

Chapter 17: International Comparisons: Incidence, Prevalence Markers of Quality of Care and Survival

Summary

- Amongst developed countries, the UK has a relatively low acceptance rate for RRT, with a low proportion due to diabetic nephropathy.
- The UK achieves similar phosphate control in PD patients to that in Australia although phosphate control in HD patients is slightly worse in the UK.
- Two year survival of incident patients in the UK is around the European average.
- Comparisons of national registries show that age distribution of dialysis patients in the UK and the USA is similar. In the UK, history of a previous MI is found in 50% more patients starting RRT over age 65 years than in the USA.
- In the USA the apparent higher rates of cardiac disease than the UK is misleading. It is due to the inclusion of congestive cardiac failure and dysrhythmias, which are not collected by the UK Registry.
- In the UK, patients starting RRT have a much higher incidence of cerebrovascular disease than the USA (18% v 12% in patients aged 75+).
- The incidence of peripheral vascular disease and COPD is similar in the UK to the USA across all age bands.

Problems of international comparison

When making international comparisons of RRT, it is essential to ensure that the data sets are truly comparable. There are two main types of data used; data sets from national registries and data sets from sample studies such as the Dialysis Outcomes and Practice Pattern Study (DOPPS)¹. There are problems associated with both types of data set. Registries may have

complete or near complete coverage of their country or region, but often lack detail (eg co-morbidity) and depend on the rigour of individual renal units to ensure the accuracy of the data. Not all renal units are motivated for accurate data collection. The UK Renal Registry is now accumulating a useful volume of detailed data, including some co-morbidity data.

Sample studies such as DOPPS are often well-funded and record detailed data, but are open to sampling errors which may be important when it comes to interpretation. iDOPPS only collect data on haemodialysis patients which in the UK would exclude 33% of the dialysis population who are on PD (and have less co-morbidity). In some UK centres, 60% of patients are on PD and iDOPPS sampling from HD patients in these centres would produce an even more biased subset of patients. This accounts for the apparent higher UK mortality published by iDOPPS which is not seen in the European Renal Registry analysis of UK data compared with other European countries (Table 17.7).

These data used for international comparisons in this chapter are all derived from large national or renal registries.

International comparative incidence data

International comparisons of incidence RRT data are subject to the problems of different definitions and levels of ascertainment. It is not clear whether the small number of paediatric patients is included in the figures for all countries. In many countries there is uncertainty about the earliest date recorded – in the UK it is the first RRT, in the USA it is the 90th day of RRT. In the other European countries there is considerable variation between these extremes: it is often the date at which a patient is transferred to the renal service, although dialysis or haemofiltration may have been occurring for some weeks before. The later the date, the lower the incidence and early

Table 17.1: Annual incidence rates of RRT by country, per million population

Country	Incidence				% diabetic 2002/03
	2000	2001	2002	2003	
Taiwan	323	357	365	–	35
USA	325	328	336	–	44
Japan	252	252	262	265	41
Germany	175	184	174	186	36
Belgium (Dutch-speaking)	–	–	170	–	17
Greece	157	164	165	–	27
Czech Republic	151	163	157	–	35
Canada	143	152	154	–	34
Italy	131	136	142	–	16
Austria	133	136	132	141	33
Hungary	129	130	N/A	139	25
Uruguay	121	124	136	–	20
Denmark	–	–	130	129	22
Spain	132	127	126	–	22
Turkey	115	141	122	–	23
Sweden	126	124	125	121	24
New Zealand	110	119	115	112	40
UK	89	95	101	103	18
Netherlands	93	101	100	101	16
Poland	68	84	99	–	24
Bosnia and Herzegovina	–	–	77	95	–
Australia	92	97	94	98	26
Norway	89	95	92	95	16
Finland	90	91	94	93	39

mortality, as the initial 90-day high mortality will be lost.

The estimated UK annual acceptance rate has slowly risen to 103 pmp over the last 5 years (Table 17.1).

Some countries show a very similar pattern to the UK with a rate around 90–100 pmp, with/without a small upward trend – this group includes several Northern European countries (Finland, Netherlands, Norway) and Australia. Sweden and New Zealand, which might be expected to have this pattern, have higher rates. Southern European countries, which have lower rates of cardiovascular disease and longer life expectancy than the UK, have higher rates of RRT (Italy, Greece, Spain). One might speculate that the competing risk of cardiovascular disease, with earlier death in the UK, is a significant factor contributing to these differences.

Germany and Austria both have high rates, Germany higher than Austria. The more developed South-East Asian countries and the

USA, have the highest rates, with small upward trends.

There are complex factors that may affect RRT acceptance rates including demography, the incidence and progression rates of chronic kidney disease, competing health risks (largely cardiovascular), health care access and referral/acceptance patterns.

Diabetic nephropathy is the major contributor to the incidence of RRT in the developed world. The proportion of patients with diabetic nephropathy in the UK is relatively low for developed countries (Table 17.1). This accounts for some of the differences in incidence observed. The reasons for this are not fully understood. The USA has a higher incidence of diabetics starting on renal replacement therapy each year than total incidence rate of all patients starting RRT in the UK.

Analysis by the proportions of the incident UK and US RRT patients within specific age bands shows a similar distribution (Figure 17.1).

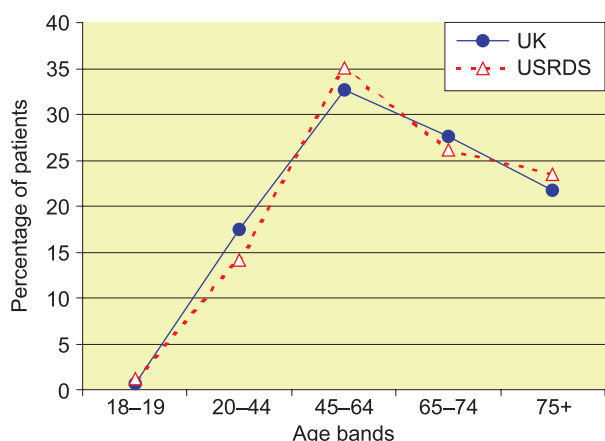


Figure 17.1: Percentage of patients on dialysis by age distribution, for UK and USA

Prevalent patients

The changing prevalence of RRT over three years in selected countries is shown in Table 17.2 and the distribution of modality for dialysis patients is in Table 17.3. The highest prevalence rates are observed in Taiwan, Japan and the USA. In Europe, Spain and Germany has the highest prevalence rate. The UK has one of the lowest prevalence rates amongst the European countries.

Haemodialysis is the main dialysis modality in all countries, with more than 90% of dialysis patients on HD in the majority of countries. New Zealand has an exceptionally high use of PD at 45%. PD use is also high in Australia, the UK, Canada and the Scandinavian countries. The 3 countries with the highest prevalence rates (Taiwan, Japan and the USA) have less than 10% of their dialysis patients on PD.

Table 17.2: Prevalence rates of RRT, pmp, by country

Country	Prevalence			
	2000	2001	2002	2003
Japan	1,576	1,642	1,726	1,862
Taiwan	1,483	1,557	1,548	–
USA	1,360	1,403	1,446	–
Spain	871	880	950	–
Germany	870	919	918	949
Canada	807	854	893	–
Belgium (Dutch-speaking)	–	–	877	–
Italy	804	835	864	–
Greece	797	815	841	–
Austria	712	748	781	814
Uruguay	737	763	807	–
Sweden	714	735	756	774
Denmark	638	679	699	732
Chile	611	672	726	–
New Zealand	611	652	685	710
Czech Republic	625	663	695	–
Australia	608	634	658	686
Netherlands	621	640	658	683
Norway	581	613	641	666
Finland	583	612	637	661
UK	–	–	626	632
Hungary	517	580	–	609
Bosnia and Herzegovina	–	–	417	432
Poland	316	353	390	–
Turkey	275	359	388	–

Table 17.3: Percentage dialysis modalities in prevalent patients

Country	Year	HD	PD	Home HD (% of HD patients)
New Zealand	2003	55	45	25.0
Netherlands	2003	72	28	2.0
United Kingdom	2002	73	27	3.0
Denmark	2003	74	26	1.3
Sweden	2002	76	24	3.0
Australia	2003	76	24	13.0
Finland	2003	79	21	4.0
Canada	2002	82	18	2.0
Norway	2003	84	16	0.3
Poland	2002	89	11	0.0
Spain	2002	90	10	–
Greece	2002	90	10	0.0
Hungary	2003	92	8	0.0
Italy	2002	92	8	1.0
Austria	2003	92	8	0.3
USA	2002	92	8	0.4
Taiwan	2002	93	7	0.0
Uruguay	2002	94	6	0.0
Belgium (Dutch-speaking)	2002	94	6	–
Germany	2003	95	5	0.9
Japan	2003	96	4	0.0
Bosnia and Herzegovina	2003	97	3	–

Comparison of biochemical and haematological results

Some comparative data on biochemical and haematological variables are shown in Table 17.4. These USA data are from the Centre for

Medicare & Medicaid Services, 2003 Annual Report of Clinical Performance Measures Project². The Australian and New Zealand data are from the Australia and New Zealand Dialysis and Transplant Registry Report, 2004⁴.

Table 17.4: Comparative data on indicators of quality of care – England & Wales, USA, Australia, and New Zealand

	E & W	USA	Australia	N. Zealand
Median URR	71.0%	71.5%	73.0%	68.0%
% patients with URR \geq 65%	78%	86%	88%	65%
% Hb \geq 10 g/dl	84% HD 88% PD	93% HD 94% PD	–	–
%Hb \geq 11 g/dl	65% HD 72% PD	79% HD 79% PD	66%	37%
Median ferritin μ g/L	440 HD 267 PD	599 HD 425 PD	–	–
% ferritin >100 μ g/L	95% HD 87% PD	92% HD 84% PD	90%	86%
Phosphate <1.8 mmol/L	59% HD 68% PD	–	66% HD 68% PD	52% HD 61% PD

Comparisons of co-morbidity

The number of national renal registries which produce a comprehensive list of co-morbid conditions of dialysis patients is small. A comparative analysis between countries, was available using publications from the USA, Australia/New Zealand and the Netherlands.

The USRDS (United States Renal Data System) generates a large amount of data which is easily accessible through its website (www.usrds.org)³. The Australian and New Zealand (ANZDATA) Registry had published co-morbid information in a paper discussing late referral and the data is on their website (www.anzdata.org)⁴. The Necosad group⁵ discussing dialysis have published information of a prospective cohort of patients from the 36 renal units in the Netherlands. Using all this information, it was possible to make a number of observations regarding co-morbidity.

Definitions of cardiac disease, peripheral vascular disease and diabetes vary between countries. **Methods of recording other co-morbidity may also be different within these Registries, therefore these comparisons should be interpreted cautiously.**

Cardiac disease, cerebrovascular disease, peripheral vascular disease and COPD appear

to be more common in Australia and New Zealand (Table 17.5). Diabetes was most common in the USRDS population, followed by Australia and New Zealand. The USA was the only other country with data on smoking history and this was 1/3 the rate seen in the UK (5.2% v 18.4%).

The incidence of peripheral vascular disease and COPD were similar in the USA, the UK and the Netherlands.

The Necosad data from the Netherlands shows a similarity to that in the UK for the incidence of diabetes, peripheral vascular disease, malignancy and COPD in the renal replacement therapy population. This may also relate to the similar incidence of RRT in the Netherlands in 2002 (100 pmp) to that of the UK (103 pmp).

The USRDS includes hypertension as a separate risk factor which is present in 74% of patients starting RRT and this explains why the percentage of patients in the USA reported as having no co-morbidity was low.

The incidence of cardiac co-morbidity was less in patients aged over 75 in the UK renal replacement therapy population than those in the 65–74 age band. A more detailed analysis of UK co-morbidity by age band, compared to the USA is shown in Table 17.6.

Table 17.5: Summary of co-morbidity from differing national registries

	National registries			
	ANZDATA	USRDS	UK RR	Necosad 2
Study period	2003	1995–2003	1999–2003	1997–2000
Number of patients	1,953	696,043	15,197*	1,041
Ischaemic heart disease incl MI	30.5%	23.8%	24.7%	11.1%
Cerebrovascular disease	11.0%	9.0%	11.7%	7.2%
Peripheral vascular disease	19.0%	14.3%	14.2%	13.0%
COPD	12.0%	7.1%	7.7%	7.2%
Diabetes**	35.0%	41.2%	18.8%	19.5%
Malignancy	not collected	5.3%	11.5%	10.1%
Smoking	11.0%	5.2%	18.4%	not collected
Congestive cardiac failure	not collected	32.0%	not collected	12.3%
Patients with no co-morbidity at start of RRT***	39.0%	9.4%	38.7%	not collected

Notes:

*Comprehensive co-morbid information was only available in 5,916 patients.

**Countries may sometimes include those patients who were diabetic not as a primary cause of renal failure in this total.

***US data includes hypertension (74%) and also congestive cardiac failure as a co-morbidity.

Table 17.6: Percentage of co-morbidity present, per age group, UK and USA populations

Registry	Conditions	Age bands			
		<44	45-64	65-74	75+
UK	Myocardial infarction	1.9	10.8	19.5	18.4
USRDS	Myocardial infarction	1.8	7.6	11.7	12.4
UK	Ischaemic heart disease	3.8	22.1	34.0	33.9
USRDS	Ischaemic heart disease	4.1	19.8	32.1	35.2
USRDS	Cardiac dysrhythmia	1.0	3.6	7.7	10.8
USRDS	Congestive heart failure	11.7	28.5	39.2	43.8
UK	COPD	1.5	6.4	11.2	10.4
USRDS	COPD	1.3	5.7	10.2	10.4
UK	Smoking	21.0	21.7	17.3	12.4
USRDS	Smoking	7.5	6.9	4.4	2.3
UK	Malignancy	1.5	9.1	15.9	17.8
USRDS	Malignancy	1.3	3.9	7.0	9.0
UK	Cerebrovascular disease	2.9	9.2	15.9	17.6
USRDS	Cerebrovascular disease	2.5	8.1	11.8	12.3
UK	Peripheral vascular disease	4.6	13.0	19.6	17.1
USRDS	Peripheral vascular disease	4.0	13.1	18.8	18.3

In the UK, the incidence of previous myocardial infarction rises with age and falls slightly in those aged over 75 years. This contrasts with the USA, where the incidence of a previous myocardial infarction is much lower than the UK in patients starting renal replacement therapy. Although in the USA it continues to rise in patients aged over 75 (probably at less than the expected rate seen in the general population), the rate is still only 2/3 that seen in the UK (12% v 18%). This higher incidence of previous MI would have a detrimental effect on survival in the UK and partly accounts for the lower incidence rates, with many patients in the UK dying before reaching the stage of requiring renal replacement therapy.

The incidence of ischaemic heart disease is similar between the UK and USA at 34% and 35% of patients aged over 75 years respectively. The apparent similar incidence of cardiac disease in the USA when compared to the UK (Table 17.5) is due to the inclusion of cardiac dysrhythmia. Congestive cardiac failure is not collected in the UK which also accounts for the apparent higher co-morbidity rate in the USA.

Cerebrovascular disease in UK patients was more common than in the USA across all age bands, rising to almost 50% higher in those aged over 75 years. In contrast the incidence of

peripheral vascular disease was similar in the UK to that of the USA, across all age bands.

Transplant recipients in 2003

The median age of all transplant recipients in 2003 (including those from live donors) is shown in Figure 17.2. These data from the USA have been supplied by the UNOS database and the Australian data from the ANZDATA Registry. The median age of transplant recipients is slightly higher in the US and 11% of recipients are aged over 65 compared with 7.5% in the UK and 7.2% in Australia.

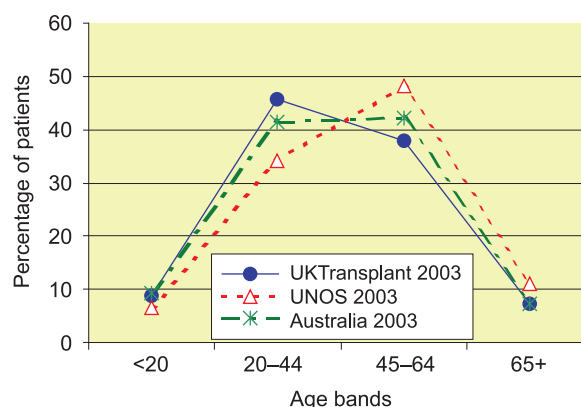


Figure 17.2: Age distribution of patients transplanted in 2003, UK, USA, and Australia

Table 17.7: All European Registry countries, adjusted survival of incident RRT patients

Adjusted for age, gender and primary diagnosis

	1 year survival from 90 days (95% CI)	2 year survival from 90 days (95% CI)
0–19 yrs	96.4 (95.1–97.8)	95.1 (93.5–96.6)
20–44 yrs	95.5 (95.1–96.0)	92.0 (91.4–92.7)
45–64 yrs	88.6 (88.1–89.1)	79.8 (79.2–80.4)
65–74 yrs	79.2 (78.5–79.9)	63.1 (62.3–64.0)
75+ yrs	70.6 (69.6–71.6)	50.4 (49.3–51.6)
Male	87.3 (86.9–87.6)	76.7 (76.2–77.2)
Female	87.6 (87.2–88.1)	77.6 (77.0–78.2)
Diabetes	82.4 (81.7–83.1)	66.7 (65.8–67.7)
Non diabetic	88.3 (88.0–88.6)	79.0 (78.6–79.5)
All	87.4 (87.1–87.7)	77.0 (76.6–77.4)

Table 17.8: UK England & Wales adjusted survival of incident RRT patients

Adjusted for age, gender and primary diagnosis

	1 year survival from 90 days (95% CI)	2 year survival from 90 days (95% CI)
0–19 yrs	Not available	Not available
20–44 yrs	95.4 (94.0–96.8)	91.7 (89.9–93.6)
45–64 yrs	88.3 (86.8–89.9)	80.3 (78.4–82.3)
65–74 yrs	77.0 (74.6–79.5)	61.1 (58.3–64.0)
75+ yrs	72.4 (69.0–76.0)	51.3 (47.6–55.4)
Male	88.0 (86.9–89.1)	77.8 (76.3–79.3)
Female	85.4 (83.8–87.1)	75.3 (73.3–77.4)
Diabetes	82.7 (80.0–85.5)	65.6 (62.1–69.2)
Non diabetic	88.0 (87.1–89.0)	79.3 (78.0–80.5)
All	87.1 (86.2–88.0)	77.0 (75.8–78.2)

One and two-year survival of incident patients

All European Registry Countries

These data are taken from the European Renal Registry report⁶.

The survival of incident patients in the first 2 years in the UK is very close to the European average (Tables 17.7 and 17.8). The use of the 90-day starting point avoids some of the potential errors associated with the variability of the first date recorded. By excluding the initial 3-month high mortality period for all countries, the comparisons are more valid.

Death rates of period prevalent RRT patients – UK and USA

Death rates of point prevalent RRT patients in different age groups, established on RRT in the

UK and USA are shown in Table 17.9 and Figure 17.3. To eliminate the effect of ethnicity, the comparison of death rates in the UK and the USA was calculated for white patients only. The death rates in the UK are significantly

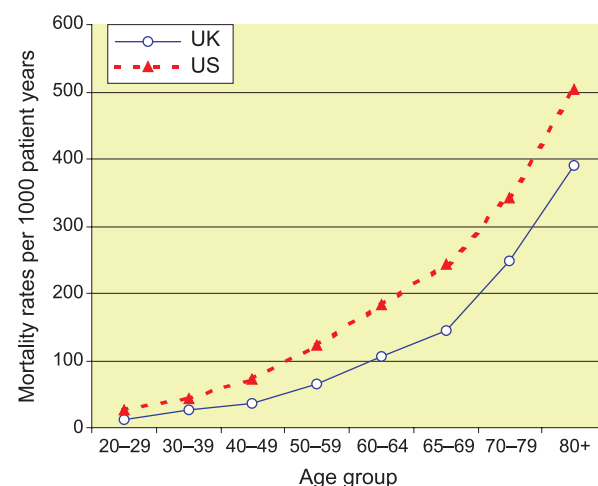


Figure 17.3: Death rates per 1,000 years exposed, period prevalent RRT patients (White patients only), USA and UK

Table 17.9: Death rates per 1,000 years exposed, period prevalent RRT patients (White patients only), USA and UK

Age group	No. died	Total	Sum of patient years	UK deaths per 1,000 years	95% CI	US deaths per 1,000 years
20–29	10	893	317,825	11.5	4.4–18.6	26.2
30–39	53	2,086	736,935	26.3	19.3–33.2	43.6
40–49	90	2,532	887,668	37.0	29.5–44.6	71.6
50–59	190	3,087	1,065,546	65.1	56.2–74.1	122.7
60–64	146	1,497	502,853	106.0	89.8–122.3	182.3
65–69	190	1,476	482,311	143.9	125.0–162.8	243.2
70–79	535	2,555	787,874	248.0	229.8–266.2	342.3
80+	226	740	211,803	389.7	350.0–429.4	504.3

better than in the USA. The USA data are from the USRDS Annual Report 2004³.

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