nephron
Clinical Practice

Nephron 2017;137(suppl1):117–150
DOI: 10.1159/000481367

Published online: September 29, 2017

UK Renal Registry 19th Annual Report: Chapter 5 Survival and Causes of Death in UK Adult Patients on Renal Replacement Therapy in 2015: National and Centre-specific Analyses

Shona Methven[a], Retha Steenkamp[a], Simon Fraser[b]

[a]UK Renal Registry, Bristol, UK; [b]University of Southampton, UK

Keywords

Causes of death · Comorbidity · Dialysis · End stage renal disease (ESRD)· Established renal failure (ERF) · Haemodialysis · Outcome · Peritoneal dialysis · Renal replacement therapy (RRT) · Survival · Transplant · Vintage

Summary

- Short-term (90 day) age-adjusted survival of incident RRT patients in 2014 was static compared with 2013 (96.8% versus 96.9%).
- One year after 90 day age adjusted survival for incident RRT patients in the 2014 cohort fell slightly to 90.2% compared with the previous year (91.4%).
- There was a difference in one year after 90 day incident survival by age group and diagnosis of diabetes: patients with diabetes aged <45 years have worse one year after 90 day survival than patients without diabetes, but for older patients with diabetes (⩾45 years) survival was similar compared to those without diabetes.
- One year age adjusted survival for prevalent dialysis patients was static at 88.3% in the 2014 cohort, compared with 88.6% in the 2013 cohort. Age adjusted one year survival for prevalent dialysis patients with diabetic primary renal disease has been declining slightly from 2012 onwards.
- Centre and UK country variability was evident in incident and prevalent patient survival after adjusting to age 60. Further adjustment for comorbidity was not possible due to missing data.
- The relative one year risk of death for prevalent RRT patients compared with the general population was approximately 22.0 for age group 35–39 compared with 2.3 at age 85+ years, but the relative risk of death for younger patients has improved over time.
- In the prevalent RRT population, cardiovascular disease was the most common cause of death and accounted for 22% of deaths, with infection accounting for 21%. In 2014 treatment withdrawal accounted for 18% of deaths and this represents an increase in recent years from historical levels.

KARGER

Fax +41 61 306 12 34
E-Mail karger@karger.com
www.karger.com/nef

Retha Steenkamp
UK Renal Registry, Southmead Hospital, Southmead Road,
Bristol, BS10 5NB, UK
Email: renalregistry@renalregistry.nhs.uk

Introduction

The analyses presented in this chapter examine a) survival from the start of renal replacement therapy (RRT) of adult patients; b) survival amongst prevalent adult dialysis patients alive on 31st December 2014; c) the death rate in the UK compared to the general population; d) the causes of death for incident and prevalent adult patients. They encompass the outcomes of the total incident adult UK RRT population (2014) reported to the UK Renal Registry (UKRR), including the 19.2% who started on peritoneal dialysis and the 7.7% who received a pre-emptive renal transplant. These results are therefore a true reflection of the outcomes in the whole UK adult incident RRT population. Analyses of survival within the first year of starting RRT include patients who were recorded as having started RRT for established renal failure (as opposed to acute kidney injury) but who had died within the first 90 days of starting RRT, a group excluded from most other countries' registry data. As is common in other countries, survival analyses are also presented for the first year after 90 days.

The term established renal failure (ERF) used throughout this chapter is synonymous with the terms end stage renal failure (ESRF) and end stage renal disease (ESRD) which are in more widespread international usage. Within the UK, patients have disliked the term 'end stage'; the term ERF was endorsed by the English National Service Framework for Renal Services, published in 2004.

Since 2006, the UKRR has openly reported and published centre attributable RRT survival data. These are raw data which must be interpreted with caution. The UKRR adjusts for the different age distributions of patients in different centres, but lacks sufficient data from many participating centres to allow adjustment for primary renal diagnosis, other comorbidities at start of RRT (comorbidity, especially diabetes, is a major factor associated with survival [1–3]) and ethnic origin, which have been shown to have an impact on outcome (for instance, better survival is expected in centres with a higher proportion of Black and South Asian patients) [4]. This lack of data on the centre level case-mix makes interpretation of any apparent difference in survival between centres and UK countries difficult. Despite the uncertainty about apparent differences in outcome, any centre which appears to be an outlier will be subject to the UKRR clinical governance procedures as set out in chapter 2 of the 2009 UKRR Report [5].

Methods

The unadjusted survival probabilities (with 95% confidence intervals) were calculated using the Kaplan–Meier method, in which the probability of surviving more than a given time can be estimated for all members of a cohort of patients overall or by subgroup such as age group, but without any adjustment for confounding factors such as age that affect the chances of survival. Where centres are small, or the survival probabilities are greater than 90%, the confidence intervals are only approximate.

In order to estimate the difference in survival of different subgroups of patients within the cohort, a stratified proportional hazards model (Cox) was used where appropriate. The results from the Cox model were interpreted using a hazard ratio. When comparing two groups, the hazard ratio is the ratio of the estimated hazard for group A relative to group B, where the hazard is the risk of dying at time t given that the individual has survived until this time. The underlying assumption of a proportional hazards model is that the hazard ratio remains constant throughout the period under consideration. Whenever used, the assumptions of the proportional hazards model were tested by plotting the log(−log(survival)) versus the log of survival time or by testing time dependent covariates in the model.

To allow for comparisons between centres with differing age distributions, survival analyses were adjusted for age and reported as survival adjusted to age 60. This gives an estimate of what the survival would have been if all patients in that centre had been aged 60 at the start of RRT. This age was chosen because it was approximately the average age of patients starting RRT 16 years ago at the start of the UKRR's data collection. The average age of patients commencing RRT in the UK has recently stabilised around an age of 62 years, but the UKRR has maintained age adjustment to 60 years for comparability with all previous years' analyses. Diabetic patients were included in all analyses unless stated otherwise and for some analyses, diabetic and non-diabetic patients were analysed separately and compared. Non-diabetic patients were defined as all patients excluding those patients with diabetes as the primary renal disease.

Centre variability for incident and prevalent patient survival was analysed using a funnel plot. For any number of patients in the incident or prevalent cohort (x-axis), one can identify whether any given survival probability (y-axis) falls within, plus or minus two standard deviations (SDs) from the national mean (solid lines, 95% limits) or three SDs (dotted lines, 99.9% limits). All analyses were undertaken using SAS 9.3.

Definition of RRT start date

The incident survival figures quoted in this chapter are from the first day of RRT whether with dialysis or a pre-emptive transplant. In the UKRR all patients starting RRT for ERF are included from the date of the first RRT treatment wherever it took place (a date currently defined by the clinician) if the clinician considered the renal failure irreversible. Should a patient recover renal function within 90 days they were then excluded. These UK data therefore may include some patients who died within 90 days who had developed acute, potentially reversible renal failure but were recorded by the clinician as being in irreversible ERF.

Previously, the UKRR asked clinicians to re-enter a code for ERF in patients initially coded as having acute renal failure once it had become clear that there was no recovery of kidney function.

However, adherence to this requirement was very variable, with some clinicians entering a code for ERF only once a decision had been made to plan for long-term RRT [6]. All UK nephrologists have now been asked to record the date of the first haemodialysis session and to record whether the patient was considered to have acute kidney injury (acute renal failure) or to be in ERF at the time. For patients initially categorised as 'acute', but who were subsequently categorised as ERF, the UKRR assigns the date of this first 'acute' session as the date of start of RRT.

UKRR analyses of electronic data extracted for the immediate month prior to the start date of RRT provided by clinicians highlighted additional inconsistencies in the definition of this first date when patients started on peritoneal dialysis, with the date of start reported to the UKRR being later than the actual date of start. These findings are described in detail in chapter 13 of the 2009 Annual Report [6]. This concern is unlikely to be unique to the UK, but will be common to analyses from all renal centres and registries.

In addition to these problems of defining day 0 within one country, there is international variability when patient data are collected by national registries with some countries (often for financial re-imbursement or administrative reasons) defining the 90th day after starting RRT as day 0, whilst others collect data only on those who have survived 90 days and report as zero the number of patients dying within the first 90 days.

Thus, as many other national registries do not include reports on patients who do not survive the first 90 days, survival from 90 days onwards is also reported to allow international comparisons. This distinction is important, as there is a much higher death rate in the first 90 days, which would distort comparisons.

Methodology for incident patient survival

The incident population is defined as all patients over 18 who started RRT at UK renal centres. Patients were considered 'incident' at the time of their first RRT, thus patients re-starting dialysis after a failed transplant were not included in the incident RRT cohort (see appendix B for a detailed definition of the incident (take-on) population).

For incident survival analyses, patients newly transferred into a centre who were already on RRT were excluded from the incident population for that centre and were counted at the centre at which they started RRT. Some patients recovered renal function after more than 90 days but subsequently returned to RRT and for these patients the most recent start of RRT was used.

The incident survival cohort was **NOT** censored at the time of transplantation and therefore included the survival of the 7.7% who received a pre-emptive transplant. An additional reason for not censoring was to facilitate comparison between centres. Centres with a high proportion of patients of South Asian and Black origin are likely to have a healthier dialysis population, because South Asian and Black patients are less likely to undergo early transplantation [7], and centres with a high pre-emptive transplant rate are likely to have a less healthy dialysis population as transplantation selectively removes fitter patients. However, censoring at transplantation was performed in the 1997–2014 cohort to establish the effect on long term survival by age group and also in the 2011–2014 cohort to investigate the effect on the outlying status of centres.

The one year incident survival is for patients who started RRT from 1st October 2013 until the 30th September 2014 and followed up for one full year (e.g. patients starting RRT on 1st December 2013 were followed through to 30th November 2014). The 2015 incident patients could not be analysed as they had not yet been followed for a sufficient length of time. For analysis of one year after 90 day survival, patients who started RRT from 1st October 2013 until 30th September 2014 were included in the cohort and they were followed up for a full year after the first 90 days of RRT.

Two years' incident data (2013–2014) were combined to increase the size of the patient cohort, so that any differences between the four UK countries can be more reliably identified. To help identify any centre differences in survival from the small centres (where confidence intervals are large), an analysis of one year after 90 day survival using a rolling four year combined incident RRT cohort from 2011 to 2014 was also undertaken. A 10 year rolling cohort was used when analysing trends over time and for long term survival, a cohort from 1997 to 2014 was analysed.

The death rate per 1,000 patient years was calculated by dividing the number of deaths by the person years exposed. Person years exposed are the total years at risk for each patient (until death, recovery or lost to follow up). The death rate is presented by age group and UK nation.

Adjustment of one year after 90 day survival for the effect of comorbidity was undertaken using a rolling four year combined incident RRT cohort from 2011 to 2014. Twenty-eight centres returned $\geqslant 85\%$ of comorbidity data for patients in the combined cohort. Adjustment was first performed to a mean age of 60 years, then to the average distribution of primary diagnoses for the 28 centres. The individual centre data were then further adjusted for average distribution of comorbidity present at these centres.

Methodology for prevalent dialysis patient survival

The prevalent dialysis patient group was defined as all patients over 18 years old, alive and receiving dialysis on 31st December 2014 who had been on dialysis for at least 90 days at one of the UK adult renal centres. Prevalent dialysis patients on 31st December 2014 were followed-up in 2015 and were censored at transplantation. When a patient is censored at transplantation, this means that the patient is considered as alive up to the point of transplantation, but the patient's status post-transplant is not considered.

As discussed in previous reports, comparison of survival of prevalent dialysis patients between centres is complex. Survival of prevalent dialysis patients can be studied with or without censoring at transplantation and it is common practice in some registries to censor at transplantation. Censoring could cause apparent differences in survival between those renal centres with a high transplant rate and those with a low transplant rate, especially in younger patients where the transplant rate is highest. Censoring at transplantation systematically removes younger fitter patients from the survival data. The differences are likely to be small due to the relatively small proportion of patients being transplanted in a given year compared to the whole dialysis population (about 12% of the dialysis population aged under 65 and about 2% of the population aged 65 years and over). To allow comparisons with other registries the survival results for prevalent dialysis patients **CENSORED** for transplantation have been quoted. To understand survival of patients, including survival following transplantation, the incident patient analyses should be viewed.

The effect of not censoring at transplantation was performed in the 2014 cohort to investigate the effect on the outlying status of centres.

Methodology for comparing mortality in prevalent RRT patients with mortality in the general population

Data on the UK population in mid-2014 and the number of deaths in each age group in 2014 were obtained from the Office of National Statistics [8]. The age specific UK death rate was calculated as the number of deaths in the UK per thousand people in the population. The age specific expected number of deaths in the RRT population was calculated by applying the UK age specific death rate to the total of years exposed for RRT patients in that age group. This is expressed as deaths per 1,000 patient years. The age specific number of RRT deaths is the actual number of deaths observed in 2014 in RRT patients. The RRT observed death rate was calculated as number of deaths observed in 2014 per 1,000 patient years exposed. Relative risk of death was calculated as the ratio of the observed and expected death rates for RRT patients. The death rate was calculated for the UK general population by age group and compared with the same age group for prevalent patients on RRT on 31st December 2014.

Methodology of causes of death

The EDTA–ERA Registry codes for causes of death were used. These have been grouped into the following categories:

- Cardiac disease
- Cerebrovascular disease
- Infection
- Malignancy
- Treatment withdrawal
- Other
- Uncertain

Completeness of cause of death data was calculated for all prevalent patients on RRT that died in a specific year with cause of death data completed for that year. Patients that were lost to follow up or that recovered were not included in the cause of death completeness calculation.

Adult patients aged 18 years and over from England, Wales, Scotland and Northern Ireland were included in the analyses of cause of death. The incident patient analysis included all patients starting RRT in the years 2000–2014. Analysis of prevalent patients included all those aged over 18 years and receiving RRT on 31st December 2014 and followed-up for one year in 2015.

Results

Incident (new RRT) patient survival

Overall survival

The 2014 incident RRT cohort included 7,251 patients who started RRT. Survival at 90 days (adjusted to age 60) for the 2014 cohort was 96.8%, and was unchanged compared to the previous year (96.9%) (table 5.1). One year after 90 days survival for incident patients starting RRT in 2014 (adjusted to age 60) fell slightly compared to the previous year: 90.2% compared to 91.4% in the 2013 cohort (table 5.1).

Survival by UK country

Survival at 90 days was highest in Scotland compared with the other nations (table 5.2), while one year after 90 day survival also differed between countries, with England having the highest survival (table 5.2). However, there are two important caveats for the interpretation of these data; they have not been adjusted for differences in primary renal diagnosis, ethnicity, socio-economic status or comorbidity, which may differ by country. Secondly, there are known regional differences in the life expectancy of the general population within the UK (which may be explained by some of the factors outlined above plus others). These general population differences are likely to contribute to the variation in survival between renal centres and UK countries. To illustrate this, table 5.3 shows general population life expectancy of the UK countries for the period 2013–2015.

Table 5.1. Survival of incident RRT patients, 2014 cohort

Interval	Unadjusted survival (%)	Adjusted survival (%)	*95% CI*	*N*
Survival at 90 days	95.5	96.8	*96.3–97.3*	7,251
Survival one year after 90 days	87.1	90.2	*89.4–91.1*	6,896

Table 5.2. Incident RRT survival across the UK countries, combined two year cohort (2013–2014), adjusted to age 60

Interval	England	N Ireland	Scotland	Wales	UK
Survival at 90 days (%)	96.7	96.5	98.0	96.6	96.8
95% CI	*96.4–97.1*	*94.9–98.1*	*97.2–98.7*	*95.5–97.6*	*96.5–97.2*
Survival 1 year after 90 days (%)	91.1	89.5	89.8	88.2	90.8
95% CI	*90.5–91.6*	*86.6–92.4*	*88.1–91.6*	*86.2–90.3*	*90.2–91.3*

Table 5.3. Life expectancy in years in the UK countries, 2013–2015 (source ONS [8])

	At birth		At age 65	
Country	Male	Female	Male	Female
England	79.4	83.1	18.6	21.0
Northern Ireland	78.3	82.3	18.1	20.5
Scotland	77.1	81.1	17.3	19.7
Wales	78.4	82.3	18.1	20.5
UK	**79.1**	**82.8**	**18.5**	**20.9**

Survival by modality

It is not possible to make truly valid comparisons of survival of cohorts of patients starting different RRT modalities, as modality selection is not random. In the UK, the cohort of patients starting peritoneal dialysis was younger and received a transplant more quickly than those starting haemodialysis. The age adjusted one year after 90 days survival estimates for incident patients starting RRT on haemodialysis (HD) and peritoneal dialysis (PD) in 2014 were 88.4% and 92.8% respectively, with both HD and PD patient survival falling slightly from the previous year (figure 5.1). This is the first time in five years that the one year after 90 days survival on haemodialysis has declined. PD patients' survival has remained relatively static over the last five years, with a small decline observed this year (figure 5.1).

Survival by age

Tables 5.4 and 5.5 show survival for the 2014 incident RRT cohort divided by age (⩾65 years and <65 years). Short term survival (at 90 days) decreased marginally for the younger age group, while it increased for those ⩾65 years compared with the 2013 cohort (98.1 to 97.8% for those aged 18–64 years and 91.6 to 93.2% for those ⩾65 years respectively). There was a small decline in one year after 90 day survival for both age groups compared to the 2013 cohort. There was a steep decline in survival with advancing age (figure 5.2).

Table 5.4. Unadjusted 90 day survival of incident RRT patients, 2014 cohort, by age

Age group	Survival (%)	*95% CI*	*N*
18–64	97.8	*97.3–98.2*	3,667
⩾65	93.2	*92.3–94.0*	3,584
All ages	95.5	*95.0–96.0*	7,251

Table 5.5. Unadjusted one year after day 90 survival of incident RRT patients, 2014 cohort, by age

Age group	Survival (%)	*95% CI*	*N*
18–64	93.3	*92.4–94.1*	3,562
⩾65	80.6	*79.2–81.9*	3,334
All ages	87.1	*86.3–87.9*	6,896

There was a curvilinear increase in the death rate per 1,000 patient years with increasing age for the one year period from 90 days after RRT start (figure 5.3). The overall death rate in Wales was higher than in the other UK countries, mostly due to a higher death rate in Wales for patients ⩾55 years old (figure 5.3) and a higher overall median age compared to other UK countries. A similar finding is reported in table 5.12, where there was evidence that the one year death rate in prevalent dialysis patients (2014 cohort) was higher in Wales compared to England. This is also consistent with the survival figures reported in table 5.2.

Figure 5.4 shows the long-term survival of incident patients from day 0 (start of RRT), according to age at

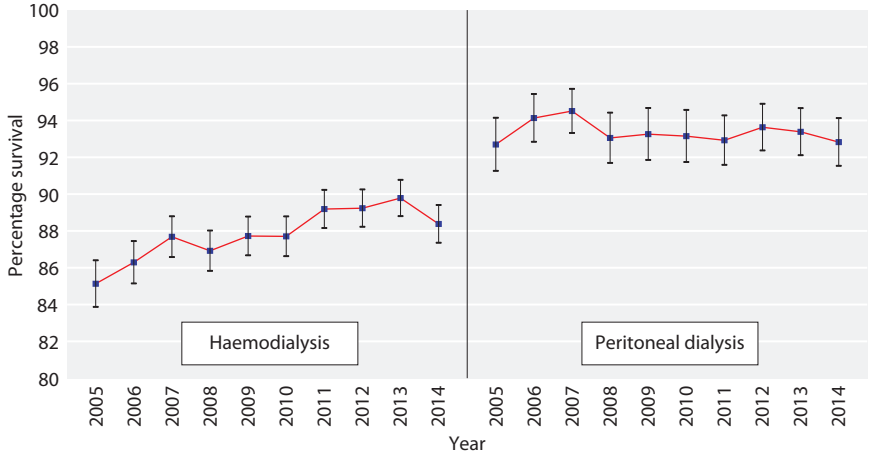

Fig. 5.1. Trend in one year after 90 day incident patient survival by first modality, 2005–2014 cohorts (adjusted to age 60, excluding patients whose first modality was transplantation)

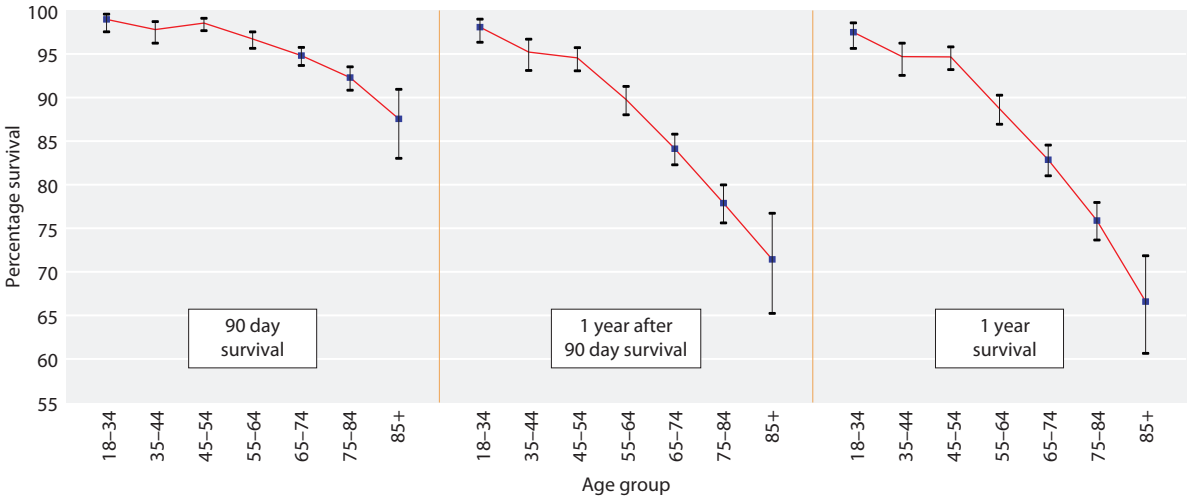

Fig. 5.2. Unadjusted survival of incident RRT patients by age group, 2014 cohort

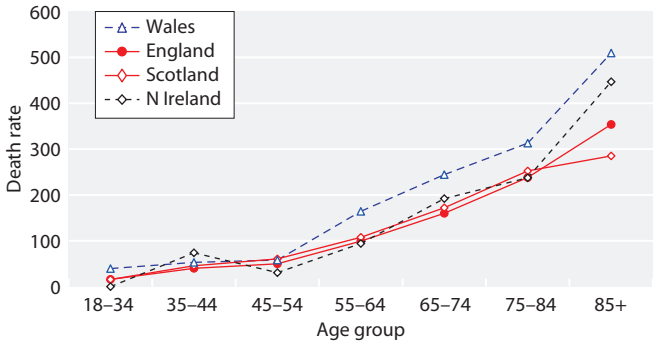

Fig. 5.3. One year after 90 days death rate per 1,000 patient years by UK country and age group for incident RRT patients, 2011–2014 cohort

RRT start. More than 50% of patients who were aged between 45–54 years when starting RRT survived for over 10 years. Median survival for those aged between 55–64 years at RRT start was around 6.0 years and median survival for those aged between 65–74 years was approximately 3.5 years.

Figure 5.5 illustrates the survival of incident patients, excluding those who died within the first 90 days and shows that median survival of patients aged between 55–64 years was approximately 6.5 years and median survival of patients aged between 65–74 years was approximately 4 years. These survival results are slightly better than survival from day 0 for the same age groups, as would be expected due to the higher mortality observed in the first 90 days of treatment (figure 5.4).

Censoring at transplantation removes the fittest patients from the survival cohort and affects the appearance of the longer-term outcomes of the younger patients (who are most likely to have undergone transplantation). Without censoring, the 10-year survival for patients aged 18–34 years was 83.7% (figure 5.4), however if survival is censored at transplantation this falls dramatically to 58.1% (data not shown). The 10 year survival without and with censoring at transplantation were 70.7% and 43.8% for age group 35–44 years and 54.6% and 30.7% for age group 45–54 years

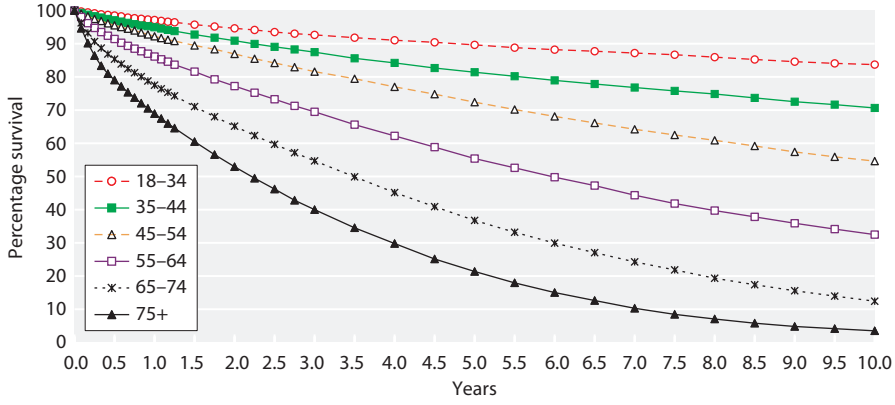

Fig. 5.4. Survival of incident RRT patients (unadjusted), 1997–2014 cohort (from day 0)

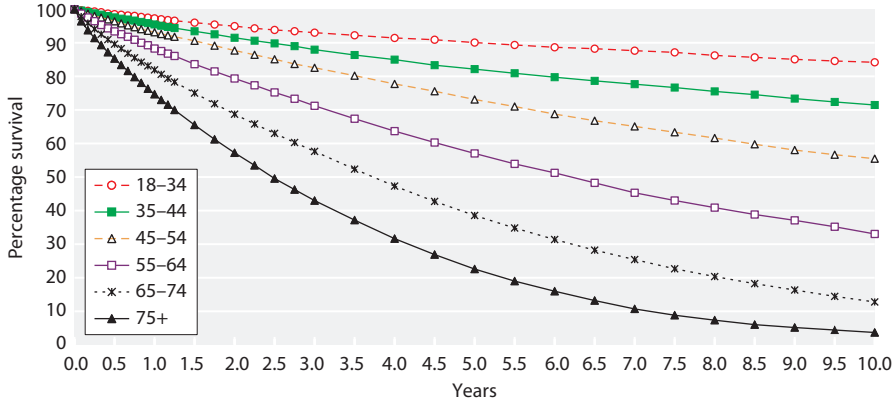

Fig. 5.5. Survival of incident RRT patients (unadjusted), 1997–2014 cohort (from day 90)

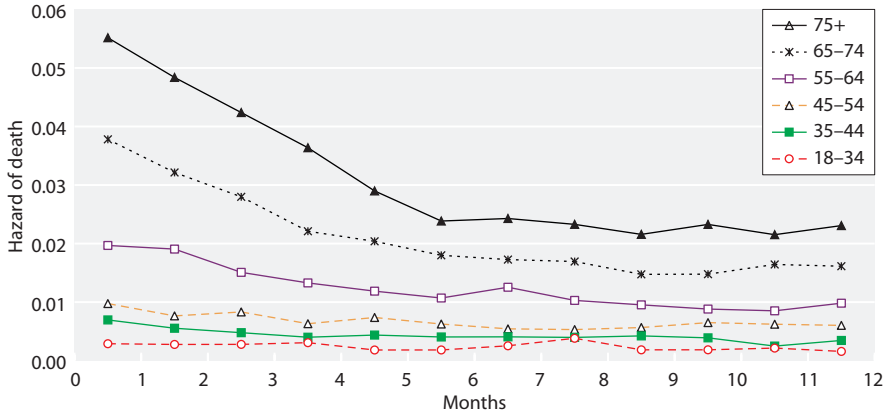

Fig. 5.6. First year monthly hazard of death, by age group, 1997–2014 combined incident RRT cohort

respectively. This difference in survival becomes less pronounced with increasing age, especially for patients aged 65+. This was previously examined in more detail in the 2008 Annual Report [9].

Age and the hazard of death

Figure 5.6 shows the monthly hazard of death from the first day of starting RRT by age group, which falls sharply during the first 4–5 months, particularly for older patients (⩾65 years), after which time the hazard remains relatively stable up to one year.

The hazard of death at 90 days per 10 year increase in patient age fell from 1.85 in the 2013 cohort to 1.61 (2014 cohort) while the hazard in the 1st year after 90 days also fell, but by a lesser magnitude (1.59 in the 2014 cohort compared to 1.65 in the 2013 cohort) (table 5.6).

Survival by gender

There was no survival difference between genders in the incident RRT cohort of patients starting RRT from 2003 to 2012 and followed up for a minimum of three years until 2015 (figure 5.7). There was also no evidence of a survival difference between genders in the first 90 days and one year after the first 90 days (data not shown).

Survival in the 2005–2014 cohort

The death rate per 1,000 patient years in the first year of starting RRT from 2005 to 2014 is shown in figure 5.8. There was essentially no change in the death rate from 2013 to 2014 on a background of a declining trend in the death rate overall and over the past decade, but with a more marked fall in the older age group (⩾65 years). It is important to note that these death rates may not be directly comparable with those produced by other registries (for instance the USRDS) if the first 90 day period, when death rates are higher than subsequent time periods, are excluded.

The time trend changes in one year after 90 days incident survival over the period 2005–2014 are shown in figure 5.9. The left hand plot, which includes only those

Table 5.6. Increase in proportional hazard of death for each 10 year increase in age, 2014 incident RRT cohort

Interval	Hazard of death for 10 year age increase	*95% CI*
First 90 days	1.61	*1.47–1.76*
1 year after first 90 days	1.59	*1.51–1.68*

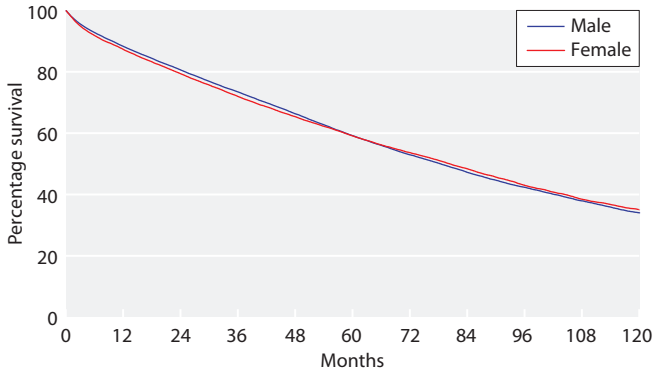

Fig. 5.7. Long term survival of incident RRT patients by gender, 2003–2012 combined cohort, adjusted to age 60, followed-up for a minimum of three years

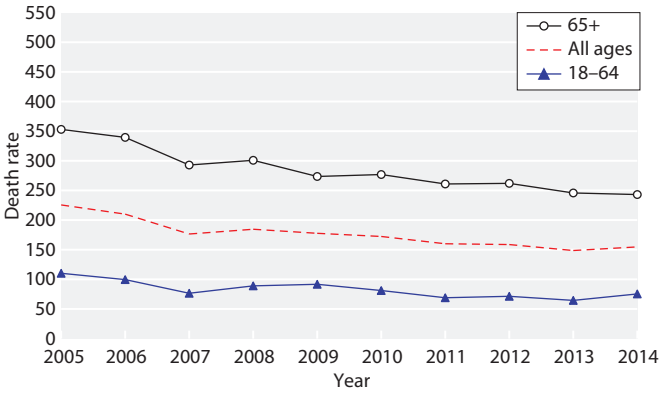

Fig. 5.8. One year incident RRT death rate per 1,000 patient years by age group, 2005–2014 cohort

centres that have been sending data continuously since the year 2000, shows a similar survival trend to the plot in which data from all renal centres were analysed, namely that the percentage of patients surviving one year after 90 days has fallen slightly in 2014 compared with the preceding year (from 91.4% to 90.2% for all renal centres).

One year after 90 days incident RRT patient survival in the 2005–2014 cohort by centre, UK country and overall, can be found in appendix 1, table 5.22.

Long term survival: trends up to 10 years post RRT start

The unadjusted survival analyses (tables 5.7, 5.8 and figures 5.10, 5.11) show an overall improvement in longer term survival between 1998 and 2014 for both those aged <65 years and those ⩾65 years. For example, five year survival amongst patients aged <65 years at start of RRT has improved from 64.1% in the 1998 cohort to 72.8% in the 2010 cohort. For those aged 65 years and above at RRT initiation during the same period, five year survival improved from 20.0% (1998) to 32.5% (2010).

Although survival improved overall between the 1998 and 2014 cohorts, the improvement was more pronounced in patients aged ⩾65: there has been a 16.1% absolute improvement in one year survival from the 1998 to 2014 cohorts (table 5.8), versus 5.2% in those <65 years during the same period. It is not possible to ascertain the specific reasons for this reduction in risk of death.

Survival by RRT vintage

Figure 5.12 shows the six monthly hazard of death for incident patients, by age group. There is little evidence of a worsening prognosis with increasing time on RRT (vintage) for the majority of incident RRT patients in the UK, except in incident patients aged 65 years and older where an increased hazard over time is evident. When the analysis is repeated with censoring for transplantation an apparent vintage effect is evident (data not shown) and this is, at least in part, because younger and healthier patients are only included in the survival

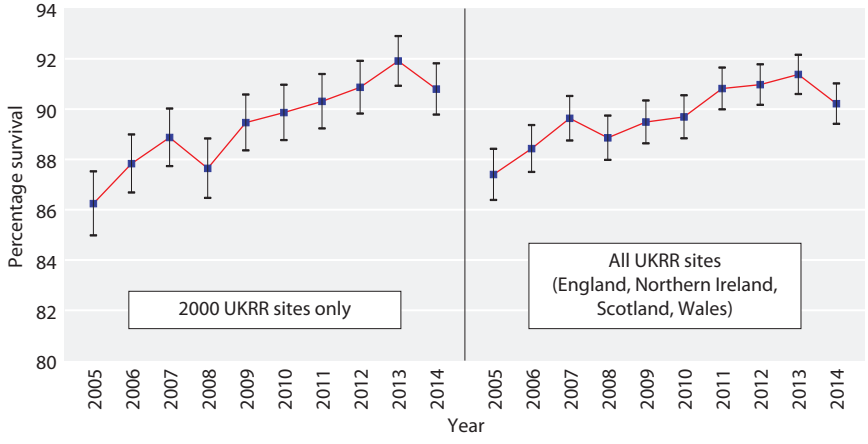

Fig. 5.9. Change in one year after 90 day survival, 2005–2014 incident RRT cohort (adjusted to age 60)
Showing 95% confidence intervals

Table 5.7. Unadjusted survival of incident RRT patients, 1998–2014 cohort for patients aged 18–64 years

Cohort	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year	*95% CI for latest year*	*N*
2014	**92.8**										***91.9–93.6***	**3,667**
2013	93.8	88.3									*87.2–89.3*	3,584
2012	93.1	87.4	81.9								*80.6–83.2*	3,538
2011	93.4	88.7	83.7	79.0							*77.5–80.3*	3,349
2010	92.2	86.7	81.7	77.3	72.8						*71.3–74.3*	3,368
2009	91.3	85.0	80.4	76.4	71.1	67.1					*65.4–68.7*	3,388
2008	91.5	86.0	81.1	76.9	73.1	69.4	65.6				*64.0–67.2*	3,445
2007	92.6	87.2	81.8	76.9	73.1	69.5	66.1	62.8			*61.1–64.5*	3,326
2006	90.6	84.9	80.0	75.6	72.0	68.0	64.1	61.2	58.1		*56.3–59.8*	3,162
2005	89.6	83.6	78.6	73.8	69.3	65.7	62.5	59.5	56.5	53.9	*52.0–55.7*	2,831
2004	89.6	83.4	78.0	72.5	67.8	64.1	61.0	57.1	54.6	53.0	*51.0–55.0*	2,562
2003	89.4	82.7	77.3	72.4	67.3	63.2	59.5	56.8	54.2	51.7	*49.6–53.7*	2,265
2002	88.5	80.7	74.7	69.1	65.1	61.2	57.8	54.8	51.6	49.6	*47.3–51.7*	2,020
2001	88.0	81.0	75.4	70.3	65.3	60.6	56.7	53.3	50.4	48.1	*45.7–50.5*	1,741
2000	89.0	81.3	74.4	69.2	63.7	59.0	55.5	52.4	50.0	47.3	*44.7–49.8*	1,532
1999	86.9	81.0	73.3	67.6	62.2	58.1	53.9	51.0	48.6	47.0	*44.3–49.6*	1,347
1998	87.5	80.2	74.4	69.5	64.1	59.2	55.2	53.1	49.9	47.7	*44.8–50.5*	1,167

Table 5.8. Unadjusted survival of incident RRT patients, 1998–2014 cohort for patients aged ⩾65 years

Cohort	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year	*95% CI for latest year*	*N*
2014	**78.6**										***77.3–79.9***	**3,584**
2013	78.5	64.6									*63.0–66.2*	3,439
2012	77.3	65.3	54.4								*52.7–56.1*	3,333
2011	77.4	62.8	51.4	41.1							*39.4–42.8*	3,361
2010	76.3	63.4	51.2	42.0	32.5						*30.8–34.1*	3,280
2009	76.5	63.2	52.5	41.5	32.9	26.1					*24.6–27.6*	3,374
2008	74.5	61.1	49.8	40.4	32.2	25.7	20.5				*19.1–22.0*	3,175
2007	75.0	61.1	49.7	40.4	31.9	25.3	20.1	15.5			*14.2–16.8*	3,211
2006	72.0	58.3	46.9	37.3	29.0	23.1	17.7	13.4	10.7		*9.6–11.9*	3,116
2005	71.1	57.2	45.3	36.2	27.9	21.2	16.6	12.5	10.0	7.8	*6.9–8.8*	2,940
2004	69.0	54.0	42.4	34.1	26.9	21.1	16.5	13.0	9.9	7.6	*6.7–8.7*	2,632
2003	68.4	53.6	41.7	31.8	24.3	18.1	14.3	11.1	8.5	6.8	*5.8–7.9*	2,318
2002	66.0	50.8	40.3	31.8	23.8	18.3	13.7	10.9	8.2	6.5	*5.5–7.6*	2,089
2001	66.5	51.7	38.3	28.7	21.7	15.9	11.8	8.9	7.1	5.5	*4.4–6.6*	1,708
2000	66.1	52.4	39.6	28.6	22.3	17.2	13.1	9.7	7.5	5.7	*4.6–7.0*	1,496
1999	68.3	51.5	39.0	29.8	22.2	16.1	11.5	8.3	6.1	4.8	*3.7–6.1*	1,214
1998	62.5	45.3	35.9	26.3	20.0	13.9	10.5	7.5	5.7	4.6	*3.5–6.1*	1,016

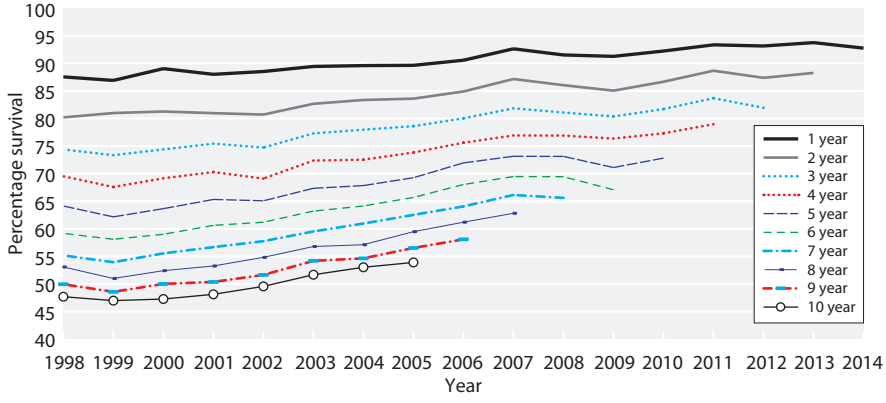

Fig. 5.10. Change in long term survival by year of starting RRT (1998–2014), for incident RRT patients aged 18–64 years

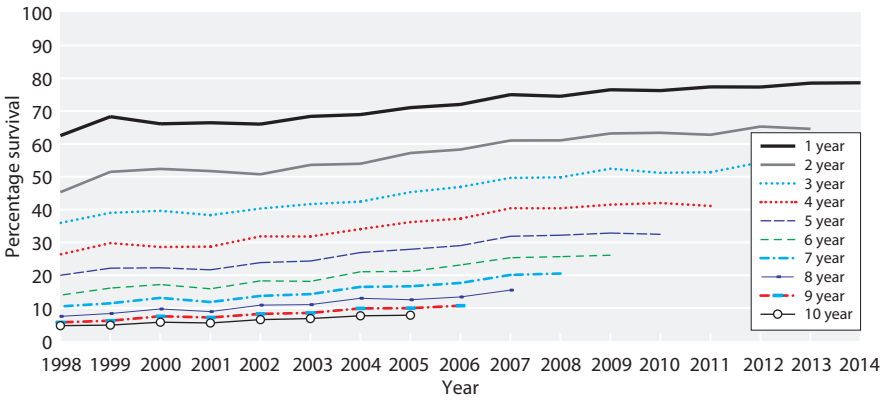

Fig. 5.11. Change in long term survival by year of starting RRT (1998–2014), for incident RRT patients aged ⩾65 years

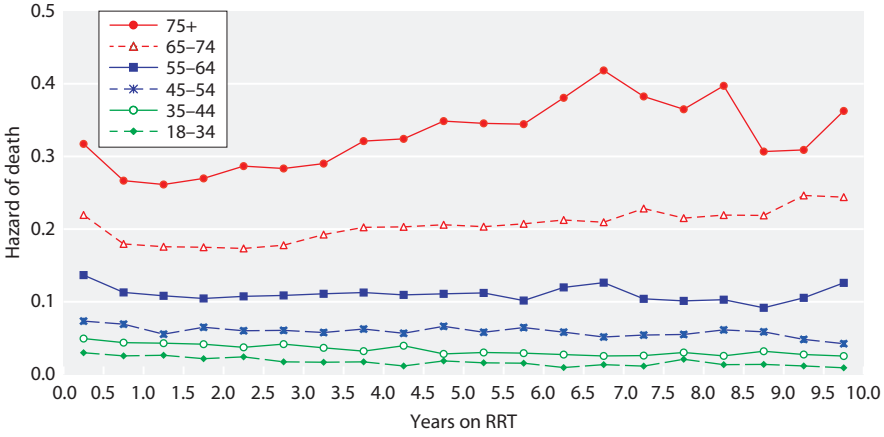

Fig. 5.12. Six monthly hazard of death, by vintage and age group, 1997–2014 incident RRT cohort after day 90

calculation up to the date of transplantation. In the oldest age group, the number of patients surviving beyond seven years was small, accounting for the variability seen. Figures 5.13 and 5.14 show the same analysis for patients without diabetes and with diabetes respectively. An increased hazard of death over time is evident for patients with diabetes predominantly ⩾65 years of age.

Centre variability in one year after 90 days survival

Due to small numbers of incident patients in any given year in each centre and resultant wide confidence intervals, variability by renal centre was assessed in a larger cohort across several years. Similar to previous years, sustained performance was assessed in a rolling four year cohort from 2011 to 2014. These data are presented as a funnel plot in figure 5.15. Table 5.9 allows centres to be identified on this graph by finding the number of patients treated by the centre and then looking up the corresponding number on the x-axis. Two centres (Cardiff and Swansea) had survival below the 95% lower limit whilst three centres (Aberdeen, London Guy's, Reading) had survival above the 95% upper limit. This

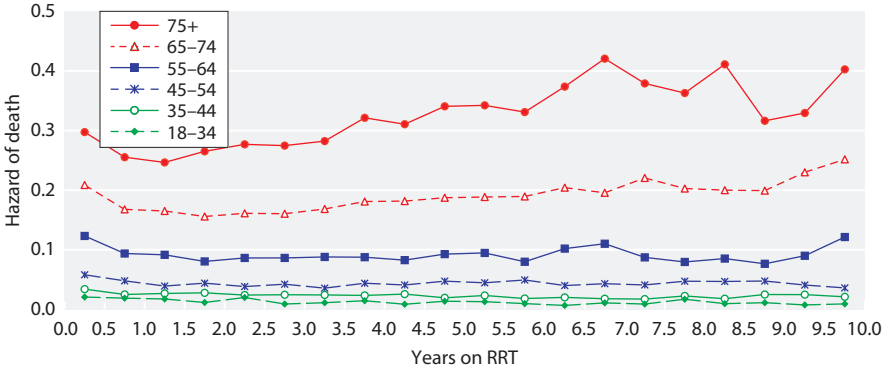

Fig. 5.13. Six monthly hazard of death, by vintage and age group, 1997–2014 incident RRT cohort without diabetes after day 90

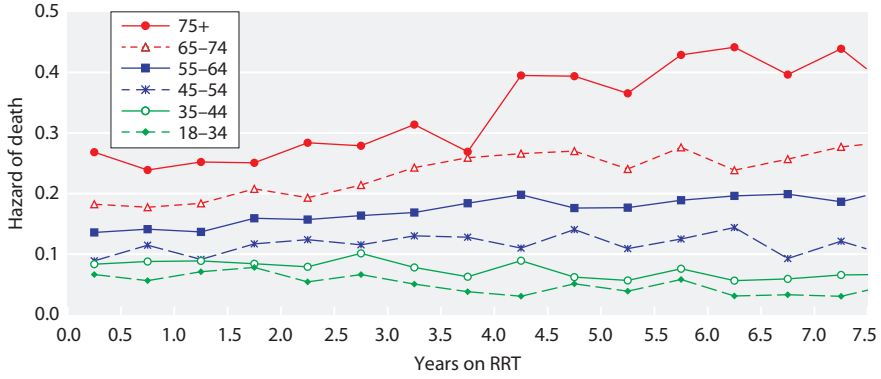

Fig. 5.14. Six monthly hazard of death, by vintage and age group, 1997–2014 incident RRT cohort with diabetes after day 90

is compared with last year when five centres were survival outliers above the 95% upper limit. With 71 centres included in the analysis it would be expected that three centres would be outside these limits by chance. It is important to highlight that these data have only been adjusted for age (i.e. no other patient factors such as comorbidity, primary renal disease or ethnicity) and have not been censored at transplantation. Therefore the effect of differing rates of transplantation by centre was not taken into account. Please see the following section for the effects of adjustment for primary renal disease and comorbidity.

Appendix 1 contains additional tables related to these survival analyses; tables 5.22 and 5.23 show unadjusted and adjusted survival together with 95% confidence intervals for incident patient survival one year after 90 days and at 90 days for the 2014 single year cohort. Table 5.24 in appendix 1 shows the one year after 90 day incident survival by centre for incident RRT cohort years 2005–2014, adjusted to age 60. One to five year survival after the first 90 days of RRT adjusted to age 60 is included in appendix 1, table 5.25 for incident RRT cohorts 2010–2014.

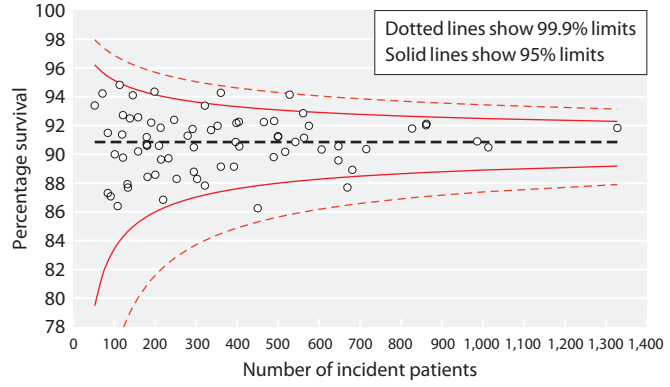

Fig. 5.15. Funnel plot for age adjusted one year after 90 days survival, 2011–2014 incident RRT cohort

Centre variability in one year after 90 day survival: impact of adjustment for comorbidity

Although comorbidity returns to the UKRR have remained poor, some centres have consistently returned ⩾85% comorbidity data for incident patients. The analyses in this section use a combined incident RRT cohort from 2011–2014 for the 28 centres who consistently returned comorbidity data for ⩾85% of patients during this period, and demonstrate the impact of sequential adjustment for age, primary renal diagnosis and comorbidity (table 5.10).

It can be seen that adjustment for age has the largest effect, most notably in those centres with the lower unadjusted survival figures. Survival improved for all centres after adjustment for age, as the average age for incident patients was higher than the adjustment to age 60 years. There were only minor changes in survival for most centres after adjustment for primary renal diagnosis, but survival did increase by ⩾1% for three centres (Newry, Swansea, Wolverhampton). In two centres (Newcastle, Swansea) adjustment for comorbidity had a noticeable effect (⩾1% increase) on adjusted survival (table 5.10, figure 5.16). After adjustment for age, primary renal diagnosis and comorbidity, Swansea, Antrim, Wrexham and Ulster had the largest improvement in survival of 9.4%, 8.7%, 7.0% and 6.9% respectively.

The largest survival improvement, as a result of adjustment for comorbidity was seen in Swansea. Adjustment for comorbidity may have an important differential effect for renal centres that have a higher comorbid burden in their RRT population. This could affect the status of centres as a survival outlier as shown in figure 5.15, such as Swansea or Cardiff. However due to poor comorbidity returns for many renal centres, comorbidity adjustment for the entire incident RRT population is not yet possible. Data completeness and data quality both have significant implications for the accuracy of analyses

Table 5.9. Age adjusted (to age 60) one year after 90 day survival, 2011–2014 incident RRT cohort

	1 year after 90 days					1 year after 90 days			
			Limits for funnel plot					Limits for funnel plot	
Centre	*N*	Adjusted survival %	Lower 95% limit	Upper 95% limit	Centre	*N*	Adjusted survival %	Lower 95% limit	Upper 95% limit
D & Gall	52	93.4	79.5	96.2	L St.G	321	93.4	87.2	93.6
Inverns	71	94.2	81.6	95.7	Wolve	321	87.8	87.2	93.6
Clwyd	84	87.3	82.6	95.4	Stoke	336	91.7	87.3	93.5
Bangor	84	91.5	82.6	95.4	Hull	352	92.0	87.4	93.5
Newry	91	87.1	83.0	95.3	Redng	360	94.3	87.4	93.4
Ulster	101	90.0	83.5	95.1	Newc	360	89.1	87.4	93.4
Antrim	108	86.4	83.8	95.0	Liv Roy	392	89.1	87.6	93.3
West NI	113	94.8	84.0	95.0	Middlbr	396	90.9	87.6	93.3
Carlis	119	91.4	84.2	94.9	B Heart	398	92.2	87.6	93.3
Sthend	121	92.7	84.3	94.9	Nottm	404	92.3	87.6	93.3
Wrexm	121	89.8	84.3	94.9	Covnt	405	90.6	87.6	93.3
Klmarnk	132	87.9	84.6	94.7	Swanse	450	86.2	87.8	93.2
Colchr	133	87.7	84.6	94.7	Exeter	465	92.2	87.9	93.2
Krkcldy	138	92.5	84.8	94.7	Brightn	489	89.8	88.0	93.1
Ipswi	145	94.1	85.0	94.6	Camb	490	92.3	88.0	93.1
Basldn	158	90.2	85.3	94.5	Kent	499	91.2	88.0	93.1
Truro	158	92.6	85.3	94.5	Stevng	500	91.2	88.0	93.1
York	179	90.7	85.7	94.3	Salford	517	90.2	88.0	93.1
Dundee	179	91.2	85.7	94.3	L Guys	528	94.2	88.1	93.0
Donc	180	90.6	85.7	94.3	Sheff	542	90.9	88.1	93.0
Chelms	181	88.4	85.7	94.3	Prestn	561	92.9	88.2	93.0
Dudley	190	92.2	85.8	94.2	L Kings	563	91.2	88.2	93.0
Abrdn	198	94.4	86.0	94.2	Bristol	575	92.0	88.2	93.0
Wirral	200	88.6	86.0	94.1	Leeds	606	90.3	88.3	92.9
Airdrie	209	90.6	86.1	94.1	M RI	647	89.6	88.4	92.8
Plymth	213	91.9	86.2	94.1	Oxford	647	90.6	88.4	92.8
Liv Ain	214	89.6	86.2	94.1	Cardff	672	87.7	88.4	92.8
Shrew	219	86.8	86.3	94.0	Glasgw	681	88.9	88.4	92.8
Sund	232	89.7	86.4	93.9	Ports	715	90.4	88.5	92.8
Glouc	246	92.4	86.6	93.9	B QEH	827	91.8	88.7	92.6
Bradfd	252	88.3	86.6	93.8	L Rfree	861	92.0	88.7	92.6
Derby	279	91.3	86.9	93.7	Carsh	862	92.1	88.7	92.6
Belfast	291	91.8	87.0	93.7	Leic	986	90.9	88.9	92.5
Dorset	294	90.5	87.0	93.7	L Barts	1,013	90.5	88.9	92.5
Edinb	294	88.8	87.0	93.7	L West	1,328	91.8	89.2	92.3
Norwch	302	88.3	87.0	93.6					

such as these. Case mix adjustment performed in a cohort of incident patients starting RRT in England from 2002 to 2006 which was linked to the Hospital Episodes Statistics (HES) data, found that three of the four survival outliers at that time were no longer outliers after adjustment for HES-derived case mix. Swansea and Cardiff could not be evaluated in that analysis as HES only included English hospitals, but the study results highlight that observed variability in survival between centres is affected by case mix [10].

Survival in patients with diabetes

Patients with diabetes have been shown to have worse long term survival compared to patients without diabetes [3]. In the following analyses, 90 day survival, 1 year after 90 day survival and long term survival are presented according to the presence or absence of a diagnosis of diabetes.

In the UK in 2014, 90 day survival for incident patients with diabetes was better than those without diabetes across the age categories of 18–44 years, 45–64 years

Table 5.10. The effect of adjustment for age, primary renal diagnosis and comorbidity on survival, 2011–2014 incident RRT cohort, percentage survival one year after 90 days

Centre*	Unadjusted	Age adjusted	Age, PRD adjusted	Age, PRD and comorbidity adjusted
Antrim	79.0	86.7	87.2	87.6
Swanse	79.4	86.1	87.7	88.9
Newry	83.0	86.8	88.6	88.8
Cardff	83.3	87.5	88.2	89.0
Wrexm	83.5	89.5	90.4	90.5
Ulster	84.0	89.6	90.5	90.9
Dorset	85.3	90.5	90.8	91.4
Wolve	85.6	89.1	90.3	90.2
Bangor	85.9	90.8	91.1	91.3
Basldn	86.0	90.1	90.5	91.4
Bradfd	87.1	88.4	88.7	89.5
Middlbr	87.4	90.5	91.2	91.8
Sund	87.4	89.9	90.5	90.7
Kent	87.5	91.1	91.8	91.0
Oxford	88.0	90.4	90.7	91.0
Leeds	88.4	90.3	90.4	91.2
L Kings	88.7	91.0	91.1	91.4
York	88.8	91.1	91.8	92.1
Nottm	88.8	92.1	92.7	92.6
Newc	88.9	91.0	91.4	92.5
B Heart	89.7	92.6	93.0	93.0
Exeter	89.8	93.6	94.0	94.0
Bristol	90.0	93.0	93.2	93.9
Hull	90.2	92.5	92.6	92.8
Sthend	91.5	94.5	95.0	94.7
Redng	91.9	94.5	95.0	95.5
Derby	92.1	93.7	94.1	94.1
B QEH	93.0	94.5	95.0	94.7
All 28 centres	87.9	91.0	91.5	91.8

PRD primary renal diagnosis
*Centre included if ⩾85% comorbidity data available

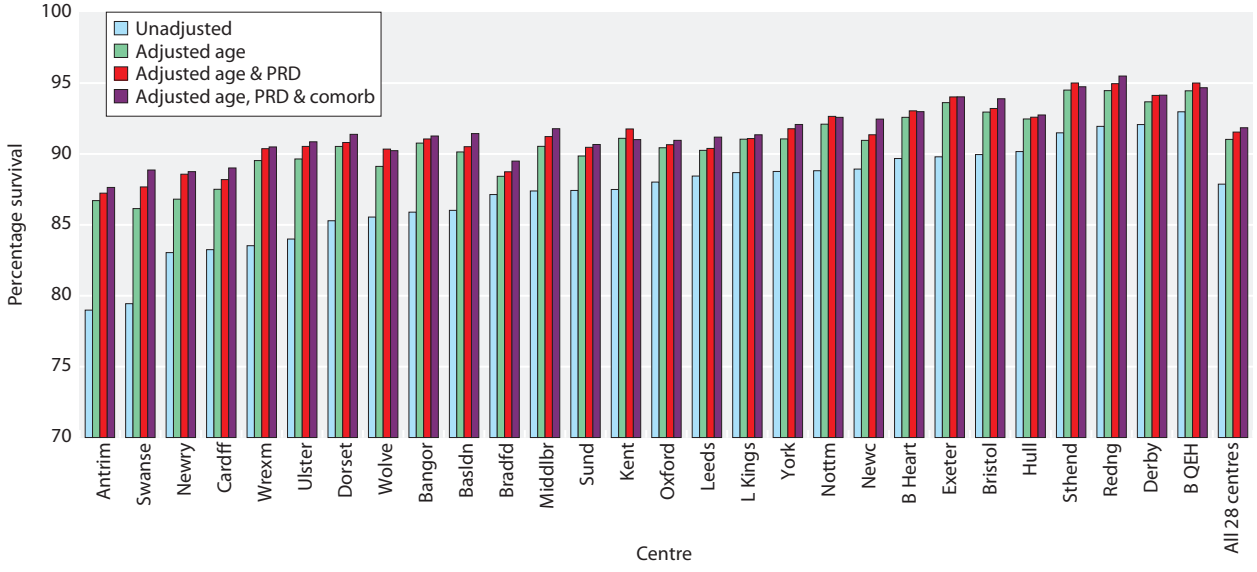

Fig. 5.16. The effect on one year after 90 day survival after sequential adjustment for age, primary renal diagnosis and comorbidity, 2011–2014 incident RRT cohort

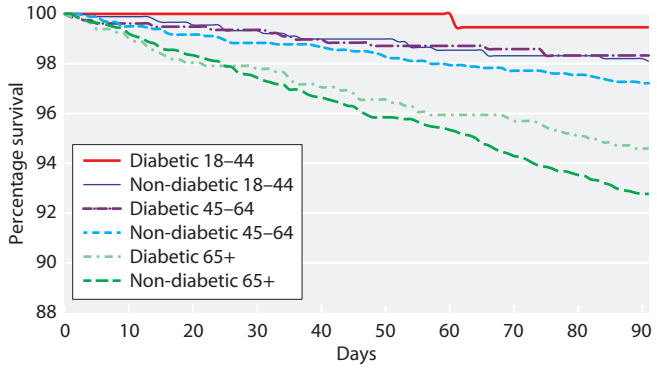

Fig. 5.17. Survival at 90 days for incident RRT patients with and without diabetes by age group, 2014 cohort

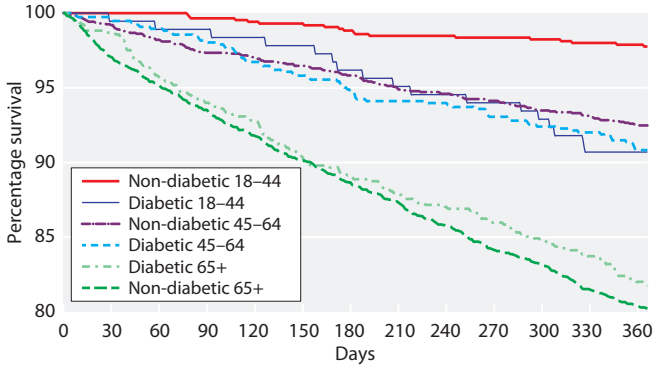

Fig. 5.18. Survival at one year after 90 days for incident RRT patients with and without diabetes by age group, 2014 cohort

and 65 years and over (figure 5.17). For one year survival after 90 days in the 2014 cohort, young patients (18–44 years) without diabetes had better survival than their counterparts with diabetes, whereas for the 45–64 years group and those 65 years and over, the survival was more similar (figure 5.18).

Long term survival for patients with diabetes and patients without diabetes is presented for the incident RRT cohort of patients starting RRT from 2003 to 2012 with a minimum of three years follow up (figure 5.19). These data show large differences between survival for

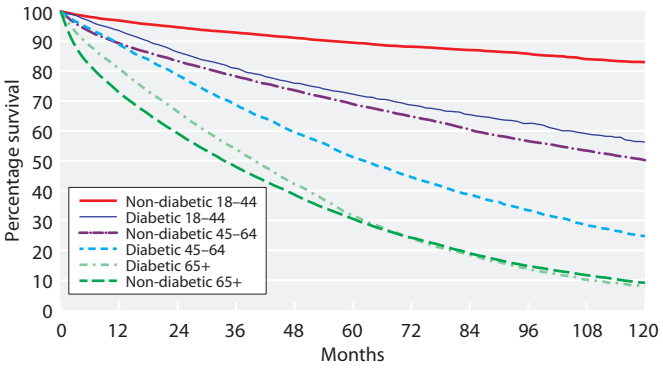

Fig. 5.19. Long term survival for incident RRT patients with and without diabetes by age group, 2003–2012 cohort, followed up for a minimum of three years

those with diabetes and those without diabetes in the age groups 18–44 years and 45–64 years. In the age group 18–44 years, 89.5% of patients without diabetes were alive five years after start of RRT compared to 72.3% for patients with diabetes. In the age group 45–64 years, 68.9% of patients without diabetes were alive five years after start of RRT compared to 51.2% for patients with diabetes (figure 5.19). The initial survival difference where incident RRT patients without diabetes in the older age group (⩾65 years) had poorer survival than incident patients with diabetes in the same age group, diminished over the years until there was very little difference in five year survival between these groups.

Survival in prevalent dialysis patients

Overall survival

Table 5.11 shows the one and two year survival for prevalent patients on dialysis. One year age adjusted survival for prevalent dialysis patients was essentially stable at 88.3% in the 2014 cohort compared to 88.6% in the 2013 cohort. Two year survival dropped slightly from 72.1% to 71.1%.

Table 5.11. One and two year survival of prevalent dialysis patients

Patient group	Patients *N*	Deaths *N*	Survival %	*95% CI*
1 year survival – 2014 cohort				
Unadjusted	26,437	3,955	84.4	*84.0–84.9*
Adjusted to age 60	26,437	3,955	88.3	*87.8–88.7*
2 year survival – 2013 cohort				
Unadjusted	26,130	6,956	71.1	*70.5–71.7*

2014 cohort: all dialysis patients alive on 31/12/2014
2013 cohort: all dialysis patients alive on 31/12/2013

Table 5.12. One year death rate per 1,000 prevalent dialysis patient years in the 2014 cohort and median age of prevalent dialysis patients by UK country

	England	N Ireland	Scotland	Wales
Death rate	166	167	188	217
95% CI	160–172	136–203	168–210	190–247
Median age	67.0	70.5	66.2	69.0

Survival by UK country

The one year death rate for prevalent dialysis patients in 2014 for each UK country is shown in table 5.12. The death rate rose in every UK nation compared to the 2013 cohort, except in Northern Ireland, with the median age of prevalent dialysis patients increasing in all four nations. The one year unadjusted death rate in Wales was significantly higher than in England. However, the higher median age in Wales and socio-economic factors such as general population life expectancy and area deprivation, may contribute to the death rate in Wales. These results are unadjusted for age, primary renal diagnosis or comorbidity.

One year survival of prevalent dialysis patients by centre

The age adjusted (adjusted to age 60) one year survival of dialysis patients by centre is illustrated in a funnel plot (figure 5.20). As there are 71 centres included in the analyses, it would be expected that three centres would fall outside the 95% (1 in 20) confidence limits, entirely by chance. The survival for patients attending two centres (Oxford and Manchester Royal Infirmary) was below the 95% confidence limit, and there were no centres below the 99% confidence limit. Comparing data over a number of years, there is no centre that has consistently been below the 95% confidence limits. One centre (West Northern Ireland) was above the 95% confidence limits, and two centres (London West and Birmingham Queen Elizabeth) were above the 99% confidence limit. A sensitivity analysis was performed, without censoring at transplantation, and the results for outlying centres were unchanged. These observed differences may have occurred by chance, may be true differences or may reflect differences in the case-mix of the renal centres. For incident patient survival, incomplete comorbidity returns prevent full adjustment for case mix.

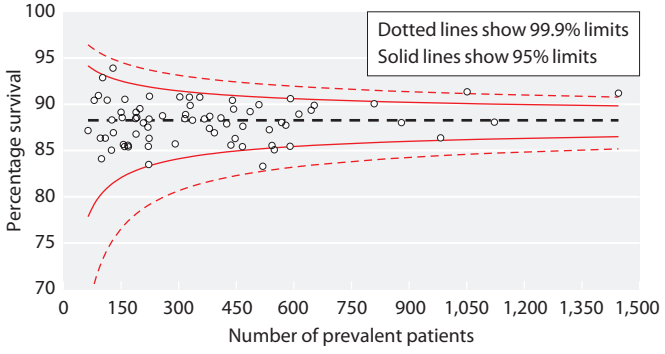

Fig. 5.20. One year survival funnel plot of prevalent dialysis patients by centre adjusted to age 60, 2014 cohort

Table 5.13 allows centres in figure 5.20 to be identified by finding the number of patients treated by the centre and the corresponding survival and then looking this up on the axes of the funnel plot.

One year survival of dialysis patients by centre is illustrated in figures 5.21 and 5.22 for patients aged <65 years and those aged $\geqslant 65$ years.

Survival by age group

Figure 5.23 shows the one year survival of prevalent dialysis patients who were alive and receiving dialysis on 31st December 2014, stratified by age group. This demonstrates a curvilinear decrease in survival with increasing age.

One year death rate in prevalent dialysis patients by age group, 2014 cohort

The death rates for prevalent patients on dialysis by age group are shown in figure 5.24. The younger patients included in this analysis are a selected higher risk group, as they remained on dialysis rather than undergoing transplantation. The increase in the death rate with age was not linear; in those aged <45 years, a 10 year increase in age was associated with a rise in the death rate of approximately 25 deaths per 1,000 patient years compared with those $\geqslant 75$ years where a 10 year increase in age was associated with a rise of about 100 deaths per 1,000 patient years.

Time trends in survival, 2005 to 2014

Figure 5.25 illustrates that one year survival for prevalent dialysis patients in England gradually improved from 2005 to 2011 with a gradual decrease thereafter. The numbers of patients were smaller in Scotland, Northern Ireland and Wales which resulted in variability and wide confidence intervals, so no firm conclusions can be drawn. The change in prevalent survival by centre between 2005 to 2014 is included in appendix 1, table 5.26.

Table 5.13. One year survival of prevalent dialysis patients in each centre (adjusted to age 60), 2014 cohort

Centre	*N*	Adjusted one year survival	Limits for funnel plot	
			Lower 95% limit	Upper 95% limit
D & Gall	64	87.2	77.9	94.2
Inverns	80	90.4	79.2	93.7
Carlis	91	91.0	79.9	93.4
Bangor	96	86.3	80.2	93.3
Clwyd	99	84.1	80.3	93.3
Newry	102	92.9	80.5	93.2
Ulster	109	86.3	80.8	93.1
Colchr	114	90.5	81.0	93.0
Wrexm	125	85.0	81.4	92.8
Antrim	126	88.3	81.4	92.8
West NI	129	93.9	81.5	92.8
Sthend	130	86.9	81.5	92.8
Ipswi	150	89.1	82.1	92.5
York	153	88.6	82.1	92.5
Truro	156	85.7	82.2	92.5
Krkcldy	159	85.4	82.3	92.4
Chelms	160	90.5	82.3	92.4
Klmarnk	168	85.6	82.5	92.3
Plymth	169	85.4	82.5	92.3
Airdrie	188	88.5	82.8	92.2
Liv Ain	189	86.8	82.9	92.1
Dundee	189	89.1	82.9	92.1
Basldn	191	88.6	82.9	92.1
Donc	199	89.5	83.0	92.1
Shrew	208	88.0	83.1	92.0
Bradfd	220	87.5	83.3	91.9
Sund	221	85.5	83.3	91.9
Wirral	222	83.5	83.3	91.9
Belfast	223	88.4	83.3	91.9
Abrdn	223	86.3	83.3	91.9
Dudley	224	90.9	83.4	91.9
Glouc	258	88.8	83.7	91.7
Edinb	291	85.7	84.0	91.5
Derby	303	90.8	84.1	91.4
Middlbr	316	88.5	84.2	91.4
Newc	318	88.9	84.2	91.4
Redng	328	90.8	84.3	91.3
Dorset	330	89.9	84.3	91.3
L St.G	336	88.3	84.4	91.3
Norwch	355	90.8	84.5	91.2
Wolve	367	88.4	84.6	91.2
Swanse	380	87.4	84.6	91.1
Hull	381	88.7	84.6	91.1
Stoke	393	86.9	84.7	91.1
Camb	410	88.5	84.8	91.0
Liv Roy	425	87.9	84.9	91.0
Covnt	436	85.6	84.9	91.0
Nottm	440	90.4	84.9	91.0
B Heart	443	89.5	84.9	91.0
Kent	447	86.3	84.9	90.9
Salford	466	85.4	85.0	90.9
Brightn	467	87.6	85.0	90.9
Exeter	486	89.2	85.1	90.8
Stevng	509	90.0	85.2	90.8
Oxford	519	83.3	85.2	90.8
Leeds	536	87.3	85.3	90.7
Cardff	543	85.6	85.3	90.7
M RI	549	85.1	85.3	90.7
Bristol	568	88.0	85.4	90.7
Prestn	579	87.7	85.4	90.7
Glasgw	590	85.5	85.4	90.6
L Kings	591	90.6	85.4	90.6
Sheff	613	88.9	85.5	90.6
Ports	645	89.4	85.6	90.5
L Guys	653	89.9	85.6	90.5
L Rfree	809	90.1	85.9	90.3
Carsh	880	88.0	86.0	90.2
Leic	982	86.4	86.1	90.1
B QEH	1,051	91.4	86.2	90.1
L Barts	1,122	88.1	86.3	90.0
L West	1,445	91.2	86.5	89.8

Survival in prevalent dialysis patients with diabetes

In patients aged <65 years, one year survival for prevalent dialysis patients with diabetes was 8.1% lower compared to the same age group without diabetes. In contrast, for prevalent dialysis patients aged 65+ years, survival was very similar for those with and without diabetes (only 1% lower, table 5.14).

Time trends in patients with a primary diagnosis of diabetes

The age adjusted one year survival for prevalent dialysis patients with a reported primary renal disease of diabetic nephropathy are shown in table 5.15.

Death rate on RRT compared with the UK general population

The death rate of patients on all RRT modalities compared to the general population is shown in table 5.16. The relative risk of death on RRT decreased with age from a peak of more than 30 times that of the general population at age 25–29 years to 2.3 times the general population at age 85 and over. Figure 5.26 shows that the relative risk of death has decreased substantially for the younger age groups (<50 years) in recent years, whereas the relative risk of death in patients aged over 55 has not changed greatly in the 2014 cohort compared

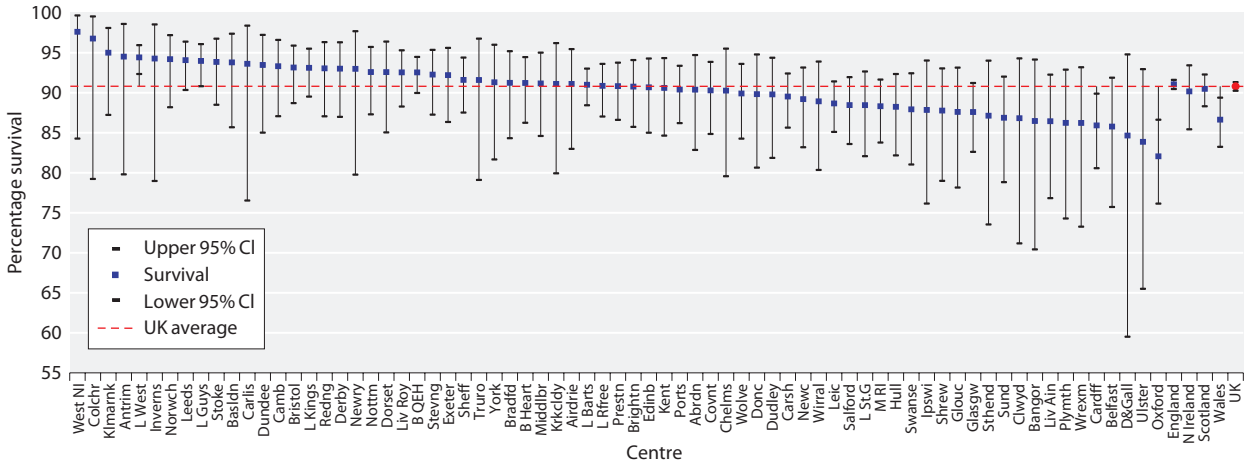

Fig. 5.21. One year survival of prevalent dialysis patients aged under 65 years by centre, 2014 cohort

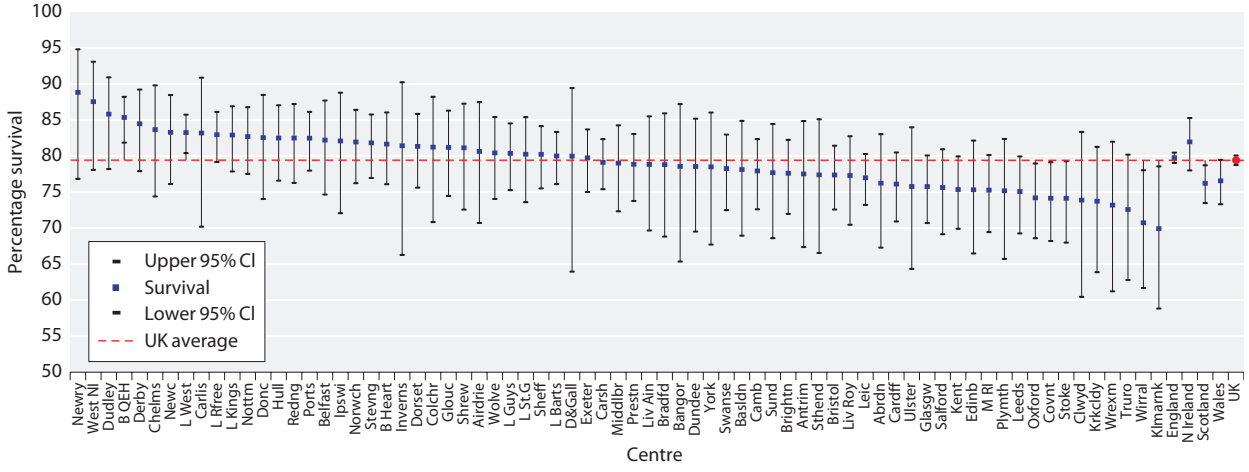

Fig. 5.22. One year survival of prevalent dialysis patients aged 65 years and over by centre, 2014 cohort

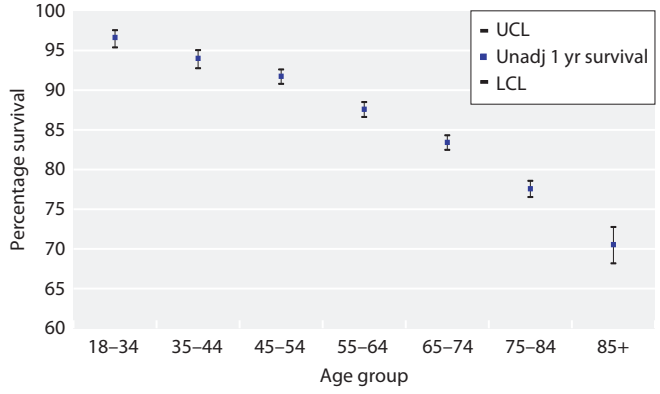

Fig. 5.23. One year survival of prevalent dialysis patients by age group, 2014 cohort

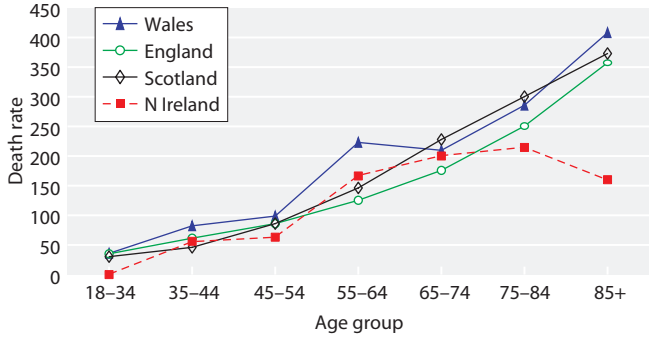

Fig. 5.24. One year death rate per 1,000 patient years by UK country and age group for prevalent dialysis patients, 2014 cohort

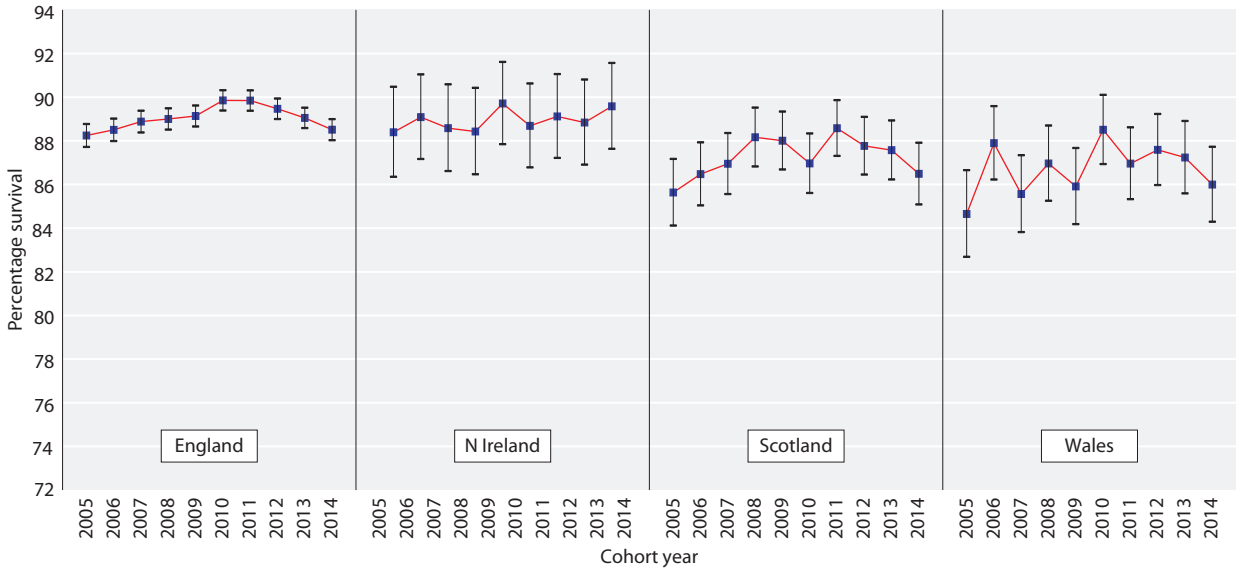

Fig. 5.25. Serial one year survival for prevalent dialysis patients by UK country, 2005 to 2014 cohort years, adjusted to age 60

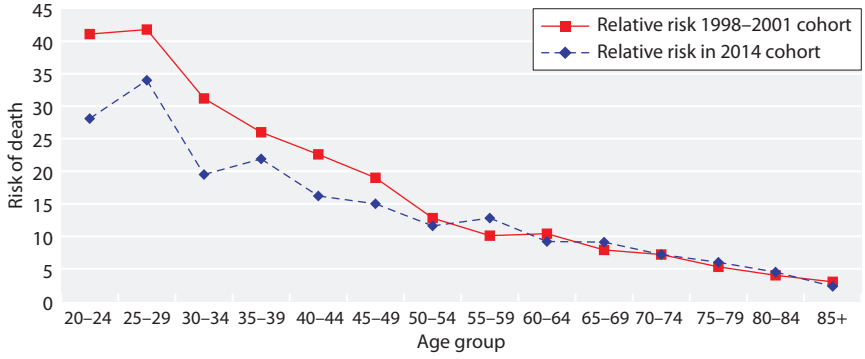

Fig. 5.26. Relative risk of death in prevalent RRT patients in the 2014 cohort compared to the 1998–2001 cohort

Table 5.14. One year survival of prevalent dialysis patients in the UK by age group and diagnosis of diabetes, 2014 cohort

Patient group	Patients *N*	Deaths *N*	Survival %	*95% CI*
Dialysis patients 2014 cohort				
All age <65	12,000	1,021	90.8	*90.3–91.3*
Non-diabetic <65	9,245	618	92.7	*92.1–93.3*
Diabetic <65	2,755	403	84.6	*83.2–85.9*
All age 65+	14,437	2,934	79.4	*78.8–80.1*
Non-diabetic 65+	11,207	2,251	79.7	*78.9–80.4*
Diabetic 65+	3,230	683	78.7	*77.2–80.0*

to the 1998–2001 cohort. The overall relative risk of death was 6.1 in the 2014 cohort and was similar to the relative risk in recent years.

Causes of death

Data completeness

Overall completeness of data for cause of death in the UK decreased slightly from 65.3% in 2014 to 63.5% in 2015, with falls in the returns from all four nations.

Table 5.15. Serial one year survival of prevalent dialysis patients with a primary diagnosis of diabetes, 2005–2014 cohort years

	Year									
Survival	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
1 year survival	82.6	84.9	83.5	83.9	83.3	84.9	85.1	84.7	83.5	83.0
Number of patients	3,529	3,962	4,368	4,713	5,054	5,222	5,444	5,642	5,935	5,985

Table 5.16. Death rate by age group for prevalent RRT patients, 2014 cohort, compared with the general population and with previous analyses in the 1998–2001 cohort

Age group	UK population mid 2014 (thousands)	UK deaths in 2014	Death rate per 1,000 population	Expected number of deaths in UKRR population	UKRR deaths in 2014	UKRR death rate per 1,000 prevalent RRT patients	Relative risk of death in 2014	Relative risk of death 1998–2001 cohort
20–24	4,295	1,553	0.4	0	10	10	28.1	41.1
25–29	4,441	2,041	0.5	1	24	16	34.0	41.8
30–34	4,382	2,829	0.6	2	29	13	19.5	31.2
35–39	4,079	3,913	1.0	3	59	21	21.9	26.0
40–44	4,299	6,131	1.4	6	95	23	16.2	22.6
45–49	4,631	9,868	2.1	12	180	32	15.0	19.0
50–54	4,565	14,514	3.2	21	242	37	11.6	12.8
55–59	3,951	19,483	4.9	31	401	63	12.8	10.1
60–64	3,502	27,901	8.0	48	438	73	9.2	10.4
65–69	3,615	43,902	12.1	75	685	111	9.1	7.9
70–74	2,725	54,971	20.2	103	742	146	7.2	7.2
75–79	2,162	74,463	34.4	147	885	208	6.0	5.3
80–84	1,584	99,140	62.6	170	755	279	4.5	4.0
85+	1,526	236,970	155.3	199	458	358	2.3	3.0
Total	**49,757**	**597,679**	**12.0**	**816**	**5,003**	**90**	**6.1**	**7.7**

The largest fall in data completeness was an 8.3% fall in Scotland (appendix 1, table 5.27). There was substantial variability in the completeness of cause of death between centres, with some returning no data whilst others achieved 100% completeness. Several centres have shown substantial improvement in data returns (appendix 1, table 5.27).

Causes of death in incident RRT patients

The number and proportion of patients in the cohort with missing data for cause of death is shown in the last row of each table for cause of death (tables 5.17 to 5.21).

Causes of death within the first 90 days

In the first 90 days after start of RRT, cardiac disease was the most common cause of death in both age groups. However, infection and treatment withdrawal as a cause of death were more common in older patients (aged 65+), whereas malignancy was more common in younger patients (<65 years old) (table 5.17).

Causes of death within one year after 90 days

In the year after the first 90 days, treatment withdrawal as a cause of death was more common in older patients (aged 65+), whereas cardiac disease was more common in younger patients (<65 years old) (table 5.18).

Table 5.17. Causes of death in the first 90 days for incident RRT patients by age group, 2000–2014 cohort

	All age groups		<65 years		⩾65 years	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	830	26	192	28	638	26
Cerebrovascular disease	141	4	32	5	109	4
Infection	563	18	100	14	463	19
Malignancy	294	9	90	13	204	8
Treatment withdrawal	510	16	71	10	439	18
Other	713	22	179	26	534	21
Uncertain	134	4	27	4	107	4
Total	**3,185**		**691**		**2,494**	
Missing data	2,838	47	623	47	2,215	47

Table 5.18. Cause of death one year after 90 days for incident RRT patients by age group, 2000–2014 cohort

	All age groups		<65 years		⩾65 years	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	1,343	22	428	25	915	21
Cerebrovascular disease	292	5	91	5	201	5
Infection	1,138	19	315	18	823	19
Malignancy	698	11	219	13	479	11
Treatment withdrawal	1,024	17	158	9	866	20
Other	1,301	21	408	24	893	20
Uncertain	336	5	98	6	238	5
Total	**6,132**		**1,717**		**4,415**	
Missing data	5,137	45.6	1,428	0.0	3,709	45.4

Table 5.19. Cause of death in prevalent RRT patients by modality, 2014 cohort

	All modalities		Dialysis		Transplant	
Causes of death	*N*	%	*N*	%	*N*	%
Cardiac disease	714	22	613	23	101	18
Cerebrovascular disease	138	4	114	4	24	4
Infection	688	21	554	21	134	24
Malignancy	327	10	201	7	126	22
Treatment withdrawal	581	18	566	21	15	3
Other	666	20	534	20	132	24
Uncertain	144	4	115	4	29	5
Total	**3,258**		**2,697**		**561**	
Missing data	1,747	35	1,439	35	308	35

Although cardiac disease remained the leading cause of death in in both older and younger age groups at one year after the first 90 days, it has decreased over time. There has been a gradual increase in treatment withdrawal over recent years as cause of death at 90 days in older patients (aged 65+).

Cause of death in prevalent RRT patients in the 2014 cohort

Table 5.19 shows the comparison of cause of death for prevalent dialysis and transplant patients in the 2014 cohort. Cardiac disease as a cause of death was less common in patients with a transplant who were a highly

Table 5.20. Cause of death in prevalent dialysis patients by age group, 2014 cohort

	All age groups		<65 years		⩾65 years	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	613	23	196	27	417	21
Cerebrovascular disease	114	4	38	5	76	4
Infection	554	21	156	22	398	20
Malignancy	201	7	50	7	151	8
Treatment withdrawal	566	21	98	14	468	24
Other	534	20	155	21	379	19
Uncertain	115	4	32	4	83	4
Total	**2,697**		**725**		**1,972**	
No cause of death data	1,439	35	356	33	1,083	35

Table 5.21. Cause of death in prevalent transplant patients by age group, 2014 cohort

	All age groups		<65 years		⩾65 years	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	101	18	54	21	47	15
Cerebrovascular disease	24	4	13	5	11	4
Infection	134	24	58	23	76	25
Malignancy	126	22	58	23	68	22
Treatment withdrawal	15	3	3	1	12	4
Other	132	24	61	24	71	23
Uncertain	29	5	10	4	19	6
Total	**561**		**257**		**304**	
No cause of death data	308	35	142	36	166	35

selected group of patients. Malignancy was responsible for a far greater percentage of deaths in prevalent patients with a transplant than in those receiving dialysis, and to a lesser extent infection too. Treatment withdrawal was a more common cause of death in the prevalent dialysis population.

Table 5.20 shows the cause of death for prevalent dialysis patients in the 2014 cohort, divided into subgroups according to age. Again, cardiac disease was the leading cause of death overall. Cardiac disease represented a higher proportion of all deaths (amongst those where cause of death was known) in younger (<65 years) dialysis patients, although the absolute number of cardiac deaths were higher amongst those aged ⩾65 years (27% versus 21%). Prevalent dialysis patients aged ⩾65 years were substantially more likely to withdraw from treatment than younger patients (24% and 14% respectively).

Table 5.21 shows the cause of death for prevalent transplant patients in the 2014 cohort, divided into subgroups according to age. It shows that cardiac disease was more common in the younger age group (similar to that seen for dialysis patients). The proportions of other causes of death were relatively similar between older and younger patients.

Figure 5.27 shows cause of death for prevalent RRT patients over time between 2000 to 2014. Cardiovascular mortality decreased from year 2000 to 2005 and has remained static since, whilst treatment withdrawal as a cause of death has increased since 2009 onwards. Infection and malignancy as cause of death have remained static over the period (figure 5.27).

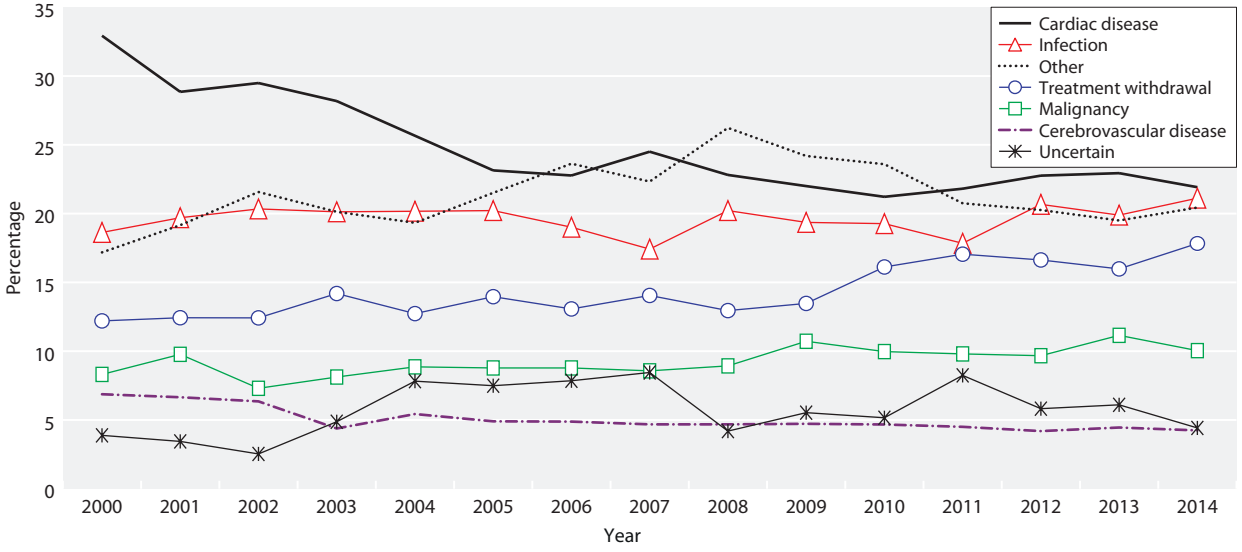

Fig. 5.27. Cause of death in prevalent RRT patients by cohort year (2000–2014)

Discussion

Survival of incident patients on RRT at 90 days (adjusted to age 60) was unchanged overall compared to the preceding year. When analysed according to age group, 90 day survival improved for those ⩾65 years whilst it fell for the younger patients. Incident one year after 90 days survival (adjusted to age 60) fell slightly in the 2014 cohort compared to 2013, and this was reflected in both age groups. There was no difference in survival by gender. Long term survival of incident patients on RRT continued to improve gradually over time.

There were differences in short term incident survival (90 days and one year after 90 days) by combined age group and diagnosis of diabetes: 90 day survival was better for those with diabetes across all age groups. For survival one year after 90 days, in the youngest group survival was much better for those without diabetes, however, this association was not seen in the older age groups, where survival was more similar between those with and without diabetes. Long-term survival showed a similar picture, where younger (<65 years) patients without diabetes survived much better than similar aged patients with diabetes. Survival was similar for older patients (⩾65 years) with and without diabetes.

One year age adjusted survival for prevalent dialysis patients was static in 2014 compared to 2013 (88.3% and 88.6% respectively). Prevalent dialysis patient survival in the UK seems to have peaked in 2011 and has been slightly lower in more recent years. The age adjusted one year survival for prevalent dialysis patients with diabetic primary renal disease in the UK has decreased slightly from 2012 onwards. The relative one year risk of death on RRT at age 20–24 years is 28 times that of the same age group in the general population, but has improved markedly over time (compared with a relative risk of 41 in the 1998–2001 cohort of the same age). For older patients (70–74 years) the relative risk is lower at 7.2 compared with the general population of a similar age, but this relative risk has not improved over time.

In the prevalent dialysis population for whom data regarding cause of death were available, cardiovascular disease was the most common cause of death accounting for 23% of deaths. Infection accounted for 21% of deaths and treatment withdrawal for 21% of deaths, with differences seen according to age group. In contrast, infection was the most common cause of death in prevalent transplant patients (24%), whilst malignancy accounted for 22% and cardiac disease 18% of all deaths. Trends in causes of death over time (2000–2014) show a decrease in cardiovascular disease, an increase in treatment withdrawal and a plateauing of deaths related to infection.

Variability in survival between centres was still evident, with some centres appearing as outliers in the data (below the lower 95% and above the upper 95% confidence limits) in incident RRT and prevalent dialysis patient survival. The survival analyses in this chapter have not been adjusted for any case-mix factors except for age. Differences in proportions of primary renal diagnosis, ethnicity and comorbidity have not been considered due to missing data from some renal centres. Although research has suggested that adjustment for comorbidity only explains a modest part of the variance in ERF patient outcomes [11], at centre level, the prevalence of comorbidities could vary substantially between renal centres and it would be expected that adjustment for comorbidity may explain a proportion of the variance in survival. The UK Renal Registry regularly evaluates the effect of adjusting for primary renal diagnosis and comorbidity in addition to age in those centres returning ⩾85% of comorbidities and repeatedly shows that, at centre level, there is clear benefit for some centres in adjusting for primary renal diagnosis and comorbidities. Research using comorbid conditions identified from hospital episode statistics (HES) data for RRT patients in England during 2002–2006 showed that adjustment for HES-derived case-mix, including comorbid conditions, affected the position on the funnel plot and outlying status of some renal centres for incident patients and reduced outlying centres from four to one [10].

Routine linkage of the UK Renal Registry data with hospital admissions information in the UK will allow the UKRR to report on survival adjusted for case-mix (age, ethnicity, primary renal diagnosis and comorbidity) in future UKRR reports. This will provide an improved comparison between centres and more accurate identification and location of outlying centres on funnel plots.

There is also considerable centre level variability in the early hazard of death (e.g. first six months) from start of RRT. The proportion of deaths in the first 90 days of starting RRT varied at centre level and, in some centres, the proportion was very low or even zero. This may be due to unreported deaths in patients that die within the first 90 days of starting RRT for ERF. Alternatively, it may be due to those patients being described as having acute kidney injury (AKI) and therefore not included in the historical UKRR data collection. From January 2015, the UKRR began collecting data for patients

receiving RRT for acute dialysis in renal centres in England and some Welsh centres, therefore future survival analyses will be able to take account of these discrepancies. In addition, from January 2016 the UKRR began collecting data for patients with chronic kidney disease (CKD) Stage 4 and 5 seen in renal centres in England, Wales and Northern Ireland, which will improve the identification of patients who opt for conservative care rather than RRT for their advanced kidney disease. These innovations in data collection will result in an improvement in the accuracy of survival estimates for patients with advanced kidney disease in the UK.

Conflicts of interest: the authors declare no conflicts of interest

References

1 Plantinga LC, Fink NE, Levin NW, et al. Early, Intermediate, and Long-Term Risk Factors for Mortality in Incident Dialysis Patients: The Choices for Healthy Outcomes in Caring for ESRD (CHOICE) Study. American journal of kidney diseases: the official journal of the National Kidney Foundation 2007;49(6):831–40

2 Miskulin DC, Meyer KB, Martin AA, et al. Comorbidity and its change predict survival in incident dialysis patients. American journal of kidney diseases: the official journal of the National Kidney Foundation 2003; 41(1):149–61

3 Nitsch D, Burden R, Steenkamp R, Ansell D, Byrne C, Caskey F, et al. Patients with diabetic nephropathy on renal replacement therapy in England and Wales. QJM-an International Journal of Medicine. 2007 Sep;100(9):551–60

4 Roderick P, Byrne C, Casula A, Steenkamp R, Ansell D, Burden R, et al. Survival of patients from South Asian and Black populations starting renal replacement therapy in England and Wales. Nephrology Dialysis Transplantation. 2009;24(12):3774–82

5 Tomson C, Maggs C. UK Renal Registry 12th Annual Report (December 2009): Chapter 2: introduction. Nephron Clin Pract. 2010;115(suppl 1): c3–8

6 Ford DJ, Fogarty DG, Steenkamp R, Tomson CRV, Ben-Shlomo Y, Ansell D. Chapter 13: The UK Renal Registry Advanced CKD Study: frequency of incorrect reporting of date of start of RRT. Nephron Clinical Practice;115(suppl 1):c271–c78

7 Malek SK, Keys BJ, Kumar S, Milford E, Tullius SG. Racial and ethnic disparities in kidney transplantation. Transplant International 2011;24(5):419–24 doi: 10.1111/j.1432-2277.2010.01205.x [published Online First: Epub Date]

8 Office for National Statistics. www.ons.gov.uk, http://www.ons.gov.uk/ons/dcp171778_238743.pdf

9 Ansell D, Roderick P, Hodsman A, Ford D, Steenkamp R, Tomson C. UK Renal Registry 11th Annual Report (December 2008): Chapter 7 Survival and cause of death of UK adult patients on renal replacement therapy in 2007: national and centre-specific analyses. Nephron Clin Pract. 2009;111(suppl 1):c113–39

10 Fotheringham, J., et al., Variation in centre-specific survival in patients starting renal replacement therapy in England is explained by enhanced comorbidity information from hospitalization data. Nephrology Dialysis Transplantation. 29(2): p. 422–430

11 van Manen JG, van Dijk PCW, Stel VS, Dekker FW, Cleries M, Conte F, et al. Confounding effect of comorbidity in survival studies in patients on renal replacement therapy. Nephrology Dialysis Transplantation. 2007; 22(1):187–95

Appendix 1: Survival tables

Table 5.22. One year after 90 day incident RRT survival percentage by centre, 2014 cohort, unadjusted and adjusted to age 60

Centre	Unadjusted one year after 90 days survival	Adjusted one year after 90 days survival	*Adjusted one year after 90 days 95% CI*
England			
B Heart	90.9	93.6	*89.8–97.5*
B QEH	87.7	90.3	*86.9–93.9*
Basldn	84.5	88.6	*79.9–98.3*
Bradfd	81.3	82.5	*74.0–91.9*
Brightn	86.7	90.6	*86.4–95.0*
Bristol	91.7	94.2	*90.9–97.6*
Camb	87.9	91.5	*87.4–95.7*
Carlis	84.5	88.3	*80.0–97.4*
Carsh	87.1	91.0	*88.0–94.1*
Chelms	85.1	88.1	*80.8–96.1*
Colchr	82.4	87.7	*79.2–97.2*
Covnt	88.7	92.4	*88.6–96.5*
Derby	94.9	95.7	*91.1–100.0*
Donc	88.5	91.6	*85.5–98.2*
Dorset	85.2	90.6	*85.7–95.8*
Dudley	88.5	91.4	*85.2–98.2*
Exeter	87.2	92.4	*88.9–96.1*
Glouc	88.2	92.7	*87.9–97.7*
Hull	89.3	92.2	*87.5–97.2*
Ipswi	97.1	98.6	*96.0–100.0*
Kent	87.4	91.4	*87.6–95.3*
L Barts	85.9	87.1	*83.4–91.0*
L Guys	91.9	93.0	*89.3–96.9*
L Kings	92.1	93.8	*90.4–97.2*
L Rfree	88.9	92.0	*88.9–95.1*
L St.G	89.7	91.7	*86.7–97.0*
L West	87.7	90.5	*87.7–93.4*
Leeds	88.6	89.6	*85.1–94.4*
Leic	88.9	91.4	*88.3–94.6*
Liv Ain	85.7	89.2	*82.1–97.0*
Liv Roy	85.6	87.4	*81.8–93.3*
M RI	82.7	85.4	*80.4–90.7*
Middlbr	89.1	92.8	*88.7–97.2*
Newc	88.7	91.3	*86.5–96.3*
Norwch	80.0	87.4	*81.7–93.6*
Nottm	89.6	92.5	*88.2–97.1*
Oxford	82.9	86.6	*82.1–91.3*
Plymth	84.0	88.8	*81.8–96.3*
Ports	85.4	88.5	*84.8–92.4*
Prestn	91.0	92.9	*89.3–96.7*
Redng	92.2	95.0	*91.4–98.7*
Salford	87.9	90.5	*86.1–95.0*
Sheff	86.3	90.6	*86.6–94.7*
Shrew	77.0	83.5	*75.9–91.8*
Stevng	87.3	90.9	*86.9–95.2*
Sthend	85.6	89.2	*80.0–99.5*
Stoke	87.2	91.8	*87.6–96.2*
Sund	84.6	87.9	*81.2–95.2*
Truro	78.9	85.4	*76.0–95.9*
Wirral	82.9	86.5	*78.3–95.6*
Wolve	82.7	88.3	*82.5–94.5*
York	83.0	87.6	*79.5–96.5*
N Ireland			
Antrim	69.8	81.8	*71.8–93.2*
Belfast	85.8	88.5	*81.3–96.2*
Ulster	90.9	92.8	*83.8–100.0*
West NI	83.8	88.7	*79.0–99.6*
Scotland			
Abrdn	92.6	94.1	*88.6–99.8*
Airdrie	85.7	88.1	*80.7–96.1*
D & Gall	95.0	97.1	*91.9–100.0*
Dundee	87.2	90.6	*83.8–98.0*
Edinb	89.1	88.5	*81.8–95.8*
Glasgw	82.9	86.3	*81.9–91.0*
Klmarnk	86.1	87.6	*78.2–98.1*
Wales			
Bangor	90.0	93.6	*85.6–100.0*
Clwyd	86.7	89.7	*80.9–99.6*
Cardff	82.5	87.1	*82.7–91.8*
Swanse	83.7	89.8	*85.3–94.6*
Wrexm	89.7	94.5	*88.7–100.0*
England	**87.4**	**90.4**	***89.6–91.2***
N Ireland	**83.2**	**87.4**	***82.9–92.2***
Scotland	**87.8**	**90.0**	***87.7–92.4***
Wales	**84.4**	**89.2**	***86.5–92.1***
UK	**87.1**	**90.2**	***89.4–91.1***

Excluded: Inverness, Kirkcaldy, Newry due to <20 patients or no deaths recorded for the year

Table 5.23. Ninety day incident RRT survival percentage by centre, 2014 cohort, unadjusted and adjusted to age 60

Centre	Unadjusted 90 day survival	Adjusted 90 day survival	*Adjusted 90 day 95% CI*
England			
B Heart	95.8	97.1	*94.6–99.6*
B QEH	96.1	97.0	*95.1–99.0*
Basldn	94.3	96.0	*90.8–100.0*
Bradfd	95.8	96.2	*92.1–100.0*
Brightn	95.6	97.0	*94.6–99.4*
Bristol	95.0	96.6	*94.1–99.1*
Camb	96.1	97.4	*95.1–99.7*
Carlis	97.5	98.2	*94.9–100.0*
Carsh	91.7	94.4	*92.1–96.8*
Colchr	94.4	96.5	*91.9–100.0*
Covnt	92.7	95.4	*92.4–98.4*
Derby	98.3	98.7	*96.1–100.0*
Donc	96.3	97.4	*94.0–100.0*
Exeter	96.9	98.3	*96.6–100.0*
Hull	95.6	96.9	*93.9–99.9*
Ipswi	97.4	98.7	*96.2–100.0*
Kent	97.9	98.6	*97.1–100.0*
L Barts	96.6	97.0	*95.2–98.9*
L Guys	98.1	98.3	*96.5–100.0*
L Kings	97.5	98.0	*96.1–100.0*
L Rfree	95.2	96.6	*94.7–98.6*
L St.G	97.8	98.3	*96.0–100.0*
L West	98.2	98.7	*97.6–99.7*
Leeds	92.6	93.6	*90.2–97.2*
Leic	93.2	94.9	*92.6–97.3*
Liv Ain	84.5	88.9	*82.3–96.0*
Liv Roy	90.6	92.6	*88.6–96.7*
M RI	93.6	95.1	*92.3–98.0*
Middlbr	94.9	96.8	*94.0–99.6*
Newc	95.1	96.3	*93.2–99.5*
Norwch	93.8	96.2	*93.0–99.5*
Nottm	94.3	96.0	*92.9–99.2*
Oxford	96.7	97.5	*95.6–99.5*
Plymth	86.2	91.3	*85.6–97.3*
Ports	98.2	98.7	*97.4–100.0*
Prestn	97.4	98.0	*96.0–100.0*
Redng	90.3	93.9	*90.3–97.7*
Salford	93.1	94.6	*91.4–97.9*
Sheff	95.9	97.3	*95.1–99.5*
Shrew	93.8	95.9	*92.0–99.9*
Stevng	93.9	95.7	*93.0–98.5*
Sthend	90.5	93.2	*86.2–100.0*
Stoke	97.1	98.2	*96.3–100.0*
Truro	92.1	94.6	*88.8–100.0*
Wirral	83.9	88.1	*81.1–95.7*
Wolve	96.2	97.4	*94.6–100.0*
York	93.5	95.4	*90.6–100.0*
N Ireland			
Belfast	96.6	97.5	*94.1–100.0*
Ulster	95.7	96.5	*90.1–100.0*
West NI	96.2	97.3	*92.3–100.0*
Scotland			
Abrdn	98.2	98.6	*95.8–100.0*
Edinb	95.6	95.6	*91.5–99.9*
Glasgw	98.3	98.8	*97.4–100.0*
Klmarnk	97.3	97.7	*93.5–100.0*
Krkcldy	94.3	96.6	*92.1–100.0*
Wales			
Bangor	95.2	97.0	*91.3–100.0*
Cardff	93.4	95.4	*92.7–98.1*
Clwyd	93.9	95.5	*89.6–100.0*
Swanse	96.3	97.8	*95.7–100.0*
England	**95.3**	**96.6**	***96.1–97.1***
N Ireland	**96.2**	**97.3**	***95.2–99.5***
Scotland	**98.0**	**98.4**	***97.5–99.4***
Wales	**95.0**	**96.8**	***95.3–98.3***
UK	**95.5**	**96.8**	***96.3–97.3***

Centres excluded 2014: <20 patients (Newry, Inverns), no deaths recorded in the first 90 days of RRT (Dudley, Chelms, Dorset, Glouc, Sund, Antrim, D&Gall, Dundee, Airdrie, Wrexm)

Table 5.24. One year after 90 day incident RRT survival percentage by centre for incident RRT cohort years 2005–2014, adjusted to age 60

	Cohort year									
Centre	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
England										
B Heart	83.6	88.5	93.5	93.6	83.7	92.0	94.4	87.0	93.5	93.6
B QEH	90.4	86.7	92.8	89.5	92.2	88.3	93.3	92.3	91.6	90.3
Basldn	92.9	90.8	89.9	89.3	87.4	85.7	91.6	89.7	90.7	88.6
Bradfd	86.2	81.3	83.8	84.1	91.6	87.9	88.9	86.8	95.5	82.5
Brightn	84.3	87.0	94.2	89.1	85.7	88.4	91.0	91.1	87.1	90.6
Bristol	82.9	92.4	91.4	84.0	89.2	88.9	94.5	88.1	91.3	94.2
Camb	89.8	90.7	93.4	91.1	87.3	89.5	91.8	92.5	93.6	91.5
Carlis	79.6	89.9	96.5	87.8	71.8	86.3	91.5		95.6	88.3
Carsh	90.6	88.2	87.1	86.6	88.0	89.9	94.3	89.6	94.0	91.0
Chelms	83.4	94.2	86.6	90.8	94.1	85.7	80.8	91.1	92.2	88.1
Colchr				85.0	86.3	93.9	84.1	82.7	97.9	87.7
Covnt	82.6	88.5	90.6	86.9	94.2	89.1	90.6	87.9	90.8	92.4
Derby	87.9	93.0	96.4	90.4	88.0	87.5	90.6	89.3	91.2	95.7
Donc				89.8	87.8	91.5	88.9	88.9	92.2	91.6
Dorset	82.6	86.2	90.4	93.5	92.4	87.5	88.2	90.2	93.2	90.6
Dudley	97.3	92.6	85.6	71.1	84.1	87.8	93.7	90.0	93.8	91.4
Exeter	86.2	88.7	86.4	87.0	89.2	95.3	88.5	93.0	94.9	92.4
Glouc	95.1	89.6	86.3	94.4	89.2	92.4	89.6	91.3	96.7	92.7
Hull	85.8	93.5	89.6	85.4	89.2	87.9	93.0	90.3	91.9	92.2
Ipswi	84.7	93.7	96.0	95.7	92.2	93.2	95.3	93.2	86.7	98.6
Kent			91.8	89.9	89.7	90.5	88.1	94.8	90.8	91.4
L Barts	91.1	93.9	86.3	92.5	90.8	91.8	93.7	90.7	91.3	87.1
L Guys	90.4	92.9	92.0	90.5	94.1	91.5	94.7	94.8	94.3	93.0
L Kings	91.7	84.5	87.5	89.6	85.5	89.7	90.8	89.8	90.0	93.8
L Rfree	93.3	89.7	94.4	95.2	89.1	90.3	90.9	93.6	91.6	92.0
L St.G			92.1	94.0	92.7	93.7	96.6	93.6	92.3	91.7
L West	94.1	92.8	92.8	94.2	93.1	88.8	90.7	92.5	93.9	90.5
Leeds	90.2	85.0	87.2	88.7	90.4	92.7	88.1	92.5	91.2	89.6
Leic	84.7	87.8	89.8	90.5	90.1	92.0	91.3	90.3	90.7	91.4
Liv Ain		86.9	82.8	78.5	82.8	89.0	86.3	95.1	85.9	89.2
Liv Roy	90.0	86.4	86.2	94.1	93.9	88.3	88.9	89.9	91.4	87.4
M RI			90.1	87.7	87.5	89.6	93.2	89.9	90.2	85.4
Middlbr	82.8	91.5	87.9	82.3	86.9	88.0	88.9	89.6	91.9	92.8
Newc	82.1	86.2	85.8	91.3	85.7	88.8	86.0	85.7	92.8	91.3
Norwch	90.7	86.5	91.0	89.0	89.7	92.2	89.5	88.3	88.0	87.4
Nottm	87.0	91.9	90.0	91.1	88.8	93.5	92.7	90.0	93.3	92.5
Oxford	87.9	89.9	89.2	87.1	91.6	90.6	88.8	93.9	93.6	86.6
Plymth	84.6	81.0	90.1	87.8	89.0	93.8	91.3	92.0	94.3	88.8
Ports	83.2	87.5	88.5	88.7	90.1	88.1	91.2	91.0	91.3	88.5
Prestn	88.5	83.5	91.4	82.1	87.5	87.6	91.7	92.8	93.9	92.9
Redng	88.5	91.3	90.1	95.3	89.0	93.0	93.0	96.0	93.2	95.0
Salford	88.3	90.5	89.2	86.0	88.5	86.4	91.9	89.0	89.1	90.5
Sheff	90.6	88.6	90.9	92.5	94.2	92.2	87.5	93.4	91.9	90.6
Shrew	86.2	87.7	91.8	93.0	84.8	86.9	91.7	85.0	86.2	83.5
Stevng	76.7	85.3	90.7	89.4	96.7	94.0	91.1	93.1	90.7	90.9
Sthend	91.1	94.8	91.8	86.5	91.5	82.0	94.3		89.6	89.2
Stoke			87.2	89.7	85.8	87.1	93.0	94.0	88.4	91.8
Sund	80.6	83.5	88.7	85.3	83.0	84.1	88.7	93.0	88.6	87.9
Truro	90.6	89.4	90.2	89.2	94.2	90.9	93.3	94.6	95.5	85.4
Wirral	87.0	85.9	88.9	90.4	84.8	93.1	86.2	86.3	93.4	86.5
Wolve	84.2	89.2	89.5	89.3	88.6	87.5	89.4	84.1	88.8	88.3
York	83.9	82.6	95.1	86.2	94.1	84.4	93.5	94.0	87.6	87.6

Table 5.24. Continued

	Cohort year									
Centre	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
N Ireland										
Antrim	85.0	93.9	85.2	88.6	97.4	85.9	85.9	86.7	92.4	81.8
Belfast	85.2	92.4	90.9	88.0	91.4	88.4	92.5	93.1	92.1	88.5
Newry	90.2					92.0	85.4	89.8	84.7	
Ulster						90.9	86.3	93.9	89.8	92.8
West NI		90.1	97.3	93.1	97.6	91.9	95.8		94.0	88.7
Scotland										
Abrdn	84.2	85.0	86.0	86.9	88.8	85.4	94.3	91.5	97.1	94.1
Airdrie	75.2	80.7	77.6	88.3	94.1	83.2	84.0	92.0	95.0	88.1
D & Gall					84.0					97.1
Dundee	83.4	89.2	81.2	85.2	87.7	90.2	90.5	93.4	90.8	90.6
Edinb	83.3	88.6	90.2	83.0	84.9	86.4	89.7	92.9	82.0	88.5
Glasgw	86.2	83.6	87.8	83.5	88.4	86.8	89.1	90.6	89.8	86.3
Inverns	84.3	83.8	90.6	87.1		96.7			95.0	
Klmarnk	96.3	82.7	86.7	90.1	84.1	88.4	91.0	90.9	83.3	87.6
Krkcldy	78.3	80.1	87.4	86.6	90.7	93.6	92.4	97.3	81.4	
Wales										
Bangor	82.3	81.4	92.2	87.8	87.3	89.1	94.4		89.0	93.6
Cardff	87.2	87.0	84.3	83.2	89.3	90.0	88.1	86.8	89.0	87.1
Clwyd	75.5	96.9			92.3					89.7
Swanse	82.7	84.2	89.0	85.1	81.7	86.8	85.0	83.8	84.9	89.8
Wrexm	97.7	85.5	89.9			82.1	88.8	86.1	88.2	94.5
England	**87.9**	**88.9**	**90.2**	**89.5**	**89.7**	**89.9**	**91.1**	**91.2**	**91.8**	**90.4**
N Ireland	**87.7**	**91.1**	**90.2**	**87.8**	**92.1**	**89.3**	**89.9**	**92.8**	**91.2**	**87.4**
Scotland	**84.4**	**84.7**	**86.4**	**85.4**	**87.2**	**87.9**	**90.4**	**91.8**	**89.5**	**90.0**
Wales	**86.0**	**86.1**	**86.7**	**84.4**	**87.3**	**88.8**	**87.6**	**85.5**	**87.6**	**89.2**
UK	**87.4**	**88.4**	**89.6**	**88.9**	**89.5**	**89.7**	**90.8**	**91.0**	**91.4**	**90.2**

Blank cells: centres with either less than 20 patients, no deaths or no data contribution to the UKRR for that year

Table 5.25. Incident RRT survival percentage after 90 days from start of RRT by centre for incident RRT cohort years 2010–2014, adjusted to age 60

Centre	5 year survival 2010 cohort	4 year survival 2011 cohort	3 year survival 2012 cohort	2 year survival 2013 cohort	1 year survival 2014 cohort
England					
B Heart	60.3	71.8	69.9	88.9	93.6
B QEH	63.2	72.7	78.9	85.7	90.3
Basldn	66.0	75.0	69.6	82.5	88.6
Bradfd	66.0	56.4	75.4	83.6	82.5
Brightn	61.4	65.8	79.4	78.0	90.6
Bristol	62.2	77.2	74.0	82.9	94.2
Camb	58.4	71.4	76.3	83.7	91.5
Carlis	67.7	73.7		88.6	88.3
Carsh	60.6	75.0	76.4	87.2	91.0
Chelms	63.1	65.2	72.3	87.7	88.1
Colchr	72.1	56.5	68.1	91.1	87.7
Covnt	58.8	69.4	69.0	81.1	92.4
Derby	53.1	68.3	75.5	83.5	95.7
Donc	52.6	70.3	75.9	88.1	91.6
Dorset	60.1	68.2	70.9	88.1	90.6
Dudley	58.6	75.4	75.6	81.3	91.4
Exeter	65.1	65.9	80.4	88.0	92.4
Glouc	61.8	67.8	78.3	93.3	92.7
Hull	53.5	72.5	73.5	87.1	92.2
Ipswi	65.5	74.6	78.1	79.0	98.6
Kent	59.0	63.4	79.2	82.4	91.4
L Barts	67.5	72.1	77.6	83.4	87.1
L Guys	66.6	78.3	80.3	89.6	93.0
L Kings	66.6	71.8	75.9	78.8	93.8
L Rfree	61.4	73.8	84.0	83.8	92.0
L St.G	71.8	75.4	79.6	86.0	91.7
L West	64.5	71.4	77.8	86.3	90.5
Leeds	61.4	67.6	75.6	81.5	89.6
Leic	64.9	67.1	73.9	80.9	91.4
Liv Ain	37.0	61.2	74.5	76.3	89.2
Liv Roy	64.5	55.3	66.2	85.6	87.4
M RI	57.5	70.1	72.7	83.0	85.4
Middlbr	69.3	66.2	70.8	83.5	92.8
Newc	51.8	72.1	74.1	85.4	91.3
Norwch	63.2	69.5	74.9	80.5	87.4
Nottm	62.6	76.0	70.5	85.9	92.5
Oxford	57.2	70.4	82.0	83.6	86.6
Plymth	49.1	69.4	73.3	79.8	88.8
Ports	59.6	67.7	73.8	84.0	88.5
Prestn	57.0	73.7	76.4	82.6	92.9
Redng	63.5	76.3	79.3	88.7	95.0
Salford	54.1	70.7	70.1	84.0	90.5
Sheff	69.1	67.8	76.9	82.4	90.6
Shrew	52.6	64.7	69.6	73.8	83.5
Stevng	66.2	71.4	83.4	86.0	90.9
Sthend	68.3	77.4	86.3	83.7	89.2
Stoke	56.1	68.2	78.4	79.4	91.8
Sund	59.2	50.9	80.1	82.4	87.9
Truro	64.0	76.0	80.6	88.9	85.4
Wirral	67.2	63.8	66.2	86.3	86.5
Wolve	60.7	59.9	70.4	80.1	88.3
York	63.2	76.5	75.9	75.2	87.6

Table 5.25. Continued

Centre	5 year survival 2010 cohort	4 year survival 2011 cohort	3 year survival 2012 cohort	2 year survival 2013 cohort	1 year survival 2014 cohort
N Ireland					
Antrim	44.8	76.4	75.9	89.8	81.8
Belfast	53.1	67.3	75.6	87.9	88.5
Newry	76.3	56.1	69.2	84.7	
Ulster	68.5	63.2	75.1	85.1	92.8
West NI	63.8	76.3	86.1	81.4	88.7
Scotland					
Abrdn	61.1	62.5	78.2	82.0	94.1
Airdrie	52.2	55.4	67.7	80.8	88.1
D & Gall					97.1
Dundee	62.0	71.2	82.3	86.4	90.6
Edinb	58.1	68.8	80.3	74.6	88.5
Glasgw	55.8	60.6	76.6	83.7	86.3
Inverns	73.8			89.8	
Klmarnk	57.6	50.4	77.8	74.1	87.6
Krkcldy	55.4	54.1	59.4	68.2	
Wales					
Bangor	47.4	57.8		84.0	93.6
Cardff	62.6	64.7	72.0	80.3	87.1
Clwyd	42.9				89.7
Swanse	55.7	65.2	69.0	76.6	89.8
Wrexm	57.7	60.9	61.1	80.6	94.5
England	**61.9**	**70.0**	**76.1**	**84.0**	**90.4**
N Ireland	**59.3**	**67.5**	**76.7**	**86.4**	**87.4**
Scotland	**57.8**	**62.5**	**76.1**	**80.5**	**90.0**
Wales	**57.9**	**63.6**	**69.8**	**79.1**	**89.2**
UK	**61.3**	**69.1**	**75.8**	**83.5**	**90.2**

Blank cells: centres with less than 20 patients for that year or no deaths or no data contribution to the UKRR for that year

Table 5.26. One year prevalent dialysis patient survival percentage by centre for prevalent cohort years 2005–2014, adjusted to age 60

	Cohort year									
Centre	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
England										
B Heart	86.6	87.8	90.4	90.9	87.4	89.5	88.4	89.1	87.8	89.5
B QEH	88.2	88.1	88.3	89.9	89.4	91.1	91.6	91.8	89.8	91.4
Basldn	89.9	90.3	92.6	91.6	88.6	91.0	88.5	92.7	87.2	88.6
Bradfd	82.9	84.3	87.8	84.5	89.3	88.0	87.7	85.1	87.8	87.5
Brightn	87.6	87.2	88.8	87.4	89.9	88.3	89.5	88.1	87.5	87.6
Bristol	87.7	89.2	87.4	85.1	85.8	89.8	90.8	90.0	89.5	88.0
Camb	89.3	88.0	92.6	90.0	91.4	93.1	89.1	92.8	87.8	88.5
Carlis	83.9	85.8	87.0	80.3	80.5	93.3	88.9	82.9	88.3	90.9
Carsh	89.2	88.4	89.8	88.7	89.2	89.6	91.0	90.6	90.1	88.0
Chelms	85.6	87.6	85.1	86.1	89.6	84.2	91.2	90.8	90.6	90.5
Colchr				91.1	86.6	89.0	89.3	86.0	88.4	90.5
Covnt	84.7	87.1	87.2	90.9	90.1	90.9	91.8	90.6	86.4	85.6
Derby	88.5	86.9	90.3	90.4	90.0	89.5	89.3	88.1	89.5	90.8
Donc			88.8	83.9	88.8	91.8	91.1	82.8	90.5	89.5
Dorset	87.0	87.5	89.9	90.1	93.0	90.0	90.5	91.9	92.3	89.9
Dudley	87.3	87.3	88.9	88.9	90.8	87.7	91.5	86.8	87.7	90.9
Exeter	91.1	87.3	85.5	85.5	86.7	88.4	88.3	91.7	90.2	89.2
Glouc	91.1	88.2	86.3	91.7	92.2	89.5	90.7	89.7	92.3	88.8
Hull	85.8	89.9	86.7	87.8	87.5	89.8	91.0	88.4	87.8	88.7
Ipswi	84.2	86.1	93.1	84.4	87.5	91.8	90.3	88.0	90.2	89.1
Kent			86.3	87.9	90.4	89.8	89.1	87.6	88.2	86.3
L Barts	88.3	89.3	88.7	90.8	92.9	91.7	89.8	91.2	90.5	88.1
L Guys	87.3	90.5	90.3	91.4	91.0	94.0	91.2	90.9	91.0	89.9
L Kings	88.7	84.3	87.5	87.6	88.6	89.7	89.4	88.9	90.6	90.6
L Rfree	90.0	90.3	91.3	89.7	90.3	91.5	90.3	90.9	90.4	90.1
L St.G			94.3	89.2	90.8	91.9	88.4	91.7	92.4	88.3
L West	91.2	91.5	90.3	92.0	90.6	90.7	91.7	90.2	90.3	91.2
Leeds	88.5	88.2	87.3	88.8	90.8	88.9	86.7	88.3	89.1	87.3
Leic	84.4	89.7	89.5	88.6	90.4	89.8	90.3	89.0	89.5	86.4
Liv Ain	86.8	90.5	88.3	91.9	89.7	89.7	83.8	84.3	87.7	86.8
Liv Roy	87.6	84.4	86.4	89.0	88.9	90.4	88.5	87.8	87.2	87.9
M RI			86.3	87.6	86.9	88.5	90.7	86.2	86.3	85.1
Middlbr	85.0	87.1	86.8	86.4	83.4	93.0	88.5	88.7	85.5	88.5
Newc	83.7	86.0	86.3	87.1	86.1	85.1	89.2	84.4	86.7	88.9
Norwch	90.3	87.7	91.2	89.6	90.0	91.3	91.5	88.7	88.8	90.8
Nottm	83.2	89.5	88.4	88.0	89.6	89.9	89.0	90.6	88.6	90.4
Oxford	86.8	86.8	87.7	88.3	87.1	87.9	88.1	89.5	88.0	83.3
Plymth	83.6	82.6	87.9	85.8	85.1	89.8	84.6	89.8	86.8	85.4
Ports	85.2	89.9	88.5	89.2	88.4	88.2	89.9	90.2	85.8	89.4
Prestn	86.3	90.8	90.2	89.7	90.1	88.2	90.8	89.2	88.8	87.7
Redng	89.0	90.3	88.9	92.4	88.9	89.5	90.9	90.9	90.0	90.8
Salford	85.4	87.6	86.0	87.5	84.6	87.0	88.4	87.5	89.3	85.4
Sheff	89.2	88.8	88.8	89.7	89.6	88.8	89.0	91.5	88.5	88.9
Shrew	86.6	89.1	88.9	87.8	85.6	87.4	89.9	83.8	86.5	88.0
Stevng	88.0	88.4	91.4	89.2	88.6	91.8	90.9	87.5	90.9	90.0
Sthend	83.4	86.4	90.3	91.0	92.5	90.3	87.8	91.8	90.7	86.9
Stoke			87.4	88.5	86.9	90.6	90.6	91.8	89.0	86.9
Sund	79.5	83.8	87.5	85.3	84.8	83.9	86.6	84.9	88.2	85.5
Truro	91.8	89.3	89.5	89.0	90.7	89.1	89.7	88.9	90.1	85.6
Wirral	88.4	88.2	89.3	90.2	88.6	90.7	90.2	90.8	84.7	83.5
Wolve	89.3	87.9	92.6	89.5	87.4	89.3	88.8	89.2	90.1	88.4
York	84.0	88.6	87.9	88.8	90.1	84.3	88.7	91.6	88.0	88.6

Table 5.26. Continued

	Cohort year									
Centre	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
N Ireland										
Antrim	92.1	85.3	87.9	89.6	88.1	91.6	90.0	90.6	85.7	88.3
Belfast	85.9	89.5	87.8	87.0	87.2	87.6	87.7	85.3	89.5	88.4
Newry	87.4	87.3	89.1	91.5	86.7	91.1	81.5	90.0	91.1	92.9
Ulster	91.6	89.5	89.6	87.4	89.8	89.0	91.0	90.8	91.3	86.3
West NI	83.4	90.2	92.7	89.3	91.0	90.8	91.5	91.8	87.5	93.9
Scotland										
Abrdn	86.3	87.3	90.0	89.5	89.5	89.2	91.5	88.1	84.1	86.3
Airdrie	79.8	78.9	85.6	85.5	89.5	88.0	86.4	85.9	85.7	88.5
D & Gall	80.4	90.0	83.6	86.4	87.6	90.9	86.8	89.9	86.6	87.2
Dundee	86.4	81.8	81.8	93.3	86.3	86.6	90.9	88.2	91.6	89.1
Edinb	85.7	87.0	87.0	85.8	88.2	81.3	89.3	89.1	88.0	85.7
Glasgw	85.7	87.4	87.0	88.1	88.0	87.3	87.7	87.3	87.7	85.5
Inverns	85.7	93.5	88.6	91.8	88.4	86.0	87.1	86.4	89.0	90.4
Klmarnk	91.8	86.8	88.4	87.9	88.4	88.9	89.6	86.9	91.8	85.6
Krkcldy	86.4	87.3	89.7	85.0	86.3	89.0	86.9	90.5	84.4	85.4
Wales										
Bangor	88.5	81.5	88.8	85.1	85.5	86.9	90.0	84.5	85.6	86.3
Cardff	84.2	88.8	82.5	86.5	85.9	88.3	86.5	87.7	87.0	85.5
Clwyd	77.3	90.5	87.1	88.8	78.3	93.1	90.0	86.3	89.2	84.1
Swanse	85.4	88.0	89.5	87.3	87.5	89.1	86.2	88.3	87.3	87.4
Wrexm	85.1	87.6	85.2	89.0	86.7	85.9	87.3	89.3	88.4	85.0
England	**88.2**	**88.5**	**88.9**	**89.0**	**89.1**	**89.9**	**89.8**	**89.5**	**89.1**	**88.5**
N Ireland	**87.3**	**88.4**	**89.1**	**88.6**	**88.4**	**89.7**	**88.7**	**89.1**	**88.8**	**89.6**
Scotland	**85.6**	**86.5**	**87.0**	**88.2**	**88.0**	**87.0**	**88.6**	**87.8**	**87.6**	**86.5**
Wales	**84.6**	**87.9**	**85.6**	**87.0**	**85.9**	**88.5**	**87.0**	**87.6**	**87.2**	**86.0**
UK	**87.8**	**88.3**	**88.5**	**88.8**	**88.9**	**89.5**	**89.6**	**89.2**	**88.9**	**88.3**

Blank cells: centres with less than 20 patients, no deaths or no data contribution to the UKRR for that year

Table 5.27. Percentage completeness of EDTA cause of death for prevalent patients by centre and year of death, 2006 to 2015

	Year of death									
Centre	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
England										
B Heart	85.7	84.5	93.9	100.0	96.6	96.1	96.6	95.0	65.6	93.8
B QEH	4.7	7.0	5.8	1.4	1.7	2.0	2.1	61.9	91.0	53.4
Basldn	21.7	45.5	47.6	76.2	66.7	84.6	88.9	90.9	90.0	86.4
Bradfd	92.2	86.5	92.5	81.8	97.0	97.5	97.7	97.9	98.0	90.2
Brightn	0.0	11.9	0.0	1.1	2.4	1.1	1.1	0.0	0.9	7.0
Bristol	61.0	60.3	66.4	70.7	89.4	96.1	82.2	82.0	94.5	61.2
Camb	1.3	1.1	1.6	5.1	10.4	62.0	94.1	80.5	42.3	0.0
Carlis	91.3	73.9	47.6	80.6	100.0	92.9	94.7	92.3	92.0	82.4
Carsh	0.0	0.8	1.5	0.8	6.7	25.0	40.8	17.4	16.3	24.9
Chelms	64.0	76.5	71.4	86.7	86.7	87.0	100.0	92.3	85.7	96.2
Colchr			33.3	66.7	85.2	82.6	100.0	91.7	77.3	90.0
Covnt			1.2	1.8	0.0	1.4	33.3	70.5	6.7	4.7
Derby	75.6	83.3	97.8	73.5	91.2	88.5	86.9	88.7	78.9	86.4
Donc			100.0	94.3	90.9	91.7	92.6	100.0	96.8	91.7
Dorset	65.1	87.2	88.9	85.2	95.7	95.0	89.1	98.3	90.6	90.2
Dudley	5.9	6.1	5.3	0.0	94.4	88.1	91.2	94.0	97.7	94.3
Exeter	19.0	4.7	3.1	3.0	89.5	84.6	95.1	98.6	96.5	85.3
Glouc	61.1	77.8	70.8	68.4	97.2	93.6	91.5	100.0	88.1	94.2
Hull	76.0	76.5	52.7	18.7	92.0	93.5	96.9	86.8	91.7	97.3
Ipswi	21.9	35.5	13.6	18.8	73.3	77.8	77.4	78.8	83.3	25.0
Kent			61.7	92.8	89.0	96.2	94.9	81.4	86.6	95.3
L Barts	87.4	74.6	77.0	69.5	73.9	82.6	79.9	82.9	83.3	49.2
L Guys	0.0	3.5	0.0	0.0	67.6	84.2	58.2	1.1	0.0	92.4
L Kings	87.9	75.8	86.2	67.1	94.8	97.6	100.0	98.9	98.7	96.7
L Rfree				0.9	1.7	0.0	7.1	5.7	16.1	16.1
L St.G		16.7	17.9	19.6	77.6	49.0	42.4	62.5	57.1	32.8
L West	31.3	18.9	6.3	2.2	2.2	95.0	97.3	96.4	94.6	96.7
Leeds	66.7	29.6	30.1	34.5	100.0	99.1	97.7	98.3	99.2	96.4
Leic	76.9	65.5	69.5	69.8	74.5	61.7	94.1	79.6	55.7	57.7
Liv Ain	81.3	73.3	66.7	100.0	89.5	95.7	0.0	0.0	0.0	12.5
Liv Roy	66.3	76.8	75.8	81.8	71.6	76.4	2.8	33.7	19.0	11.0
M RI		4.0	0.9	1.0	4.7	3.1	10.0	0.8	1.4	2.0
Middlbr	63.5	57.5	26.0	52.0	89.2	97.5	94.9	81.3	95.1	93.4
Newc	29.8	48.7	35.7	40.8	14.0	45.0	16.9	23.6	51.8	74.1
Norwch	21.4	18.2	21.2	44.4	75.8	70.3	76.5	91.0	74.0	48.6
Nottm	87.5	87.0	98.8	97.1	98.8	100.0	100.0	97.6	98.9	95.7
Oxford	0.0	0.0	1.0	0.0	84.6	97.4	92.7	96.5	98.3	96.9
Plymth	45.8	56.7	70.7	47.5	80.9	43.6	41.2	100.0	32.7	74.0
Ports	12.8	21.4	6.9	44.5	68.7	23.3	19.8	40.7	38.8	33.8
Prestn	55.4	47.8	38.1	17.9	95.7	98.9	97.6	99.0	96.2	80.3
Redng	77.1	97.8	89.6	83.0	100.0	96.7	91.2	91.9	79.7	76.7
Salford		1.3	0.0	1.3	0.0	0.0	0.0	0.0	0.0	0.0
Sheff	9.2	12.9	0.9	1.9	3.0	0.8	0.8	1.9	0.9	0.8
Shrew	53.1	89.3	62.5	20.5	46.0	0.0	7.9	17.7	0.0	34.9
Stevng	60.8	55.1	66.1	74.3	86.3	86.8	67.7	69.8	9.3	62.1
Sthend	9.4	3.2	57.7	75.0	92.3	90.0	100.0	100.0	95.7	97.0
Stoke		16.1	21.0	28.6	54.7	57.9	89.6	55.9	53.5	75.0
Sund	60.0	60.5	50.0	78.9	93.5	95.1	97.4	82.6	97.4	98.0
Truro	6.9	0.0	18.4	28.9	93.3	94.9	78.8	100.0	97.1	98.0
Wirral	94.1	84.6	96.9	84.8	86.5	0.0	2.6	25.8	68.5	69.0
Wolve	48.5	51.5	65.8	76.4	98.4	94.1	92.2	85.1	85.2	62.5
York	83.3	38.5	62.1	67.9	96.7	97.3	100.0	100.0	97.4	94.7

Table 5.27. Continued

Centre	Year of death									
	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
N Ireland										
Antrim	10.0	8.6	3.4	26.9	96.8	95.2	100.0	93.1	100.0	93.9
Belfast	33.8	36.0	20.0	25.4	80.3	77.2	77.0	41.7	51.1	47.8
Newry	42.9	15.0	11.8	68.4	95.2	94.4	96.7	100.0	93.3	100.0
Ulster	85.7	92.9	69.2	75.0	95.0	90.9	100.0	95.7	90.0	96.0
West NI	57.7	35.0	22.2	45.8	92.3	80.0	96.6	96.2	93.9	100.0
Scotland										
Abrdn		2.1	100.0	100.0	100.0	100.0	97.1	91.1	68.3	46.7
Airdrie	26.3	100.0	100.0	100.0	100.0	97.1	93.9	100.0	97.6	97.5
D & Gall	78.6	100.0	93.3	94.4	100.0	100.0	87.5	100.0	100.0	69.2
Dundee	2.8	8.9	100.0	100.0	100.0	100.0	100.0	100.0	57.6	66.7
Edinb	29.3	48.3	100.0	97.5	100.0	98.8	100.0	96.4	96.2	92.6
Glasgw	55.1	59.1	100.0	98.5	97.8	99.3	100.0	99.3	100.0	91.4
Inverns			100.0	94.7	100.0	100.0	100.0	100.0	100.0	100.0
Klmarnk	11.1	15.6	100.0	96.7	100.0	100.0	100.0	100.0	100.0	97.4
Krkcldy	66.7	61.5	100.0	96.6	96.6	100.0	96.9	100.0	94.7	54.8
Wales	30.7	43.8	36.3	47.6	53.3	48.6	50.6	84.8	91.2	89.2
Bangor	35.0	86.2	52.4	76.9	73.9	90.0	100.0	95.8	95.0	90.0
Cardff	2.9	4.9	0.0	2.4	6.7	7.9	0.6	73.5	96.7	80.9
Clwyd	11.1	45.5	84.2	83.3	100.0	85.7	89.5	83.3	90.0	100.0
Swanse	92.4	97.3	94.8	89.8	98.0	87.5	98.1	95.7	82.6	94.9
Wrexm	3.4	22.7	69.2	100.0	95.7	92.6	100.0	95.7	87.0	97.4
England	**41.5**	**37.8**	**36.9**	**38.9**	**58.8**	**63.5**	**64.5**	**64.7**	**60.5**	**59.5**
N Ireland	**38.7**	**31.7**	**20.4**	**40.8**	**89.3**	**84.6**	**90.7**	**75.2**	**81.5**	**79.7**
Scotland	**34.0**	**44.8**	**99.8**	**98.1**	**99.0**	**99.3**	**98.5**	**98.4**	**90.6**	**82.3**
Wales	**30.7**	**43.8**	**36.3**	**47.6**	**53.3**	**48.6**	**50.6**	**84.8**	**91.2**	**89.2**
UK	**40.0**	**38.7**	**42.2**	**44.9**	**62.9**	**66.6**	**67.1**	**69.1**	**65.3**	**63.5**

Blank cells: data not available for that year