



CHAPTER 3

DEATHS

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INTRODUCTION

The format of the deaths chapter continues to evolve in this report, with greater tabular data on the survival of people during renal replacement therapy. There is a particular emphasis on outcomes during dialysis treatment.

Observed survival for non-indigenous patients who started in the period 2002-2011 is shown in Figure 3.1. These data are censored at transplantation (that is, events after the date of first transplantation are not included in analyses). Survival after transplantation and survival of indigenous peoples during dialysis is covered in later chapters.

Crude unadjusted death rates for dialysis and transplantation are shown in Figure 3.2 for various groups. This is a different way of looking at the same question. This table includes all episodes of dialysis and transplantation (i.e. analyses are not censored at first transplant date), and deaths are attributed to the modality in use at the time of death. For this table, episodes of treatment include all people treated in 2011, regardless of year of first treatment.

Mortality rates are generally higher with older age, diabetes and coronary artery disease. The comparison between indigenous rates (and some other comparisons) will be subject to several confounders. Comparisons of mortality rates with the general population (stratified by gender) are shown in Figures 3.3 and 3.4.

Figure 3.1				
Survival among People who Commenced Dialysis 2002–2011 (Non-Indigenous) % (95% CI)				
Age at Start	Time Point (Number of Years from dialysis start)	Proportion Surviving Aust (95 % CI)	Proportion Surviving NZ (95 % CI)	
0–24	1	97 (95-98)	96 (90-98)	
	2	93 (90-96)	94 (86-97)	
	5	90 (85-93)	78 (56-90)	
25–44	1	97 (96-97)	99 (97-100)	
	2	91 (90-92)	94 (90-96)	
	5	80 (78-83)	73 (64-80)	
45–64	1	92 (91-92)	91 (89-92)	
	2	84 (83-85)	81 (78-83)	
	5	60 (58-61)	53 (49-58)	
65–74	1	85 (84-86)	84 (81-87)	
	2	72 (71-74)	71 (67-75)	
	5	41 (39-42)	34 (29-38)	
75–84	1	80 (79-81)	76 (72-80)	
	2	64 (62-65)	55 (50-60)	
	5	27 (25-28)	19 (14-24)	
85 +	1	69 (65-73)	65 (46-78)	
	2	51 (46-55)	43 (26-59)	
	5	17 (13-22)	13 (3-31)	

Figure 3.2

Death Rates During Renal Replacement Therapy All Patients Included who Received Treatment During 2011

Group	Dialysis Mortality Rate (per 100 patient years, 95% CI)			Transplant Mortality Rate (per 100 patient years, 95% CI)		
	Rate	Confidence Intervals		Rate	Confidence Intervals	
	Per 100 patient years	Lower	Upper	Per 100 patient years	Lower	Upper
Australia	13.7	13.0	14.4	2.4	2.1	2.7
New Zealand	15.5	14.0	17.2	2.8	2.1	3.8
AGES (YEARS)						
< 25	1.9	0.8	4.7	0.4	0.1	1.6
25–44	4.9	3.9	6.1	0.6	0.4	1.0
45–64	9.5	8.7	10.4	2.1	1.8	2.6
65–84	19.2	18.1	20.4	6.2	5.2	7.5
≥ 85	35.8	30.8	41.6	48.7	20	~
DIABETES (AT RRT START)						
Non-diabetic	12.5	11.6	18.9	2.3	2.0	2.6
Type 1	11.9	13.6	21.9	2.8	1.7	4.5
Type 2	11.6	15.2	17.6	4.9	3.4	7.1
CORONARY ARTERY DISEASE (AT RRT START)						
No	10.7	10.0	11.4	2.2	2.0	2.6
Yes	20.1	18.9	21.4	4.9	3.5	6.8
INDIGENOUS						
Non-Indigenous (Australia)	14.3	13.5	15.0	2.4	2.1	2.7
Non-Indigenous (New Zealand)	16.8	14.5	19.4	2.9	2.1	4.0
Aboriginal /Torres Strait Islanders	11.3	9.5	13.3	2.7	1.1	6.5
Maori (in Australia)	11.1	6.3	19.5	No events		
Maori (in New Zealand)	16.8	14.1	20.1	3.3	1.4	8.0
Pacific People (in Australia)	4.8	2.7	8.4	2.8	0.7	11.3
Pacific People (in New Zealand)	11.1	8.7	14.3	1.1	0.1	7.5

Figure 3.3

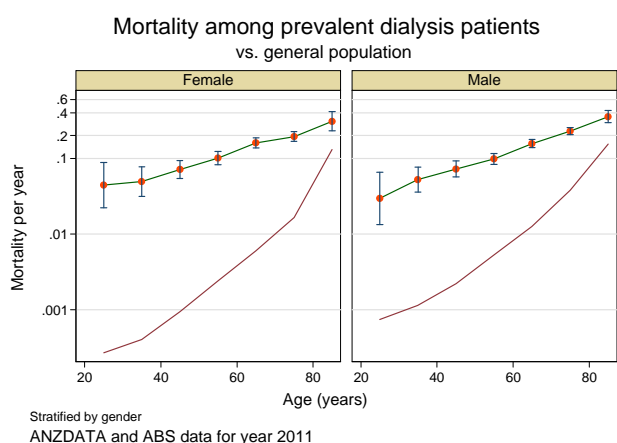
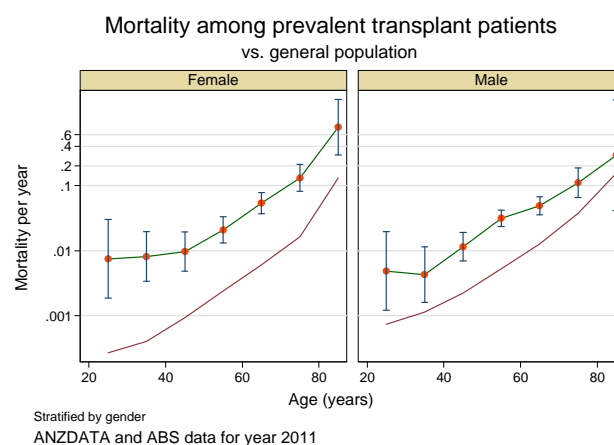


Figure 3.4





Yet another perspective on survival during dialysis is presented in Figures 3.5 and 3.6. Median survival is the time to which 50% of people can expect to survive. Figure 3.5 shows the median survival of people who started dialysis treatment from 1 January 2002, by various categories.

These survival data are censored at the time of transplantation, and include those who started dialysis in the period 2002-2011. In addition to the median, the 25 and 75th centiles are included to give an indication of the range of observed survivals. Some figures are not observed - for example if half of a cohort have not yet died it is not possible to observe a median survival; in other groups the small numbers of events mean the median and 25th/75th centiles are the same. These occurrences are indicated by * in the tables.

The survival amongst younger people are likely to be strongly affected by the selection bias (fitter people will be progressively transplanted and not be included in the analysis from that point).

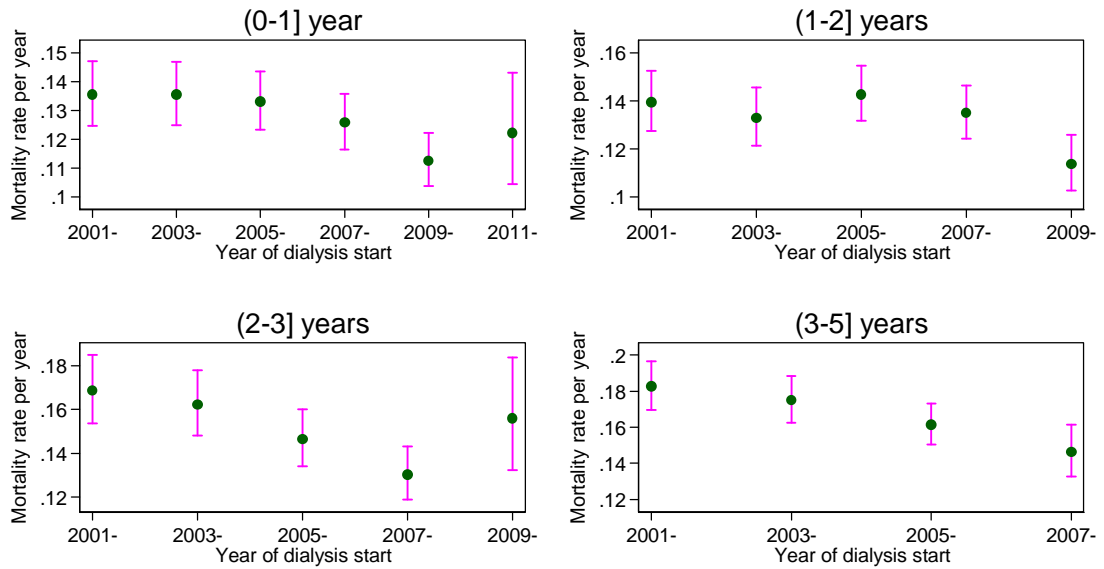
Figure 3.6 shows the survival figures in more detail, categorised by the presence or absence of any vascular comorbidity and diabetes, with a particular focus on older groups.

Figure 3.5		Figure 3.6				
Survival of Dialysis Patients by age		Survival by Age & Comorbidity amongst older age groups				
Age Groups at start of treatment	Median (25th and 75th centiles), years	Median (25th and 75th centiles), years				
		Age Groups	Any Vascular Disease	Diabetes	Australia	New Zealand
Australia						
0-24 years	*	65-69 years	No	No	5.32 (2.04 -)	6.01 (2.67-7.68)
25-44 years	9.26 (5.37-*)		No	Yes	3.95 (1.93-8.29)	5.23 (4.20-8.69)
45-64 years	6.26 (3.01-2.65)		Yes	No	4.30 (2.08-7.04)	2.36 (0.87-4.81)
65-74 years	4.10 (1.84-7.01)	70-74 years	Yes	Yes	4.31 (1.41-6.96)	4.03 (1.41-4.27)
75-84 years	2.97 (1.30-5.27)		No	No	5.89 (3.24-8.38)	3.33 (2.27-4.41)
85+ years	2.03 (0.73-3.97)		No	Yes	5.59 (2.39 -)	3.92 (3.92-4.39)*
New Zealand			Yes	No	3.46 (0.96-5.81)	2.55 (1.63-4.45)
0-24 years	9.64 (7.92-*)	75-79 years	Yes	Yes	3.65 (1.80-4.97)	3.33 (1.78-4.88)
25-44 years	7.28 (4.12-*)		No	No	5.47 (2.14-8.31)	3.43 (3.43-3.43)*
45-64 years	4.97 (2.65-8.05)		No	Yes	5.59 (2.39 -)	3.92 (3.92-4.39)*
65-74 years	3.59 (1.81-5.93)	80-84 years	Yes	No	4.00 (1.85-6.35)	1.42 (0.57-2.43)
75-84 years	2.51 (1.07-4.26)		Yes	Yes	3.08 (1.04-5.48)	2.97 (1.49-5.74)
85+ years	1.69 (0.96-3.58)		No	No	3.41 (2.02-6.41)	2.69 (1.65-3.09)
			No	Yes	4.34 (2.70-6.17)	0.67 (0.67-0.67)*
			Yes	No	2.28(1.09-4.90)	2.82 (2.82-2.82)*
			Yes	Yes	2.37 (1.29-4.55)	2.82 (2.82-2.82)*
		85-89 years	No	No	2.25 (0.63-7.79)	*
			No	Yes	2.39 (0.63-)	*
			Yes	No	2.17 (1.32-3.58)	1.38 (1.38-4.91)*
			Yes	Yes	1.57 (0.37-6.09)	*

The evolution of mortality rates over time is shown in Figures 3.7 and 3.8. In Australia, there is steady improvement in most groups over time. For New Zealand, the trends are less clear, in part reflecting the lower precision with smaller numbers.

Figure 3.7 Australia

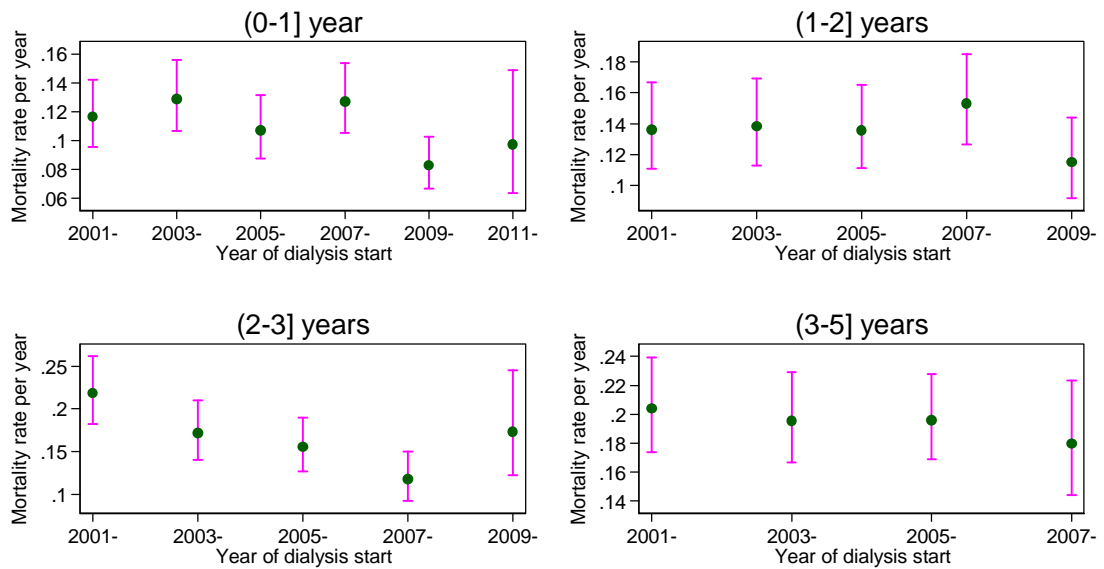
Dialysis mortality rates



ANZDATA, censored at transplantation
Australia only

Figure 3.8 New Zealand

Dialysis mortality rates



ANZDATA, censored at transplantation
NZ only



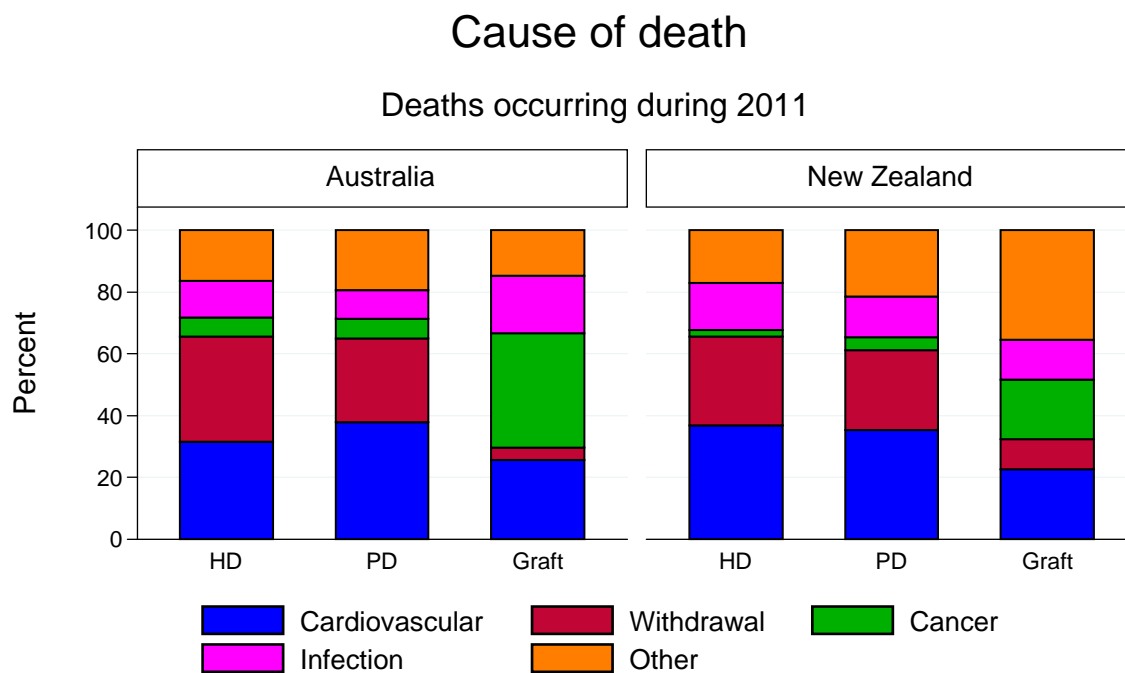
CAUSE OF DEATHS

This section contains a summary of trends in various areas. The focus on this section is on deaths reported during 2011. The cause of death reported to ANZDATA is not necessarily the same as that reported on the death certificate. In particular, ANZDATA specifically records a range of reasons for “withdrawal from treatment”. Clearly, the actual cause of death in these instances is uraemia, however the key issues presented here are the “cause” of the withdrawal.—in many cases this is related to an underlying comorbidity (these figures are explored further on pages 3-8 and 3-9)

For the purposes of Figures 3.9 - 3.11, deaths were attributed to the modality in use at the time of death.

In both Australia and New Zealand, similar trends are seen although there is a larger proportion of deaths coded as “other” from New Zealand (Figure 3.9). In particular there are a greater proportion of deaths due to cancer among patients with kidney transplants, whereas among dialysis patients deaths to cardiovascular and infective causes predominate.

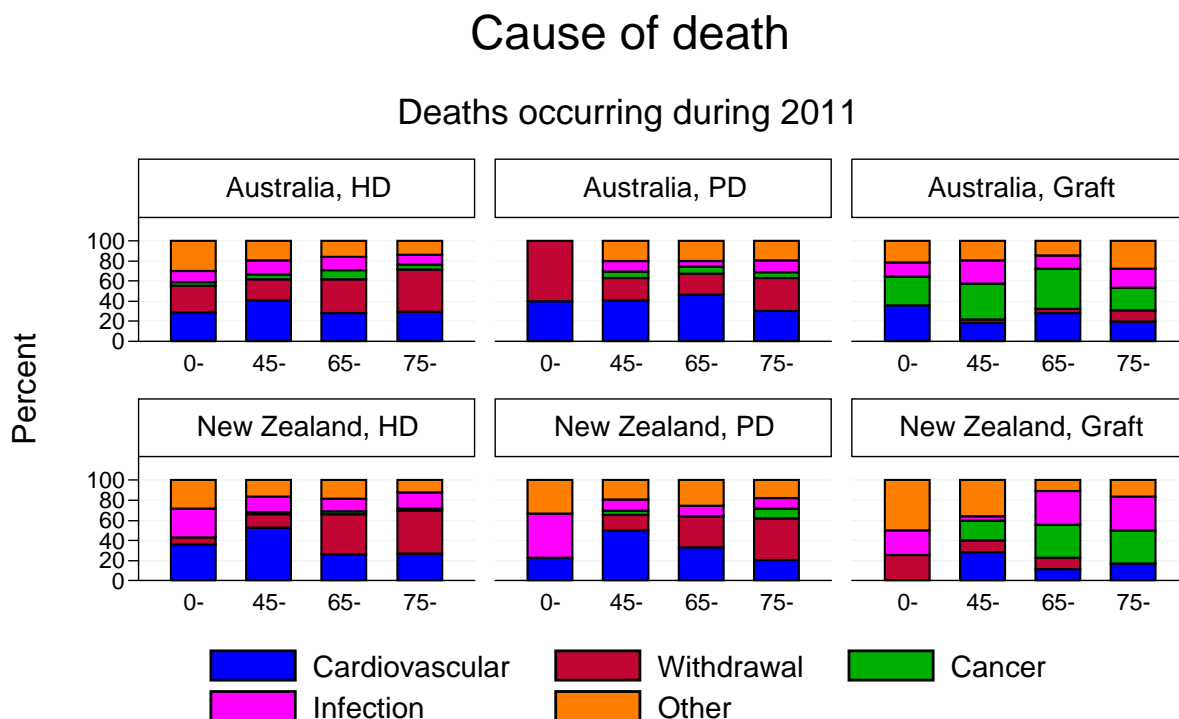
Figure 3.9



Graph by country and dialysis modality at time of death

The distribution of types of death changes with different age groups. Although one might expect the numbers of deaths reported as treatment withdrawals to increase with age, the proportion of deaths reported as related to withdrawal of dialysis is still substantial in a number of the younger age groups (among dialysis patients) (Figure 3.11)

Figure 3.10



Graph by country and dialysis modality at time of death

Figure 3.11												
Modality at time of death and age at death -2011												
Cause of Death	Haemodialysis				Peritoneal Dialysis				Transplant			
	0 - 44	45 - 64	65 - 74	≥75	0 - 44	45 - 64	65 - 74	≥75	0 - 44	45 - 64	65 - 74	≥75
Australia												
Cardiovascular	16	117	92	159	2	24	39	32	5	16	19	7
Withdrawal	15	61	110	229	3	13	18	36		3	3	4
Cancer	2	15	30	29		4	6	6	4	31	27	8
Infection	6	40	44	54		6	5	13	2	20	9	7
Other	17	56	53	74		12	17	21	3	17	10	10
New Zealand												
Cardiovascular	5	45	19	15	2	26	13	8		7	1	1
Withdrawal	1	11	30	24		8	12	16	1	3		
Cancer		2	2	1		2		4		5	2	
Infection	4	13	9	9	4	6	4	4	1	1	3	2
Other	4	14	14	7	3	10	10	7	2	9	1	1



WITHDRAWAL FROM DIALYSIS

During 2011 there were 495 deaths in Australia and 107 in New Zealand attributed to withdrawal from therapy. The vast majority of these were among patient receiving dialysis therapy. In the transplant group, malignancy figures prominently as a cause for the withdrawal decision.

The pattern differed between patients by the modality of treatment prior to death. "Psychosocial" reasons were more commonly cited among patient receiving PD prior to death than among HD patients. Figure 3.12 gives broad categories and 3.13 detailed breakdown of the causes for withdrawal. However, the coding of these categories is clearly somewhat subjective.

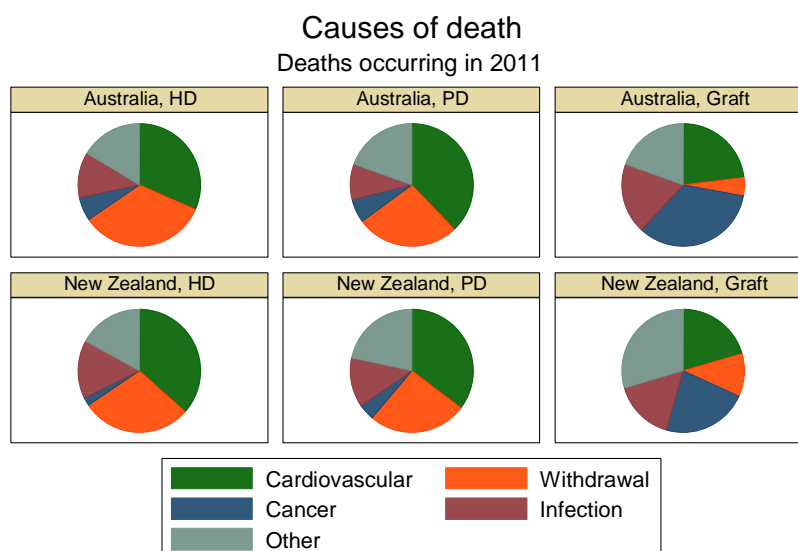
Figure 3.12						
Country at time of death and Modality at death among those who withdrew from dialysis and died in 2011						
Cause of Death	AUSTRALIA			NEW ZEALAND		
	HD	PD	GRAFT	HD	PD	GRAFT
Cardiovascular	384	97	42	84	49	9
Withdrawal	415	70	10	66	36	5
Cancer	76	16	70	5	6	10
Infection	144	24	38	35	18	7
Other	200	50	40	39	30	13

Figure 3.13				
Death due to withdrawal-2011 (Modality at time of death)				
Withdrawal	Haemodialysis	Peritoneal Dialysis	Transplant	Total
Australia				
Psychosocial	177	31	6	214
Patient refused further	2	0	0	2
Suicide	0	1	0	1
Cardiovascular comorbidity	75	13	1	89
Cerebrovascular comorbidity	36	6	0	42
Peripheral vascular comorbidity	24	8	1	33
Malignancy related withdrawal	82	7	2	91
Withdrawal due to dialysis	19	4	0	23
Total	415	70	10	495
New Zealand				
Psychosocial	24	11	2	37
Patient refused further	0	0	1	1
Suicide	0	0	0	0
Cardiovascular comorbidity	17	9	1	27
Cerebrovascular comorbidity	5	3	0	8
Peripheral vascular comorbidity	8	10	0	18
Malignancy related withdrawal	11	3	1	15
Withdrawal due to dialysis	1	0	0	1
Total	66	36	5	107

Figures 3.14 show the breakdown of the dialysis group by age and by time from start of dialysis. This area within ANZDATA has been examined in some detail in a recent publication (Chan et al *Clin J Am Soc Nephrol* 2012; 7: 775-781). The pie graphs are graphical representation of tables 3.12 and 3.13.

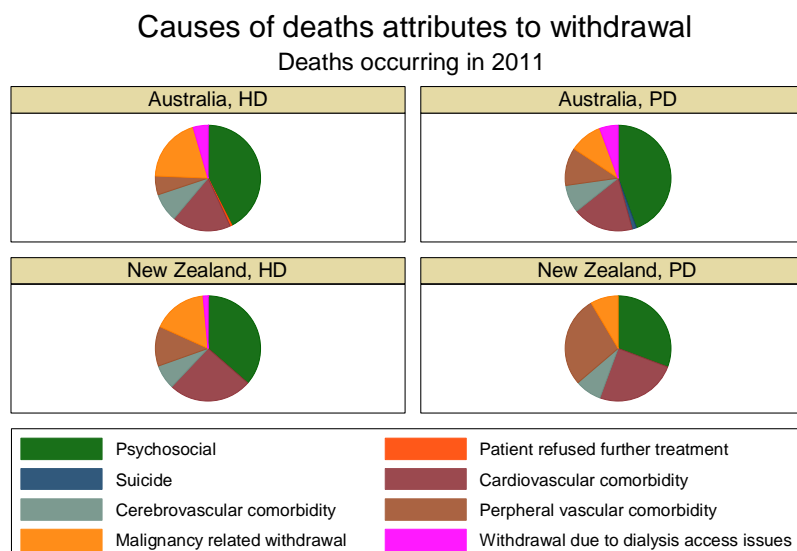
Figure 3.14										
Dialysis patients who withdrew by age at death time from first RRT-2011										
Time from first RRT	AUSTRALIA					NEW ZEALAND				
	0 - 44	45 - 64	65 - 74	≥75	Total	0 - 44	45 - 64	65 - 74	≥75	Total
0	3	13	31	30	77	0	1	8	3	12
1	3	7	13	34	57	0	4	4	2	10
2	6	25	45	96	172	0	5	17	16	38
5	6	32	42	109	189	2	12	14	19	47
Total	18	77	131	269	495	2	22	43	40	107

Figure 3.15



Graphs by Country at time of death and Modality at time of death

Figure 3.16



Graphs by Country at time of death and Modality at time of death