Chapter 7
Survival and Causes of Death of UK Adult Patients on Renal Replacement Therapy in 2008: national and centre-specific analyses

David Ansell[a], Paul Roderick[b], Retha Steenkamp[a] and Charles RV Tomson[a]

[a]UK Renal Registry, Bristol, UK; [b]Public Health Sciences and Medical Statistics, University of Southampton, Southampton General Hospital, UK

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Cause of death · Comorbidity · Dialysis · End stage renal disease · End stage renal failure · Haemodialysis · Outcome · Peritoneal dialysis · Renal replacement therapy · Survival · Transplant · Vintage

Abstract
Introduction: These analyses examine survival from the start of renal replacement therapy (RRT), based on the total incident UK RRT population reported to the UK Renal Registry, including the 19% who started on PD and the 5% who received a pre-emptive transplant. Survival of prevalent patients and changes in survival between 1997 and 2007 are also reported. ***Methods:*** Survival was calculated for both incident and prevalent patients on RRT and compared between the UK countries after adjustment for age. Survival of incident patients (starting RRT during 2007) was calculated both from the start of RRT and amongst the cohort who survived at least 90 days after RRT, and both with and without censoring at transplantation. Both the Kaplan–Meier and Cox adjusted models were used to calculate survival. Causes of death were analysed for both groups. Relative risk of death was calculated compared with the general UK population. ***Results:*** The 2007 unadjusted 1 year after 90 day survival for patients starting RRT was 86.2%. In incident 18–64 year olds the unadjusted 1 year survival had risen from 85.9% in 1997 to 92.4% in 2007 and for those aged >65 it had risen from 63.8% to 74.9%. The age-adjusted survival (adjusted to age 60) of prevalent dialysis patients rose from 85% in 2000 to 89% in 2007. Diabetic prevalent patient survival rose from 76.5% in 2000 to 83.0% in 2007. The age-standardised mortality ratio for prevalent RRT patients compared with the general population was 28.6 at age 30 years (and was lower than in the 1998–2001 cohort in all age groups up to 45–49) and 4.6 at age 80 years. In the prevalent RRT dialysis population, cardiovascular disease accounted for 29% of deaths, infection 17% and treatment withdrawal 14%. Of deaths, 26% were recorded as uncertain. Treatment withdrawal was a more frequent cause of death in patients aged >65 at start than in younger patients. The median life years remaining for a 25–29 year old on RRT was 20 years and 5 years for a 70 year old. ***Conclusions:*** Incident 2007 and prevalent 2008 patient survival on RRT in all the UK countries for all age ranges and also for patients with diabetes continued to improve. The relative risk of death on RRT compared with the general population has fallen since 2001. Death rates on dialysis in the UK remained lower than when compared with a similar aged population on dialysis in the USA.

Introduction

The analyses presented in this chapter examine survival from the start of renal replacement therapy (RRT), and also the survival amongst all prevalent RRT patients alive on 1st January 2008. They encompass the outcomes from the total incident UK dialysis population reported to the UK Renal Registry (UKRR), including the 19% who started on peritoneal dialysis and the 5% who received a pre-emptive renal transplant. These results are therefore a true reflection of the outcomes in the whole UK RRT population and are not distorted by focusing solely on the haemodialysis cohort. Additionally, analyses of the 1st year UK survival data 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.

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, patient groups have disliked the term 'end stage'; the term ERF was endorsed by the English National Service Framework for Renal Services, published in 2004.

Centre anonymity for survival analyses was first removed in the publication of the 2006 UKRR Report and the UK remains the only country openly reporting and publishing centre attributable RRT survival. It is again stressed that these are raw data which continue to require very cautious interpretation. The Registry can adjust for the effects of the different age distributions of patients in different centres, but lacks sufficient data from many participating centres to enable adjustment for comorbidity and ethnic origin, which have been shown to have a major impact on outcome (for instance, better survival is expected in centres with a higher proportion of Black and South Asian patients). With this lack of information on case mix, it is difficult to interpret any apparent difference in survival between centres. Using data only from those centres with greater than 85% complete data returns on comorbidity, an analysis has been undertaken to highlight the impact of age, primary renal diagnosis and comorbidity on survival. Now that these data items are part of the mandatory National Renal Dataset to be returned by all hospital Trusts in England, we hope that completeness of returns will rapidly improve. Despite the uncertainty about any apparent differences in outcome for centres which appear to be outliers, the Registry will follow the clinical governance procedures as set out in chapter 2.

This year some analyses on the projected life years remaining are included within this chapter.

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 members of a cohort of patients, without any adjustment for age or other factors that affect the chances of survival in the cohort. 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 hazards 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 this ratio remains constant throughout the period under consideration. Whenever used, the proportional hazards model was tested for validity.

To allow comparisons between centres with differing age distributions, survival analyses were statistically 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 14 years ago at the start of the Registry's data collection. The average age of patients commencing RRT in the UK has been stable around an age of 65 years for the last 7 years, but the Registry has maintained age adjustment to 60 years for comparability with all previous years' analyses. All analyses were undertaken using SAS vs. 9.1.3.

Definition of the date renal replacement therapy started

The incident survival figures quoted in this chapter are from the first day of renal replacement therapy. When a patient starts RRT with a pre-emptive transplant there is an easily definable date. Recent UKRR analyses of electronic data extracted for the immediate month prior to the start date of RRT provided by the clinician, have highlighted inconsistencies in the definition of this first date when patients start either on haemodialysis or peritoneal dialysis, with the date of start reported to the Registry being later than the actual date of start. These findings are described in detail in chapter 13 of this Report. This concern is unlikely to be unique to the UK, but will be common to analyses from all renal registries and to any comparison between published studies reported from different centres.

In addition to this varying clinical definition of day 0, there is international variability on when patient data are collected by national registries with some countries (often for financial reimbursement reasons) defining the 90th day after starting RRT as day 0 or others collecting data only on those who have survived 90 days and reporting as zero the number of patients dying within the first 90 days.

In the UK all patients starting RRT for ERF are included from the date of the first RRT treatment (a date currently defined by the clinician) unless they recover renal function within 90 days. These UK data therefore include some patients who develop acute irreversible renal failure in the context of an acute illness for instance and were recorded by the clinician as being in irreversible established renal failure. However, this previously relied on clinicians retrospectively assigning the date of first RRT in such patients and it became clear at the time of preparation of the last Annual Report that many clinicians were not entering timeline data in this way, but rather entering the date on which it was decided to plan for long-term RRT or the date of first outpatient dialysis. 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 of the first session. For patients initially categorised as 'acute', but who are subsequently categorised as ERF, the UKRR will extract information from the first session of RRT onwards (including all forms of RRT for acute renal failure) and will assign the date of this first session as the date of start of RRT.

As many other national registries do not include reports on patients who started RRT for ERF but died in the first 90 days, survival from 90 days onwards is also reported in this chapter, to allow international comparisons. Although the USRDS 2008 Report is now reporting on survival data from day 0, the finding of a lower rate of death which then increases throughout the first 90 day period strongly suggests that there remains variable reporting of patients who do not survive this period. This distinction is important, as there is a much higher death rate in the first 90 days, which would distort any international comparisons.

Methodology for incident patient survival

The incident survival cohort was **NOT** censored at the time of transplantation and therefore included the 5% who received a pre-emptive transplant. Censoring excludes the healthier patient cohort. 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.

The incident ('take-on') population in any specific year included patients who recovered from ERF after 90 days from the start of RRT, but excluded those that recovered within 90 days. 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. Patients re-starting dialysis after a failed transplant were also excluded (unless the transplant also occurred in the same year).

For patients who recovered renal function for >90 days and then went back into ERF, the length of time on RRT was calculated from the day on which the patient restarted RRT. If recovery was for less than 90 days, the start of renal replacement therapy was calculated from the date of the first episode and the recovery period ignored.

The one year incident survival for patients in 2007 was calculated for those who had all been followed for 1 full year through 2007 and 2008 (e.g. patients starting RRT on 1st December 2007 were followed through to 30th November 2008). The 2008 incident patients were excluded from this year's incident survival analysis as they had not been followed for a sufficient length of time.

For analysis of 1 year after 90 day survival, patients who started RRT in October through December 2007 were not included in the cohort, as 1st quarter 2008 data on these patients were not yet available.

It is important to note that in the 1 year after 90 day survival analyses in the 2005 UKRR Report and all reports prior to 2005, the previous year's patient cohort was used to calculate the 1 year after 90 day survival (e.g. this year the alternative would have been to use the 2006 rather than 2007 cohort) starting in October. A comparison of these two methods has shown no difference between them for any but the smallest centres (which will have wide 95% confidence intervals), so for simplicity of understanding the cohort and using a common cohort across analyses, the UKRR uses the previous year's data (2007 cohort).

To help identify any centre differences in survival from the small centres (where confidence intervals are large), an analysis of 1 year after 90 day survival using a rolling 4 year combined incident cohort from 2004 to 2007 was also undertaken. For those centres which had joined the UKRR in the previous 1–3 years, the available data were included.

The death rate per 1,000 patient years was calculated by counting the number of deaths and dividing by the person years exposed. This included all patients, including those who died within the first 3 months of therapy. The person years at risk were calculated by adding up, for each patient, the number of days at risk (until they died or were lost to follow-up) and dividing by 365.

Adjustment of 1 year after 90 day survival for the effect of comorbidity was undertaken using a rolling 5 year combined incident cohort from 2003 to 2007. Thirteen centres had returned >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 diagnosis for all the nine centres. The individual centre data were then further adjusted for average distribution of comorbidity present at these centres.

The survival hazard function was calculated as the probability of dying in a short time interval considering survival to that interval.

Methodology for prevalent patient survival

All patients who had been established on RRT for at least 90 days on 1 January 2008 were included in these analyses. The patients in the transplant cohort had all been established with a transplant for at least 6 months.

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 transplant. When a patient is censored at transplantation, the patient is considered as alive up to the point of

transplantation, but the patient's status post-transplant is not considered. Therefore a death following transplantation is not taken into account in calculating the survival figure. This 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. The differences are likely to be small due to the low post-transplantation mortality rate and the relatively small proportion of patients being transplanted in a given year compared to the whole dialysis population (usually less than 7% of the total dialysis population). To estimate the potential differences, the results for individual renal centres were compared with and without censoring at transplant. Overall there was a 0.2% higher survival using the uncensored data. With such small differences only the censored results have been quoted throughout the prevalent analyses.

Methodology of causes of death

Cause of death was sent in by renal centres as an EDTA-ERA registry code. These have been grouped into the following categories:

Cardiac disease
Cerebrovascular disease
Infection
Malignancy
Treatment withdrawal
Other
Uncertain

Some centres had high completeness of data returns to the UKRR regarding cause of death, whilst others returned no information.

Adult patients aged 18 years and over, from England, Wales, Scotland and Northern Ireland, were included in the analyses on cause of death. The incident patient analysis included all patients starting RRT in the years 2002–2007. Previously data analysis was limited to centres with a high rate of return for cause of death. When this was compared with an analysis of all the cause of death data on the database, the percentages in corresponding EDTA categories remained unchanged so the latter data were therefore included.

Analysis of prevalent patients included all those aged over 18 years and receiving RRT on 1 January 2008. The death rate was calculated for the UK general population (data from the Office of National Statistics (ONS) http://www.statistics.gov.uk/statbase/Product.asp?vlnk = 14409) by age band and compared with the same age band for prevalent patients on RRT on 1 January 2008.

Methodology of median life expectancy (life table calculations)

Kaplan–Meier survival analyses were used to calculate the hazard of death by age group (18–34, 35–44, 45–54, 55–64, 65–74, 75+) for incident patients starting RRT from 1997 to 2007. The patient cohort inclusion criteria are similar to that of the incident cohort described above. Patients were then followed until death, censoring or end of the study period.

This analysis showed that the hazard of death stabilized after year one with variability increasing again after nine years. Due to this, the average hazard of death for the periods 1 to 9 years was calculated for each age group. Life expectancy was calculated as (1 – hazard of death) which gives the probability of surviving until the next time period. Median life years remaining is then the difference between the age when reaching the 50% probability of survival and the age of starting RRT.

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

Data on the UK population in mid-2007 and the number of deaths in 2007 was obtained from the Office of National Statistics for each nation separately, and added together. The age-specific UK death rate was calculated as the number of UK deaths/UK population. The age-specific 'expected' rate of deaths in the RRT population was then calculated: years exposed for RRT patients*UK death rate/1,000. The age-specific observed number of RRT deaths was calculated as the actual number of deaths observed in 2008, and the RRT death rate as the actual number of deaths in 2008/years exposed for RRT patients*1,000. The observed/expected ratio was then calculated.

Results of incident (new RRT) patient survival

The 2007 cohort included 6,634 patients who were starting RRT (table 7.1).

Comparison with audit standards

The current 2007 4th UK Renal Standards document [1] does not set any standards for audit of patient survival. This is in contrast to the 2002 3rd UK Renal Standards document [2] (http://www.renal.org/standards/standards.html) which concluded that:

It is hard to set survival standards at present because these should be age, gender and co-morbidity adjusted and this is not yet possible from Registry data. The last Standards document (2nd – 1998) recommended at least 90% one year survival for patients aged 18–55 years with standard primary renal disease. This may have been too low as the rate in participating centres in the Registry was 97%, though numbers were small.

The 3rd Renal Standards document defines standard primary renal disease using the EDTA-ERA diagnosis codes (including only codes 0–49); this excludes patients with renal disease due to diabetes and other systemic diseases. It is more widespread practice to simply exclude patients with diabetes, so these analyses were also included in this report to allow comparison with reports from other registries. The results are shown in table 7.2 and are similar to the previous year.

Table 7.1. Summary of the exclusions from the incident cohorts

	Cohort year				
	2007	2006	2005	2004	2003
All incident patients	6,644	6,322	6,067	5,403	4,784
Exclusion category (1)	−2	−1	−1	−4	−3
Exclusion category (2)	−2	−6	−5	−2	−5
Exclusion category (3)	−6	−8	−24	−23	−16
Remaining incident cohort	6,634	6,307	6,037	5,374	4,760
Died within 90 days of start	−386	−469	−477	−486	−448
Lost within 90 days of start	−31	−29	−18	−28	−17
Cohort at one year after 90 days	6,217	5,809	5,542	4,860	4,295
Deaths at one year after 90 days	829	832	821	775	681

(1) patient had 2nd start in same year, if recovery <90 days, used 1st start date, if recovery ⩾90 days used 2nd start date
(2) recovery <90 days, used 1st start date in previous year(s) which is not in this cohort – delete from current cohort
(3) recovery ⩾90 days, should use 2nd start date in next year(s) which is not in this cohort – delete from current cohort

Table 7.2. One-year incident dialysis patient survival (from day 0–365), patients aged 18–54, 2007 and 2002 cohort (does not include patients whose first modality was transplantation)

	2007 cohort		2002 cohort	
First treatment	Standard primary renal disease	All primary renal diseases except diabetes	Standard primary renal disease	All primary renal diseases except diabetes
All dialysis %	96.5	95.1	95.4	93.9
95% CI	*95.2–97.5*	*93.9–96.1*	93.7–97.1	92.2–95.5
HD %	95.0	93.3	93.4	91.6
95% CI	*93.1–96.4*	*91.6–94.6*	90.7–96.0	89.2–94.0
PD %	99.4	99.3	98.6	97.9
95% CI	*97.7–99.9*	*98.0–99.8*	71.1–100	96.3–99.6

In this younger patient cohort, the trend in the improvement in patient survival from the 2006 cohort continues. The improvement is seen in both those patients with 'standard primary renal disease' and those with all other primary renal diseases (excluding diabetes). For a longer term comparison, the 2002 cohort is shown.

Comparison of survival between UK countries

Two years incident data have been combined to increase the size of the patient cohort, so that any differences between the 4 UK countries are more likely to be reliably identified (table 7.3). These data have not been adjusted for differences in primary renal diagnosis, ethnicity or comorbidity, nor for differences in life expectancy in the general populations of the four countries. There is a significant difference in 90 day survival between the UK countries ($p = 0.02$) that was not seen previously and the 1 year after 90 day survival was once again significantly different ($p = <0.0001$) between countries. It is postulated that greater prevalence of cardiovascular disease in Wales and Scotland compared with England may account for these differences.

Table 7.3. Incident patient survival across the UK countries, combined 2 year cohort (2006–2007), adjusted to age 60

	England	N Ireland	Scotland	Wales	UK
% 90 day	95.7	97.4	94.7	95.1	95.6
95% CI	*95.3–96.1*	*96.2–98.6*	*93.5–95.8*	*94.0–96.3*	*95.2–96.0*
% 1 year after 90 days	89.6	90.8	85.9	85.8	89.1
95% CI	*88.9–90.3*	*88.3–93.3*	*83.9–87.9*	*83.7–88.1*	*88.4–89.7*

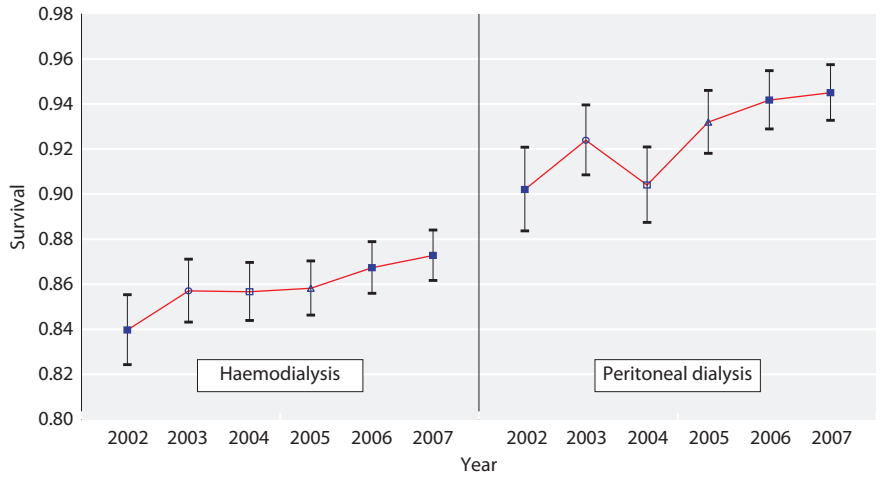

Fig. 7.1. Trend in 1 year after 90 day mortality by first established modality 2002–2007 (adjusted to age 60) (excludes patients whose first modality was transplantation)

Modality

The age-adjusted one year survival estimates on HD and PD were 87.3% and 94.5% respectively which both show a trend in improvement in survival from 2002 (figure 7.1 and table 7.4). There appeared to be better one year survival on PD compared with HD after age adjustment; however, a straightforward comparison of the modalities in this way is misleading, given that in general PD is used in patients with less severe comorbidity. A similar finding is seen in the USRDS and Australasian (ANZDATA) registries even after adjustment for comorbidity.

Age

Tables 7.5 to 7.10 show survival of all patients and those above and below 65 years of age, for up to eleven years after initiation of renal replacement therapy. The UK is showing an improvement in both short and longer term survival on RRT for patients aged both under and over 65 years. As expected, there was also a steep age-related decline in survival over all time periods (see also figures 7.2 and 7.3).

If the survival data in tables 7.8 to 7.10 are recalculated using data only from day 90 onwards, as used by many other countries, (1 year after day 90 survival, 2 year after day 90 survival, etc) the survival in all cases increased by an additional 3–4% across both age bands. These would then be the results most comparable to the figures quoted by the USRDS from the USA [3] and most other national registries.

There was a curvilinear increase in death rate per 1,000 patient years with age, shown in figure 7.3 for

Table 7.4. One-year after day 90 incident patient survival by first established treatment modality (adjusted to age 60) (excluding patients whose first modality was transplantation)

	Adjusted 1 year after 90 days % *95% CI*	
Year	HD	PD
2007	87.3	94.5
	86.2–88.4	*93.3–95.7*
2006	86.7	94.2
	85.6–87.9	*92.9–95.5*
2005	85.8	93.2
	84.6–87.0	*91.8–94.6*
2004	85.7	90.4
	84.4–87.0	*88.7–92.1*
2003	85.7	92.4
	84.3–87.1	*90.9–94.0*
2002	87.3	94.5
	86.2–88.4	*93.3–95.7*

Table 7.5. Unadjusted 90 day survival of incident patients, 2007 cohort, by age

Age	KM* survival (%)	KM 95% CI	N
18–64	97.8	97.3–98.3	3,437
⩾65	90.2	89.2–91.2	3,197
All ages	94.2	93.6–94.7	6,634

* KM = Kaplan–Meier

Table 7.6. Unadjusted 1 year after day 90 survival of incident patients, 2007 cohort, by age

Age	KM survival (%)	KM 95% CI	N
18–64	92.5	91.6–93.4	3,344
⩾65	78.9	77.3–80.4	2,873
All ages	86.2	85.3–87.1	6,217

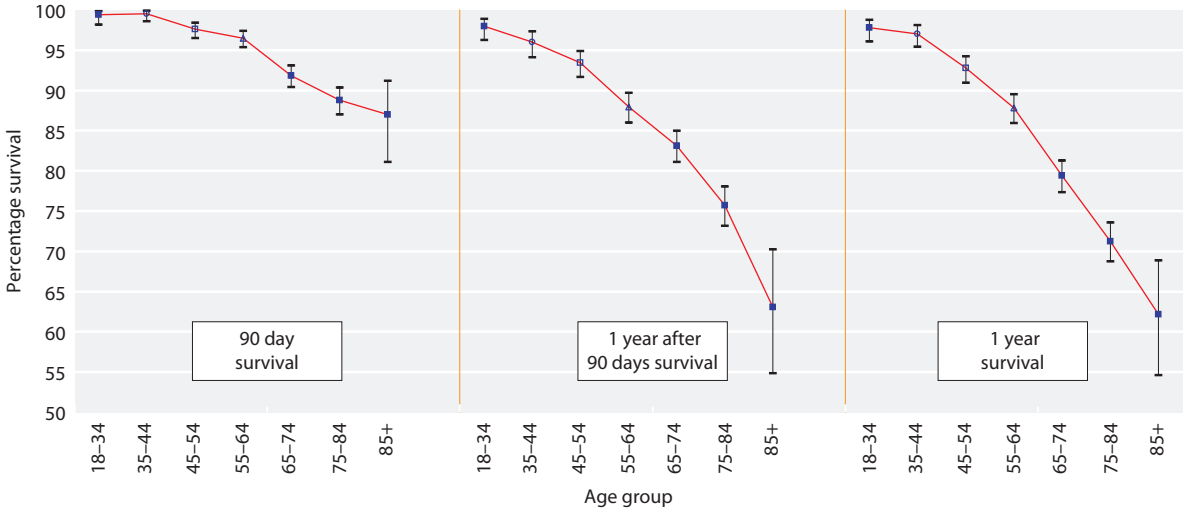

Fig. 7.2. Unadjusted survival of all incident patients by age band, 2007 cohort

the period one year after 90 days. There were no differences between the UK countries.

The effect of censoring age related survival at the time of transplantation

The KM long term survival curves published in all reports prior to the previous 2 years were censored at the time of transplantation. This was not made clear in the description of methodology and although not incorrect, will make the longer term outcomes of younger patients (who are more likely to have undergone transplantation) appear worse than is actually the case. This is because only those younger patients remaining on dialysis (who may have more comorbidity than those transplanted) will have been included in the censored survival analysis. Without censoring, the 10 year survival for patients aged 18–34 years is 80.4%, which contrasts with a 55.2% survival if censoring at the time of transplantation (data not shown). For more detailed information on this effect, refer to the 2008 Report [4].

From figure 7.4, it can be seen that the 50% survival for patients starting RRT in the UK aged 50, 60 and 70 years is 10 years, 5 years and 3 years respectively.

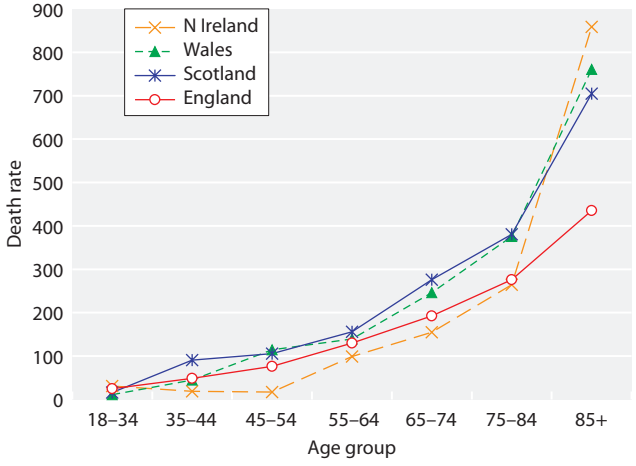

Fig. 7.3. One year after 90 days death rate per 1,000 patients years by UK country and age group for incident patients, 2004–2007 cohort

The change in hazard of death by age, during the first 12 month period

Figure 7.5 shows the monthly hazard of death from the 1st day of starting RRT by age, which falls sharply during the first 3–4 months particularly for older patients. In Renal Registries that receive details on all patients starting RRT from day zero, this difference in the change in hazard of death between the age groups will affect proportionality in any Cox model analysis that uses data starting from day zero and combines these different aged cohorts.

The USRDS, in contrast, reports a rising mortality in the first 3 month period [3] which they have reported as reflecting an under-reporting to the USRDS of patients that start on RRT who do not survive the first 90 days.

The hazard of death per each 10 year increase in patient age (unadjusted for primary renal disease) is shown in table 7.7. The hazard of death increase for each 10 year age band has been stable over time (data not shown).

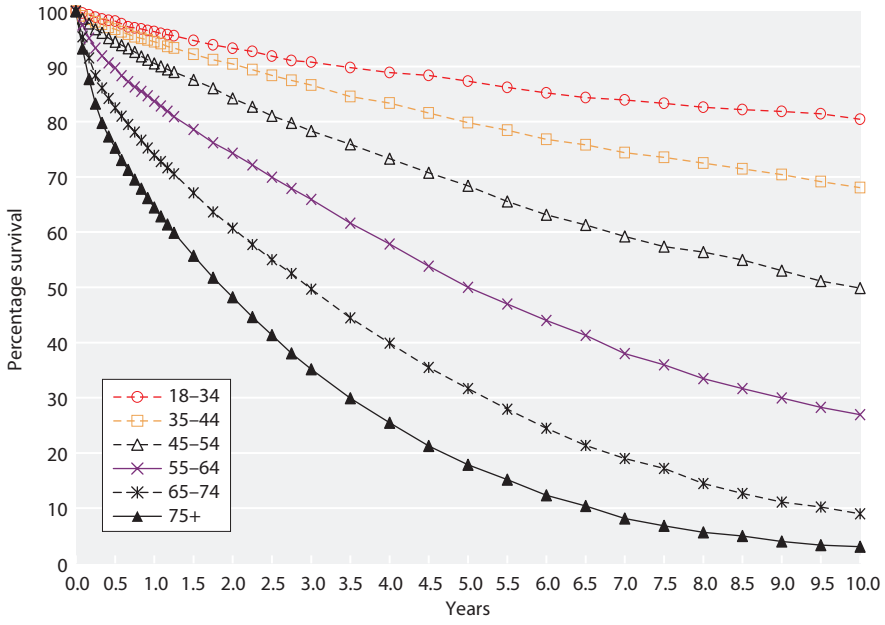

Fig. 7.4. Kaplan–Meier survival of incident patients 1997–2007 cohort (from day 0), without censoring at transplantation

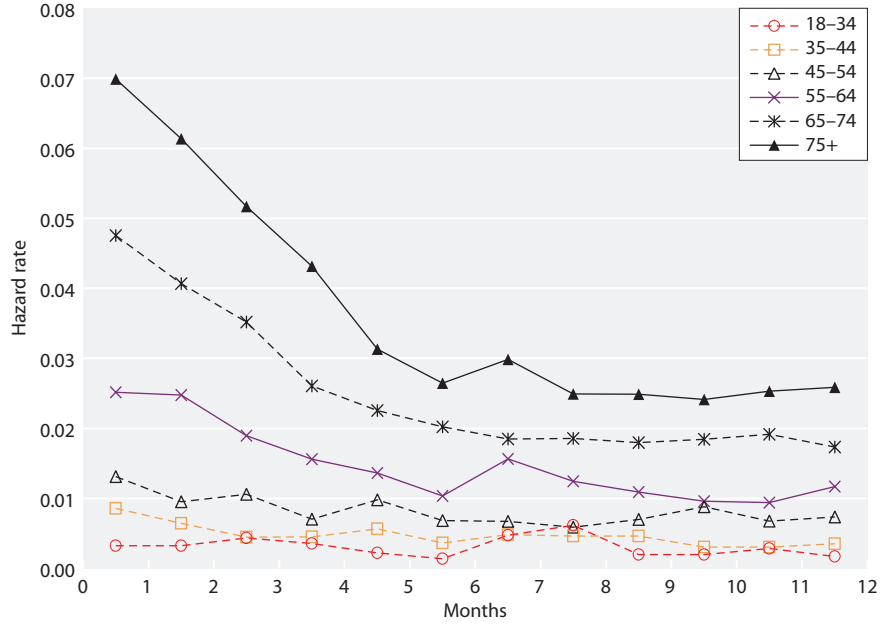

Fig. 7.5. First year monthly hazard of death, by age band 1997–2007 combined incident cohort

Table 7.7. Increase in proportional hazard of death for each 10 year increase in age, at 90 days and for 1 year thereafter, 2007 cohort

Interval	Hazard of death for 10 year age increase	95% CI
First 90 days	1.79	1.64–1.95
1 year after first 90 days	1.63	1.55–1.73

Changes in survival from 1997–2007

The 1st year death rate per 1,000 patient years is shown in figure 7.6. Although in the last UKRR report it was stated that the 2006 death rate for patients aged over 65 years was unchanged from 2005, at 326 per 1,000 patient years, the 2007 data show a continued trend of a further fall to 294 per 1,000 patient years. In the under 65 year age group the fall in death rate

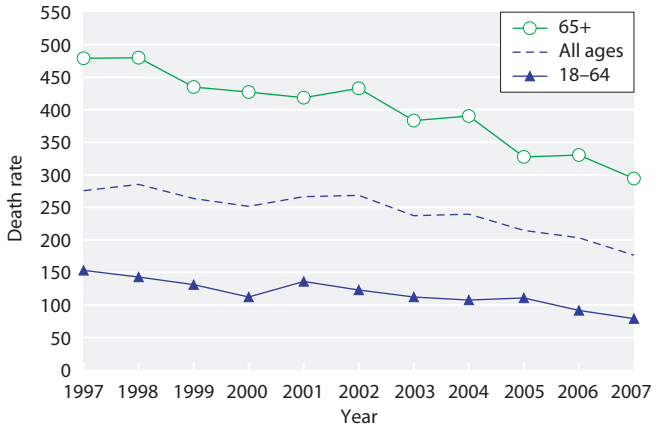

Fig. 7.6. One-year incident death rate per 1,000 patient years for all age groups

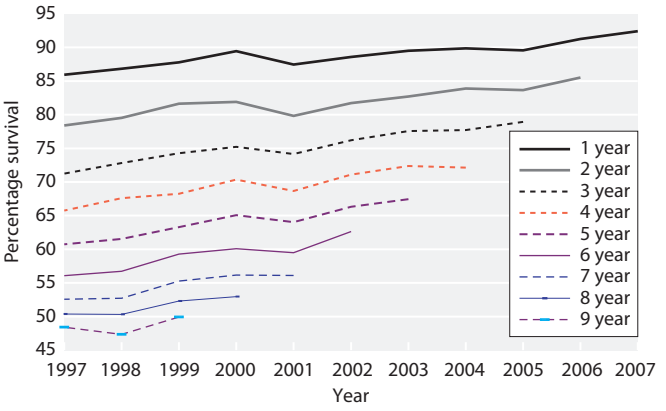

Fig. 7.7. Change in KM long term survival by year of starting RRT; for incident patients aged 18–64 years

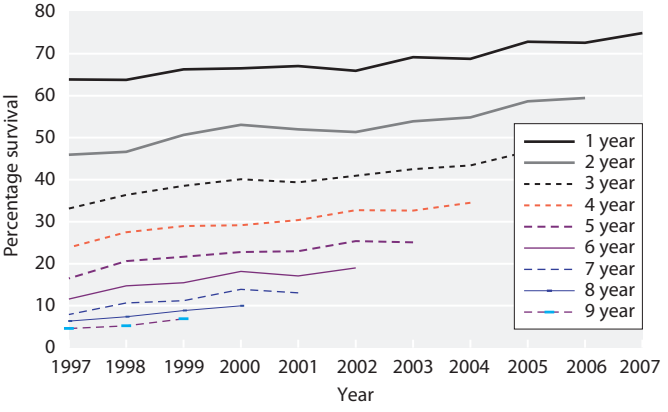

Fig. 7.8. Change in KM long term survival by year of starting RRT; for incident patients aged ⩾65 years

continues: from 111 per 1,000 patient years in 2005 to 92 and 79 per 1,000 patient years in 2006 and 2007 respectively.

It is important to note that these death rates are not directly comparable with those produced by the USRDS Registry, as the UK data include the first 90 day period where the death rates are higher than subsequent time periods.

The unadjusted KM survival analyses (tables 7.8 and 7.9, figures 7.7 and 7.8) and annual death rates show the large improvement in 1 to 11 year survival across the time periods for both the under and over 65s. This has happened even though the average age of patients starting RRT has risen by 5 years during this period. Survival amongst patients aged under 65 years at start of RRT has improved from 85.9% to 92.4%. As survival rates were already high in these patients, the absolute overall survival improvement was only 6.5%. The reduction in the death rate (= relative survival improvement) in figure 7.6 shows that this equates to a 48% relative improvement over this 11 year period.

Similarly for patients aged over 65 years there has been an 11.1% absolute improvement in 1st year survival,

Table 7.8. Unadjusted KM survival of incident patients, 1997–2007 cohort for patients aged 18–64

Cohort	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year	11 year	95% CI for latest year	N
2007	92.4											91.5–93.3	3,437
2006	91.3	85.5										84.2–86.7	3,141
2005	89.6	83.7	78.9									77.4–80.4	2,960
2004	89.9	83.9	77.7	72.1								70.4–73.8	2,647
2003	89.5	82.7	77.6	72.4	67.4							65.5–69.3	2,388
2002	88.6	81.7	76.2	71.1	66.3	62.6						60.5–64.7	2,090
2001	87.5	79.8	74.2	68.7	64.0	59.5	56.1					53.8–58.4	1,838
2000	89.5	81.9	75.2	70.4	65.1	60.1	56.2	53.0				50.4–55.4	1,579
1999	87.8	81.6	74.3	68.2	63.3	59.3	55.3	52.3	49.9			47.2–52.6	1,368
1998	86.8	79.5	72.8	67.6	61.5	56.7	52.7	50.3	47.3	46.0		43.2–48.8	1,275
1997	85.9	78.4	71.3	65.7	60.7	56.1	52.6	50.4	48.4	44.2	41.6	38.1–45.1	792

Table 7.9. Unadjusted KM survival of incident patients, 1997–2007 cohort for patients aged ⩾65

Cohort	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year	11 year	95% CI for latest year	N
2007	74.9											73.3–76.4	3,197
2006	72.6	59.4										57.7–61.1	3,166
2005	72.8	58.7	46.7									44.9–48.4	3,077
2004	68.7	54.8	43.4	34.5								32.7–36.3	2,727
2003	69.1	53.9	42.5	32.6	25.1							23.3–26.9	2,372
2002	65.9	51.3	40.9	32.8	25.4	19.0						17.3–20.7	2,171
2001	67.1	52.0	39.4	30.4	23.0	17.1	13.0					11.5–14.7	1,854
2000	66.5	53.0	40.1	29.2	22.8	18.1	13.9	9.9				8.5–11.6	1,503
1999	66.3	50.6	38.5	28.9	21.6	15.5	11.2	8.8	6.9			5.6–8.4	1,266
1998	63.7	46.6	36.4	27.5	20.6	14.7	10.7	7.3	5.2	4.0		2.9–5.3	1,139
1997	63.8	45.9	33.1	23.8	16.5	11.6	7.9	6.3	4.6	3.9	2.8	1.7–4.4	582

which translates into a 39% relative reduction in death rate over this 10 year period. This lower rate of relative reduction in risk is probably related to the increasing proportion of very elderly patients in this group over time; the analysis has not been adjusted for differences in age structure within these cohorts. Another potential confounding factor could be that additional renal centres have joined the UKRR over these intervening years. If each additional centre joining had better survival than all the previous centres (unlikely), this would appear as a time trend. However separate analysis of survival in the earlier versus later centres has confirmed this not to be the case.

As these are observational data it remains difficult to attribute this reduction in risk of death to any specific improvements in care. During this period mean haemoglobin in HD patients has shown improvement rising from 10.8 g/dl in 1998 to 11.5 g/dl in 2008 with little change in the last 2 years. In contrast, improvements in serum phosphate and calcium control have been restricted to the last 5 years, and improvement in dialysis dose were mainly in the first 4 years.

Change in survival on renal replacement therapy by vintage

RRT patients in the UK continued to show no evidence of a worsening prognosis with time on RRT (vintage), even with the follow up period now increased to 11 years. Figure 7.9 demonstrates this clearly for all patients. In the older age groups, there are decreasing numbers remaining alive beyond 7 years accounting for the increase seen in the variability. This lack of a 'vintage' effect was partly related to the effect of having a survivor cohort which was healthier than those patients who died early after starting RRT, which was then also partly offset by increasing comorbidity with time in the survivor cohort. Unfortunately, the Registry does not collect data on the incidence of new comorbid conditions amongst prevalent RRT patients, and so is currently unable to study this possibility further.

Table 7.10. Unadjusted KM survival of incident patients, 1997–2007 cohort for patients of all ages

Cohort	1 year	2 year	3 year	4 year	5 year	6 year	7 year	8 year	9 year	10 year	11 year	95% CI for latest year	N
2007	84.0											83.1–84.8	6,634
2006	81.9	72.4										71.3–73.5	6,307
2005	81.0	70.9	62.4									61.2–63.7	6,037
2004	79.1	69.1	60.3	53.0								51.7–54.4	5,374
2003	79.4	68.4	60.1	52.6	46.3							44.9–47.8	4,760
2002	77.0	66.2	58.2	51.5	45.4	40.3						38.8–41.8	4,261
2001	77.2	65.9	56.7	49.5	43.4	38.2	34.5					32.9–36.0	3,692
2000	78.3	67.9	58.2	50.3	44.5	39.7	35.6	32.0				30.4–33.7	3,082
1999	77.4	66.7	57.1	49.3	43.3	38.2	34.0	31.4	29.2			27.4–30.9	2,634
1998	76.0	64.1	55.7	48.8	42.3	37.0	32.9	30.1	27.5	26.2		24.4–28.0	2,414
1997	76.6	64.7	55.2	48.1	42.1	37.3	33.7	31.7	29.9	27.2	25.2	22.9–27.5	1,374

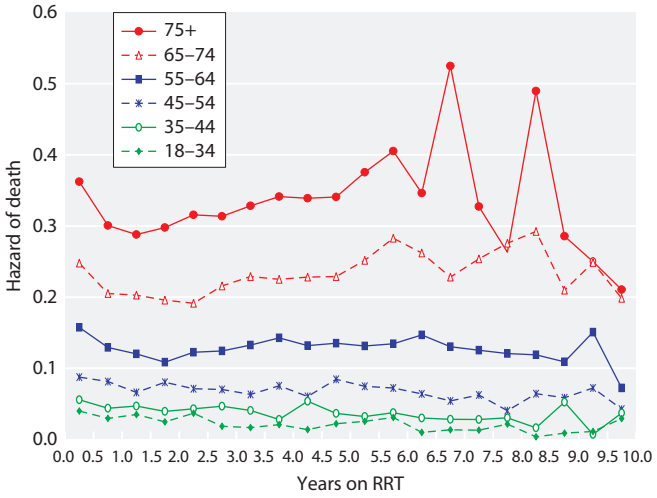

Fig. 7.9. Six monthly hazard of death, by vintage and age band, 1997–2007 incident cohort after day 90

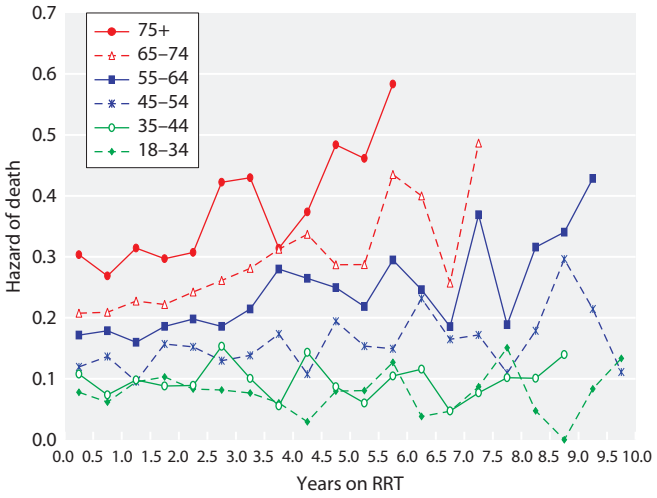

Fig. 7.11. Six monthly hazard of death, by vintage and age band, 1997–2007 diabetic incident cohort after day 90

Figures 7.10 and 7.11 show these data for the non-diabetic and diabetic patients respectively with a suggestion of worsening prognosis in older diabetic patients.

Previously the USRDS has shown a worsening prognosis between being on RRT 1 year, 2–5 years and >5 years. In the latest USRDS report [3] this difference in prognosis with time on RRT has narrowed.

Time trend changes in incident patient survival, 1999–2007

The time trend changes are shown in figure 7.12. The left hand plot includes only those centres that have been sending continual data since 1999. These centres show a similar improvement to when the data are analysed by all renal centres.

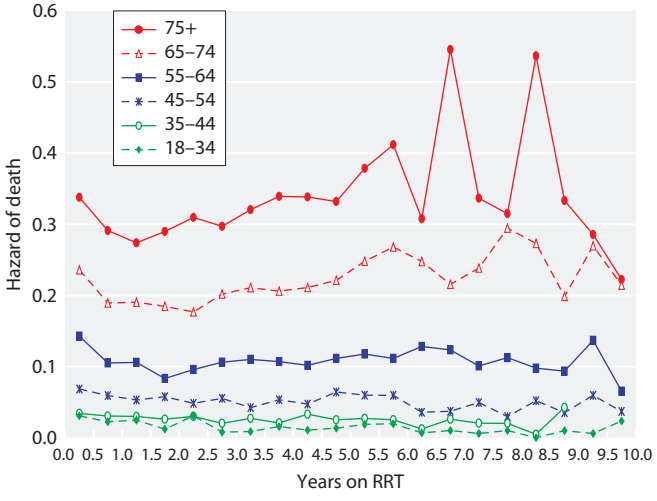

Fig. 7.10. Six monthly hazard of death, by vintage and age band, 1997–2007 non-diabetic incident cohort after day 90

Analysis of centre variability in 1 year after 90 days survival

The one year after 90 day survival for the 2007 incident cohort is shown in figure 7.13 for each renal centre. The tables for these data and for 90 day survival are given in appendix 1 at the end of this chapter (tables 7.24 and 7.25). The age-adjusted individual centre survival for each of the last 9 years can also be found in appendix 1, table 7.26.

In the analysis of 2007 survival data, some of the smaller centres had wide confidence intervals (figure 7.13). This is addressed by including a larger cohort across several years, which will also assess sustained performance. Similar to previous years, this is shown as a rolling 4 year cohort, with the data in this report for the 4 year period 2004 to 2007. These data are presented as a funnel plot in figure 7.14. For any size of incident cohort (x-axis) one can identify whether any given survival rate (y-axis) falls within plus or minus 2 standard deviations (SDs) from the national mean (solid lines, 95% limits) or 3 SDs (dotted lines, 99.9% limits). Table 7.11 allows centres to be identified on this graph by finding the number of patients treated by the centre and then looking up this number on the x-axis.

There are 3 centres that fall between 2 and 3 standard deviations below average (Airdrie, Glasgow, Cardiff), 3 centres between 2 and 3 SDs above average (Kent,

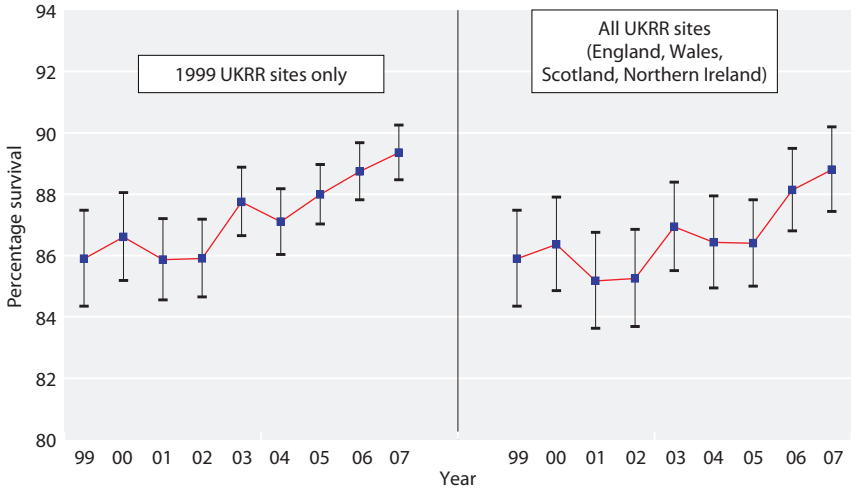

Fig. 7.12. Change in one-year after 90 day adjusted (age 60) survival, 1999–2007 Showing 95% confidence intervals

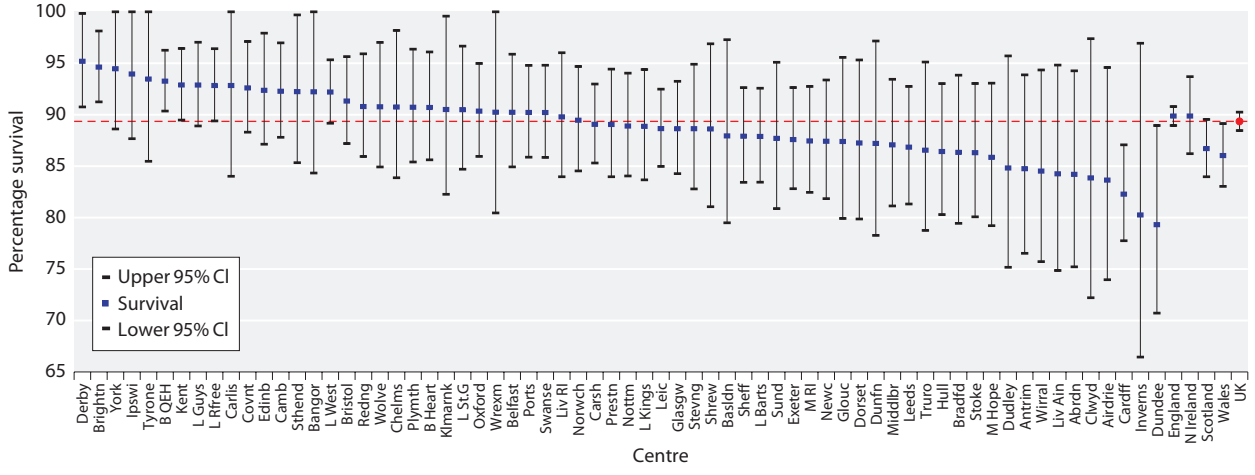

Fig. 7.13. Survival one-year after 90 days, adjusted to age 60, 2007 cohort

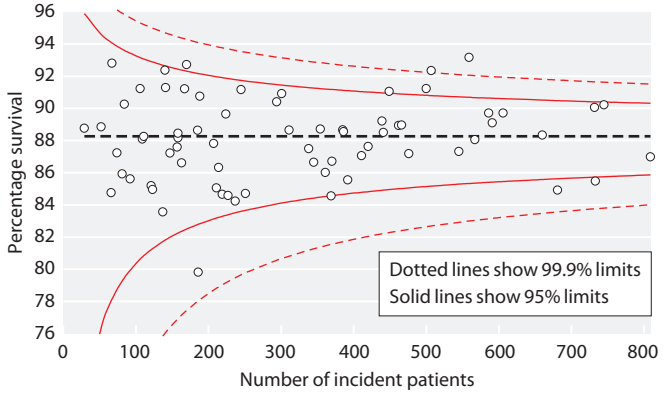

Fig. 7.14. Funnel plot for age adjusted 1 year after 90 days survival, 2004–2007 cohort

Cambridge and London Guys) and 2 centres above the 3 SDs above average (London Royal Free and London West). These data have not been adjusted for any patient related factor except age (i.e. not comorbidity, primary renal disease or ethnicity). This year a funnel plot for the 2007 1 year after 90 day survival is included (figure 7.15) and shows that both Airdrie and Glasgow centres are now close to the mean UK survival (table 7.26), indicating probable improvement in survival in the most recent cohort. Cardiff remains between the lower 2–3 SD limit, although one centre falling within this range would be expected by chance alone.

The 3 London centres within the upper 2–3 SDs (figure 7.14) could reflect the higher proportion of patients from ethnic minorities (associated with better

Table 7.11. Adjusted 1 year after 90 day survival, 2004–2007 incident cohort

Centre	N	1 year after 90 day survival %	Centre	N	1 year after 90 day survival %
Ulster	29	88.8	Redng	294	90.4
Newry	52	88.8	Belfast	301	90.9
D & Gall	66	84.8	Wolve	311	88.7
Tyrone	67	92.8	Covnt	338	87.5
Clwyd	74	87.2	Middlbr	345	86.7
Stoke	81	85.9	Norwch	354	88.7
L St G	84	90.3	Stevng	361	86.0
Liv Ain	92	85.6	Newc	369	84.6
Wrexm	106	91.2	Edinb	370	86.7
Antrim	109	88.1	Hull	385	88.7
Carlis	111	88.2	B Heart	386	88.6
Inverns	121	85.2	Swanse	392	85.5
Bangor	123	85.0	Exeter	411	87.1
Dunfn	137	83.6	Prestn	420	87.6
Sthend	140	92.4	Brightn	439	89.2
Basldn	141	91.3	M Hope	441	88.5
M RI	147	87.2	Camb	449	91.0
Klmarnk	157	87.6	L Kings	462	88.9
York	158	88.2	Nottm	466	89.0
Dudley	158	88.4	Liv RI	476	87.2
Chelms	163	86.6	L Guys	500	91.2
Ipswi	167	91.2	L Rfree	507	92.3
Kent	170	92.7	Ports	545	87.3
Shrew	185	88.6	L West	559	93.2
Airdrie	186	79.8	Leeds	567	88.1
Truro	188	90.7	Oxford	586	89.7
Dorset	207	87.8	Bristol	591	89.1
Sund	211	85.1	Sheff	606	89.7
Wirral	214	86.3	Carsh	660	88.3
Dundee	219	84.7	Glasgw	681	84.9
Glouc	224	89.6	L Barts	732	90.1
Abrdn	227	84.6	Cardff	733	85.5
Bradfd	237	84.2	B QEH	745	90.2
Derby	245	91.2	Leic	809	87.0
Plymth	251	84.7			

Data from centres with <20 incident patients are not shown (Derry, Doncaster)
*Data from London West excluded for 2004–2005

survival) in these centres, but this pattern is not seen in London Kings or other non-London centres with a high proportion of ethnic minority patients. These data have not been censored at transplantation, so the effect of differing centre rates of transplantation was not taken into account. Data for the London West centre only includes the 2006–2007 cohort, due to data problems in the previous years.

There are known regional differences in the life expectancy of the general population within the UK. Table 7.12 shows differences in life expectancy between the UK countries [5, 6]. The UKRR is investigating ways to adjust centre survival for the differences in the underlying population, although crude analysis does not demonstrate any apparent relationship at PCT level between age-adjusted survival on RRT and life expectancy (data not shown).

Analysis of the impact of adjustment for comorbidity on the 1 year after 90 day survival

Comorbidity returns to the UKRR have remained static (chapter 6), although with the recent 2009 mandation of these returns within the National Renal Dataset for England these returns should improve. Figure 7.16 shows the importance of adjusting patient survival for comorbidity. Using the combined incident cohort from

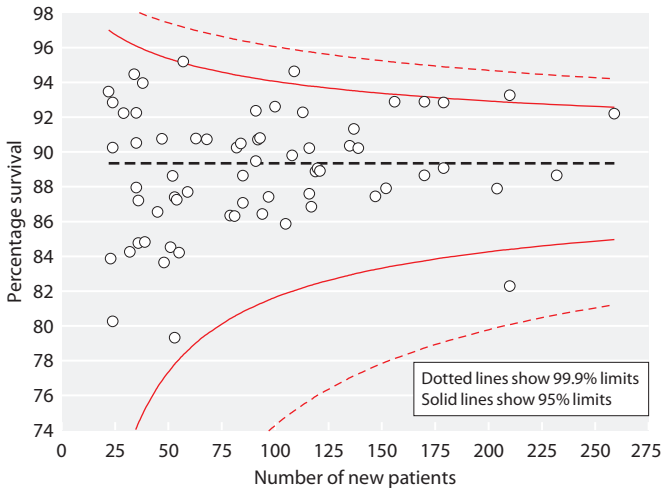

Fig. 7.15. Funnel plot for age adjusted 1 year after 90 days survival, 2007 cohort

2003–2007, 13 centres had returned comorbidity data for more than 85% of patients. Adjustment was first performed to age 60, then to the average distribution of primary diagnoses for all 13 centres. Further adjustment was then made to the average distribution of comorbidities present at these centres.

It can be seen that adjustment for age has the largest effect, with only minor differences within centres after adjustment for primary renal diagnosis; in a few centres, adjustment for co-morbidity has a noticeable effect on adjusted survival.

Table 7.12. Life expectancy in years in UK countries, 2005–2007 (source ONS)

	At birth		At age 65	
Country	Male	Female	Male	Female
England	77.7	81.8	17.5	20.2
Wales	76.8	81.2	17.1	19.8
Scotland	74.8	79.7	16.1	18.8
N Ireland	76.3	81.3	16.9	19.8
UK	**77.3**	**81.5**	**17.3**	**20.0**

Results of prevalent patient survival analyses

Table 7.13 shows the one year survival on dialysis, after censoring at the time of transplantation.

Table 7.14 gives the 2008 one-year death rate for dialysis patients in each UK country. The median age of prevalent patients in Northern Ireland and Wales was higher than those in England and this probably explains the higher death rate in these two countries.

Table 7.15 gives the 2008 one-year survival for transplanted patients.

Figure 7.17 shows the one year survival of prevalent dialysis patients in different age groups on 1 January 2008.

One year survival of prevalent dialysis patients by centre

The age-adjusted one year survival of dialysis patients in each centre is shown in table 7.13 and is illustrated in

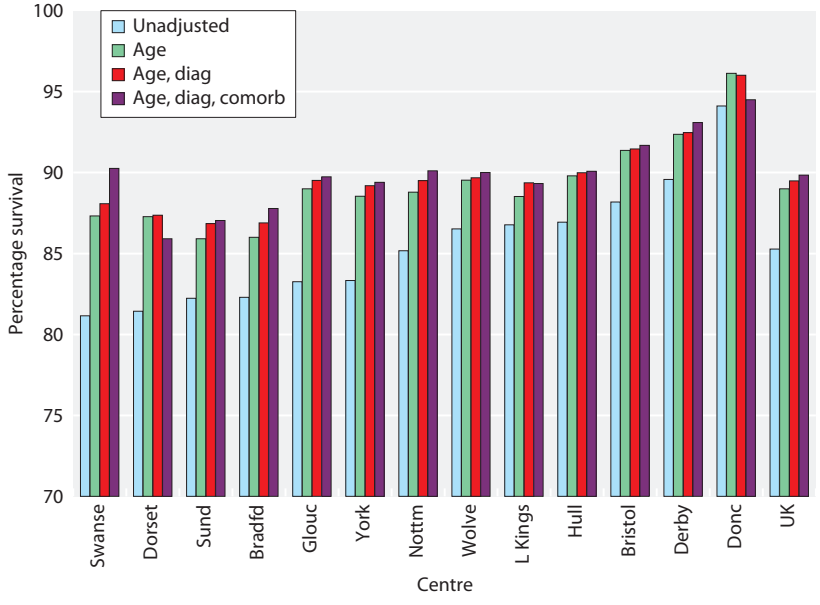

Fig. 7.16. Change in 1 year after 90 day survival after adjustment for age, primary renal diagnosis and comorbidity, 2003–2007 cohort

Table 7.13. Prevalent 1 year KM survival of dialysis patients in 2008, censoring at transplantation (adjusted for age 60)

Centre	Number in centre	Adjusted 1 year survival	Lower 95% CI	Upper 95% CI	Centre	Number in centre	Adjusted 1 year survival	Lower 95% CI	Upper 95% CI
Abrdn	220	89.7	86.1	93.4	L Rfree	699	91.3	89.3	93.2
Airdrie	165	85.5	80.4	90.9	L St G	223	93.9	91.2	96.7
Antrim	144	89.2	85.1	93.4	L West	1,345	90.5	89.1	92.0
B Heart	391	90.5	88.0	93.1	Leeds	587	87.6	85.2	90.1
B QEH	870	88.5	86.6	90.5	Leic	841	89.5	87.6	91.4
Bangor	91	88.9	83.6	94.5	Liv Ain	109	88.9	83.7	94.5
Basldn	155	93.1	89.7	96.5	Liv RI	485	87.5	84.7	90.4
Belfast	313	87.2	83.8	90.7	M Hope	442	87.1	84.1	90.2
Bradfd	207	88.0	84.0	92.2	M RI	475	86.6	83.7	89.7
Brightn	400	89.5	87.0	92.2	Middlbr	293	87.1	83.7	90.6
Bristol	514	87.2	84.7	89.7	Newc	295	88.0	84.6	91.5
Camb	455	92.9	90.8	95.1	Newry	96	90.5	85.5	95.7
Cardff	633	82.7	80.0	85.4	Norwch	323	90.8	88.2	93.5
Carlis	92	86.6	80.6	93.1	Nottm	485	88.4	85.8	91.0
Carsh	729	90.1	88.1	92.0	Oxford	538	88.4	86.0	90.9
Chelms	134	84.3	79.3	89.8	Plymth	170	88.3	84.3	92.5
Clwyd	83	87.6	81.6	94.1	Ports	470	88.7	86.1	91.3
Covnt	360	87.3	84.3	90.5	Prestn	467	90.4	87.9	92.9
D & Gall	66	85.6	78.7	93.1	Redng	283	89.4	86.3	92.6
Derby	274	90.9	87.9	94.0	Sheff	613	88.8	86.5	91.1
Derry	55	92.3	86.6	98.4	Shrew	191	88.9	84.9	93.1
Donc	60	93.4	88.0	99.1	Stevng	447	92.9	90.9	95.0
Dorset	194	89.6	86.0	93.3	Sthend	132	90.3	86.1	94.6
Dudley	168	88.8	84.6	93.3	Stoke	333	87.3	84.0	90.6
Dundee	197	84.2	79.9	88.7	Sund	158	87.6	82.9	92.6
Dunfn	137	90.5	86.2	95.1	Swanse	352	89.5	86.9	92.3
Edinb	347	88.2	85.0	91.6	Truro	172	90.3	86.8	93.9
Exeter	351	85.5	82.4	88.7	Tyrone	85	93.4	88.8	98.2
Glasgw	685	87.9	85.7	90.2	Ulster	83	92.0	87.5	96.9
Glouc	185	87.3	83.4	91.3	Wirral	201	88.6	84.7	92.6
Hull	384	86.9	83.9	90.0	Wolve	297	93.1	90.6	95.7
Inverns	126	89.0	84.2	94.1	Wrexm	127	86.0	80.9	91.5
Ipswi	134	91.5	87.4	95.9	York	138	88.2	83.6	92.9
Kent	347	86.5	83.3	89.8	**England**	**19,350**	**89.1**	**88.6**	**89.6**
Klmarnk	171	88.8	84.7	93.1	**N Ireland**	**776**	**89.6**	**87.7**	**91.6**
L Barts	803	88.7	86.5	90.9	**Scotland**	**2,114**	**87.8**	**86.5**	**89.1**
L Guys	523	90.1	87.7	92.6	**Wales**	**1,286**	**85.8**	**84.0**	**87.5**
L Kings	408	88.4	85.4	91.4	**UK***	**22,831**	**88.8**	**88.4**	**89.3**

* Colchester is the only UK renal centre excluded from this analysis as they only started sending in data in 2008

figures 7.18 and 7.19, dividing the data into those patients aged <65 years and those 65 years and over. Figure 7.20 shows the age adjusted data (60 years) and in figure 7.21 as a funnel plot. The solid lines show the 2 standard deviation limits (95% limits) and the dotted lines the limits for 3 standard deviations (99.9% limits). With over 70 centres included, it would be expected by chance that 3 centres would fall outside the 95% (1 in 20) confidence limits. Figure 7.21 shows 0 centres fall in the lower 2–3 SD interval (compared with 4 in 2007) and 5 in the upper 2–3 SD interval (Basildon, London St George's, Wolverhampton, London Royal Free, London West). Two centres are just above the 3 SD survival (Cambridge, Stevenage) and 1 centre is below the 3 SD survival (Cardiff); reasons for this change are being investigated.

Table 7.14. One-year death rate per 1,000 prevalent dialysis patient years in 2008 by country

	England	N Ireland	Scotland	Wales
Death rate	149	149	164	216
95% CI	144–155	122–180	146–184	189–245
Median age	64.1	66.3	63.3	66.4

Table 7.15. One-year survival of prevalent RRT patients in the UK by modality (unadjusted unless stated otherwise)

Patient group	Patients	Deaths	KM survival	KM 95% CI
Transplant patients 2008				
Censored at dialysis	19,166	443	97.7	97.4–97.9
Not censored at dialysis	19,166	475	97.5	97.3–97.7
Dialysis patients 2008				
All	23,526	3,230	85.7	85.3–86.2
All adjusted age = 60	23,526	3,230	88.8	88.4–89.3
2 year survival – dialysis patients 2007				
All 1/1/2007 (2 year)	22,332	5,567	73.1	72.5–73.7
Dialysis patients 2008				
All age <65	12,137	929	91.8	91.3–92.3
All age 65+	11,389	2,301	79.6	78.9–80.3
Non-diabetic <55	6,023	257	95.3	94.7–95.8
Non-diabetic 55–64	3,482	331	90.0	89.0–91.0
Non-diabetic 65–74	4,410	645	85.1	84.0–86.2
Non-diabetic 75+	4,478	1,114	75.1	73.8–76.3
Non-diabetic <65	9,505	588	93.3	92.8–93.8
Diabetic <65	2,133	310	84.7	83.1–86.2
Non-diabetic 65+	8,888	1,759	80.0	79.2–80.8
Diabetic 65+	2,059	446	78.2	76.3–79.9

KM = Kaplan–Meier survival
Cohorts of patients alive on 1/1/2008 unless indicated otherwise

The 2008, one year death rate in prevalent dialysis patients by age band

The death rates on dialysis by age band are shown in figure 7.22. The younger patients included in this analysis are a selected higher risk group, as the similar aged transplanted patients have been excluded. The increase in death rate is non-linear with age: with a 10 year increase in age in the younger patients, the death rate increased by about 20 per 1,000 patient years compared with an increase of 100 per 1,000 patient years in the older age group. When compared with data from the USRDS report 2007 (the most recent report in which this analysis is available), the death rates for UK dialysis patients were lower than dialysis patients in the USA across all age bands (figure 6.12 USRDS) [7].

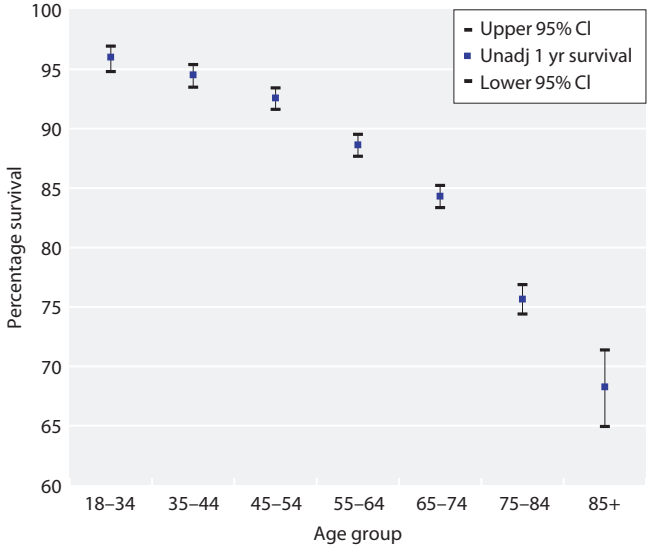

Fig. 7.17. One year survival of prevalent dialysis patients in different age groups, 2008

One year survival of prevalent dialysis patients by UK country from 1997–2008

All UK countries except Wales are showing a continued improvement in the age-adjusted survival on dialysis (figure 7.23). The change in prevalent survival by centre over the years 2000 to 2008 is shown in this chapter appendix 1, table 7.27.

One year survival of prevalent dialysis patients with a primary diagnosis of diabetes from 2000–2008

The UK has shown a continued improvement in the age-adjusted one year survival of prevalent patients whose primary renal diagnosis was diabetes, although this seems to have plateaued in 2008 (table 7.16).

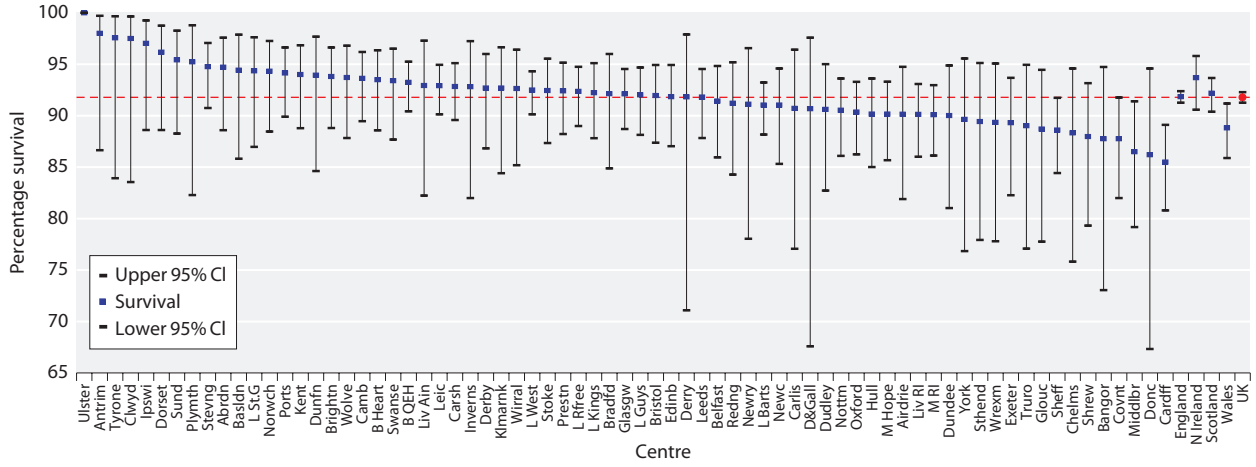

Fig. 7.18. One year survival of prevalent dialysis patients aged under 65 in each centre, 2008

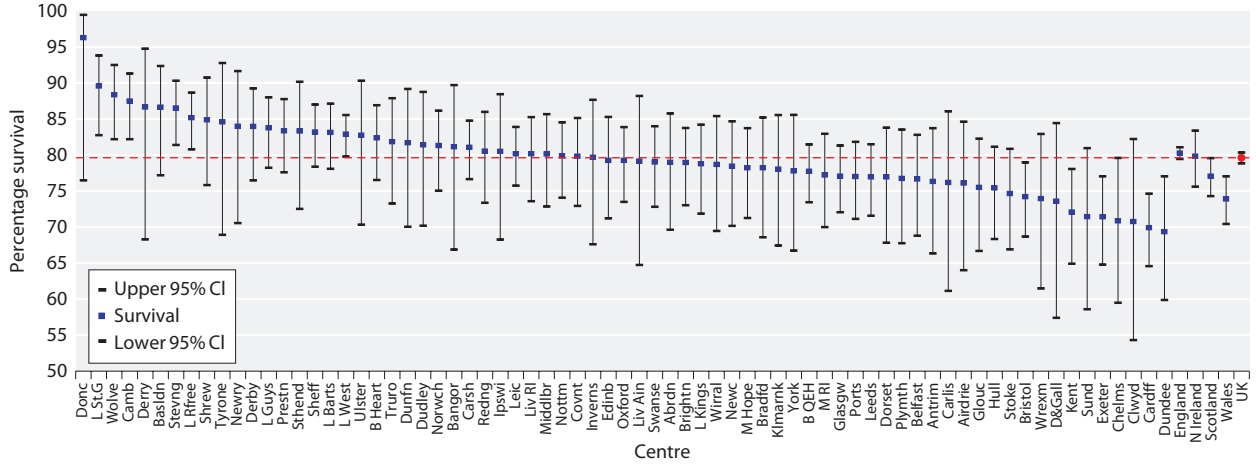

Fig. 7.19. One year survival of prevalent dialysis patients aged 65 and over in each centre, 2008

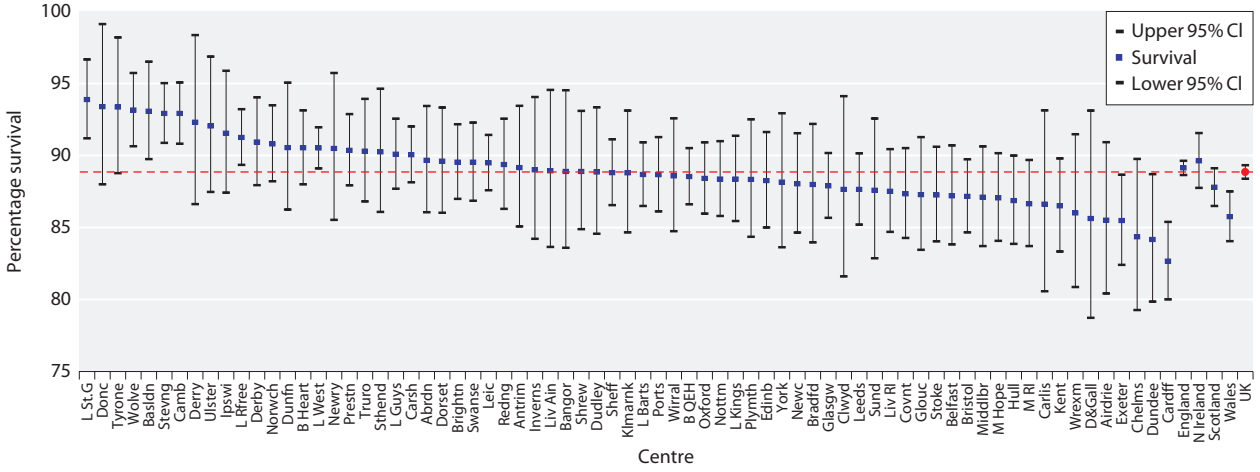

Fig. 7.20. One year survival of prevalent dialysis patients in each centre adjusted to age 60, 2008

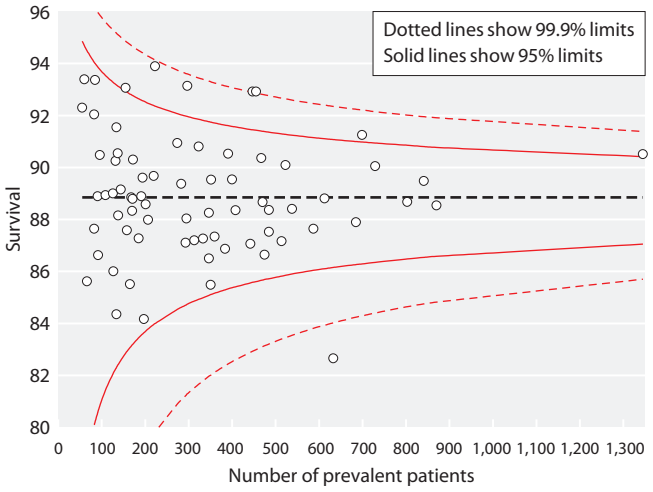

Fig. 7.21. One year funnel plot of prevalent dialysis patients in each centre adjusted to age 60, 2008

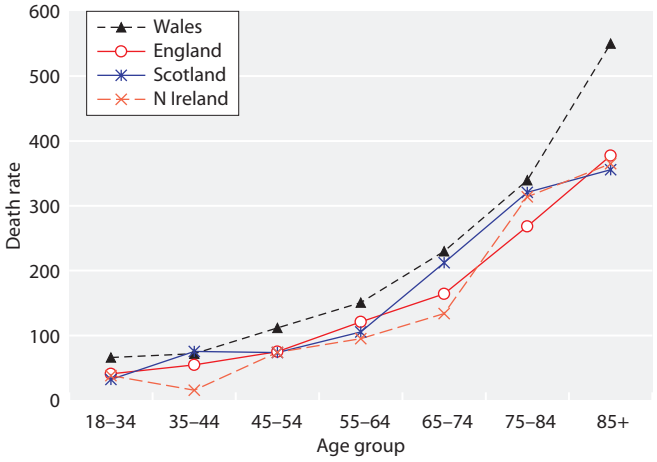

Fig. 7.22. One year death rate per 1,000 patient years by UK country and age group for prevalent dialysis patients

Death rate on RRT compared with the UK general population

The death rate compared to the general population is shown in table 7.17. Figure 7.24 shows that the relative risk of death on RRT decreased with age from 28.6 times that of the general population at age 30 to 34 to 2.7 at age 85+. With the reduction in rates of death on RRT over the last 10 years the age-standardised mortality ratios compared with the general population is falling (7.7 in 2001, 6.9 in 2007).

Results of analyses on causes of death

Data completeness

The data completeness is shown in table 7.18. Overall it is less than 50% and has fallen in recent years, largely

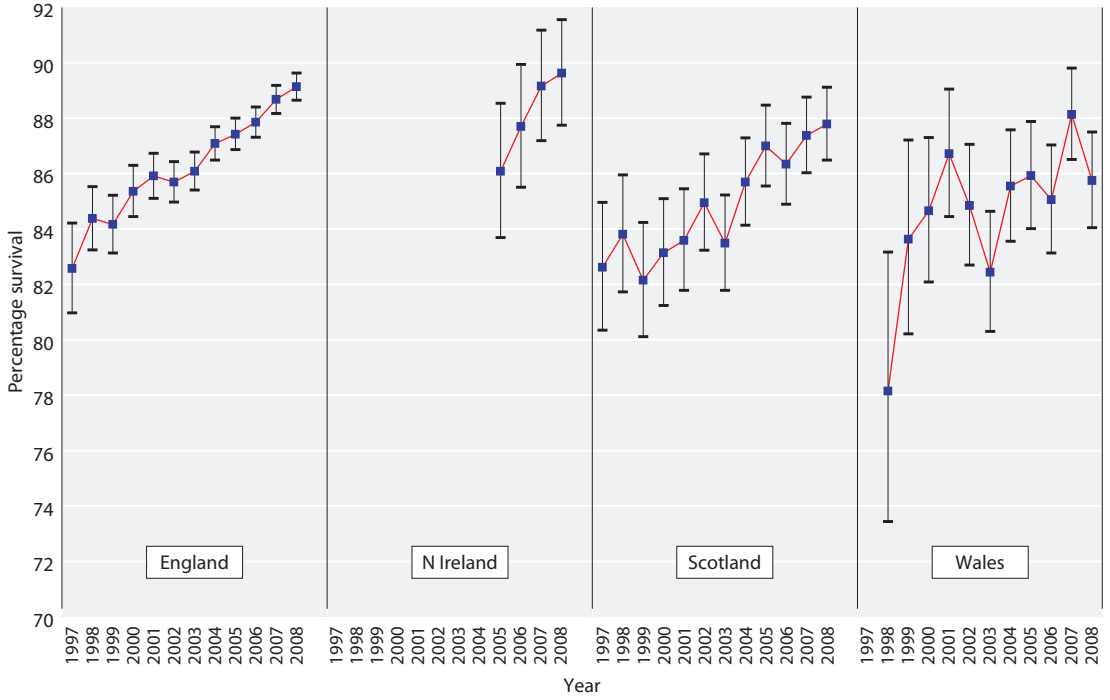

Fig. 7.23. Serial 1 year survival for prevalent dialysis patients by UK country from 1997–2008 adjusted to age 60

Table 7.16. Serial 1 year survival of prevalent dialysis patients with a primary diagnosis of diabetes from 2000–2008

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
1 year survival	76.5	77.1	78.4	77.7	80.6	82.3	81.5	84.2	83.0

Table 7.17. Death rate by age for all prevalent RRT patients on 1/1/2008, compared with the general population and with previous analyses in the 1998–2001 cohort

Age group	UK population mid 2007 (thousands)	UK deaths	Death rate per 1,000 population	Expected number of deaths in UK RR population	Renal Registry deaths	RR deaths per 1,000 prev RRT patients	Observed: expected ratio 2008	Observed: expected ratio 1998–2001
20–24	4,141	2,013	0.5	0	12	13.4	27.5	41.1
25–29	3,966	2,220	0.6	1	18	12.7	22.7	41.8
30–34	3,893	3,066	0.8	2	42	22.6	28.6	31.2
35–39	4,534	4,705	1.0	3	64	21.1	20.3	26.0
40–44	4,714	7,116	1.5	6	106	26.7	17.7	22.6
45–49	4,250	9,749	2.3	10	132	30.3	13.2	19.0
50–54	3,730	13,783	3.7	16	211	47.6	12.9	12.8
55–59	3,748	21,652	5.8	26	300	67.4	11.7	10.1
60–64	3,483	31,368	9.0	42	413	87.9	9.8	10.4
65–69	2,697	39,509	14.6	61	523	124.7	8.5	7.9
70–74	2,360	55,514	23.5	90	637	166.0	7.1	7.2
75–79	1,972	79,911	40.5	120	727	245.0	6.0	5.3
80–84	1,452	102,399	70.5	116	527	321.4	4.6	4.0
85+	1,298	195,076	150.3	97	266	411.0	2.7	3.0
Total	**46,238**	**568,081**	**12.3**	**591**	**3,978**	**93.8**	**6.7**	**7.7**

due to low completeness from a number of centres that have only recently started submitting data to the UKRR. Interpretation of patterns of cause of death must be cautious as it is not known whether non-return is associated with cause. Some centres (e.g. Derby, Nottingham and Swansea) consistently achieved a very high rate of data return for cause of death, because a process is in place to make sure that these data are entered. The Scottish centres overall have the highest rate of data return. Several centres have shown huge improvement in data returns but others that were reporting these data in previous years appear to have discontinued collection.

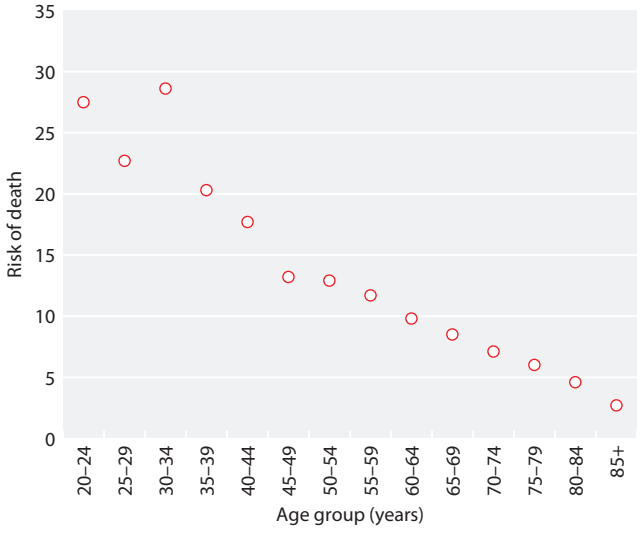

Fig. 7.24. Relative risk of death in all prevalent RRT patients in 2008 compared with the UK general population in 2007

Causes of death in incident RRT patients

Causes of death within the first 90 days

Treatment withdrawal and infection (table 7.19) were slightly more common as a cause of death within the first 90 days within the patient group aged ⩾65 years when compared with the younger age group.

Causes of death within one year after 90 days

Treatment withdrawal as a cause of death (table 7.20) again was more common in the older age group. Cardiac disease accounted for 25% of all deaths and overall cardiovascular disease for 31%. Infection was still an important cause of nearly 1 in 5 deaths.

Table 7.18. Percentage completeness of EDTA causes of death for incident patients by centre and year of starting RRT

Centre	2000	2001	2002	2003	2004	2005	2006	2007	2008
Abrdn	28.0	31.3	26.5	16.1	10.0	16.7	12.5	80.0	60.0
Airdrie	37.0	32.6	30.8	30.3	48.3	34.8	47.6	66.7	100.0
Antrim						11.1	0.0	7.1	0.0
B Heart	75.0	83.3	76.6	70.0	75.9	88.1	88.4	94.1	100.0
B QEH					39.8	2.6	3.6	8.8	0.0
Bangor			50.0	22.2	54.2	48.0	45.5	18.2	33.3
Basldn				47.8	60.9	37.5	54.5	40.0	100.0
Belfast						24.5	11.1	40.9	50.0
Bradfd		77.5	88.6	91.8	82.9	92.9	92.6	100.0	87.5
Brightn					4.3	3.6	4.7	0.0	0.0
Bristol	50.0	49.0	65.0	71.1	75.5	56.6	70.4	51.4	55.6
Camb		0.0	0.0	0.0	0.0	0.0	7.7	0.0	0.0
Cardff	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0
Carlis	33.0	28.6	61.1	60.9	72.2	81.8	66.7	75.0	100.0
Carsh	3.6	1.2	0.0	1.0	0.0	0.0	0.0	0.0	0.0
Chelms					51.6	87.5	77.3	90.0	50.0
Clwyd			12.5	0.0	11.1	6.7	62.5	40.0	100.0
Colchr									0.0
Covnt	21.0	9.3	14.3	2.4	0.0	0.0	0.0	0.0	0.0
D & Gall	94.0	72.2	91.7	83.3	72.7	84.6	90.0	100.0	0.0
Derby	39.0	41.0	0.0	54.3	70.6	92.3	85.0	88.9	90.9
Derry							0.0	0.0	100.0
Donc								100.0	50.0
Dorset				30.0	71.0	81.0	71.4	62.5	91.7
Dudley	30.0	4.8	33.3	0.0	0.0	0.0	0.0	0.0	0.0
Dundee	74.0	72.2	59.6	56.4	59.0	29.2	15.0	20.0	20.0
Dunfn	81.0	84.6	78.9	61.5	69.2	60.9	53.8	37.5	0.0
Edinb	75.0	58.5	53.2	39.6	51.0	46.5	55.6	73.3	100.0
Exeter	29.0	27.0	20.3	27.4	16.1	11.1	8.6	0.0	0.0
Glasgw	51.0	57.5	53.4	53.5	44.1	51.1	62.7	84.4	85.7
Glouc	53.0	70.0	51.6	50.0	60.0	52.0	14.3	58.8	40.0
Hull	74.0	75.0	73.4	58.7	71.0	69.1	55.6	69.6	42.9
Inverns	16.0	4.3	6.3	10.0	5.9	28.6	25.0	37.5	100.0
Ipswi			20.7	23.8	30.4	15.4	50.0	0.0	0.0
Kent								44.4	18.2
Klmarnk	0.0	10.0	28.6	23.8	22.2	21.1	16.7	80.0	50.0
L Barts					76.5	84.2	78.3	77.1	83.3
L Guys	0.0	5.5	1.4	3.1	0.0	2.8	0.0	5.3	0.0
L Kings			64.4	72.1	74.1	84.4	87.5	91.7	71.4
L Rfree						2.9	0.0	0.0	0.0
L St G								30.8	33.3
L West			53.4	46.0	42.2	11.5	1.4	5.0	3.8
Leeds	50.0	62.0	57.8	47.7	54.5	52.1	46.7	13.8	18.8
Leic	71.0	76.9	81.5	83.5	82.2	77.6	69.5	55.1	77.3
Liv Ain						45.5	63.6	83.3	62.5
Liv RI		77.8	72.2	72.1	68.8	75.4	76.5	78.9	57.1
M Hope				0.0	0.0	0.0	3.2	0.0	0.0
M RI								0.0	0.0
Middlbr	77.0	78.0	67.6	55.6	52.7	65.8	31.0	25.0	7.7
Newc			40.4	25.6	35.0	55.0	44.4	50.0	40.0
Newry						45.5	0.0	0.0	0.0
Norwch					25.5	19.0	23.3	16.1	23.1
Nottm	93.0	97.5	96.6	95.6	96.4	92.1	88.2	92.3	100.0
Oxford	8.6	7.9	6.5	3.8	13.9	5.3	0.0	0.0	0.0
Plymth	45.0	38.0	50.0	56.5	46.5	43.3	50.0	55.0	40.0
Ports		25.8	20.4	18.4	15.3	7.0	17.7	2.7	7.1

Table 7.18. Continued

Centre	2000	2001	2002	2003	2004	2005	2006	2007	2008
Prestn	70.0	71.8	64.1	64.6	58.1	52.5	51.3	51.9	27.3
Redng	67.0	61.0	76.0	85.7	95.7	70.0	90.5	89.5	81.8
Sheff	57.0	43.5	54.8	29.6	2.7	3.1	0.0	0.0	0.0
Shrew					53.3	37.5	31.3	30.8	25.0
Stevng	25.0	42.7	73.6	41.7	38.7	54.3	54.1	33.3	0.0
Sthend	39.0	30.8	30.4	35.7	18.2	11.8	0.0	60.0	100.0
Stoke								28.0	10.0
Sund	47.0	58.3	61.5	50.0	44.4	71.0	60.9	58.8	100.0
Swanse	83.0	87.0	92.0	94.1	90.4	89.1	95.7	100.0	91.7
Truro		43.5	37.5	40.0	0.0	0.0	0.0	25.0	0.0
Tyrone						45.5	66.7	50.0	0.0
Ulster						75.0	75.0	100.0	0.0
Wirral			54.8	76.7	65.6	67.7	66.7	81.8	33.3
Wolve	91.0	90.6	83.6	82.7	75.5	55.3	54.5	60.0	55.6
Wrexm	9.8	0.0	10.5	5.0	11.8	18.2	28.6	50.0	50.0
York	33.0	44.0	58.7	63.6	61.5	52.4	45.0	62.5	55.6
England	**49.0**	**48.9**	**49.3**	**44.8**	**44.4**	**41.4**	**38.3**	**35.4**	**31.5**
N Ireland						**29.0**	**23.5**	**30.2**	**23.1**
Scotland	**53.0**	**50.4**	**48.1**	**43.3**	**42.9**	**41.6**	**46.2**	**63.6**	**71.8**
Wales	**26.0**	**32.7**	**37.5**	**37.1**	**30.9**	**31.2**	**37.9**	**33.9**	**46.5**
UK	**48.0**	**47.8**	**48.0**	**43.9**	**43.2**	**40.2**	**38.8**	**37.7**	**36.6**

Blank cells, data not available for that year

Table 7.19. Cause of death in the first 90 days for incident patients by age, 2000–2007

	All age groups		<65 years		⩾65 years	
Cause of death	Number of deaths	%	Number of deaths	%	Number of deaths	%
Cardiac disease	437	29	106	32	331	28
Cerebrovascular disease	78	5	18	5	60	5
Infection	271	18	43	13	228	19
Malignancy	122	8	32	10	90	8
Treatment withdrawal	236	15	35	10	201	17
Other	145	9	32	10	113	9
Uncertain	244	16	69	21	175	15
Total	**1,533**		**335**		**1,198**	
No cause of death data	1,847		403		1,444	

Table 7.20. Cause of death in 1 year after 90 days for incident patients by age, 2000–2007

	All age groups		<65 years		⩾65 years	
Cause of death	Number of deaths	%	Number of deaths	%	Number of deaths	%
Cardiac disease	609	25	189	27	420	24
Cerebrovascular disease	147	6	39	6	108	6
Infection	454	18	131	19	323	18
Malignancy	250	10	89	13	161	9
Treatment withdrawal	395	16	57	8	338	19
Other	172	7	61	9	111	6
Uncertain	455	18	130	19	325	18
Total	**2,482**		**696**		**1,786**	
No cause of death data	3,118		892		2,226	

Table 7.21 Cause of death in prevalent RRT patients by age and modality on 1/1/2008

Cause of death	All age groups		<65 years		⩾65 years	
	Number of deaths	%	Number of deaths	%	Number of deaths	%
Cardiac disease	381	24	341	25	40	21
Cerebrovascular disease	68	4	55	4	13	7
Infection	266	17	235	17	31	16
Malignancy	135	9	96	7	39	21
Treatment withdrawal	220	14	211	15	9	5
Other	110	7	89	6	21	11
Uncertain	388	25	352	26	36	19
Total	**1,568**		**1,379**		**189**	
No cause of death data	2,412		2,047		365	

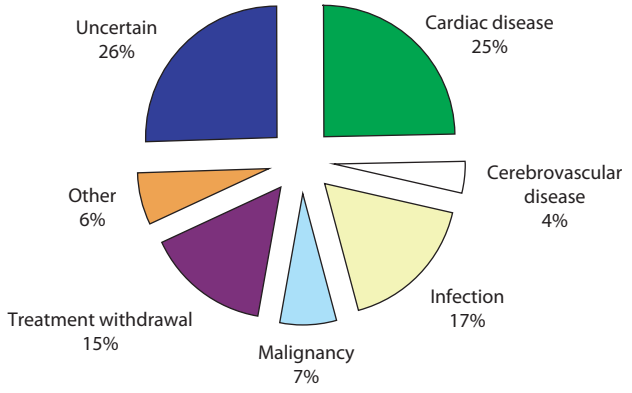

Fig. 7.25. Frequency of causes of death for prevalent dialysis patients in 2008

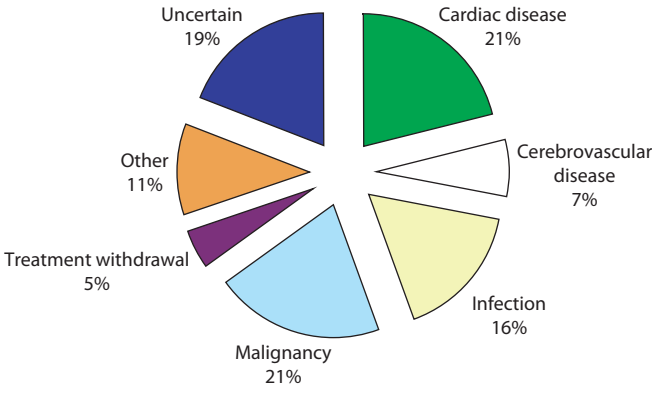

Fig. 7.26. Frequency of causes of death for prevalent transplant patients in 2008

Causes of death in prevalent RRT patients in 2008

Causes of death in prevalent RRT patients in 2008 by modality and age

Table 7.21 and figures 7.25 and 7.26 show the frequency of the causes of death for both prevalent dialysis and transplant patients. In tables 7.22 and 7.23 a comparison has been made with data available from the ANZDATA Registry Report [8]. The Australian Registry appears to have many fewer cases of 'uncertain' causes of death; amongst dialysis patients

Table 7.22. Cause of death in prevalent transplanted patients by age on 1/1/2008

Cause of death in transplanted patients	All age groups		<55 years		⩾55 years		ANZdata*
	Number of deaths	%	Number of deaths	%	Number of deaths	%	%
Cardiac disease	40	21	12	24	28	20	30
Cerebrovascular disease	13	7	3	6	10	7	7
Infection	31	16	5	10	26	19	15
Malignancy	39	21	11	22	28	20	32
Treatment withdrawal	9	5	4	8	5	4	1
Other	21	11	6	12	15	11	15
Uncertain	36	19	10	20	26	19	0
Total	**189**		**51**		**138**		
No cause of death data	365		92		273		

* ANZDATA Registry Report 2008

Table 7.23. Cause of death in prevalent dialysis patients by age on 1/1/2008

Cause of death in transplanted patients	All age groups		<55 years		⩾55 years		ANZdata*
	Number of deaths	%	Number of deaths	%	Number of deaths	%	%
Cardiac disease	341	25	120	30	221	23	35
Cerebrovascular disease	55	4	16	4	39	4	9
Infection	235	17	59	15	176	18	10
Malignancy	96	7	29	7	67	7	7
Treatment withdrawal	211	15	34	9	177	18	34
Other	89	6	30	8	59	6	5
Uncertain	352	26	109	27	243	25	1
Total	**1,379**		**397**		**982**		
No cause of death data	2,047		601		1,446		

* ANZDATA Registry Report 2008

withdrawal of treatment was reported more frequently in ANZDATA, but this apparent difference may be the result of differences in classification of patients whose treatment was withdrawn in the context of another illness.

Figure 7.27 contrasts the differences in frequency of these causes, between the 2 modalities within the UK (figures 7.25, 7.26). These data are neither age-adjusted nor adjusted for differences in the comorbidity between the 2 groups. Cardiac disease as a cause of death was less common in the transplanted patients as these were a pre-selected low risk group of patients. Treatment withdrawal still occurs in the transplanted group, in patients who choose not to restart dialysis when their renal transplant fails.

Table 7.22 shows there were no differences in the causes of death between transplanted patients aged <55 or ⩾55 years. Table 7.23 shows these data for dialysis patients.

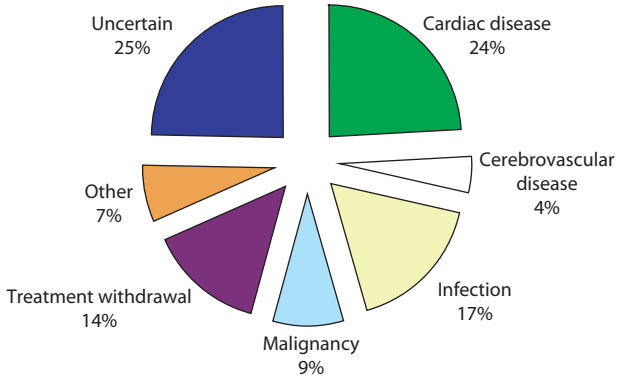

Fig. 7.27. Frequency of causes of death for all prevalent patients in 2008

Expected life years remaining on RRT

For the statistical methodology for this analysis please refer to the methodology section at the start of this chapter.

Figure 7.28 shows the median remaining life years expected by age band. All incident patients starting RRT from 1997 to 2007 have been included in this analysis and the projected median survival will be different for low risk (e.g. polycystic kidney disease with a transplant) vs. high risk (diabetic with previous myocardial infarction on dialysis) patients even within the same age band.

Conflict of interest: none

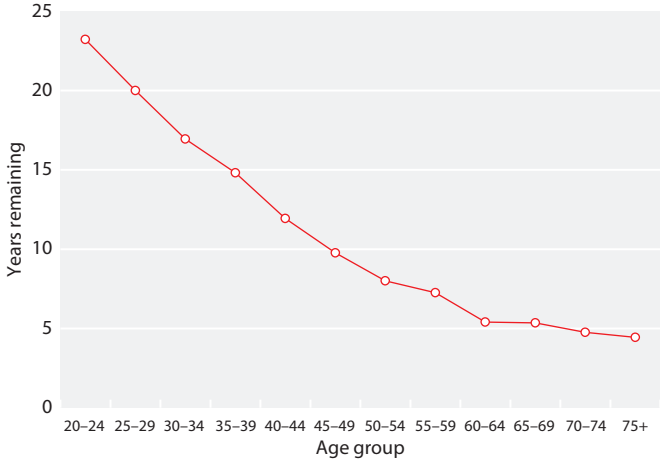

Fig. 7.28. Median remaining life years on RRT by age band

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5 General Register Office for Scotland; 2005 Annual Review; Chapter 1 http://www.gro-scotland.gov.uk/statistics/library/annrep/rgs-annual-review-2005/chapter-1/chapter-1-demographic-overview-deaths/deaths-part-1.html#variationsinmortalitylevelswithinscotland
6 Office for National Statistics http://www.statistics.gov.uk
7 US Renal Data System, USRDS 2007 Annual Report Volume 1, Chapter 6 www.usdrs.org/atlas.htm
8 Anzdata Report 2008 http://www.anzdata.org.au/v1/report_2008.html

Appendix 1: Survival tables

Table 7.24. One-year after 90-day incident survival by centre for 2007, unadjusted and adjusted to age 60

Centre	Unadjusted 1 yr after 90 d survival	Adjusted 1 yr after 90 d survival	Adjusted 1 yr after 90 d 95% CI
Abrdn	82.5	84.2	75.2–94.3
Airdrie	82.2	83.6	74.0–94.6
Antrim	72.2	84.8	76.5–93.9
B Heart	87.5	90.7	85.6–96.1
B QEH	90.8	93.3	90.4–96.3
Bangor	88.3	92.2	84.3–100.0
Basldn	82.4	87.9	79.5–97.3
Belfast	86.5	90.2	84.9–95.9
Bradfd	84.2	86.3	79.4–93.8
Brightn	91.5	94.6	91.2–98.1
Bristol	88.5	91.3	87.2–95.6
Camb	90.9	92.3	87.8–97.0
Cardff	76.8	82.3	77.8–87.1
Carlis	91.7	92.8	84.0–100.0
Carsh	83.4	89.1	85.3–93.0
Chelms	85.5	90.7	83.9–98.2
Clwyd	77.4	83.9	72.2–97.4
Covnt	89.7	92.6	88.3–97.1
Derby	93.0	95.2	90.8–99.8
Dorset	82.7	87.3	79.9–95.3
Dudley	82.1	84.8	75.2–95.7
Dundee	69.8	79.3	70.7–89.0
Dunfn	82.9	87.2	78.3–97.2
Edinb	92.2	92.4	87.1–97.9
Exeter	81.0	87.6	82.8–92.6
Glasgw	86.9	88.6	84.3–93.2
Glouc	81.0	87.4	79.9–95.6
Hull	83.7	86.4	80.3–93.0
Inverns	78.3	80.3	66.4–96.9
Ipswi	91.6	94.0	87.7–100.0
Kent	90.9	92.9	89.5–96.4
Klmarnk	88.6	90.5	82.3–99.6
L Barts	87.7	87.9	83.4–92.6
L Guys	92.4	92.9	88.9–97.0
L Kings	87.0	88.9	83.7–94.4
L Rfree	91.3	92.8	89.4–96.4
L St G	88.4	90.5	84.7–96.7
L West	90.9	92.2	89.2–95.3
Leeds	84.1	86.8	81.3–92.7
Leic	85.8	88.6	85.0–92.5
Liv Ain	75.0	84.3	74.9–94.8
Liv RI	89.5	89.8	84.0–96.0
M Hope	86.0	85.9	79.2–93.1
M RI	86.0	87.4	82.4–92.7
Middlbr	81.7	87.1	81.1–93.4
Newc	83.5	87.4	81.8–93.4
Norwch	83.5	89.5	84.5–94.7
Nottm	85.6	88.9	84.0–94.0
Oxford	87.7	90.3	85.9–95.0
Plymth	85.2	90.7	85.4–96.4
Ports	87.1	90.2	85.9–94.8
Prestn	87.1	89.0	84.0–94.4
Redng	86.8	90.8	85.9–95.9
Sheff	83.5	87.9	83.4–92.6
Shrew	86.1	88.6	81.1–96.9
Stevng	85.7	88.6	82.8–94.9
Sthend	88.3	92.2	85.3–99.7
Stoke	81.0	86.3	80.1–93.0
Sund	83.0	87.7	80.9–95.1
Swanse	84.9	90.2	85.8–94.8
Truro	79.0	86.5	78.8–95.1
Tyrone	90.9	93.5	85.5–100.0
Wirral	81.2	84.5	75.7–94.3
Wolve	87.3	90.8	84.9–97.0
Wrexm	85.6	90.2	80.5–100.0
York	91.2	94.5	88.6–100.0
England	**86.9**	**89.9**	**89.0–90.8**
N Ireland	**84.9**	**89.9**	**86.2–93.7**
Scotland	**84.4**	**86.7**	**84.0–89.5**
Wales	**80.4**	**86.0**	**83.0–89.1**
UK	**86.2**	**89.3**	**88.5–90.2**

Excluded: Colchester (contributed data from 2008 onwards), Dumfries & Galloway, Derry, Doncaster, Newry and Ulster all due to <20 patients.

Table 7.25. Ninety day incident survival by centre for 2007, unadjusted and adjusted to age 60

Centre	Unadjusted 90 d survival	Adjusted 90 d survival	Adjusted 90 d 95% CI
Abrdn	98.2	98.6	96.0–100.0
Airdrie	96.0	96.9	92.8–100.0
B Heart	93.9	96.0	92.9–99.2
B QEH	95.0	96.7	94.8–98.7
Bangor	80.6	88.9	81.6–97.0
Basldn	92.3	95.4	90.5–100.0
Belfast	93.2	95.8	92.6–99.2
Bradfd	90.8	93.0	88.5–97.8
Brightn	93.2	96.3	93.7–98.9
Bristol	89.0	92.8	89.5–96.2
Camb	90.4	92.7	88.8–96.8
Cardff	95.5	97.1	95.3–98.9
Carlis	92.3	94.2	86.9–100.0
Carsh	93.8	96.5	94.5–98.5
Chelms	92.2	95.5	91.2–99.9
Covnt	90.9	94.1	90.6–97.8
Derby	93.4	96.1	92.4–99.9
Dorset	91.5	94.6	90.1–99.3
Dundee	86.9	93.0	88.4–97.9
Dunfn	97.3	98.3	95.1–100.0
Edinb	96.8	97.1	94.0–100.0
Exeter	93.5	96.5	94.1–98.9
Glasgw	89.9	92.6	89.4–95.9
Glouc	93.0	96.3	92.7–99.9
Hull	96.0	97.0	94.1–99.9
Inverns	92.3	94.0	86.6–100.0
Ipswi	97.4	98.4	95.3–100.0
Kent	98.8	99.2	98.1–100.0
Klmarnk	97.2	97.9	94.1–100.0
L Barts	98.1	98.3	96.7–100.0
L Guys	97.5	97.9	95.8–100.0
L Kings	94.4	95.7	92.6–98.9
L Rfree	98.4	98.8	97.4–100.0
L St G	96.6	97.5	94.7–100.0
L West	94.9	96.0	94.0–98.1
Leeds	94.4	96.0	93.1–98.9
Leic	95.9	97.1	95.4–98.9
Liv Ain	91.4	95.2	90.2–100.0
Liv RI	95.6	96.0	92.7–99.5
M Hope	99.1	99.2	97.6–100.0
M RI	95.5	96.4	93.8–99.1
Middlbr	85.9	91.3	87.0–95.8
Newc	91.5	94.3	90.7–98.0
Norwch	86.7	92.5	88.7–96.4
Nottm	94.5	96.3	93.7–99.0
Oxford	93.1	95.1	92.2–98.1
Plymth	89.5	94.0	89.9–98.1
Ports	89.7	93.1	89.8–96.5
Prestn	93.0	94.6	91.3–98.1
Sheff	93.9	96.1	93.7–98.5
Shrew	94.5	96.0	91.6–100.0
Stevng	96.6	97.6	94.9–100.0
Stoke	93.1	95.6	92.2–99.1
Sund	95.2	97.1	94.0–100.0
Swanse	90.6	94.8	92.0–97.8
Truro	97.8	98.8	96.4–100.0
Wirral	96.2	97.1	93.3–100.0
Wolve	94.0	96.2	92.5–99.9
Wrexm	88.9	93.5	86.8–100.0
York	97.1	98.4	95.3–100.0
England	**94.3**	**96.2**	**95.6–96.8**
N Ireland	**96.2**	**97.8**	**96.2–99.4**
Scotland	**93.3**	**95.2**	**93.7–96.8**
Wales	**92.6**	**95.7**	**94.2–97.3**
UK	**94.2**	**96.1**	**95.6–96.7**

Excluded: Colchester (contributed data from 2008 onwards), Dumfries & Galloway, Derry, Doncaster, Newry and Ulster all due to <20 patients. Antrim, Tyrone, Southend, Reading, Clwyd and Dudley excluded due to no deaths in the first 90 days

Table 7.26. One year after 90-day incident survival by centre for incident cohort years 1999–2007, adjusted to age 60

Centre	1999	2000	2001	2002	2003	2004	2005	2006	2007
Abrdn	81.9	79.9	92.4	87.9	83.0	89.8	79.5	82.7	84.2
Airdrie	73.7	81.7	84.8	78.4	79.8	85.6	72.3	75.7	83.6
Antrim							86.1	94.4	84.8
B Heart	86.5	83.7	85.2	88.0	86.2	87.3	86.1	89.9	90.7
B QEH						88.5	90.7	87.8	93.3
Bangor				83.0	89.0	84.1	81.3	81.4	92.2
Basldn					92.0	95.1	92.0	90.9	87.9
Belfast							90.4	92.1	90.2
Bradfd			93.4	86.5	84.2	84.5	85.5	76.7	86.3
Brightn						87.8	83.1	90.2	94.6
Bristol	85.9	86.5	85.8	88.0	87.5	87.6	83.7	93.1	91.3
Camb			90.7	82.0	89.0	87.6	90.9	92.3	92.3
Cardff	88.9	88.7	83.2	82.9	89.4	86.3	88.3	85.9	82.3
Carlis	74.6	76.7	94.7	87.7	78.4	87.0	83.3	91.0	92.8
Carsh	86.0	86.2	76.3	84.7	90.8	86.6	91.9	85.6	89.1
Chelms						81.2	85.7	87.0	90.7
Clwyd				87.7	76.3	90.1	81.7	95.9	83.9
Covnt	78.3	82.6	87.8	90.5	82.3	84.9	87.1	84.2	92.6

Table 7.26. Continued

Centre	1999	2000	2001	2002	2003	2004	2005	2006	2007
D & Gall	87.4	87.4	74.6	78.1	85.6	89.1	81.1	84.6	84.4
Derby		88.3	85.1		83.7	86.8	89.4	92.7	95.2
Donc									96.2
Dorset					86.2	91.1	82.0	89.8	87.3
Dudley	90.0	86.3	90.6	89.4	88.9	85.8	96.7	89.5	84.8
Dundee	89.6	77.7	86.8	83.9	89.7	84.1	85.8	89.9	79.3
Dunfn	80.0	72.3	70.4	86.9	85.8	87.9	77.0	83.1	87.2
Edinb	84.8	80.4	80.5	82.5	83.3	79.6	86.0	88.6	92.4
Exeter	88.2	85.5	86.2	87.0	85.3	86.7	86.2	87.6	87.6
Glasgw	85.3	84.8	79.9	84.1	85.1	81.3	84.7	84.7	88.6
Glouc	87.4	95.0	82.4	82.2	84.5	86.9	93.3	89.8	87.4
Hull	86.7	86.0	88.9	85.3	87.5	86.2	89.4	91.9	86.4
Inverns	94.2	84.1	91.7	83.7	88.1	83.5	85.4	90.8	80.3
Ipswi				98.3	93.7	91.1	84.8	96.1	94.0
Kent									92.9
Klmarnk	90.5	91.5	88.3	87.3	85.4	84.0	93.9	84.0	90.5
L Barts						87.5	93.0	91.6	87.9
L Guys		89.4	88.7	85.9	95.6	87.8	92.5	90.1	92.9
L Kings				88.0	86.2	88.8	88.9	89.1	88.9
L Rfree							91.5	92.5	92.8
L St G									90.5
L West				93.0	95.6	92.0	94.3	94.1	92.2
Leeds	81.9	91.3	89.7	85.6	88.8	90.4	89.5	84.8	86.8
Leic	85.7	84.5	87.3	88.0	91.2	85.4	85.6	87.6	88.6
Liv Ain							85.5	86.1	84.3
Liv RI			87.6	85.1	83.2	84.2	91.1	83.6	89.8
M Hope					88.2	82.7	92.2	92.2	85.9
M RI									87.4
Middlbr	82.4	88.9	83.0	78.4	82.5	85.5	83.2	89.7	87.1
Newc				88.0	88.4	83.9	82.2	84.4	87.4
Newry							86.6	82.9	94.7
Norwch						86.0	90.1	88.4	89.5
Nottm	86.9	89.4	89.3	86.6	86.5	84.7	86.5	94.5	88.9
Oxford	94.4	89.9	86.6	88.9	87.9	90.5	86.9	90.7	90.3
Plymth	82.6	86.3	73.0	81.9	81.6	81.0	81.8	83.0	90.7
Ports			86.9	86.2	88.0	89.3	83.6	86.3	90.2
Prestn	87.8	87.3	87.1	87.3	85.8	83.9	91.7	84.8	89.0
Redng		77.7	84.0	91.7	90.8	93.3	88.6	89.4	90.8
Sheff	85.1	94.9	94.3	84.1	90.1	89.9	92.1	89.3	87.9
Shrew						88.0	87.5	89.6	88.6
Stevng	87.9	91.1	81.3	87.5	94.9	87.5	79.3	88.3	88.6
Sthend	88.7	82.6	82.5	87.4	90.8	88.7	92.3	96.3	92.2
Stoke									86.3
Sund	79.7	85.3	83.9	69.6	81.5	87.5	82.5	82.3	87.7
Swanse		85.8	85.7	83.1	83.1	82.9	84.1	83.3	90.2
Truro			91.4	83.8	88.7	93.3	88.0	92.6	86.5
Tyrone							96.4	90.0	93.5
Ulster							89.7	83.9	91.1
Wirral				77.2	95.0	82.5	87.9	90.3	84.5
Wolve	86.5	87.4	77.1	87.0	83.2	88.2	86.6	89.4	90.8
Wrexm	81.7	85.3	83.2	93.2	81.7	91.8	91.6	90.9	90.2
York		83.7	87.1	82.3	78.1	89.6	85.1	83.6	94.5
England	**85.9**	**87.7**	**86.6**	**86.4**	**88.3**	**87.6**	**88.5**	**89.3**	**89.9**
N Ireland							**89.7**	**91.6**	**89.9**
Scotland	**85.3**	**82.0**	**82.8**	**83.8**	**85.3**	**83.7**	**84.1**	**85.1**	**86.7**
Wales	**87.1**	**87.3**	**84.2**	**84.4**	**86.0**	**85.8**	**86.3**	**85.6**	**86.0**
UK	**85.9**	**86.6**	**85.9**	**85.9**	**87.8**	**87.1**	**88.0**	**88.7**	**89.3**

Excluded: centres with <20 patients for that year: Derry; Excluded Colchester (contributing data since 2008); Blank cells, data not available for that year

Table 7.27. One year prevalent survival by centre for prevalent cohort years 2000–2008, adjusted to age 60

	1 year survival by centre and year								
Centre	2000	2001	2002	2003	2004	2005	2006	2007	2008
Abrdn	85.8	89.4	87.2	80.5	85.5	87.5	86.8	87.0	89.7
Airdrie	77.8	77.4	81.6	83.9	84.6	82.8	79.5	78.9	85.5
Antrim						83.4	92.0	85.5	89.2
B Heart	86.7	87.5	87.7	87.7	86.9	87.9	86.2	87.7	90.5
B QEH					89.0	88.9	88.7	88.5	88.5
Bangor			86.3	81.8	89.9	86.7	89.5	81.0	88.9
Basldn				81.4	88.0	90.7	90.2	91.0	93.1
Belfast						86.3	86.8	90.9	87.2
Bradfd		80.2	87.7	82.5	88.0	86.3	82.4	84.3	88.0
Brightn					86.9	84.1	87.9	87.7	89.5
Bristol	87.2	86.1	87.7	88.8	86.8	87.6	87.8	89.2	87.2
Camb		86.0	86.7	86.9	87.6	87.5	89.1	88.5	92.9
Cardff	85.2	85.7	85.9	80.8	84.4	84.3	84.3	88.7	82.7
Carlis	82.8	88.9	80.4	82.5	82.0	84.2	83.8	86.6	86.6
Carsh	83.2	83.9	82.9	85.1	88.0	86.4	89.1	89.0	90.1
Chelms					86.8	81.7	85.3	86.0	84.3
Clwyd			88.3	89.0	75.9	82.4	80.1	91.2	87.6
Covnt	87.2	85.7	85.2	87.8	88.7	89.5	85.5	87.0	87.3
D & Gall	87.2	84.2	84.4	84.8	83.1	91.0	81.5	90.3	85.6
Derby	88.9	89.6		86.6	88.9	88.1	89.1	87.5	90.9
Derry								86.5	92.3
Donc									93.4
Dorset				90.1	88.0	90.2	86.1	87.1	89.6
Dudley	85.5	83.3	83.3	84.8	86.8	86.3	87.2	86.9	88.8
Dundee	77.1	86.2	85.1	83.9	85.3	87.7	87.6	83.7	84.2
Dunfn	76.4	79.2	82.6	83.8	89.0	91.0	88.1	88.8	90.5
Edinb	83.0	81.4	83.6	83.1	85.6	85.8	86.6	88.1	88.2
Exeter	86.1	85.0	87.4	86.6	85.9	84.2	90.8	87.5	85.5
Glasgw	86.1	83.3	85.9	83.7	85.5	87.5	86.4	88.5	87.9
Glouc	89.1	79.9	84.1	82.1	89.1	88.5	91.1	87.9	87.3
Hull	81.5	87.1	87.5	85.6	85.7	84.8	85.8	90.1	86.9
Inverns	81.1	88.9	88.5	87.5	86.8	87.0	86.3	94.4	89.0
Ipswi			82.3	84.9	90.4	85.9	84.8	85.3	91.5
Kent									86.5
Klmarnk	80.4	85.4	82.6	82.2	87.2	84.7	91.5	87.1	88.8
L Barts					83.8	85.5	88.3	89.2	88.7
L Guys	86.1	86.7	86.3	88.6	88.6	89.1	87.8	90.7	90.1
L Kings			81.1	77.4	81.7	86.5	88.9	84.7	88.4
L Rfree						90.1	90.5	90.4	91.3
L St G								95.8	93.9
L West			89.8	91.4	91.1	91.6	91.7	91.9	90.5
Leeds	83.4	85.3	87.1	86.1	85.2	88.7	88.8	88.2	87.6
Leic	83.3	84.7	84.1	83.8	85.2	87.3	84.6	90.0	89.5
Liv Ain		92.6	90.6	90.5	86.9	96.9	86.7	90.9	88.9
Liv RI		81.2	82.2	84.6	86.0	84.1	88.2	85.4	87.5
M Hope				84.5	82.2	84.4	86.2	88.3	87.1
M RI								85.9	86.6
Middlbr	84.1	83.9	84.2	84.3	83.0	85.9	85.4	87.0	87.1
Newc			83.2	81.3	82.2	87.5	85.3	86.7	88.0
Newry						85.9	87.9	86.9	90.5
Norwch					86.9	87.4	89.7	86.8	90.8
Nottm	85.0	87.0	82.6	85.0	86.3	85.1	83.3	89.4	88.4
Oxford	87.7	88.4	85.6	86.6	88.1	87.5	88.1	87.6	88.4
Plymth	85.0	87.3	76.6	84.9	86.9	87.4	83.4	82.8	88.3
Ports		83.8	80.7	81.6	89.1	85.4	84.8	89.7	88.7

Table 7.27. Continued

	1 year survival by centre and year								
Centre	2000	2001	2002	2003	2004	2005	2006	2007	2008
Prestn	85.7	87.2	86.3	84.7	85.9	85.6	86.6	90.9	90.4
Redng	84.0	78.9	86.1	82.2	90.0	86.3	89.0	90.0	89.4
Sheff	84.2	88.0	90.5	91.0	87.8	87.1	89.2	88.6	88.8
Shrew					85.1	87.2	86.2	89.3	88.9
Stevng	89.7	91.1	86.6	88.4	89.5	88.6	89.5	89.6	92.9
Sthend	85.3	88.7	88.8	86.9	88.9	86.4	83.6	85.8	90.3
Stoke								84.5	87.3
Sund	77.2	79.4	78.1	75.8	82.6	86.4	79.4	83.2	87.6
Swanse	84.6	87.6	80.8	82.3	87.8	89.3	85.9	88.4	89.5
Truro		89.0	82.7	90.3	90.1	86.0	91.9	89.0	90.3
Tyrone						89.0	82.8	93.1	93.4
Ulster						85.8	91.3	89.1	92.0
Wirral			93.0	84.9	87.5	89.4	89.3	88.0	88.6
Wolve	84.3	90.1	86.7	83.5	86.5	87.5	89.8	87.9	93.1
Wrexm	83.5	87.9	87.1	85.7	86.1	84.4	84.9	88.9	86.0
York	86.6	79.7	85.2	81.0	83.2	88.7	83.6	88.9	88.2
England	**85.4**	**85.9**	**85.7**	**86.1**	**87.1**	**87.4**	**87.9**	**88.7**	**89.1**
N Ireland						**86.1**	**87.7**	**89.2**	**89.6**
Scotland	**83.1**	**83.6**	**84.9**	**83.5**	**85.7**	**87.0**	**86.3**	**87.4**	**87.8**
Wales	**84.7**	**86.7**	**84.8**	**82.4**	**85.5**	**85.9**	**85.1**	**88.1**	**85.8**
UK	**84.9**	**85.6**	**85.5**	**85.5**	**86.8**	**87.3**	**87.5**	**88.5**	**88.8**

Blank cells, data not available for that year
Colchester not in analysis – does not have any timeline information before 2008
Derry <20 patients in 2006, starting to contribute to the RR in 2006
Doncaster <20 patients in 2007
Kent no deaths in 2007