CHAPTER 3

DEATHS

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INTRODUCTION

Observed survival for non-indigenous patients who started in the period 2003-2012 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 2012, 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 2003 - 2012 (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 (90-99)
	2	93 (90-95)	93 (85-97)
	5	90 (86-93)	83 (64-92)
25—44	1	97 (96-98)	98 (96-99)
	2	92 (90-93)	93 (89-96)
	5	80 (78-83)	74 (65-81)
45—64	1	92 (91-92)	91 (89-92)
	2	85 (84-85)	81 (78-84)
	5	61 (59-62)	54 (49-58)
65—74	1	86 (85-87)	85 (82-87)
	2	74 (72-75)	72 (69-76)
	5	42 (41-44)	34 (30-39)
75—84	1	80 (79-81)	77 (72-81)
	2	64 (63-66)	56 (51-61)
	5	28 (26-29)	19 (15-24)
85 +	1	70 (66-74)	67 (46-80)
	2	51 (47-56)	45 (28-61)
	5	20 (15-24)	17 (5-34)

Figure 3.2

Death Rates During Renal Replacement Therapy
All Patients Included who Received Treatment During 2012

Group	Dialysis Mortality Rate (per 100 patient years, 95% CI)			Transplant Mortality Rate (per 100 patient years, 95% CI)		
Overall	Rate	Confidence Intervals		Rate	Confidence Intervals	
	Per 100 patient years	Lower	Upper	Per 100 patient years	Lower	Upper
Australia	12.7	12.2	13.4	1.8	1.6	2.1
New Zealand	14.6	13.2	16.2	1.9	1.3	2.8
AGES (YEARS)						
< 25	3.7	2.0	7.0	0.4	0.1	1.5
25—44	4.9	3.9	6.1	0.5	0.3	0.8
45—64	9.3	8.5	10.2	1.4	1.1	1.8
65—84	17.1	16.1	18.2	5.1	4.1	6.2
≥ 85	36.5	31.6	42.1	2.1	5.4	8.6
DIABETES (AT RRT START)						
Non-diabetic	11.2	10.6	12.1	1.7	1.4	2.0
Type 1	12.1	9.6	16.8	2.7	1.7	4.4
Type 2	15.5	14.6	16.6	3.1	2.0	4.9
CORONARY ARTERY DISEASE (AT RRT START)						
No	9.9	9.3	10.6	1.7	1.5	2.0
Yes	19.0	17.8	20.3	3.1	2.0	4.7
INDIGENOUS						
Non-Indigenous (Aus)	13.5	12.8	14.3	1.8	1.5	2.1
Non-Indigenous (NZ)	15.7	13.5	18.3	1.8	1.2	2.8
Aboriginal /Torres Strait Islanders	9.0	7.5	10.7	3.2	1.4	7.1
Maori (in Aus)	9.0	4.9	16.8	3.4	0.5	23.8
Maori (in NZ)	16.4	13.8	19.6	2.5	0.9	6.7
Pacific People (in Aus)	6.5	4.1	10.3	1.3	0.2	9.1
Pacific People (in NZ)	10.2	7.9	13.2	2.1	0.5	8.5

Figure 3.3

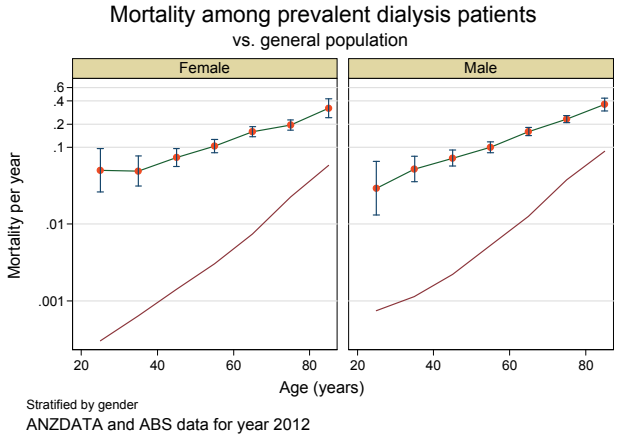
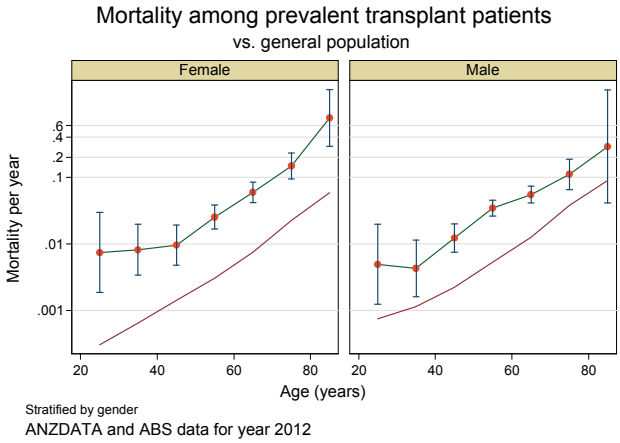


Figure 3.4



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 2003, by various categories.

These survival data are censored at the time of transplantation, and include those who started dialysis in the period 2003-2012. 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

Survival of Dialysis Patients by Age

Age Groups at start of treatment	Median (25th and 75th centiles), years
Australia	
0-24 years	*
25-44 years	* (5.35-*)
45-64 years	6.35 (3.09-*)
65-74 years	4.18 (1.90-7.23)
75-84 years	3 (1.31-5.32)
85+ years	2.03 (0.76-4.02)
New Zealand	
0-24 years	9.64 (8.11-*)
25-44 years	7.28 (4.11-*)
45-64 years	5 (2.65-8.41)
65-74 years	3.65 (1.84-5.93)
75-84 years	2.61 (1.08-4.37)
85+ years	1.70 (0.96-3.58)

Figure 3.6

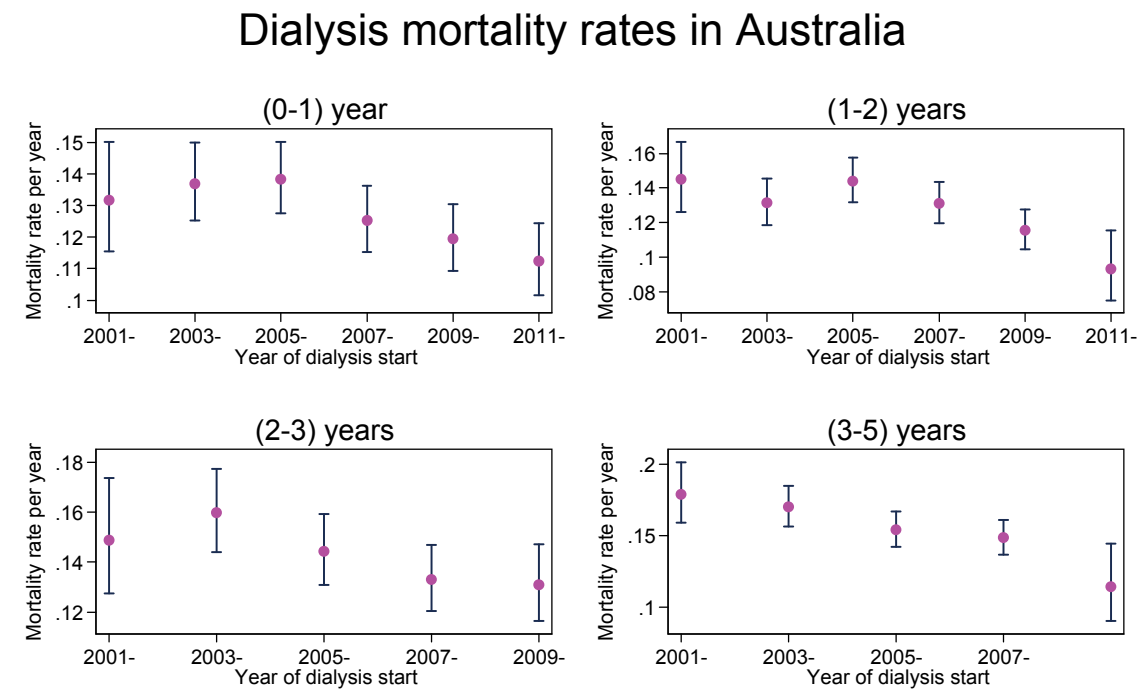
Survival by Age & Comorbidity Amongst Older Age Groups

Median (25th and 75th centiles), years

Age Groups	Any Vascular Disease	Diabetes	Australia	New Zealand
65-69 years	No	No	5.32 (2.04-*)	6.01 (2.67-7.68)
	No	Yes	3.95 (1.93-8.29)	5.23 (4.20-8.69)
	Yes	No	4.30 (2.08-7.04)	2.36 (0.87-4.81)
	Yes	Yes	4.31 (2.05-6.96)	4.03 (1.41-4.27)
70-74 years	No	No	5.37 (2.03-8.37)	3.40 (3.12-5.37)
	No	Yes	5.89 (3.23-8.38)	3.33 (2.27-4.41)
	Yes	No	3.46 (0.96-5.81)	2.55 (1.63-4.45)
	Yes	Yes	3.65 (1.80-5.97)	3.33 (1.78-4.88)
75-79 years	No	No	5.47 (2.14-8.31)	3.43 (3.43-3.43)
	No	Yes	5.59 (2.39-*)	3.92 (3.92-4.39)
	Yes	No	4.00 (1.85-6.35)	1.42 (0.57-2.43)
	Yes	Yes	3.08 (1.04-5.48)	2.97 (1.49-5.74)
80-84 years	No	No	3.41 (2.02-6.21)	2.69 (1.65-3.01)
	No	Yes	4.34 (2.70-6.17)	0.67 (0.67-0.67)
	Yes	No	2.28(1.02-4.90)	4.10 (1.04-4.10)
	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 (0.36-6.09)	*

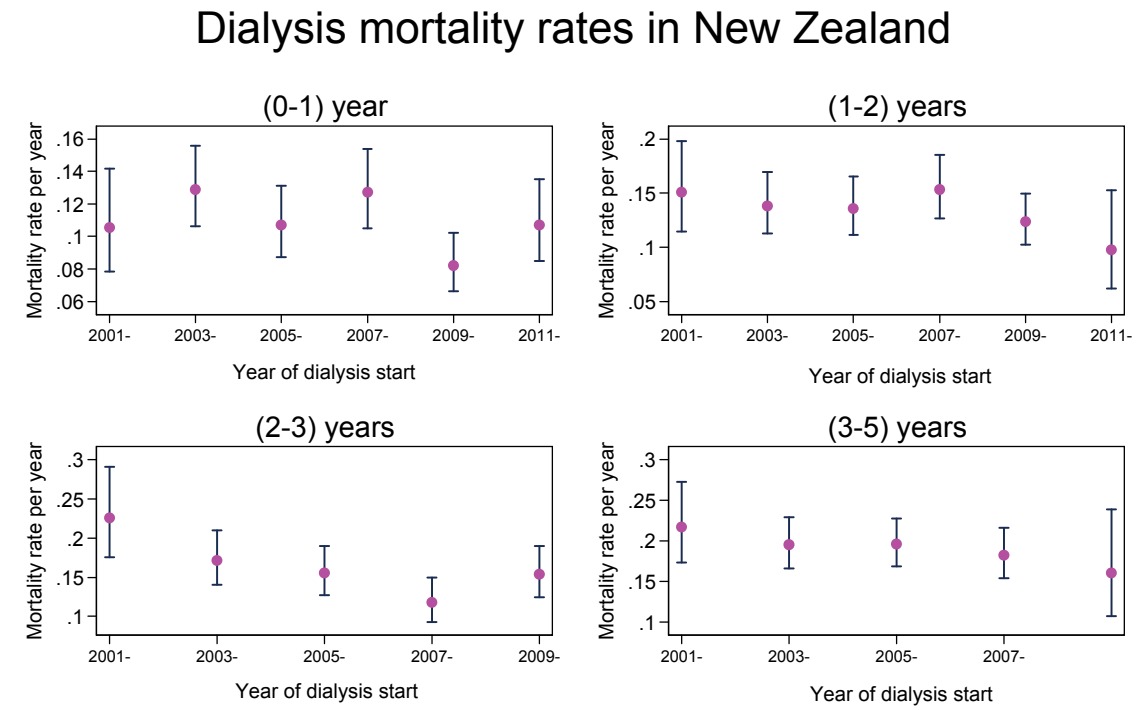
The evolution of mortality rates over time is shown in Figures 3.7 and 3.8. In Australia, there is steady improvement in most groups over time. For New Zealand, the trends are less clear, in part reflecting the lower precision with smaller numbers.

Figure 3.7



ANZDATA, censored at transplantation

Figure 3.8



ANZDATA, censored at transplantation

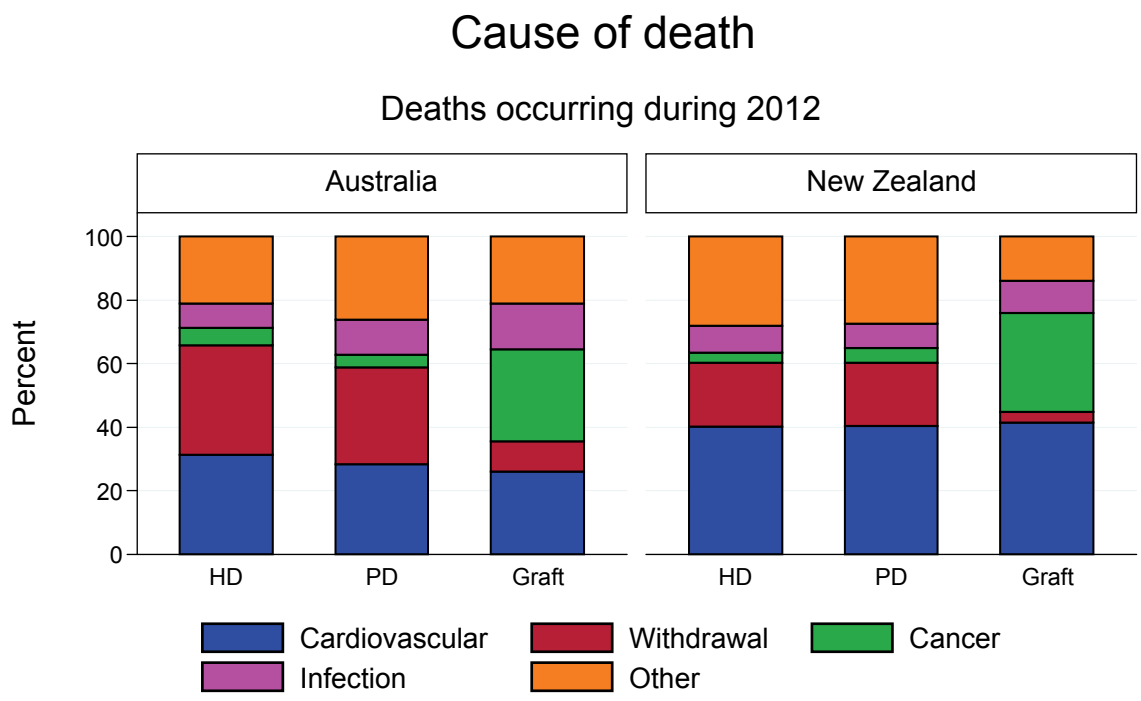
Cause of Deaths

This section contains a summary of trends in various areas. The focus on this section is on deaths reported during 2012. 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). A greater proportion of deaths due to cancer is seen among patients with kidney transplants, whereas among dialysis patients deaths to cardiovascular and infective causes predominate.

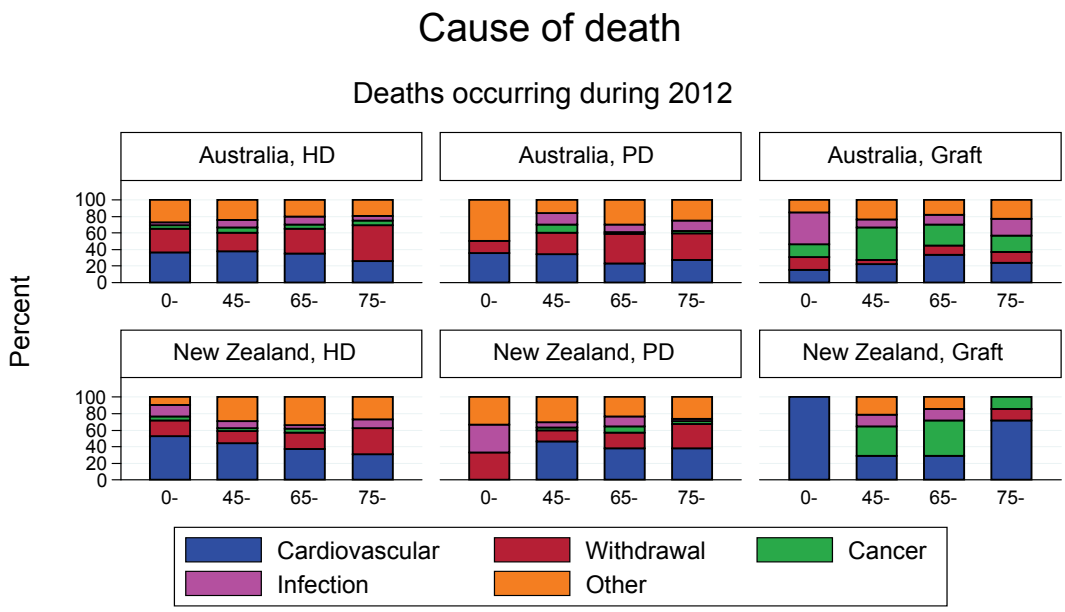
Figure 3.9



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 3.10)

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 – 2012

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	19	113	101	147	5	17	13	29	2	14	20	7
Withdrawal	15	67	88	248	2	13	20	34	2	3	7	4
Cancer	2	17	14	34	0	5	1	3	2	25	15	6
Infection	2	28	30	34	0	7	5	13	5	25	15	6
Other	14	73	58	110	7	8	17	27	2	15	11	7
New Zealand												
Cardiovascular	11	41	24	14	0	24	16	13	1	4	2	5
Withdrawal	4	14	13	14	1	7	8	10	0	0	0	1
Cancer	1	3	3	0	0	2	3	1	0	5	3	1
Infection	3	8	3	5	1	3	5	1	0	2	1	0
Other	2	27	22	12	1	16	10	9	0	3	1	0

WITHDRAWAL FROM DIALYSIS

During 2012 there were 503 deaths in Australia and 72 in New Zealand attributed to withdrawal from therapy. The vast majority of these were among patients receiving dialysis therapy. “Psychosocial” reasons were the most commonly cited reason for withdrawal in patients receiving all modalities.

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 2012

Cause of Death	AUSTRALIA			NEW ZEALAND		
	HD	PD	GRAFT	HD	PD	GRAFT
Cardiovascular	380	64	43	90	53	12
Withdrawal	418	69	16	45	26	1
Cancer	67	9	48	7	6	9
Infection	94	25	24	19	10	3
Other	255	59	35	63	36	4

Figure 3.13

Death Due to Withdrawal - 2012 (Modality at Time of Death)

Withdrawal	Haemodialysis	Peritoneal Dialysis	Transplant	Total
Australia				
Psychosocial	163	26	7	**196**
Patient refused further	20	4	4	**28**
Suicide	5	0	1	**6**
Cardiovascular comorbidity	81	13	0	**94**
Cerebrovascular comorbidity	43	10	1	**54**
Peripheral vascular comorbidity	31	2	0	**33**
Malignancy related withdrawal	63	11	0	**77**
Withdrawal due to dialysis	12	3	0	**15**
Total	**418**	**69**	**16**	**503**
New Zealand				
Psychosocial	15	10	0	**25**
Patient refused further	4	2	0	**6**
Suicide	0	0	0	**0**
Cardiovascular comorbidity	5	5	1	**11**
Cerebrovascular comorbidity	8	6	0	**14**
Peripheral vascular comorbidity	8	1	0	**9**
Malignancy related withdrawal	4	1	0	**5**
Withdrawal due to dialysis	1	1	0	**2**
Total	**45**	**26**	**1**	**72**

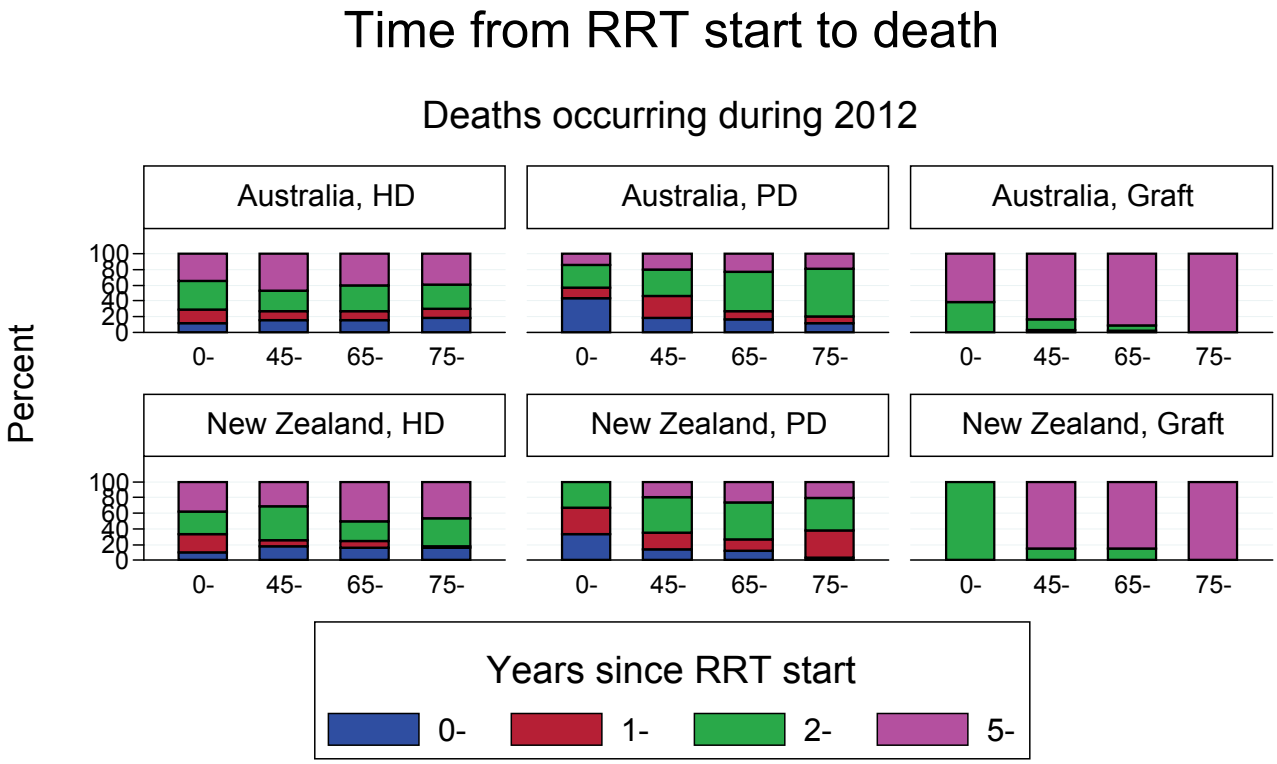
Figure 3.14 show the breakdown of the dialysis group by age and by time from start of dialysis for those deaths which occurred in 2012. This area within ANZDATA has been previously been examined in some detail (Chan et al *Clin J Am Soc Nephrol* 2012; **7:** 775-781), available at http://cjasn.asnjournals.org/content/7/5/775.full.

Figure 3.14

Dialysis patients who withdrew by age at death time from first RRT-2012

Time from first RRT (years)	AUSTRALIA					NEW ZEALAND				
	0 - 44	45 - 64	65 - 74	≥75	Total	0 - 44	45 - 64	65 - 74	≥75	Total
0	2	19	16	49	**86**	2	3	3	1	**9**
1	2	15	13	36	**66**	1	3	3	6	**13**
2	7	15	48	96	**166**	2	7	7	8	**24**
5	8	34	38	105	**185**	0	8	8	10	**26**
Total	**19**	**83**	**115**	**286**	**503**	**5**	**21**	**21**	**25**	**72**

Figure 3.15



Graph by country at time of death
Time period from first renal replacement treatment to date of death

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