) Cryptococcus

Figure 63 **New Zealand**

Cause of Death - Dialysis and Transplant Dependent 1998

	Dialysis	Transplant		Dialysis	Transplant
Cardiac			**Vascular**		
Cardiac Arrest	30	1	Bowel Infarction	1	0
Hyperkalaemia	1	0	Cerebrovascular Accident	11	1
Hypertensive Cardiac Failure	1	2	Haemorrhage from elsewhere	2	0
Myocardial Infarction	29	1	Ruptured Aortic Aneurysm	1	0
Myocardial Infarct. (presumed)	37	3	**Total**	**15 (8%)**	**1 (4%)**
Other Causes of Cardiac Failure	6	3	**Social**		
Pulmonary Oedema	1	0	Accidental	1	0
Total	**105 (59%)**	**10 (40%)**	Patient refused further Rx	9	0
Infection			Suicide	1	0
Lung - bacterial	1	0	Therapy ceased	10	0
Lung -viral	0	1 (d)			
Lung - other	1 (a)	1 (a)	**Total**	**21 (11%)**	**0**
Wound - bacterial	1	0	**Miscellaneous**		
Peritoneum - bacterial	6	0	Cachexia	4	0
Peritoneum - fungal	3 (b/c)	0	Hepatic failure	1	0
Peritoneum - other	3 (a)	0	Malignancy	6	8
Septicaemia - bacterial	2	0	Other	3	0
Septicaemia - fungal	0	1 (e)	Perforated Abdominal Viscus	0	2
Septicaemia - other	1 (a)	0	Sclerosing Peritonitis	2	0
Other site - bacterial	3	0	Unknown	0	1
Total	**21 (12%)**	**3 (12%)**	**Total**	**16 (10%)**	**11 (44%)**
			Total Deaths	**178 (100%)**	**25 (100%)**

(a) Organism not isolated (b) Candida (c) Candida Albicans (d) Influenza A e) Aspergillus

Figure 64 **Australia**

Death Rates Calculated as Deaths Per 100 Patient Years
Dialysis Patients 1998

	Age Groups						All Ages
	00-14	15-24	25-44	45-64	65-84	85-94	
All Dialysis							
All Patients Death Rate	**11.1**	**2.4**	**7.4**	**13.5**	**25.2**	**36.2**	**16.6**
No. of Deaths	4	3	80	277	520	8	**892**
No. at Risk	53	176	1384	2602	2659	33	**6907**
Diabetic Death Rate	**0**	**0**	**18.9**	**22.6**	**24.4**	**0**	**22.5**
No. of Deaths	0	0	29	98	73	0	**200**
No. at Risk	0	2	217	579	395	2	**1195**
Non Diabetic Death Rate	**11.1**	**2.4**	**5.5**	**11.1**	**25.4**	**38.2**	**15.5**
No. of Deaths	4	3	51	179	447	8	**692**
No. at Risk	53	174	1167	2023	2264	31	**5712**
CAPD ★							
All Patients Death Rate	**0**	**4.9**	**5.8**	**12.2**	**28.4**	**33.0**	**18.3**
No. of Deaths	0	1	14	64	179	6	**260**
No. at Risk	7	40	367	784	975	11	**2184**
Diabetic Death Rate	**0**	**0**	**13.0**	**20.5**	**38.1**	**0**	**24.8**
No. of Deaths	0	0	7	31	38	0	**76**
No. at Risk	0	1	84	237	171	2	**495**
Non Diabetic Death Rate	**0**	**5.0**	**3.8**	**8.8**	**26.6**	**40.9**	**16.5**
No. of Deaths	0	1	7	33	141	2	**184**
No. at Risk	7	39	283	547	804	9	**1689**
Haemodialysis ★							
All Patients Death Rate	**11.6**	**2.2**	**7.8**	**13.7**	**23.7**	**37.4**	**15.9**
No. of Deaths	1	2	63	199	326	6	**597**
No. at Risk	15	133	1134	2026	1919	25	**5252**
Diabetic Death Rate	**0**	**0**	**22.5**	**23.6**	**17.2**	**0**	**21.2**
No. of Deaths	0	0	21	62	32	0	**115**
No. at Risk	0	1	155	412	270	0	**838**
Non Diabetic Death Rate	**11.6**	**2.2**	**5.9**	**11.5**	**24.8**	**37.4**	**15.1**
No. of Deaths	1	2	42	137	294	6	**482**
No. at Risk	15	132	979	1614	1649	25	**4414**

★ Treatment at Death

Figure 65 **Australia**

Death Rates Calculated as Deaths Per 100 Patient Years
Transplant Patients 1998

	Age Groups									All Ages
	00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	
All Transplants										
All Patients Death Rate	**8.2**	**0**	**0.8**	**0.4**	**1.0**	**2.0**	**3.5**	**7.6**	**13.7**	**2.4**
No. of Deaths	1	0	2	3	10	24	36	36	5	**117**
No. at Risk	18	101	283	771	1073	1272	1111	497	39	**5165**
Diabetic Death Rate	**0**	**0**	**0**	**0**	**2.0**	**9.5**	**0**	**11.1**	**0**	**3.9**
No. of Deaths	0	0	0	0	2	8	0	1	0	**11**
No. at Risk	0	0	1	49	109	99	50	10	0	**318**
Non Diabetic Death Rate	**8.2**	**0**	**0.8**	**0.4**	**0.9**	**1.4**	**3.6**	**7.6**	**13.7**	**2.3**
No. of Deaths	1	0	2	3	8	16	36	35	5	**106**
No. at Risk	18	101	282	722	964	1173	1061	487	39	**4847**
Cadaver Transplants ★										
All Patients Death Rate	**0**	**0**	**1.7**	**0.6**	**0.9**	**2.2**	**3.5**	**8.1**	**13.7**	**2.8**
No. of Deaths	0	0	2	3	7	23	34	36	5	**110**
No. at Risk	4	43	132	523	826	1114	1023	470	39	**4174**
Diabetic Death Rate	**0**	**0**	**0**	**0**	**1.2**	**10.4**	**0**	**12.5**	**0**	**4.2**
No. of Deaths	0	0	0	0	1	8	0	1	0	**10**
No. at Risk	0	0	1	42	85	91	42	9	0	**270**
Non Diabetic Death Rate	**0**	**0**	**1.7**	**0.6**	**0.8**	**1.5**	**3.7**	**8.0**	**13.7**	**2.7**
No. of Deaths	0	0	2	3	6	15	34	35	5	**100**
No. at Risk	4	43	131	481	741	1023	981	461	39	**3904**
Living Donor Transplants ★										
All Patients Death Rate	**10.0**	**0**	**0**	**0**	**1.3**	**0.7**	**2.6**	**0**	**0**	**0.7**
No. of Deaths	1	0	0	0	3	1	2	0	0	**7**
No. at Risk	14	58	151	248	247	158	88	27	0	**991**
Diabetic Death Rate	**0**	**0**	**0**	**0**	**5.2**	**0**	**0**	**0**	**0**	**2.4**
No. of Deaths	0	0	0	0	1	0	0	0	0	**1**
No. at Risk	0	0	0	7	24	9	8	1	0	**49**
Non Diabetic Death Rate	**10.0**	**0**	**0**	**0**	**0.9**	**0.7**	**2.9**	**0**	**0**	**0.7**
No. of Deaths	1	0	0	0	2	1	2	0	0	**6**
No. at Risk	14	58	151	241	223	149	80	26	0	**942**

★ Functioning Transplant at Death

Figure 66 **New Zealand**

Death Rates Calculated as Deaths Per 100 Patient Years
Dialysis Patients 1998

	Age Groups						All Ages
	00-14	15-24	25-44	45-64	65-84	85-94	
All Dialysis							
All Patients Death Rate	**7.2**	**2.8**	**4.0**	**20.9**	**22.4**	**0**	**16.5**
No. of Deaths	1	1	10	108	58	0	**178**
No. at Risk	19	48	310	676	341	3	**1397**
Diabetic Death Rate	**0**	**0**	**5.9**	**26.7**	**20.8**	**0**	**22.6**
No. of Deaths	0	0	3	66	17	0	**86**
No. at Risk	0	0	65	334	105	0	**504**
Non Diabetic Death Rate	**7.2**	**2.8**	**3.5**	**15.6**	**23.2**	**0**	**13.2**
No. of Deaths	1	1	7	42	41	0	**92**
No. at Risk	19	48	245	342	236	3	**893**
CAPD ★							
All Patients Death Rate	**0**	**5.5**	**5.5**	**20.1**	**20.2**	**0**	**17.2**
No. of Deaths	0	1	5	58	35	0	**99**
No. at Risk	6	27	134	407	240	0	**817**
Diabetic Death Rate	**0**	**0**	**8.1**	**23.6**	**21.5**	**0**	**21.5**
No. of Deaths	0	0	2	37	12	0	**51**
No. at Risk	0	0	36	233	75	0	**344**
Non Diabetic Death Rate	**0**	**5.5**	**4.5**	**16.0**	**19.5**	**0**	**14.2**
No. of Deaths	0	1	3	21	23	0	**48**
No. at Risk	6	27	98	174	165	3	**473**
Haemodialysis ★							
All Patients Death Rate	**0**	**0**	**2.0**	**22.1**	**26.3**	**0**	**15.6**
No. of Deaths	0	0	3	48	22	0	**73**
No. at Risk	5	29	204	366	142	0	**746**
Diabetic Death Rate	**0**	**0**	**4.3**	**33.1**	**19.6**	**0**	**25.5**
No. of Deaths	0	0	1	28	5	0	**34**
No. at Risk	0	0	34	157	43	0	**234**
Non Diabetic Death Rate	**0**	**0**	**1.6**	**15.0**	**29.2**	**0**	**11.7**
No. of Deaths	0	0	2	20	17	0	**39**
No. at Risk	5	29	170	209	99	0	**512**

★ Treatment at Death

Figure 67 **New Zealand**

Death Rates Calculated as Deaths Per 100 Patient Years
Transplant Patients 1998

	Age Groups								All Ages
	00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	
All Transplants									
All Patients Death Rate	**0**	**0**	**0**	**0**	**0.4**	**0.4**	**7.8**	**16.7**	**2.7**
No. of Deaths	0	0	0	0	1	1	12	11	**25**
No. at Risk	2	23	54	181	233	241	168	75	**988**
Diabetic Death Rate	**0**	**0**	**0**	**0**	**0**	**0**	**21.3**	**0**	**4.6**
No. of Deaths	0	0	0	0	0	0	3	0	**3**
No. at Risk	0	0	0	9	22	26	16	3	**76**
Non Diabetic Death Rate	**0**	**0**	**0**	**0**	**0.5**	**0.5**	**6.4**	**17.5**	**2.6**
No. of Deaths	0	0	0	0	1	1	9	11	**22**
No. at Risk	2	23	54	172	211	215	152	72	**912**
Cadaver Transplants ★									
All Patients Death Rate	**0**	**0**	**0**	**0**	**0**	**0.5**	**7.4**	**17.6**	**3.2**
No. of Deaths	0	0	0	0	0	1	10	11	**22**
No. at Risk	0	7	18	104	173	204	148	71	**735**
Diabetic Death Rate	**0**	**0**	**0**	**0**	**0**	**0**	**21.3**	**0**	**5.2**
No. of Deaths	0	0	0	0	0	0	3	0	**3**
No. at Risk	0	0	0	8	19	19	16	3	**65**
Non Diabetic Death Rate	**0**	**0**	**0**	**0**	**0**	**0.5**	**5.8**	**18.4**	**3.0**
No. of Deaths	0	0	0	0	0	1	7	11	**19**
No. at Risk	0	7	18	96	154	185	132	68	**670**
Living Donor Transplants ★									
All Patients Death Rate	**0**	**0**	**0**	**0**	**1.8**	**0**	**10.4**	**0**	**1.3**
No. of Deaths	0	0	0	0	1	0	2	0	**3**
No. at Risk	2	16	36	77	60	37	20	4	**253**
Diabetic Death Rate	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
No. of Deaths	0	0	0	0	0	0	0	0	**0**
No. at Risk	0	0	0	1	3	7	0	0	**11**
Non Diabetic Death Rate	**0**	**0**	**0**	**0**	**1.8**	**0**	**10.4**	**0**	**1.3**
No. of Deaths	0	0	0	0	1	0	2	0	**3**
No. at Risk	2	16	36	76	57	30	20	4	**242**

★ Functioning Transplant at Death

Figure 68 **Australia and New Zealand**

Death as a Proportion of Dialysis Treated Patients 1993 - 1998

	1993	1994	1995	1996	1997	1998
Australia						
All Dialysis	12%	11.7%	11.6%	12.1%	12.3%	12.9%
CAPD	10%	10.6%	10.4%	13.0%	11.4%	11.9%
Haemodialysis	10.5%	10.3%	10.2%	9.7%	10.9%	11.3%
All Patients 55-64 years	14%	14%	10%	13%	14%	12%
CAPD	12%	11%	8%	14%	12%	9%
Haemodialysis	12%	12%	10%	10%	13%	11%
All Patients 65-74 years	17%	18%	18%	18%	18%	18%
CAPD	15%	17%	17%	18%	16%	16%
Haemodialysis	15%	16%	16%	14%	17%	16%
New Zealand						
All Dialysis	15%	13.7%	14%	11.5%	12.3%	12.7%
CAPD	15.6%	14.3%	14.3%	10.3%	11.7%	12.1%
Haemodialysis	9.7%	9.1%	10.6%	10%	8.8%	9.7%

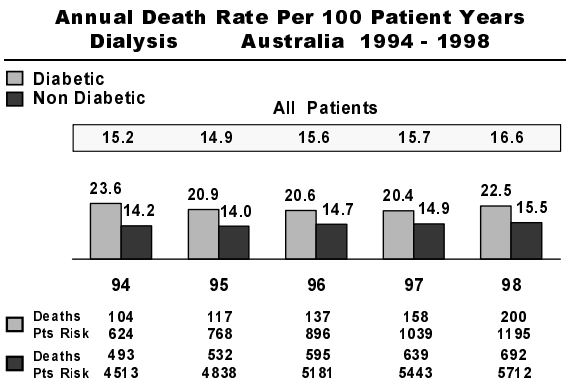
Figure 69 **Australia and New Zealand**

Dialysis and Transplant Patient Death Rates ∗ 1998

Mode of Treatment	No. of Pts.	Age Groups										Total Deaths
		00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94	
Australia												
All Patients												
CAPD	2184	0%	0%	2.5%	2%	5%	7%	9%	16%	24%	18%	**11.9% (260)**
Haemodialysis	5252	0%	7%	1.5%	4%	6%	8%	11%	16%	19%	24%	**11.3% (597)**
All Dialysis Pts ★	6907	12%	5.5%	2%	4.5%	6.5%	9%	12%	18%	23%	24%	**12.9% (892)**
Transplant Pts	5165	5.5%	0%	<1%	<1%	1%	2%	3%	7%	13%	0%	**2.2% (117)**
★ Includes (35) patients having PD at death												
Diabetic Patients												
CAPD	495	0%	0%	0%	9%	8%	13%	13%	21%	27%	0%	**15.3% (76)**
Haemodialysis	838	0%	0%	0%	8%	16%	14%	16%	12%	12%	0%	**13.7% (115)**
All Diabetic Dx ★	1195	0%	0%	0%	10%	14%	16%	18%	18%	21%	0%	**16.7% (200)**
Diabetic Tx	318	0%	0%	0%	0%	2%	8%	0%	10%	0%	0%	**3.4% (11)**
★ Includes (9) patients having PD at death												
Non Diabetic Patients												
CAPD	1689	0%	0%	2.5%	1%	3%	3%	8%	15%	24%	22%	**10.8% (184)**
Haemodialysis	4414	0%	7%	1.5%	4%	4%	7%	10%	17%	20%	24%	**10.9% (482)**
Non Diabetic Pts ★	5712	12%	5.5%	2%	4%	5%	7%	11%	18%	23%	26%	**12.1% (692)**
Non Diabetic Tx	4847	5.5%	0%	<1%	<1%	<1%	1%	3%	7%	13%	0%	**2.1% (106)**
★ Includes (26) patients having PD at death												
New Zealand												
All Patients												
CAPD	817	0%	0%	4%	8%	1%	12%	16%	14%	17%	0%	**12.1% (99)**
Haemodialysis	746	0%	0%	0%	1%	1.5%	16%	11%	15%	17%	0%	**9.7% (73)**
All Dialysis Pts ★	1397	0%	6%	2%	5%	2%	16%	16%	17%	19%	0%	**12.7% (178)**
Transplant Pts	988	0%	0%	0%	0%	<1%	<1%	7%	15%	0%	0%	**2.5% (25)**
★ Includes (6) patients having PD at death												
Diabetic Patients												
CAPD	344	0%	0%	0%	12.5%	3.5%	15%	16%	16%	17%	0%	**14.8% (51)**
Haemodialysis	234	0%	0%	0%	0%	3%	23%	14%	12%	0%	0%	**14.5% (34)**
All Diabetic Dx ★	504	0%	0%	0%	8%	4%	21%	19%	16%	17%	0%	**17.0% (86)**
Diabetic Tx	76	0%	0%	0%	0%	0%	0%	19%	0%	0%	0%	**3.9% (3)**
★ Includes (1) patient having PD at death												
Non Diabetic Patients												
CAPD	473	0%	0%	4%	7%	0%	9%	14%	13%	18%	0%	**10.1% (48)**
Haemodialysis	512	0%	0%	0%	1%	1%	11%	8%	17%	18%	0%	**7.6% (39)**
Non Diabetic Pts ★	893	0%	6%	2%	5%	1%	12%	12.5%	17%	19%	0%	**10.3% (92)**
Non Diabetic Tx	912	0%	0%	0%	0%	<1%	<1%	6%	15%	0%	0%	**2.4% (22)**
★ Includes (5) patients having PD at death												

∗ Expressed as (%) of all patients, non diabetic, and diabetic patients treated by dialysis or with a functioning transplant in 1998
Note: Some patients will have been treated by both CAPD and haemodialysis

Figure 70



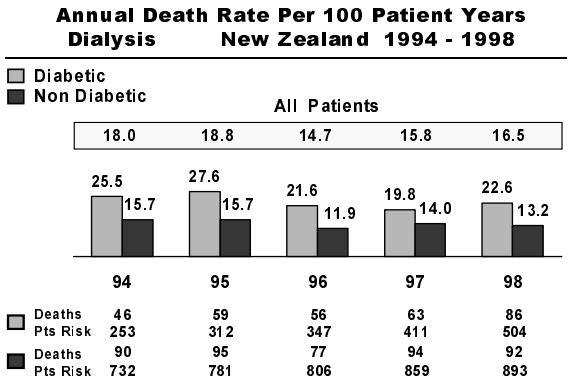
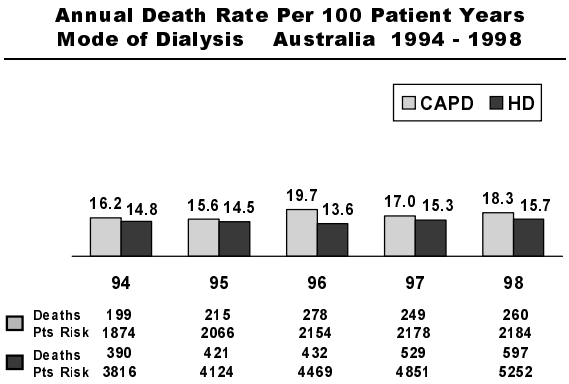
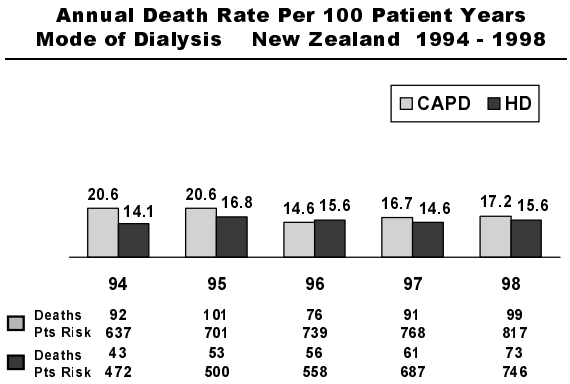


Figure 71





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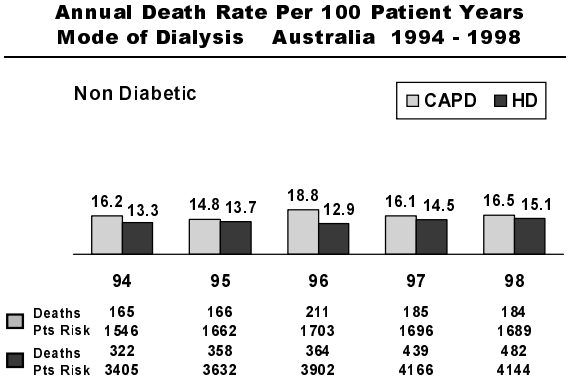

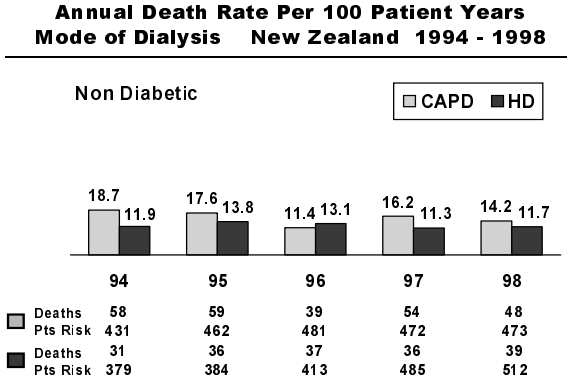

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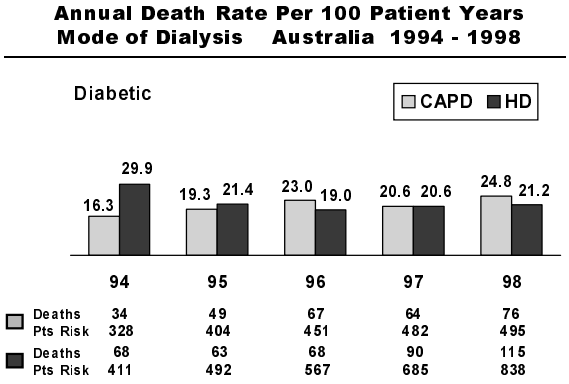

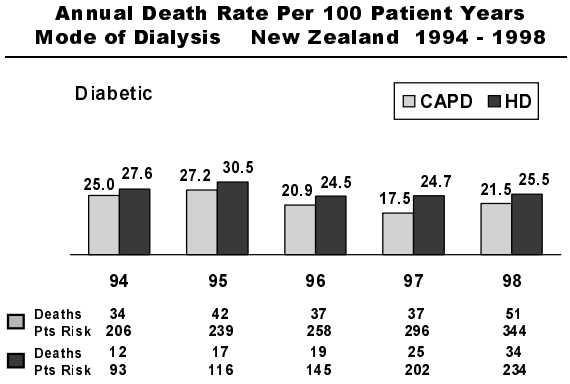

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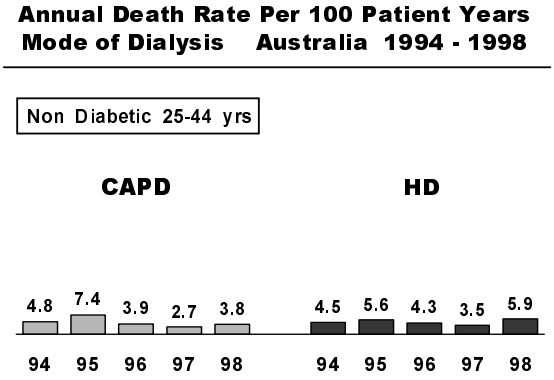

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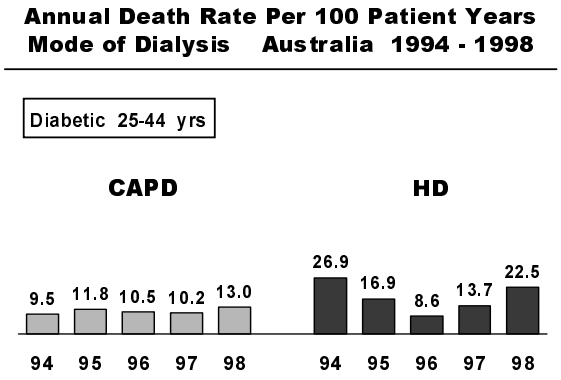

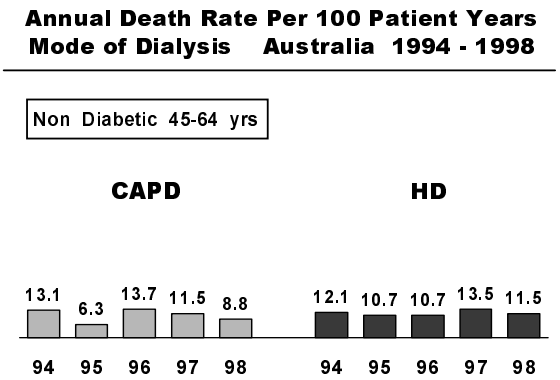

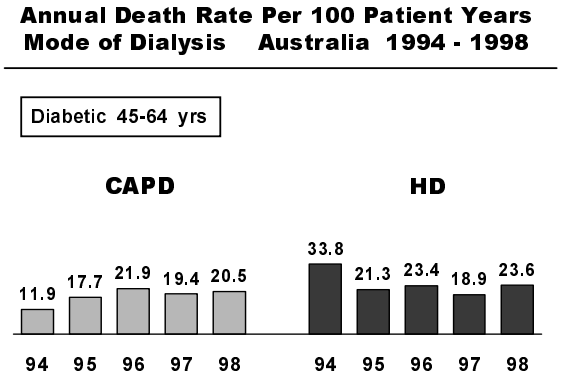

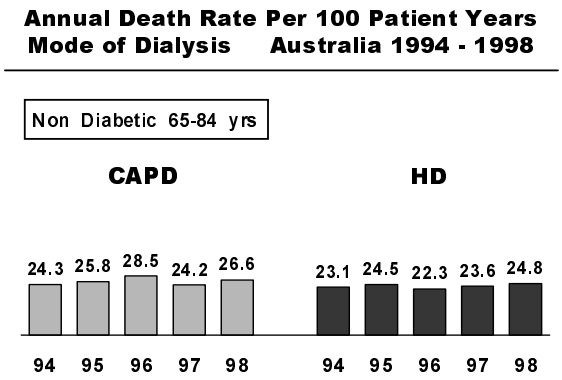

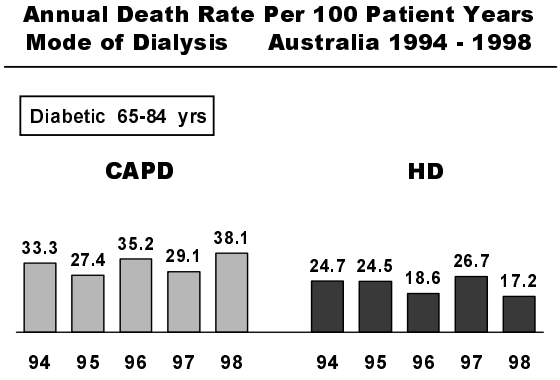

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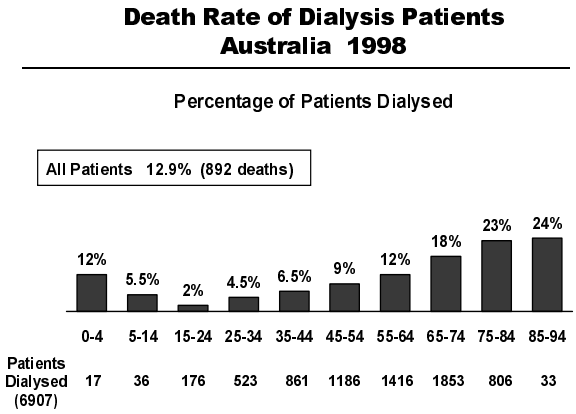

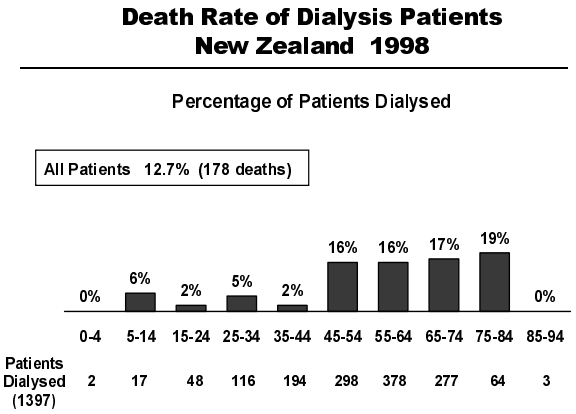

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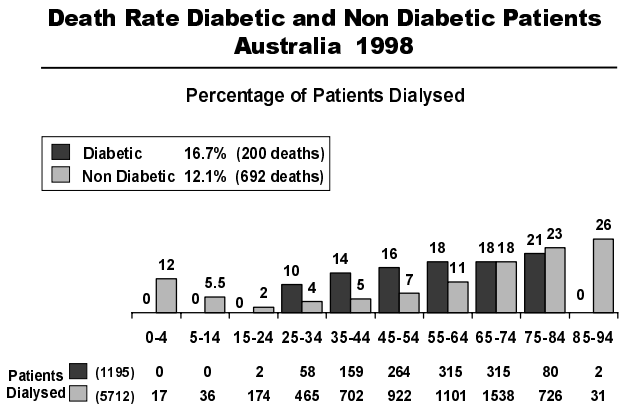


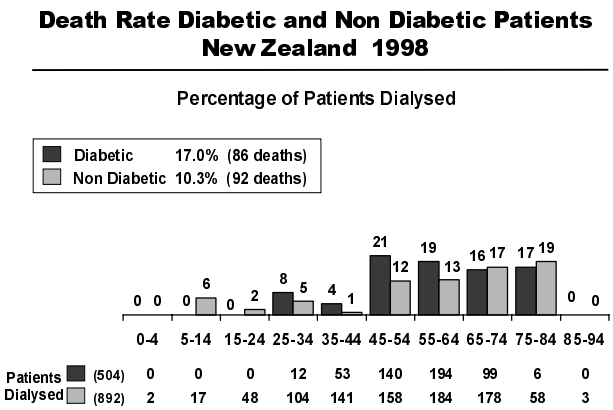
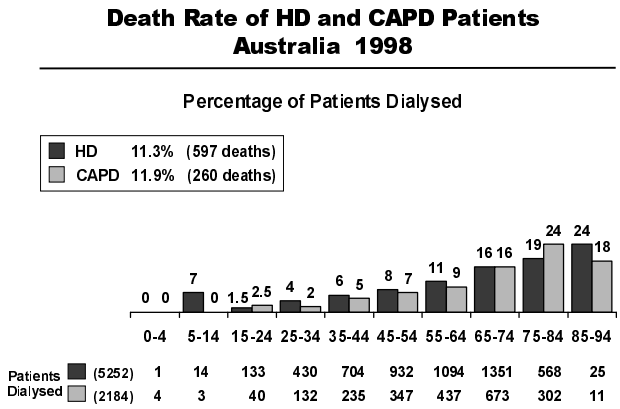
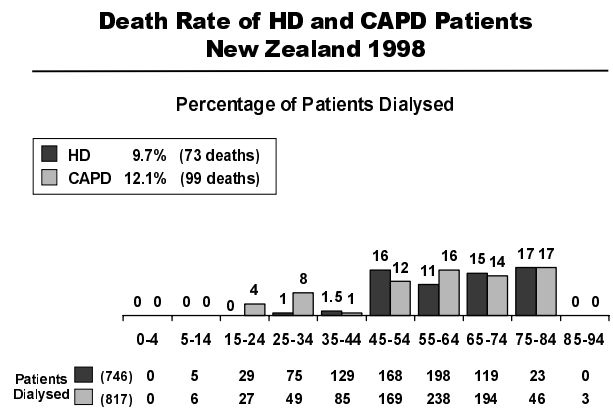


Figure 78





Deaths From Malignancy

Australia

There were 96 fatal malignancies in patients with a functioning transplant (38) or dialysis dependent (58), during 1998.

Dialysis Dependent

Twenty three of the 58 patients had cancer diagnosed before their first dialysis; more than half due to myeloma and a quarter to transitional carcinoma of the urinary tract. A further seven tumours were identified in less than nine months after the first dialysis. Eight patients had dialysed for more than five years. Four patients had had a previous renal transplant.

There were: thirteen tumours of the urinary tract, thirteen with myeloma, nine tumours of the lung, and two with lymphoma.The myeloma patients had had a median survival from diagnosis of 19 months (range 1-136 months).

Transplant Dependent

There were 38 deaths (32, 1997) in this group of patients. Seven died from skin cancer: two melanoma, two Merkel Cell and three SCC's. Thirty one patients died from non-skin cancer: nine lung, three urinary tract, six lymphoma (1 in transplant)

New Zealand

Dialysis Dependent

There were six deaths due to malignancy: three were diagnosed before dialysis; none had been previously transplanted

Transplant Dependent

There were eight deaths; six were non-skin tumours.

Figure 79

Deaths from Malignancy 1998
Dialysis and Transplant Dependent

	Dx	Tx	Total
Australia			
Adenocarcinoma			
Bile Duct	1	0	**1**
Breast	2	0	**2**
Colon	2	1	**3**
Kidney	6 (★1#1)	1	**7**
Lung	4 (★1)	1	**5**
Oesophagus	0	2	**2**
Prostate	1 (#)	0	**1**
Recto-Sigmoid	1 (#)	1	**2**
Stomach	2	0	**2**
Unknown Site	1	4	**5**
Hodgkins Disease	0	1	**1**
Leukaemia	1	0	**1**
Lymphoma			
Abdomen	0	1	**1**
Caecum	1 (#)	0	**1**
Jejunum	1 (#)	0	**1**
Lymph Glands	0	1	**1**
Stomach	0	2	**2**
Cervical	0	1	**1**
Transplant Kidney	0	1	**1**
Melanoma			
Eye	0	1	**1**
Back	0	1	**1**
Scalp	1 (#)	0	**1**
Merkel Cell	0	2	**2**
Myeloma	13 (#12)	0	**13**
Squamous Cell Carcinoma			
Cervix	1	0	**1**
Lung	1	7	**8**
Oesophagus	1	1	**2**
Skin	2	3	**5**
Supraglottis	0	1	**1**
Tonsils	1	0	**1**
Transitional Cell Carcinoma			
Bladder	2 (#2)	1	**3**
Kidney	4 (#2)	0	**4**
Ureter	1 (#)	1	**2**
Other			
Glioma - brain	1	0	**1**
Haemangioblastoma - medulla	1	0	**1**
Hepatoma - liver	1 (★)	1	**2**
Large Cell - lung	1	0	**1**
Mesothelioma - lung	0	1	**1**
Small Cell - lung	1 (★)	0	**1**
Unknown - lung	2	0	**2**
Unknown - unknown site	1	1	**2**
Total Deaths from Malignancy	**58**	**38**	**96**

★ Previous transplant (4 patients)
#Diagnosed pre dialysis (23 patients)

New Zealand			
Adenocarcinoma			
Colon	0 (#1)	1	**1**
Kidney	1	0	**1**
Lung	0	2	**2**
Rectum	1 (#)	0	**1**
Lymphoma			
Spleen	0	1	**1**
Stomach	0	1	**1**
Myeloma	1 (#)	0	**1**
Squamous Cell Carcinoma			
Skin	0	2	**2**
Transitional Cell Carcinoma			
Kidney	1	0	**1**
Other			
Oat Cell - lung	1	0	**1**
Unknown - pancreas	1	0	**1**
Unknown - unknown site	0	1	**1**
Total Deaths from Malignancy	**6**	**8**	**14**

Diagnosed pre dialysis (3 patients)

Withdrawal from Dialysis Treatment

Australia

See Figure 80 and 81.

The number of deaths continued to rise substantially from 125 (1996) to 161 in 1998; they were evenly distributed between patient refusal of further treatment and those for whom treatment was withdrawn after consultation with the family. Twenty eight of the 161 patients were diabetics. The majority of all deaths were amongst the age group 65-94 years (70%).

Eighteen percent of all deaths 65-74 years, 29% of these 75-84 years were due to withdrawal of treatment: half refused further treatment.

Most CAPD cases were male and HD female. The median duration of dialysis of those in the 75-84 year group was 28.1 months.

Six young patients were <35 years, five female, four after refusing further treatment: 21% of all deaths in this age group. Further detail of this cause of death over the last five years can be found at Website (www.anzdata.org.au).

New Zealand

See Figure 80 and 81.

There were 19 deaths in 1998 (22 in 1997): 17% of all deaths of patients 65-74 years, 42% of those 75-84 years of age were due to treatment withdrawal. Seven of the 19 patients had diabetic nephropathy.

Figure 80 **Australia and New Zealand**

Age Group Related Treatment Withdrawal 1998

Mode of Treatment	Gender	Age Groups 00-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94	Total
Australia										
IPD/CCPD	Female	0	0	0	0	2 (1)	2 (1)	1	0	**5 (2)**
	Male	1	0	0	1	0	0	0	0	**2 (0)**
CAPD	Female	0	1 (1)	2 (1)	3 (1)	1	7 (1)	7 (1)	0	**21 (5)**
	Male	0	0	2	0	1	13 (4)	15 (2)	0	**31 (6)**
Haemodialysis	Female	0	4 (1)	3 (1)	1	13 (4)	21 (4)	10	1	**53 (10)**
	Male	0	0	1	5	8 (2)	16 (2)	19 (1)	0	**49 (5)**
Total		**1**	**5 (2)**	**8 (2)**	**10 (1)**	**25 (7)**	**59 (12)**	**52 (4)**	**1**	**161 (28)**
New Zealand										
CAPD	Female	0	0	0	0	1 (1)	5 (1)	1	0	**7 (2)**
	Male	0	0	0	1 (1)	1 (1)	2 (1)	1	0	**5 (3)**
Haemodialysis	Female	0	0	0	1 (1)	2 (1)	1	1	0	**5 (2)**
	Male	0	0	0	0	0	0	2	0	**2 (0)**
Total		**0**	**0**	**0**	**2 (2)**	**4 (3)**	**8 (2)**	**5**	**0**	**19 (7)**

( ) Diabetics

Figure 81 **Australia and New Zealand**

Treatment Withdrawal 1995 - 1998

Year	Treatment	Age Groups 00-24	25-34	35-44	45-54	55-64	65-74	75-84	85-94	Total
Australia										
1995	CAPD	0	0	0	1	5 (3)	20 (4)	4 (1)	1	**31 (8)**
	HD	1	4	4 (1)	6 (2)	12 (4)	29 (1)	18 (1)	0	**74 (9)**
1996	CAPD	1	0	2 (1)	1 (1)	8 (7)	23 (8)	9	2	**46 (17)**
	HD	0	1	2 (1)	12 (4)	15 (2)	27	17	2	**76 (7)**
1997	CAPD	0	1 (1)	1	2 (2)	12 (7)	16 (3)	9	0	**41 (13)**
	HD	0	2	3 (1)	5	17 (2)	42 (8)	20 (2)	2	**91 (13)**
1998	CAPD	0	1 (1)	4 (1)	3 (1)	2	20 (5)	22 (3)	0	**52 (11)**
	HD	0	4 (1)	4 (1)	6	21 (6)	37 (6)	29 (1)	1	**102 (15)**
New Zealand										
1995	CAPD	0	0	0	0	5 (4)	8 (2)	5	0	**18 (6)**
	HD	0	0	1	0	4 (1)	1	0	0	**6 (1)**
1996	CAPD	0	1	0	4 (3)	6 (3)	6	4	0	**21 (6)**
	HD	0	0	0	1	4 (1)	2 (1)	3 (1)	0	**10 (3)**
1997	CAPD	0	0	1 (1)	2 (1)	3 (1)	6 (2)	2	0	**14 (5)**
	HD	0	0	0	1 (1)	2 (1)	3 (2)	1	0	**7 (4)**
1998	CAPD	0	0	0	1 (1)	2 (2)	7 (2)	2	0	**12 (5)**
	HD	0	0	0	1 (1)	2 (1)	1	3	0	**7 (2)**

( ) Diabetics

METHOD AND LOCATION OF DIALYSIS

Australia

During the past year, although there has been a further increase in the total number of dialysis patients, the distribution of these patients across the modalities is slowly changing. These are depicted in Figure 82, 85, 86.

There were 5523 patients (295 per million) receiving dialysis treatment at the completion of the year to 31st December 1998. See Figure 84 and 87. The majority (72%) were out of hospital: 40% were dialysing at home and 31% were dialysing in satellite centres. However, over the past ten years, home haemodialysis has decreased from 21% of all dialysis patients to now being 12% of the total. In addition CAPD numbers have decreased by 3% in the last year. The major growth area has been in satellite haemodialysis centres, many of these distant from the parent hospital.

As noted in the previous report, satellite centres vary considerably in the nature and activity of patients catered for, the degree of independence of the patients, the nurse:patient ratios and the degree of training of the staff.

Twenty five percent of all patients were using CAPD, 28% using hospital based haemodialysis, 31% satellite haemodialysis, and 12% home haemodialysis. In the modal age group 65-74 years, 33% were dialysing in hospital and 37% at home.

The number of dialysis dependent patients increased by 6% in 1998 (6% in 1997). This was not due to a particularly large increase in the number of dialysis patients transplanted. The actual increase in the number of dialysis patients has been 328 in 1998, 298 in 1997 and 360 in 1996. Home based dialysis has declined and satellite dialysis increased by 19%. Continuous Cycling Peritoneal Dialysis (CCPD) increased in March 1999 by 17% to 189 patients, from 165 in 1998 and 104 in March 1997. The growth in total dialysis patients since 1991 is 76%, increasing from 3140 patients (1991) to 5523 patients (1998).

Thirty nine percent of patients were 65 years and older; 22 patients were 85 years or more. An increase occurred in all age groups 35 years or older, especially 65-84 years.

The effect of age on selection of dialysis method and location is shown in the Appendix. For those <15 years, peritoneal dialysis was used in 82% (69% in 1997), for those 25-34 years it was 22%, for those 65-84 years it was 33%, and for the 85 years and older group it was 23%.

The number of patients rose in all States except Tasmania. There was a considerable population adjusted increase in Northern Territory, New South Wales/ACT and Victoria.

The number of dialysis patients in relation to population in each State is shown in Figure 84.

In relation to State population, the highest prevalence of dialysis patients was in the Northern Territory (821 per million), New South Wales/ACT (312 per million) and Victoria (310 per million). The number in South Australia (219 per million) remained similar to 1996 and 1997 (214 and 211 per million).

New Zealand

There was a 9.4% increase in dialysis patients (1117 patients, 295 per million), mainly in the age group of 45 to 74 years. Home haemodialysis increased from 190 to 199 patients in 1998. Seventy four percent of patients used some form of home dialysis (76% of these as peritoneal dialysis patients). See Figure 83, 84 and 88-90.

Home CCPD has become more popular, the number increasing by 44% (36 patients in March 1998, 25 patients in March 1997). PD remains a dominant mode of dialysis (56% in 1998, 57% in 1997). Together satellite and hospital haemodialysis account for 26% of patients in 1998, compared to 25% in 1997.

Between 1994 and 1998 there has been a total growth in patients on PD of 20% which compared to a 141% growth in hospital and satellite haemodialysis over the same period. Over the four years the proportion of patients on PD has dropped from 62% to 56%, and the proportion on hospital or satellite HD has risen from 15% to 26% of total patients. In contrast home haemodialysis accounted for 22% in 1994, dropping to 18% by 1998.

Figure 82 **Australia**

Method and Location of Dialysis 1991 - 1998

Mode of Treatment		1991	1992	1993	1994	1995	1996	1997	1998
PD	CCPD/IPD	52	49	41	63	95	129	177	212
	CAPD	925	1034	1182	1284	1430	1461	1446	1396
Total		**977**	**1083**	**1223**	**1347**	**1525**	**1590**	**1623**	**1608**
HD	Hospital	966	979	1085	1195	1275	1361	1478	1525
	Home	587	611	645	625	627	642	635	653
	Satellite	610	716	754	936	1110	1304	1459	1737
Total		**2163**	**2306**	**2484**	**2756**	**3012**	**3307**	**3572**	**3915**

Figure 83 **New Zealand**

Method and Location of Dialysis 1991 - 1998

Mode of Treatment		1991	1992	1993	1994	1995	1996	1997	1998
PD	CCPD/IPD	1	3	3	8	25	28	33	36
	CAPD	333	376	414	486	501	534	548	595
Total		**334**	**379**	**417**	**494**	**526**	**562**	**581**	**631**
HD	Hospital	94	103	126	113	151	180	238	240
	Home	202	194	179	174	172	192	190	199
	Satellite	2	1	1	6	4	4	12	47
Total		**298**	**298**	**306**	**293**	**327**	**376**	**440**	**486**

Figure 84 **Australia and New Zealand**

State Distribution of Dialysis Dependent Patients 1991 - 1998

Dialysis Patients

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	501	511	558	610	682	733	809	874
New South Wales/ACT	1247	1330	1472	1612	1765	1938	1996	2074
Victoria	764	857	921	1050	1136	1224	1326	1447
Tasmania	59	62	63	67	92	98	109	101
South Australia	285	295	308	322	329	312	317	325
Northern Territory	45	54	78	91	112	129	146	156
Western Australia	239	280	307	351	421	463	492	546
Australia	**3140**	**3389**	**3707**	**4103**	**4537**	**4897**	**5195**	**5523**
New Zealand	**632**	**677**	**723**	**787**	**853**	**938**	**1021**	**1117**

Per Million Population

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	169	168	179	191	208	219	238	253
New South Wales/ACT	201	212	233	254	275	298	303	312
Victoria	173	192	206	235	252	270	288	310
Tasmania	128	132	134	142	194	207	230	214
South Australia	196	202	211	219	223	211	214	219
Northern Territory	283	320	464	532	644	726	780	821
Western Australia	143	168	183	206	243	263	274	298
Australia	**181**	**193**	**210**	**230**	**251**	**268**	**280**	**295**
New Zealand	**182**	**193**	**203**	**218**	**233**	**252**	**271**	**295**

Figure 85

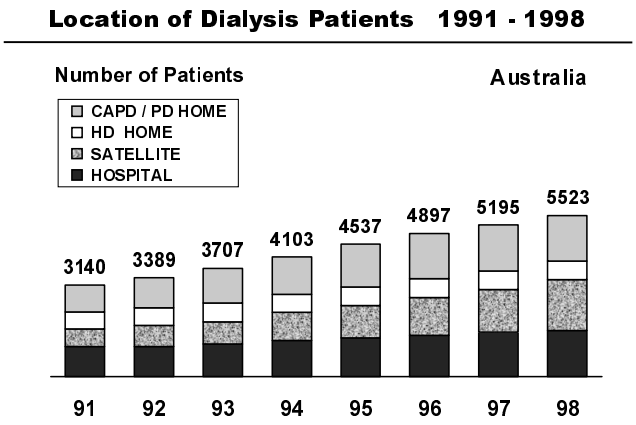


Figure 86

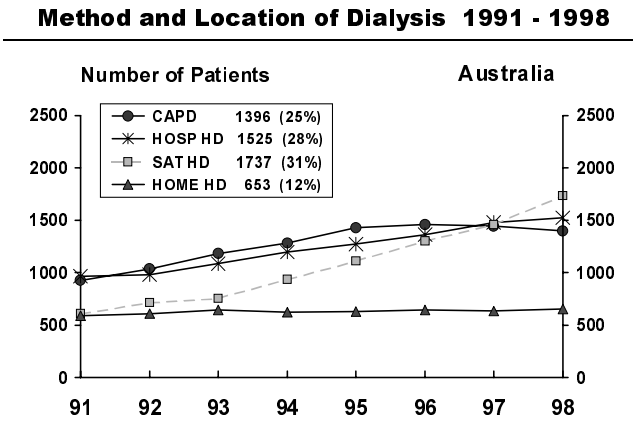


Figure 87

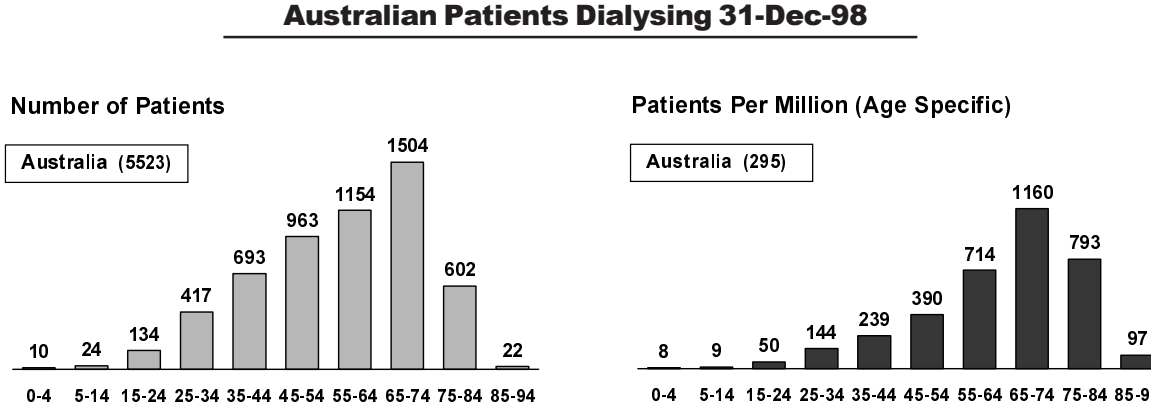


Figure 88

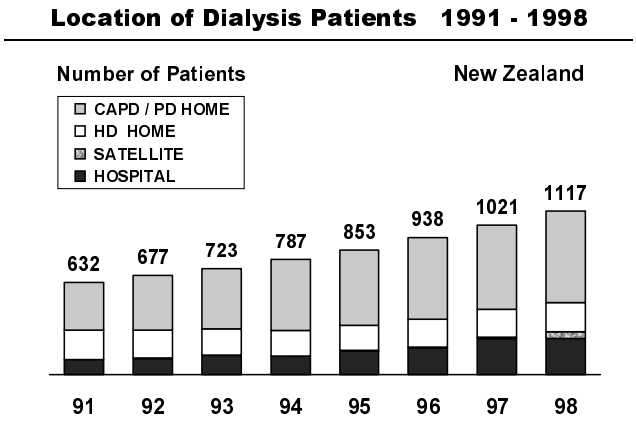


Figure 89

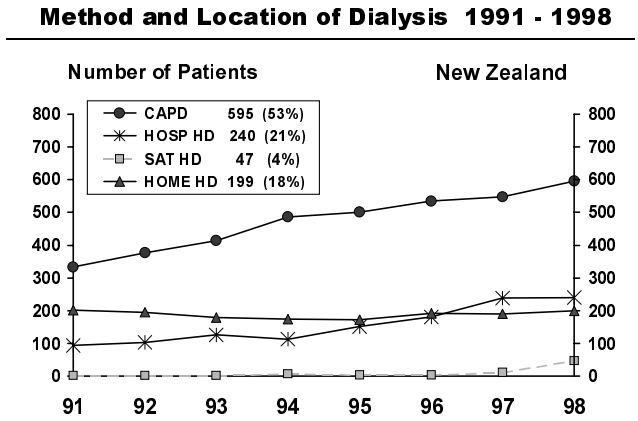
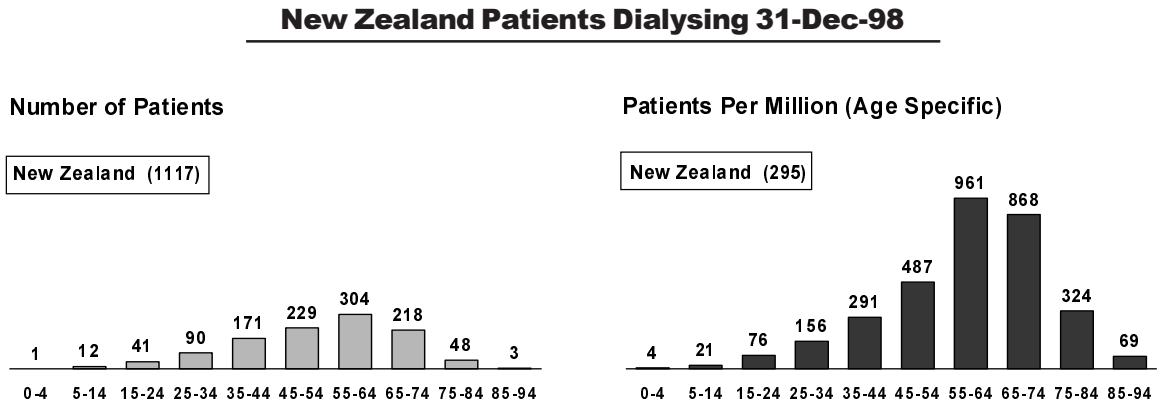


Figure 90



PERITONEAL DIALYSIS

Dr John Collins
Auckland Hospital, New Zealand

Stock and Flow

Australia

Of 11,515 patients treated since 1978, 1,396 (12%) were still alive on CAPD at 31 December 1998. CAPD treated 25% (28% 1997) of all dialysis patients, and CCPD 3.4%, together accounting for 70% of all home dialysis. Of the 11,515 patients, 334 patients (2.9%) had had at least five years of continuous CAPD treatment. See Figure 95.

CCPD has increased rapidly from 102 patients in 1997 (161 in 1998) to 189 patients in the past year, reflecting the increased use of automated cyclers.

In relation to age, the proportion of all dialysis patients (65-74 years) using CAPD was 30% (32% 1997); range 20% (25-34 years) to 30% (65-74 years). See Figure 96 and 97.

The annual stock and flow of patients during the period 1991-98 is shown in Figure 92 and 94.

The State prevalence of CAPD ranged from 8% (Northern Territory), 18% (South Australia), 30% (Queensland and Tasmania) and 32% (Western Australia). The steady decline in relative prevalence in Victoria continued; 32% (1993) to 19% (1998). With the exception of South Australia, relative prevalence decreased in the other States at the end of 1998. See Figure 91.

There were 669 new CAPD patients in the calendar year 1998, a rise of 3% compared to the previous year (3% fall in 1997); of whom 309 (46%) started dialysis with CAPD and 360 (54%) previously had haemodialysis or peritoneal dialysis or a failed transplant. See Figure 92.

New patients over the age of 65 rose from 272 in 1997 to 297 in 1998, reflecting a 9% growth in total numbers in this age group. This compared to an 11% growth in new haemodialysis patients in the same older age groups.

There were 260 deaths (18.3 deaths per 100 pt yrs; 11.9% of patients at risk); 4.9 deaths per 100 pt yrs: 2.5% (15-24 years), 28.4 deaths per 100 pt yrs; 18.3% (65-84 years). See Figure 64 and Appendix II at Website (www.anzdata.org.au).

There were only 260 patients, a 4% rise in 1998, receiving a transplant compared to 249 in 1997; 7% of all patients treated, (12% of patients <65 years treated during the year). See Figure 92.

Permanent transfer (>12 months) to another form of dialysis, normally haemodialysis, rose from 348 patients (24% of patients dialysed) to 399 patients (29%) in 1998. Most transfers to another form of dialysis were permanent (399/535). See Figure 92.

The primary renal disease of new patients to CAPD was 32% glomerulonephritis, 24% diabetic nephropathy. See Figure 96.

New Zealand

The annual stock and flow of patients during the period 1991 to 1998 is shown in Figures 93 and 94. Of 3,013 treated, 595 (20%) were alive at 31 December 1998, 141 (4.7%) had had more than five years continuous treatment. See Figure 95.

Together CAPD and CCPD accounted for 56% of all dialysis patients, and 76% of all patients dialysing at home.

Modal age group was 55-64 years (29%), 9% <35 years (10% 1997), 30% >65 years (26% 1997). See Figure 97 and 105.

There were 249 new CAPD patients in the calendar year 1998 (218 in 1997), 59% as initial dialysis treatment; 18% were 45-54 years, 12% <35 years, 29% >65 years. See Figures 93 and 104. For more detail see Appendix III at Website (www.anzdata.org.au).

There were 99 deaths in 1998 (91, 1997), 17.2 deaths per 100 pt yrs, (12.1% of patients at risk; 3.7% 25-44 years, 14% 45-64 years, 15% 65-84 years). For more detail see Figures 66,68, 76-78, and Appendix III at Website (www.anzdata.org.au).

Thirty two patients were transplanted in 1998 (39, 1997), 5% of patients dialysed, 7% of patients <65 years old. See Figure 93.

The proportion of patients in each age group using CAPD range from 39% (25-34 years) to 69% (75-84 years). See Figures 102 and 103.

Figure 91 **Australia and New Zealand**

Proportion (%) CAPD of all HD and PD Patients 1991 - 1998

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	34%	39%	39%	38%	39%	33%	33%	30%
New South Wales/ACT	27%	28%	30%	29%	31%	32%	30%	28%
Victoria	30%	30%	32%	30%	27%	24%	21%	19%
Tasmania	58%	53%	46%	54%	57%	47%	36%	30%
South Australia	22%	21%	21%	22%	17%	16%	17%	18%
Northern Territory	0%	2%	4%	7%	12%	13%	8%	8%
Western Australia	38%	42%	45%	46%	47%	41%	37%	32%
Australia	**29%**	**31%**	**32%**	**31%**	**32%**	**30%**	**28%**	**25%**
New Zealand	**53%**	**56%**	**57%**	**62%**	**59%**	**57%**	**54%**	**53%**

Figure 92 **Australia**

Stock and Flow of CAPD Patients 1991 - 1998

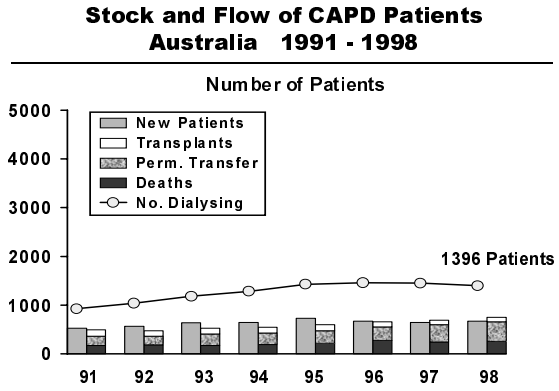
	1991	1992	1993	1994	1995	1996	1997	1998
Patients new to CAPD	520	569	641	652	730	671	648	669
First Dialysis Treatment	232	228	258	269	302	292	286	309
Previous Dialysis (HD/IPD)	274	318	364	359	406	363	344	345
Failed Transplant	14	23	19	24	22	16	18	15
Transplanted	127	115	106	116	116	103	91	97
Deaths	174	190	176	199	215	278	249	260
Never Transplanted	157	178	166	187	204	267	241	250
Previous Transplant	17	12	10	12	11	11	8	10
Permanent Transfers Out (>12/12)	189	168	240	235	261	274	348	399
Temporary Transfers (<12/12)	80	117	115	132	131	166	139	136
Patients Dialysing at 31 December	925	1034	1182	1284	1430	1461	1446	1396
Patients Dialysing at Home 31 December	894	1001	1155	1254	1399	1429	1420	1368
% of all Home Dialysis Patients (HD/PD)	60%	61%	63%	66%	67%	66%	64%	62%

Figure 93 **New Zealand**

Stock and Flow of CAPD Patients 1991 - 1998

	1991	1992	1993	1994	1995	1996	1997	1998
Patients new to CAPD	158	164	176	221	213	224	218	249
First Dialysis Treatment	100	112	89	134	134	127	113	147
Previous Dialysis (HD/IPD)	55	45	82	78	74	91	100	99
Failed Transplant	3	7	5	9	5	6	5	3
Transplanted	34	45	23	30	43	46	39	32
Deaths	48	61	88	92	101	76	91	99
Never Transplanted	44	57	80	83	97	70	87	94
Previous Transplant	4	4	8	9	4	6	4	4
Permanent Transfers Out (>12/12)	32	23	37	36	57	71	83	81
Temporary Transfers (<12/12)	4	8	22	28	8	29	49	37
Patients Dialysing at 31 December	333	376	414	486	501	534	548	595
Patients Dialysing at Home 31 December	325	369	407	481	497	530	542	589
% of all Home Dialysis Patients HD/PD	62%	65%	69%	73%	72%	71%	71%	72%

Figure 94



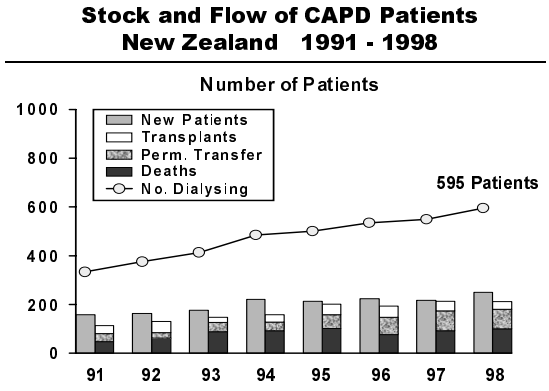


Figure 95 **Australia and New Zealand**

Continuous Period of CAPD

	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 9281 Patients	2665	1901	1335	950	771	467	331	282	288	165	68	34	14	10
All Treatments 11,515 Patients	3526	2355	1624	1148	912	563	393	321	339	185	78	40	17	14
New Zealand														
1st Treatment 2604 Patients	541	435	376	310	244	200	164	72	142	51	24	27	6	12
All Treatments 3013 Patients	670	517	443	341	274	219	178	77	153	58	29	28	8	18

Figure 96 **Australia**

Stock and Flow of CAPD Patients 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients ★								
00-14 years	10	11	14	15	11	6	3	4
15-24 years	29	21	26	24	23	15	18	16
25-34 years	37	48	45	51	43	43	46	39
35-44 years	50	72	64	55	101	79	68	69
45-54 years	74	84	80	118	132	99	97	105
55-64 years	156	168	182	149	172	154	144	139
65-74 years	145	146	193	191	194	213	200	211
75-84 years	17	19	36	47	52	58	72	84
85-94 years	2	0	1	2	2	4	0	2
Total	**520**	**569**	**641**	**652**	**730**	**671**	**648**	**669**
Patients Dialysing								
00-14 years	14	10	13	12	9	7	3	1
15-24 years	27	30	39	42	38	34	32	25
25-34 years	66	77	77	86	80	74	85	82
35-44 years	103	123	127	128	162	167	162	144
45-54 years	113	136	152	187	235	237	233	230
55-64 years	265	308	327	320	350	342	298	282
65-74 years	289	301	374	402	437	463	461	452
75-84 years	47	48	72	104	115	132	170	175
85-94 years	1	1	1	3	4	5	2	5
Total	**925**	**1034**	**1182**	**1284**	**1430**	**1461**	**1446**	**1396**
Primary Renal Disease ★								
Glomerulonephritis	174	217	192	199	245	208	209	213
Analgesic Nephropathy	66	58	78	53	60	59	46	49
Hypertension	52	51	74	75	65	94	81	81
Polycystic Disease	33	33	38	43	42	32	35	40
Reflux Nephropathy	21	35	35	32	33	31	34	30
Diabetic Nephropathy	84	98	112	136	172	156	161	161
Miscellaneous	52	46	64	60	69	49	33	50
Uncertain	38	31	48	54	44	42	49	45
Total	**520**	**569**	**641**	**652**	**730**	**671**	**648**	**669**

★ New patients receiving first CAPD treatment

Proportion (%) Age Distribution 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients								
00-14 years	2%	2%	2%	2%	2%	1%	<1%	<1%
15-24 years	6%	4%	4%	4%	3%	2%	3%	2%
25-34 years	7%	8%	7%	8%	6%	6%	7%	6%
35-44 years	10%	13%	10%	8%	14%	12%	11%	10%
45-54 years	14%	15%	13%	18%	18%	14%	15%	16%
55-64 years	30%	29%	28%	23%	23%	23%	22%	21%
65-74 years	28%	26%	30%	29%	27%	32%	31%	32%
75-84 years	3%	3%	6%	7%	7%	9%	11%	13%
85-94 years	<1%	0%	<1%	1%	<1%	1%	0%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Patients Dialysing								
00-14 years	2%	1%	1%	1%	1%	<1%	<1%	<1%
15-24 years	3%	3%	3%	3%	3%	2%	2%	2%
25-34 years	7%	7%	7%	7%	6%	5%	6%	6%
35-44 years	11%	12%	11%	10%	11%	11%	11%	10%
45-54 years	12%	13%	13%	15%	16%	16%	16%	16%
55-64 years	28%	30%	27%	25%	24%	23%	21%	20%
65-74 years	31%	29%	32%	31%	31%	32%	32%	32%
75-84 years	5%	5%	6%	8%	8%	9%	12%	13%
85-94 years	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Figure 97 **New Zealand**

Stock and Flow of CAPD Patients 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients ★								
00-14 years	5	5	6	4	5	5	1	5
15-24 years	6	7	3	7	9	12	7	8
25-34 years	11	13	21	23	16	12	10	18
35-44 years	20	26	23	33	27	28	21	20
45-54 years	37	36	36	53	55	57	47	45
55-64 years	56	47	54	68	54	63	59	80
65-74 years	19	28	31	31	40	44	63	59
75-84 years	4	2	2	2	7	3	9	13
85-94 years	0	0	0	0	0	0	1	1
Total	**158**	**164**	**176**	**221**	**213**	**224**	**218**	**249**
Patients Dialysing								
00-14 years	7	10	8	6	6	0	1	1
15-24 years	13	11	10	12	13	19	21	18
25-34 years	24	31	39	46	41	38	35	35
35-44 years	47	52	65	74	77	65	59	63
45-54 years	79	84	88	113	125	135	127	124
55-64 years	106	111	119	138	135	160	160	174
65-74 years	53	69	73	85	91	102	119	144
75-84 years	4	8	12	12	13	15	25	33
85-94 years	0	0	0	0	0	0	1	3
Total	**333**	**376**	**414**	**486**	**501**	**534**	**548**	**595**
Primary Renal Disease ★								
Glomerulonephritis	30	51	33	55	61	49	45	46
Analgesic Nephropathy	2	2	1	2	0	0	0	1
Hypertension	19	24	27	28	31	25	36	35
Polycystic Disease	9	4	10	8	6	17	8	10
Reflux Nephropathy	8	12	8	9	6	15	7	7
Diabetic Nephropathy	65	51	66	87	80	90	97	121
Miscellaneous	14	13	17	24	21	21	17	15
Uncertain	11	7	14	8	8	7	8	14
Total	**158**	**164**	**176**	**221**	**213**	**224**	**218**	**249**

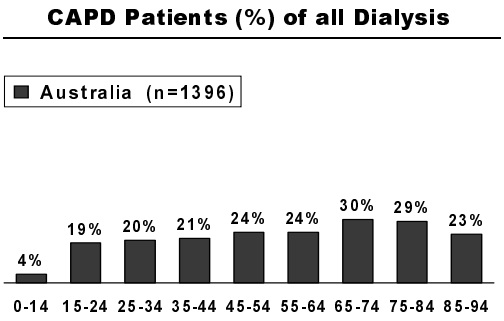
★ New patients receiving first CAPD treatment

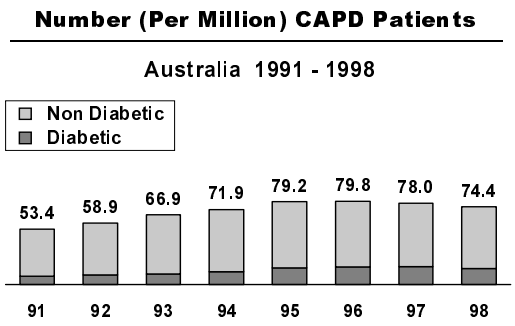
Proportion (%) Age Distribution 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients								
00-14 years	3%	3%	3%	2%	2%	2%	<1%	2%
15-24 years	3%	4%	2%	3%	4%	5%	3%	3%
25-34 years	7%	8%	12%	10%	8%	5%	5%	7%
35-44 years	13%	16%	13%	15%	13%	13%	10%	8%
45-54 years	23%	22%	20%	25%	26%	26%	22%	18%
55-64 years	35%	29%	31%	30%	25%	28%	26%	33%
65-74 years	12%	17%	18%	14%	19%	20%	29%	24%
75-84 years	3%	1%	1%	1%	3%	1%	4%	5%
85-94 years	0%	0%	0%	0%	0%	0%	<1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Patients Dialysing								
00-14 years	2%	3%	2%	1%	1%	0%	<1%	<1%
15-24 years	4%	3%	2%	2%	3%	4%	4%	3%
25-34 years	7%	8%	9%	10%	8%	7%	6%	6%
35-44 years	14%	14%	16%	15%	15%	12%	11%	11%
45-54 years	24%	22%	21%	23%	25%	25%	23%	21%
55-64 years	32%	30%	29%	29%	27%	30%	29%	29%
65-74 years	16%	18%	18%	18%	18%	19%	22%	24%
75-84 years	1%	2%	3%	2%	3%	3%	5%	6%
85-94 years	0%	0%	0%	0%	0%	0%	<1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

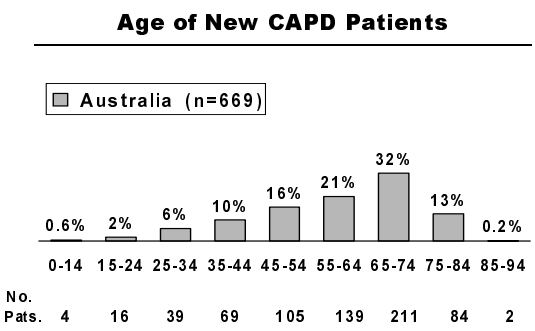
Australia 1998

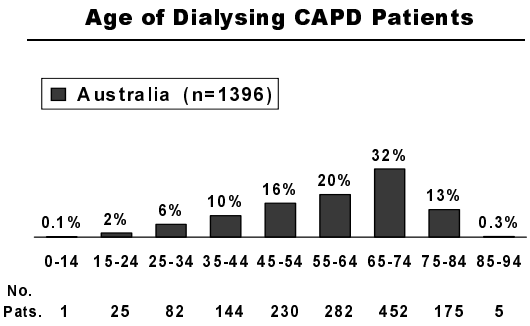
Figures 98 and 99





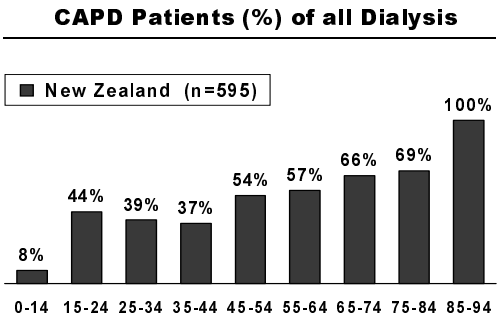
Figures 100 and 101

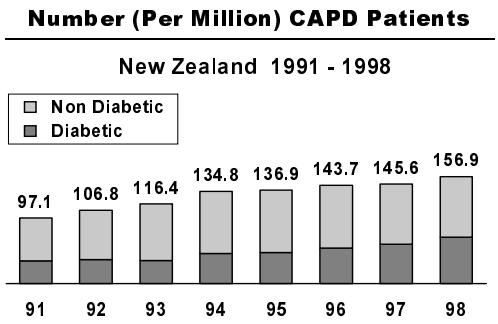




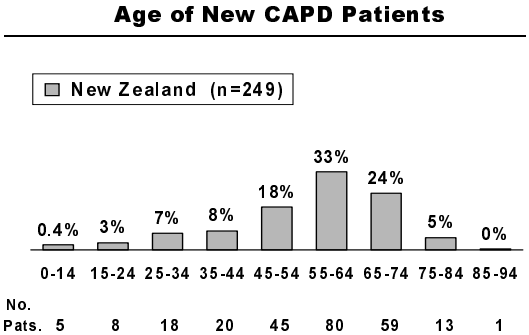
New Zealand 1998

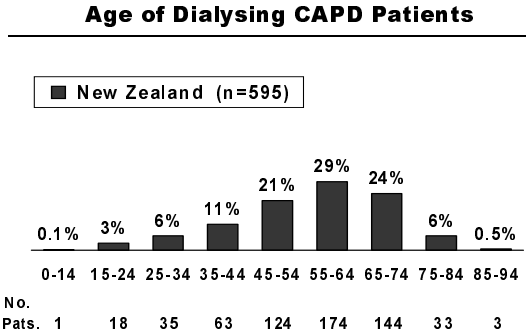
Figures 102 and 103





Figures 104 and 105





CAPD Litres Per Week

The prescribed dose of peritoneal dialysis rose steadily over the years 1995 to 1997, but is now showing signs of stabilising in most BMI groups in both Australia and New Zealand, suggesting that tolerable volume limits are being reached.

In 1995 most patients used 56 litres per week (4 x 2 litres per day) regardless of body size.

In 1998 more than 60% of patients who were large (BMI $\geq$ 30) in both countries were receiving $\geq$ 70 litres per week ($\geq$ 4 x 2.5 litres per day, or $\geq$ 5 x 2 litres per day), In contrast approximately 35% of those with average BMI (20 to 24.9) were on larger daily volumes ($\geq$ 70 L./week).

Figure 106

Relationship of BMI to Weekly Dialysate Volume

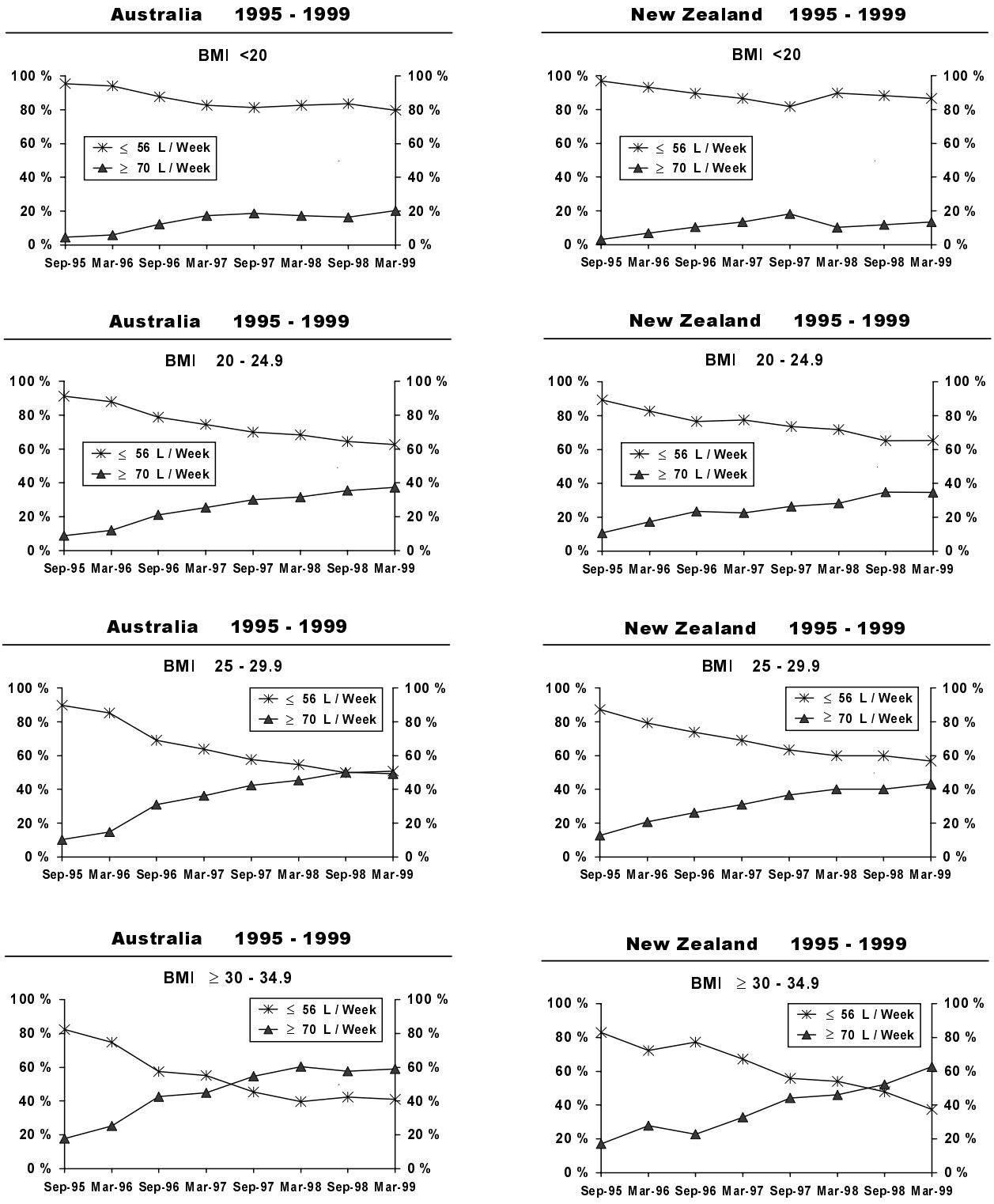


Figure 107 **Australia and New Zealand**

Volume of Dialysate per Week

Age Groups	March 1996					March 1999				
		Litres per Week					Litres per Week			
	No. Pts	42	56	70	84	No. Pts	42	56	70	84
Australia		per cent					per cent			
45-64	(549)	7	75	15	3	(468)	3	48	34.5	14.5
65-74	(396)	9	80	10	1	(410)	7	55	30	8
75-84	(115)	10	80	5	4	(158)	5	60	29	6
New Zealand		per cent					per cent			
45-64	(263)	4	77	14	5	(282)	3.5	47.5	37	12
65-74	(93)	10	72	15	3	(141)	2	61	31	6
75-84	(15)	20	60	20	0	(31)	6.5	64.5	26	3

PERITONITIS

AUSTRALIA

See Figures 108-110.

The median survival peritonitis free period remains approximately 16 months overall with 22% of patients completely free of peritonitis by three years.

There is a striking difference between Caucasoid and Aboriginal, Maori and Pacific Islander peritonitis free periods. These trends are evident both in 1991-1995 and 1995-1999 cohorts of patients in the age groups 35-54 years and 55-64 years.

NEW ZEALAND

See Figures 108-110.

The median survival peritonitis free period is approximately 12 months overall with 19% of patients remaining completely free of peritonitis by three years. There has been a statistically significant (p=0.0001) improvement in peritonitis free survival in patients commencing in the period 1995-1999 aged 35-54 years in comparison to the same age group commencing in the period 1991-1995.

Median peritonitis free survival is lower for Maori and Pacific Islanders in comparison with those of Caucasoid origin.

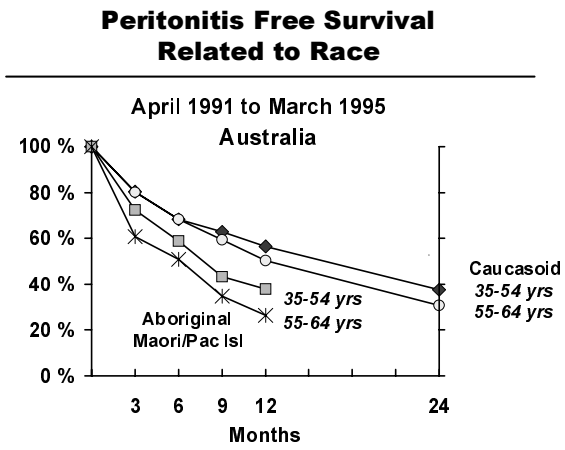
Figure 108 **Australia and New Zealand**

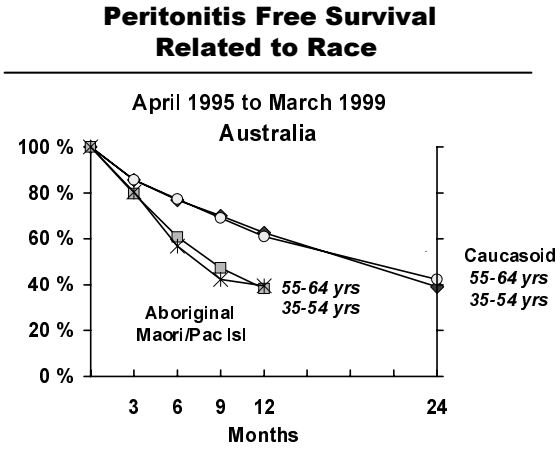
First CAPD Treatment to First Episode of Peritonitis
Related to Age at Entry 1995 to 30-Dec-1998

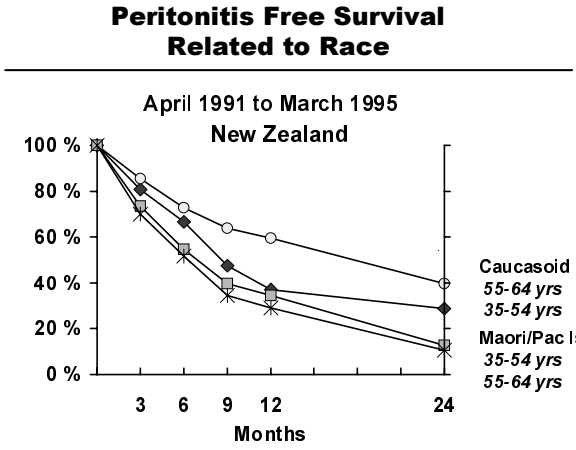
Survival	Age Groups						All
	00-14	15-34	35-54	55-64	65-74	> 75	
Australia	n=22	n=243	n=722	n=600	n=812	n=273	n=2672
3 months	50 + 11.3 9	81 + 2.5 182	84 + 1.4 561	84 + 1.5 472	85 + 1.3 625	80 + 2.5 190	83 + 0.7 2039
6 months	25 + 10.5 3	68 + 3.2 126	74 + 1.7 420	74 + 1.8 368	75 + 1.6 480	69 + 3.0 135	73 + 0.9 1532
9 months	16 + 9.8 2	59 + 3.5 92	66 + 1.9 331	66 + 2.1 287	66 + 1.8 371	60 + 3.3 106	64 + 1.0 1189
1 year	16 + 9.8 2	52 + 3.7 68	59 + 2.1 252	59 + 2.2 224	57 + 2.0 277	52 + 3.6 77	57 + 1.1 900
2 years	16 + 9.8 1	34 + 4.2 19	38 + 2.4 82	40 + 2.6 81	36 + 2.2 92	32 + 3.9 22	37 + 1.2 297
3 years	16 + 9.8 1	24 + 5.2 4	22 + 2.7 20	25 + 3.0 14	22 + 2.5 22	18 + 4.6 3	22 + 1.4 64
New Zealand	n=16	n=91	n=301	n=256	n=207	n=34	n=905
3 months	72 + 11.6 8	78 + 4.4 67	86 + 2.0 248	81 + 2.4 203	85 + 2.5 163	73 + 8.1 19	83 + 1.3 708
6 months	54 + 14.2 6	69 + 5.0 52	71 + 2.7 184	65 + 3.1 144	71 + 3.3 120	57 + 9.6 13	68 + 1.6 519
9 months	36 + 14.1 4	56 + 5.6 38	60 + 3.0 136	52 + 3.3 103	62 + 3.6 97	52 + 9.8 11	57 + 1.8 389
1 year	26 + 13.4 2	48 + 5.8 28	50 + 3.2 104	42 + 3.4 71	58 + 3.7 74	41 + 10.4 6	49 + 1.9 285
2 years	13 + 11.3 1	33 + 6.3 10	32 + 3.3 39	19 + 3.1 15	38 + 4.5 18	23 + 11.3 1	29 + 1.9 84
3 years	-	28 + 7.0 3	20 + 3.6 6	10 + 3.3 2	31 + 5.7 3	-	19 + 2.2 14

% Survival + S.E. and Numbers at risk

Figure 109







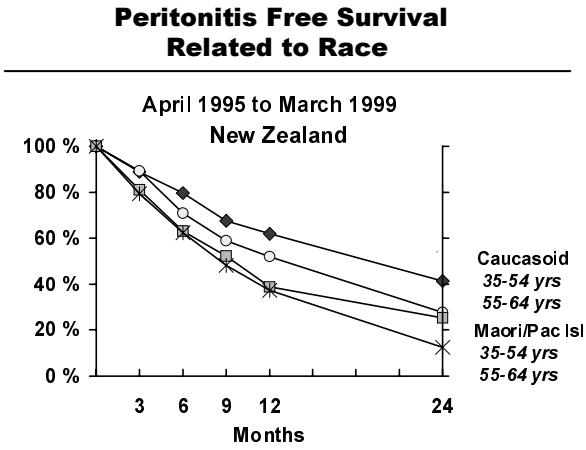
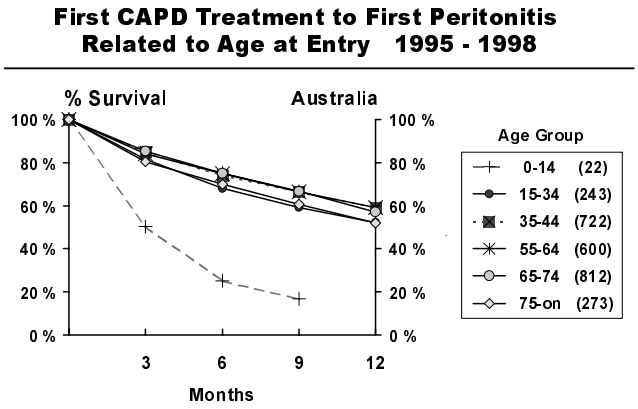
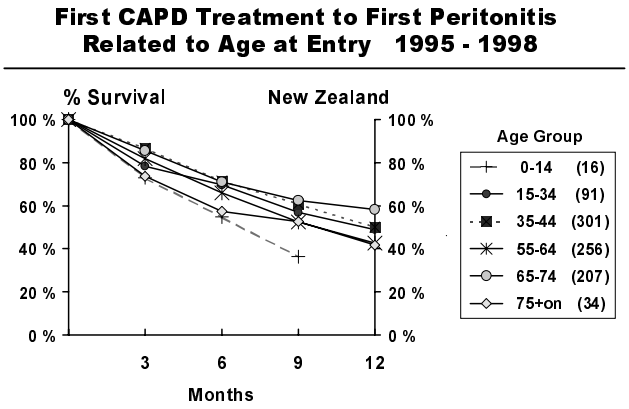


Figure 110





Body Mass Index

In Australia smaller (BMI <25) Caucasoid men and women are more likely to remain on PD longer than larger people. This trend is not apparent with Aboriginal, Maori and Pacific Islanders. In New Zealand there are no differences in technique survival related to BMI.

Figure 111 **Australia and New Zealand**

Gender and Body Mass Index (BMI) 1980 - 1998

Survival Period	Female BMI		Male BMI	
	<25	>25	<25	>25
Australia				
0-4 years	649 (85.6%)	560 (91.1%)	587 (87.9%)	633 (93.6%)
>4 years	109 (14.4%)	55 (8.9%)	81 (12.1%)	43 (6.4%)
New Zealand				
0-4 years	144 (87.8%)	245 (88.8%)	160 (89.9%)	254 (88.5%)
>4 years	20 (12.2%)	31 (11.2%)	18 (10.1%)	33 (11.5%)

Technique Survival
Censored for Death or Transplantation

Peritoneal dialysis is a self-care therapy utilising a limited single dialysing space, and technique failure resulting in transfer to haemodialysis is related to factors which compromise the use of this dialysing space (infection, technical factors), the patients ability to continue with the therapy (social) or the efficiency of treatment.

In Figure 112 primary and secondary reasons for technique failure are shown grouped into four major categories of infection, dialysis, technical and social. Reporting of secondary reasons is likely to be incomplete. A list of other reasons for technique failure is provided as a separate Figure 113.

There are significant differences in technique survival related to race. We have previously demonstrated (1998) that in both New Zealand and Australia diabetics have a reduced survival in comparison to non-diabetics. However, in New Zealand where the majority of Pacific Islander and Maori dialysis patients are diabetic and constitute half of all patients, it is clear from Figure 116 that three year survival for the age group 19-54 years is similarly poor in both diabetic and non-diabetic Maori and Pacific Islanders suggesting that at least in this (largest) age group the effect on technique survival is related to race rather than to diabetes.

Figure 112 **Australia and New Zealand**

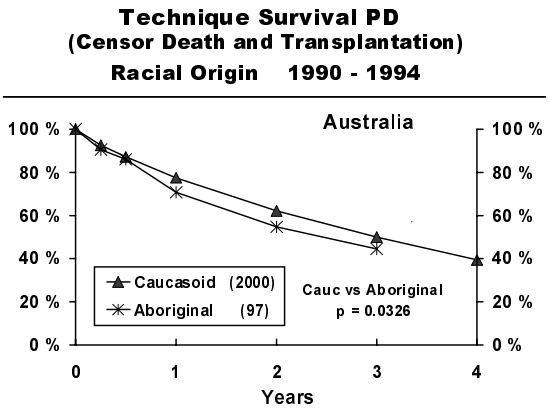
Causes of Technique Failure April 1994 to March 1999
Excluding Death, Transplantation, Recovery of Renal Function

Causes of Technique Failure	Australia		New Zealand	
	Primary	Secondary	Primary	Secondary
Recurrent/persistent peritonitis	538	21	145	5
Acute peritonitis	331	8	80	2
Tunnel/exit site infection	228	5	21	0
Total Infective Complications	**1097 (43%)**	**34 (1%)**	**246 (43%)**	**7 (1%)**
Inadequate solute clearance	214	13	47	-
Inadequate fluid ultrafiltration	188	7	37	-
Total Dialysis Failure	**402 (16%)**	**20 (<1%)**	**84 (14%)**	**-**
Dialysate leak	174	26	27	2
Catheter block	28	3	17	-
Catheter fell out	10	-	2	-
Hernia	79	6	7	-
Abdominal pain	18	2	5	-
Abdominal surgery	89	7	17	-
Multiple adhesions	5	-	3	-
Hydrothorax	5	-	3	1
Haemoperitoneum	3	4	-	-
Scrotal oedema	1	-	-	-
Total Technical Failure	**412 (16%)**	**48 (2%)**	**81 (14%)**	**3 (<1%)**
Unable to manage self care	215	5	31	1
Patient preference	384	19	112	3
Total Social Reasons	**599 (23%)**	**24 (1%)**	**148 (26%)**	**4 (<1%)**

Other Causes of Technique Failure April 1994 to March 1999
Excluding Death, Transplantation, Recovery of Renal Function

Other Causes of Technique Failure	Australia		New Zealand	
	Primary	Secondary	Primary	Secondary
Transfer Overseas	14	-	-	-
Diverticulitis	18	-	5	-
Excessive Fluid Ultrafiltration	1	-	-	-
Sclerosing Peritonitis	7	-	8	-
Peritoneal Infection	1	-	1	-
Pregnancy	1	-	-	-
Haematuria	1	-	-	-
Other Surgery	9	-	-	-
CCPD Machine Availability	2	-	-	-
CCPD Not Available	-	1	1	-
Poor Nutrition	2	-	-	-
End Machine Trial	3	-	-	-
Transplant Overseas	-	-	2	-
Total Other Reasons	**59 (2%)**	**1 (<1%)**	**17 (3%)**	**-**

Figure 114



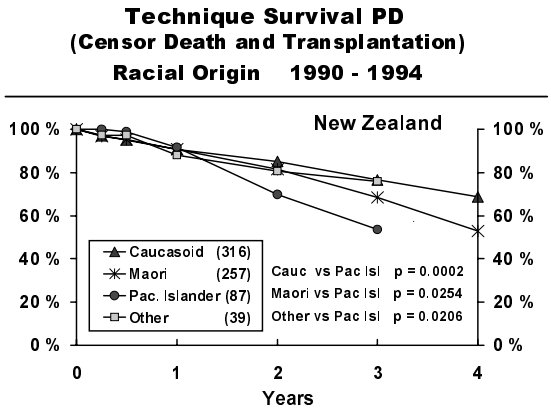
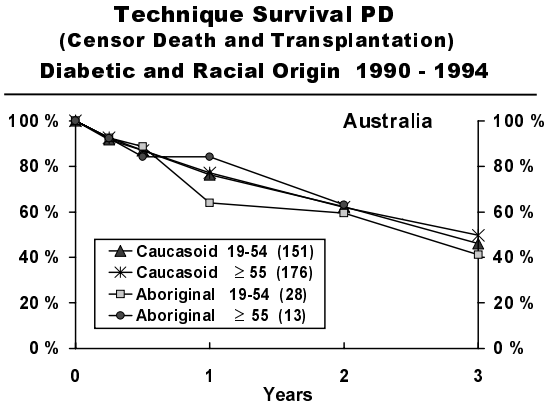


Figure 115



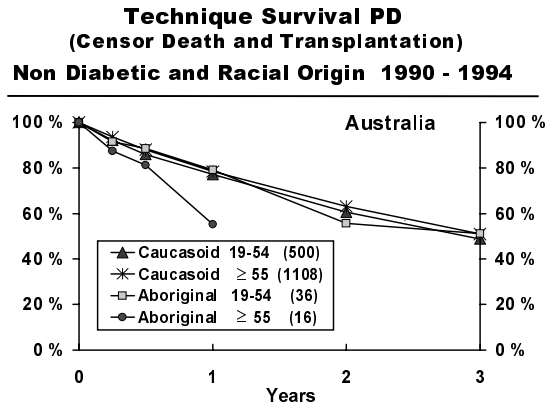
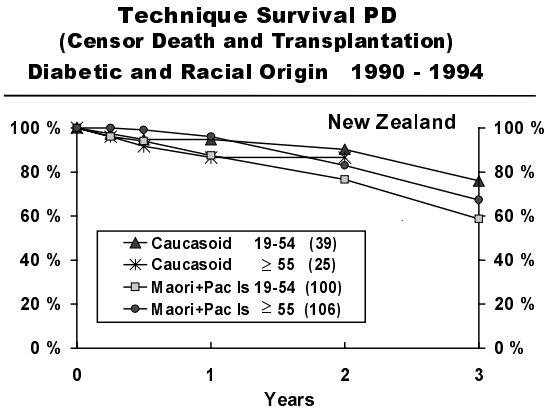
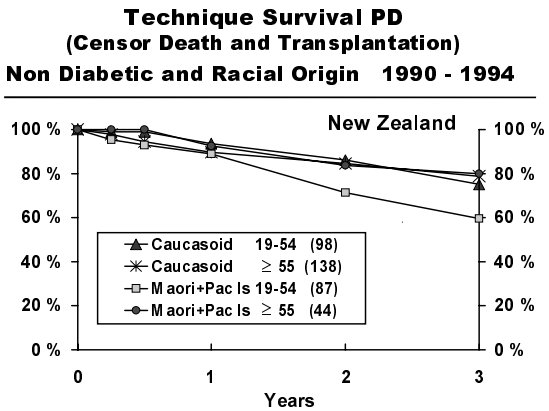


Figure 116





HAEMODIALYSIS

Dr Peter Kerr

Monash Medical Centre, Victoria

Stock and Flow

Australia

The annual stock and flow of haemodialysis patients during the period 1991-98 is shown in Figures 117 and 118.

There were 3915 patients (208 per million) receiving treatment at 31st December 1998, an increase of 10% (8% in 1997); 39% hospital based (41% in 1997), 44% in satellite (limited or self care) centres (41% in 1997) and 17% at home (18% in 1997). The proportion of patients receiving satellite haemodialysis continued to grow, this year by 19%, compared to the previous year (12% in 1997 and 17% in 1996).

The proportion of all dialysis patients who were using home haemodialysis in each State, shown in Figure 117, was less than 10% except for New South Wales/ACT 21%. No State had a rise in the proportion of patients receiving haemodialysis at home.

A total of 1391 patients received haemodialysis for the first time during the year, a 10% increase; 84% had no previous dialysis nor a transplant. The modal age group was 65-74 years (27%). See Figure 128.

Of the 3915 patients dialysing, 37% were 65 years or over, 11% less than 35 years old. There was a 47% increase in the number of new patients commencing haemodialysis aged 75 years or more. See Figure 121 and 128. The proportion of all dialysis patients in each age group who were using haemodialysis is shown in Figure 122. For more detail regarding age and mode of haemodialysis in each State see Appendix II at Website (www.anzdata.org.au).

There were 357 transplants, a 1% increase from 352 in 1997, c.f. growth in haemodialysis patients numbers of 10%.

There were 597 deaths, representing 15.9 deaths per 100 patient years (11.3% of patients at risk). See Figure 119. For more detail of cause of death see Appendix II at Website (www.anzdata.org.au).

There was a moderate increase (27%) in the number of permanent transfers (> 12 months). The majority (77%) of all transfers were permanent.

New Zealand

The annual stock and flow of haemodialysis patients during the period 1991-98 is shown in Figures 123, 124, 129.

There were 486 patients (128 per million) receiving treatment at 31st December 1998, a 10% increase (17% in 1997). Hospital based haemodialysis decreased to 49% of all haemodialysis (54% in 1997), and home dialysis decreased to 41% (43% in 1997). Modal age group 55-64 years (26%): 18% >65 years; 15% <35 years. See Figure 126. The proportion of all dialysis patients who were using home haemodialysis is shown in Figure 129.

There were 262 patients who received haemodialysis for the first time, a 4% decrease from 1997, 76% having their initial dialysis treatment. Modal age group 45-64 years (51%), 14% <35 years, 21% >65 years. See Figure 124 and 125 and Appendix III at Website (www.anzdata.org.au).

Fifty nine haemodialysis patients received transplants in 1998 (63 in 1997), 12% of all patients dialysing, 16% of patients <65 years dialysed.

There were 73 deaths, 15.6 deaths per 100 patient years, (9.7% of patients at risk); more in the young and old groups. See Figure 124.

Permanent transfers for >12 months remained steady at 117 (116 in 1997). The proportion of dialysis patients in each age group using haemodialysis is shown in Figure 127. Most middle aged and elderly patients used peritoneal dialysis.

Figure 117 **Australia and New Zealand**

Proportion (%) Home Haemodialysis
Of all HD and PD Dialysis Patients 1991 - 1998

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	6%	6%	6%	5%	4%	3%	3%	3%
New South Wales/ACT	27%	25%	25%	22%	21%	21%	21%	21%
Victoria	22%	21%	20%	17%	14%	13%	10%	10%
Tasmania	5%	3%	5%	3%	1%	1%	1%	2%
South Australia	11%	11%	11%	9%	8%	7%	5%	4%
Northern Territory	0%	0%	0%	0%	0%	0%	0%	0%
Western Australia	8%	10%	9%	8%	8%	7%	7%	5%
Australia	**19%**	**18%**	**17%**	**15%**	**14%**	**13%**	**12%**	**12%**
New Zealand	**32%**	**29%**	**25%**	**22%**	**20%**	**20%**	**19%**	**18%**

Figure 118

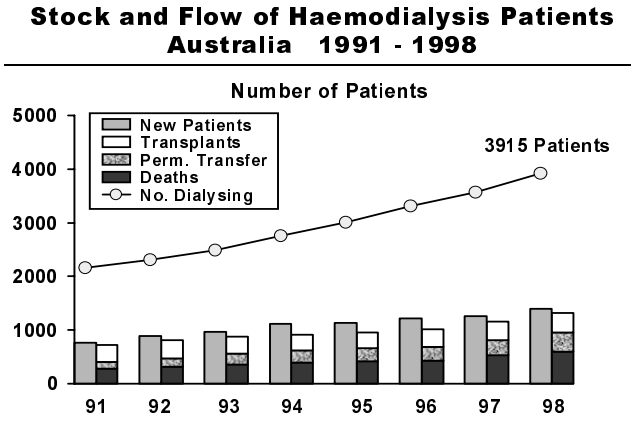


Figure 119 **Australia**

Stock and Flow of Haemodialysis Patients 1991 - 1998

	1991	1992	1993	1994	1995	1996	1997	1998
Patients new to Haemodialysis	767	887	966	1118	1146	1215	1265	1391
First Dialysis Treatment	608	729	768	922	956	1016	1065	1164
Previous Dialysis (PD/CAPD)	136	134	179	178	167	175	182	201
Failed Transplant	23	24	19	18	23	24	18	26
Transplanted	319	341	322	301	297	329	352	357
Deaths	277	313	365	390	421	432	529	597
Never Transplanted	214	257	303	335	372	372	467	533
Previous Transplant	63	56	62	55	49	60	62	64
Permanent Transfers Out (>12/12)	129	160	193	226	238	250	282	359
Temporary Transfers (<12/12)	80	88	108	121	102	139	125	108
Patients Dialysing at 31 December	2163	2306	2484	2756	3012	3307	3572	3915
Patients Dialysing at Home 31 December	587	611	645	625	627	642	635	653
% of all Home Dialysis Patients (HD/PD)	39%	37%	35%	33%	30%	29%	29%	29%

Figure 120

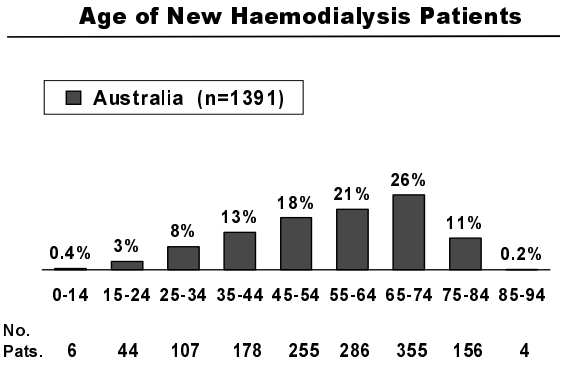


Figure 121

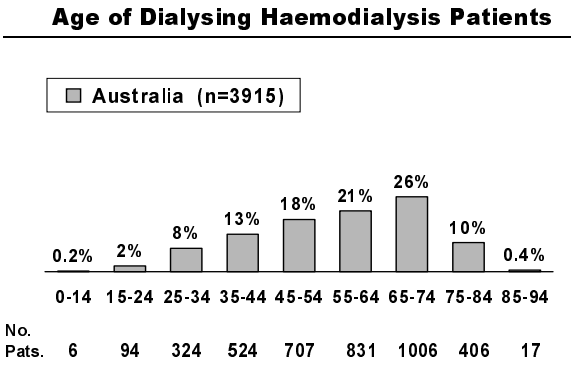


Figure 122

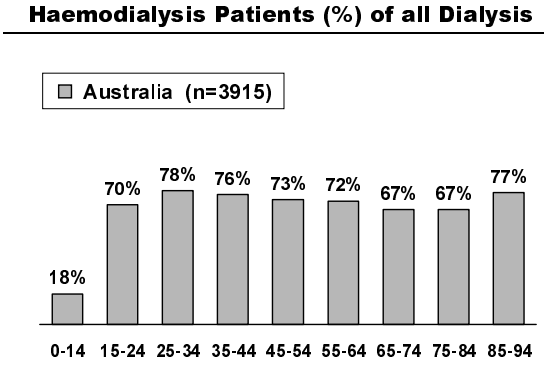


Figure 123

Stock and Flow of Haemodialysis Patients
New Zealand 1991 - 1998

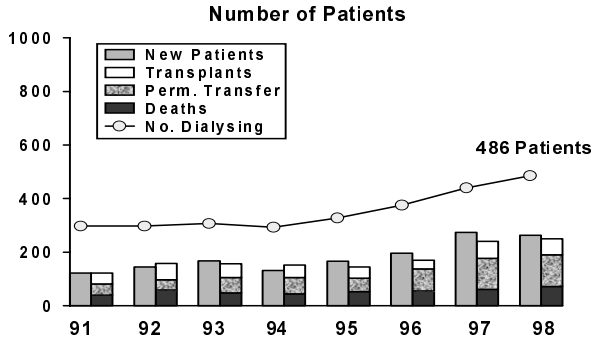


Figure 124 **New Zealand**

Stock and Flow of Haemodialysis Patients 1991 - 1998

	1991	1992	1993	1994	1995	1996	1997	1998
Patients new to Haemodialysis	122	144	168	132	165	197	274	262
First Dialysis Treatment	108	122	128	103	133	144	188	199
Previous Dialysis (PD/CAPD)	13	19	35	23	28	47	73	54
Failed Transplant	1	3	5	6	4	6	13	9
Transplanted	39	62	51	48	41	32	63	59
Deaths	40	59	47	43	53	56	61	73
Never Transplanted	26	48	34	34	40	45	57	65
Previous Transplant	14	11	13	9	13	11	4	8
Permanent Transfers Out (>12/12)	42	38	58	61	50	82	116	117
Temporary Transfers (<12/12)	11	5	21	22	11	13	21	24
Patients Dialysing at 31 December	298	298	306	293	327	376	440	486
Patients Dialysing at Home 31 December	202	194	179	174	172	192	190	199
% of all Home Dialysis Patients (HD/PD)	38%	34%	30%	26%	25%	26%	25%	24%

Figure 125

Age of New Haemodialysis Patients

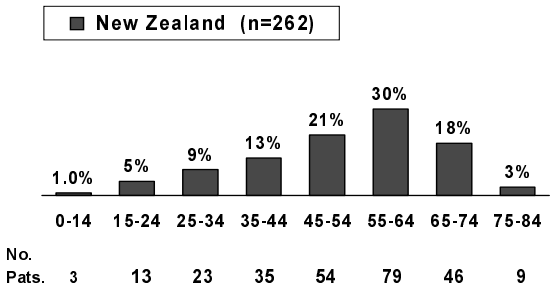


Figure 126

Age of Dialysing Haemodialysis Patients

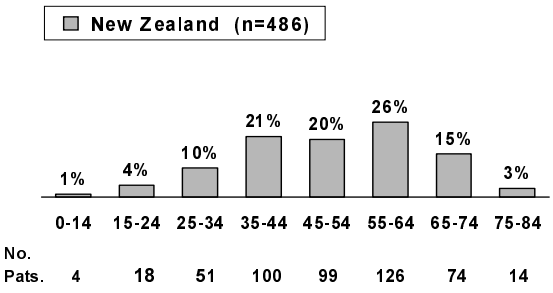


Figure 127

Haemodialysis Patients (%) of all Dialysis

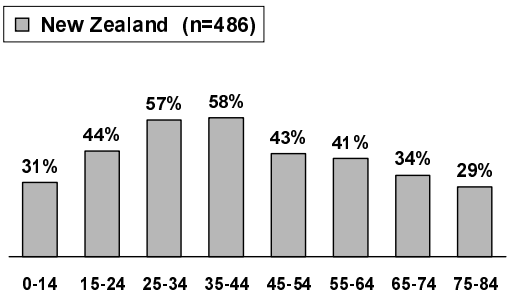


Figure 128 **Australia**

Stock and Flow of Haemodialysis Patients 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients ★								
00-14 years	5	6	5	11	12	12	10	6
15-24 years	53	62	50	60	58	43	54	44
25-34 years	71	101	94	98	101	109	110	107
35-44 years	115	103	122	151	139	145	169	178
45-54 years	143	163	164	208	214	201	197	255
55-64 years	192	240	245	246	248	268	272	286
65-74 years	164	185	234	288	281	331	344	355
75-84 years	24	27	51	54	89	103	108	156
85-94 years	0	0	1	2	1	3	1	4
Total	**767**	**887**	**966**	**1118**	**1143**	**1215**	**1265**	**1391**
Patients Dialysing								
00-14 years	8	6	4	12	14	12	10	6
15-24 years	92	102	107	109	107	105	98	94
25-34 years	221	242	263	288	298	300	319	324
35-44 years	310	314	349	386	415	461	485	524
45-54 years	417	424	456	494	548	582	633	707
55-64 years	517	544	555	617	660	716	772	831
65-74 years	508	567	631	698	771	868	927	1006
75-84 years	90	107	118	150	195	259	316	406
85-94 years	0	0	1	2	4	4	12	17
Total	**2163**	**2306**	**2484**	**2756**	**3012**	**3307**	**3572**	**3915**
Primary Renal Disease ★								
Glomerulonephritis	291	347	347	401	406	425	441	460
Analgesic Nephropathy	96	74	101	81	79	78	67	83
Hypertension	59	73	80	112	92	143	155	169
Polycystic Disease	53	76	74	78	98	83	72	92
Reflux Nephropathy	47	56	54	56	51	54	61	62
Diabetic Nephropathy	92	109	137	191	213	221	259	305
Miscellaneous	67	100	109	123	134	137	133	135
Uncertain	62	52	64	76	70	74	77	85
Total	**767**	**887**	**966**	**1118**	**1143**	**1215**	**1265**	**1391**

★ New patients receiving first haemodialysis treatment

Proportion (%) Age Distribution 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients								
00-14 years	<1%	<1%	<1%	1%	1%	1%	1%	<1%
15-24 years	7%	7%	5%	5%	5%	4%	4%	3%
25-34 years	9%	11%	10%	9%	9%	9%	9%	8%
35-44 years	15%	12%	13%	13%	12%	12%	13%	13%
45-54 years	19%	18%	17%	19%	19%	16%	16%	18%
55-64 years	25%	27%	25%	22%	21%	22%	21%	21%
65-74 years	22%	21%	24%	26%	25%	27%	27%	26%
75-84 years	3%	3%	5%	5%	8%	8%	9%	11%
85-94 years	0%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Patients Dialysing								
00-14 years	<1%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
15-24 years	4%	4%	4%	4%	4%	3%	3%	2%
25-34 years	10%	11%	11%	10%	10%	9%	9%	8%
35-44 years	15%	14%	14%	14%	14%	14%	13%	13%
45-54 years	19%	18%	18%	18%	18%	18%	18%	18%
55-64 years	24%	23%	22%	23%	22%	22%	22%	21%
65-74 years	23%	25%	25%	25%	26%	26%	26%	26%
75-84 years	4%	5%	5%	5%	6%	8%	9%	10%
85-94 years	0%	<1%	<1%	<1%	<1%	<1%	<1%	<1%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Figure 129 **New Zealand**

Stock and Flow of Haemodialysis Patients 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients ★								
00-14 years	2	0	0	2	1	0	2	3
15-24 years	7	13	13	8	5	17	13	13
25-34 years	18	18	26	20	14	10	29	23
35-44 years	15	19	29	19	22	36	31	35
45-54 years	28	29	37	34	47	44	66	54
55-64 years	36	42	40	33	49	47	67	79
65-74 years	13	21	20	15	24	38	59	46
75-84 years	3	2	3	1	3	5	7	9
85-94 years	0	0	0	0	0	0	0	0
Total	**122**	**144**	**168**	**132**	**165**	**197**	**274**	**262**
Patients Dialysing								
00-14 years	0	0	0	1	0	0	2	4
15-24 years	23	25	21	18	15	20	19	18
25-34 years	48	46	51	48	48	47	54	51
35-44 years	48	52	53	54	60	71	83	100
45-54 years	71	71	79	65	79	94	108	99
55-64 years	73	64	59	64	78	80	102	126
65-74 years	32	35	38	39	41	57	63	74
75-84 years	3	5	5	4	6	7	9	14
85-94 years	0	0	0	0	0	0	0	0
Total	**298**	**298**	**306**	**293**	**327**	**376**	**440**	**486**
Primary Renal Disease ★								
Glomerulonephritis	31	46	52	45	53	59	66	56
Analgesic Nephropathy	1	1	0	0	0	1	1	2
Hypertension	18	23	18	18	15	26	29	30
Polycystic Disease	6	12	9	4	11	11	16	17
Reflux Nephropathy	11	9	11	2	6	4	19	11
Diabetic Nephropathy	38	31	54	41	57	67	107	104
Miscellaneous	12	17	16	15	15	17	25	22
Uncertain	5	5	8	7	8	12	11	20
Total	**122**	**144**	**168**	**132**	**165**	**197**	**274**	**262**

★ New patients receiving first haemodialysis treatment

Proportion (%) Age Distribution 1991 - 1998

Age Groups	1991	1992	1993	1994	1995	1996	1997	1998
New Patients								
00-14 years	2%	0%	0%	2%	<1%	0%	<1%	1%
15-24 years	6%	9%	8%	6%	3%	9%	5%	5%
25-34 years	14%	13%	16%	15%	9%	5%	11%	9%
35-44 years	12%	13%	17%	14%	13%	19%	11%	13%
45-54 years	23%	20%	22%	26%	29%	23%	24%	21%
55-64 years	30%	29%	24%	26%	29%	23%	25%	30%
65-74 years	11%	15%	12%	11%	15%	19%	21%	18%
75-84 years	2%	1%	1%	<1%	2%	2%	3%	3%
85-94 years	0%	0%	0%	0%	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**
Patients Dialysing								
00-14 years	0%	0%	0%	<1%	0%	0%	1%	1%
15-24 years	8%	8%	7%	6%	5%	5%	4%	4%
25-34 years	16%	16%	17%	16%	15%	13%	12%	10%
35-44 years	16%	18%	17%	19%	18%	19%	19%	21%
45-54 years	24%	24%	26%	22%	24%	25%	25%	20%
55-64 years	25%	21%	19%	22%	24%	21%	23%	26%
65-74 years	11%	12%	12%	13%	12%	15%	14%	15%
75-84 years	<1%	1%	2%	1%	2%	2%	2%	3%
85-94 years	0%	0%	0%	0%	0%	0%	0%	0%
Total	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**	**100%**

Blood Flow Rates

Australia Figures 130 and 131

The trend towards a prescribed blood flow rate of 300 mls/minute or higher has accelerated rapidly from approximately 15% of all patients in 1994 to 60% in 1999; only 10% were now prescribed less than 250 mls/minute.

New Zealand Figures 130 and 131

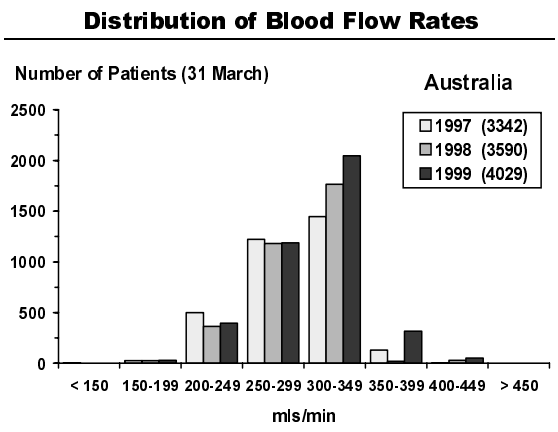
In 1999, 34% of patients were using 300 ml/minute or higher compared to 6% in 1996. A considerable proportion (25%) still used <250 mls/minute, many of these are receiving long session duration dialysis.

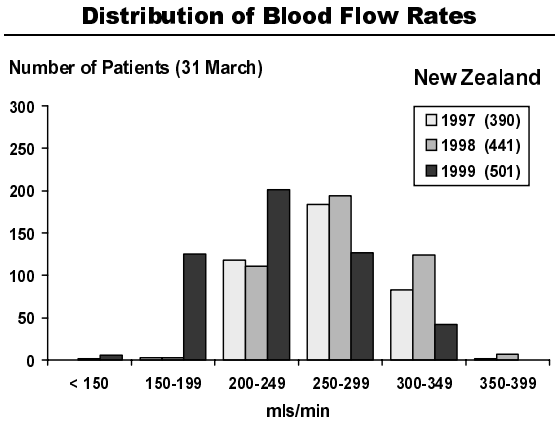
Figure 130 **Australia and New Zealand**

Blood Flow Rates (mls/minute) 1992 - 1999

	No. Pts	Mls / Minute							
		<150	150-199	200-249	250-299	300-349	350-399	400-499	>450
Australia									
March 1999	4029	<1%	<1%	10%	29%	51%	8%	1%	<1%
March 1998	3590	<1%	<1%	10%	33%	49%	6%	<1%	0%
March 1997	3342	<1%	<1%	15%	37%	43%	4%	<1%	<1%
March 1996	3041	<1%	<1%	18%	45%	33%	3%	<1%	<1%
March 1995	2765	<1%	1%	24%	50%	22%	1%	<1%	<1%
March 1994	2547	<1%	2%	39%	44%	13%	1%	<1%	<1%
March 1993	2278	<1%	2%	41%	43%	12%	<1%	<1%	<1%
March 1992	2175	<1%	2%	47%	42%	7%	<1%	<1%	<1%
New Zealand									
March 1999	501	0%	0%	25%	40%	26%	8%	0%	0%
March 1998	441	<1%	<1%	25%	44%	28%	2%	0%	0%
March 1997	390	0%	<1%	30%	47%	21%	<1%	0%	0%
March 1996	352	0%	1%	42%	51%	5%	<1%	0%	0%
March 1995	297	0%	<1%	43%	51%	4%	<1%	<1%	0%
March 1994	296	0%	<1%	51%	45%	2%	1%	<1%	0%
March 1993	288	0%	1%	54%	39%	4%	<1%	1%	0%
March 1992	293	0%	0%	56%	39%	2%	<1%	2%	0%

Figure 131





Frequency and Hours of Dialysis

Australia

See Figures 132-135.

Of the 4029 patients there were still 78 receiving dialysis twice a week (2%); almost all patients (97%) dialysed three times per week. There has not been a significant trend to daily dialysis.

There was a continuing trend towards longer duration of each dialysis treatment. Of the patients dialysing three times per week 32% were dialysing for five hours or longer (31% 1997) ; only 8% (9% 1997) received less than four hours. Forty four percent of patients dialysed for 4-4.4 hours. Amongst patients dialysing only twice per week, 22% received less than four hours, and only 1% more than five hours each treatment.

The median weekly dialysis treatment period of all haemodialysis patients was 12 hours; range 4-25 hours.

New Zealand

See Figures 132-135.

There were 501 patients (97%) dialysing three times per week.

The majority dialysed for five hours or more, three times a week; most of the remainder dialysed for four hours.

Only five patients (1%) dialysed less than four hours thrice weekly.

The trend was towards five hours as the standard treatment. Median weekly treatment was 15 hours, range 8-30 hours per week.

Figure 132 **Australia and New Zealand**

Duration and Number of Treatments Per Week 31-Mar-1999

Country	Sessions per week	Hours of Each Treatment										Total
		<2.5	2.5-2.9	3-3.4	3.5-3.9	4-4.4	4.5-4.9	5-5.4	5.5-5.9	6-6.4	> 6.5	
Australia	1	0	0	0	0	3	0	0	0	0	0	**3**
	2	0	1	9	7	38	8	14	0	1	0	**78**
	3	3	3	124	190	1737	639	1032	120	64	9	**3921**
	4	1	0	1	2	8	4	3	1	0	0	**20**
	5	0	1	0	0	0	0	1	0	0	0	**2**
	6	4	0	1	0	0	0	0	0	0	0	**5**
Total		**8**	**5**	**135**	**199**	**1786**	**651**	**1050**	**121**	**65**	**9**	**4029**
New Zealand	1	0	0	0	0	0	0	0	0	0	0	**0**
	2	0	0	0	0	2	0	8	0	0	0	**10**
	3	0	0	4	1	167	57	180	14	24	41	**488**
	4	0	0	0	0	0	0	3	0	0	0	**3**
Total		**0**	**0**	**4**	**1**	**169**	**57**	**191**	**14**	**24**	**41**	**501**

Figure 133 **Australia and New Zealand**

Number of Sessions Per Week (At 31-Mar) 1994 - 1999

Country	Sessions per week	1994	1995	1996	1997	1998	1999
Australia	1	8	3	1	5	3	**3**
	2	127	86	104	100	84	**78**
	3	2398	2667	2924	3222	3479	**3906**
	3.5	0	0	1	1	8	**15**
	4	14	9	8	14	15	**20**
	5	0	0	0	0	1	**2**
	6	0	0	0	0	0	**5**
Total		**2547**	**2765**	**3041**	**3342**	**3590**	**4029**
New Zealand	1	1	1	0	0	1	**0**
	2	30	17	21	12	14	**10**
	3	263	273	323	372	419	**488**
	3.5	0	0	3	0	0	**0**
	4	2	6	5	6	7	**3**
Total		**296**	**297**	**352**	**390**	**441**	**501**

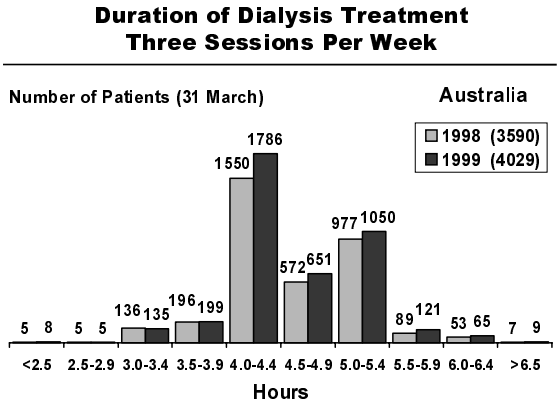
Figure 134 Australia and New Zealand

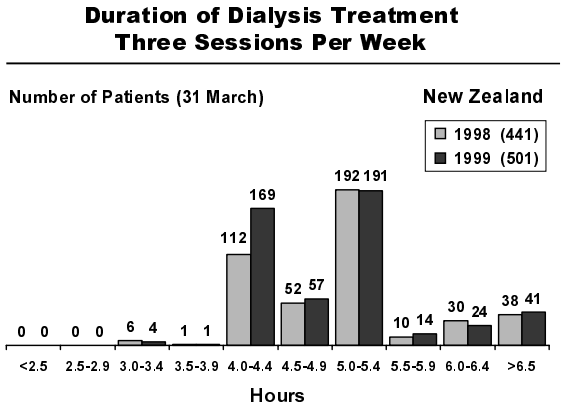
Duration of Haemodialysis Per Week 31-Mar-99

Country	No. Pts	Hours of Haemodialysis Per Week							
		<9	9-11	12-14	15-17	18-20	21-23	24-26	>27
Australia	3951	2%	8%	59%	29%	2%	<1%	<1%	0
New Zealand	501	<1%	3%	45%	39%	6%	3%	3%	1%

Excludes patients on haemofiltration and haemodiafiltration

Figure 135





Membrane Type and Surface Areas

Australia See Figures 136-137

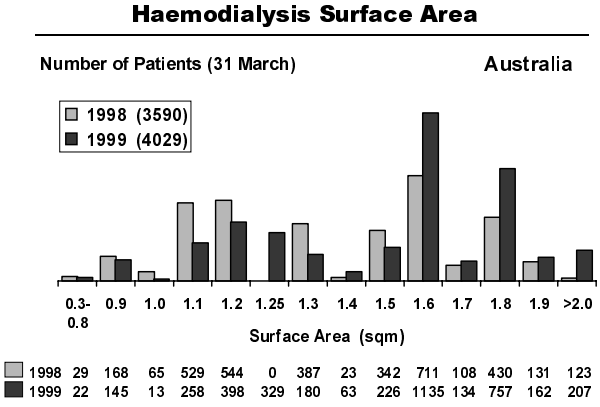
The trend away from cuprophan continues (11% of total, down from 17% in March 1998). The major change was a surge in the use of low flux polysulfone now 37%. Only 10% of patients receive high flux dialysis, with only cellulose triacetate gaining a small amount of ground (from 6% to 7% over the last year).

The trend to larger surface area dialysers continues, in part due to the increased use of polysulfone dialysers which require a larger surface area to achieve adequate clearances.

New Zealand See Figures 136-137

The cuprophan usage declined to 21% in 1999 (41% in 1998) while that of haemophan and low flux polysulphone increased to 39% and 28% respectively. High flux dialysis is almost non-existent.

Figure 136



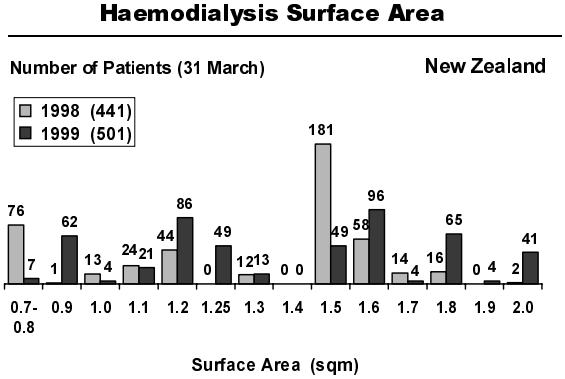


Figure 137 **Australia and New Zealand**

Haemodialyser Membrane Types by Surface Area
Patients on Haemodialysis 31-Mar-99

	Dialyser Membrane Type	Square Metres					Total
		<1.0	1.0-1.4	1.5-1.7	1.8-1.9	>1.9	
Australia	Cellulose Acetate	12	142	205	22	79	460 (11%)
	Cellulose Triacetate	1	95	56	124	4	280 (7%)
	Cuprophan	17	139	236	0	39	431 (11%)
	Diacetate	0	1	0	0	1	2 (<1%)
	Exebrane	0	0	7	13	0	20 (<1%)
	Haemophan	106	355	487	0	79	1027 (25%)
	Poly/Carbonate/Ether/Co-polymer	0	58	0	15	0	73 (2%)
	Polyflux	0	1	0	0	0	1 (<1%)
	Polyamide Haemo-diafiltration	0	2	9	0	5	16 (<1%)
	Polysulphone - High Flux	0	52	0	73	0	125 (3%)
	Polysulphone - Low Flux	30	285	495	671	0	1481 (37%)
	Polysynthane	0	82	0	0	0	82 (2%)
	Sureflex	1	29	0	1	0	31 (1%)
	Total	**167**	**1241**	**1495**	**919**	**207**	**4029 (100%)**
New Zealand	Cellulose Acetate	0	20	18	0	0	38 (8%)
	Cuprophan	7	34	60	3	0	104 (21%)
	Haemophan	0	53	69	34	41	197 (39%)
	Poly/Carbonate/Ether/Co-polymer	0	17	0	5	0	21 (4%)
	Polysulphone - Low Flux	62	49	2	28	0	141 (28%)
	Total	**69**	**173**	**149**	**69**	**41**	**501 (100%)**

Urea Reduction Ratio (URR)

Since we have been collecting URR data, there has been an increase in the number of Australian patients achieving a URR ≥ 65%, to 75% of the total (68% in 1998). There are still too many abstainers in New Zealand to make a valid comment.

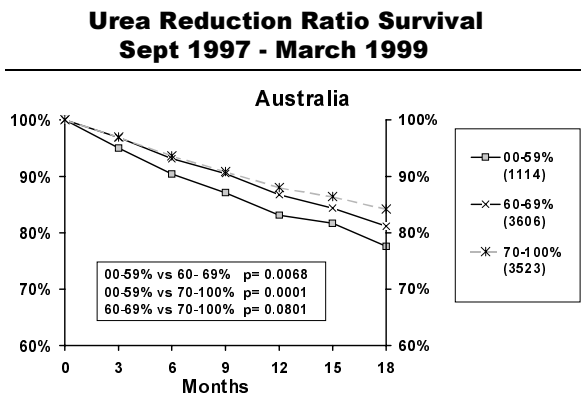
Overall, data has not been reported on about 17% of patients in Australia and 54% in New Zealand. Abstaining units are encouraged to participate in this aspect of the survey so that meaningful data can be reported.

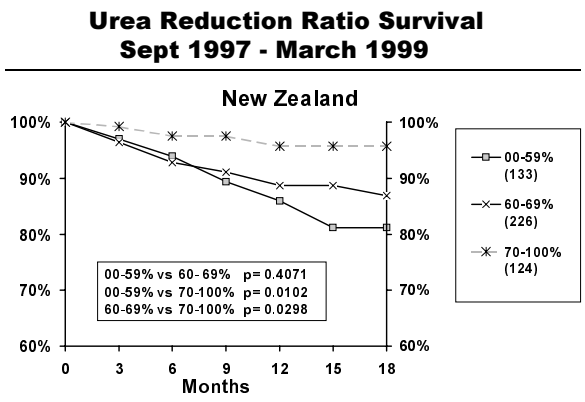
Figure 138 **Australia and New Zealand**

Urea Reduction Ratio (URR) of Patients Alive on Haemodialysis
At 30-Sep-97 and 31-Mar-99

Reported URR	Australia				New Zealand			
	30-Sep-97	31-Mar-98	30-Sep-98	31-Mar-99	30-Sep-97	31-Mar-98	30-Sep-98	31-Mar-99
00-39%	5	12	10	7	1	0	0	0
40-49%	35	40	40	33	6	7	2	4
50-59%	282	325	308	271	33	41	37	35
60-64%	427	491	472	514	32	31	56	53
65-69%	577	727	775	832	24	36	39	54
70-79%	800	1034	1201	1382	23	32	55	70
80-100%	93	120	177	204	0	6	8	9
Total Pts	**2219**	**2749**	**2983**	**3243**	**119**	**153**	**197**	**225**

Figure 139





TRANSPLANTATION

Renal Transplants Performed in 1998

Australia

The 517 operations performed in 1998 is a small increase over the last few years (a rise of 3% over 1997). This represents a transplant rate of 28 per million of population (27 per million in 1997 and 26 per million in 1996). (Figure 144). The improvement in the transplant rate over the last three years has been due to an increase in the proportion of living donor transplants (31% in 1998, 29% in 1997, 24% in 1996).

The proportion of patients receiving dialysis who were transplanted in 1998 was 7.4% compared to 7.7% in 1997. (Figure 143). For dialysing patients in the 15-59 year age group, the percentage was 12.2% in 1998 and 12.6% 1997. (Figure 143).

Of the kidneys transplanted, 85% were for primary recipients. This percentage has remained relatively constant over the last decade, varying between 82% and 88%.

New Zealand

The number of operations (106) performed in 1998 represents a transplant rate of 28 per million (a decrease of 6% from 1997). (Figure 144).

The percentage of living donors was 29% of all operations. These figures are similar to those seen in Australia for that year.

The number of operations represents 7.5% of all dialysed patients and 9.5% of dialysed patients in the age group 15-59 years. (Figure 143). Of the grafts performed in 1998, 90% were to primary recipients.

Figure 140 **Australia and New Zealand**

Summary of Renal Transplantation

Transplants		Australia 1963 - 1998		New Zealand 1965 - 1998	
		Performed	Functioning ★	Performed	Functioning ★
Cadaver	First	8375	3355	1551	593
	Second	1358	482	319	83
	Third	209	73	60	18
	Fourth	29	12	6	2
	Fifth	2	2	0	0
Living Donor	First	1272	857	334	215
	Second	125	85	33	20
	Third	15	10	3	3
	Fourth	3	3	0	0
	Fifth	1	1	0	0
Total		**11389**	**4880**	**2306**	**934**

★ Lost to follow up not included

Figure 141

Cadaver and Living Donor Transplants
Australia 1991 - 1998

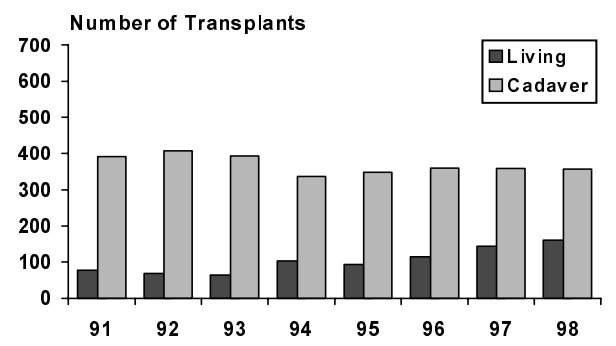


Figure 142 — Australia and New Zealand

Number of Renal Transplant Operations ( ) Living Donors

Year	Australia						New Zealand				
	1st	2nd	3rd	4th	5th	Total	1st	2nd	3rd	4th	Total
1963	5	1	0	0	0	**6 (1)**	0	0	0	0	**0**
1964	2	0	0	0	0	**2 (0)**	0	0	0	0	**0**
1965	12	1	1	0	0	**14 (3)**	1	0	0	0	**1 (1)**
1966	18	2	0	0	0	**20 (5)**	10	3	0	0	**13 (0)**
1967	69	2	0	0	0	**71 (2)**	18	4	1	0	**23 (1)**
1968	97	10	0	0	0	**107 (0)**	17	4	0	0	**21 (2)**
1969	149	12	0	0	0	**161 (0)**	39	5	0	0	**44 (0)**
1970	168	12	2	0	0	**182 (1)**	21	3	1	0	**25 (0)**
1971	207	22	1	0	0	**230 (1)**	26	6	0	0	**32 (1)**
1972	183	16	0	0	0	**199 (2)**	43	8	0	0	**51 (1)**
1973	213	30	1	0	0	**244 (7)**	50	10	2	0	**62 (0)**
1974	224	35	4	0	0	**263 (6)**	35	5	1	0	**41 (3)**
1975	271	29	3	1	0	**304 (7)**	61	13	0	0	**74 (2)**
1976	223	41	4	0	0	**268)10)**	38	13	1	0	**52 (1)**
1977	265	57	4	0	0	**326 (16)**	46	10	2	0	**58 (4)**
1978	269	43	2	0	0	**314 (17)**	43	11	3	0	**57 (11)**
1979	293	35	5	0	0	**333 (34)**	61	13	3	2	**79 (16)**
1980	287	63	9	0	0	**359 (36)**	57	13	4	0	**74 (18)**
1981	306	588	9	1	0	**374 (35)**	51	8	1	0	**60 (10)**
1982	321	72	6	0	0	**399 (53)**	48	17	0	0	**65 (8)**
1983	272	63	10	2	0	**347 (48)**	69	25	4	0	**98 (11)**
1984	362	72	10	1	0	**445 (48)**	63	11	0	0	**74 (16)**
1985	318	79	17	1	0	**415 (36)**	60	25	3	0	**88 (6)**
1986	366	63	7	2	0	**438 (32)**	79	19	6	1	**105 (13)**
1987	309	58	21	3	0	**391 (39)**	57	17	4	1	**79 (20)**
1988	391	62	10	2	1	**466 (46)**	61	11	6	0	**78 (8)**
1989	433	46	10	2	0	**491 (48)**	71	11	1	0	**83 (12)**
1990	387	45	9	2	0	**443 (59)**	86	14	2	0	**102 (23)**
1991	385	70	11	3	0	**469 (77)**	62	10	4	1	**77 (13)**
1992	403	57	13	3	0	**476 (69)**	105	5	5	0	**115 (17)**
1993	383	63	6	4	1	**457 (64)**	69	13	2	0	**84 (20)**
1994	384	41	12	2	1	**440 (103)**	70	11	1	1	**83 (20)**
1995	370	60	11	0	0	**441 (93)**	84	7	3	0	**94 (24)**
1996	416	50	9	0	0	**475 (115)**	88	7	1	0	**96 (26)**
1997	444	51	6	1	0	**502 (144)**	101	10	1	0	**112 (31)**
1998	442	62	11	2	0	**517 (160)**	95	10	1	0	**106 (31)**

Figure 143

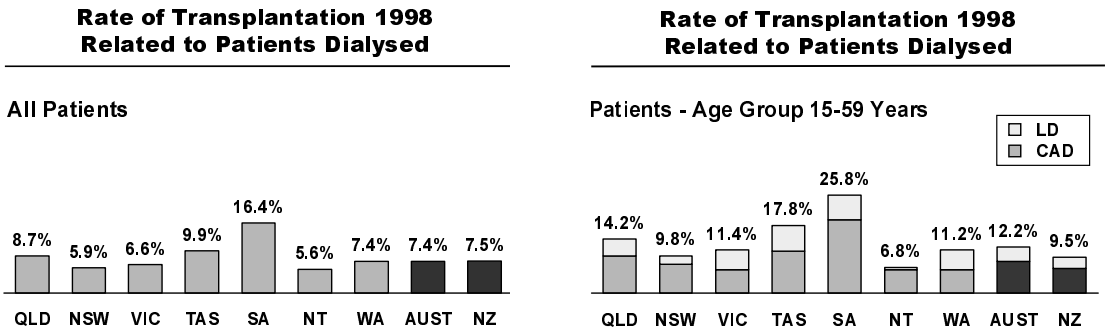
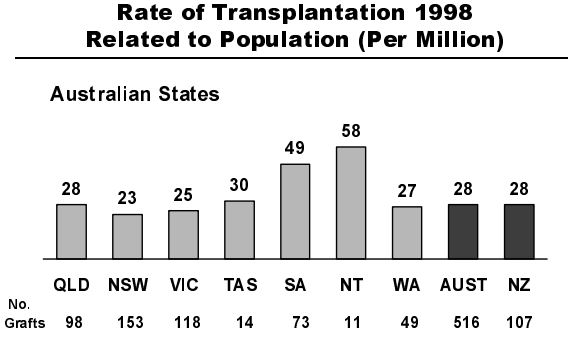


Figure 144



Thirteen Tasmanian residents transplanted in Vic, one in NSW
Ten NT residents transplanted in SA, one in QLD
One New Zealand patient transplanted in NSW

Age of Recipients

Australia

The median age of transplanted recipients in 1998 was 43 years compared to 42 years for 1997. Forty nine percent of recipients fell into the 35-54 year age group. Twenty percent of recipients in 1998 were over 54 years of age compared to 22% in 1997. Range 2-70 years. (Figure 145).

The transplantation rate per million for each age group and as a percentage of dialysed patients for each age group is shown in Figure 146 and 147.

New Zealand

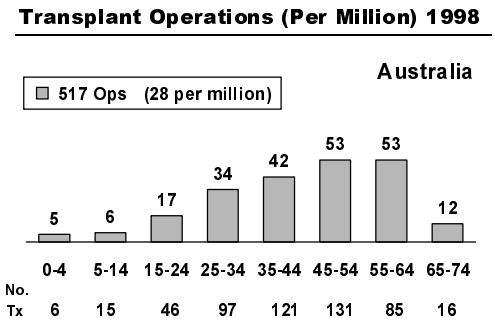
The median age of transplant recipients in 1998 was 43 years compared with 46 years in 1997. (Figure 145). Recipients aged between 35 and 54 years comprised 40% of the total. Twenty four percent of recipients in 1998 were over 54 years of age. Range 3-73 years. (figure 146 and 147).

Figure 145 **Australia and New Zealand**

Graft Number and Age of Patients Transplanted 1-Jan-1998 to 31-Dec-1998

Donor Source	Graft No.	Age Groups									Total
		00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	
Australia											
Cadaver	1	1	6	15	45	62	91	61	12	0	**293**
	2	1	2	5	12	14	11	6	1	0	**52**
	3	0	0	1	3	6	1	0	0	0	**11**
	4	0	0	0	1	0	0	0	0	0	**1**
Living Donor	1	4	7	24	31	37	26	17	3	0	**149**
	2	0	0	1	4	2	2	1	0	0	**10**
	4	0	0	0	1	0	0	0	0	0	**1**
Total		**6**	**15**	**46**	**97**	**121**	**131**	**85**	**16**	**0**	**517**
New Zealand											
Cadaver	1	0	1	6	11	10	17	14	8	0	**67**
	2	0	0	1	3	1	0	2	0	0	**7**
	3	0	0	0	0	0	1	0	0	0	**1**
Living Donor	1	1	2	3	9	3	9	0	1	0	**28**
	2	0	0	0	2	1	0	0	0	0	**3**
Total		**1**	**3**	**10**	**25**	**15**	**27**	**16**	**9**	**0**	**106**

Figure 146



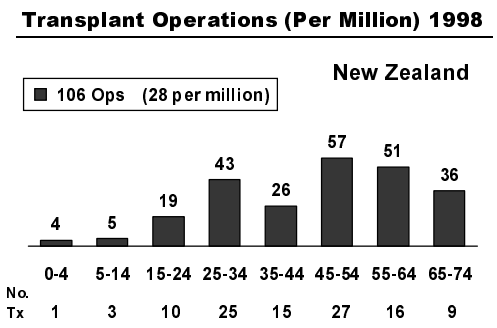
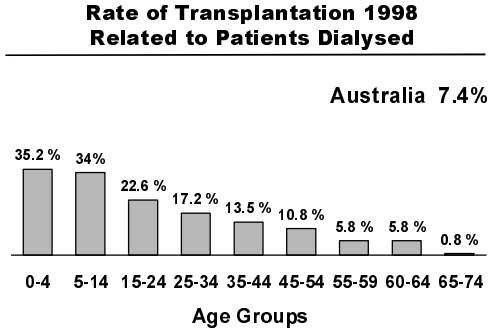
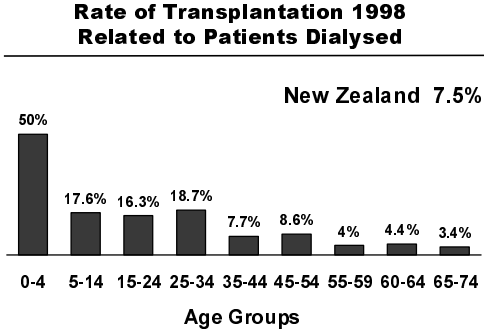


Figure 147





Race of Transplant Recipients

Australia (Figure 148 and 150).

In the 15-59 year age group in 1998, 13.4% of dialysed Caucasoid patients were transplanted. This figure has fallen slowly over the last four years. For Australian Aboriginals, the corresponding transplant rate for 1998 was 5.8%. The absolute number (26) is the greatest recorded and the percentage is the highest since 1992.

New Zealand (Figure 149 and 150).

In the 15-59 year age group, 1998 has seen a continuation of the rapid increase in number of Maori and Pacific Islanders being accepted onto dialysis programs. The proportion of Maori and Pacific Islanders in this age group who have received a renal transplant in 1998 was 4.3% and 4% respectively, compared to 16.2% for Caucasoid dialysis patients.

Figure 148 **Australia**

Transplantation Rate - Age Group 15-59 years 1986 - 1998

Year	Caucasoid			Aboriginal			All Patients		
	Dialysed	Tx	Rate	Dialysed	Tx	Rate	Dialysed	Tx	Rate
1986	1889	355	18.7%	68	13	19.1%	2070	391	18.8%
1987	1882	318	16.8%	88	15	17.0%	2102	346	16.4%
1988	1910	358	18.7%	93	19	20.4%	2173	407	18.7%
1989	1900	367	19.3%	123	18	14.6%	2213	422	19.0%
1990	1922	318	16.5%	146	18	12.3%	2265	373	16.4%
1991	1963	363	18.4%	160	12	7.5%	2328	401	17.2%
1992	2006	349	17.3%	185	17	9.1%	2446	402	16.4%
1993	2078	328	15.7%	223	10	4.4%	2575	375	14.5%
1994	2225	334	15.0%	272	12	4.4%	2804	369	13.1%
1995	2321	317	13.6%	323	13	4.0%	2998	365	12.1%
1996	2451	358	14.6%	363	8	2.2%	3195	402	12.5%
1997	2526	359	14.2%	414	18	4.3%	3367	426	12.6%
1998	2649	356	13.4%	444	26	5.8%	3545	435	12.2%

Figure 149 **New Zealand**

Transplantation Rate - Age Group 15-59 years 1986 -1998

Year	Caucasoid			Maori			Pacific Islander			All Patients		
	Dialysed	Tx	Rate	Dialysed	Tx	Rate	Dialysed	Tx	Rate	Dialysed	Tx	Rate
1986	295	61	20.6%	123	26	21.1%	35	5	14.2%	460	94	20.4%
1987	299	53	17.7%	128	13	10.1%	33	5	15.1%	466	72	15.4%
1988	299	53	17.7%	134	13	9.7%	44	7	15.9%	488	74	15.1%
1989	309	48	15.5%	151	12	7.9%	53	9	16.9%	527	72	13.6%
1990	318	68	21.3%	156	9	5.7%	62	8	12.9%	553	89	16.0%
1991	314	44	14.0%	188	15	7.9%	61	5	8.1%	579	67	11.5%
1992	336	80	23.8%	203	11	5.4%	64	3	4.7%	626	104	16.6%
1993	318	53	16.6%	211	4	1.8%	88	3	3.4%	642	63	9.8%
1994	317	52	16.4%	228	11	4.8%	96	5	5.2%	673	71	10.5%
1995	332	54	16.3%	241	11	4.5%	114	6	5.2%	728	78	10.7%
1996	347	58	16.7%	262	7	2.6%	130	7	5.3%	786	79	10.0%
1997	370	73	19.7%	280	9	3.2%	134	3	2.2%	829	91	10.9%
1998	370	60	16.2%	321	14	4.3%	151	7	4.6%	898	86	9.5%

Australian State Transplantation Activity 1998

The population related rate of transplantation for each State is shown in Figure 151 and 152. Those transplants performed in Tasmania and Northern Territory patients have been included in figures for Victoria and South Australia respectively.

For the fifth consecutive year, South Australia/ Northern Territory has the highest transplant rate which gradually increased from 38 per million to 50 per million since 1997. The rate in the other States was between 24 and 28 per million.

The population related transplant rate has been calculated for each State and the Northern Territory and is shown in Figure 144. In addition, the rates as a percentage of all patients and the 15-59 year age group are shown in Figure 143. There has been a significant increase in the number of South Australian residents transplanted compared to previous years (34 per million in 1997 compared to 49 per million in 1998). This increase has been seen for cadaveric and living donor transplants. There was a fall in all rates for New South Wales in 1998. In the Northern Territory the high rate of dialysis acceptance is reflected in a high rate of transplantation by dialysis but a low rate by population.

Figure 150

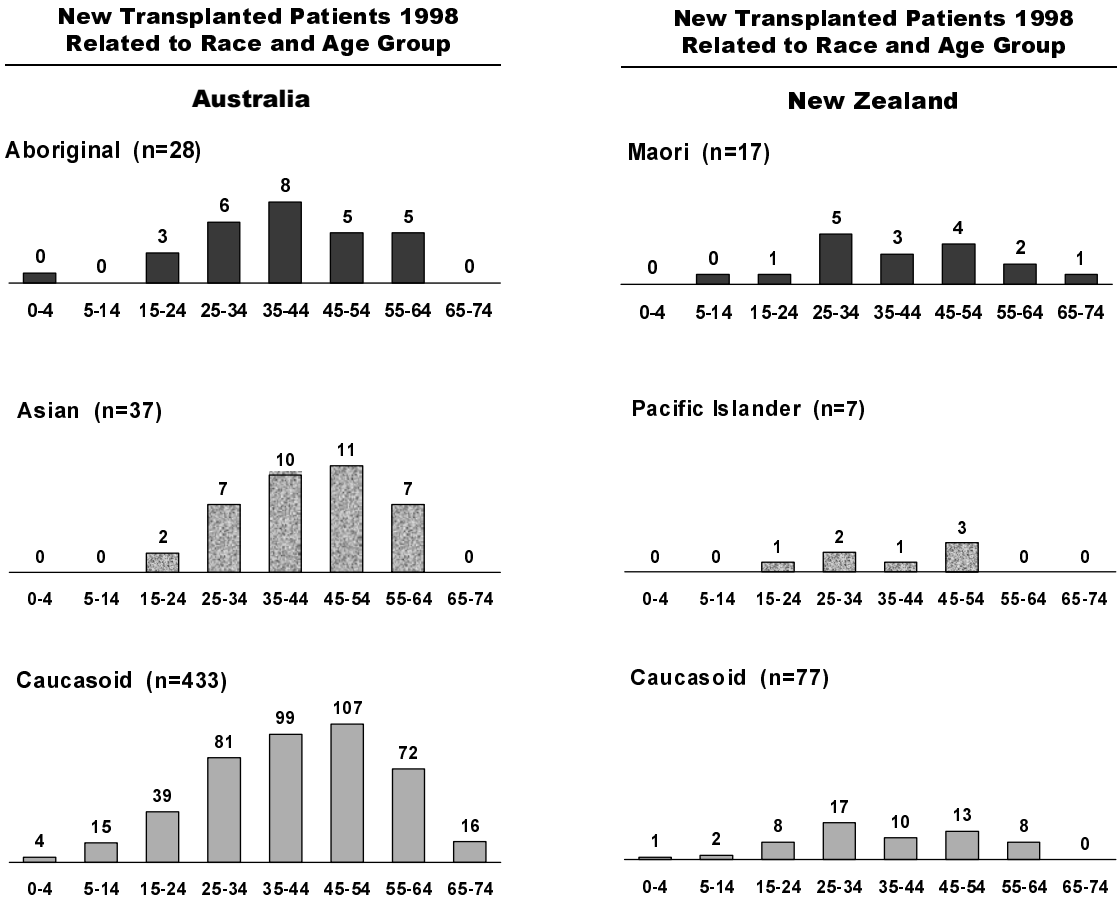


Figure 151

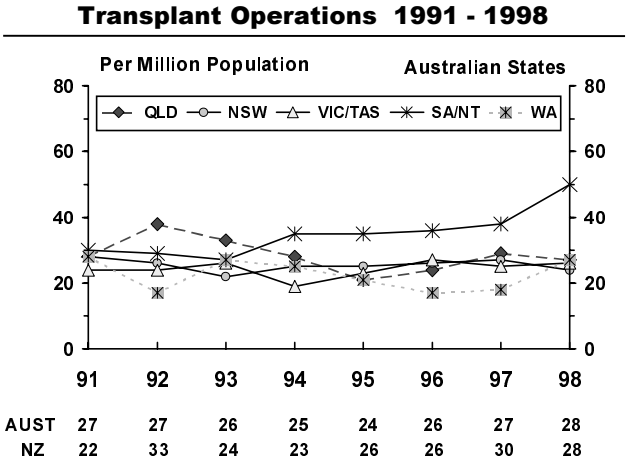
Australia

Transplants in each State 1991 - 1998
Number of Operations (Per Million Population)

State	1991	1992	1993	1994	1995	1996	1997	1998
Queensland	84 (28)	114 (38)	102 (33)	88 (28)	69 (21)	80 (24)	98 (29)	93 (27)
New South Wales/ACT	174 (28)	166 (26)	136 (22)	158 (25)	161 (25)	171 (26)	179 (27)	160 (24)
Victoria/Tasmania ★	116 (24)	120 (24)	129 (26)	94 (19)	116 (23)	134 (27)	128 (25)	131 (26)
South Australia/NT ★	49 (30)	47 (29)	44 (27)	57 (35)	58 (35)	60 (36)	64 (38)	84 (50)
Western Australia	46 (28)	29 (17)	46 (27)	43 (25)	37 (21)	30 (17)	33 (18)	49 (27)
Australia	**469 (27)**	**476 (27)**	**457 (26)**	**440 (25)**	**441 (24)**	**475 (26)**	**502 (27)**	**517 (28)**

★ For calculation of population related totals, the populations of these States were amalgamated

Figure 152



Transplant Survival - Primary Cadaveric Grafts
Australia

The patient and graft survivals for primary cadaveric grafts for each year since 1988 are shown in Figure 153. Graphical representations of some years is shown in Figure 154. For grafts performed in 1997, the 12 month patient and graft survival was 96% and 89% respectively.

The five year graft survival for transplants performed in primary recipients in 1993 is 73% with 87% of recipients still being alive at five years. This survival rate has been constant for grafts performed in the years 1989-92 and represents an annual graft failure rate after the first year of approximately 3%.

The annual patient death rate for this period was 2%.

Figure 153 **Australia**

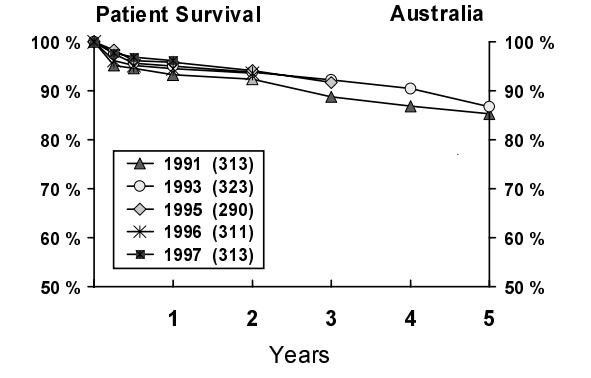
Primary Cadaver Patient and Graft Survival 1988 - 1998

Year of Transplant		Survival											
		1 month		3 months		6 months		1 year		3 years		5 years	
Patient Survival													
1988	n=353	98 + 0.7	347	97 + 1.0	341	95 + 1.2	334	93 + 1.4	327	87 + 1.8	307	82 + 2.1	288
1989	n=390	99 + 0.4	388	97 + 0.8	380	96 + 1.0	373	94 + 1.2	368	90 + 1.5	350	85 + 1.8	330
1990	n=334	99 + 0.7	329	96 + 1.1	320	94 + 1.3	315	93 + 1.4	311	88 + 1.8	294	85 + 2.0	284
1991	n=313	99 + 0.6	309	95 + 1.2	298	95 + 1.3	296	93 + 1.4	292	89 + 1.8	278	85 + 2.0	267
1992	n=342	99 + 0.5	339	97 + 0.9	333	95 + 1.1	326	93 + 1.4	319	89 + 1.7	305	83 + 2.0	284
1993	n=323	98 + 0.7	318	98 + 0.9	315	96 + 1.1	309	95 + 1.2	307	92 + 1.5	298	87 + 1.9	280
1994	n=286	99 + 0.6	283	98 + 0.9	279	96 + 1.1	275	96 + 1.2	274	92 + 1.6	262	-	
1995	n=290	100 + 0.3	289	98 + 0.8	285	96 + 1.1	279	96 + 1.2	278	92 + 1.6	266	-	
1996	n=311	99 + 0.6	307	96 + 1.1	299	95 + 1.2	296	95 + 1.3	294	-		-	
1997	n=313	98 + 0.7	308	98 + 0.8	306	97 + 1.0	303	96 + 1.1	300	-		-	
1998	n=293	99 + 0.6	290	98 + 0.8	284	97 + 1.0	196	-		-		-	
Graft Survival													
1988	n=353	91 + 1.5	321	87 + 1.8	308	85 + 1.9	301	82 + 2.0	291	76 + 2.3	268	67 + 2.5	237
1989	n=390	94 + 1.2	366	91 + 1.5	355	87 + 1.7	341	85 + 1.8	333	77 + 2.1	301	72 + 2.3	280
1990	n=334	92 + 1.5	308	89 + 1.7	297	87 + 1.8	291	86 + 1.9	287	78 + 2.3	260	72 + 2.5	240
1991	n=313	91 + 1.6	286	88 + 1.9	275	86 + 2.0	269	84 + 2.1	262	76 + 2.4	239	72 + 2.6	224
1992	n=342	91 + 1.5	312	90 + 1.6	307	88 + 1.8	300	86 + 1.9	293	79 + 2.2	269	72 + 2.4	247
1993	n=323	92 + 1.5	296	89 + 1.7	288	87 + 1.9	281	85 + 2.0	276	81 + 2.2	260	73 + 2.5	237
1994	n=286	95 + 1.3	271	94 + 1.4	268	92 + 1.6	262	91 + 1.7	259	83 + 2.2	236	-	
1995	n=290	96 + 1.2	277	94 + 1.4	272	91 + 1.7	263	90 + 1.8	260	83 + 2.2	242	-	
1996	n=311	94 + 1.4	291	91 + 1.6	284	90 + 1.7	279	89 + 1.8	276	-		-	
1997	n=313	94 + 1.4	293	92 + 1.5	288	90 + 1.7	283	89 + 1.8	279	-		-	
1998	n=293	97 + 1.1	283	95 + 1.2	276	94 + 1.4	188	-		-		-	

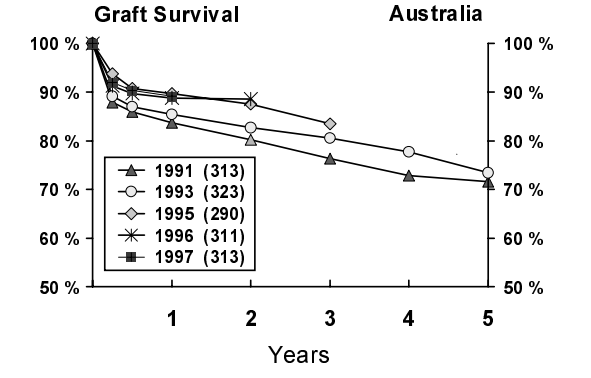
% Survival + S.E. / Number at Risk
n = Number of Patients

Figure 154

Primary Cadaver Patient Survival 1991 - 1997
Related to Year of Transplant



Primary Cadaver Graft Survival 1991 - 1997
Related to Year of Transplant



Transplant Survival - Primary Cadaveric Grafts

New Zealand

For recipients of primary cadaveric grafts performed in 1997, the 12 month patient and graft survivals were 96% and 85% respectively. The five year patient and graft survivals for primary cadaveric grafts performed in 1993 were 72% and 57% respectively.

Figure 155 **New Zealand**

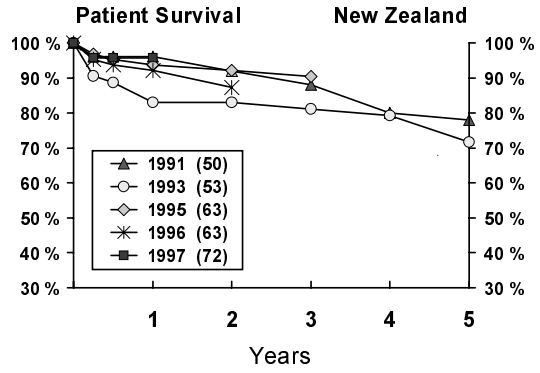
Primary Cadaver Patient and Graft Survival 1988 - 1998

Year of Transplant		Survival											
		1 month		3 months		6 months		1 year		3 years		5 years	
Patient Survival													
1988	n=53	100 + 0.0	53	96 + 2.6	51	96 + 2.6	51	93 + 3.2	50	87 + 4.7	46	81 + 5.4	42
1989	n=59	100 + 0.0	59	95 + 2.9	56	93 + 3.3	55	88 + 4.2	52	76 + 5.5	45	66 + 6.2	39
1990	n=65	94 + 3.0	61	91 + 3.6	59	91 + 3.6	59	89 + 3.8	58	83 + 4.7	54	77 + 5.2	50
1991	n=50	100 + 0.0	50	96 + 2.8	48	96 + 2.8	48	96 + 2.8	48	88 + 4.6	44	78 + 5.9	39
1992	n=90	99 + 1.1	89	97 + 1.9	87	96 + 2.2	86	92 + 2.8	83	86 + 3.7	77	83 + 3.9	75
1993	n=53	96 + 2.6	51	91 + 4.0	48	89 + 4.4	47	83 + 5.2	44	81 + 5.4	43	72 + 6.2	38
1994	n=51	96 + 2.7	49	92 + 3.8	47	88 + 4.5	45	88 + 4.5	45	86 + 4.8	44	-	
1995	n=63	98 + 1.6	62	97 + 2.2	61	95 + 2.7	60	94 + 3.1	59	90 + 3.7	57	-	
1996	n=63	98 + 1.6	62	95 + 2.7	60	94 + 3.1	59	92 + 3.4	58	-		-	
1997	n=72	99 + 1.4	71	96 + 2.4	69	96 + 2.4	69	96 + 2.4	69	-		-	
1998	n=67	99 + 1.5	66	97 + 2.1	64	92 + 3.4	51	-		-		-	
Graft Survival													
1988	n=53	87 + 4.7	46	79 + 5.6	42	77 + 5.8	41	75 + 5.9	40	68 + 6.4	36	58 + 6.8	30
1989	n=59	92 + 3.6	54	80 + 5.2	47	76 + 5.5	45	69 + 6.0	41	61 + 6.4	36	54 + 6.5	32
1990	n=65	92 + 3.3	60	86 + 4.3	56	86 + 4.3	56	83 + 4.7	54	72 + 5.5	47	63 + 6.0	41
1991	n=50	88 + 4.6	44	84 + 5.2	42	82 + 5.4	41	82 + 5.4	41	74 + 6.2	37	62 + 6.9	31
1992	n=90	91 + 3.0	82	87 + 3.6	78	83 + 3.9	75	80 + 4.2	72	76 + 4.5	68	73 + 4.7	66
1993	n=53	85 + 4.9	45	81 + 5.4	43	79 + 5.6	42	74 + 6.1	39	68 + 6.4	36	57 + 6.8	30
1994	n=51	80 + 5.6	41	78 + 5.8	40	76 + 5.9	39	75 + 6.1	38	71 + 6.4	36	-	
1995	n=63	94 + 3.1	59	92 + 3.4	58	90 + 3.7	57	84 + 4.6	53	79 + 5.1	50	-	
1996	n=63	89 + 4.0	56	87 + 4.2	55	86 + 4.4	54	84 + 4.6	53	-		-	
1997	n=72	90 + 3.5	65	88 + 3.9	63	88 + 3.9	63	85 + 4.2	61	-		-	
1998	n=67	96 + 2.5	64	93 + 3.2	61	88 + 4.1	49	-		-		-	

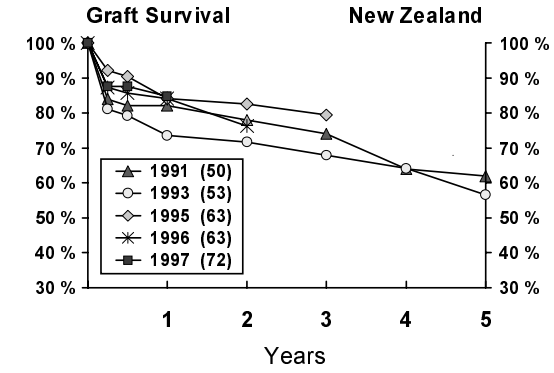
% Survival + S.E. / Number at Risk
n = Number of Patients

Figure 156

Primary Cadaver Patient Survival 1991 - 1997
Related to Year of Transplant



Primary Cadaver Graft Survival 1991 - 1997
Related to Year of Transplant



AUSTRALIAN TRANSPLANT SURVIVAL - SUBSEQUENT CADAVERIC GRAFTS

Patient and graft survivals for second or subsequent cadaveric grafts are examined in three year cohorts, 1996-98; 1993-95; 1990-92; 1987-89 and 1984-86. (Figure 157, 158)

Figure 157 **Australia**

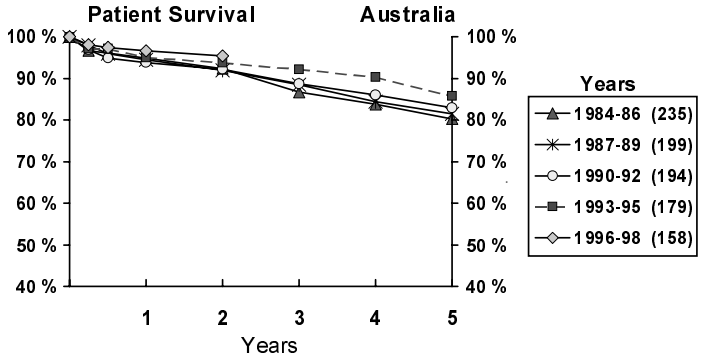
Second and Subsequent Cadaver Patient and Graft Survival 1984 - 1998

Year of Transplant		Survival					
		1 month	3 months	6 months	1 year	3 years	5 years
Patient Survival							
1984-86	n=235	100 + 0.4 234	97 + 1.2 227	96 + 1.3 226	95 + 1.4 222	87 + 2.2 202	80 + 2.6 187
1987-89	n=199	100 + 0 199	98 + 1.0 195	96 + 1.4 191	94 + 1.6 188	88 + 2.3 176	81 + 2.8 162
1990-92	n=194	99 + 0.7 192	97 + 1.2 188	95 + 1.6 184	94 + 1.7 182	89 + 2.3 172	83 + 2.7 161
1993-95	n=179	98 + 1.0 176	97 + 1.2 174	97 + 1.2 174	95 + 1.6 170	92 + 2.0 165	86 + 2.9 71
1996-98	n=158	100 + 0 158	98 + 1.1 155	97 + 1.3 133	97 + 1.5 106	-	-
Graft Survival							
1984-86	n=235	81 + 2.6 190	75 + 2.8 177	72 + 2.9 170	69 + 3.0 163	56 + 3.2 131	50 + 3.3 116
1987-89	n=199	83 + 2.6 166	79 + 2.9 158	76 + 3.0 151	73 + 3.1 146	62 + 3.4 123	57 + 3.5 113
1990-92	n=194	85 + 2.6 164	82 + 2.8 159	80 + 2.9 155	78 + 3.0 152	72 + 3.2 140	63 + 3.5 122
1993-95	n=179	84 + 2.7 151	82 + 2.9 147	82 + 2.9 146	80 + 3.0 143	73 + 3.3 131	67 + 3.7 57
1996-98	n=158	91 + 2.3 144	87 + 2.7 138	87 + 2.7 118	83 + 3.1 91	-	-

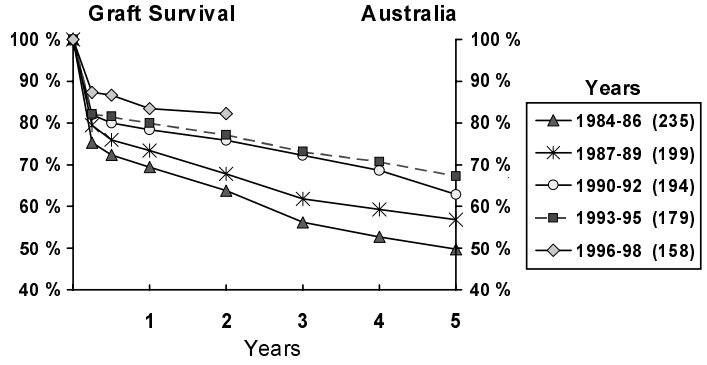
% Survival + S.E. / Number at Risk
n = Number of Patients

Figure 158

Second and Subsequent Cadaver Patient Survival Related to Years of Transplant 1984 - 1998



Second and Subsequent Cadaver Graft Survival Related to Years of Transplant 1984 - 1998



LIVING DONOR TRANSPLANTS

AUSTRALIA

The year 1998 saw the largest number and proportion of living donor transplants being performed in Australia representing 31% of all transplant operations.

This represents an ongoing increase since 1994. (Figure 159). The number of unrelated donors increased markedly in 1998. Thirty of the living unrelated donors were spouses in 1998, compared to 19 in 1997. Fifty six percent of the living donors in 1998 and 52% in 1997 were female. (Figure 163). Most of the unrelated donors were spouses.

Figure 160 shows the age-related proportion of living donor transplants for the years 1994 and 1998. The overall proportion of living donor transplants continued to rise between these years. The increase in proportion of living donors increased in all age groups except the 5-14 year group. the largest increase was in the 55-64 year group.

The proportion of living donor transplants for each State and New Zealand for recipients aged 25-44 years is shown in Figure 161 for the years 1991-94 and 1995-98. There have been increases in all regions.

NEW ZEALAND

Twenty nine percent of grafts were from a living donor (28% in 1997 and 27% in 1996). There has been a marked increase in the number of living unrelated donor transplants in the last two years. Forty eight percent of living donors were female. (Figure 164). As in Australia there has been a significant increase in the proportion of living donors for recipients aged 25-44 years comparing 1991-94 and 1995-98. (Figure 161).

Timing of Living Donor Transplants

The timing of living donor transplants is shown in Figure 162. New Zealand has over this period had a higher proportion of living transplants performed before dialysis commencement.

Figure 159 **Australia**

Living Donor Operations as Proportion (%) of Annual Transplantation

Recipient Age Groups	Year of Transplantation							
	1991	1992	1993	1994	1995	1996	1997	1998
00-04 years	100%	43%	60%	67%	83%	50%	100%	67%
05-14 years	50%	73%	55%	73%	65%	50%	60%	47%
15-24 years	34%	31%	22%	44%	36%	36%	57%	54%
25-34 years	22%	15%	23%	24%	26%	32%	44%	37%
35-44 years	12%	19%	13%	24%	21%	27%	27%	32%
45-54 years	10%	4%	7%	17%	12%	12%	18%	21%
55-64 years	4%	2%	5%	13%	5%	13%	10%	21%
65-74 years	0%	0%	5%	8%	0%	18%	0%	19%
All Recipients	**16%**	**14%**	**14%**	**23%**	**21%**	**24%**	**29%**	**31%**

Figure 160

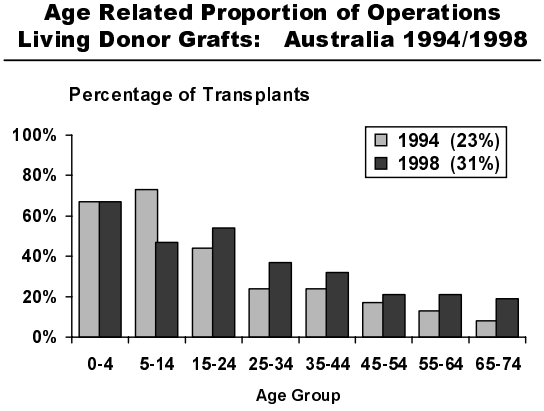


Figure 161

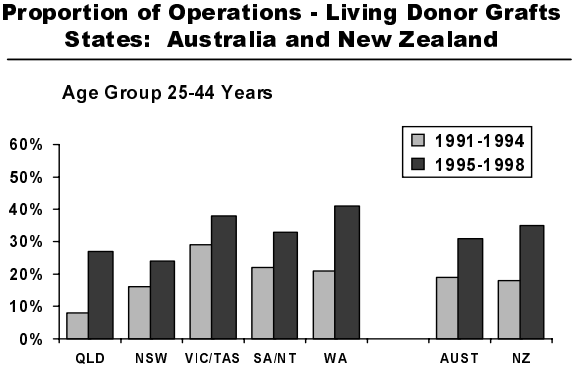


Figure 162 **Australia and New Zealand**

Timing of Living Donor Transplantation in Relation to Date of Dialysis Start by Year 1991 - 1998

	1991	1992	1993	1994	1995	1996	1997	1998
Australia								
Pre-dialysis	17%	13%	12%	11%	14%	16%	19%	17%
<1 month post dialysis	4%	13%	10%	4%	1%	6%	5%	4%
1-5.9 months post dialysis	28%	30%	28%	30%	26%	15%	21%	24%
6-11.9 months post dialysis	31%	16%	18%	20%	21%	15%	15%	20%
>12 months post dialysis	21%	28%	32%	35%	38%	48%	40%	36%
New Zealand								
Pre-dialysis	25%	20%	25%	21%	10%	32%	21%	32%
<1 month post dialysis	0%	0%	6%	0%	10%	4%	0%	0%
1-5.9 months post dialysis	25%	20%	13%	11%	14%	12%	17%	21%
6-11.9 months post dialysis	8%	20%	19%	26%	14%	8%	10%	4%
>12 months post dialysis	42%	40%	38%	42%	52%	44%	52%	43%

Figure 163 **Australia**

Source of Living Donor Kidney 1991 - 1998

	1991	1992	1993	1994	1995	1996	1997	1998
Total Living Donors	**77**	**69**	**64**	**103**	**93**	**115**	**144**	**160**
Related	**(72)**	**(68)**	**(60)**	**(94)**	**(87)**	**(96)**	**(125)**	**(125)**
Mother	21	25	19	27	34	26	39	27
Father	14	10	9	14	16	24	22	24
Brother	14	12	17	19	8	17	29+	28+
Sister	17	14x	7	28	15	18x	23+	32
Offspring	3	2	5	4	6	6	3	5
Grandfather	1	0	0	0	1	0	1	0
Grandmother	0	0	1	0	2	2	0	4
Cousin	1	3	0	1	2	1	4	1
Nephew	0	2	1	0	0	0	0	0
Niece	0	0	0	0	1	0	1	0
Uncle	0	0	1	1	2	1	1	0
Aunt	1	0	0	0	0	1	2	4
Unrelated	**(5)**	**(1)**	**(4)**	**(9)**	**(6)**	**(19)**	**(19)**	**(35)**
Wife	2	1	1	2	1	10	10	17
Husband	2	0	2	4	3	3	8	13
Mother in Law	0	0	1	0	0	0	0	0
Stepmother	0	0	0	1	1	0	0	0
Adoptive Mother	1	0	0	0	0	1	0	0
Sister in Law	0	0	0	0	1	2	0	1
Partner	0	0	0	0	0	2	0	1
Uncle	0	0	0	0	0	1	0	0
Unrelated	0	0	0	2	0	0	1	3

\+ Twin (non identical) x Twin (identical)

Figure 164 **New Zealand**

Source of Living Donor Kidney 1991 - 1998

	1991	1992	1993	1994	1995	1996	1997	1998
Total Living Donors	**13**	**17**	**20**	**20**	**24**	**26**	**31**	**31**
Related	**(12)**	**(17)**	**(19)**	**(20)**	**(23)**	**(25)**	**(23)**	**(19)**
Mother	4	2	6	9	3	11	6	4
Father	1	4	3	5	4	5	6	5
Brother	3	2	6	2	5	3	3	6
Sister	2	7x	2	3	8x	5	5	2
Offspring	2	2	1	1	3	0	3	2
Uncle	0	0	1	0	0	0	0	0
Aunt	0	0	0	0	0	1	0	0
Nephew	0	0	0	0	0	0	0	0
Unrelated	**(1)**	**(0)**	**(1)**	**(0)**	**(1)**	**(1)**	**(8)**	**(12)**
Wife	1	0	0	0	1	0	4	7
Husband	0	0	0	0	0	1	1	2
Mother in Law	0	0	0	0	0	0	1	0
Sister in Law	0	0	1	0	0	0	1	0
Unrelated	0	0	0	0	0	0	1	3

x Twin (identical)

FUNCTIONING TRANSPLANTS AT 31-Dec-1998

Transplant Operations 1963 - 1998

Australia

There have been 11389 operations performed on 9647 patients since 1963. Of these, 4880 were functioning at 31st December 1998, which represents 260 patients per million of population. Fifteen percent of operations and 14% of functioning grafts were regrafts. Living donor transplants accounted for 12% of operations and 20% of functioning grafts. The number of operations performed by each hospital during this period is shown in Appendix II at Website (www.anzdata.org.au).

The number of functioning grafts at the end of 1998 represents a 5% increase over the previous year, an annual rate of increase which has remained steady. (Figure 165,166). Eighty six percent of the functioning graf ts were primary and 80 % were from cadaveric donors. The number of functioning grafts from living donors increased by 15% from 834 to 956 patients.

The prevalence of functioning grafts in each State is shown in Figure 165 and 167. South Australia/Northern Territory has the highest prevalence of functioning renal transplants at 348 per million.

The lowest prevalence was recorded in Western Australia (216 per million) an increase from 209 in 1997.

Patients with functioning grafts were in excess of those dependent on dialysis in South Australia and Queensland, once again reflecting the higher transplant rate in these regions over the last few years. (Figure168).

The age dependence on a functioning transplant as a proportion of patients on renal replacement therapy is shown in Figure 170. The proportion drops with age and the proportion of patients depending on living donor grafts is greater in the younger age groups, particularly those aged 5-14 years. (Figure 169).

The modal age group for transplant dependent patients was 45-54 years and the mean and median ages were 47.5 and 48.4 years respectively. (Figure 169,171). The modal age group for living donor recipients was 35-44 years and 70% of recipients dependent on living donor grafts were less than 45 years of age.

The racial distribution of recipients with functioning grafts was Caucasoid 91%, Asian 6%, Aboriginal 2% and Others 2%. (Figure 173).

The 4880 grafts functioning at the end of 1998 represent 43% of all kidneys transplanted since 1963. Twenty five percent of grafts were functioning more than 10 years, 5% more than 20 years and now there are thirteen recipients with grafts functioning 30 years or longer. twenty percent of functioning grafts were from living donors. (Figure 172).

New Zealand

There have been 2306 operations performed on 1885 patients since 1965 with 934 grafts (246 per million) still functioning at 31st December 1998. (Figure 165, 166). This represents a 6% increase from the previous year. Eighteen percent of operations and 13% of functioning grafts were regrafts. Kidneys from living donors accounted for 16% of operations and 25% of functioning grafts. The number of operations performed by individual hospitals is shown in Appendix III at Website (www.anzdata.org.au).

For the eighth consecutive year, the number of transplant patients was less than those dependent on dialysis. The age related dependence on a transplant and the living or cadaveric donor source are shown in Figure 170.

The majority were male (59%) and the racial distribution was Caucasoid 80%, Maori 10%, Pacific Islander 4%, Asian 5% and Other <1%. (Figure 173).

The majority (67%) of functioning grafts were in the 25-54 year age group. The modal age group for living donors was 25-34 years. (Figure 169).

The 934 grafts functioning at the end of 1998 represent 41% of all kidneys transplanted since 1965. The longest surviving grafts have reached 31 years. Thirty five grafts have been functioning for more than 20 years. Twenty five percent of functioning grafts were from living donors. (Figure 172).

Figure 165 **Australia and New Zealand**

Functioning Transplants
By Transplanting State, Australia and New Zealand 1991 - 1998
( ) Per Million Population

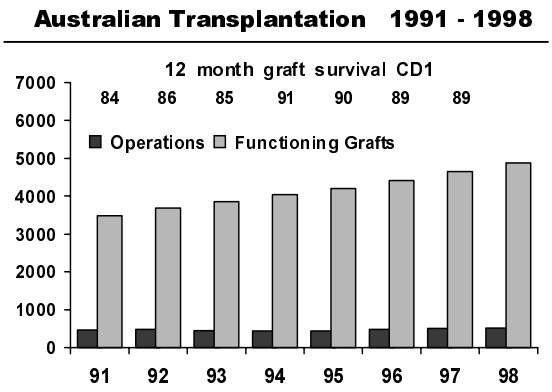
Year	Qld	NSW/ACT	Vic./Tas ★	SA/NT ★	WA	Aust.	N.Z.
1991	609 (205)	1254 (202)	926 (189)	409 (253)	287 (172)	**3485 (201)**	**604 (174)**
1992	691 (227)	1315 (210)	963 (195)	428 (263)	291 (175)	**3688 (210)**	**673 (191)**
1993	741 (238)	1347 (214)	1027 (208)	423 (260)	315 (188)	**3853 (218)**	**704 (198)**
1994	785 (246)	1410 (222)	1050 (212)	458 (279)	341 (200)	**4044 (227)**	**730 (203)**
1995	808 (247)	1470 (229)	1093 (220)	477 (289)	358 (207)	**4206 (233)**	**782 (214)**
1996	841 (251)	1540 (237)	1151 (230)	514 (310)	363 (206)	**4409 (241)**	**823 (221)**
1997	895 (263)	1624 (247)	1215 (239)	538 (323)	376 (209)	**4648 (251)**	**882 (234)**
1998	939 (272)	1676 (252)	1287 (251)	583 (348)	395 (216)	**4880 (260)**	**934 (246)**

★ For calculation of Population Related totals, the populations of these States were amalgamated.

Patients lost to follow up are not included.

Vic./Tas. includes patients transplanted in Tasmania prior to 1975 (one only functioning transplant since 1990).

Figure 166



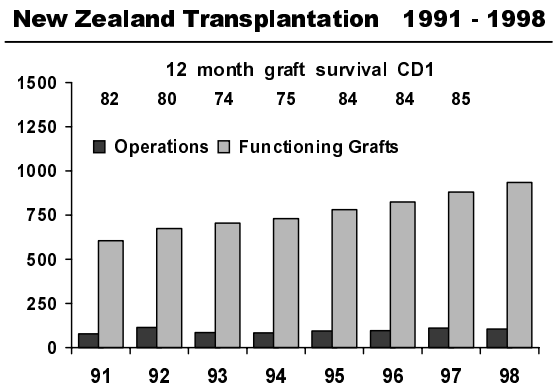


Figure 167

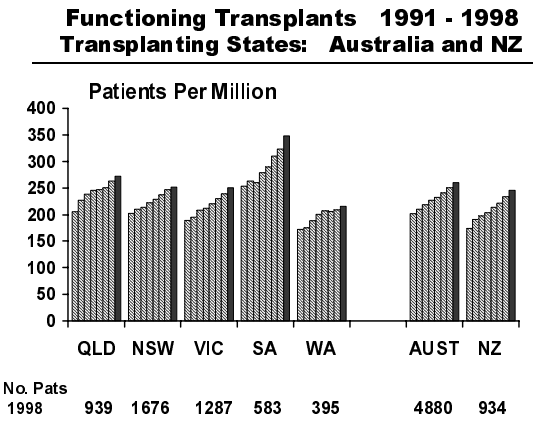


Figure 168

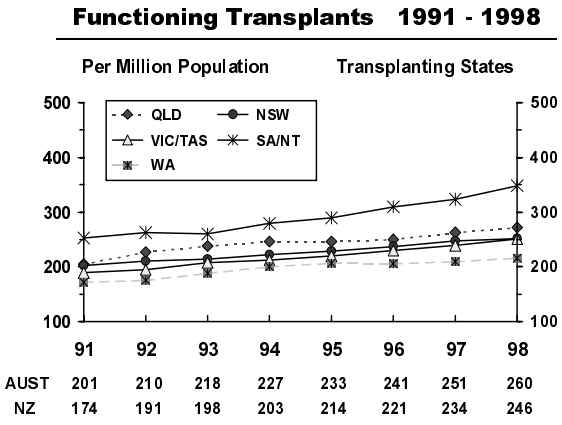
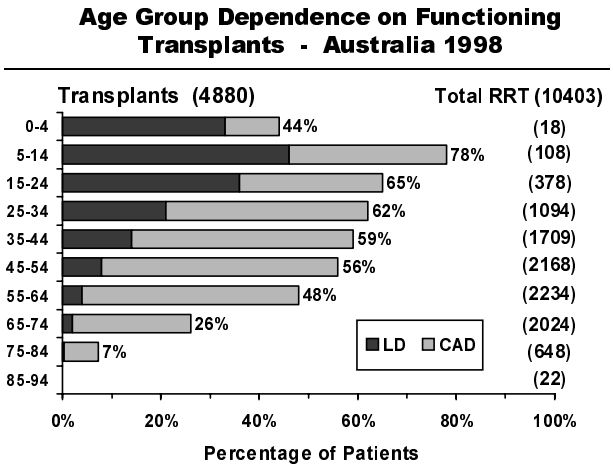


Figure 169 **Australia and New Zealand**

Age of All Functioning Transplant Patients (31-Dec-1998)

Donor Source	Graft No.	Age Groups									Total
		00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	
Australia		**8**	**84**	**244**	**677**	**1016**	**1205**	**1080**	**520**	**46**	**4880**
Cadaver	1	2	30	82	353	616	890	449	43	0	**3355**
	2	0	4	21	75	124	131	87	39	1	**482**
	3	0	0	5	16	21	21	8	2	0	**73**
	4	0	0	0	1	6	2	2	1	0	**12**
	5	0	0	0	0	1	1	0	0	0	**2**
Total		**2**	**34**	**108**	**445**	**768**	**1045**	**987**	**491**	**44**	**3924**
Living Donor	1	6	44	130	206	219	134	90	27	2	**858**
	2	0	6	6	23	24	21	2	2	0	**84**
	3	0	0	0	1	4	4	1	0	0	**10**
	4	0	0	0	2	0	1	0	0	0	**3**
	5	0	0	0	0	1	0	0	0	0	**1**
Total		**6**	**50**	**136**	**232**	**248**	**160**	**93**	**29**	**2**	**956**
New Zealand		**2**	**19**	**46**	**157**	**232**	**235**	**153**	**76**	**14**	**934**
Cadaver	1	0	5	14	63	138	165	129	66	13	**593**
	2	0	1	1	20	28	22	7	4	0	**83**
	3	0	0	0	4	7	6	1	0	0	**18**
	4	0	0	0	0	0	2	0	0	0	**2**
Total		**0**	**6**	**15**	**87**	**173**	**195**	**137**	**70**	**13**	**696**
Living Donor	1	2	13	31	62	49	36	15	6	1	**215**
	2	0	0	0	7	8	4	1	0	0	**20**
	3	0	0	0	1	2	0	0	0	0	**3**
Total		**2**	**13**	**31**	**70**	**59**	**40**	**16**	**6**	**1**	**238**

Figure 170



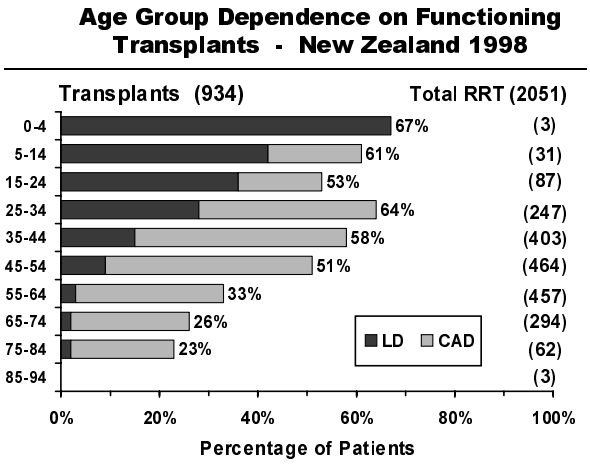
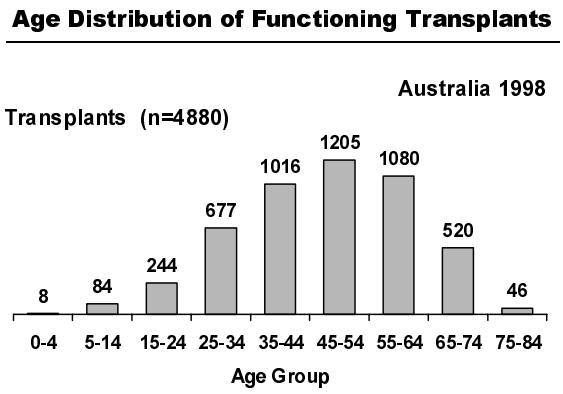
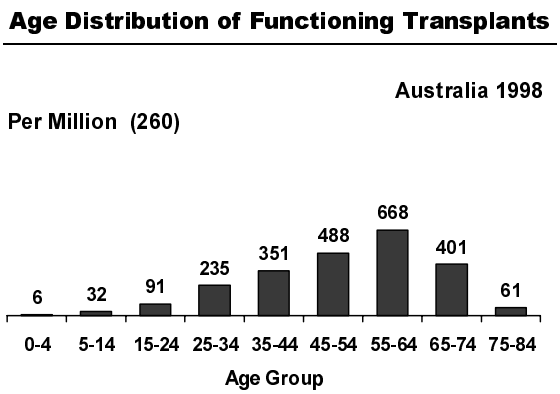
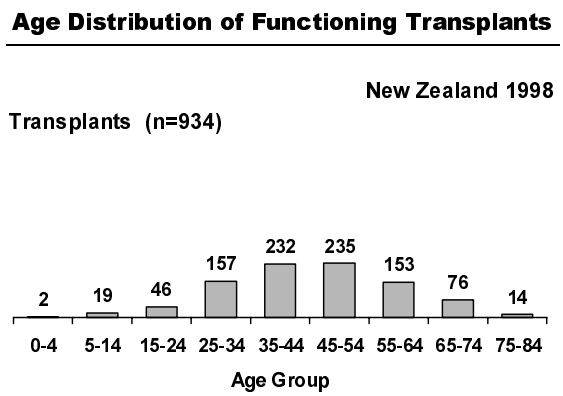


Figure 171







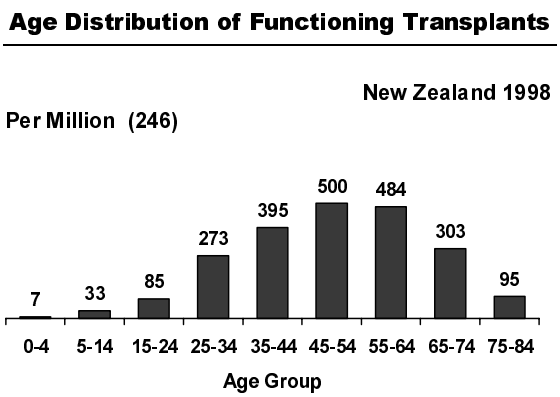
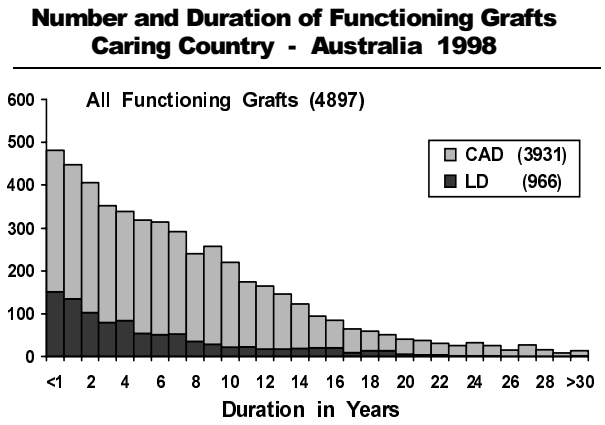


Figure 172



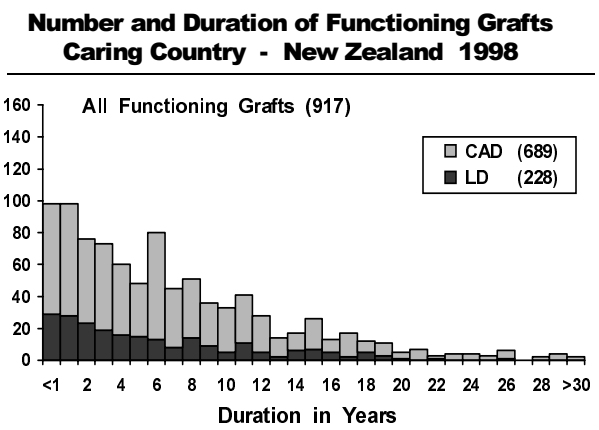
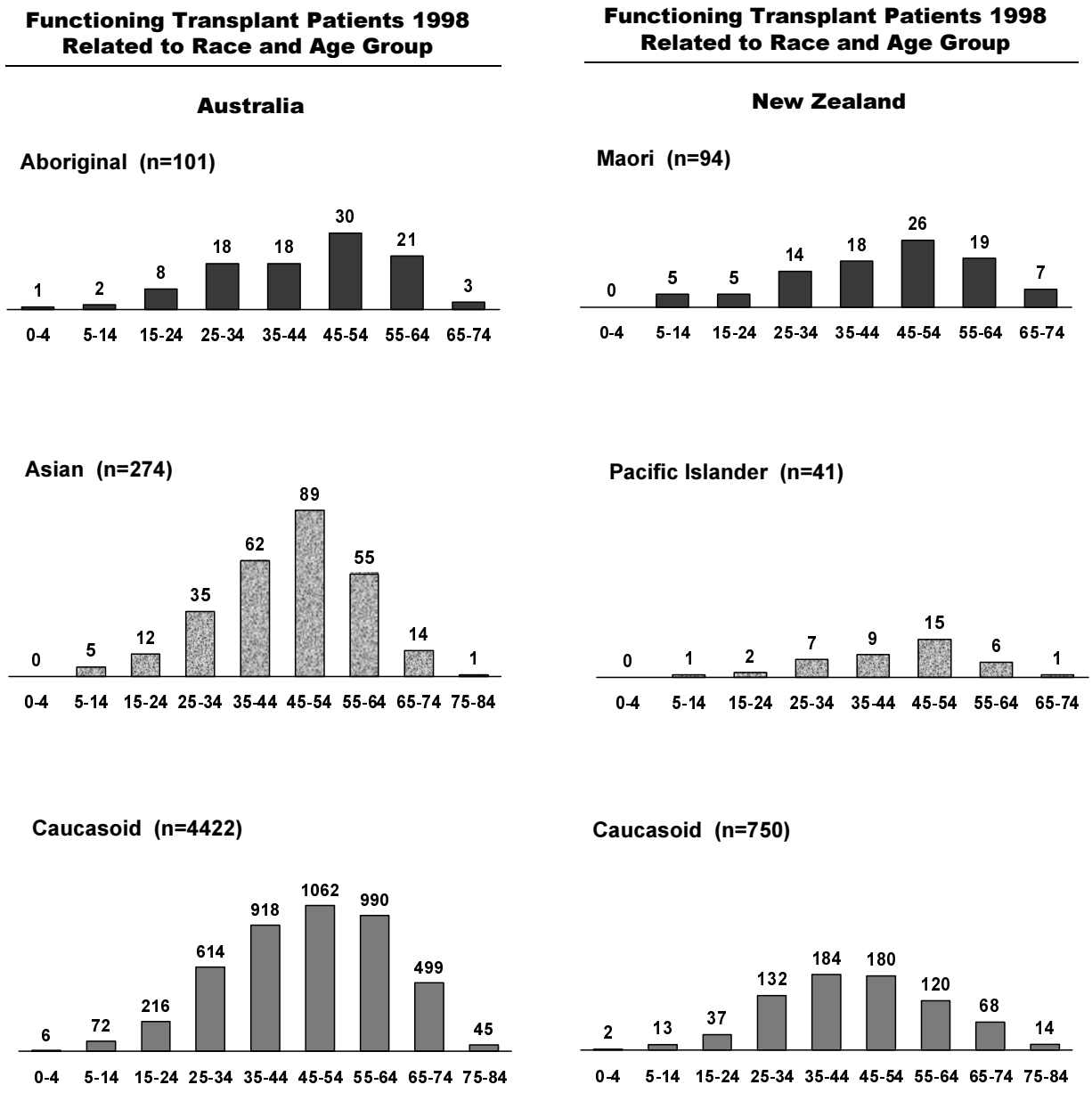


Figure 173


Functioning Transplant Patients 1998
Related to Race and Age Group
Australia
Aboriginal (n=101)
1 2 8 18 18 30 21 3
0-4 5-14 15-24 25-34 35-44 45-54 55-64 65-74
Asian (n=274)
0 5 12 35 62 89 55 14 1
0-4 5-14 15-24 25-34 35-44 45-54 55-64 65-74 75-84
Caucasoid (n=4422)
6 72 216 614 918 1062 990 499 45
0-4 5-14 15-24 25-34 35-44 45-54 55-64 65-74 75-84
Functioning Transplant Patients 1998
Related to Race and Age Group
New Zealand
Maori (n=94)
0 5 5 14 18 26 19 7
0-4 5-14 15-24 25-34 35-44 45-54 55-64 65-74
Pacific Islander (n=41)
0 1 2 7 9 15 6 1
0-4 5-14 15-24 25-34 35-44 45-54 55-64 65-74
Caucasoid (n=750)
2 13 37 132 184 180 120 68 14
0-4 5-14 15-24 25-34 35-44 45-54 55-64 65-74 75-84

REJECTION EPISODES

Data on rejection episodes occurring in the first six months post transplant has now been collected since the 1st April 1997. A preliminary analysis is now therefore possible. For the purposes of this analysis, rejection episodes are considered to be present if they have been proven by transplant biopsy or if they are considered on clinical grounds to be definite or possible. This analysis is restricted to those rejection episodes occurring in the first month post transplant. In the period under analysis (1-Apr-1997 to 28-Feb-1999) there were 714 primary cadaver grafts, 122 cadaver re-grafts, and 330 primary living donor grafts.

As expected, the incidence of rejection was higher in re-grafts compared to primary grafts. However, in all groups most patients with rejection had only a single episode. Less than 10% of patients have multiple episodes of rejection (Figure 174).

The rejection incidence is shown to be lower in recipients of primary cadaveric grafts aged more than 54 years. This group also have a lower incidence of multiple rejection or rejections requiring treatment with antibody. This result is consistent with the overall lower immune reactivity of the elderly patients (Figure 175).

There is little difference in the incidence of rejection in primary cadaveric recipients when analysed according to total ischaemia time (Figure 176). However, primary grafts which experience delayed graft function have a slightly higher incidence of rejection and a greater requirement for antibody treatment (Figure 177).

The incidence of rejection according to HLA matching is shown for primary cadaveric recipients. There is a greater rate of rejection including multiple episodes of rejection and the need for antibody therapy with greater degrees of HLA mismatching (Figure 178-180).

There is little difference in rejection rate or severity according to the use of Cyclosporin Sparing Agents (Figure 181). When one analyses the incidence of rejection according to primary renal disease there is a higher rate of rejection and a greater need for treatment with antibody therapy in patients with diabetic nephropathy (Figure 182).

When analysed according to panel reactive antibody patients who are unsensitised in both peak and current serum have a lower rate of rejection and need for antibody therapy compared with patients who are sensitised either on peak or current serum. (Figure 183).

Figure 174

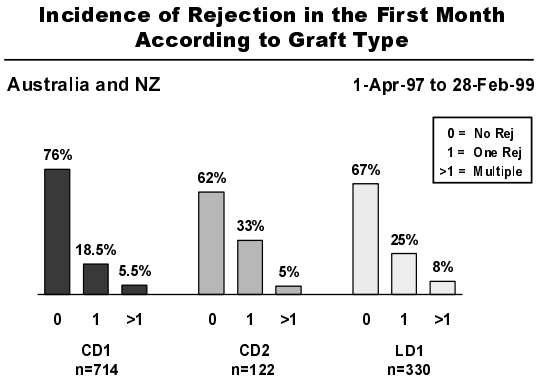


Figure 175

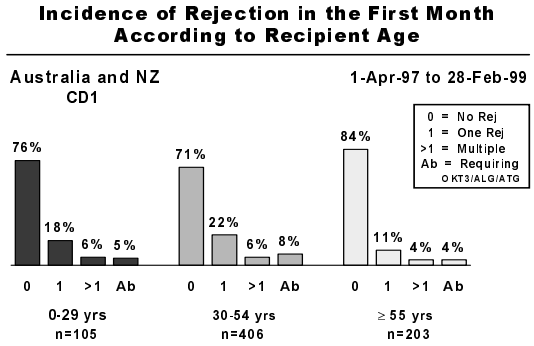


Figure 176

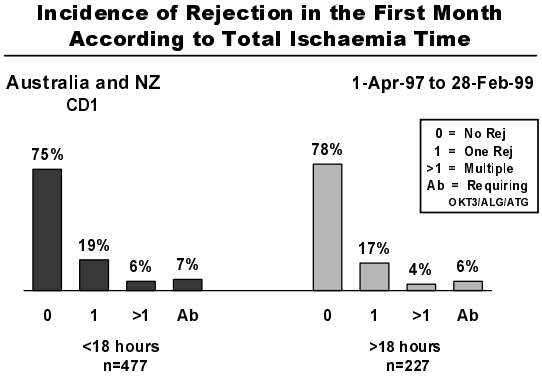
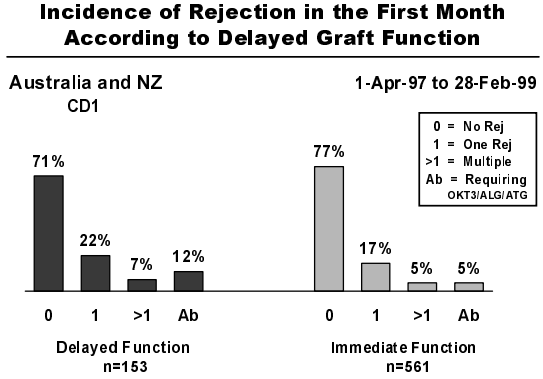


Figure 177



Rejection Episodes (continued)

There is no appreciable difference in rejection rates according to donor age (Figure 184).

The incidence of rejection in the first month for primary cadaveric grafts was analysed according to initial drug therapy. There was a rejection rate of 25% and 24% respectively for recipients receiving triple therapy with Mycophenolate, Mofetil or Azathioprine. Triple therapy with Azathioprine was however associated with a greater need for antibody therapy. Trials of Sirolimus in combination with Cyclosporin and Prednisolone were conducted during the time period under study. One of these trials was double blind, placebo controlled and at this stage the Registry does not have information after unblinding. It is instructive however to note that the rejection rate in these patients (n=95) in the first month was only 15% and only 2% required antibody treatment. Of note also is the rejection rate of about 43% with 13% requirement for antibody therapy in patients who received Cyclosporin and Mycophenolate without Prednisolone (Figure 185).

The incidence of rejection in the first month according to donor/recipient gender mismatch is shown in Figure 184. Whereas there is no overall difference there may be an increased need for antibody therapy in the male to female group.

The impact of rejection episodes on graft survival at one and two years is shown in Figure 186. There is no difference in graft survival between recipients who have no rejection and those who have a single rejection episode. There is a trend towards reduced survival at two years in those with mutliple rejections. Patients receiving antibody therapy for rejection have a lower graft survival at one and two years. None of these differences reach statistical significance. (Figure 187).

The occurrence of biopsy proven vascular rejection occurring in the first month does however have a statistically significant effect in reducing graft survival at both one and two years (Figure 188).

There was a trend to increasing serum creatinine at 12 months according to whether the patients had a single rejection, multiple rejections or needed antibody therapy. These differences did however not reach statistical significance (Figure 189).

Figure 178

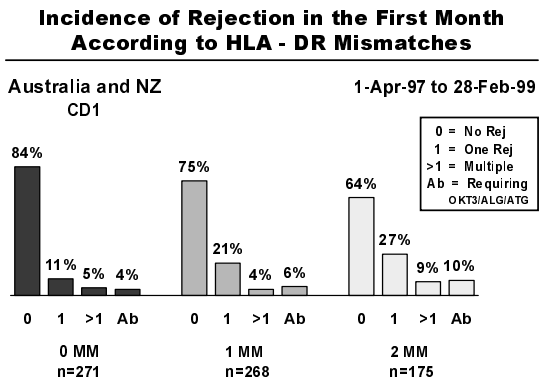


Figure 179

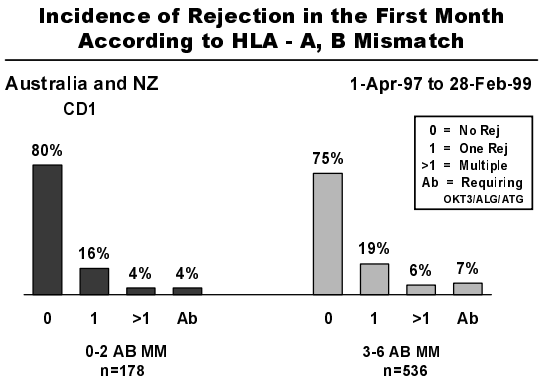


Figure 180

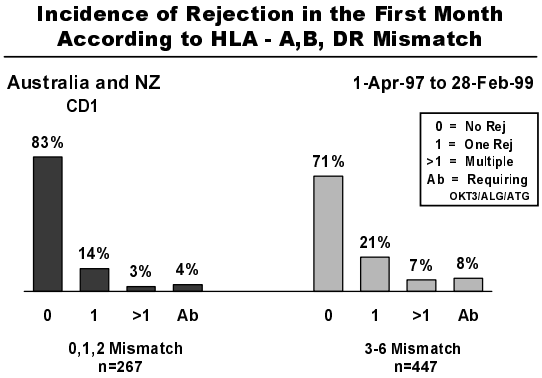


Figure 181

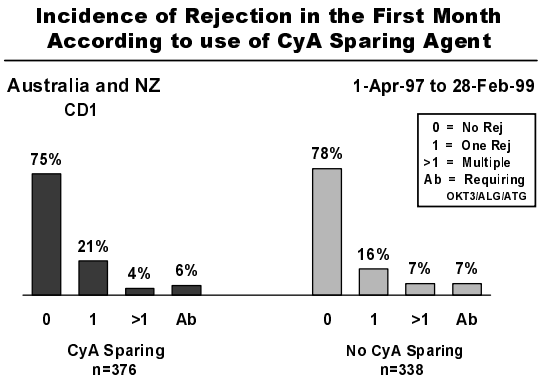


Figure 182

Incidence of Rejection in the First Month According to Primary Renal Disease

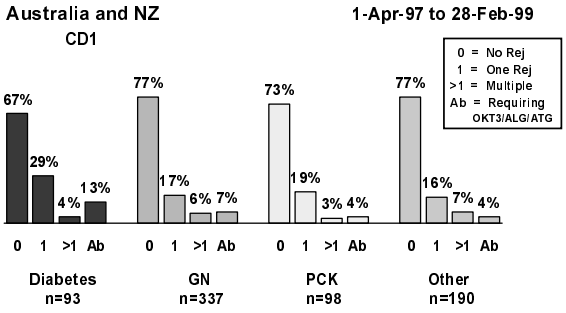


Figure 183

Incidence of Rejection in the First Month According to Peak or Current PRA

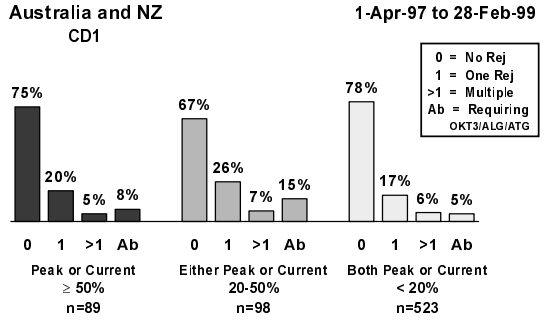


Figure 184

Incidence of Rejection in the First Month According to Donor Age

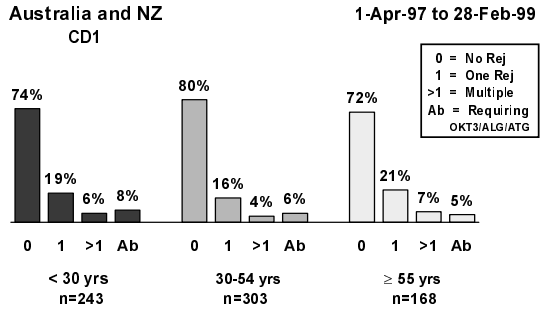


Figure 185

Incidence of Rejection in the First Month According to Initial Drug Therapy

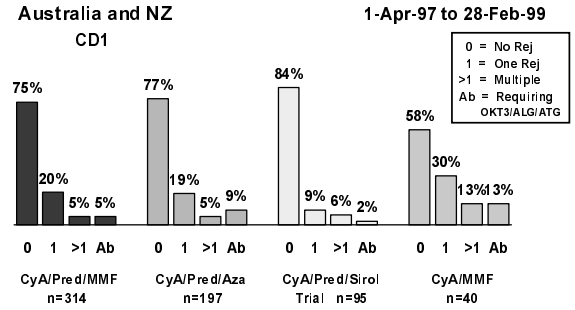


Figure 186

Incidence of Rejection in the First Month According to Donor-Recipient Gender Mismatch

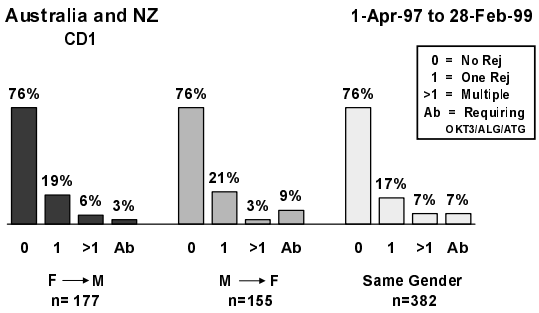


Figure 187

Survival of Primary Cadaver Grafts According to Rejection in the First Month

Australia and NZ — 1-Apr-97 to 28-Feb-99

		Graft Survival 1 yr	2 yr
No Rejection	n=542	89%	85%
One Rejection	n=132	89%	86%
>1 Rejection	n=40	88%	80%
Antibody Therapy	n=46	82%	82%

p = n.s.

Figure 188

Survival of Primary Cadaver Grafts According to Vascular Rejection Occurring in the First Month

Australia and NZ — 1-Apr-97 to 28-Feb-99

		Graft Survival 1 yr	2 yr
Vascular Rejection	n=56	78%	73%
Non Vasc Rejection	n=96	94%	94%

p = 0.004

Figure 189

Serum Creatinine at 12 Months in Primary Cadaver Graft Recipients According to the Occurrence of Rejection in the First Month

Australia and NZ — 1-Apr-97 to 28-Feb-99

	Se Creat µmol/L Mean ± SD
No Rejection	150 ± 81
Single Rejection	164 ± 64
Multiple Rejection	174 ± 75
Antibody Therapy	164 ± 62

p = n.s.

ORGAN DONOR PROCUREMENT

Organ Donors in Australia and New Zealand

(Summarised from the Australia and New Zealand Organ Donation Registry Report 1999)
For more detail please refer to Website: www.anzdata.org.au

Editors K.Herbertt and G.Russ

The Australian and New Zealand organ donation rate over the last four years has remained unchanged at 10-11 donors per million of population (dpmp) per year.

In 1998, of the States with sufficient population to make figures meaningful there was a range of 24 dpmp in South Australia to 7 dpmp in Western Australia. New Zealand has had a slight increase to 12 dpmp.

Figure 190 **Australia and New Zealand**

Number of Donors 1994 - 1998

	1994		1995		1996		1997		1998	
Queensland	38	(12)	34	(10)	35	(10)	37	(11)	40	(12)
New South Wales/ACT	73	(11)	67	(10)	69	(11)	69	(10)	65	(10)
Victoria	26	(6)	38	(8)	49	(11)	42	(9)	40	(9)
Tasmania	6	(13)	4	(8)	1	(2)	5	(11)	0	0
South Australia	23	(16)	23	(16)	25	(17)	25	(17)	35	(24)
Northern Territory	1	(6)	1	(6)	3	(17)	4	(21)	3	(16)
Western Australia	16	(9)	17	(10)	12	(7)	8	(4)	13	(7)
Australia	**183**	**(10)**	**184**	**(10)**	**194**	**(11)**	**190**	**(10)**	**196**	**(10)**
New Zealand	**35**	**(10)**	**35**	**(10)**	**36**	**(10)**	**42**	**(11)**	**46**	**(12)**

( ) Per Million

Figure 191 **Australia and New Zealand**

Donor per Thousand Deaths 1992 - 1998

Year	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Australia	New Zealand
1992	3.2	1.53	1.32	1.07	1.83	0	1.41	1.75	0
1993	2.19	1.68	1.67	1.65	1.99	3.99	1.84	1.82	1.25
1994	1.74	1.59	0.8	1.54	1.96	1.29	1.55	1.44	1.29
1995	1.64	1.46	1.17	1.07	2.04	1.23	1.64	1.47	1.29
1996	1.56	1.49	1.5	0.26	2.15	3.89	1.09	1.51	1.27
1997	1.71	1.46	1.28	1.32	2.16	4.5	0.73	1.47	1.52
1998	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	1.76

Donor Profile

Age and Gender Distribution

The mean age for donors has remained the same as in the previous year, 40.4 years. (Figure 192). In 1998 there were 16 donors (8%) older than 65 years. This is the same as for 1997. The oldest donor was 73.7 years (Figure 193).

New Zealand has seen an increase in mean and median ages over the last four years (mean 34.3 to 38.0 years and median 34.8 to 35.9 years). In 1998 there was one donor (2%) older than 65 years, being 69.7 years (Figure 193).

When comparing Australian States, the mean age ranged from the highest in Victoria 43.4 years to the lowest 33.9 years in Western Australia (Figure 192).

The gender distribution by Australian States and New Zealand is shown in Figure 194.

Figure 192 **Australia**

Mean Age of Donors 1995 - 1998

	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.
1995	34.4	37.2	38.8	23.4	40.2	43.4	42.0	**37.6**
1996	30.5	39.4	43.0	47.1	38.5	36.8	35.0	**38.3**
1997	37.5	40.1	43.8	38.1	45.3	33.5	28.7	**40.4**
1998	35.7	42.7	43.4	0	40.3	44.7	33.9	**40.4**

Figure 193 **Australia and New Zealand**

Age of Male and Female Donors 1995 - 1998

	Year	Mean (years)			Median (years)			Range Years
		All	Female	Male	All	Female	Male	
Australia	1995	37.6	40.0	36.4	38.1	41.7	35.2	3.0 - 72.0
	1996	38.3	40.3	36.9	38.5	46.1	36.2	1.45 - 74.2
	1997	40.4	42.4	39.3	43.1	41.9	43.6	2.5 - 76.1
	1998	40.4	43.8	37.7	43.2	46.2	37.2	0.94 - 73.7
New Zealand	1995	34.2	34.0	34.3	34.8	35.3	28.6	6.8 - 70.7
	1996	36.6	37.9	35.1	35.2	42.7	29.9	9.6 - 72.5
	1997	34.8	37.3	33.2	26.4	46.0	23.7	7.1 - 71.6
	1998	38.0	45.0	34.5	35.9	50.1	32.5	2.8 - 69.7

Figure 194 **Australia and New Zealand**

Gender of Donors 1989 - 1998

	Female		Male		Total
Queensland	149	36%	266	64%	**415**
New South Wales/ACT	293	40%	438	60%	**731**
Victoria	191	43%	253	57%	**444**
Tasmania	10	31%	22	69%	**32**
South Australia	97	41%	138	59%	**235**
Northern Territory	1	5%	19	95%	**20**
Western Australia	64	43%	86	57%	**150**
Australia	**805**	**40%**	**1222**	**60%**	**2027**
New Zealand 1993-98	**92**	**40%**	**136**	**60%**	**228**

Cause of Death - All Donors

Figure 196 shows the cause of death for all organ donors in Australia since 1989 and for New Zealand since 1993. The primary cause of death is cerebrovascular accident (CVA) (47% of all Australian donors and 49% of all New Zealand donors).

Figure 195 shows CVA is responsible for 80% of all deaths in donors 55 years and older, whereas in the 15-34 year age group, trauma accounted for 59% of all deaths, compared to 57% in 1997.

Figure 198 shows detailed cause of death by gender for 1998.

Figure 199 shows a breakdown by Australian States of the major causes of death for total donors in the last ten years. Of the larger States, in only Queensland does trauma (road and non-road) exceed CVA as a cause of donor death.

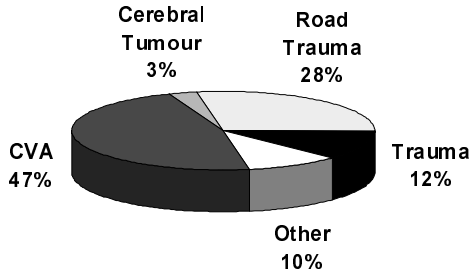
Figure 195 **Australia and New Zealand**

Cause of Donor Death Related to Age Group 1998

	Australia					New Zealand				
	0-14	15-34	35-54	55 on	Total	0-14	15-34	35-54	55 on	Total
CVA	4	12	45	40	**101**	1	3	10	8	**22**
Trauma (road)	5	26	7	3	**41**	0	9	2	0	**11**
Trauma (non-road)	0	9	7	3	**19**	2	2	2	0	**6**
Other	6	12	13	4	**35**	2	1	2	2	**7**
Total	**15**	**59**	**72**	**50**	**196**	**5**	**15**	**16**	**10**	**46**

Figure 196

Cause of Donor Death
Australia 1989 - 1998



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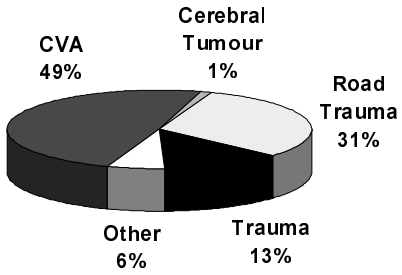
Cause of Donor Death
New Zealand 1993 - 1998



n=228

Figure 197 **Australia and New Zealand**

Cause of Donor Death 1989 - 1998

	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
CVA	40%	51%	49%	41%	45%	20%	47%	**47%**	**49%**
Trauma (road)	31%	26%	27%	28%	25%	35%	39%	**28%**	**30%**
Trauma (non-road)	17%	12%	9%	22%	13%	25%	5%	**12%**	**13%**
Other	12%	11%	15%	9%	17%	20%	9%	**13%**	**8%**

Figure 198 **Australia and New Zealand**

Cause of Donor Death 1998

Causes of Death		Australia			New Zealand		
		Male	Female	Total	Male	Female	Total
CVA	Cerebral Infarct	4	3	**7**	1	0	**1**
	Intracranial Haemorrhage	43	51	**94**	10	11	**21**
Road Trauma	Cyclist	0	1	**1**	2	1	**3**
	Motor Bike Accident	7	0	**7**	0	0	**0**
	Motor Vehicle Accident	14	9	**23**	5	1	**6**
	Pedestrian	5	4	**9**	2	0	**2**
	Other Road Accident	1	0	**1**	0	0	**0**
Other Trauma	Fall	8	2	**10**	4	0	**4**
	Felony / Crime - Assault	4	0	**4**	0	0	**0**
	Gunshot	5	0	**5**	1	0	**1**
	Other trauma	0	0	**0**	1	0	**1**
Hypoxia Anoxia	Asthma	1	3	**4**	0	0	**0**
	Carbon monoxide	2	0	**2**	0	0	**0**
	Cardiac arrest	3	2	**5**	1	0	**1**
	Cardiac Arrhythmia	0	1	**1**	0	0	**0**
	Drowning	3	1	**4**	0	0	**0**
	Drug Overdose	0	1	**1**	0	0	**0**
	Hanging	1	1	**2**	0	0	**0**
	Smoke Inhalation	0	1	**1**	0	0	**0**
	Strychnine Poisoning	1	0	**1**	0	0	**0**
Cerebral Tumour	Acoustic Neuroma (benign)	0	1	**1**	0	0	**0**
	Astrocytoma (malignant)	2	1	**3**	0	0	**0**
	Glioblastoma (malignant)	0	0	**0**	0	1	**1**
	Glioma (malignant)	1	0	**1**	0	0	**0**
	Medulloblastoma (malignant)	1	0	**1**	0	0	**0**
	Pinocytoma (benign)	0	0	**0**	1	0	**1**
	Pituitary Adenoma (benign)	0	1	**1**	0	0	**0**
Other	Cerebral Oedema	2	2	**4**	3	1	**4**
	Haemorrhage	0	1	**1**	0	0	**0**
	Meningitis (meningococcal)	1	0	**1**	0	0	**0**
	Respiratory Disease	0	1	**1**	0	0	**0**
Total		**109**	**87**	**196**	**31**	**15**	**46**

Organs Retrieved

For those Australian organs for whom consent had been given, the specific organ retrieval rates in 1998 were: kidneys 96%, liver 76%, heart 49%, lungs 47% and pancreas 26%.

Figure 199 shows the number of organs retrieved from each donor. In Australia in 1998, 77% of donors were multiple organ donors, compared to 80% in New Zealand. These figures exclude tissue donation.

Figure 200 shows some differences between States. In particular, single organ donation ranged from 0% in Western Australia and Northern Territory to 37% in South Australia.

There was no donor in the Northern Territory and Queensland who donated five organs in 1998.

For New Zealand in 1998, the specific organ retrieval rates when consent had been given were: kidneys 95%, liver 78%, heart 37%, lungs 29% and pancreas 11%.

Figure 199 **Australia and New Zealand**

Trend to Multiple Organ Retrieval 1995 - 1998

No. of Organs	Australia				New Zealand			
	1995	1996	1997	1998	1995	1996	1997	1998
Single	18%	27%	24%	23%	29%	17%	33%	24%
Two	20%	23%	21%	32%	31%	44%	31%	45%
Three	32%	24%	24%	18%	20%	25%	33%	19%
Four	27%	20%	25%	21%	20%	14%	3%	10%
Five	3%	6%	6%	6%	0	0	0	2%

Figure 200 **Australia**

State by State Comparison of Multiple Organ Retrieval 1998

No. of Organs	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA
Single	15%	22%	30%	0	37%	0	0
Two	32%	35%	30%	0	32%	0	31%
Three	27%	18%	10%	0	11%	33%	31%
Four	23%	14%	25%	0	17%	67%	31%
Five	3%	11%	5%	0	3%	0	7%
Total	**100%**	**100%**	**100%**	**0**	**100%**	**100%**	**100%**

NB: 2 kidneys = 1 organ 2 lungs = 1 organ

(On occasions when only one kidney is retrieved, this is also defined as one organ)

Organs Transplanted

The rate of transplantation from Australian organs that were retrieved in 1998 was: kidneys 97%, liver 99% (including recipients of "split" livers), heart 97%, lungs 93% and pancreas 72%.

In 1998, Australia had 3.4 organs used for transplantation, compared to New Zealand at 2.9.

Northern Territory had the highest number of organs transplanted, 5 per donor, followed by Queensland 3.7. These figures exclude tissue transplantation and relates to the number of recipients.

In 1998 for New Zealand, the transplantation rate was: kidneys 91%, liver 94%, heart 100%, lungs 94% and pancreas 50%.

Figure 201 **Australia and New Zealand**

Organs Transplanted per Donor 1998 (1997)

	Qld	NSW/ACT	Vic.	Tas.	SA	NT	WA	Aust.	N.Z.
No. Organs Transplanted	146 (150)	227 (240)	127 (144)	0 (16)	99 (79)	15 (14)	52 (36)	666 (679)	132 (126)
No. of Donors	40 (37)	65 (69)	40 (42)	0 (5)	35 (25)	3 (4)	13 (8)	196 (190)	46 (42)
Average per Donor	3.7 (4.1)	3.5 (3.5)	3.2 (3.4)	0 (3.2)	2.8 (3.1)	5.0 (3.5)	4.0 (4.5)	3.4 (3.6)	2.9 (3.0)

Kidney Donation

Figure 202 **Australia and New Zealand**

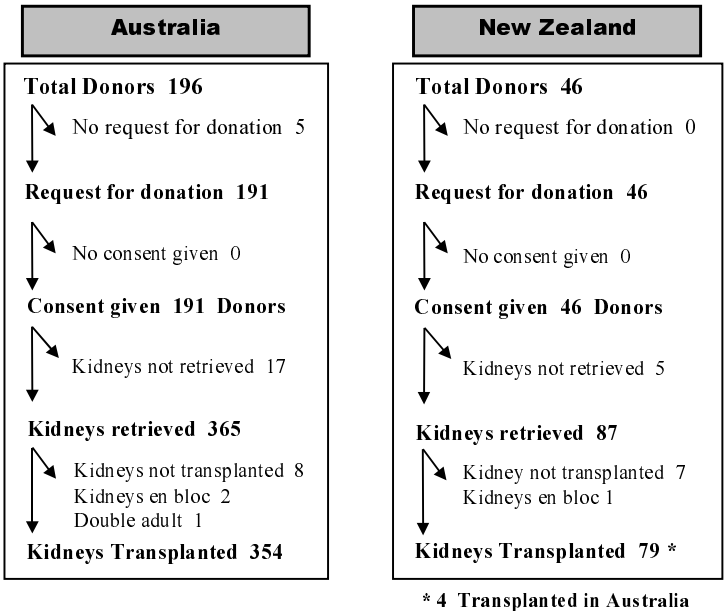
Age of Kidney Donors 1994 - 1998

	Year	00-04	05-14	15-24	25-34	35-44	45-54	55-64	65-74	75-84	Total
Australia	1994	5 (3)	10	46	23	27	32	17	10	1	**171**
	1995	4 (2)	9	39	31	33	29	23 (1)*	10	0	**178**
	1996	5 (3)	10	36	29	36	39	25	8	0	**188**
	1997	3 (2)	8	32	21	36	46	21	12	3	**182**
	1998	1 (1)	10	37	22	32	33	34 (1*)	14 (1x)	0	**183**
	Total	**18 (11)**	**47**	**190**	**126**	**164**	**179**	**120**	**54**	**4**	**902**
New Zealand	1994	1 (1)	0	4	8	7	10	4	1	0	**35**
	1995	0	4	9	6	7	5	2	2	0	**35**
	1996	0	2	12	3	3	9	6	1	0	**36**
	1997	0	4	14	4	3	9	7	1	0	**42**
	1998	1 (1)	4	8	6	8	7	6	1	0	**41**
	Total	**2 (2)**	**14**	**47**	**27**	**28**	**40**	**25**	**6**	**0**	**189**

( ) En-Bloc Kidneys
* Horseshoe Kidney (Adult)
x Double Adult

Figure 203 **Australia and New Zealand**

Outcome of Request for Kidney Donation 1998



* 4 Transplanted in Australia

CANCER REPORT

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The risks of developing cancer in immune-suppressed renal allograft recipients (cadaveric donor and living unrelated donor) in Australia and New Zealand are shown in Figure 204. The patients analysed are those receiving primary renal allografts who have survived three months following transplantation with functioning grafts.

The patients number 7255. Of these, 1611 have survived beyond 10 years post-transplantation, 188 beyond 20 years and 39 beyond 25 years. The graphs reveal steadily increasing risk for non-skin cancer, skin cancer and any cancer. The non-skin plus skin cancers do not sum directly to provide "any cancer" because some patients have both skin cancer and non-skin cancer. By 30 years post-transplantation the risks are 33% for non-skin, 75% for skin and 80% for any cancer. The comparative incidence of non-skin cancer in the age matched general population (South Australia) is shown.

The cancer tables, with data enrolled until September 1998, are presented. In Figure 205, it can be seen that most cancers which occur in the general population have now been recorded in cadaveric donor renal graft recipients. Ten per cent of the transplant population is affected, representing a continuous increase year by year. As most transplant recipients are relatively young, the occurrence of any cancer should be rare. For the great majority of malignancies therefore, the frequency of occurrence is increased compared to that in the age-matched general population. Overall, the increased risk ratio (RR) for non-skin malignancies is 3.2, females being more at risk (RR 3.9) compared to males (RR 2.7).

The cancers with the greatest increased risk have in common an established or suspected viral component to the aetiology. For cadaveric donor graft recipients they include lymphomas (RR 8.4), Kaposi sarcoma (RR 82.6), leukaemia (RR3.3), hepatoma (RR 7.3), and cancers of the oesophagus (RR 5.8), cervix (in situ RR 7.6, invasive RR 3.1), vulva and vagina (RR 41.0) and penis (RR 24.2). As well, there are increased risks in the native renal tracts of renal transplant recipients and an increase in malignancies affecting the endocrine glands (RR 5.3). However, after excluding all of the above-mentioned lymphoid and renal tract cancers, the frequency of other non-skin cancers is still twice that of the age-matched population in Australia and New Zealand, implying either more widespread viral involvement in cancer development than currently is recognised or that the originally postulated immunosuppressive inhibition of immune elimination of naturally occurring malignant mutations is operative. Among the relatively few cancers so far without significantly increased incidence is that of the female breast (RR 1.0). The only two cancers with significantly reduced incidence in renal transplant recipients are those of the prostate (RR 0.6) and ovary (RR 0.4), perhaps reflecting a decreased hormonal drive in these patients.

Analysis of the cancers occurring in recipients of living related donor (LRD) renal grafts (Figure 206) shows a reduced proportion of patients affected (6.7% versus 10%). However, these patients are younger with somewhat shorter follow-up. When compared with the age-matched general population, the risk ratio is increased compared to cadaver donor graft recipients (5.4 versus 3.2), a difference that has now become statistically significant ($p < .02$). There are no striking differences in the distribution of malignancies recorded in LRD recipients with the exception that alimentary tract cancers constitute a much smaller proportion of cancers recorded (8% versus 18%). However, these cancers have a late mean time of presentation in cadaveric donor recipients (mean time of presentation 10.4 years, mean time of recipient follow-up 7.9 years) and follow-up in LRD recipients is less than this (mean 6.9 years). The increased risk of cancer in LRD graft recipients may reflect greater susceptibility of the younger patients to viral infections, or greater susceptibility to the effect of immunosuppressive agents or that greater proportions of these recipients survive with functioning grafts, exposing them to the effects of continued immunosuppression, antigenic stimulation and viral exposure.

Genito-Urinary Malignancies

The most frequent malignancies are those of the genito-urinary system. These constitute one-third of the total. The female genital tract is particularly at risk, contributing approximately one-half of the genito-urinary malignancies. Squamous cell carcinomas of the vulva and vagina, and in situ and invasive carcinomas of the uterine cervix feature particularly with greatly increased risk ratios. These cancers have an association with human papilloma virus infections. The considerably increased risk ratios for bladder (RR 7.19), kidney (RR 6.9) and ureter (RR 250.0) malignancies no doubt reflect in part the serious urinary tract abnormalities common in these patients. Indeed, retained native kidneys represent a definitive threat both because the cause of renal failure may have been a condition known to predispose to malignancy, such as analgesic nephropathy, and because the retained kidneys may have developed the condition of acquired cystic disease with its malignant potential.

Alimentary Tract Malignancies

Malignancies involving the digestive organs are a second major group and constitute 20% of the total. One-half involve the large bowel. However, the entire gastrointestinal tract and its accessory organs are at increased risk, particularly the oesophagus (RR 5.04) and liver (RR 5.67). Those in which the increased risk has not yet reached statistical significance are the pharynx, small intestine, rectum and anus and gall bladder and bile ducts.

Post-transplant Lymphoproliferative Disease and Malignant Lymphoma

While post-transplant lymphoproliferative disease (PTLD) is the most common neoplasia occurring in the early post-transplant course of graft recipients, with the passage of time and the concomitant diagnosis of other forms of malignancy, the proportion has now fallen to 12% of all non-skin malignancies. The incidence has remained at approximately 1% of all patients receiving renal allografts in Australia and New Zealand throughout the years, and there has been no change in this incidence since the introduction of Cyclosporin in the early 1980's or of other agents (Tacrolimus, Mycophenolate Mofetil, various anti-lymphocyte antibodies) since. However, apart from Cyclosporin, the introduction of the new agents has been too recent to allow meaningful analysis.

Carcinoma of the Lung and Leukaemia

Two other malignancies occurring with steadily increasing frequency are those of the lung and leukaemia. These cancers constitute 8% and 3% of malignancies respectively.

Kaposi Sarcoma

As with other western countries, Kaposi sarcoma is occurring in around 0.25% of renal allograft recipients, contributing 2% of all cancers. This reflects the proportion of patients with Mediterranean heritage in our population. In Mediterranean countries, such as Saudi Arabia, the condition affects approximately 5% of recipients causing 40-70% of all cancers. It is exceedingly rare in countries such as Japan.

Skin Cancer

The pre-malignant and malignant skin conditions which occur in transplant recipients include keratoacanthomas, Bowen's disease, basal cell carcinoma, squamous cell carcinoma and malignant melanoma. Those which have occurred in the Australia and New Zealand patients are shown in Figure 207. Here, the apparent decreased incidence in recipients of living donor grafts is accounted for by the younger age and shorter follow-up of these patients compared to recipients of cadaveric donor grafts. When these factors are taken into account there is no significant difference in skin cancer incidences between living and cadaveric donor recipients.

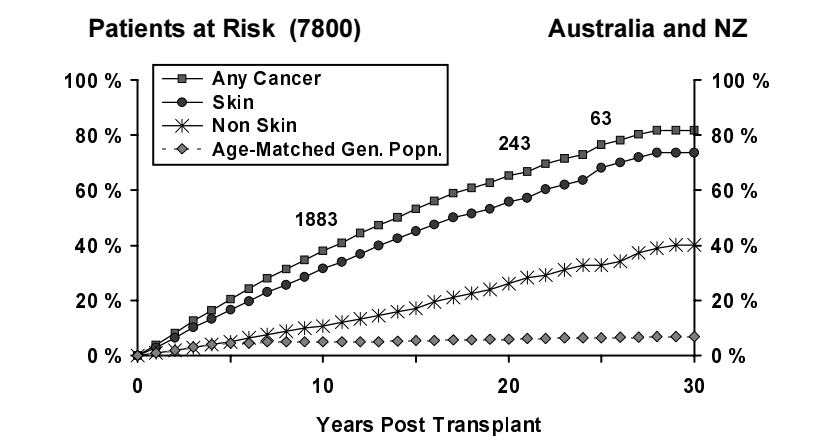
Time of Cancer Presentation

The average times of presentation of the various cancers gradually lengthen in concert with the progressively lengthening mean follow-up period for transplant recipients. In the Australian experience with patient follow-up of 0-31 (mean 7.9) years, the current mean time of appearance for lymphomas, Kaposi sarcoma and cancers of the endocrine glands is approximately 6.0 years following transplant; for cancers affecting the respiratory tract 8 years; breast, genito-urinary system and leukaemia 8.8 years; and alimentary tract 10.4 years. For skin malignancy the average time of diagnosis is 7.6 years post-transplant.

See Figures 208 to 211.

Figure 204

Risk of Cancer Post Transplant 1965 to 30-Sep-98
Primary Cadaver and Living Unrelated Donors
Patient and Graft Survived 90 Days Post Transplant



Risk of Cancer* Following Cadaveric Donor Renal Transplantation 1965 to 30-Sep-1998 [n=9200]

Site of Cancer	Cancer		Risk Ratio	95% Confidence	
	Observed	Expected			
Alimentary Tract	184	80.53	2.30	1.97	2.64
Buccal Cavity	34	13.61	2.5	1.73	3.49
Pharynx	5	2.40	2.1	0.68	4.86
Oesophagus	19	3.25	5.8	3.52	9.13
Stomach	10	7.56	1.3	0.63	2.43
Small Intestine	3	0.73	4.1	0.85	12.01
Colon	58	25.73	2.3	1.71	2.91
Rectum & Anus	25	17.87	1.4	0.91	2.07
Liver	12	1.65	7.3	3.76	12.70
Gall Bladder & extra Hepatic Bile Ducts	5	2.21	2.3	0.73	5.28
Pancreas	13	5.51	2.4	1.26	4.03
Respiratory	88	37.76	2.30	1.87	2.87
Larynx	7	2.93	2.4	0.96	4.92
Trachea, Bronchus & Lung	76	33.35	2.3	1.80	2.85
Pleura	5	1.48	3.4	1.10	7.88
Bone	3	0.69	4.3	0.90	12.71
Connective Tissue	1	3.03	0.3	0.01	1.84
Breast	52	49.63	1.00	0.78	1.37
Female	50	49.27	1.0	0.75	1.34
Male	2	0.36	5.6	0.67	20.07
Genito-urinary	313	81.78	3.8	3.42	4.28
Cervix - in situ	66	4.06	7.6	12.57	20.68
Cervix - invasive	14	4.45	3.1	1.72	5.28
Uterus	11	7.66	1.4	0.72	2.57
Ovary	2	5.26	0.4	0.05	1.37
Vulva & Vagina	43	1.05	41.0	29.64	55.16
Prostate	23	37.95	0.6	0.38	0.91
Testis	5	3.11	1.6	0.52	3.75
Penis	8	0.33	24.2	10.47	47.77
Bladder	66	8.80	7.5	5.80	9.54
Kidney	63	9.06	7.0	5.34	8.90
Ureter	12	0.04	300.0	155.03	524.05
Central Nervous System not Lymphoma	7	7.51	0.9	0.37	1.92
Endocrine Glands	19	3.60	5.3	3.18	8.24
Thyroid	16	3.58	4.5	2.55	7.26
Parathyroid	2	0.01	200.0	24.20	722.50
Other endocrine	1	0.02	50.0	1.27	278.60
Lymphoma	123	14.63	8.4	6.99	10.0
CNS	17	0.01	>1000	990.00	>1000
Non-Hodgkins	103	12.82	8.03	6.56	9.75
Hodgkins Disease	3	1.81	1.7	0.34	4.84
Multiple Myeloma	9	3.63	2.5	1.13	4.71
Leukaemia	29	8.68	3.3	2.24	4.80
Kaposi's Sarcoma	19	0.23	82.6	49.73	129.00
Malignant Melanoma	104	32.50	3.2	2.61	3.88
Miscellaneous	78	12.03	6.5	5.13	8.09
Total	**1029****	**318.51**	**3.2**	**3.04**	**3.43**

* Non-melanotic skin cancers are not included
** The 1029 cancers occurred in 925 (10%) patients

Figure 206 **Australia and New Zealand**

Risk of Cancer* Following Living Donor Renal Transplantation
1965 to 30-Sep-1998 [n=1379]

Site of Cancer	Cancer		Risk Ratio	95% Confidence	
	Observed	Expected			
Alimentary Tract	7	3.57	2.0	0.79	4.04
Buccal Cavity	1	0.85	1.2	0.03	6.56
Pharynx	0	0.11	0.0	0.00	33.54
Oesophagus	2	0.12	16.7	2.02	60.21
Stomach	1	0.29	3.4	0.09	19.21
Small Intestine	0	0.03	0.0	0.00	122.97
Colon	1	1.07	0.9	0.02	5.21
Rectum & Anus	1	0.73	1.4	0.03	7.63
Liver	1	0.06	16.7	0.42	92.87
Gall Bladder & extra Hepatic Bile Ducts	0	0.09	0.0	0.00	40.99
Pancreas	0	0.22	0.0	0.00	16.77
Respiratory	5	1.38	3.6	1.18	8.46
Larynx	0	0.11	0.0	0.00	33.54
Trachea, Bronchus & Lung	5	1.21	4.1	1.34	9.64
Pleura	0	0.06	0.0	0.00	61.48
Bone	0	0.07	0.0	0.00	52.70
Connective Tissue	2	0.23	8.7	1.05	31.41
Breast	3	2.72	1.1	0.23	3.22
Female	3	2.71	1.1	0.23	3.24
Male	0	0.02	0.0	0.00	184.45
Genito-urinary	36	3.88	9.3	6.50	12.85
Cervix - in situ	5	0.61	8.2	2.66	19.13
Cervix - invasive	12	0.37	5.4	16.76	56.65
Uterus	2	0.34	5.9	0.71	21.25
Ovary	0	0.26	0.0	0.00	14.19
Vulva & Vagina	0	0.00	0.0	0.00	0.00
Prostate	0	1.01	0.0	0.00	3.65
Testis	1	0.46	2.2	0.05	12.11
Penis	1	0.02	50.0	1.25	278.60
Bladder	2	0.35	5.7	0.69	20.64
Kidney	3	0.41	7.3	1.51	21.38
Ureter	1	0.01	100.0	2.53	557.00
Central Nervous System not Lymphoma	3	0.51	5.9	1.21	17.19
Endocrine Glands	1	0.34	2.9	0.07	16.39
Thyroid	1	0.33	3.0	0.08	16.88
Parathyroid	0	0.00	0.0	0.00	0.00
Other endocrine	0	0.00	0.0	0.00	0.00
Lymphoma	9	1.00	9.0	4.12	17.09
CNS	0	0.00	0.0	0.00	0.00
Non-Hodgkins	8	0.75	10.7	4.61	21.02
Hodgkins Disease	1	0.24	4.2	0.10	23.22
Multiple Myeloma	1	0.15	6.7	0.17	37.15
Leukaemia	2	0.48	4.2	0.50	15.05
Kaposi's Sarcoma	3	0.02	150.0	30.95	438.35
Malignant Melanoma	10	2.56	3.9	1.87	7.18
Miscellaneous	5	0.51	9.8	3.18	22.88
Total	**87**	**16.19**	**5.4**	**4.30**	**6.63**

* Non-melanotic skin cancers are not included

Figure 207 **Australia and New Zealand**

Skin Pre-cancer and Cancer
In Patients Following Renal Transplantation

		Beyond 3 months Post Transplant	
		Living Related Donor	Cadaveric Donor
Pre-cancer	Keratoacanthoma	18	489
	Bowen's Disease	26	583
Cancer	Squamous Cell Carcinoma	79 (58%)	1644 (55%)
	Basal Cell Carcinoma	47 (34%)	1137 (38%)
	Melanoma	8 (6%)	87 (3%)
	Other	3 (2%)	106 (4%)
Total Cancers		**137**	**2974**
Total Patients with Cancer		**105 (9%)**	**2031 (24%)**
Patients at Risk		**1178**	**8618**
Patient Years of Risk		**8005**	**68,580**

Figure 208 **Australia and New Zealand**

Renal Failure Patients
Sites of Cancer* Diagnosed During Different Treatment Periods
1965 to 30-Sep-1998

Site of Cancer	Prior to Dialysis	On Dialysis	Transplant Recipients	
			Living Donor	Cadaver Donor
Alimentary Tract	200	137	7 (8%)	184 (18%)
Buccal Cavity	16	17	1	34
Pharynx	4	4	0	5
Oesophagus	2	9	2	19
Stomach	15	18	1	10
Small Intestine	3	2	0	3
Colon	114	51	1	58
Rectum & Anus	42	19	1	25
Liver	1	6	1	12
Gall Bladder & extra Hepatic Bile Ducts	1	4	0	5
Pancreas	2	7	0	13
Respiratory	23	104	5 (6%)	88 (9%)
Larynx	4	6	0	7
Trachea, Bronchus & Lung	19	96	5	76
Pleura	0	2	0	5
Bone	4	2	0	3 (0.3%)
Connective Tissue	1	0	2 (2%)	1 (0.1%)
Breast	120	60	3 (3%)	52 (5%)
Female	119	59	3	50
Male	1	1	0	2
Genito-urinary	790	255	36 (41%)	313 (30%)
Cervix - in situ	33	18	15	66
Cervix - invasive	23	7	2	14
Cervix - unknown	3	0	0	0
Uterus	35	8	2	11
Ovary	21	8	0	2
Vulva & Vagina	5	1	9	43
Prostate	111	38	0	23
Testis	28	1	1	5
Penis	2	0	1	8
Bladder	145	90	2	66
Kidney	355	71	3	63
Ureter	29	13	1	12
Central Nervous System not Lymphoma	4	14	3 (3%)	7 (0.6%)
Endocrine Glands	18	18	1 (1%)	19 (2%)
Thyroid	12	15	1	16
Parathyroid	3	2	0	2
Other Endocrine	3	1	0	1
Lymphoma	50	18	9 (10%)	123 (12%)
CNS	1	1	0	17
Non-Hodgkins	39	13	8	10
Hodgkins Disease	10	4	1	3
Multiple Myeloma	173	19	1 (1%)	9 (1%)
Leukaemia	27	7	2 (2%)	29 (3%)
Kaposi's Sarcoma	1	3	3 (3%)	19 (2%)
Malignant Melanoma	83	44	10 (11%)	104 (10%)
Miscellaneous	28	44	5 96%)	78 (8%)
Total	**1522**	**725**	**87**	**1029**
Total Patients with Cancer	**1361 (5%)**	**673 (3%)**	**79 (5.7)**	**925 (10%)**
Patients at Risk	**26,467**	**23,702**	**1379**	**9200**

* Non-melanotic skin cancers are not included

Figure 209 **Australia and New Zealand**

The Clinical Features of all Cancers* Diagnosed Following Cadaveric Donor Renal Transplantation 1965 to 30-Sep-1998 [n=9200]

Site of Cancer	No. of Cancers	Age of Patients (years)		Sex		Time of Diagnosis after Transplant (months)		Occurr-ence of Metas-tases	Death		Patients Alive
		Range	Mean	M	F	Range	Mean		Of this cancer	Other causes	
Alimentary Tract	184	23-78	56	105	79	4-334	129	89	111	28	45
Stomach	10	48-67	59	6	4	11-134	62	5	9	0	1
Colon	58	39-75	59	26	32	11-323	130	33	33	15	10
Rectum	25	37-68	53	9	16	40-325	155	12	13	2	10
Other	91	23-78	54	64	27	4-334	129	39	56	11	24
Respiratory Organs	88	31-77	60	57	31	3-277	101	50	70	8	10
Trachea and Lung	76	31-77	60	49	27	3-277	103	45	62	5	9
Other	12	47-66	59	8	4	6-214	86	5	8	3	1
Bone	3	51-58	54	1	2	70-90	82	0	2	0	1
Connective Tissue	1	60-60	60	0	1	33-33	0	0	0	1	0
Breast	52	31-72	52	2	50	3-266	105	24	19	7	26
Genito-urinary	313	13-75	50	91	222	3-296	100	40	76	95	142
Cervix - in situ	66	23-65	44	0	14	21-249	108	7	8	3	3
Cervix - invasive	14	26-69	38	0	66	3-236	79	1	1	17	48
Uterus	11	37-65	51	0	11	15-296	134	3	4	2	5
Vulva & Vagina	43	25-60	45	0	43	21-284	146	4	5	15	23
Prostate	23	54-71	64	23	0	16-242	100	4	4	8	11
Bladder	66	30-70	54	26	40	4-277	97	8	22	24	20
Kidney & Ureter	75	13-75	56	29	46	4-257	87	8	29	24	22
Other	15	23-69	45	13	2	16-231	110	5	3	2	10
Central Nervous System Not Lymphoma	7	35-71	48	7	0	26-250	120	1	5	0	2
Endocrine Glands	19	23-60	45	10	9	6-249	84	8	3	5	11
Lymphoma	123	13-74	51	70	53	3-342	80	45	74	20	29
CNS	17	27-72	48	9	8	4-106	28	0	10	7	0
Non-Hodgkins	103	13-74	52	58	45	3-342	89	43	64	13	26
Hodgkin's Lymphoma	3	53-67	60	3	0	48-78	65	2	0	0	3
Multiple Myeloma	9	44-70	60	6	3	10-315	119	0	6	1	2
Leukaemia	29	31-67	51	17	12	11-225	106	9	27	0	2
Kaposi Sarcoma	19	28-63	50	9	10	4-216	71	8	8	3	8
Malignant Melanoma	104	21-74	52	63	41	8-309	92	32	25	29	50
Miscellaneous	27	31-66	52	21	6	7-284	112	15	17	5	5
Unknown	51	24-76	58	31	20	5-313	106	49	46	2	3
Total	**1029****	**13-78**	**53**	**490**	**539**	**3-342**	**103**	**370**	**489**	**204**	**336**

* Non-melanotic skin cancers are not included
** The 1029 cancers occurred in 925 (10%) patients

Figure 210 **Australia and New Zealand**

The Clinical Features of all Cancers* Diagnosed Following Living Related Donor Renal Transplantation 1965 to 30-Sep-1998 [n=1379]

Site of Cancer	No. of Cancers	Age of Patients (years)		Sex		Time of Diagnosis after Transplant (months)		Occurr-ence of Metas-tases	Death		Patients Alive
		Range	Mean	M	F	Range	Mean		Of this cancer	Other causes	
Alimentary Tract	7	35-69	47	1	6	16-235	108	4	4	1	2
Stomach	1	37-37	38	0	1	16-16	16	1	1	0	0
Colon	1	43-43	43	0	1	103-103	103	1	1	0	0
Rectum	1	35-35	35	0	1	127-127	127	0	0	0	1
Other	4	42-69	53	1	3	71-235	127	2	2	1	1
Respiratory Organs	5	45-69	55	2	3	12-234	110	4	2	1	2
Trachea and Lung	5	45-69	55	2	3	12-234	110	4	2	1	2
Other	0	0-0	0	0	0	0-0	0	0	0	0	0
Bone	0	0-0	0	0	0	0-0	0	0	0	0	0
Connective Tissue	2	39-46	43	1	1	45-70	58	0	0	0	2
Breast	3	31-51	43	0	3	32-290	153	3	3	0	0
Genito-urinary	36	16-56	34	7	29	3-313	92	2	3	2	31
Cervix - in situ	15	22-42	29	0	15	9-159	68	0	0	1	14
Cervix - invasive	2	38-48	43.8	0	2	106-126	117	1	1	0	1
Uterus	2	43-50	48	0	2	23-182	103	1	1	0	1
Vulva & Vagina	9	24-52	33	0	9	18-280	105	0	0	0	9
Prostate	0	0-0	0	0	0	0-0	0	0	0	0	0
Bladder	2	41-43	43	2	0	102-313	208	0	0	0	2
Kidney & Ureter	4	16-56	34	3	1	3-123	60	0	1	1	2
Other	2	35-46	41	2	0	79-216	148	0	0	0	2
Central Nervous System Not Lymphoma	3	19-55	39	3	0	7-92	37	2	1	0	2
Endocrine Glands	1	30-30	30	0	1	67-67	67	1	0	0	1
Lymphoma	9	23-63	42	3	6	3-144	77	3	1	1	7
CNS	0	0-0	0	0	0	0-0	0	0	0	0	0
Non-Hodgkins	8	23-63	44	3	5	3-144	73	3	1	1	6
Hodgkin's Lymphoma	1	24-24	24	0	1	104-104	104	0	0	0	1
Multiple Myeloma	1	58-58	58	1	0	59-59	59	0	0	1	0
Leukaemia	2	19-39	30	2	0	45-59	53	1	2	0	0
Kaposi Sarcoma	3	11-43	31	2	1	9-146	70	0	0	0	3
Malignant Melanoma	10	33-64	46	8	2	20-222	93	3	2	1	7
Miscellaneous	2	2-52	28	1	1	9-160	85	2	2	0	0
Unknown	3	43-60	51	1	2	50-213	130	3	2	0	1
Total	**87****	**2-69**	**40**	**32**	**55**	**3-313**	**91**	**28**	**22**	**7**	**58**

* Non-melanotic skin cancers are not included
** The 87 cancers occurred in 79 patients

Figure 211 **Australia and New Zealand**

Renal Failure Patients Risk of Cancer Other than Skin, Related to Treatment Period At 30-Sep-1998

Patient Group		Males				Females				Both Genders				
		Pts at Risk	* Obs Ca	** Exp Ca	*** Risk Ratio	Pts at Risk	* Obs Ca	** Exp Ca	*** Risk Ratio	Pts at Risk	Pt Years at Risk	* Obs Ca	** Exp Ca	*** Risk Ratio
Prior to Dialysis		14,863	823	1317	0.6	11,604	699	993	0.7	26,467	1,302,986	1522	2310	0.7
On Dialysis		13,287	396	298	1.3	10,415	329	161	2.0	23,702	53,162	725	459	1.6
Post Transp-lant	LRD	825	32	8.04	4.0	554	55	8.15	6.7	1379	9576.2	87	16	5.4
	CD	5350	490	179	2.7	3850	539	140	3.9	9200	76,072	1029	319	3.2

* Obs Ca = Observed Cancers
** Exp Ca = Expected Cancers
*** Risk Ratio = Obs Ca / Exp Ca

PAEDIATRIC REPORT

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Introduction

The major focus of this year's paediatric report will again be transplantation. The report will also include outcomes for the 15-19 year old 'adolescent' group.

Although for analyses the separation of children on the basis of age range clearly has limitations it does offer some opportunities for historical comparisons as the subsequent annual ANZDATA Reports are produced.

Incidence of End Stage Renal Failure

The age related incidence of ESRF for children in Australia and New Zealand is shown in Figure 212.

In infants (0-2 years) in Australia, on average over the last four years the incidence has exceeeded 8 per million of population aged 0-2 years - equal to the highest incidence of any age group up to 15 years.

Mode of Current Treatment

Figure 213, shows the current mode of treatment for all children and adolescents (at 31st March 1999) with ESRF. The age related relative proportion of children with a functioning transplant is shown in Figure 214. Results are similar to the 1998 figures.

The distribution of dialysis and transplant patients by State is shown in Figures 215-216. Considerable variation in the proportion of children and adolescents with functioning transplants is seen across the Australian States.

Transplantation

Immunosuppression

Prednisolone

In the 1998 Report, doses of Cyclosporin (CyA), Prednisolone and Azathioprine were analysed for the first 12 months. Figure 217 shows the proportion of patients able to achieve a 'zero' Prednisolone dose up to ten years post-transplant. Approximately 30% of children (0-14 years) and adolescents are not taking Prednisolone as part of maintenance immunosuppression at 12 months - this proportion does not change substantially up to ten years.

Cyclosporin and Cyclosporin Sparing Agents

In the 1998 Report, CyA dosage was tabulated across the age groups in relation to the use of CyA sparing agents (essentially Diltiazem). Figures 218 and 219 detail the use of CyA sparing agents in Australia and New Zealand and confirms the relatively low usage of these agents in children even allowing for the incomplete data collection prior to April 1994.

Graft Survival (for all grafts) for Australia and New Zealand children and adolescents (since April 1994) comparing CyA alone and CyA and CyA sparing agents is shown in Figure 220.

In the 0-14 year age group only one graft treated with CyA and a CyA sparing agent has been lost since April 1994. As the total number of patients treated with CyA sparing agents is small it is not surprising that no significant difference is observed in either age groups between patients treated with CyA alone or with CyA and CyA sparing agents. For Australian children 0-14 years, the difference in graft survival for the two treatment groups has a p value of 0.06.

For Australian patients treated with CyA and CyA sparing agents, the 0-14 year old group had a significantly better graft outcome than adolescents; p = 0.05.

Graft Function

In Fi9gure 221 glomerular filtration rates (GFR) are expressed as calculated creatinine clearance estimations (mean and median values) for children treated between 1984 and 1998. The data includes all primary CD and LD grafts. The basis of the calculation is as follows: [1]

GFR = k* height (cm) / creatinine (μ mol/L)
k = 49 for girls aged 2 to 15.9 years.
k = 49 for boys aged 2 to 12.9 years.
k = 60 for boys aged 13 to 15.9 years.

A steady average annual reduction of mean and median GFR estimations of approximately 3-5 ml/min/1.73m^2 is observed in all CyA treated grafts after the first 12 months.

[1] Taylor CM; 'Assessment of glomerular filtration rate'. In: Clinical Paediatric Nephrology. Ed. Postlethwaite RJ, 2nd Edition, p 91-100. 1994.

Second and Subsequent Grafts

Patient survival and graft survival for children and adolescents receiving second and subsequent grafts is shown in Figures 222-223, for patients receiving allografts between 1984 and 1998. The overall experience is limited but the results are comparable to overall graft outcome (especially when the 2nd or subsequent graft has a LD source). Figure 224.

Results for adolescents receiving CD grafts as a second or subsequent graft are disappointing, with an overall experience for Australia and New Zealand showing a <50% survival for such grafts at three years.

Growth and Development

Height Standard Deviation Scores (HtSDS)

Figure 225 shows the first recorded HtSDS for Australian and New Zealand children and adolescents, the last HtSDS recorded and the 'delta' (differences) between the first and the last score.

Consistent with previous reporting in the Registry, the data suggest continued average growth in ESRF patients but failure to achieve catch up growth. The sparse use of Recombinant Human Growth Hormone (HGH) appears to have been preserved for children with relatively poor initial HtSDS scores.

The data reinforces the notion that there is an absolute requirement for maximising the growth potential of a child before he/she reaches ESRF.

Note: $\text{HtSDS} = \frac{\text{Actual height - mean height for age}}{\text{standard deviation at that age}}$

Bone Ages

Serious limitations exist concerning the 'bone age' data. Recording of bone age is sporadic. Figure 226 shows the relationship between bone age and chronological age for patients related to current treatment and age range for both Australian and New Zealand children and adolescents.

The combined data (Australia and New Zealand) for all modalities of treatment suggests a reasonably consistent difference between bone age and chronological age appropriate across the age groups (approximate difference: chronological age - bone age approximately 1.5 years). Figure 227 shows the combined data.

Tanner Scores

These are also noteworthy for the incompleteness of the data. Figure 228 shows Tanner Scores for Australian and New Zealand children (all modalities of treatment) and adolescents. No child $\leq$ 10 years of age has a Tanner Scale recorded of $\geq$ 1. There are only 46 valid observations in females and 64 such observations in males, between the ages of 10 and 15.

Concluding Remarks and Summary

Incidence: the incidence of 0-2 year olds requiring ESRF treatment is amongst the highest across the paediatric age groups.

Mode of Treatment: of children and adolescents with ESRF the proportion with a functioning transplant (children 72%, adolescents 65%) is being maintained.

Transplantation: complete withdrawal of Prednisolone is achievable or favoured in approximately 30% of patients from the first year post transplant.

The trend towards improved graft outcome with Cya and CyA sparing agents compared to CyA alone does not reach significance.

GFR's: (calculated) appear to deteriorate steadily from the first year post transplant.

Graft outcome in second and subsequent grafts in adolescents is particularly poor.

Growth and Development: growth data for children and adolescents with ESRF highlights the need for vigilance in maximising growth potential in the predialysis phase.

Note to Contributors: the individual contributors to the Paediatric Registry Database deserve ongoing praise for their efforts in providing timely and accurate data submissions. We need to constantly review the data we are collecting not only for its usefulness but for its completeness.

Figure 212 **Australia and New Zealand**

Age of New Patients by Year of Entry

Year	Australia						New Zealand					
	Age Range in Years						Age Range in Years					
	0-2	3-4	5-9	10-14	**Total**	15-19	0-2	3-4	5-9	10-14	**Total**	15-19
1990	3	1	6	8	**18**	25	0	0	0	5	**5**	4
1991	6	2	4	8	**20**	18	0	2	1	3	**6**	3
1992	5	2	5	13	**25**	29	1	0	3	3	**7**	7
1993	3	1	3	12	**19**	21	2	2	1	3	**8**	2
1994	0	4	10	14	**28**	19	0	1	2	3	**6**	3
1995	10	2	9	11	**32**	15	1	0	3	1	**5**	7
1996	8	4	11	7	**30**	14	2	1	5	2	**10**	5
1997	2	5	6	13	**26**	21	1	0	3	3	**7**	3
1998	5	2	5	12	**24**	19	0	0	0	5	**5**	6

Figure 213 **Australia and New Zealand**

Mode of Current Treatment Related to Age
Patients alive at 31-Mar-1999

Mode of Treatment	Australia						New Zealand					
	Age Range in Years						Age Range in Years					
	0-2	3-4	5-9	10-14	**Total**	15-19	0-2	3-4	5-9	10-14	**Total**	15-19
IPD Hospital	0	1	0	2	**3**	0	1	0	0	0	**1**	0
IPD Home	2	4	5	10	**21**	8	1	0	1	7	**9**	3
CAPD Home	2	0	1	0	**3**	7	0	0	0	0	**0**	5
HD Hospital	0	0	2	4	**6**	16	0	0	0	2	**2**	5
HD Home	0	0	0	0	**0**	5	0	0	0	0	**0**	0
HD Satellite	0	0	0	0	**0**	6	0	0	0	0	**0**	2
Transplanted	1	8	36	48	**93**	90	0	2	6	13	**21**	17
Total	**5**	**13**	**44**	**64**	**126**	**132**	**2**	**2**	**7**	**22**	**33**	**32**

Figure 214 **Australia and New Zealand**

Mode of Current Treatment Related to Age 31-Mar-1999
Proportion (%) of Patients with Functioning Transplant

Country	Age Range in Years					Total 1999	Total 1998
	0-2	3-4	5-9	10-14	15-19		
Australia	(5) 20%	(13) 62%	(44) 82%	(64) 75%	(132) 68%	**(258) 71%**	(270) 70%
New Zealand	(2) 0%	(2) 100%	(7) 86%	(22) 59%	(32) 53%	**(65) 58%**	(57) 60%

( ) Number of Patients

Figure 215 **Australia and New Zealand**

Mode of Current Treatment Related to Age
Patients alive at 31-Mar-1999

Country	Mode of Treatment	Australian States	Age Range in Years					
			0-2	3-4	5-9	10-14	**Total**	15-19
Australia	Dialysis	Qld	0	0	1	2	**3**	10
		NSW/ACT	1	1	3	8	**13**	20
		Vic.	2	0	2	3	**7**	7
		SA	0	2	0	0	**2**	3
		WA	1	2	2	3	**8**	2
	Transplantation	Qld	0	0	5	5	**10**	15
		NSW/ACT	0	2	9	18	**29**	31
		Vic.	0	5	12	16	**33**	20
		Tas.	0	0	1	2	**3**	3
		SA	0	0	4	4	**8**	7
		NT	0	0	0	2	**2**	4
		WA	1	1	5	1	**8**	10
		Total	**5**	**13**	**44**	**64**	**126**	**132**
New Zealand	Dialysis		2	0	1	9	**12**	15
	Transplantation		0	2	6	13	**21**	17
		Total	**2**	**2**	**7**	**22**	**33**	**32**
Total Australia and New Zealand			**7**	**15**	**51**	**86**	**159**	**164**

Figure 216 **Australia and New Zealand**

Proportion [%] of Children and Adolescents With a Functioning Renal Transplant 31-Mar-1999

Age Group	Qld	NSW/ACT	Vic./Tas.	SA/NT	WA	New Zealand
0-14 years	(13) 70%	(42) 69%	(43) 84%	(12) 83%	(16) 50%	(33) 64%)
15-19 years	(25) 60%	(51) 61%	(30) 77%	(14) 79%	(12) 83%	(32) 53%

( ) Number of Children with ESRF

Figure 217 **Australia and New Zealand**

Proportion [%] of Patients on Zero Dose Prednisolone Grafts 1-Jan-1984 to 31-Dec-1998

	Country	Age Range in Years at Time of Transplant				
		0-4	5-9	10-14	0-14	15-19
0 Month	Australia	(6) 10.5%	(10) 12.8%	(18) 12.6%	(34) 12.2%	(48) 20.8%
	New Zealand	0	0	0	0	0
1 Month	Australia	(3) 5.8%	(4) 5.6%	(8) 6.2%	(15) 5.9%	(32) 14.7%
	New Zealand	0	0	0	0	0
3 Months	Australia	(4) 8.7%	(6) 8.3%	(8) 6.6%	(18) 7.5%	(24) 11.5%
	New Zealand	0	0	0	0	0
6 Months	Australia	(6) 12.8%	(14) 19.7%	(18) 15.0%	(38) 16.0%	(26) 13.6%
	New Zealand	0	0	(1) 2.9%	(1) 1.7%	(1) 3,2%
1 Year	Australia	(7) 16.3%	(17) 25.8%	(29) 25.0%	(53) 23.6%	(35) 20.0%
	New Zealand	0	(1) 5.9%	(2) 6.5%	(3) 5.6%	(1) 3.6%
5 Years	Australia	(3) 13.6%	(17) 54.8%	(20) 28.2%	(40) 32.3%	(25) 28.7%
	New Zealand	0	0	(4) 25.0%	(4) 16.7%	0
10 Years	Australia	(1) 12.5%	(5) 45.5%	(6) 25.0%	(12) 27.9%	(13) 43.8%
	New Zealand	0	(1) 33.3%	(2) 40.0%	(3) 37.5%	(1) 16.7%

( ) Number of Patients

Figure 218 **Australia and New Zealand**

Use of CyA Sparing Agents in grafts. CyA Sparing agent data were not collected until 1-Apr-1994

Transplant Status			Australia					New Zealand				
			Age Range in Years					Age Range in Years				
			0-4	5-9	10-14	0-14	15-19	0-4	5-9	10-14	0-14	15-19
Functioning	Before 1 April 1994	CyA + Sparing	4	3	9	16	9	0	0	0	0	0
		CyA Alone	13	17	41	71	51	2	6	12	20	9
		No CyA	0	5	6	11	12	0	0	1	1	2
		Other CyA	2	5	12	19	22	0	0	3	3	2
	After 31 March 1994	CyA + Sparing	10	5	13	28	26	0	1	3	4	3
		CyA Alone	13	24	26	63	21	3	7	10	20	0
		No CyA	0	0	0	0	1	0	0	0	0	0
		Other CyA	1	3	1	5	7	0	0	0	0	1
Failed	Before 1 April 1994	CyA + Sparing	0	0	0	0	5	0	0	0	0	1
		CyA Alone	10	13	26	49	59	2	4	7	13	9
		No CyA	3	16	36	55	53	0	0	6	6	20
		Other CyA	0	1	4	5	12	0	1	0	1	4
	After 31 March 1994	CyA + Sparing	0	0	1	1	6	0	0	0	0	0
		CyA Alone	5	3	5	13	4	1	0	2	3	0
		No CyA	2	1	0	3	0	0	0	0	0	0
		Other CyA	0	0	0	0	1	0	0	0	0	2

Figure 219 **Australia and New Zealand**

Use of CyA Sparing Agents in Grafts.
CyA Sparing Agent Data were not collected until 1-Apr-1994

		Australia					New Zealand				
		Age Range in Years					Age Range in Years				
		0-4	5-9	10-14	0-14	15-19	0-4	5-9	10-14	0-14	15-19
Before 1 April 1994	CyA + Sparing	4	3	9	16	14	0	0	0	0	1
	CyA Alone	23	30	67	120	110	4	10	19	33	18
	No CyA	3	21	42	66	65	0	0	7	7	22
	Other CyA	2	6	16	24	34	0	1	3	4	6
After 31 March 1994	CyA + Sparing	10	5	14	29	32	0	1	3	4	3
	CyA Alone	18	27	31	76	25	4	7	12	23	0
	No CyA	2	1	0	3	1	0	0	0	0	0
	Other CyA	1	3	1	5	8	0	0	0	0	3

Figure 220 **Australia and New Zealand**

Graft Survival 1-Apr-1994 to 31-Dec-1998
Comparing CyA Alone with CyA + CyA Sparing Agents

Age Range		Survival in Years									
		0		1		2		3		4	
Australia											
0-14	CyA + Sparing	100 + 0	29	100 + 0	23	100 + 0	18	100 + 0	13	100 + 0	5
	CyA Alone	100 + 0	76	85 + 4	55	83 + 5	41	83 + 5	24	78 + 6	13
15-19	Cya + Sparing	100 + 0	32	90 + 6	23	76 + 9	13	76 + 9	6	76 + 9	4
	CyA Alone	100 + 0	25	92 + 6	21	86 + 7	13	80 + 9	11	80 + 9	5
New Zealand											
0-14	CyA + Sparing	100 + 0	4	100 + 0	4	100 + 0	4	100 + 0	2	100 + 0	2
	CyA Alone	100 + 0	23	91 + 6	19	91 + 6	15	83 + 10	6	83 + 10	2
15-19	Cya + Sparing	100 + 0	3	100 + 0	2	100 + 0	2	100 + 0	2	100 + 0	2
	CyA Alone	-		-		-		-		-	

% Survival + S.E. / Number at Risk

Figure 221 **Australia and New Zealand**

Calculated Glomerular Filtration Rates for all Primary Grafts
1-Apr-1994 to 31-Dec-1998

Graft		Survival in Years					
		1 Month	3 Months	6 Months	1 Year	5 Years	10 Years
Australia							
CD	Mean	79.7 (103)	83.5 (98)	82.0 (80)	71.4 (79)	60.3 (33)	57.7 (4)
	Median	80.0 (103)	80.2 (98)	79.0 (80)	68.4 (77)	60.4 (33)	55.2 (4)
LD	Mean	90.6 (153)	85.8 (145)	85.5 (120)	78.9 (115)	61.8 (45)	62.1 (6)
	Median	90.2 (153)	81.7 (145)	84.0 (120)	77.9 (115)	58.4 (45)	72.7 (6)
New Zealand							
CD	Mean	57.0 (18)	76.3 (18)	77.7 (11)	90.5 (9)	69.8 (8)	0
	Median	44.6 (18)	78.1 (18)	75.3 (11)	91.9 (9)	78.2 (8)	0
LD	Mean	75.6 (13)	72.3 (14)	84.2 (10)	58.4 (14)	54.0 (13)	49.0 (3)
	Median	78.4 (13)	75.7 (14)	84.7 (10)	59.8 (14)	53.5 (13)	53.4 (3)

( ) Number of Patients

Figure 222 Australia and New Zealand

Second and Subsequent Grafts: Patient Survival 1984 -1998

Age Range	Graft	Survival in Years											
		0		1		3		5		7		10	
Australia													
0-14	CD	100 + 0	29	100 + 0	26	96 + 4	23	83 + 8	20	83 + 8	20	83 + 8	12
	LD	100 + 0	11	100 + 0	11	100 + 0	9	100 + 0	6	100 + 0	4	75 + 22	2
15-19	CD	100 + 0	38	95 + 4	36	89 + 5	30	77 + 7	24	74 + 8	20	68 + 9	12
	LD	100 + 0	8	100 + 0	7	71 + 17	5	71 + 17	4	54 + 20	3	54 + 20	2
New Zealand													
0-14	CD	100 + 0	3	100 + 0	2	100 + 0	2	100 + 0	2	100 + 0	2	-	
	LD	100 + 0	1	100 + 0	1	100 + 0	1	-		-		-	
15-19	CD	100 + 0	11	82 + 12	9	82 + 12	9	82 + 12	9	82 + 12	9	73 + 13	8
	LD	100 + 0	2	100 + 0	2	100 + 0	2	-		-		-	

% Survival + S.E. / Number at Risk

Figure 223 Australia and New Zealand

Second and Subsequent Grafts: Graft Survival 1984 -1998

Age Range	Graft	Survival in Years											
		0		1		3		5		7		10	
Australia													
0-4	CD	100 + 0	2	50 + 0	1	50 + 0	1	-		-		-	
	LD	100 + 0	1	100 + 0	1	100 + 0	1	100 + 0	1	-		-	
5-9	CD	100 + 0	7	100 + 0	7	86 + 13	6	86 + 13	6	71 + 17	5	71 + 17	4
	LD	100 + 0	6	100 + 0	6	100 + 0	4	100 + 0	2	100 + 0	2	50 + 35	1
10-14	CD	100 + 0	20	74 + 10	13	61 + 12	9	47 + 12	7	47 + 12	7	47 + 12	3
	LD	100 + 0	4	100 + 0	4	100 + 0	4	71 + 24	2	71 + 24	1	71 + 24	1
0-14	CD	100 + 0	29	79 + 8	21	67 + 9	16	58 + 10	14	54 + 10	13	54 + 10	8
	LD	100 + 0	11	100 + 0	11	100 + 0	9	85 + 14	5	85 + 14	3	56 + 25	2
15-19	CD	100 + 0	38	68 + 7	26	56 + 8	17	32 + 8	9	28 + 8	7	24 + 8	4
	LD	100 + 0	8	87 + 12	6	58 + 19	4	41 + 19	2	41 + 19	2	41 + 19	2
New Zealand													
0-4	CD	-		-		-		-		-		-	
	LD	-		-		-		-		-		-	
5-9	CD	-		-		-		-		-		-	
	LD	100 + 0	1	100 + 0	1	-		-		-		-	
10-14	CD	100 + 0	3	60 + 31	1	-		-		-		-	
	LD	-		-		-		-		-		-	
0-14	CD	100 + 0	3	60 + 31	1	-		-		-		-	
	LD	100 + 0	1	100 + 0	1	-		-		-		-	
15-19	CD	100 + 0	11	64 + 15	7	45 + 15	5	36 + 15	4	27 + 13	3	27 + 13	3
	LD	100 + 0	2	100 + 0	2	100 + 0	2	100 + 0	2	100 + 0	2	50 + 35	1

% Survival + S.E. / Number at Risk

Figure 224 **Australia and New Zealand**

Graft Survival: All Grafts 1994 - 1998

Age Range	Graft	Survival in Years											
		0		1 year		3 years		5 years		7 years		10 years	
Australia													
0-4	CD	100 + 0	24	75 + 9	18	75 + 9	14	63 + 11	10	48 + 12	4	24 + 40	2
	LD	100 + 0	38	83 + 6	27	83 + 6	20	83 + 6	14	83 + 6	8	83 + 6	5
5-9	CD	100 + 0	51	78 + 6	38	67 + 7	27	59 + 7	14	53 + 18	17	53 + 8	9
	LD	100 + 0	42	98 + 2	40	93 + 4	28	85 + 7	21	80 + 8	17	65 + 10	6
10-14	CD	100 + 0	93	85 + 4	74	75 + 5	59	66 + 5	49	57 + 6	37	47 + 6	21
	LD	100 + 0	83	91 + 3	72	85 + 4	56	78 + 5	44	70 + 6	27	64 + 7	18
0-14	CD	100 + 0	168	82 + 3	130	73 + 4	100	63 + 4	78	56 + 4	58	46 + 5	32
	LD	100 + 0	163	91 + 2	139	86 + 3	104	81 + 3	79	76 + 4	52	67 + 5	29
15-19	CD	100 + 0	196	79 + 3	151	65 + 4	112	51 + 4	73	46 + 4	61	39 + 4	33
	LD	100 + 0	87	92 + 3	74	84 + 4	54	80 + 5	43	72 + 6	29	62 + 7	14
New Zealand													
0-4	CD	100 + 0	2	100 + 0	2	50 + 35	1	50 + 35	1	-		-	
	LD	100 + 0	6	82 + 16	4	82 + 16	3	49 + 27	1	-		-	
5-9	CD	100 + 0	3	100 + 0	2	100 + 0	1	-		-		-	
	LD	100 + 0	16	100 + 0	16	85 + 10	8	74 + 13	6	56 + 19	3	56 + 19	3
10-14	CD	100 + 0	11	81 + 12	8	69 + 15	4	50 + 20	2	50 + 20	2	50 + 20	1
	LD	100 + 0	32	90 + 5	28	80 + 7	21	72 + 9	16	61 + 10	9	54 + 11	10
0-14	CD	100 + 0	16	87 + 9	12	69 + 13	6	44 + 17	3	44 + 17	2	44 + 17	1
	LD	100 + 0	54	92 + 4	48	82 + 6	32	71 + 7	23	59 + 9	12	54 + 9	8
15-19	CD	100 + 0	40	67 + 7	26	46 + 8	18	34 + 8	13	28 + 7	9	24 + 7	5
	LD	100 + 0	13	92 + 8	11	84 + 11	10	84 + 11	7	84 + 11	6	56 + 18	4

% Survival + S.E. / Number at Risk

Figure 225 **Australia and New Zealand**

HtSDS and Growth in Children with ESRF

			Australia		New Zealand		Total	
First	Mean		-1.78	(352)	-1.58	(74)	**-1.75**	**(426)**
	Median		-1.67	(352)	-1.82	(74)	**-1.68**	**(426)**
Last	Mean	rHGH (yes)	-2.55	(99)	-3.23	(4)	**-2.59**	**(103)**
		rHGH (no)	-1.67	(249)	-1.68	(66)	**-1.67**	**(315)**
	Median	rHGH (yes)	-2.53	(99)	-3.53	(4)	**-2.54**	**(103)**
		rHGH (no)	-1.55	(249)	-1.35	(66)	**-1.50**	**(315)**
	Total	Mean	-1.92	(348)	-1.78	(70)	**-1.90**	**(418)**
		Median	-1.74	(348)	-1.38	(70)	**-1.65**	**(418)**
Delta	Mean	rHGH (yes)	-0.01	(84)	-0.41	(3)	**-0.01**	**(87)**
		rHGH (no)	-0.11	(220)	-0.25	(58)	**-0.12**	**(278)**
	Median	rHGH (yes)	-0.01	(84)	-0.59	(3)	**-0.02**	**(87)**
		rHGH (no)	-0.11	(220)	-0.14	(58)	**-0.12**	**(278)**
	Total	Mean	-0.09	(304)	-0.16	(61)	**-0.10**	**(365)**
		Median	-0.08	(304)	-0.27	(61)	**-0.11**	**(365)**

( ) Number of Patients

Figure 226 **Australia and New Zealand**

Mode of Current treatment related to age.
Patients alive at 31-Mar-1999
Chronologic Age = Paed.Age versus Bone Age

Treatment			Australia				New Zealand			
			Age Range in Years				Age Range in Years			
			0-4	5-9	10-14	15-19	0-4	5-9	10-14	15-19
Dialysis	Paed.Age	Mean	3.02	7.96	12.25	16.15	1.64	6.39	12.83	16.05
		Median	3.43	8.06	12.73	15.95	1.64	6.39	13.30	15.84
		Valid N	N=9	N=8	N=16	N=9	N=2	N=1	N=9	N=4
	Bone Age	Mean	2.47	6.25	10.92	13.86	0	0	11.84	17.00
		Median	2.30	6.50	10.00	14.00	0	0	12.20	17.00
		Valid N	N=4	N=4	N=9	N=5	0	0	N=5	N=1
Transplant	Paed.Age	Mean	3.74	7.89	12.76	16.52	4.43	8.59	12.47	16.24
		Median	3.84	8.19	13.02	16.39	4.43	8.65	12.36	15.78
		Valid N	N=9	N=36	N=48	N=47	N=2	N=6	N=13	N=11
	Bone Age	Mean	0.90	5.92	10.80	14.30	3.00	8.25	8.93	15.33
		Median	0.90	5.90	11.00	14.75	3.00	8.25	9.00	15.00
		Valid N	N=1	N=15	N=20	N=12	N=1	N=2	N=3	N=3
Dialysis and Transplant	Paed.Age	Mean	3.38	7.91	12.63	16.46	3.03	8.28	12.61	16.19
		Median	3.64	8.10	12.79	16.39	3.17	8.23	12.36	15.78
		Valid N	N=18	N=44	N=64	N=56	N=4	N=7	N=22	N=15
	Bone Age	Mean	2.16	5.99	10.83	14.17	3.00	8.25	10.75	15.75
		Median	2.10	6.00	11.00	14.50	3.00	8.25	11.00	16.00
		Valid N	N=5	N=19	N=29	N=17	N=1	N=2	N=8	N=4

Figure 227 **Australia and New Zealand**

Mode of Current Treatment Related to Age.
Patients Alive at 31-Mar-1999
Chronologic Age = Paed.Age versus Bone Age

Treatment			Age Range in Years			
			0-4	5-9	10-14	15-19
Dialysis and Transplant	Paed.Age	Mean	3.32	7.96	12.63	16.4
		Median	3.64	8.19	12.76	16.36
		Valid N	N=22	N=51	N=86	N=71
	Bone Age	Mean	2.30	6.20	10.82	14.47
		Median	2.30	6.00	11.00	15.00
		Valid N	N=6	N=21	N=37	N=21

Figure 228 **Australia and New Zealand**

Mode of Current Treatment Related to Age
Paediatric Assessment by Tanner Scores
Patients Alive at 31-Mar-1999

Gender			Age Range in Years									
			0-4	5-9	10	11	12	13	14	15	16	17
Female	Breast	Mean	1	1	1	2	1	3	3	3	5	5
		Median	1	1	1	2	1	3	3	3	5	5
		Valid N	N=7	N=27	N=2	N=13	N=7	N=5	N=10	N=9	N=8	N=8
		Minimum	1	1	1	1	1	1	1	1	4	4
		Maximum	1	1	1	3	2	5	5	5	5	5
	Pubic Hair	Mean	1	1	1	2	1	3	3	3	4	5
		Median	1	1	1	2	1	3	4	3	5	5
		Valid N	N=7	N=27	N=2	N=13	N=7	N=5	N=10	N=9	N=8	N=8
		Minimum	1	1	1	1	1	1	1	1	1	4
		Maximum	1	1	1	3	2	5	5	5	5	5
Male	Genital	Mean	1	1	1	2	2	2	3	4	5	5
		Median	1	1	1	1	1	2	3	4	5	5
		Valid N	N=15	N=24	N=8	N=10	N=9	N=9	N=9	N=21	N=6	N=11
		Minimum	1	1	1	1	1	1	1	1	4	3
		Maximum	1	1	1	3	3	3	5	5	5	5
	Pubic Hair	Mean	1	1	1	1	2	2	3	4	5	5
		Median	1	1	1	1	1	2	4	4	5	5
		Valid N	N=15	N=24	N=8	N=10	N=9	N=9	N=9	N=21	N=6	N=11
		Minimum	1	1	1	1	1	1	1	1	4	3
		Maximum	1	1	1	2	3	3	5	5	5	5