UK Renal Registry 14th Annual Report: Chapter 6 Survival and Causes of Death of UK Adult Patients on Renal Replacement Therapy in 2010: national and centre-specific analyses

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Key Words
Cause of death · Comorbidity · Dialysis · End stage renal disease · Established renal failure · Haemodialysis (HD) · Outcome · Peritoneal dialysis (PD) · Renal replacement therapy (RRT) · Survival · Transplant · Vintage

Summary

- Unadjusted 1 year after 90 day survival for patients starting RRT in 2009 was 86.6%.
- Unadjusted 1 year survival for incident patients aged <65 years declined slightly from 91.9% in 2008 to 91.3% in 2009 although the decline was not statistically significant.
- In incident patients aged ⩾65 years, unadjusted 1 year survival has increased from 64.1% in 1997 to 76.2% in 2009 and also increased year on year in 2008 and 2009.
- Prevalent patient survival was the same as in 2009 (89.0% in 2009 and 89.1% in 2010).
- Prevalent diabetic patient survival at one year increased from 77.1% in 2001 to 83.2% in 2010.
- RRT patients aged 30–34 had a mortality rate 25 times higher than the age matched general population, whereas RRT patients aged 85+ had a mortality rate 2.7 times higher.
- In the prevalent RRT dialysis population, cardiovascular disease accounted for 22% of deaths, infection 19% and treatment withdrawal 15%; 21% were recorded as uncertain.
- The median life years remaining for an incident patient aged 25–29 years was 18 years and was about three years for a 75 year old.
- The one-year death rate for prevalent dialysis patients in the UK appear to be lower than in similar patients in the USA.

Introduction

The analyses presented in this chapter examine a) survival from the start of renal replacement therapy (RRT); b) the survival amongst all prevalent RRT patients alive on 1st January 2010; c) causes of death for incident and prevalent patients and d) projected life years remaining for patients starting RRT. They encompass the outcomes from the total incident UK dialysis population reported to the UK Renal Registry (UKRR), including the 18% who started on peritoneal dialysis and the 7% who received a pre-emptive renal transplant. These results are therefore a true reflection of the outcomes in the whole UK RRT population. Analyses of survival within the 1st 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, 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.

The prevalent patient group was defined as all patients over 18 years old, alive and receiving renal replacement therapy on 31st December 2009 who had been on RRT for at least 90 days at one of the UK adult renal centres.

Since 2006 the UK has openly reported and published centre-attributable RRT data. It is again stressed that these are raw data which continue to require very cautious interpretation. The UKRR 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 primary renal diagnosis, other comorbidities at start of RRT 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). This lack of information on case mix makes interpretation of any apparent difference in survival between centres difficult, although age and comorbidity, especially diabetes, are the major factors associated with survival [1,2]. Despite the uncertainty about any apparent differences in outcome for centres which appear to be outliers, the UKRR will follow the clinical governance procedures as set out in chapter 2 of the 2009 UKR report [3].

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. 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.

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 15 years ago at the start of the UKRR's data collection. For the last 7 years the average age of patients commencing RRT in the UK has been stable around an age of 65 years, but the UKRR has maintained age adjustment to 60 years for comparability with all previous years' analyses. Diabetic patients are included in all analyses unless otherwise stated and diabetic patients are also analysed separately and compared to non-diabetic patients. All analyses were undertaken using SAS v 9.2.

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 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 developed 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. Capture of data on these patients requires accurate coding. Previously, the UKRR asked clinicians to re-enter a code for established renal failure 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 established renal failure only once a decision had been made to plan for long-term RRT [4]. 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 were subsequently categorised as ERF, the UKRR will extract information from the first session of RRT onwards if available and will assign the date of this first session as the date of start of RRT.

Recent 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 Report. 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 on 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. Some other countries do not include initial urgent/emergency dialysis in intensive care units or acute wards.

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 any such comparisons.

Methodology for incident patient survival

Patients are considered 'incident' at the time of their first RRT, thus patients re-starting dialysis after a failed transplant were not included.

Some patients recover renal function after more than 90 days but subsequently returned to 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. If recovery was for 90 days or more the length of time on RRT was calculated from the day on which the patient restarted RRT.

The incident survival cohort was **NOT** censored at the time of transplantation and therefore included the survival of the 7% who received a pre-emptive transplant. Censoring would exclude this 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 [5].

The incident ('take-on') population in any specific year excludes those who recovered within 90 days from the start of RRT, but includes patients who recovered from ERF after 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.

The one year incident survival is for patients who started RRT in 2009 and was calculated for one full year through 2009 and 2010 (e.g. patients starting RRT on 1st December 2009 were followed through to 30th November 2010). The 2010 incident patients could not be analysed as they had not yet 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 2009 were not included in the cohort, as data on these patients were not yet available to complete a full year of follow-up.

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 2006 to 2009 was also undertaken. For those centres which had joined the UKRR after 2006, data are not available for all the years but the available data were included.

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 sum of the days at risk for each patient (until death, recovery or lost to follow-up) divided by 365. All patients, even those who died within the first 90 days of RRT, were included in the death rate calculation.

Adjustment of 1 year after 90 day survival for the effect of comorbidity was undertaken using a rolling 5 year combined incident cohort from 2005 to 2009. Fourteen centres 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 fourteen 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

Dialysis patients

For prevalent dialysis patients, all patients on dialysis who had been established on RRT for at least 90 days on 1st January 2010 were included in these analyses with one exception. Prevalent dialysis patients that had received a transplant in the previous six months (1st July 2009 to 31st December 2009) which had failed were excluded from the analyses as this period is associated with an increased risk of death which is attributed to the act of transplantation. Prevalent dialysis patients on 1st January 2010 were followed up in 2010 and were censored when transplanted. 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 2% of the population aged 65 years and over). However, 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.

Transplant patients

The survival analyses for prevalent transplant patients included all patients who had been established on a transplant for at least 6 months on the 1st January 2010 unless transplantation was the first treatment modality in which case they were included in the analyses 3 months after transplantation. The months immediately following transplant have been shown to be associated with an increased risk of death and these analyses attempt to remove this high risk period to examine stable transplant patients only. However, this methodology results in including pre-emptively transplanted patients after 3 months and all other transplants only after 6 months. The methodology will be changed in the next report to treat pre-emptive transplants and transplants after start of dialysis in the same manner.

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

Some centres had high completeness of data returns to the UKRR for cause of death, whilst others returned no information. Completeness of cause of death data were calculated for prevalent patients on RRT on 1st January 2010 as the percentage of patients that died in 2010 with cause of death data completed.

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 2000–2009. 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-ERA 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 1st January 2010. The death rate was calculated for the UK general population (data from the Office of National Statistics) by age group and compared with the same age group for prevalent patients on RRT on 1st January 2010.

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 2000–2007, with at least three years follow-up from 2008 to 2010. The patient cohort inclusion criteria are the same to that of the incident cohort described above. Patients were then followed until death, censoring (recovery or lost to follow-up) or end of the study period. Life expectancy which gives the probability of surviving until the next time period was calculated as: 1 – hazard of death. 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–2010 and the number of deaths in each age group in 2010 were 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 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 sum total of years alive (exposed) of the RRT patients in that age group. This is expressed as deaths per 1,000 patient years. The age-specific number of RRT deaths was the actual number of deaths observed in 2010 in RRT patients. The RRT observed death rate was calculated as number of deaths observed in 2010 per 1,000 patient years exposed. The relative risk of death is the ratio of the observed and expected death rates for RRT patients.

Results of incident (new RRT) patient survival

The 2009 cohort included 6,827 patients who started RRT, without any periods of renal function recovery lasting more than 90 days. The unadjusted 1 year after 90 day survival for incident patients starting RRT in 2009 (table 6.1) was similar to that observed last year (86.6% in 2009 and 87.3% in 2008).

Comparison of survival between UK countries

Two year's incident data have been combined to increase the size of the patient cohort, so that any differences between the four UK countries are more likely to be reliably identified (table 6.2). These data have not been adjusted for differences in primary renal diagnosis,

Table 6.1. Unadjusted survival of incident patients, 2009 cohort

Interval	KM* survival (%)	*95% CI*	N
Survival at 90 day (%)	93.9	*93.3–94.4*	6,827
Survival 1 year after 90 days (%)	86.6	*85.7–87.4*	6,389

*KM = Kaplan–Meier

Table 6.2. Incident patient survival across the UK countries, combined 2 year cohort (2008–2009), adjusted to age 60

Interval	England	N Ireland	Scotland	Wales	UK
Survival at 90 day (%)	95.9	97.5	94.0	95.6	95.8
95% CI	*95.5–96.3*	*96.2–98.9*	*92.7–95.2*	*94.4–96.9*	*95.4–96.2*
Survival 1 year after 90 days (%)	89.9	90.8	87.5	86.0	89.5
95% CI	*89.2–90.5*	*88.1–93.6*	*85.6–89.4*	*83.6–88.4*	*88.9–90.1*

Table 6.3. Life expectancy in years in UK countries, 2007–2009 (source ONS [6])

	At birth		At age 65	
Country	Male	Female	Male	Female
England	78.3	82.3	18.0	20.6
N Ireland	76.8	81.4	17.2	20.0
Scotland	75.4	80.1	16.5	19.1
Wales	77.2	81.6	17.4	20.1
UK	**77.9**	**82.0**	**17.8**	**20.4**

ethnicity, socio-economic status or comorbidity, nor for differences in life expectancy in the general populations of the four UK countries. There was a significant difference in 90 day survival in the UK countries with survival in Scotland significantly lower compared to survival in England and Northern Ireland. One year after 90 day survival was also significantly lower in Wales compared to England. It is postulated that greater prevalence of cardiovascular disease in Wales and Scotland compared with England may account for these differences.

There are known regional differences in the life expectancy of the general population within the UK. Table 6.3 shows differences in life expectancy between the UK countries. These differences in life expectancy are not accounted for in these analyses and are likely to be one of the reasons behind the variation in survival between renal centres.

Table 6.4. One year after 90 day survival by first established modality 2003–2009 (adjusted to age 60) (excluding patients whose first modality was transplantation)

	Age adjusted 1 year after 90 days % survival[a] *95% CI*	
Year	HD	PD
2009	87.4	92.7
	86.4–88.5	*91.2–94.2*
2008	87.9	93.9
	86.9–89.0	*92.7–95.2*
2007	87.0	94.0
	85.9–88.1	*92.8–95.3*
2006	86.9	94.2
	85.7–88.0	*92.9–95.5*
2005	85.8	93.2
	84.6–87.0	*91.8–94.6*
2004	85.8	90.5
	84.5–87.1	*88.8–92.1*
2003	85.7	92.2
	84.3–87.1	*90.7–93.8*

[a]Includes Northern Ireland from 2005 onwards

Modality

It is impossible to obtain truly valid comparisons of survival of patients starting on different modalities, as

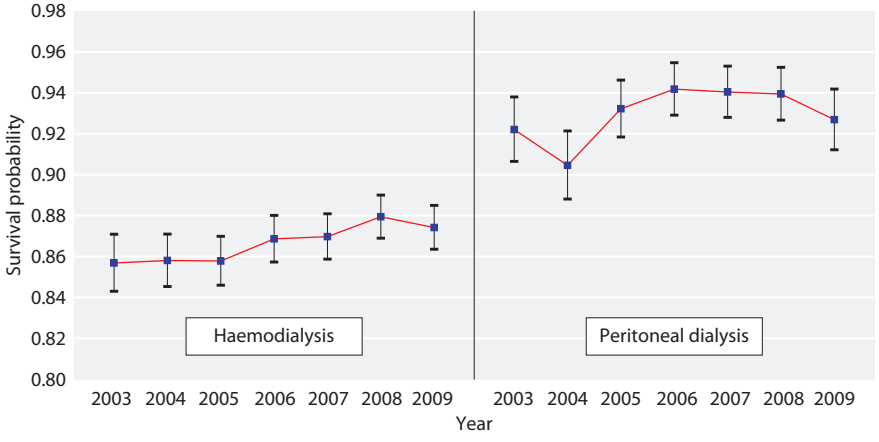

Fig. 6.1. Trend in 1 year after 90 day survival by first established modality 2003–2009 (adjusted to age 60) (excluding patients whose first modality was transplantation)

Table 6.5. Unadjusted 90 day survival of incident patients, 2009 cohort, by age

Age	KM* survival (%)	*95% CI*	N
18–64	97.1	*96.5–97.6*	3,435
⩾65	90.6	*89.5–91.5*	3,392
All ages	93.9	*93.3–94.4*	6,827

*KM = Kaplan–Meier

Table 6.6. Unadjusted 1 year after day 90 survival of incident patients, 2009 cohort, by age

Age	KM* survival (%)	*95% CI*	N
18–14	92.4	*91.4–93.2*	3,324
⩾65	80.4	*78.9–81.8*	3,065
All ages	86.6	*85.7–87.4*	6,389

*KM = Kaplan–Meier

modality selection is not random. In the UK, patients starting peritoneal dialysis as a group were younger and fitter than those starting haemodialysis and were transplanted more quickly. The age-adjusted one year survival estimates on HD and PD were 87.4% and 92.7% respectively which both show a slight decline compared to last year (figure 6.1, table 6.4) although not statistically significant. The inclusion of Northern

Table 6.7. Increase in proportional hazard of death for each 10 year increase in age, at 90 days and for 1 year thereafter, 2009 cohort

Interval	Hazard of death for 10 year age increase	*95% CI*
First 90 days	1.61	*1.49–1.74*
1 year after first 90 days	1.50	*1.42–1.58*

Table 6.8. Unadjusted KM survival of incident patients, 1997–2009 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	*95% CI for latest year*	N
2009	**91.3**										***90.3–92.2***	**3,435**
2008	91.9	86.5									*85.3–87.6*	3,503
2007	92.4	86.5	81.2								*79.8–82.5*	3,492
2006	91.4	85.7	81.0	76.2							*74.7–77.7*	3,207
2005	89.7	83.9	79.3	75.0	70.6						*68.9–72.2*	3,028
2004	89.9	84.2	78.1	72.6	68.0	64.0					*62.1–65.8*	2,688
2003	89.6	82.8	77.6	72.5	67.5	63.4	59.8				*57.8–61.8*	2,400
2002	88.6	81.8	76.4	71.3	66.6	62.8	59.1	56.4			*54.2–58.6*	2,102
2001	87.5	80.0	74.4	68.8	64.2	59.8	56.5	53.3	49.7		*47.4–52.0*	1,879
2000	89.5	81.9	75.3	70.5	65.3	60.4	56.4	53.2	51.0	48.3	*45.8–50.8*	1,609
1999	87.7	81.7	74.4	68.5	63.6	59.6	55.5	52.6	50.2	47.8	*45.1–50.5*	1,386
1998	86.8	79.4	72.7	67.6	61.6	56.9	52.9	50.5	47.6	46.3	*43.5–49.0*	1,285
1997	86.0	78.5	71.4	66.0	60.9	56.1	52.7	50.6	48.5	44.4	*40.9–47.9*	802

Table 6.9. Unadjusted KM survival of incident patients, 1997–2009 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	*95% CI for latest year*	N
2009	**76.2**										***74.7–77.6***	**3,392**
2008	75.8	62.9									*61.2–64.6*	3,252
2007	74.9	61.1	49.3								*47.6–51.0*	3,205
2006	72.5	59.4	48.4	38.4							*36.7–40.1*	3,172
2005	72.9	58.8	46.7	37.8	29.3						*27.7–30.9*	3,084
2004	68.7	54.8	43.3	34.4	26.8	20.8					*19.3–22.4*	2,732
2003	69.2	53.9	42.4	32.5	24.9	19.6	15.4				*14.0–16.9*	2,383
2002	66.1	51.5	40.9	32.6	25.2	19.0	14.7	11.8			*10.4–13.2*	2,181
2001	67.2	52.1	39.5	30.4	23.1	17.2	13.1	10.1	8.0		*6.8–9.4*	1,864
2000	66.2	52.9	40.1	29.2	22.9	18.2	14.1	10.2	7.9	6.1	*4.9–7.4*	1,519
1999	66.2	50.8	38.5	28.9	21.6	15.6	11.3	9.0	7.1	5.8	*4.6–7.2*	1,268
1998	63.8	46.8	36.2	27.5	20.6	14.8	10.7	7.5	5.3	4.1	*3.0–5.3*	1,148
1997	64.1	46.4	33.4	24.0	16.2	11.5	7.8	6.3	4.5	3.8	*2.5–5.6*	589

Table 6.10. Unadjusted KM survival of incident patients, 1997–2009 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	*95% CI for latest year*	N
2009	**83.8**										***82.9–84.6***	**6,827**
2008	84.1	75.1									*74.0–76.1*	6,755
2007	84.0	74.3	65.9								*64.7–67.0*	6,697
2006	82.0	72.6	64.8	57.4							*56.1–58.6*	6,379
2005	81.3	71.2	62.9	56.2	49.7						*48.4–51.0*	6,112
2004	79.2	69.4	60.6	53.3	47.3	42.2					*40.9–43.5*	5,420
2003	79.5	68.4	60.1	52.6	46.3	41.6	37.7				*36.3–39.1*	4,783
2002	77.1	66.3	58.3	51.6	45.5	40.4	36.4	33.6			*32.2–35.1*	4,283
2001	77.4	66.1	57.0	49.7	43.7	38.6	34.9	31.8	29.0		*27.5–30.5*	3,743
2000	78.2	67.9	58.3	50.5	44.8	40.0	35.9	32.4	30.1	27.9	*26.3–29.5*	3,128
1999	77.4	66.9	57.2	49.6	43.5	38.5	34.3	31.7	29.5	27.7	*26.0–29.4*	2,654
1998	76.0	64.1	55.6	48.7	42.3	37.0	33.0	30.2	27.7	26.4	*24.6–28.1*	2,433
1997	76.8	65.0	55.4	48.3	42.1	37.3	33.8	31.9	30.0	27.3	*25.0–29.7*	1,391

Ireland from 2005 did not significantly affect the survival for the UK in that year (table 6.4).

Age

Tables 6.5 to 6.9 show survival of all patients, those aged 65 and above and those aged below 65 years, for up to ten years after start of renal replacement therapy. In the UK, short term survival (survival at 90 days) remained similar to last year (table 6.5). Survival 1 year after 90 days declined compared to last year and this was due mainly to a decline in survival for patients aged 65 years and younger (tables 6.6, 6.8). Longer term survival of patients on RRT continued to improve (tables 6.8, 6.9, 6.10). There was a steep decline in

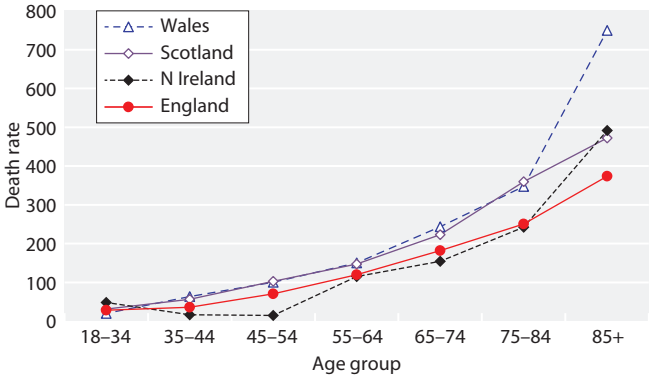

Fig. 6.3. One year after 90 days death rate per 1,000 patients years by UK country and age group for incident patients, 2006–2009 cohort

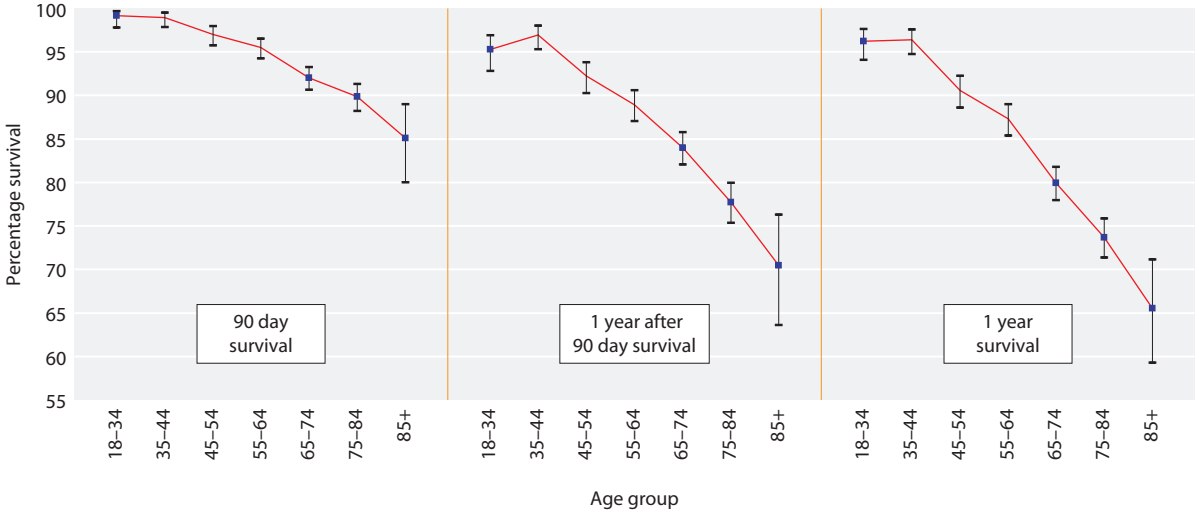

Fig. 6.2. Unadjusted survival of all incident patients by age group, 2009 cohort

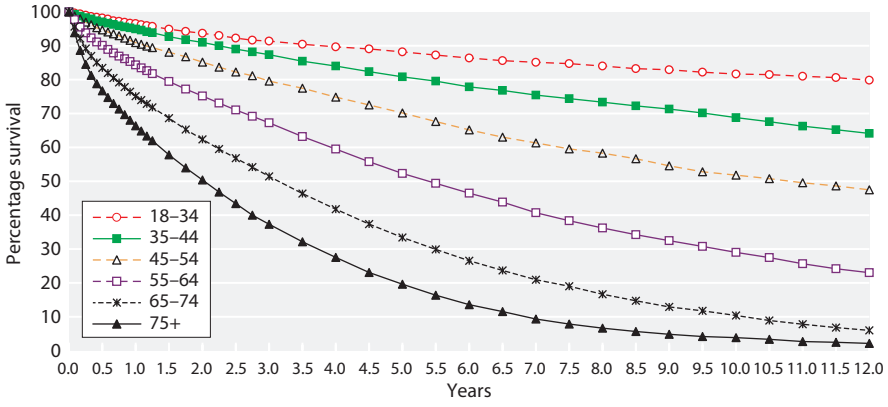

Fig. 6.4. Kaplan–Meier survival of incident patients 1997–2009 cohort (from day 0), without censoring at transplantation

survival with advancing age (figures 6.2, 6.3). Survival for patients aged 65 years and younger were lower but not significantly different compared to the previous year (tables 6.6, 6.8).

There was a curvilinear increase in death rate per 1,000 patient years with age, shown in figure 6.3 for the period one year after 90 days. The death rate in Scotland and Northern Ireland decreased for patients aged 85+ compared to last year. There are differences between the overall death rates (all age groups) between some of the nations: Scotland significantly higher than England, Wales significantly higher than England and Northern Ireland.

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 3 years were censored at the time of transplantation. This was not made clear in the description of the methodology and was misleading as it made the longer term outcomes of younger patients (who are more likely to have undergone transplantation) appear worse than was 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 81.6% (figure 6.4), which contrasts with a 56.4% survival if censoring at the time of transplantation (data not shown). For more detailed information on this effect, refer to the 2008 Report [7].

From figure 6.4, it can be seen that 50% of patients starting RRT aged between 45–54 survived for 10.5 years, 50% of patients starting RRT aged between 55–64 survived for 5.6 years and 50% of patients starting RRT aged between 65–74 survived for 3 years. The comparative figures when censoring for transplantation are only different for the younger age groups where patients starting RRT aged between 45–54 survived for 6.5 years and patients aged between 55–64 years survived for 4.5 years.

Figure 6.5 shows the survival of incident patients, excluding those who died within the first 90 days and shows that 50% of patients aged between 55–64 survived for 5.5 years and 50% of patients aged between 65 and 74 survived for 3.5 years.

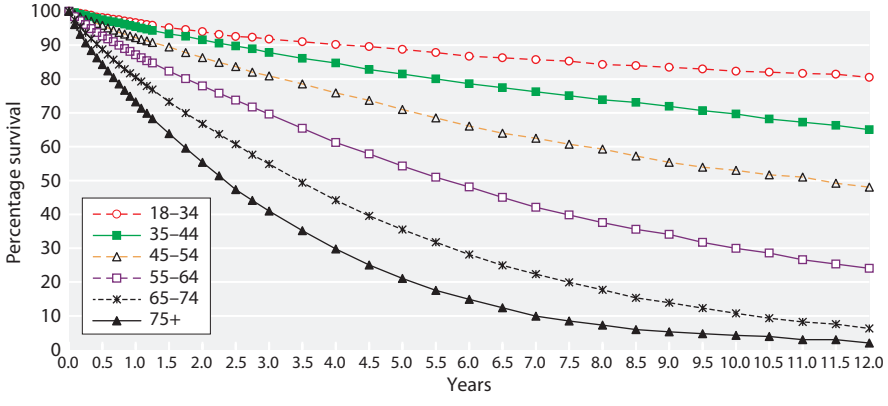

Fig. 6.5. Kaplan–Meier survival of incident patients 1997–2009 cohort (from day 90), without censoring at transplantation

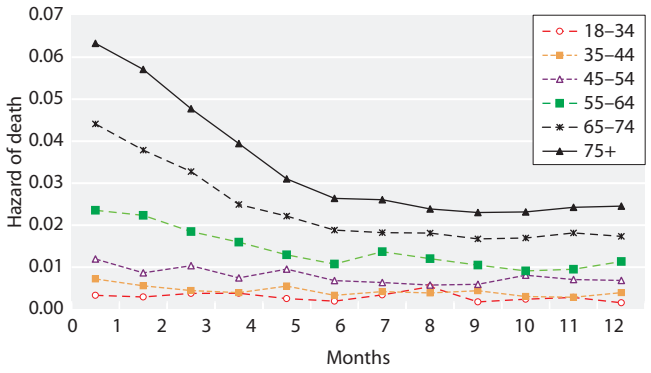

Fig. 6.6. First year monthly hazard of death, by age group 1997–2009 combined incident cohort

Age and hazard of death by age in the first 12 months

Figure 6.6 shows the monthly hazard of death from the first day of starting RRT by age, which falls sharply during the first 4–5 months particularly for older patients.

A 10 year increase in patient age was associated with a 1.6 times increased risk of death within 90 days and a 1.5 times increased risk of death within 1 year after 90 days (table 6.7).

Changes in survival from 1997–2009

The death rate per 1,000 patient years for the first year of starting RRT is shown in figure 6.7. There was a continued fall in the overall death rate with a steeper rate of decline in the older age group (aged 65 years and older). Although the death rate for all patients starting RRT in 2009 and followed up in 2010 increased slightly compared to the previous year, this increase was not significant.

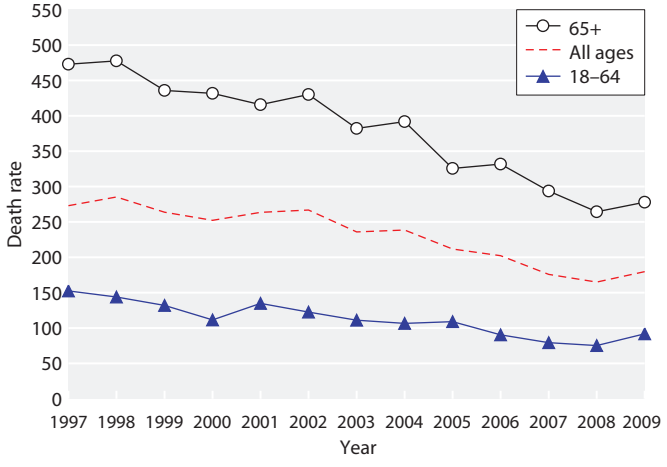

Fig. 6.7. One-year incident death rate per 1,000 patient years by age group

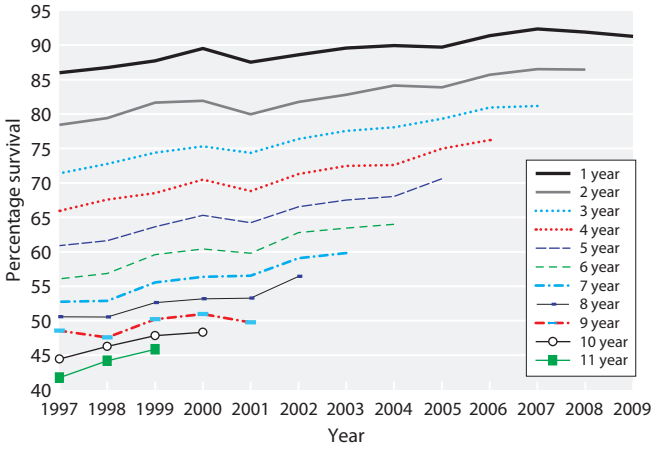

Fig. 6.8. Change in KM long term survival by year of starting RRT, for incident patients aged 18–64 years

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 when the death rates are higher than subsequent time periods.

The unadjusted KM survival analyses (tables 6.8, 6.9, 6.10, figures 6.7, 6.8, 6.9) and annual death rates show a large improvement in 1 to 10 year survival across the years for both those under and those aged 65 years and over. Although one year survival amongst patients aged less than 65 years at start of RRT has improved from 86.0% in 1997 to 91.3% in 2009, survival in this age group has plateaued since 2006.

Similarly for patients aged 65 years and over there has been a 12.1% absolute improvement in one year survival from 1997 to 2009. Survival for patients aged 65 years

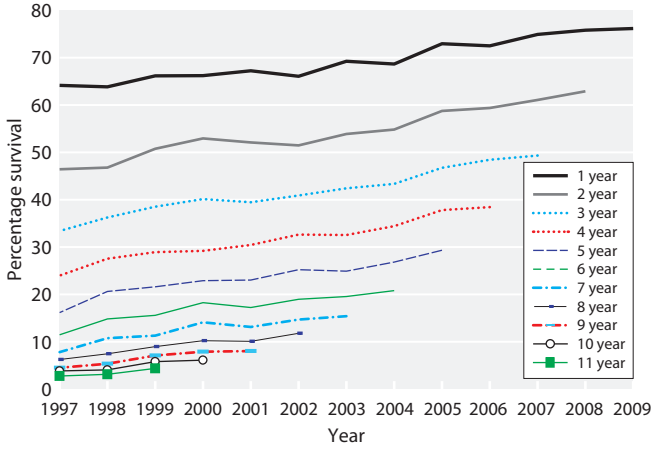

Fig. 6.9. Change in KM long term survival by year of starting RRT, for incident patients aged ⩾65 years

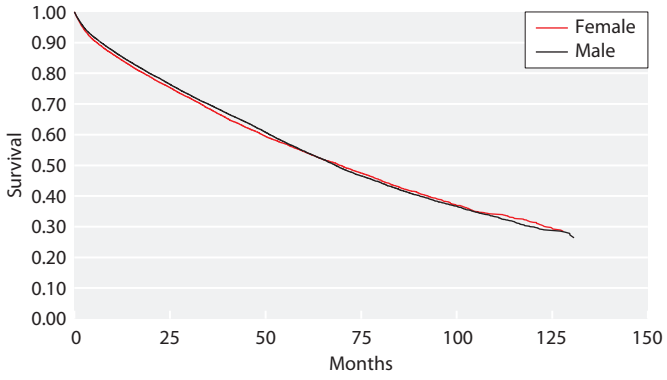

Fig. 6.10. Long term survival of incident patients by gender, 2000–2007 combined incident cohort, adjusted to age 60

and over continued to improve in both 2008 and 2009 unlike the levelling off of survival for patients aged 18–64 (see table 6.8). As these are observational data it remains difficult to attribute this reduction in risk of death to any specific improvements in care.

Gender

There were no survival differences between genders and these data are shown in figure 6.10 in an incident cohort of patients starting RRT from 2000 to 2007 and followed up for a minimum of 3 years until 2010. Gender differences were also investigated in the first 90 days and 1 year after the first 90 days and there was also no evidence of a survival difference (data not shown).

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) when comparing survival without censoring for transplantation. Figure 6.11 shows the instantaneous hazard of death and demonstrates this for all patients. The apparent vintage effect when censoring for transplantation is at least in part because these younger and healthier patients are only included in the survival calculation up to the date of transplantation (data not shown). In the older age groups, there were decreasing numbers remaining alive beyond 7 years accounting for the increased variability seen. Figures 6.12 and 6.13 show these data for the non-diabetic and diabetic patients respectively. Non-diabetic patients were defined as all incident patients excluding patients with diabetes as primary renal disease and patients with a missing primary renal diagnosis.

Time trend changes in incident patient survival, 1999–2009

The time trend changes are shown in figure 6.14. The left hand plot, which includes only those centres that have been sending data continuously since 1999, shows a similar improvement in survival to the plot in which data from all renal centres are analysed.

Analysis of centre variability in 1 year after 90 days survival

The one year after 90 day survival for the 2009 incident cohort is shown in figure 6.15 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 6.25, 6.26). The age-adjusted individual centre survival for each of the last 9 years can also be found in appendix 1, table 6.27. There was much variability in survival between centres, but these results have to be interpreted cautiously as they were not adjusted for

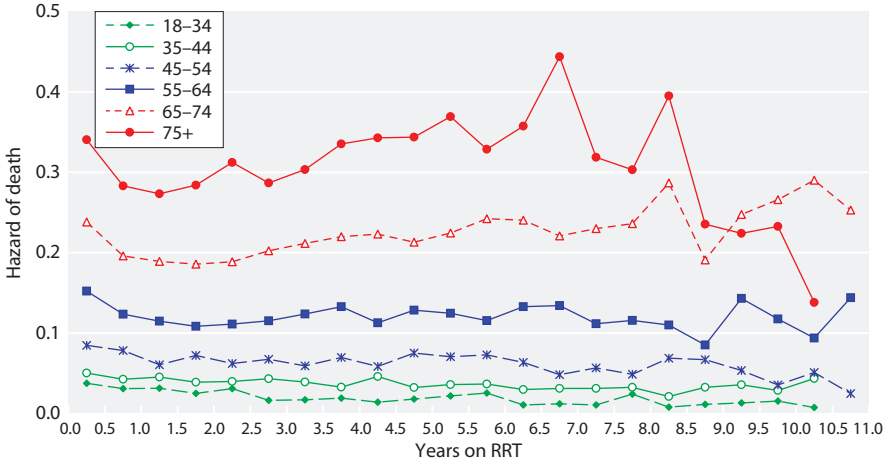

Fig. 6.11. Six monthly hazard of death, by vintage and age group, 1997–2009 incident cohort after day 90 (not censored at transplantation)

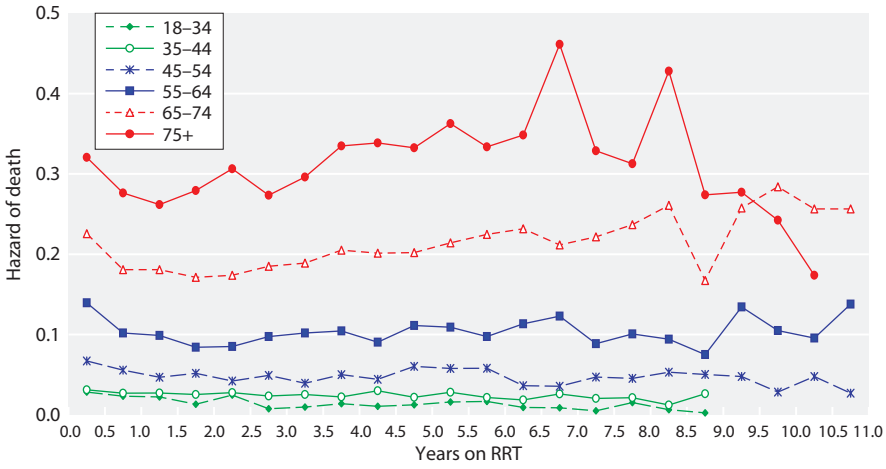

Fig. 6.12. Six monthly hazard of death, by vintage and age group, 1997–2009 non-diabetic incident cohort after day 90 (not censored at transplantation)

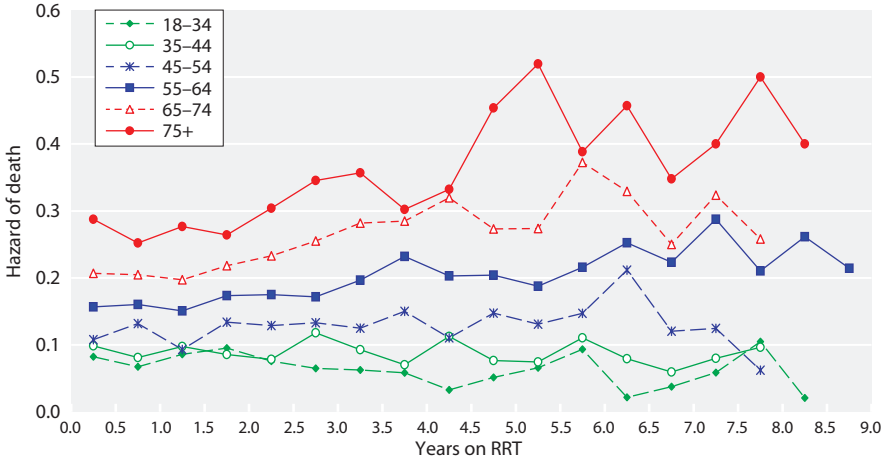

Fig. 6.13. Six monthly hazard of death, by vintage and age group, 1997–2009 diabetic incident cohort after day 90 (not censored at transplantation)

comorbidity, ethnicity nor primary renal disease and patient numbers were small in many centres. Survival results for centres with less than 20 incident patients in 2009 (Clwyd, Colchester, Dumfries & Galloway, Derry, Inverness, Newry, Tyrone, Ulster, Wrexham) are not shown in figure 6.15, although they were included in the national and UK survival calculation.

In the analysis of 2009 survival data, some of the smaller centres had wide confidence intervals (figure 6.15) due to small numbers of patients. This was addressed

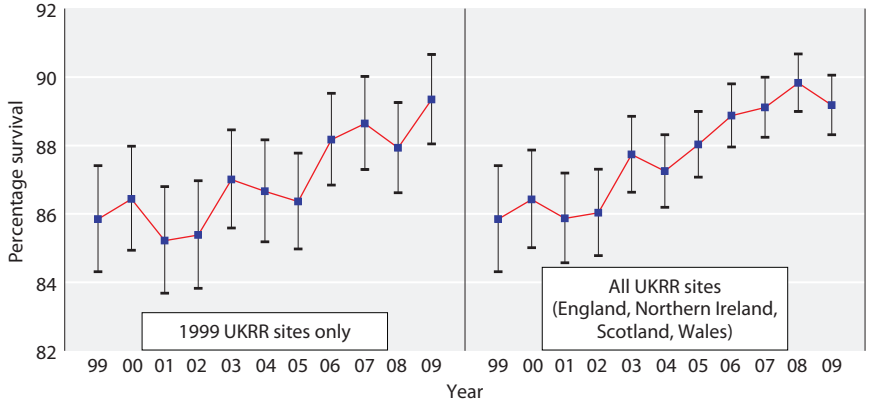

Fig. 6.14. Change in one-year after 90 day incident survival, 1999–2009 (adjusted to age 60)
Showing 95% confidence intervals

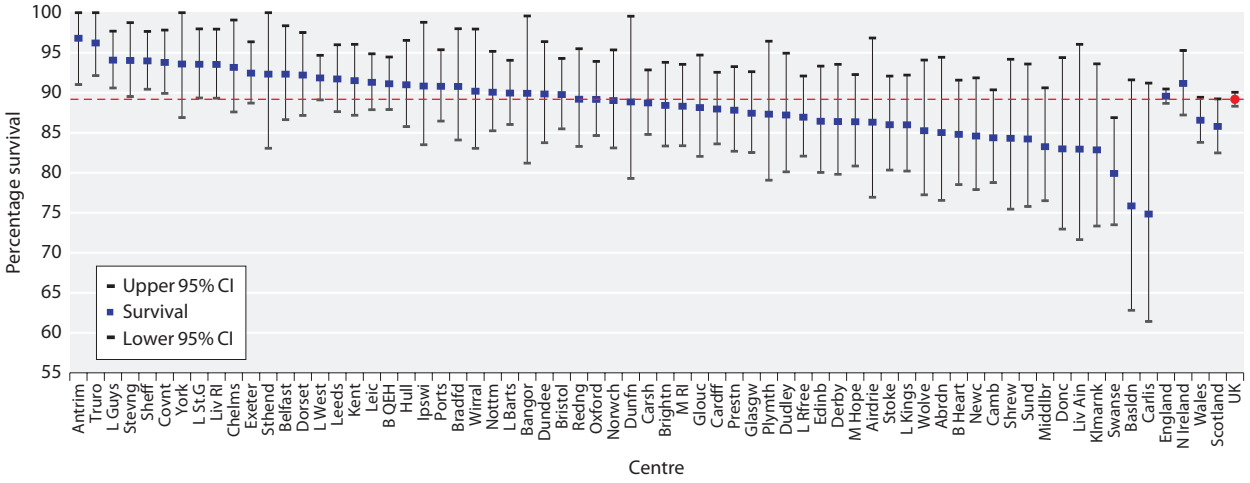

Fig. 6.15. Survival one-year after 90 days, adjusted to age 60, 2009 incident cohort

by including a larger cohort across several years, which will also assess sustained performance. Similar to previous years, this is shown as a rolling four year cohort from 2006 to 2009. These data are presented as a funnel plot in figure 6.16. For any number of patients in the 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 6.11 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. Six centres had significantly lower than average survival and seven centres had significantly higher than average survival. However with 72 centres it would be expected that three centres would be outside these limits by chance. These data have not been adjusted for any patient related factor except age (i.e. not comorbidity, primary renal disease nor ethnicity) and have not been censored at transplantation, so the effect of differing centre rates of transplantation was not taken into account.

Fig. 6.16. Funnel plot for age adjusted 1 year after 90 days survival, 2006–2009 incident cohort

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

Although comorbidity returns to the UKRR have remained poor, there was an increase in the number of centres returning more than 85% of comorbidity data to the UKRR in 2009. Using the combined incident cohort from 2005–2009, it was found that 14 centres had returned comorbidity data for more than 85% of patients and these centres were included in this analysis. Adjustment was first performed to age 60, then to the average distribution of primary diagnoses for all 14 centres. Further adjustment was then made to the average distribution of comorbidities present at those centres.

It can be seen that adjustment for age has the largest effect, most notably in those with the lower survival in the unadjusted figures. There were only minor differences for most centres after adjustment for primary renal diagnosis. In four centres (Swansea, Carlisle, Bradford and Middlesbrough) adjustment for comorbidity had a noticeable effect on adjusted survival (table 6.12, figure 6.17) explaining the lower survival noted in figure 6.15.

Survival in patients with diabetes

Although it has been shown that diabetic patients have worse survival compared to non-diabetic patients,

Table 6.11. Adjusted (to age 60) 1 year after 90 day survival, 2006–2009 incident cohort

Centre	N	1 year after 90 day survival %	Centre	N	1 year after 90 day survival %
Abrdn	207	86.8	L Barts	820	90.8
Airdrie	181	83.8	L Guys	640	92.0
Antrim	126	91.8	L Kings	486	88.0
B Heart	381	89.7	L Rfree	691	92.1
B QEH	880	90.5	L St.G	282	93.0
Bangor	118	88.2	L West	1,195	93.0
Basldn	141	87.9	Leeds	568	88.8
Belfast	322	90.8	Leic	884	89.9
Bradfd	235	85.5	Liv Ain	131	83.3
Brightn	459	90.0	Liv RI	436	90.3
Bristol	609	89.4	M Hope	502	87.2
Camb	482	90.3	M RI	422	89.0
Cardff	713	85.3	Middlbr	359	86.5
Carlis	104	85.5	Newc	378	87.7
Carsh	735	87.6	Newry	65	87.9
Chelms	181	91.1	Norwch	347	89.4
Clwyd	67	88.1	Nottm	474	91.0
Colchr	69	86.1	Oxford	572	90.0
Covnt	415	89.7	Plymth	271	87.7
D & Gall	69	85.7	Ports	591	88.5
Derby	286	91.2	Prestn	481	85.7
Derry	34	97.6	Redng	359	91.1
Donc	78	89.9	Sheff	624	91.7
Dorset	258	90.7	Shrew	209	89.6
Dudley	178	83.7	Stevng	390	90.6
Dundee	213	87.1	Sthend	130	91.6
Dunfn	129	87.3	Stoke	258	87.2
Edinb	366	87.5	Sund	213	85.1
Exeter	470	88.6	Swanse	444	84.7
Glasgw	633	86.5	Truro	184	92.0
Glouc	239	89.8	Tyrone	91	92.5
Hull	392	89.2	Ulster	49	83.3
Inverns	92	85.5	Wirral	191	88.8
Ipswi	154	94.5	Wolve	283	89.0
Kent	422	90.8	Wrexm	83	89.9
Klmarnk	157	86.3	York	153	89.3

non-diabetic patient survival in the older age group (65 years and older) was worse compared to diabetic patients in the same age group during the first 90 days for patients starting RRT in 2009 (figure 6.18) presumably due to patient selection. When excluding the first 90 days from the analysis and following patients up for 1 year, survival was lower for diabetic patients in the younger age group (less than 65 years) with 92% of patients alive at 1 year compared to 97% for non-diabetic patients. Survival 1 year after 90 days was similar for diabetic and non-diabetic patients aged 45–64 and 65+ (figure 6.19).

Long term survival for diabetic and non-diabetic patients was evaluated in a cohort of patients starting RRT from 2000 to 2007 with a minimum of 3 years follow-up until 2010. These data show that long term diabetic patient survival was worse compared to non-diabetic patients in the 18–44 year and the 45–64 year age groups; 89% of non-diabetic patients in age group 18–44 were alive at 5 years after start of RRT compared to 69% for diabetic patients and 66% of non-diabetic patients in age group 45–64 were alive at 5 years after start of RRT compared to 47% for diabetic patients (figure 6.20).

Standard primary renal disease and survival

It is hard to set survival standards at present because these should be age, gender, ethnicity and comorbidity

Table 6.12. The effect of adjustment for age, PRD and comorbidity on survival, 2005–2009 cohort

	% survival 1 year after 90 days			
Centre[a]	Unadjusted	Age adjusted	Age, PRD adjusted	Age, PRD and comorbidity adjusted
Swanse	80.1	86.7	87.9	89.7
Ulster	80.8	87.0	87.6	88.3
Carlis	81.9	85.1	86.2	87.6
Sund	82.1	85.5	85.9	86.5
Dorset	83.7	89.5	89.5	89.3
Bradfd	84.0	87.0	87.7	88.8
Middlbr	86.1	89.0	89.3	90.2
L Kings	86.3	88.4	89.6	89.7
Hull	86.9	89.9	90.3	90.5
Glouc	87.1	91.3	91.8	92.1
Bristol	88.4	91.3	91.6	91.7
Nottm	88.7	91.3	92.0	92.4
Wolve	88.9	91.4	91.8	91.9
L Barts	96.0	96.0	96.4	96.2
All centres	**86.4**	**90.3**	**90.0**	**90.4**

[a]Centres included if >85% comorbidity data available

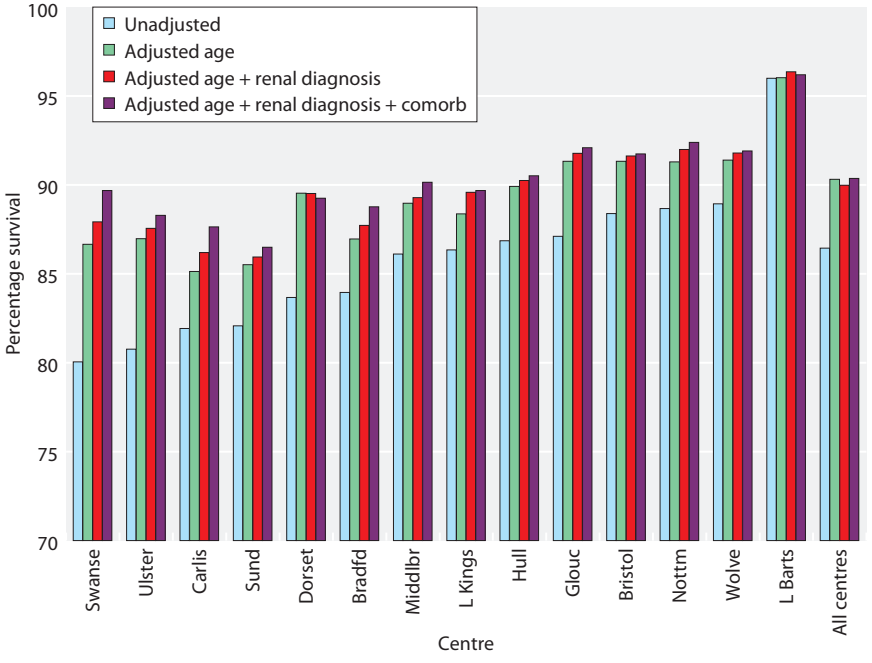

Fig. 6.17. The effect on survival after sequential adjustment for age, PRD and comorbidity, 2005–2009 cohort

adjusted and this is not yet possible from UKRR data. The current 5th edition of the Renal Association Clinical Practice Guidelines [8] does not set any standards for audit of patient survival.

The 3rd Renal Standards document defined standard primary renal disease using the EDTA-ERA diagnosis codes (including only codes 0–49); this excluded 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 are also included in this report to allow comparison with reports from other registries. The survival for patients starting RRT in 2009 in younger age groups (aged 18–54) and followed-up for a maximum of one year is shown in table 6.13. For a longer term comparison, the 2002 cohort is also included (table 6.13).

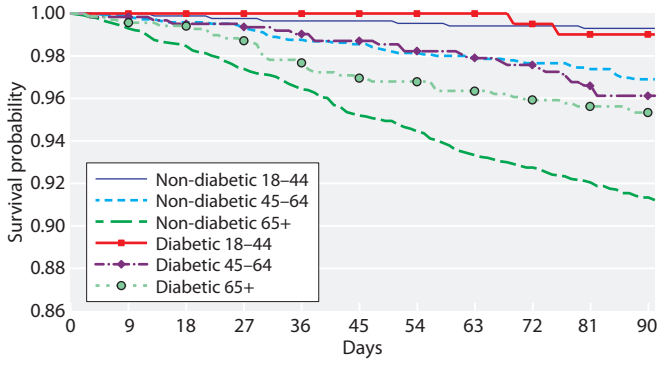

Fig. 6.18. Survival at 90 days for incident diabetic and non-diabetic patients by age group in 2009

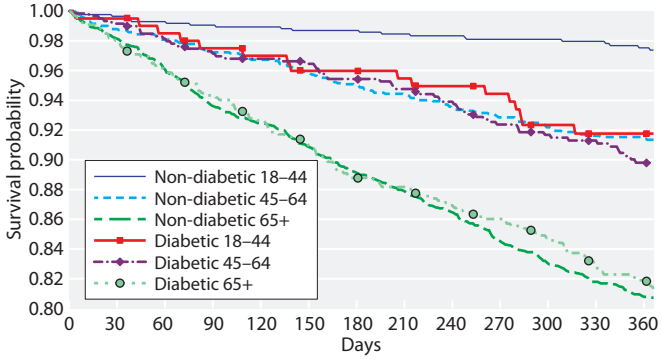

Fig. 6.19. Survival at 1 year after 90 days for incident diabetic and non-diabetic patients by age group in 2009

Results of prevalent patient survival analyses

Table 6.14 shows the one year survival on dialysis, after censoring at the time of transplantation. Patients who have been on dialysis for less than 90 days were excluded. One year survival for prevalent patients was similar to 2009 (89.0%).

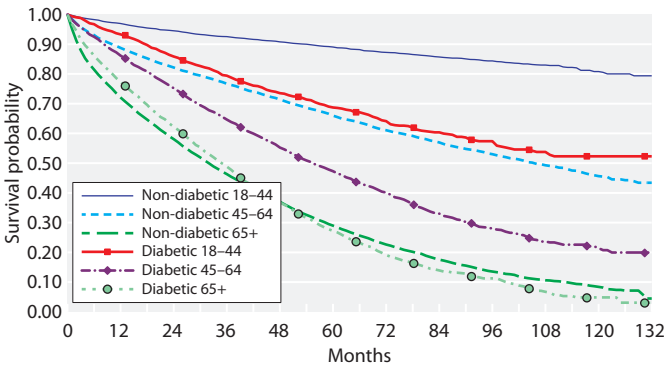

Fig. 6.20. Long term survival for incident diabetic and non-diabetic patients by age group, cohort 2000–2007, followed up for a minimum of 3 years

Table 6.15 gives the 2009 one-year death rate for prevalent dialysis patients in each UK country. The one-year death rate in Wales was significantly higher than in England and Scotland: the higher median age in Wales together with socio-economic reasons probably explains this. The one-year death rate for prevalent dialysis patients in the UK appear to be lower than similar patients in the USA [9].

Table 6.16 shows the 2009 one-year survival for transplanted patients.

Figure 6.21 shows the one year survival of dialysis patients who were alive and receiving dialysis on 1st January 2010.

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 6.14 and is illustrated in figures 6.22 and 6.23; the data for those patients aged <65 years and those aged 65 years and over are separated.

Table 6.13. One-year incident dialysis patient survival (from day 0–365), patients aged 18–54, 2009 and 2002 cohort (excludes patients whose first modality was transplantation)

	2009 cohort		2002 cohort	
First treatment	Standard primary renal disease[a]	All primary renal diseases except diabetes[b]	Standard primary renal disease[a]	All primary renal diseases except diabetes[b]
All dialysis %	95.3	93.4	95.4	93.9
95% CI	*93.7–96.5*	*92.0–94.6*	*93.7–97.1*	*92.2–95.5*
HD %	93.8	92.0	93.4	91.6
95% CI	*91.6–95.5*	*90.1–93.5*	*90.7–96.0*	*89.2–94.0*
PD %	98.9	97.2	98.6	97.9
95% CI	*96.5–99.6*	*95.0–98.4*	*71.1–100*	*96.3–99.6*

[a]Exclude patients with a missing primary renal disease
[b]Exclude patients with diabetes as primary renal disease and patients with a missing primary renal disease

Table 6.14. One year survival of prevalent dialysis patients in each centre (adjusted to age 60), 2010

Centre	N	Adjusted 1 year survival	*Lower 95% CI*	*Upper 95% CI*
Abrdn	221	90.3	*86.8*	*93.9*
Airdrie	165	89.1	*84.5*	*93.8*
Antrim	142	88.6	*84.4*	*93.0*
B Heart	442	87.2	*84.5*	*90.0*
B QEH	1,008	89.8	*88.1*	*91.5*
Bangor	105	86.3	*80.7*	*92.2*
Basldn	165	89.6	*85.7*	*93.7*
Belfast	287	86.9	*83.3*	*90.6*
Bradfd	206	89.5	*85.7*	*93.6*
Brightn	409	90.2	*87.8*	*92.7*
Bristol	494	86.0	*83.3*	*88.7*
Camb	458	91.3	*89.1*	*93.6*
Cardff	585	86.0	*83.5*	*88.6*
Carlis	77	80.7	*73.0*	*89.2*
Carsh	801	90.0	*88.2*	*91.9*
Chelms	150	90.9	*87.1*	*94.9*
Clwyd	79	77.1	*69.1*	*86.1*
Colchr	114	84.8	*79.3*	*90.6*
Covnt	416	90.4	*87.9*	*93.0*
D & Gall	66	87.3	*80.8*	*94.3*
Derby	339	90.4	*87.6*	*93.2*
Derry	65	87.8	*80.9*	*95.2*
Donc	124	89.6	*85.0*	*94.4*
Dorset	271	92.3	*89.7*	*95.0*
Dudley	194	90.6	*87.0*	*94.4*
Dundee	216	88.0	*84.4*	*91.7*
Dunfn	144	87.9	*83.2*	*92.8*
Edinb	340	89.6	*86.5*	*92.7*
Exeter	380	86.5	*83.7*	*89.5*
Glasgw	678	88.8	*86.6*	*91.0*
Glouc	220	91.9	*88.9*	*94.9*
Hull	381	87.4	*84.4*	*90.5*
Inverns	110	88.9	*84.1*	*94.1*
Ipswi	149	88.1	*83.5*	*92.9*
Kent	399	90.8	*88.3*	*93.3*
Klmarnk	180	88.5	*84.4*	*92.7*
L Barts	895	92.8	*91.2*	*94.5*
L Guys	594	90.9	*88.7*	*93.0*
L Kings	495	89.0	*86.5*	*91.6*
L Rfree	698	90.5	*88.5*	*92.5*
L St.G	317	91.0	*88.2*	*93.8*
L West	1,315	91.0	*89.6*	*92.4*
Leeds	568	90.9	*88.8*	*93.0*
Leic	908	90.7	*89.0*	*92.4*
Liv Ain	100	88.3	*82.5*	*94.5*
Liv RI	521	89.5	*87.0*	*92.0*
M Hope	493	86.2	*83.3*	*89.2*
M RI	516	87.0	*84.2*	*89.9*
Middlbr	295	84.2	*80.5*	*88.0*
Newc	333	86.8	*83.5*	*90.2*
Newry	110	86.2	*80.5*	*92.2*
Norwch	355	90.0	*87.4*	*92.7*
Nottm	488	89.5	*87.0*	*92.0*
Oxford	507	87.2	*84.6*	*89.9*
Plymth	168	85.4	*80.9*	*90.2*
Ports	527	88.3	*85.9*	*90.9*
Prestn	523	90.2	*87.9*	*92.6*
Redng	307	89.0	*85.9*	*92.1*
Sheff	658	89.6	*87.5*	*91.7*
Shrew	220	86.3	*82.3*	*90.6*
Stevng	467	90.1	*87.7*	*92.5*
Sthend	135	92.3	*88.5*	*96.3*
Stoke	357	87.1	*84.0*	*90.3*
Sund	193	85.5	*80.9*	*90.4*
Swanse	409	87.9	*85.2*	*90.7*
Truro	155	90.7	*87.0*	*94.5*
Tyrone	99	93.0	*88.6*	*97.5*
Ulster	94	89.4	*84.4*	*94.6*
Wirral	204	88.4	*84.5*	*92.5*
Wolve	342	87.8	*84.8*	*91.0*
Wrexm	110	88.1	*82.9*	*93.6*
York	155	89.4	*85.3*	*93.7*
England	**21,006**	**89.4**	***88.9***	***89.8***
N Ireland	**797**	**88.2**	***86.3***	***90.3***
Scotland	**2,120**	**88.8**	***87.6***	***90.1***
Wales	**1,288**	**86.3**	***84.6***	***88.0***
UK	**25,211**	**89.1**	***88.7***	***89.6***

Survival for Derry is not shown on figure 6.22 as no deaths were recorded for patients aged <65 years. Figure 6.24 shows the age adjusted (adjusted to age 60) data and in figure 6.25 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. Four centres had survival that was significantly below average and two centres had survival that was significantly above average. Figures 6.22 to 6.25 and 6.27 exclude patients once they were transplanted.

Table 6.14 allows centres in figure 6.25 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.

Table 6.15. One-year death rate per 1,000 prevalent dialysis patient years in 2010 and median age of prevalent patients by country

	England	N Ireland	Scotland	Wales
Death rate	149	170	155	207
95% CI	143–154	141–203	138–174	181–235
Median age	65.1	66.6	63.9	66.9

Table 6.16. 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 2010				
Censored at dialysis	22,556	530	97.6	*97.4–97.8*
Not censored at dialysis	22,556	566	97.5	*97.3–97.7*
Dialysis patients 2010				
All	25,211	3,426	85.8	*85.4–86.3*
All adjusted age = 60	25,211	3,426	89.1	*88.7–89.6*
2 year survival – dialysis patients				
All alive on 1/1/2009 (2 year)	24,287	5,869	73.8	*73.2–74.4*
Dialysis patients 2010				
All age <65	12,515	941	91.9	*91.4–92.4*
All age 65+	12,696	2,485	80.2	*79.5–80.9*
Non-diabetic <55	6,021	239	95.7	*95.1–96.2*
Non-diabetic 55–14	3,568	314	90.7	*89.7–91.6*
Non-diabetic 65–14	4,524	652	85.2	*84.2–86.3*
Non-diabetic 75+	5,171	1,189	76.9	*75.8–78.1*
Non-diabetic <65	9,589	553	93.8	*93.3–94.3*
Diabetic <65	2,406	343	85.1	*83.6–86.5*
Non-diabetic 65+	9,695	1,841	80.8	*80.0–81.5*
Diabetic 65+	2,479	533	78.4	*76.7–79.9*

KM = Kaplan–Meier survival
Cohorts of patients alive on 1/1/2010 unless indicated otherwise

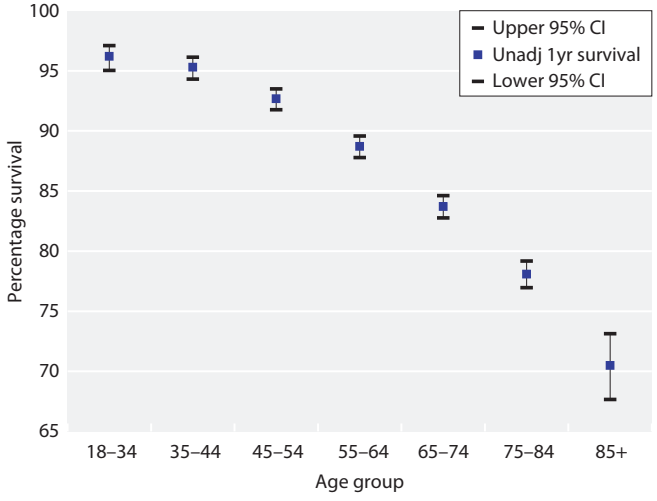

Fig. 6.21. One year survival of prevalent dialysis patients in different age groups, 2010

The one year death rate in prevalent dialysis patients in 2010 by age group

The death rates on dialysis by age group are shown in figure 6.26. 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 the death rate was not 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 groups. The apparent differences between the countries were not statistically significant except for Wales where the death rate was significantly higher compared to England and Scotland.

One year survival of prevalent dialysis patients by UK country from 1997 to 2010

One year survival improvement for prevalent patients seems to have stabilised in England and possibly in Scotland (figure 6.27). In Northern Ireland and Wales numbers are much smaller, the death rate is therefore more variable with very wide confidence intervals and it is difficult to draw conclusions on trends in these countries. The change in prevalent survival by centre over the years 2001 to 2009 is shown in this chapter, appendix 1, table 6.28.

One year survival of prevalent dialysis patients with a primary diagnosis of diabetes from 2001 to 2010

The previously improving age-adjusted survival in patients with diabetic renal disease in the UK seems to have plateaued since 2008 and declined slightly in 2010

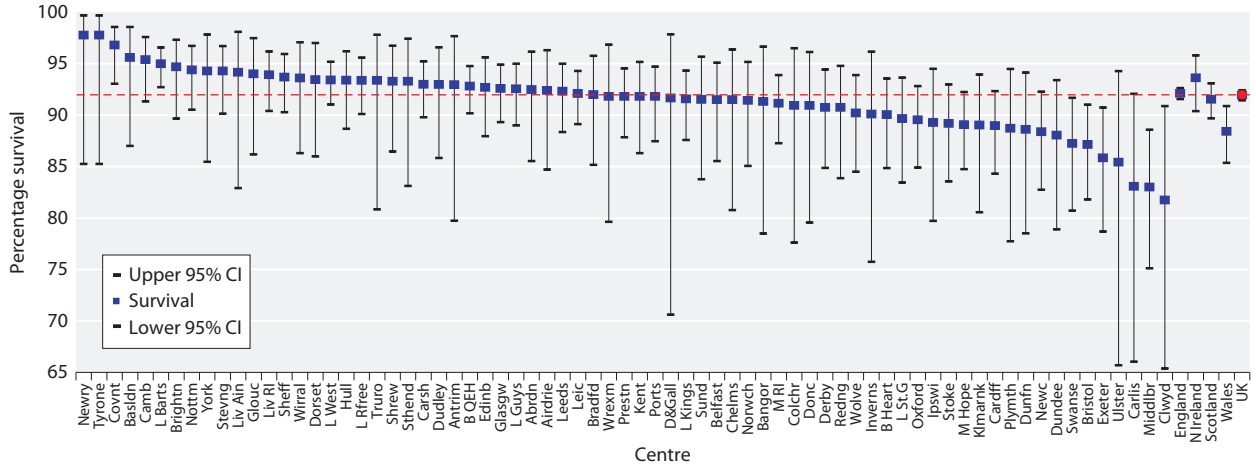

Fig. 6.22. One year survival of prevalent dialysis patients aged under 65 in each centre, 2010

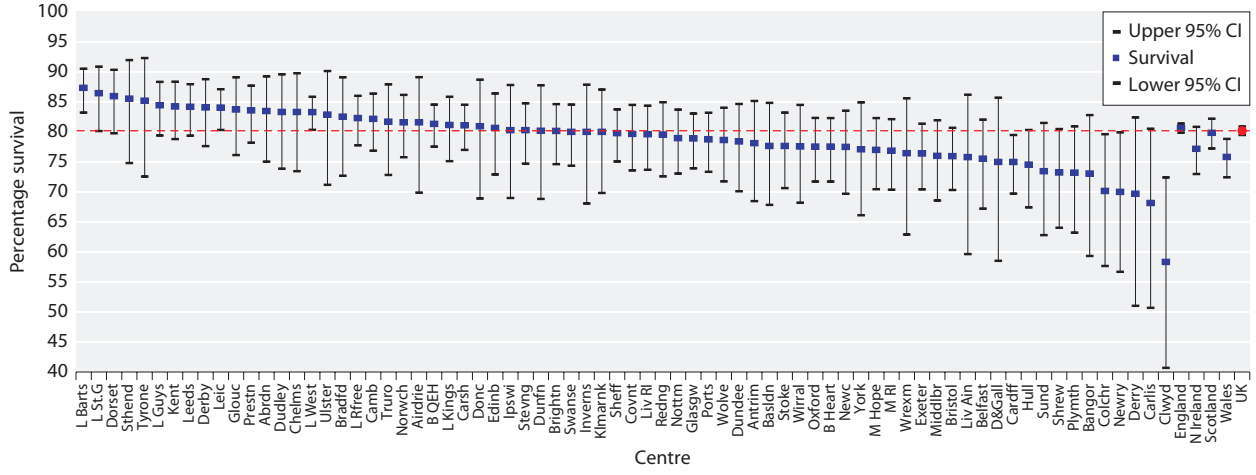

Fig. 6.23. One year survival of prevalent dialysis patients aged 65 years and over in each centre, 2010

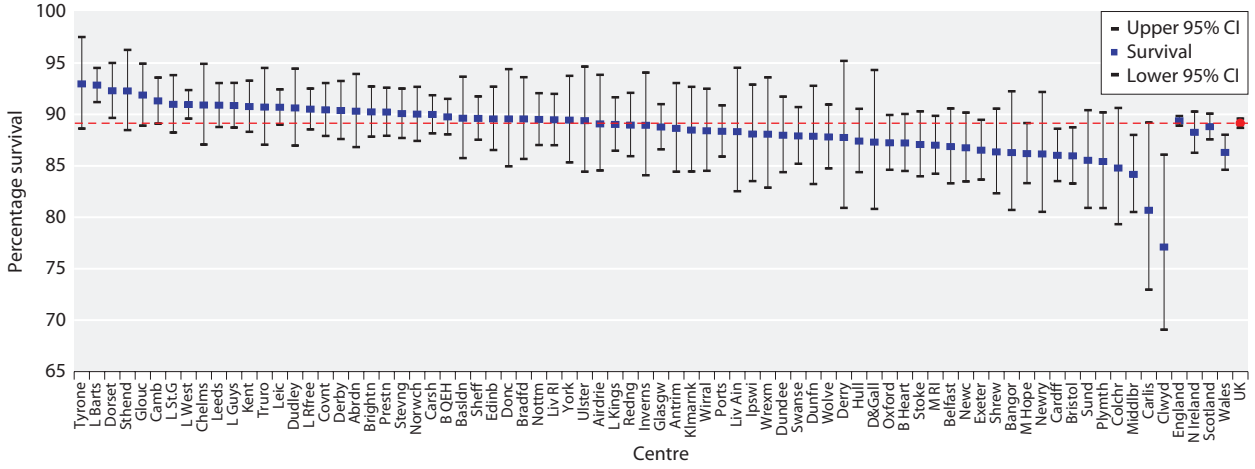

Fig. 6.24. One year survival of prevalent dialysis patients in each centre adjusted to age 60, 2010

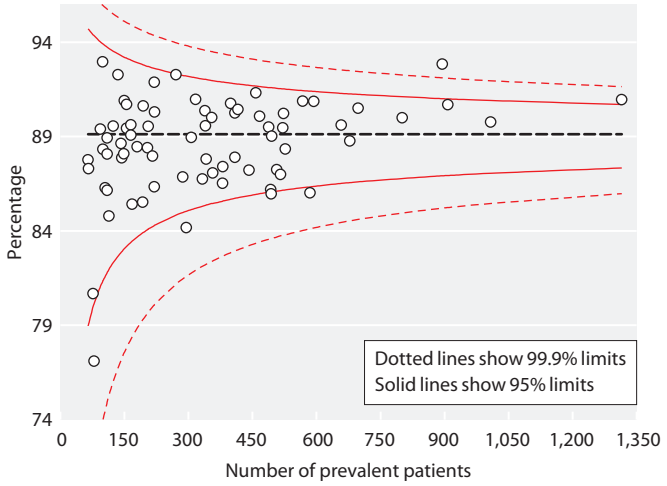

Fig. 6.25. One year funnel plot of prevalent dialysis patients in each centre adjusted to age 60, 2010

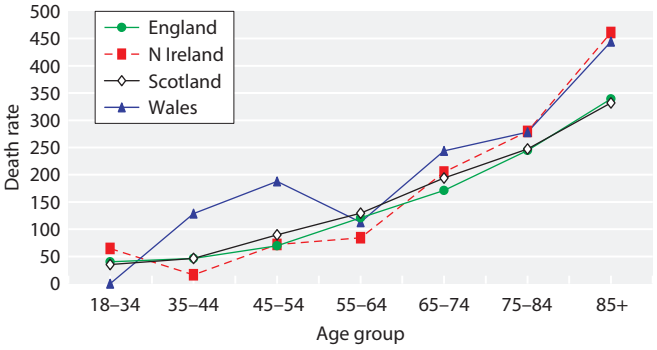

Fig. 6.26. One year death rate per 1,000 patient years by UK country and age group for prevalent dialysis patients

(table 6.17), although this decline was not statistically significant.

Death rate on RRT compared with the UK general population

The death rate compared to the general population is shown in table 6.18. Figure 6.28 shows that the relative risk of death on RRT decreased with age from 25 times that of the general population at age 30 to 34 to 2.7 times the general population 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 are falling (7.7 in 2001, 6.6 in 2010).

Results of analyses on causes of death

Data completeness

Data completeness for cause of death data in the UK has increased by almost 18% from 2009 (table 6.19) with both Northern Ireland and Scotland recording more than 80% of cause of death data. Northern Ireland centres overall had the highest rate of data return (93%) and their cause of death completeness improved by about 50% from 2009. The completeness of cause of death is not comparable with last year's report because of a

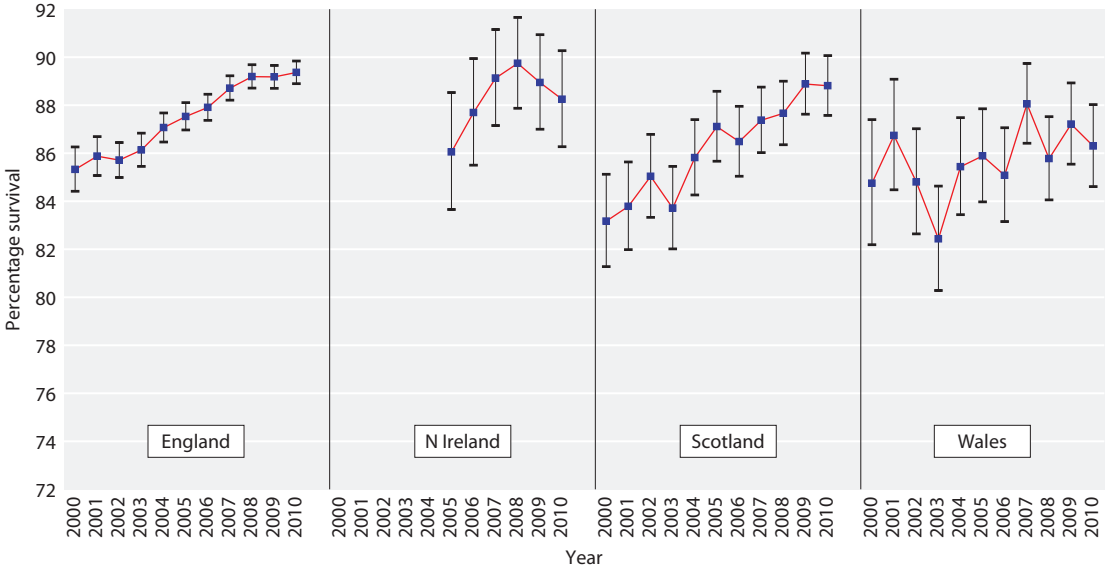

Fig. 6.27. Serial 1 year survival for prevalent dialysis patients by UK country from 2000–2010 adjusted to age 60

Table 6.17. Serial 1 year survival of prevalent dialysis patients with a primary diagnosis of diabetes from 2001–2010

Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
1 year survival	77.1	78.5	77.9	80.6	82.7	82.0	84.9	83.5	83.6	83.2

Table 6.18. Death rate by age for all prevalent RRT patients on 1/1/2010, compared with the general population and with previous analyses in the 1998–2001 cohort

Age group	UK population mid 2010 (thousands)	UK deaths in 2010	Death rate per 1,000 population	Expected number of deaths in UK RR population	UKRR deaths in 2010	UKRR death rate per 1,000 prevalent RRT patients	Relative risk of death[1] in 2010	Relative risk of death[1] 1998–2001
20–24	4,310	1,811	0.4	0	8	9	20.4	41.1
25–29	4,249	2,121	0.5	1	22	15	29.0	41.8
30–34	3,891	2,811	0.7	1	35	18	24.8	31.2
35–39	4,202	4,305	1.0	3	47	16	15.4	26.0
40–44	4,633	6,901	1.5	6	107	26	17.4	22.6
45–49	4,566	9,899	2.2	11	167	34	15.7	19.0
50–54	3,981	13,752	3.5	17	230	46	13.4	12.8
55–59	3,579	19,568	5.5	26	305	64	11.7	10.1
60–64	3,763	31,385	8.3	44	437	84	10.0	10.4
65–69	2,932	38,723	13.2	60	496	108	8.2	7.9
70–74	2,468	53,534	21.7	93	757	177	8.2	7.2
75–79	2,002	73,431	36.7	124	715	211	5.7	5.3
80–84	1,492	95,798	64.2	128	596	298	4.6	4.0
85+	1,411	201,716	143.0	125	331	380	2.7	3.0
Total	**47,479**	**555,755**	**11.7**	**640**	**4,253**	**91**	**6.6**	**7.7**

[1]Relative risk of death for prevalent RRT patients compared with the UK general population

change in the cohort of patients included. This year the calculation is based on all prevalent patients receiving RRT in a calendar year, including incident patients for that year, and for which a death was recorded compared to the previous year when completeness was based on incident patients only. Patterns of cause of death must be cautiously interpreted, as there are significant differences between the causes of death for centres with a high proportion of non-returns when compared to centres with good ($\geqslant$70% causes of death returned) returns. Some centres consistently achieve a very high rate of data return for cause of death because a process is in place to ensure that these data were entered. Several centres have shown significant improvement in data returns and some centres that were not reporting these data in previous years have started collecting and reporting cause of death data. There is still much variability between the centres regarding the completeness of cause of death with some centres returning no data and other centres having 100% completeness (table 6.19).

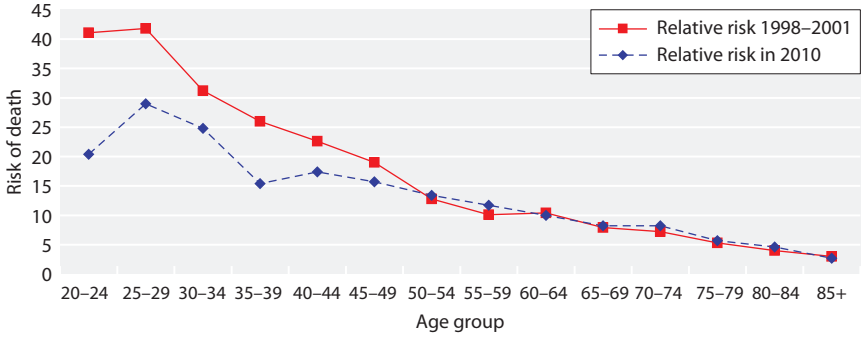

Fig. 6.28. Relative risk of death in all prevalent RRT patients in 2010 compared with the UK general population in 2010

Table 6.19. Percentage completeness of EDTA causes of death for incident patients by centre and year

Centre	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Abrdn	4.8	41.4	38.6	24.4	2.8	0.0	0.0	82.9	97.7	89.2
Airdrie	37.0	50.0	26.7	10.3	40.0	26.3	26.8	79.3	100.0	96.8
Antrim					4.3	10.0	8.6	3.8	26.9	100.0
B Heart	77.2	83.0	75.9	75.0	65.8	83.1	84.5	93.9	100.0	96.6
B QEH				0.0	60.2	3.4	3.2	2.3	0.7	0.6
Bangor		37.5	39.1	42.1	66.7	35.0	86.2	52.4	76.9	73.9
Basldn			96.0	84.0	47.4	23.8	43.5	50.0	80.0	71.0
Belfast					17.5	34.8	38.6	20.7	26.2	82.8
Bradfd	77.8	71.4	86.0	83.3	87.8	90.2	90.0	92.3	77.8	87.9
Brightn				0.0	0.0	0.0	12.0	0.0	1.1	2.4
Bristol	11.7	60.9	85.0	89.9	76.7	60.2	59.2	65.8	69.5	89.4
Camb	0.0	0.0	0.0	1.6	1.5	1.3	0.0	0.0	2.5	10.4
Cardff	5.4	0.9	1.4	0.9	2.8	2.2	2.5	0.0	0.0	2.0
Carlis	35.3	36.8	44.0	68.2	78.3	82.6	65.2	38.1	71.0	100.0
Carsh	0.0	0.0	0.0	0.0	0.0	0.0	0.8	0.8	0.8	6.7
Chelms				35.0	69.7	64.0	76.5	71.4	86.7	86.7
Clwyd		28.6	22.2	0.0	0.0	11.1	45.5	83.3	83.3	100.0
Colchr								0.0	0.0	69.6
Covnt	33.9	43.3	4.4	1.7	0.0	0.0	0.0	1.2	0.0	0.0
D & Gall	100.0	61.5	69.2	76.9	80.0	76.9	100.0	93.3	94.1	100.0
Derby	0.0	5.9	10.0	69.0	77.6	75.6	83.3	97.8	71.4	84.2
Derry						100.0	33.3	16.7	71.4	100.0
Donc								100.0	94.3	90.9
Dorset			0.0	30.6	61.5	64.3	84.6	86.7	81.5	95.7
Dudley	52.9	39.5	0.0	12.2	0.0	0.0	0.0	0.0	0.0	94.3
Dundee	94.1	47.1	92.1	92.1	88.6	2.8	0.0	50.0	90.6	85.7
Dunfn	100.0	95.5	80.0	66.7	81.3	50.0	53.8	61.9	89.3	72.4
Edinb	78.8	58.2	60.4	44.2	50.9	29.3	45.0	85.9	96.2	98.3
Exeter	5.1	23.3	35.1	38.0	31.6	15.8	3.5	2.1	3.0	89.5
Glasgw	63.6	53.6	49.6	41.9	40.2	52.9	55.3	75.4	88.0	66.4
Glouc	60.4	72.2	63.0	43.2	48.4	36.1	48.9	52.1	65.8	97.3
Hull	85.7	90.7	38.4	83.6	81.5	77.3	76.5	48.4	15.8	90.9
Inverns	0.0	0.0	0.0	0.0	0.0	0.0	0.0	65.2	89.5	91.7
Ipswi		60.0	48.5	30.4	10.3	21.9	35.5	13.0	18.8	70.0
Kent								54.4	88.0	89.0
Klmarnk	0.0	4.0	4.0	10.0	0.0	11.1	9.4	95.8	93.3	93.9
L Barts				87.4	83.3	86.3	74.4	76.1	70.1	73.9
L Guys	0.0	0.9	1.2	0.0	0.0	0.0	2.4	1.2	0.0	67.3
L Kings		100.0	31.9	66.7	85.7	90.6	75.6	88.2	67.1	96.1
L Rfree						0.0	0.0	0.0	0.9	1.7
L St.G							16.7	14.8	21.4	53.1
L West		76.4	79.1	67.5	79.5	31.5	16.7	5.8	2.2	0.5
Leeds	52.6	52.4	59.1	68.2	67.2	64.4	27.4	27.0	30.7	95.9
Leic	66.9	78.4	76.8	88.2	71.7	74.1	64.1	63.2	64.7	70.1
Liv Ain				66.7	50.0	81.3	73.3	66.7	100.0	80.0
Liv RI	82.6	81.4	71.0	70.6	39.8	63.6	77.0	74.4	79.2	71.6
M Hope			1.7	1.3	0.0	0.0	1.3	0.0	1.3	0.0
M RI							4.0	0.9	0.0	4.7
Middlbr	84.8	93.7	66.7	42.0	76.1	61.9	50.7	18.2	41.3	88.2
Newc		78.3	30.7	27.4	20.8	29.8	49.4	35.7	43.6	14.3
Newry					0.0	45.0	16.7	15.4	85.7	95.2
Norwch				30.8	21.0	21.4	18.2	21.2	44.4	77.0
Nottm	86.3	94.8	91.5	93.3	96.9	87.5	85.9	98.8	97.1	98.8
Oxford	2.0	3.0	0.8	1.9	1.9	0.0	0.0	1.0	0.0	84.6
Plymth	46.8	44.9	41.5	42.9	35.1	39.6	56.7	70.0	40.0	78.7
Ports	58.3	30.2	32.7	32.6	9.3	4.5	14.6	5.0	41.8	67.0
Prestn	78.7	82.1	73.8	75.9	50.0	55.4	47.8	38.1	17.9	95.7

Table 6.19. Continued

Centre	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Redng	64.3	46.9	86.0	77.1	81.5	77.1	97.8	89.6	83.0	97.3
Sheff	100.0	95.7	97.6	19.6	0.0	0.9	0.8	0.9	0.9	3.0
Shrew				25.0	63.6	53.1	82.1	56.3	20.5	46.0
Stevng	8.5	63.4	63.8	64.2	73.8	55.6	46.4	61.8	64.3	84.9
Sthend	30.8	48.4	66.7	25.0	41.2	9.4	3.2	57.7	75.0	92.3
Stoke							16.1	21.0	28.6	53.9
Sund	58.1	69.2	51.1	54.8	54.8	60.0	60.5	50.0	78.4	93.5
Swanse	74.5	94.9	92.0	89.2	85.7	92.4	97.3	96.1	89.8	96.9
Truro	25.0	67.5	80.6	57.1	2.3	6.9	0.0	18.4	27.0	93.3
Tyrone					46.2	56.0	41.7	30.0	35.3	100.0
Ulster					100.0	85.7	93.3	90.0	78.9	100.0
Wirral		36.4	82.9	64.5	31.3	79.4	60.5	84.4	3.0	54.1
Wolve	97.6	98.2	98.5	96.6	89.1	43.9	52.3	63.2	70.9	96.9
Wrexm	14.8	10.3	0.0	0.0	3.8	0.0	18.2	70.4	100.0	95.7
York	0.0	33.3	82.5	65.8	41.4	83.3	38.5	60.0	60.7	88.9
England	**46.6**	**53.7**	**51.1**	**50.1**	**45.7**	**39.7**	**35.6**	**34.9**	**36.3**	**57.2**
N Ireland					**20.5**	**39.6**	**33.8**	**22.8**	**42.4**	**92.7**
Scotland	**61.5**	**49.6**	**49.5**	**41.7**	**40.4**	**32.1**	**33.6**	**75.2**	**92.5**	**82.9**
Wales	**28.7**	**36.7**	**32.3**	**29.4**	**28.3**	**30.1**	**42.0**	**36.4**	**46.5**	**50.2**
UK	**47.3**	**51.8**	**49.2**	**47.7**	**43.3**	**38.3**	**35.7**	**38.4**	**42.2**	**60.1**

Blank cells, data not available for that year

Table 6.20. Cause of death in the first 90 days for incident patients by age, 2000–2009

	All age groups		<65 years		⩾65 years	
Cause of death	N	%	N	%	N	%
Cardiac disease	526	28	123	30	403	27
Cerebrovascular disease	95	5	21	5	74	5
Infection	327	17	58	14	269	18
Malignancy	158	8	43	10	115	8
Treatment withdrawal	284	15	45	11	239	16
Other	168	9	37	9	131	9
Uncertain	325	17	85	21	240	16
Total	**1,883**		**412**		**1,471**	
No cause of death data	2,341	55	522	56	1,819	55

Table 6.21. Cause of death in 1 year after 90 days for incident patients by age, 2000–2009

	All age groups		<65 years		⩾65 years	
Cause of death	N	%	N	%	N	%
Cardiac disease	787	24	247	26	540	23
Cerebrovascular disease	175	5	44	5	131	6
Infection	593	18	177	19	416	18
Malignancy	342	10	126	13	216	9
Treatment withdrawal	522	16	78	8	444	19
Other	243	7	85	9	158	7
Uncertain	625	19	190	20	435	19
Total	**3,287**		**947**		**2,340**	
No cause of death data	3,991	55	1,145	55	2,846	55

Table 6.22 Cause of death in prevalent RRT patients by age and modality on 1/1/2010

	All modalities		Dialysis		Transplant	
Cause of death	N	%	N	%	N	%
Cardiac disease	572	22	510	23	62	17
Cerebrovascular disease	122	5	101	5	21	6
Infection	498	19	419	19	79	22
Malignancy	279	11	196	9	83	23
Treatment withdrawal	351	14	337	15	14	4
Other	233	9	196	9	37	10
Uncertain	535	21	466	21	69	19
Total	**2,590**		**2,225**		**365**	
No cause of death data	1,666	39	1,393	39	273	43

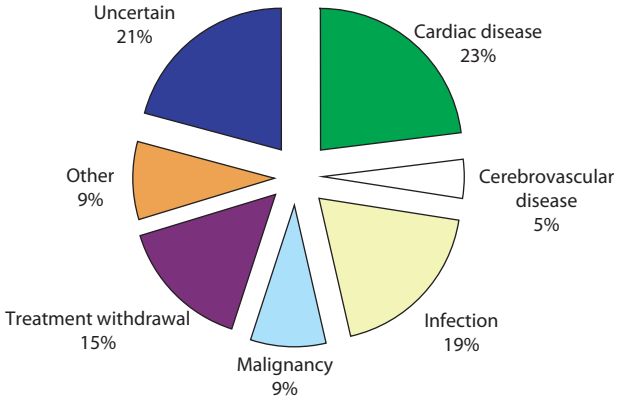

Fig. 6.29. Percentage contribution to cause of death for prevalent dialysis patients in 2010

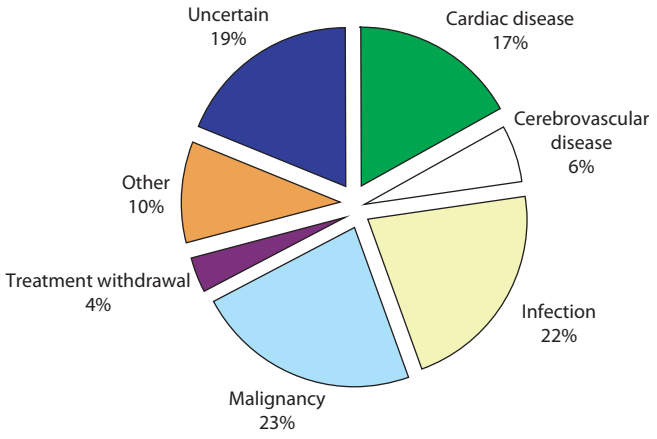

Fig. 6.30. Percentage contribution to cause of death for prevalent transplant patients in 2010

Causes of death in incident RRT patients

Causes of death within the first 90 days

See table 6.20.

Causes of death within one year after 90 days

Treatment withdrawal as a cause of death (tables 6.20, 6.21) in incident patients in the first 90 days and one year after 90 days was more common in older (aged 65+) patients and malignancy more common in younger patients (<65 years old). Infection within the first 90 days as cause of death was more common in older patients.

Causes of death in prevalent RRT patients in 2010

Table 6.22, figures 6.29 and 6.30 show the causes of death for both prevalent dialysis and transplant patients. These data are neither age-adjusted nor adjusted for differences in the comorbidity between the two groups. Cardiac disease as a cause of death was less common in transplanted patients as these were a pre-selected low risk group of patients. Malignancy and infection were both responsible for a greater percentage of deaths in prevalent transplanted patients. There was an increase in treatment withdrawal in the transplanted group compared to 2009 indicating more patients choose not to restart dialysis when their renal transplant fails.

Table 6.23 shows that infection as the cause of death in prevalent patients was much more common in older (⩾65 years old) transplanted patients and malignancy more common in the younger (<65 years old) transplanted patients.

Table 6.24 shows the cause of death for prevalent dialysis patients. Prevalent dialysis patients aged 65 years and over were significantly more likely to withdraw from treatment than younger patients and cardiac disease was much more common as a cause of death in younger (<65 years old) dialysis patients. Figure 6.31 shows cause of death for prevalent patients over the time period 1998 to 2010. Over time, cardiac disease as cause of death has decreased markedly, unknown cause of death increased and cerebrovascular disease gradually declined (figure 6.31).

Table 6.23. Cause of death in prevalent transplanted patients by age on 1/1/2010

	All age groups		<65 years		⩾65 years	
Cause of death	N	%	N	%	N	%
Cardiac disease	62	17	37	18	25	16
Cerebrovascular disease	21	6	12	6	9	6
Infection	79	22	38	18	41	26
Malignancy	83	23	54	26	29	19
Treatment withdrawal	14	4	6	3	8	5
Other	37	10	24	11	13	8
Uncertain	69	19	38	18	31	20
Total	**365**		**209**		**156**	
No cause of death data	273	43	157	57	116	43

Table 6.24. Cause of death in prevalent dialysis patients by age on 1/1/2010

	All age groups		<65 years		⩾65 years	
Cause of death	N	%	N	%	N	%
Cardiac disease	510	23	194	31	316	20
Cerebrovascular disease	101	5	22	3	79	5
Infection	419	19	124	20	295	19
Malignancy	196	9	47	7	149	9
Treatment withdrawal	337	15	43	7	294	18
Other	196	9	68	11	128	8
Uncertain	466	21	136	21	330	21
Total	**2,225**		**634**		**1,591**	
No cause of death data	1,393	39	361	36	1,032	39

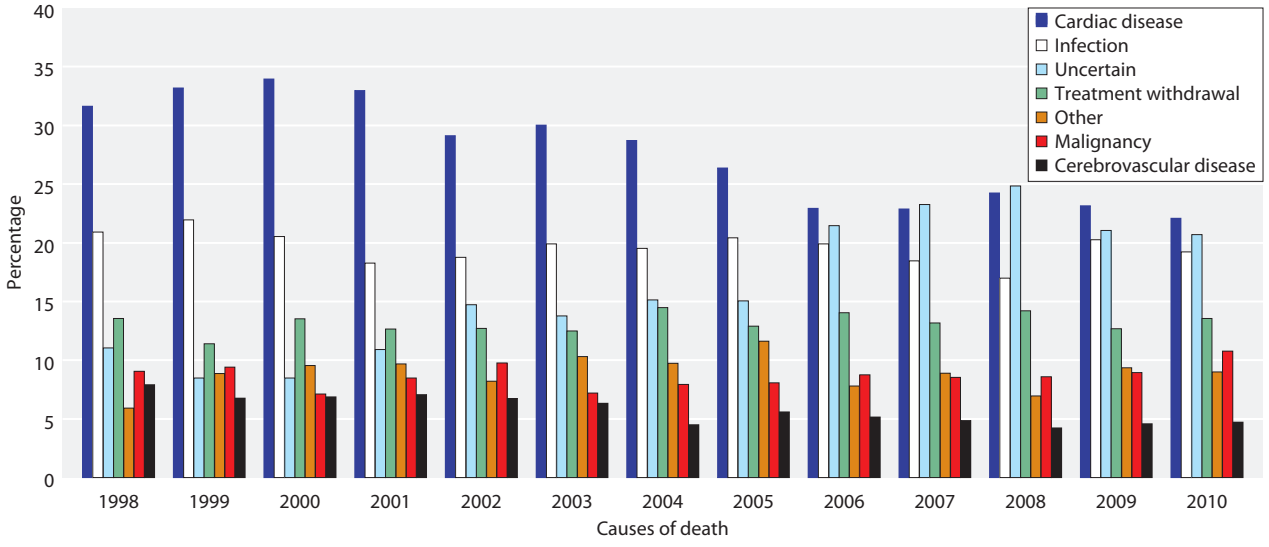

Fig. 6.31. Cause of death in prevalent RRT patients by year

Median life expectancy on RRT

The statistical methodology for this analysis is described in the methodology section at the start of this chapter. Figure 6.32 shows median life expectancy by age group. All incident patients starting RRT from 2000 to 2007 have been included in this analysis and patients were followed up for a minimum of 3 years.

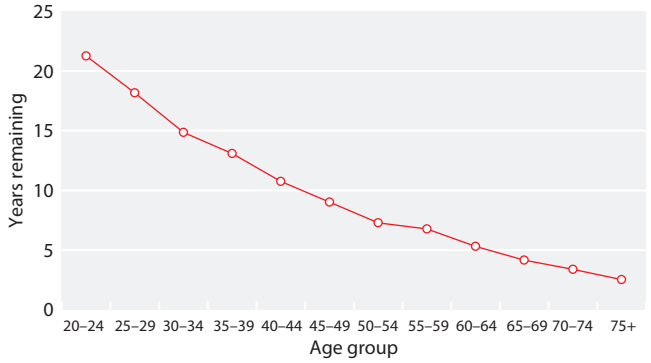

Fig. 6.32. Median life expectancy on RRT by age group, incident patients starting RRT from 2000–2007

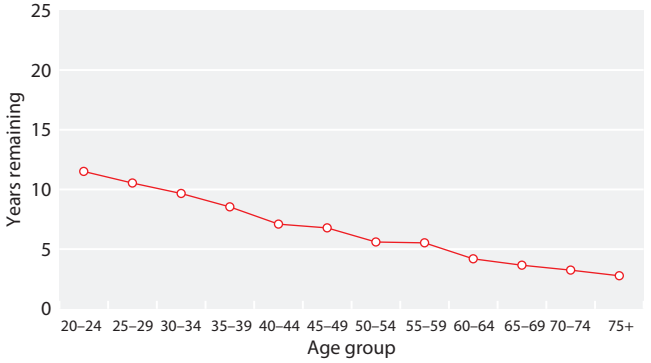

Fig. 6.33. Median life expectancy on RRT by age group, incident diabetic patients starting RRT from 2000–2007

The estimated median survival will be different for low risk patients (e.g. polycystic kidney disease with a transplant) vs. high risk (diabetic with previous myocardial infarction on dialysis) even within the same age group. Median life years remaining for non-diabetic and diabetic patients were also calculated and show that median life expectancy for patients younger than 45 is on average nine years more for non-diabetic patients compared to diabetic patients (figure 6.33). In the older age group ($\geqslant$65 years old) the median life years remaining were similar between diabetic and non-diabetic patients.

Conflicts of interest: none

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Appendix 1: Survival tables

Table 6.25. One-year after 90-day incident survival by centre for 2009, unadjusted and adjusted to age 60

Centre	Unadjusted 1 year after 90 days survival	Adjusted 1 year after 90 days survival	Adjusted 1 year after 90 days 95% CI	Centre	Unadjusted 1 year after 90 days survival	Adjusted 1 year after 90 days survival	Adjusted 1 year after 90 days 95% CI
Abrdn	82.00	85.01	*76.5–94.4*	L Rfree	85.13	86.93	*82.1–92.1*
Airdrie	86.30	86.31	*76.9–96.8*	L St.G	91.81	93.56	*89.3–98.0*
Antrim	95.00	96.80	*91.0–100.0*	L West	90.44	91.85	*89.1–94.7*
B Heart	80.71	84.78	*78.5–91.6*	Leeds	89.87	91.72	*87.6–96.0*
B QEH	89.26	91.12	*87.9–94.5*	Leic	89.32	91.30	*87.9–94.9*
Bangor	86.21	89.92	*81.2–99.6*	Liv Ain	79.86	82.94	*71.6–96.0*
Basldn	66.41	75.84	*62.8–91.6*	Liv RI	92.41	93.53	*89.3–97.9*
Belfast	89.83	92.31	*86.6–98.4*	M Hope	84.17	86.36	*80.8–92.3*
Bradfd	89.22	90.78	*84.1–98.0*	M RI	86.97	88.31	*83.4–93.5*
Brightn	84.16	88.41	*83.3–93.8*	Middlbr	79.46	83.25	*76.5–90.6*
Bristol	86.50	89.77	*85.5–94.3*	Newc	81.92	84.75	*78.1–91.9*
Camb	80.91	84.36	*78.8–90.4*	Norwch	84.15	89.01	*83.1–95.3*
Cardff	84.61	87.96	*83.6–92.5*	Nottm	88.27	90.06	*85.2–95.2*
Carlis	66.41	74.84	*61.4–91.2*	Oxford	87.34	89.16	*84.6–93.9*
Carsh	84.30	88.72	*84.8–92.8*	Plymth	85.49	87.31	*79.1–96.4*
Chelms	90.20	93.16	*87.6–99.1*	Ports	88.79	90.80	*86.4–95.4*
Covnt	91.35	93.78	*89.9–97.8*	Prestn	86.46	87.81	*82.7–93.3*
Derby	82.04	86.40	*79.8–93.5*	Redng	86.78	89.18	*83.3–95.5*
Donc	76.52	82.97	*72.9–94.4*	Sheff	92.71	93.97	*90.4–97.7*
Dorset	88.82	92.19	*87.2–97.5*	Shrew	78.25	84.29	*75.4–94.2*
Dudley	82.20	87.20	*80.1–94.9*	Stevng	93.29	94.03	*89.5–98.8*
Dundee	84.99	89.84	*83.7–96.4*	Sthend	90.87	92.32	*83.1–100.0*
Dunfn	85.71	88.85	*79.3–99.6*	Stoke	81.27	85.99	*80.3–92.1*
Edinb	83.76	86.42	*80.0–93.3*	Sund	83.33	84.21	*75.8–93.6*
Exeter	89.05	92.44	*88.7–96.4*	Swanse	72.20	79.90	*73.5–86.9*
Glasgw	86.16	87.43	*82.5–92.6*	Truro	94.44	96.21	*92.1–100.0*
Glouc	83.41	88.14	*82.0–94.7*	Wirral	88.64	90.19	*83.0–97.9*
Hull	88.68	90.99	*85.8–96.5*	Wolve	83.22	85.24	*77.2–94.1*
Ipswi	86.20	90.82	*83.5–98.8*	York	91.84	93.58	*86.9–100.0*
Kent	88.65	91.50	*87.2–96.0*	**England**	**87.18**	**89.56**	***88.7–90.5***
Klmarnk	76.32	82.85	*73.3–93.6*	**N Ireland**	**88.36**	**91.15**	***87.2–95.3***
L Barts	89.96	89.95	*86.0–94.0*	**Scotland**	**83.69**	**86.56**	***83.8–89.4***
L Guys	93.92	94.07	*90.6–97.7*	**Wales**	**80.77**	**85.79**	***82.5–89.2***
L Kings	85.48	85.99	*80.2–92.2*	**UK**	**86.59**	**89.18**	***88.3–90.0***

Excluded: Data from centres with less than 20 patients (Clwyd, Colchr, D & Gall, Derry, Invern, Newry, Tyrone, Ulster, Wrexm)

Table 6.26. Ninety day incident survival by centre for 2009, unadjusted and adjusted to age 60

Centre	Unadjusted 90 day survival	Adjusted 90 day survival	Adjusted 90 day 95% CI
Abrdn	90.9	93.3	*87.8–99.1*
Airdrie	91.7	92.4	*85.5–99.8*
Antrim	95.2	97.3	*92.2–100.0*
B Heart	96.0	97.2	*94.6–99.9*
B QEH	97.6	98.2	*96.8–99.6*
Bangor	96.7	97.8	*93.9–100.0*
Basldn	92.3	95.4	*89.5–100.0*
Belfast	96.7	97.8	*94.8–100.0*
Bradfd	93.4	95.0	*90.3–99.9*
Brightn	92.5	95.1	*92.0–98.3*
Bristol	91.8	94.4	*91.5–97.5*
Camb	94.9	96.3	*93.6–99.0*
Cardff	94.9	96.5	*94.3–98.8*
Carsh	93.2	95.6	*93.4–97.9*
Covnt	92.4	95.1	*92.0–98.3*
Derby	93.6	95.7	*92.1–99.4*
Donc	87.5	91.9	*85.4–98.9*
Dorset	94.7	96.7	*93.6–99.9*
Dudley	84.1	89.9	*84.4–95.8*
Dundee	89.9	94.2	*90.0–98.5*
Dunfn	84.8	89.6	*81.6–98.5*
Edinb	90.7	93.0	*88.7–97.5*
Exeter	90.3	94.1	*91.1–97.2*
Glasgw	88.6	90.8	*87.0–94.8*
Glouc	93.7	96.0	*92.6–99.5*
Hull	94.0	95.6	*92.2–99.1*
Inverns	85.7	89.5	*79.2–100.0*
Kent	91.5	94.4	*91.3–97.7*
Klmarnk	97.4	98.4	*95.3–100.0*
L Barts	96.7	96.8	*94.7–99.0*
L Guys	97.2	97.4	*95.2–99.7*
L Kings	98.4	98.6	*96.6–100.0*
L Rfree	95.3	96.1	*93.6–98.8*
L St.G	95.3	96.6	*93.8–99.6*
L West	95.5	96.5	*94.8–98.2*
Leeds	94.1	95.7	*93.0–98.5*
Leic	93.4	95.1	*92.7–97.6*
Liv Ain	78.9	85.3	*76.5–95.2*
Liv RI	98.2	98.6	*96.6–100.0*
M Hope	96.8	97.5	*95.0–99.9*
M RI	99.3	99.4	*98.3–100.0*
Middlbr	92.6	94.7	*91.0–98.6*
Newc	91.0	93.2	*89.0–97.6*
Newry	95.0	96.2	*89.4–100.0*
Norwch	98.6	99.2	*97.6–100.0*
Nottm	95.5	96.6	*93.9–99.3*
Oxford	87.0	90.2	*86.4–94.2*
Plymth	92.9	94.5	*89.5–99.9*
Ports	94.6	96.0	*93.3–98.8*
Prestn	93.9	94.8	*91.5–98.2*
Redng	90.7	93.4	*89.4–97.7*
Sheff	94.0	95.5	*92.6–98.4*
Shrew	93.6	95.9	*91.6–100.0*
Stevng	96.9	97.5	*94.7–100.0*
Stoke	93.6	95.8	*92.8–98.9*
Sund	93.8	94.5	*89.4–99.9*
Swanse	93.0	95.8	*92.9–98.7*
Truro	93.1	95.8	*91.8–99.9*
Wirral	90.5	92.4	*86.8–98.4*
Wolve	93.8	95.1	*90.6–99.9*
Wrexm	85.0	91.2	*82.3–100.0*
York	87.2	90.7	*83.9–98.0*
England	**94.2**	**95.8**	***95.2–96.4***
N Ireland	**96.7**	**97.8**	***95.9–99.7***
Scotland	**90.1**	**92.8**	***90.9–94.8***
Wales	**93.9**	**96.2**	***94.6–97.8***
UK	**93.9**	**95.6**	***95.1–96.2***

Excluded: centres with data from less than 20 incident patients (Clwyd, Colchr, D & Gall, Derry, Tyrone, Ulster) and centres with no deaths in the first 90 days of RRT (Carlis, Chelms, Ipswi, Sthend)

Table 6.27. One year after 90-day incident survival by centre for incident cohort years 2001–2009, adjusted to age 60

	One year after 90 days survival								
Centre	2001	2002	2003	2004	2005	2006	2007	2008	2009
Abrdn	92.4	88.0	82.9	89.7	79.5	82.8	85.1	94.0	85.0
Airdrie	84.8	79.5	78.8	85.7	72.3	75.6	84.2	90.9	86.3
Antrim					86.2	94.4	84.9	94.9	96.8
B Heart	85.9	88.7	86.5	87.6	85.0	90.0	90.9	93.2	84.8
B QEH				88.5	90.3	87.7	93.3	89.3	91.1
Bangor		83.1	88.9	84.2	81.4	81.5	92.7	88.6	89.9
Basldn			91.9	95.1	92.4	91.0	87.8	92.4	75.8
Belfast					90.4	92.4	90.3	88.3	92.3
Bradfd	93.4	86.3	84.5	84.6	85.7	76.9	86.8	85.3	90.8
Brightn				88.1	83.2	90.4	94.3	87.1	88.4
Bristol	85.7	87.9	87.2	87.9	83.5	93.2	90.9	83.5	89.8
Camb	90.7	82.4	88.9	87.6	90.9	92.4	91.7	92.6	84.4
Cardff	83.3	83.0	89.3	86.3	88.4	85.9	82.2	86.7	88.0
Carlis		87.8	78.3	87.0	82.8	91.1	92.8	85.5	75.0
Carsh	76.2	84.7	90.8	87.0	91.6	85.8	89.1	86.5	88.7
Chelms				81.5	86.6	87.4	90.3	94.5	93.2
Clwyd					80.1		82.8		
Colchr								85.4	
Covnt	87.8	90.5	82.9	85.7	87.3	85.0	91.3	87.5	93.8
D & Gall	74.0	78.2							
Derby	85.1		83.6	87.2	89.2	92.8	94.2	91.8	86.4
Derry									
Donc								92.8	83.0
Dorset			86.3	91.3	82.7	90.0	86.1	92.8	92.2
Dudley	90.6	89.4	89.2	85.9	96.7	89.5	84.9	65.4	87.2
Dundee	86.9	84.0	89.7	84.2	86.4	89.7	79.4	89.0	89.8
Dunfn	70.4	86.2	85.7	88.0	77.1	83.2	85.3	93.0	88.8
Edinb	80.5	82.6	83.2	79.7	86.0	87.9	92.4	83.4	86.4
Exeter	85.6	87.1	85.2	86.8	86.2	87.7	86.8	87.2	92.4
Glasgw	79.9	83.8	85.4	81.4	84.8	84.5	88.0	86.5	87.4
Glouc	82.6	82.4	85.0	87.0	93.4	89.9	86.6	96.5	88.1
Hull	88.9	85.8	87.6	86.3	89.5	92.1	86.4	87.3	91.0
Inverns	91.7	83.7	88.0	83.6	85.4	90.9	80.1	90.9	
Ipswi		98.3	93.7	91.2	85.4	96.1	94.3	97.5	90.8
Kent							92.4	88.3	91.5
Klmarnk	88.3	87.4	85.3	84.1	93.9	84.0	90.4	91.4	82.9
L Barts				87.7	93.1	91.6	88.0	93.7	90.0
L Guys	88.5	86.6	93.9	88.0	93.1	91.0	92.8	90.4	94.1
L Kings		88.0	86.0	88.8	88.8	88.8	88.0	89.1	86.0
L Rfree					91.6	92.3	93.4	95.3	86.9
L St.G							92.4	92.6	93.6
L West		93.1	95.9	92.0	93.9	94.0	92.0	94.0	91.8
Leeds	89.8	85.7	88.9	89.8	89.7	85.3	87.4	91.2	91.7
Leic	87.4	88.0	90.7	85.9	85.6	87.6	88.8	91.8	91.3
Liv Ain					85.5	86.3	80.4	84.5	82.9
Liv RI	87.3	85.0	83.3	84.8	91.2	83.8	89.6	95.5	93.5
M Hope			88.7	82.9	92.1	91.7	82.8	87.1	86.4
M RI							87.6	91.1	88.3
Middlbr	83.3	78.5	82.5	85.6	83.2	89.6	87.4	85.9	83.3
Newc		87.1	86.8	83.9	83.6	87.0	86.4	92.7	84.7
Newry					86.6			88.4	
Norwch				86.2	90.2	89.1	88.8	91.0	89.0
Nottm	90.0	86.8	86.4	84.8	86.8	94.6	88.6	90.3	90.1
Oxford	86.8	89.0	87.9	90.6	87.0	90.7	89.0	91.2	89.2
Plymth	73.3	82.0	81.5	81.2	82.0	83.9	89.7	91.6	87.3

Table 6.27. Continued

	One year after 90 days survival								
Centre	2001	2002	2003	2004	2005	2006	2007	2008	2009
Ports	86.7	86.1	87.9	89.4	83.5	86.3	89.9	87.7	90.8
Prestn	87.1	86.6	86.0	84.1	91.9	84.8	89.2	80.6	87.8
Redng	83.3	92.5	92.0	93.8	88.7	90.5	90.2	94.5	89.2
Sheff	94.3	84.4	90.1	89.9	92.1	89.5	86.9	96.0	94.0
Shrew				88.0	89.7	90.0	89.5	92.5	84.3
Stevng	81.3	87.6	94.8	88.7	78.9	88.4	88.8	91.9	94.0
Sthend	80.7	87.7	90.8	87.4	92.3	96.4	91.9	84.0	92.3
Stoke							85.5	90.4	86.0
Sund	85.2	71.3	81.3	88.2	82.6	82.4	87.6	86.2	84.2
Swanse	85.7	83.4	82.4	82.3	84.2	83.5	89.6	85.1	79.9
Truro	91.4	83.6	88.5	92.4	88.1	92.8	86.6	92.2	96.2
Tyrone						89.7	89.5	97.2	
Ulster									
Wirral		78.4	94.9	82.6	88.2	90.9	86.8	87.1	90.2
Wolve	77.4	88.0	82.7	88.0	86.0	90.0	90.8	89.2	85.2
Wrexm	83.3	93.2	83.9	91.9	91.8	90.8	90.7		
York	87.1	82.4	78.9	90.1	85.4	83.4	94.6	85.3	93.6
England	**86.6**	**86.6**	**88.3**	**87.8**	**88.6**	**89.4**	**89.6**	**90.1**	**89.6**
N Ireland					**89.8**	**91.8**	**89.7**	**90.7**	**91.2**
Scotland	**82.7**	**83.8**	**85.4**	**83.8**	**84.2**	**84.9**	**86.5**	**88.5**	**86.6**
Wales	**84.3**	**84.5**	**85.9**	**85.7**	**86.3**	**85.6**	**85.9**	**86.2**	**85.8**
UK	**85.9**	**86.0**	**87.7**	**87.2**	**88.0**	**88.9**	**89.1**	**89.8**	**89.2**

Blank cells: centres with <20 patients for that year or centres with no data available for that year

Table 6.28. One year prevalent survival percentage by centre for prevalent cohort years 2001–2010, adjusted to age 60

	One-year prevalent survival									
Centre	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Abrdn	89.4	87.2	80.6	85.6	87.6	86.9	87.1	89.7	89.6	90.3
Airdrie	78.6	82.1	84.8	84.3	83.1	79.8	79.4	85.7	85.7	89.1
Antrim					83.6	92.0	85.6	89.0	89.6	88.6
B Heart	87.5	88.0	87.8	86.9	88.0	86.3	87.8	90.4	90.8	87.2
B QEH				89.1	89.0	88.7	88.4	88.4	90.0	89.8
Bangor		86.2	81.3	89.6	86.4	89.3	80.6	88.6	84.5	86.3
Basldn			82.8	87.7	90.9	90.5	91.1	93.2	91.9	89.6
Belfast					86.1	86.6	90.7	87.5	87.3	86.9
Bradfd	78.8	88.4	82.7	87.8	86.2	82.0	84.0	88.1	84.8	89.5
Brightn				87.1	84.5	87.6	87.3	89.4	87.6	90.2
Bristol	86.1	87.7	88.8	86.8	87.6	87.7	89.2	87.1	84.9	86.0
Camb	86.2	86.8	87.0	87.6	87.7	89.0	88.2	92.8	90.4	91.3
Cardff	85.7	85.9	80.8	84.4	84.4	84.3	88.8	82.6	86.7	86.0
Carlis	89.2	81.3	83.2	82.4	84.7	84.0	85.9	86.6	80.1	80.7
Carsh	83.7	82.7	85.0	87.9	86.4	89.2	88.9	90.0	89.3	90.0
Chelms				87.0	82.3	85.7	86.3	84.6	85.7	90.9
Clwyd		88.1	89.0	75.7	81.8	78.9	90.6	87.8	89.0	77.1
Colchr									91.0	84.8
Covnt	85.3	85.5	87.8	88.7	89.2	85.8	87.2	87.5	91.0	90.4
D&Gall	83.4	83.4	85.3	83.2	92.0	83.2	90.3	85.7	88.4	87.3
Derby	89.6		86.6	89.0	88.5	89.1	87.5	90.9	91.0	90.4
Derry							86.8	92.4	90.8	87.8
Donc								93.9	83.9	89.6
Dorset			90.2	88.1	90.4	86.3	87.4	89.8	89.8	92.3
Dudley	83.3	83.4	84.8	86.9	86.4	87.3	87.0	88.9	88.5	90.6
Dundee	86.2	85.2	83.7	85.8	87.9	87.6	83.9	84.1	93.8	88.0
Dunfn	78.9	82.3	84.2	88.9	90.9	88.6	88.8	89.9	87.8	87.9
Edinb	81.9	84.0	83.4	86.3	86.2	86.9	88.3	88.2	86.9	89.6
Exeter	85.2	87.5	86.7	86.1	84.3	90.9	87.4	85.5	85.1	86.5
Glasgw	83.5	86.0	83.9	85.5	87.5	86.4	88.2	87.6	88.5	88.8
Glouc	79.8	84.0	82.2	89.2	88.2	91.6	88.0	87.3	92.0	91.9
Hull	87.1	87.5	85.6	85.7	84.9	85.8	90.1	87.0	87.9	87.4
Inverns	89.0	88.5	87.6	86.9	87.2	86.4	94.4	89.1	92.1	88.9
Ipswi		82.2	84.6	90.4	86.0	84.8	85.3	91.6	85.0	88.1
Kent								86.6	87.9	90.8
Klmarnk	86.4	83.0	82.7	87.5	85.1	91.7	87.2	88.9	88.5	88.5
L Barts				83.9	85.6	88.3	89.2	88.7	90.7	92.8
L Guys	86.8	86.3	88.7	88.5	89.2	87.5	90.5	90.1	91.3	90.9
L Kings		81.1	77.5	81.6	86.5	89.1	84.9	88.4	87.9	89.0
L Rfree					90.1	90.7	90.4	91.3	89.7	90.5
L St.G							95.9	94.3	89.9	91.0
L West		89.8	91.4	91.1	91.7	91.6	92.1	90.5	92.4	91.0
Leeds	85.4	87.0	86.1	84.9	88.8	88.7	88.0	87.5	89.1	90.9
Leic	84.6	84.0	83.8	85.2	87.3	84.6	90.1	89.6	88.7	90.7
Liv Ain		90.8	90.9	90.4	97.0	86.7	91.0	88.9	92.1	88.3
Liv RI	81.3	82.4	84.8	85.9	84.2	88.3	85.5	87.2	89.2	89.5
M Hope			84.7	82.3	84.5	86.4	88.4	87.3	88.4	86.2
M RI							85.9	86.7	87.5	87.0
Middlbr	84.1	84.3	84.5	83.2	86.2	85.5	87.2	87.2	86.9	84.2
Newc		83.2	81.3	82.4	89.4	88.4	90.0	90.5	88.8	86.8
Newry					86.2	88.1	87.2	90.6	94.7	86.2
Norwch				87.2	87.9	90.0	87.1	91.0	89.1	90.0
Nottm	86.9	82.9	85.0	86.3	85.1	83.3	89.4	88.3	87.8	89.5
Oxford	88.3	85.5	86.5	88.1	87.7	87.7	87.1	88.2	89.0	87.2
Plymth	87.4	76.7	84.4	86.9	88.0	83.5	82.8	88.7	85.6	85.4

Table 6.28. Continued

	One-year prevalent survival									
Centre	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Ports	84.0	80.9	81.8	89.2	85.7	84.9	89.9	88.7	89.1	88.3
Prestn	87.3	86.4	84.8	85.9	85.5	86.6	90.9	90.4	89.7	90.2
Redng	78.0	85.8	83.7	89.7	87.0	89.5	90.0	89.5	92.3	89.0
Sheff	88.0	90.5	91.0	87.8	87.2	89.2	88.6	88.7	89.5	89.6
Shrew				85.2	87.4	86.3	89.5	89.0	88.1	86.3
Stevng	91.2	86.5	88.4	89.5	88.7	89.7	89.5	92.9	90.5	90.1
Sthend	88.9	89.6	87.2	89.4	86.6	83.7	85.2	90.1	90.9	92.3
Stoke							84.5	87.3	88.2	87.1
Sund	78.6	78.6	76.1	82.8	86.6	79.6	83.3	87.7	85.7	85.5
Swanse	87.6	80.8	82.4	87.6	89.3	86.3	88.3	89.7	87.5	87.9
Truro	89.0	82.6	90.2	89.9	85.7	91.7	88.7	90.1	88.7	90.7
Tyrone					89.0	82.8	93.1	93.5	87.3	93.0
Ulster					86.2	91.6	89.4	92.3	87.4	89.4
Wirral		93.2	83.7	87.9	89.4	89.2	87.7	89.3	90.6	88.4
Wolve	90.1	86.7	83.8	86.3	87.4	89.4	87.9	93.2	89.6	87.8
Wrexm	88.1	87.3	86.0	86.2	84.6	85.1	88.9	86.0	90.2	88.1
York	79.8	85.5	82.1	83.5	89.0	84.1	89.1	88.5	88.6	89.4
England	85.9	85.7	86.1	87.1	87.5	87.9	88.7	89.2	89.2	89.4
N Ireland					86.1	87.7	89.1	89.7	88.9	88.2
Scotland	83.8	85.0	83.7	85.8	87.1	86.5	87.4	87.7	88.9	88.8
Wales	86.7	84.8	82.4	85.4	85.9	85.1	88.1	85.8	87.2	86.3
UK	85.6	85.6	85.6	86.8	87.3	87.6	88.6	88.9	89.0	89.1

Blank cells: data not available for that year or less than 20 patients in that year