

## **CHAPTER 14**

# **INTEGRATED SURVIVAL OF PATIENTS TREATED WITH RENAL REPLACEMENT THERAPY**

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Traditionally ANZDATA has presented mortality for patients as death rates per hundred years or survival at set time points. An alternative way of presenting this data is of median survivals. This is often clinically more useful, and can provide the basis for counselling patients about their expected outcomes.

Presented below are data drawn from the outcomes of all patients who commenced renal replacement therapy in Australia or New Zealand between 1-Apr-1992 and 31-Mar-2002.

Despite the dramatic increase in rates of end stage renal disease treatment in the  $\geq 65$  year age group over the past 10 years, there has been little change in the prevalence of vascular comorbidities (fig 14.1), although there has been a steady increase in the proportion with type II diabetes (fig 14.2).

One issue which may affect the outcomes seen in the older group is the changes in selection bias as a result of changing renal replacement therapy entry rates. There is no direct evidence available in Australia about the proportion of ESRD patients treated. When the short to medium term survival of the older group is compared across recent years, there is however little difference observable (fig 14.3).

In the first section, the age specific mortality rate and observed survival times are tabulated together with the numbers in each age category (fig 14.4). Since this table describes observed data, with less than half of the

starting cohort having died, a median survival has not been presented for all groups.

The impact of age on survival is illustrated graphically in the Kaplan Meier curve (fig 14.5).

The second approach is to use the available data to extrapolate an expected survival. This involves making an assumption about the underlying distribution of the survival curve. The method used was that of Royston et al <sup>(1)</sup>.

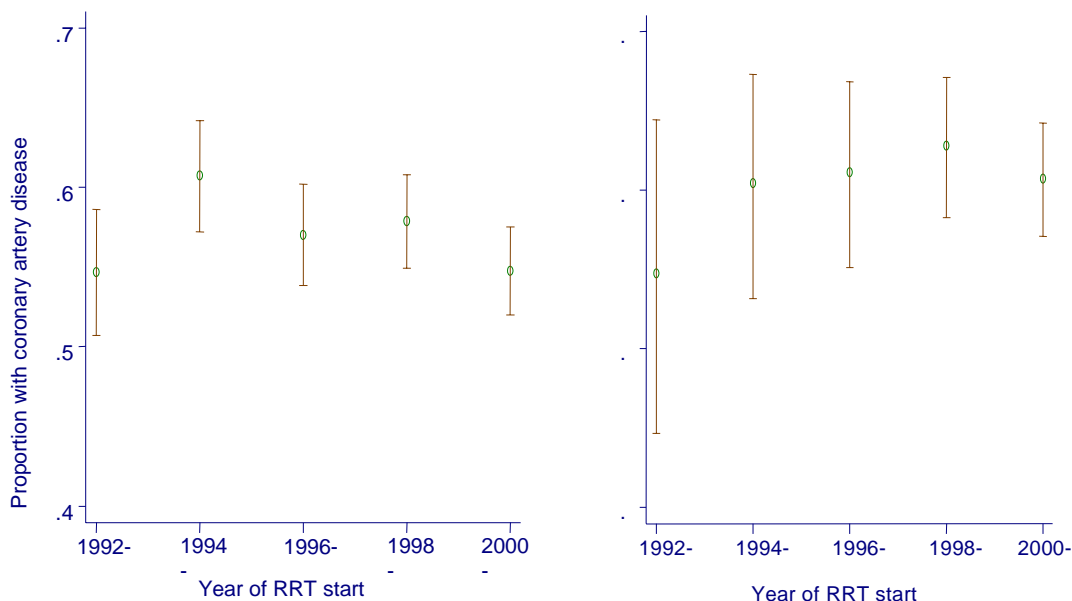
Tabulated are the 25th, 50th (median) and 75th percentiles of predicted survival by age category for older people. Again this incorporates all forms of renal replacement therapy (including kidney transplantation). Of note is the broad range of survivals.

A model was developed using this to derive baseline survival estimates (fig 14.6) and the influence of comorbidities.

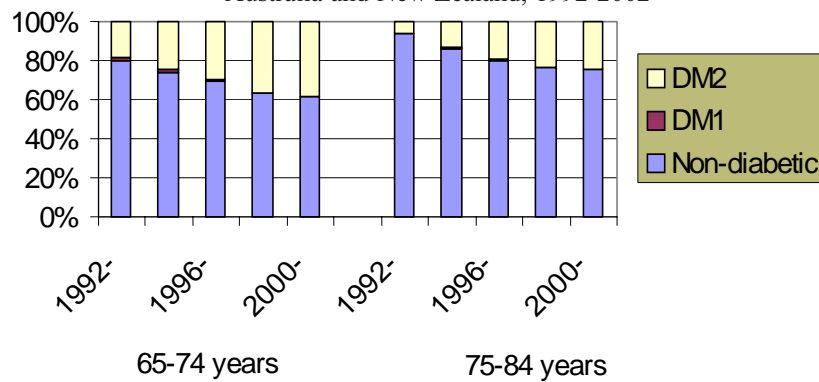
At present, this is based entirely on historical data. These analyses are obviously amenable to tests of validity, examining in prospectively collected data how accurate the predictions are.

*1. Royston P, Parmar MK. Flexible parametric proportional-hazards and proportional-odds models for censored survival data, with application to prognostic modelling and estimation of treatment effects. Stat Med 2002; 21:2175-97.*

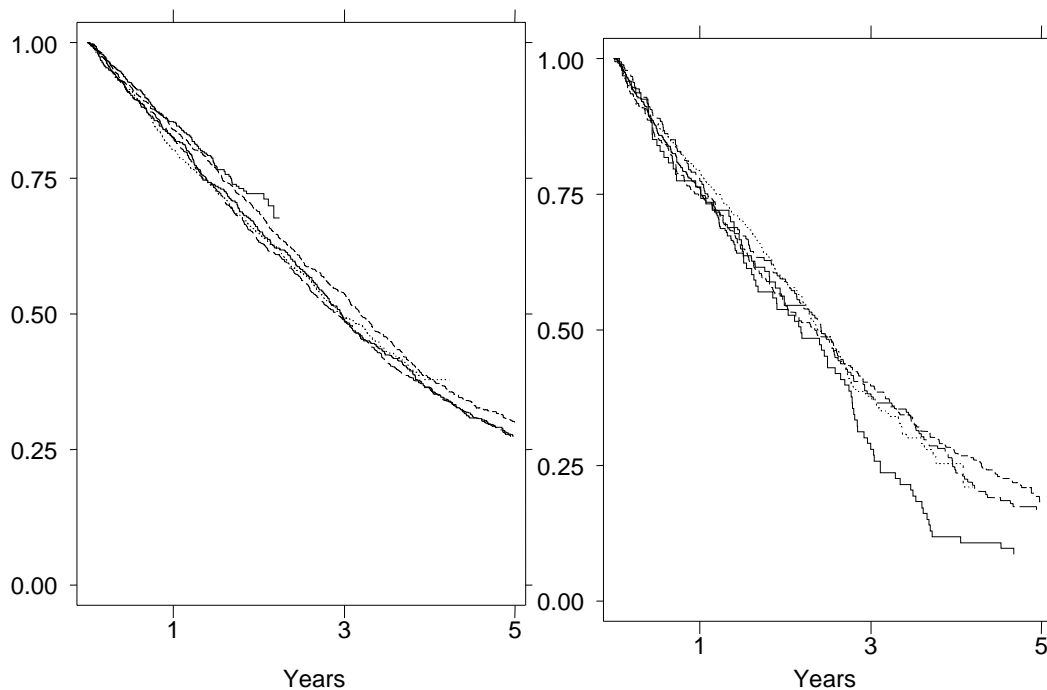
**Figure 14.1** Prevalence of coronary artery disease by year of RRT start among 65-74 year olds (left) and 75-84 year olds (right).



**Figure 14.2** Prevalence of diabetes among new RRT patients in Australia and New Zealand, 1992-2002



**Figure 14.3** Survival of patients on renal replacement therapy, by year of commencement. Groups starting from 1992 (—) 1994 (— —) 1996 (---) 1998 (....) 2000 (—)



**Table 14.4**

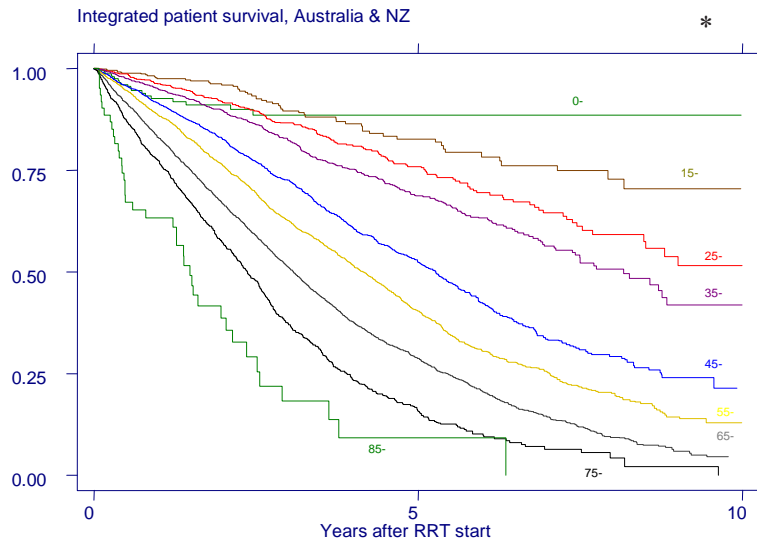
**Age-specific Death Rates, and Observed Survival Times (25th, 50th and 75th centiles), Integrated RRT for Australia and New Zealand**

Age Group	Mortality Rate (per 100 years)	Number of Subjects	Observed Cohort		
			25%	50%	75%
00-14	1.8	322			
15-24	1.8	713			
25-34	3.3	1464	9.0		
35-44	4.8	2163	5.7		
45-54	9.3	3240	3.1	7.3	
55-64	14.6	4135	2.1	4.6	9.0
65-74	23.1	4570	1.5	3.1	5.5
75-84	31.6	1704	1.1	2.4	3.9
>85	52.2	63	0.4	1.5	2.6



**Figure 14.5**

Kaplan-Meier curve of patient survival by age category, integrated across all RRT modalities, for those who started RRT between 1-Apr-1992 and 31-Mar-2002. \* = years of age.



**Figure 14.6**

**Predicted 25th, 50th and 75th Centiles of Survival by Age, assuming NO comorbidities**

Age Group	Observed Cohort		
	25%	50% (median)	75%
65-69	2.3	4.5	7.4
70-74	1.8	3.7	6.1
75-79	1.5	3.2	5.3
80-84	1.2	2.6	4.4
85 +	0.8	1.7	3.0

**Figure 14.7**

**"Time Ratios" for Survival in the >65 Year Age Group**

**These are the degree by which survival was shortened in the cohort studied for each comorbidity, and are the inverse of the "hazard ratio". Note that the values are multiplicative; for someone with both type II diabetes and coronary artery disease, the average survival was less by  $0.80 \times 0.79 = 0.63$ .**

Parameter	Time Ratio	(95% Confidence Interval)
Male gender	1.11	( 1.03 - 1.18 )
Type I diabetes	0.62	( 0.45 - 0.86 )
Type II diabetes	0.80	( 0.74 - 0.87 )
Aboriginal	0.84	( 0.66 - 1.07 )
Maori / Pac.Isl.	0.80	( 0.67 - 0.96 )
Coronary artery disease	0.79	( 0.73 - 0.86 )
Cerebrovascular disease	0.82	( 0.76 - 0.89 )
Chronic lung disease	0.78	( 0.72 - 0.85 )
Peripheral vascular disease	0.79	( 0.73 - 0.85 )

\* Note these are an analysis of a previous historical cohort, and have not been validated as prospective predictors of outcome, however may serve as a guide to the likely impact of age and other comorbidities on outcome.