



Australia &  
New Zealand Dialysis  
& Transplant Registry

# Chapter 3

## Mortality in End Stage Kidney Disease

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### Suggested Citation:

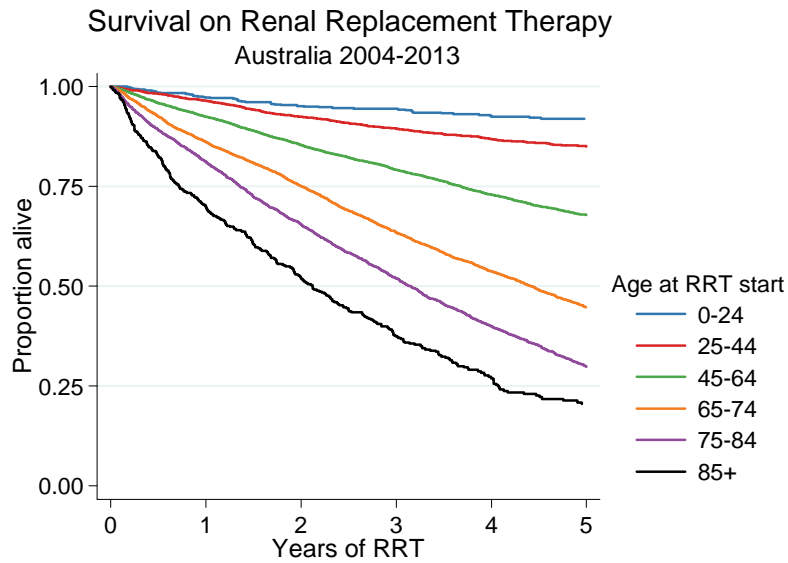
ANZDATA Registry. 37th Report, Chapter 3: Mortality in End Stage Kidney Disease. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2015. Available at: <http://www.anzdata.org.au>

## Survival

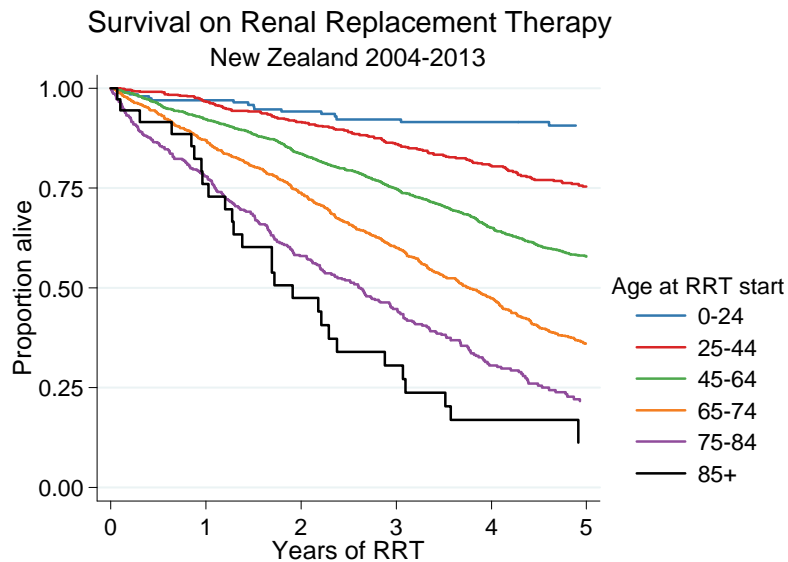
Overall survival for patients who started renal replacement therapy (RRT) in the period 2004-2013 is

shown in figure 3.1 and table 3.1. These data are not censored at transplantation.

**Figure 3.1.1**



**Figure 3.1.2**



Survival on dialysis for non-indigenous patients that commenced RRT during 2004-2013 is shown in table 3.2. In this analysis patients were censored at transplantation (that is, events after the date of first

transplantation were not included in analyses). Survival after transplantation and survival of indigenous peoples during dialysis is covered in later chapters.

Table 3.1

**Survival (95% CI) among People who Commenced Renal Replacement Therapy 2004-2013**

Age at RRT start	Years	Australia	New Zealand
<b>0-24</b>	<b>1</b>	97 (96, 98)	97 (93, 99)
	<b>2</b>	95 (93, 97)	94 (90, 97)
	<b>5</b>	92 (89, 94)	91 (85, 94)
<b>25-44</b>	<b>1</b>	96 (96, 97)	97 (95, 98)
	<b>2</b>	92 (91, 93)	92 (89, 94)
	<b>5</b>	85 (84, 86)	75 (71, 79)
<b>45-64</b>	<b>1</b>	92 (92, 93)	92 (91, 93)
	<b>2</b>	85 (85, 86)	84 (82, 85)
	<b>5</b>	68 (67, 69)	58 (55, 60)
<b>65-74</b>	<b>1</b>	86 (85, 87)	87 (85, 89)
	<b>2</b>	75 (74, 76)	74 (71, 77)
	<b>5</b>	45 (43, 46)	36 (33, 40)
<b>75-84</b>	<b>1</b>	81 (80, 82)	78 (74, 82)
	<b>2</b>	66 (64, 67)	58 (53, 63)
	<b>5</b>	30 (28, 32)	22 (17, 27)
<b>85+</b>	<b>1</b>	70 (66, 74)	76 (58, 87)
	<b>2</b>	52 (48, 57)	48 (30, 63)
	<b>5</b>	20 (16, 25)	11 (3, 27)

Table 3.2

**Survival (95% CI) among People who Commenced Dialysis 2004-2013 (Non-indigenous)**

Age at RRT start	Years	Australia	New Zealand
<b>0-24</b>	<b>1</b>	97 (95, 98)	96 (89, 98)
	<b>2</b>	93 (90, 96)	94 (85, 97)
	<b>5</b>	88 (81, 92)	82 (62, 92)
<b>25-44</b>	<b>1</b>	97 (96, 98)	98 (96, 99)
	<b>2</b>	92 (90, 93)	91 (86, 94)
	<b>5</b>	81 (78, 83)	73 (64, 80)
<b>45-64</b>	<b>1</b>	92 (91, 93)	91 (89, 93)
	<b>2</b>	85 (84, 86)	82 (79, 84)
	<b>5</b>	62 (60, 64)	56 (52, 61)
<b>65-74</b>	<b>1</b>	86 (85, 87)	86 (83, 89)
	<b>2</b>	75 (73, 76)	74 (70, 77)
	<b>5</b>	44 (42, 45)	35 (30, 39)
<b>75-84</b>	<b>1</b>	81 (80, 82)	76 (72, 81)
	<b>2</b>	66 (64, 67)	57 (51, 62)
	<b>5</b>	30 (28, 32)	20 (15, 26)
<b>85+</b>	<b>1</b>	70 (66, 74)	75 (56, 86)
	<b>2</b>	52 (48, 57)	49 (30, 65)
	<b>5</b>	21 (16, 25)	12 (3, 28)

Crude unadjusted death rates for dialysis and transplantation are shown in table 3.3 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 2013, regardless of year of first treatment.

Table 3.3

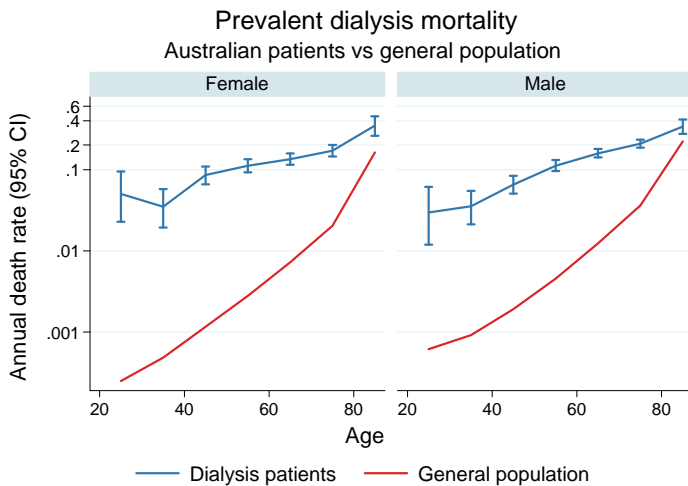
### Death Rates per 100 patient-years during Renal Replacement Therapy - 2013

Category	Level	Dialysis rate	95% CI		Transplant rate	95% CI	
Country	Australia	13.1	12.5	13.8	2.3	2.0	2.6
	New Zealand	13.7	12.3	15.2	1.9	1.3	2.7
Age	<25	3.5	1.7	6.5	0.5	0.1	1.6
	25-44	4.0	3.1	5.1	0.8	0.5	1.2
	45-64	9.9	9.1	10.8	1.9	1.6	2.3
	65-84	17.8	16.7	18.8	5.4	4.4	6.5
	85+	34.5	29.4	40.2	39.5	8.1	115.4
Diabetes status	Non-diabetic	11.3	10.5	12.1	1.9	1.6	2.2
	Type 1 diabetes	13.7	10.4	17.6	3.6	1.9	6.1
	Type 2 diabetes	15.5	14.5	16.5	3.4	2.6	4.2
Coronary disease	No	8.5	7.9	9.2	1.6	1.3	1.8
	Yes	18.5	17.5	19.6	4.8	3.9	5.7
Race	Non Indigenous (AUS)	13.4	12.7	14.1	2.3	2.0	2.6
	Non Indigenous (NZ)	15.3	13.1	17.8	1.9	1.2	2.8
	Aboriginal/TSI	12.3	10.6	14.3	4.5	2.1	8.6
	Māori (AUS)	14.8	8.6	23.7	1.9	0.0	10.9
	Māori (NZ)	13.6	11.2	16.4	2.7	0.7	7.0
	Pacific (AUS)	9.1	6.1	13.2	1.3	0.0	7.1
	Pacific (NZ)	10.8	8.4	13.8	0.0	0.0	4.1

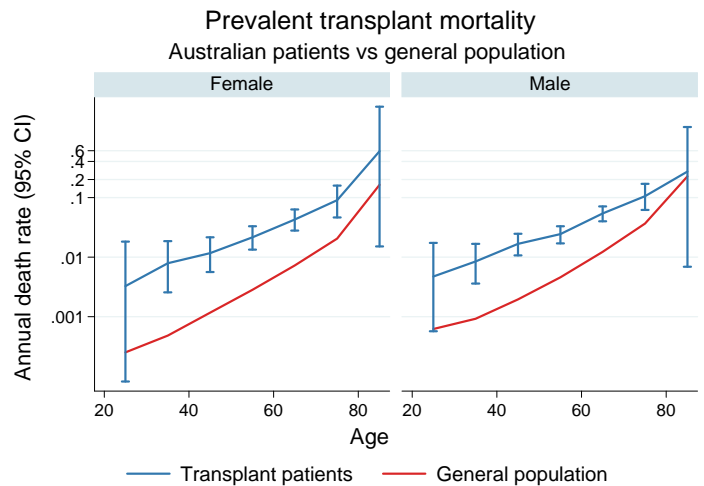
Mortality rates are generally higher with older age, diabetes and coronary artery disease. The comparison between indigenous rates (and some other comparisons) will be subject to several confounders.

Comparisons of mortality rates with the general population (stratified by gender) are shown in figures 3.2 and 3.3.

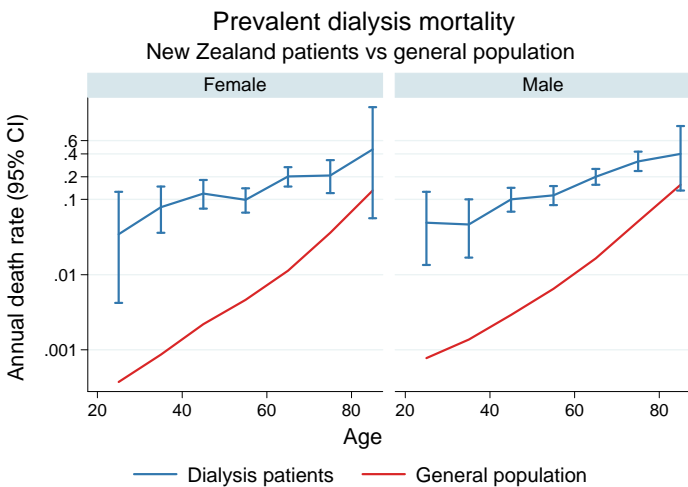
**Figure 3.2.1**



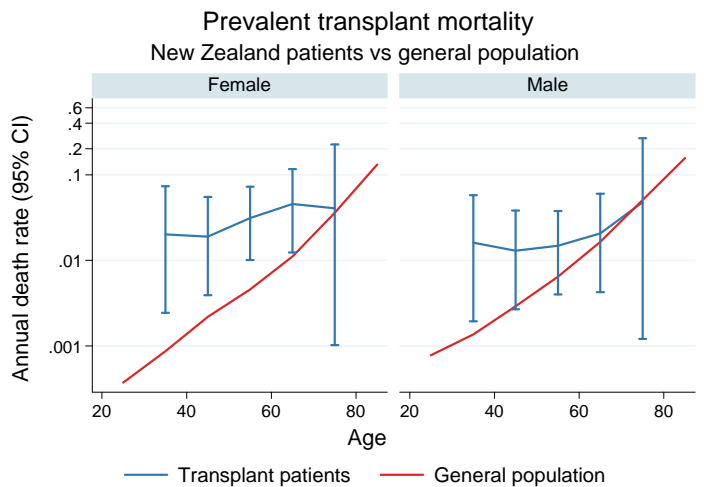
**Figure 3.2.2**



**Figure 3.3.1**



**Figure 3.3.2**



Another perspective on survival during dialysis is presented in table 3.4. Median survival is the time to which 50% of people can expect to survive. Table 3.5 shows the median survival of people who started dialysis treatment from 1 January 2004, by various categories. These survival data are censored at the time of transplantation, and include those who started dialysis in the period 2004-2013. In addition to the median, the 25th 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. These occurrences are indicated by \* in the tables. The survival times 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).

**Table 3.4**  
**Median Survival on Dialysis by Age**

Country	Age at start	Median (25th and 75th centiles), years
Australia	0-24	. (8.1, .)
	25-44	9.8 (5.4, .)
	45-64	6.6 (3.2, .)
	65-74	4.3 (2.0, 7.8)
	75-84	3.2 (1.4, 5.6)
	85+	2.1 (0.7, 4.1)
New Zealand	0-24	8.6 (8.2, 0)
	25-44	7.5 (4.2, 0)
	45-64	5.4 (2.8, 0)
	65-74	3.7 (1.9, 5.9)
	75-84	2.6 (1.1, 4.6)
	85+	1.9 (1.0, 3.1)

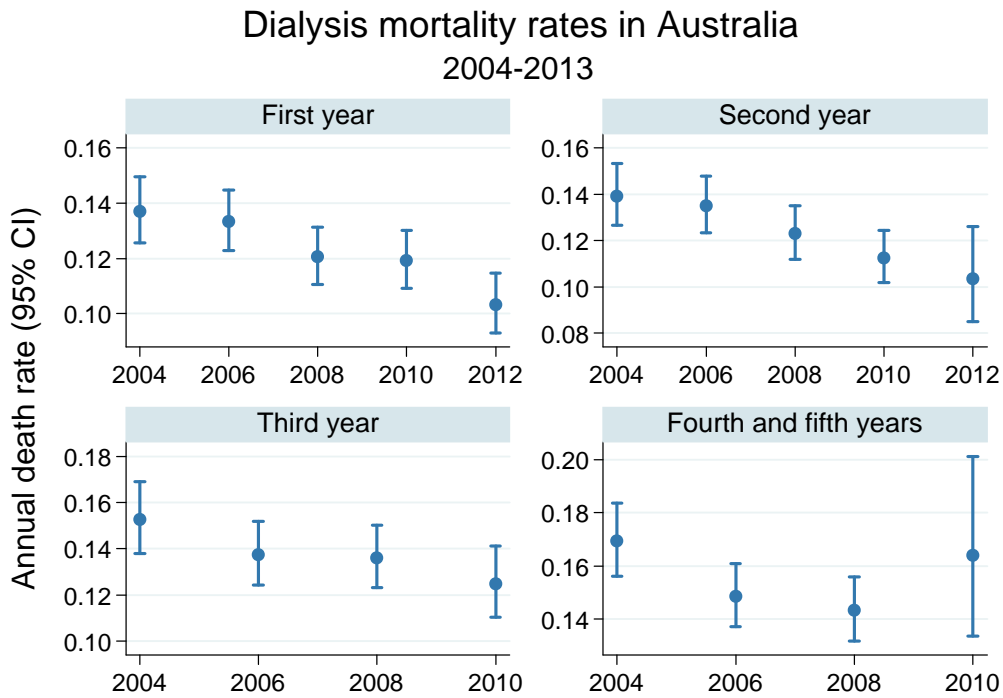
**Table 3.5**  
**Survival on Dialysis by Age and Comorbidity amongst Older People**  
**Years (median, 25th and 75th centiles)**

Age at start	Any vascular disease	Diabetes	Australia	New Zealand
65-69	No	No	6.1 (3.3, .)	5.0 (2.7, 7.1)
65-69	No	Yes	5.1 (3.1, .)	5.0 (3.0, 6.8)
65-69	Yes	No	4.3 (1.7, 7.6)	4.0 (1.9, 5.8)
65-69	Yes	Yes	4.0 (2.0, 7.1)	3.0 (1.6, 4.6)
70-74	No	No	5.4 (2.5, .)	4.4 (1.9, 6.3)
70-74	No	Yes	5.4 (2.7, .)	4.1 (2.2, 6.9)
70-74	Yes	No	3.8 (1.6, 6.9)	3.0 (1.6, 4.7)
70-74	Yes	Yes	3.1 (1.5, 5.5)	3.2 (1.5, 4.9)
75-79	No	No	4.8 (2.1, 7.4)	3.6 (1.7, 6.2)
75-79	No	Yes	4.2 (2.1, 6.5)	4.3 (1.7, 5.8)
75-79	Yes	No	3.1 (1.4, 5.8)	1.9 (0.6, 3.7)
75-79	Yes	Yes	2.9 (1.3, 5.3)	1.9 (0.8, 4.4)
80-84	No	No	3.4 (1.8, 6.1)	2.7 (1.5, 4.4)
80-84	No	Yes	3.1 (1.8, 4.6)	3.8 (1.2, 6.0)
80-84	Yes	No	2.5 (1.1, 4.8)	2.1 (1.2, 4.1)
80-84	Yes	Yes	2.4 (1.0, 4.4)	3.1 (2.0, 4.9)
85+	No	No	3.1 (1.2, 5.5)	2.4 (1.0, 3.6)
85+	No	Yes	2.4 (1.4, 7.9)	0.9 (0.9, 0.9)
85+	Yes	No	2.0 (0.7, 3.9)	1.9 (1.0, 3.1)
85+	Yes	Yes	1.5 (0.4, 3.3)	1.7 (1.2, .)

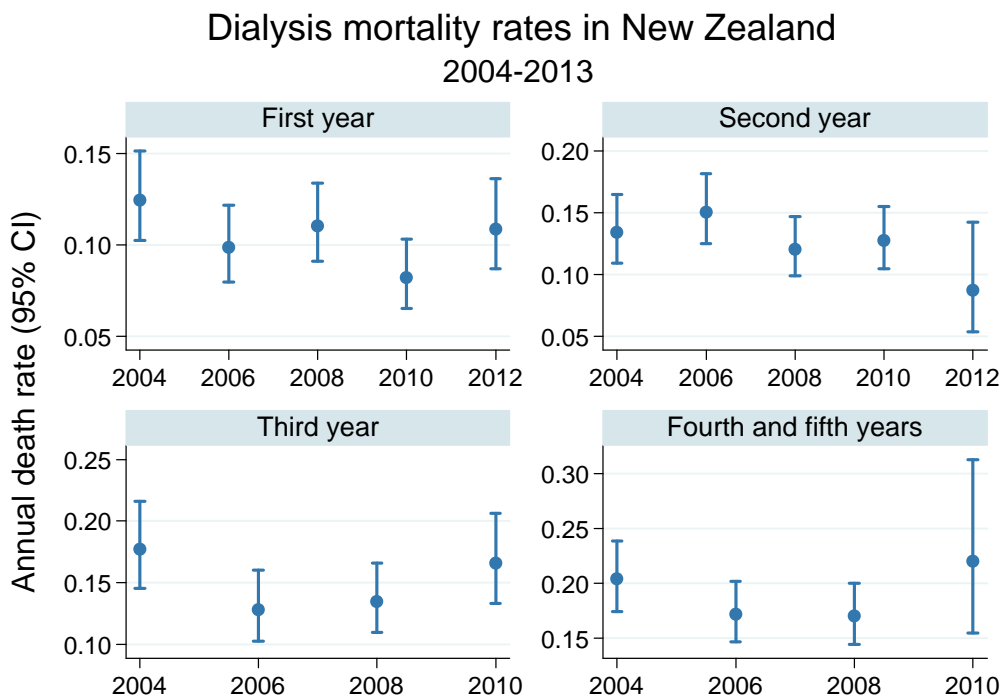
The evolution of mortality rates over time is shown in figure 3.4. In Australia, there is steady improvement in most groups over time. For New Zealand, the trends are

less clear, in part reflecting the lower precision with smaller numbers.

**Figure 3.4.1**



**Figure 3.4.2**

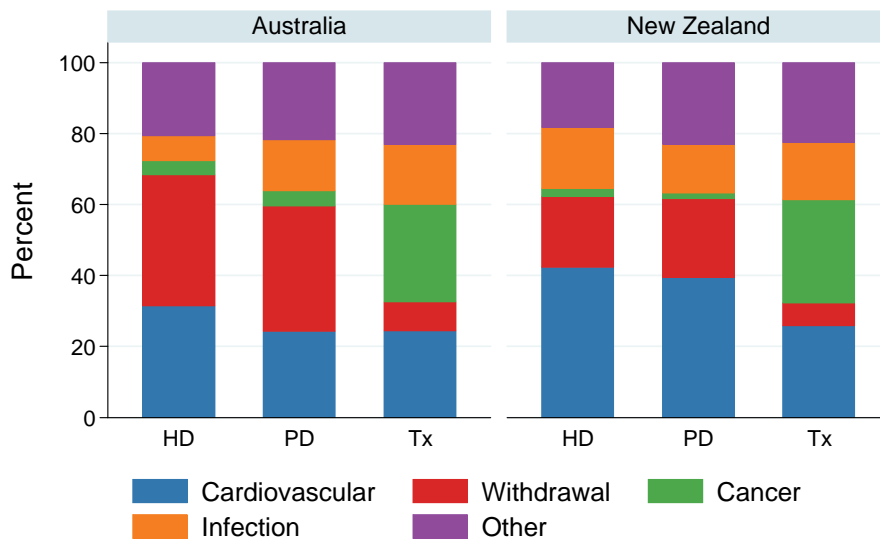


### Cause of Death

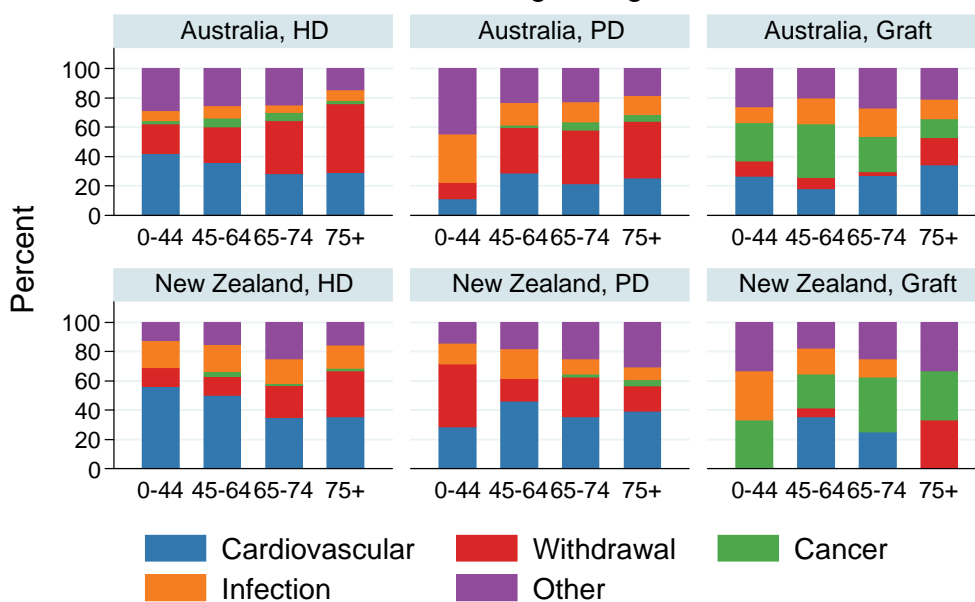
This section contains a summary of trends in various areas. The focus on this section is on deaths reported during 2013. The cause of death reported to ANZDATA is not necessarily the same as that reported on the death certificate. In particular, ANZDATA specifically records a range of reasons for “withdrawal 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 page 3-10).

**Figure 3.5** Cause of death  
Deaths occurring during 2013



**Figure 3.6** Cause of death  
Deaths occurring during 2013





For the purposes of these analyses, 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 “cardiovascular” and smaller proportion coded as “withdrawal” from New Zealand (figure 3.5 and table 3.6). 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.

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) (table 3.6).

**Table 3.6**

**Modality and Age at time of Death - 2013**

Cause of death	Haemodialysis					Peritoneal Dialysis					Graft				
	0-44	45-64	65-74	75+	Total	0-44	45-64	65-74	75+	Total	0-44	45-64	65-74	75+	Total
<b>Cardiovascular</b>	19	126	96	161	402	1	15	15	26	57	5	16	21	13	55
<b>Withdrawal</b>	9	85	122	258	474	1	16	26	40	83	2	7	2	7	18
<b>Cancer</b>	1	20	18	12	51	0	1	4	5	10	5	33	19	5	62
<b>Infection</b>	3	30	18	39	90	3	8	10	13	34	2	16	15	5	38
<b>Other</b>	13	89	84	80	266	4	12	16	19	51	5	18	21	8	52
<b>Australia</b>	45	350	338	550	1283	9	52	71	103	235	19	90	78	38	225
<b>Cardiovascular</b>	9	43	25	18	95	2	18	17	9	46	0	6	2	0	8
<b>Withdrawal</b>	2	11	16	16	45	3	6	13	4	26	0	1	0	1	2
<b>Cancer</b>	0	3	1	1	5	0	0	1	1	2	1	4	3	1	9
<b>Infection</b>	3	16	12	8	39	1	8	5	2	16	1	3	1	0	5
<b>Other</b>	2	13	18	8	41	1	7	12	7	27	1	3	2	1	7
<b>New Zealand</b>	16	86	72	51	225	7	39	48	23	117	3	17	8	3	31

**Withdrawal from renal replacement therapy**

During 2013 there were 575 deaths in Australia and 73 in New Zealand attributed to withdrawal from therapy (table 3.7). 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.

However, the coding of these categories is clearly somewhat subjective.

Table 3.8 shows the breakdown of the dialysis group by age and by time from start of RRT for those deaths which occurred in 2013.

**Table 3.7**  
Reason for Withdrawal from Renal Replacement Therapy - 2013

Country	Reason for withdrawal	HD	PD	Graft
Australia	Psychosocial	171	28	8
	Refused further treatment	10	2	0
	Suicide	5	0	2
	Cardiovascular co-morbidity	94	12	3
	Cerebrovascular co-morbidity	36	11	2
	Peripheral vascular co-morbidity	50	13	1
	Malignancy	90	14	2
	Dialysis access difficulties	18	3	0
New Zealand	Psychosocial	20	10	0
	Refused further treatment	0	1	1
	Suicide	0	0	0
	Cardiovascular co-morbidity	6	2	0
	Cerebrovascular co-morbidity	2	5	0
	Peripheral vascular co-morbidity	7	4	0
	Malignancy	9	2	1
	Dialysis access difficulties	1	2	0

**Table 3.8**  
Time from Renal Replacement Therapy Start to Death, in Patients who Withdrew and Died in 2013

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	21	24	42	89	1	3	6	1	11
1	1	15	18	29	63	2	3	3	2	10
2	5	34	55	101	195	1	5	10	10	26
5	4	38	53	133	228	1	7	10	8	26
<b>Total</b>	12	108	150	305	575	5	18	29	21	73

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**Suggested Citation:**

ANZDATA Registry. 37th Report, Chapter 3: Mortality in End Stage Kidney Disease. Australia and New Zealand Dialysis and Transplant Registry, Adelaide, Australia. 2015. Available at: <http://www.anzdata.org.au>

**Notes:**

This is a corrected version of chapter 3 and was released on September 18,2015. This version corrects errors in table 3.5.



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