Chapter 4: New Adult Patients Starting Renal Replacement Therapy

Summary

The estimated rate of adult patients starting renal replacement therapy (RRT) in the England & Wales is 89 pmp indicating that approximately 5350 patients started RRT in 2000. This figure is identical to the 1999 report.

Incidence rates calculated from health authorities with complete Registry coverage varied from 157 down to 52 per million population.

Haemodialysis was the modality of RRT at a day 90 for 60% of dialysis patients in England & Wales (58.8% in 1999)

By the end of the first year 16% of patients starting on PD had changed to HD, similar to last year's data.

The 90-day survival is 95% (95%CI 94-96%) for those aged less than 65 and 83% (95%CI 81-85%) for patients aged 65 and over.

The one-year survival is 86% (95%CI 84-88%) for those aged less than 65 and 66% (95%CI 63-69%) for patients aged 65 and over.

The consistency of many of these results from year to year, as more units join the Registry, gives grounds for confidence that the population of patients followed by the Registry is representative of the UK as a whole.

Introduction

This year the Registry has taken the first step towards relating details of new patients accepted for renal replacement treatment to local populations. A further change is that with the agreement of contributing centres, anonymity has been dropped for acceptance rates, demographic data and primary renal diagnosis.

The number of units participating in the registry has increased by 5, (6 new, one unable to return the data for this period) to 28 of the 57 units (48%) in England and Wales.

	England & Wales
No. of Units	28
No. of new patients on Registry	2357
Catchment population million	26.44
New patients pmp	89
(95% C.I.)	(85 – 93)
New patients per Unit	90

Table 4.1: Summary of new adult patients accepted during 2000

Acceptance Rates

Last year's report showed a wide variation in estimated acceptance rates between centres These calculations were based on estimates of catchment population given by each centre. However in many areas there are no clearly defined catchment areas. This is probably a major cause for the wide variation because of unknown extent of cross-boundary flows of patients. Now that the Registry covers larger contiguous areas of the UK it has been possible to make a start on calculating rates according to the known population of Health Authorities. Eventually this approach will make it possible to relate new patient acceptances to the needs of local populations, taking into account differences in age and ethnicity. Rates could be age standardised to control for differences in age structure and likewise by ethnicity once 2001 Census data are available. It will also help to identify variations due to differing referral practices, and differing policies for acceptance for therapy, which in some cases are determined by resource limitations.

Acceptance rates calculated by Health Authority (table 4.2)

These data have been calculated by mapping patient post codes (after using a post code correction package) to Health Authorities, using the NHS Organisational postcode mapping supplied by the Department of Health. England and Wales population figures for each health authority have been obtained from the Office for National.

This table includes only those Health Authorities with complete / near complete coverage by the Registry.

In England

HA Code	Region	HA name	Population	1998 pmp	1999 pmp	2000 pmp	Patient Number
QDT	Y01	Calderdale and Kirklees	583800			**81**	47
QDE	Y01	County Durham and Darlington	607800	100	74	**72**	44
QDF	Y01	East Riding and Hull	574500	71	71	**89**	51
QDH	Y01	Leeds	727400			**77**	56
QDK	Y01	North Cumbria	319300	125	72	**69**	22
QDR	Y01	North Yorkshire	742400			**93**	69
QDN	Y01	Sunderland	292300	51	86	**82**	24
QDP	Y01	Tees	556300	108	92	**83**	46
QDQ	Y01	Wakefield	318800			**100**	32
QCG	Y02	Barnsley	228100	70	83	**61**	14
QCK	Y02	Doncaster	290500	76	83	**79**	23
QCL	Y02	Leicestershire	928700	108	89	**92**	85
QCM	Y02	Lincolnshire	623100	82	91	**88**	55
QCH	Y02	North Derbyshire	370200	51	62	**59**	22
QCN	Y02	North Nottinghamshire	388900	116	95	**108**	42
QCP	Y02	Nottingham	642700	120	110	**96**	62
QCQ	Y02	Rotherham	254400	51	63	**102**	26
QCR	Y02	Sheffield	531100	88	90	**81**	43
QDL	Y02	South Humber	308600	104	65	**75**	23
QCJ	Y02	Southern Derbyshire	567500			**56**	32

HA Code	Region	HA name	Population	1998 pmp	1999 pmp	2000 pmp	Patient Number
QEA	Y07	Coventry	304300	112	115	**118**	36
QEC	Y07	Dudley	311500	80	64	**71**	22
QEG	Y07	Solihull	205600	83	73	**88**	18
QEK	Y07	Walsall	261200		115	**77**	20
QEL	Y07	Warwickshire	506700	97	116	**101**	51
QEM	Y07	Wolverhampton	241600		99	**157**	38
QCX	Y08	East Lancashire	511200	39	68	**74**	38
QC4	Y08	Morecambe Bay	310300	45	71	**100**	31
QCY	Y08	North-West Lancashire	466300	75	69	**79**	37
QAD	Y10	Croydon	338200	50	56	**89**	30
QAH	Y10	Lambeth, Southwark and Lewisham	745200			**78**	58
QA7	Y11	Berkshire	556600			**108**	60
QA8	Y11	Buckinghamshire	618900	63	76	**71**	44
QCC	Y11	Northamptonshire	615800	71	73	**89**	55
QCE	Y11	Oxfordshire	616700	76	65	**62**	38
QD8	Y12	Avon	999300	82	84	**109**	109
QDY	Y12	Gloucestershire	557300	90	95	**88**	49
QDX	Y12	North and East Devon	479300	81	88	**92**	44
QD5	Y12	Somerset	489300	67	84	**69**	34
QD6	Y12	South and West Devon	589100	119	107	**97**	57

Table 4.2: Acceptance rate by Health Authority England.

Health Authorities in Wales

HA Code	Region	HA name	Population	1998 pmp	1999 pmp	2000 pmp	Patient Number
QW1	W00	Gwent	557200	102	75	**93**	52
QW2	W00	Bro Taf	739600	88	111	**97**	72
QW5	W00	Morgannwg	499700	26	14	**82**	41

Table 4.3: Acceptance rate by Health Authority Wales

Other health authorities in England& Wales do not have complete coverage from Registry units to enable the take-on rate to be calculated. With the rapidly increasing coverage by the Registry it is anticipated that a much more complete picture will be available in the next report.

These data continue to show a wide variation in take-on rate around the country from 52 per million per annum to 157 per million per annum. Whilst the unit with the highest acceptance has a relatively high ethnic minority population, and the very lowest areas have relatively small ethnic minority populations, there is no clear relationship between acceptance rates and the proportion of population from ethnic minorities.

With the formation of large strategic health authorities as described in Chapter 2, this geographic variation in acceptance rates may be partially obscured if reporting is done by such large areas. From table 4.2 it can be seen that contiguous areas with widely differing take-on rates will be merged into one authority, giving an average rate hiding the variation. To monitor the variation, it will therefore be necessary to continue to monitor acceptance rates for geographic areas smaller than those covered by the new strategic authorities.

Using data from those areas with good Registry coverage, the annual acceptance rate in England is 86 per million population and 92 per million population in Wales.

Acceptance of new patients by renal unit (table 4.4)

The number of patients accepted by each renal unit is shown in table 4.4

		Number of new patients		
Centre	**Estimated catchment pop**	**1998**	**1999**	**2000**
Bristol	1.50	122	119	151
Carlisle	0.36	40	26	27
Carshalton	1.67	141	108	117
Coventry	0.85	87	92	89
Cardiff	1.30	137	138	137
Derby	0.48			26
Exeter	0.75	74	82	71
Gloucester	0.55	49	59	46
Guys	1.73			122
Heartlands	0.60	71	71	77
Hull	0.84	73	65	81
Leicester	1.73	181	161	177
Leeds GI	0.90			68
Nottingham	1.16	129	128	113
Oxford	1.80	146	139	144
Plymouth	0.55	71	67	63
Preston	1.56	79	105	118
Reading	0.60			54
S Cleveland	1.00	109	92	90
Sheffield	1.75	129	134	136
Southend	0.35		43	39
StJames, Leeds	1.30	71	79	89
Sunderland	0.34	41	45	46
Swansea	0.70			61
Wolverhampton	0.49		75	77
Wordsley	0.42	46	43	40
Wrexham	0.42		51	58
York	0.34			40
	26.44			
Total E&W		**N/A**	**N/A**	**2357**

Table 4.4: Number of new patients accepted by renal units

Acceptance rate by Renal Unit

As discussed at the start of this chapter, the renal unit catchment populations are estimates based on information either from the local renal unit or the 1992 national renal survey, which analysed patient distributions in England by postcode and calculated a catchment population for each English renal unit. Many Health Authority boundaries have changed slightly over the last 10 years causing some redistribution, and cross boundary flow patterns between units will also have altered. The Welsh renal unit at Wrexham is uncertain of its cross boundary flow from England. For this reason incidence rates have not been calculated for each renal unit, as the estimates of catchment are not considered sufficiently accurate to render such a calculation meaningful. The difficulties are illustrated in the following paragraphs.

1. An example of differences in unit acceptance rates which are almost certainly due to difficulties in establishing the catchment population is provided by Leeds where the incidence rates calculated from the Health Authority population was 77 pmp compared with the figures calculated from the catchment populations estimated by the hospitals which serve Leeds - St. James' (estimated unit acceptance rate 61 pmp) and Leeds General Infirmary (estimated acceptance rate 90.7 pmp). Mapping individual patients from each unit it is clear that are large areas from which patients may go to either unit, rendering catchment populations difficult to assess. This probably explains much of the apparent variation between the units. It would be necessary to have more details of the demography of the city to assess possible variation due to differences in age and ethnic distribution.

2. A further instance where the figures are difficult to interpret is provided by the Plymouth unit in south and west Devon (unit rate 140 pmp, Health Authority 97pmp) and the Exeter unit in north and east Devon (unit rate 84 pmp, Health Authority 92pmp). Again, although the acceptance rate may be genuinely higher in south and west Devon, mapping shows that much of the difference in unit acceptance rates is likely to be explained by difficulties in establishing the size of the catchment populations, and influx of patients to Plymouth from Cornwall.

3. A further example is North Cumbria. The Carlisle renal unit quotes the same catchment population as the North Cumbria Health Authority, of 0.32 million. The Health Authority annual acceptance rate is 69 pmp, yet it is almost exclusively served by Carlisle whose calculated acceptance rate would be 84pmp. Inspection of the patients' addresses indicates that the difference is due to several patients referred from outside the HA boundary into Carlisle, again an example of cross-boundary flow and an underestimate of the effective catchment population of the unit concerned.

4. In the case of smaller units and Health Authorities, small changes year on year in the number of new patients will be reflected in relatively large changes in acceptance rates.

The catchment populations shown in table 4.4 now take into account some of these considerations and as a result are slightly different from that shown in last years report.

Ethnicity

The number of units providing details of ethnicity has increased considerably; in the 1999 report only 6 units provided data on at least 85% of patients, in the 2000 report this had

increased to 12 and the figure for the current report is 17. In England, ethnicity data was missing in 24% of all the patients reported to the Registry in 2000 compared with 34% in the previous year. In 17 units the returns were high (>87%) rendering data from these units useful. Eight units provided little or no ethnicity data. In Wales and Scotland it is not health authority policy to collect ethnicity data. There was a notable increase in the percentage of Asian patients quoted by the Leicester unit – from 10% last year to 41.5% in this report.

Centre	% sent	White	Black	Asian	Chinese	Other
Gloucester	100	100.0				
Heartlands	100	85.7	2.6	7.8		2.6
Nottingham	100	87.6	4.4	6.2		1.8
Sheffield	100	94.9		4.4		0.7
Wolverhampton	100	80.5	5.2	13.0		1.3
Wordsley	100	92.5		7.5		
Exeter	99	98.6	1.4			
Preston	98	87.9		12.1		
Bristol	97	93.8	1.4	4.8		
Reading	96	78.8	3.8	13.5		1.9
Guys	95	73.3	22.9	1.9		
Plymouth	94	94.9	3.4	1.7		
Sunderland	93	100.0				
Southend	92	97.2	2.8			
Coventry	90	82.5	1.2	16.3		
Leicester	90	56.0	1.9	41.5		
St James, Leeds	87	89.6	1.3	7.8		1.3
Hull	78	98.4				1.6
Derby	*46*	*100.0*				
S Cleveland	*41*	*94.6*		*5.4*		
Carshalton	*26*					
Carlisle	*7*					
Oxford	*6*					
Leeds GI	*4*					
York	0					
England	**76**	**86.0**	**3.3**	**9.7**		**0.7**

Table 4.5: Ethnicity by centre

	Median age of incident patients	
Centre	**Ethnic minority**	**All**
Hull	41	65
Preston	47	60
Plymouth	47	67
Sheffield	49	58
Reading	51	60
Carshalton	55	60
Southend	56	68
Leicester	56	61
Heartlands	56	66
Guys	57	59
Wolverhampton	62	69
Coventry	63	62
Nottingham	63	65
Exeter	63	64
Wordsley	63	64

StJames, Leeds	64	63
SCleveland	64	67
Bristol	64	67
England	**57**	**64**

Table 4.6: Median age of ethnic groups accepted for renal replacement therapy

Higher acceptance rates are to be expected from the ethnic minority groups. The ethnic minority communities are also younger than the indigenous white populations. This is clearly reflected by the lower median age of those from ethnic minorities starting renal replacement therapy (table 4.5). As the ethnic communities age, even larger numbers of patients from them will be expected to start RRT.

Age and Gender

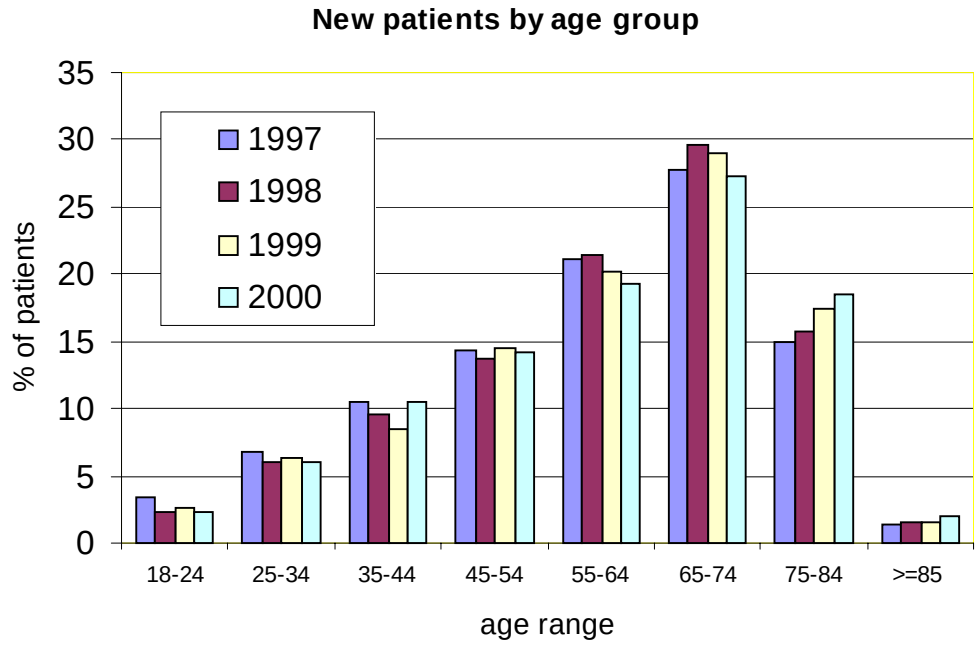

Figure 4.1: New patients by age group1997 - 2000

Figure 4.1 shows a four year increase in the proportion of over 75s taken onto the renal replacement programme. The incidence rate of 320 per million population in this age group is low when compared to other European populations, and probably still reflects an unmet need. Figure 4.2 shows the median age in each renal unit.

Percentage of males accepted for RRT				
Year	1997	1998	1999	2000
England & Wales	63.1	62.8	62.2	59.3

Table 4.7: Percentage of males by age 1999-2000

Although these data are not from the same centres there appears to be a trend over the 4 years to an increasing percentage of females being started on renal replacement therapy. This may be due to an increase in the incidence in patients aged 75-84 year age group, which is predominantly female in the general population.

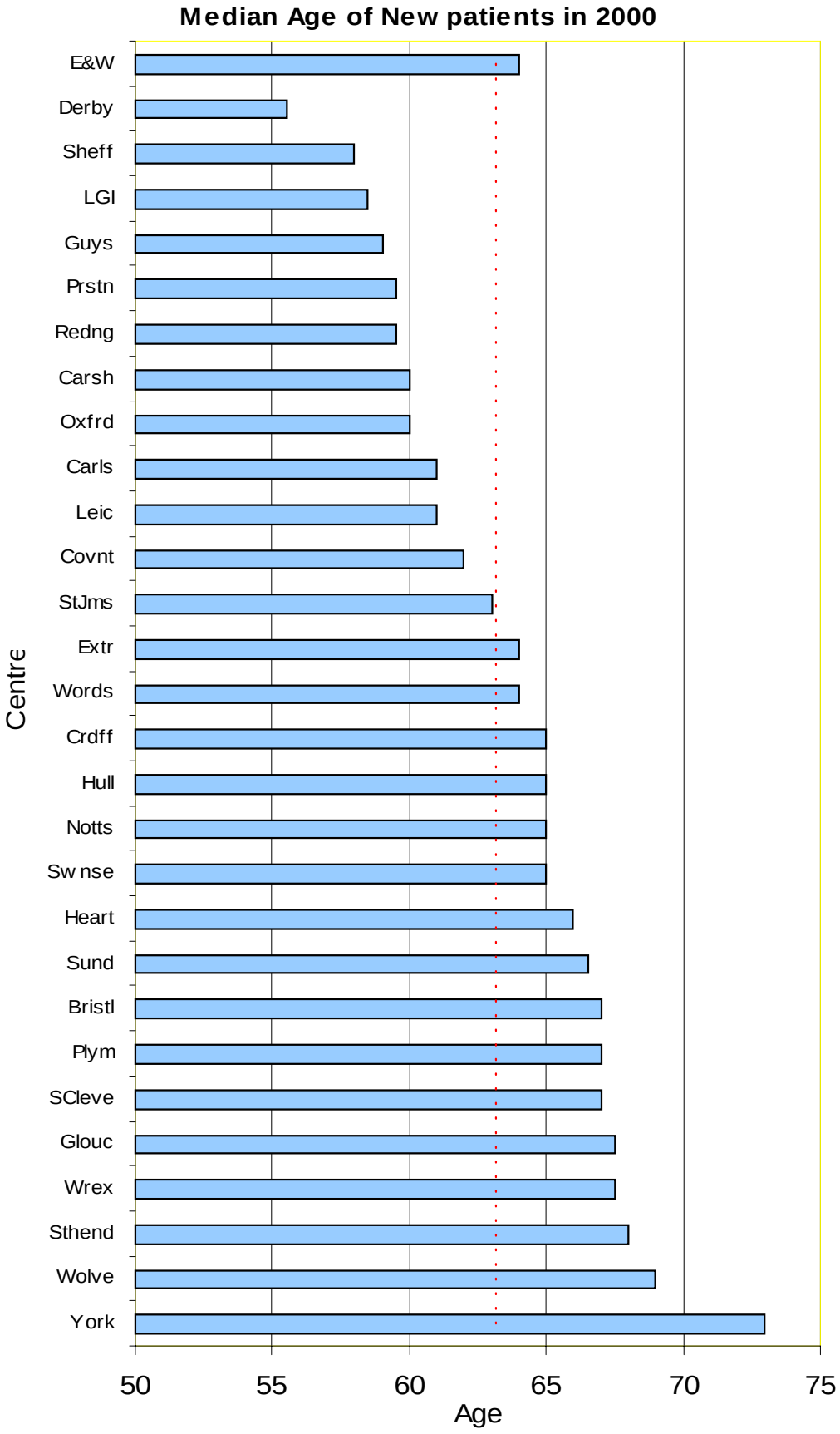

Figure 4.2: Median Age of New Patients in 2000

Primary Renal Diagnosis

The primary renal diagnoses for England and Wales, and by renal unit, are shown in tables 4.8 and 4.9. The high proportion of diabetic nephropathy seen in the USA and much of Europe, particularly the north, is still not seen in England and Wales. Diabetic nephropathy does not appear to be increasing as a proportion of the total patients starting RRT.

Diagnosis	E&W < 65	E&W ≥ 65	M:F
Aetiology uncertain and GN not proven	16	24	1.7
Glomerulonephritis	14	6	2.3
Diabetes	19	13	1.5
Polycystic Kidney	10	2	1.1
Pyelonephritis	8	7	1.0
Renal Vascular disease	2	10	2.1
Hypertension	4	5	2.4
Other	13	12	1.3
No diagnosis sent	15	20	1.8
Total patients	**1217**	**1160**	**1.5**

Table 4.8: Percentage Primary renal diagnosis by age, and gender ratios

Unit	Not sent	Aetiology unk. *	Diabetes	GN	Pyelo-nephritis	Polycystic Kidney	Reno-Vasc	Hypertens	Other
Gloucester	0	32.6	8.7	15.2	6.5	8.7	13.0	0.0	15.2
Heartlands	0	23.4	18.2	11.7	7.8	7.8	9.1	2.6	19.5
Reading	0	24.1	22.2	14.8	9.3	9.3	5.6	1.9	13.0
Sheffield	0	23.5	19.9	8.8	8.1	5.1	5.9	7.4	21.3
Wolverhampton	0	28.6	26.0	7.8	11.7	7.8	2.6	9.1	6.5
Wordsley	0	35.0	22.5	2.5	5.0	7.5	5.0	12.5	10.0
Nottingham	1	26.8	23.2	12.5	7.1	7.1	10.7	3.6	8.9
S Cleveland	1	36.0	14.6	13.5	6.7	6.7	6.7	6.7	9.0
Bristol	1	24.8	14.1	11.4	8.7	8.7	9.4	3.4	19.5
StJames, Leeds	2	19.5	13.8	9.2	16.1	10.3	8.0	0.0	23.0
Guys	3	17.8	28.0	11.0	8.5	7.6	10.2	5.9	11.0
York	8	32.4	5.4	8.1	16.2	2.7	10.8	8.1	16.2
Swansea	8	5.4	23.2	21.4	14.3	1.8	8.9	8.9	16.1
Carlisle	11	20.8	20.8	16.7	8.3	8.3	8.3	0.0	16.7
Coventry	13	20.8	20.8	9.1	11.7	1.3	9.1	13.0	14.3
Leeds GI	15	19.0	22.4	19.0	8.6	5.2	6.9	5.2	13.8
Hull	15	24.6	27.5	14.5	5.8	7.2	4.3	4.3	11.6
Preston	17	23.5	22.4	13.3	10.2	6.1	5.1	1.0	18.4
Sunderland	17	15.8	31.6	7.9	5.3	5.3	2.6	21.1	10.5
Leicester	18	34.2	15.1	10.3	10.3	2.7	8.2	6.2	13.0
Southend	18	34.4	15.6	6.3	6.3	6.3	6.3	6.3	18.8
Oxford	20	19.1	15.7	14.8	7.8	16.5	5.2	2.6	18.3
Cardiff	34	-	-	-	-	-	-	-	-
Plymouth	35	-	-	-	-	-	-	-	-
Exeter	46	-	-	-	-	-	-	-	-
Wrexham	90	-	-	-	-	-	-	-	-
E&W	**17**	**24.1**	**19.6**	**12.2**	**8.9**	**7.2**	**7.3**	**5.5**	**15.2**

* - Aetiology uncertain and Glomerulonephritis not proven

Diagnostic distributions were not calculated for units with less than 80% returns for diagnosis.

Table 4.9: Percentage diagnostic distribution of new RRT patients by unit

Treatment modality

The proportion of patients in each unit established on haemodialysis by day 90, and the variations with age are shown in figures 4.3 and 4.4.

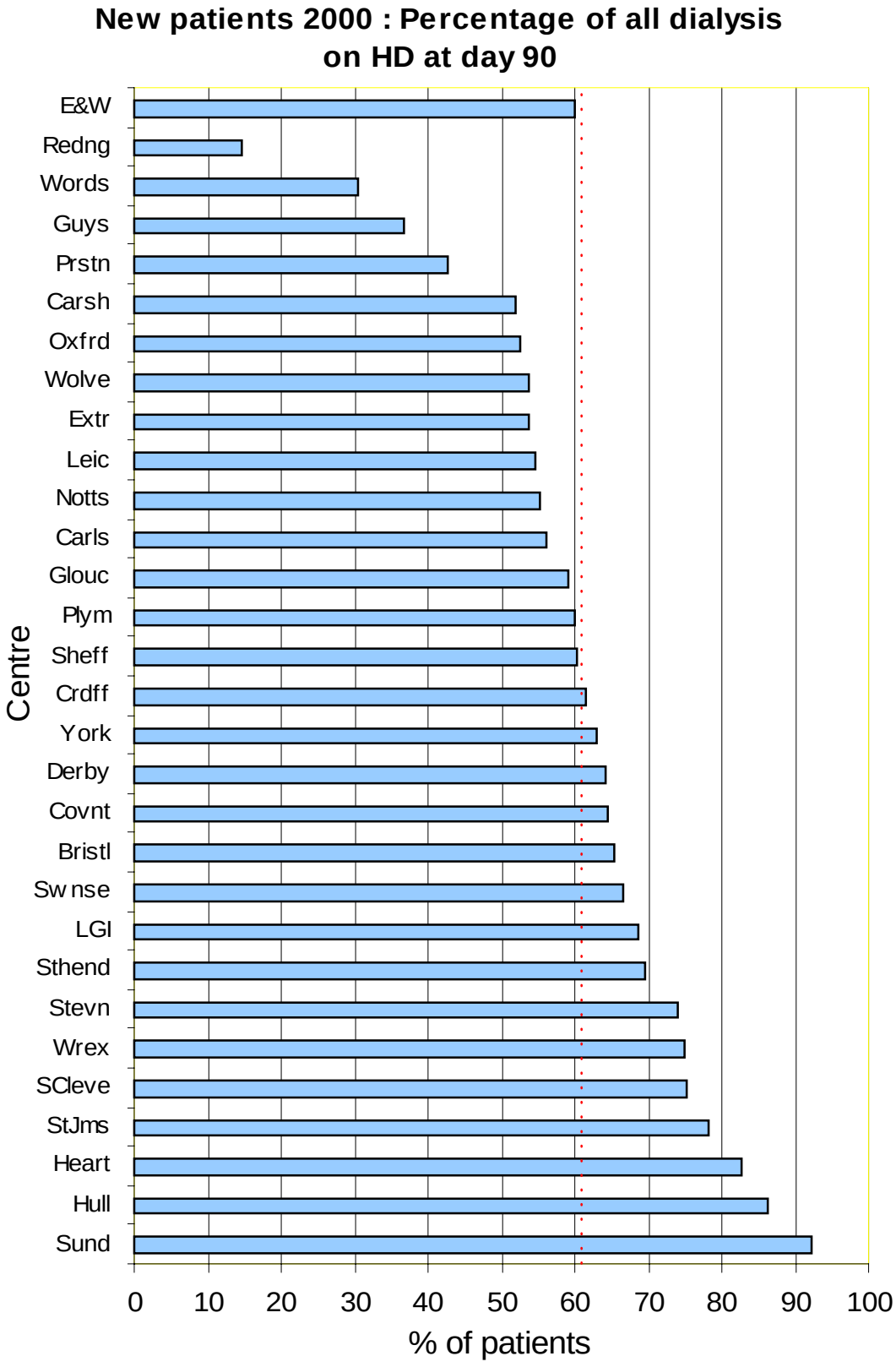

Figure 4.3: New patients 2000 - percentage of all dialysis on HD at day 90

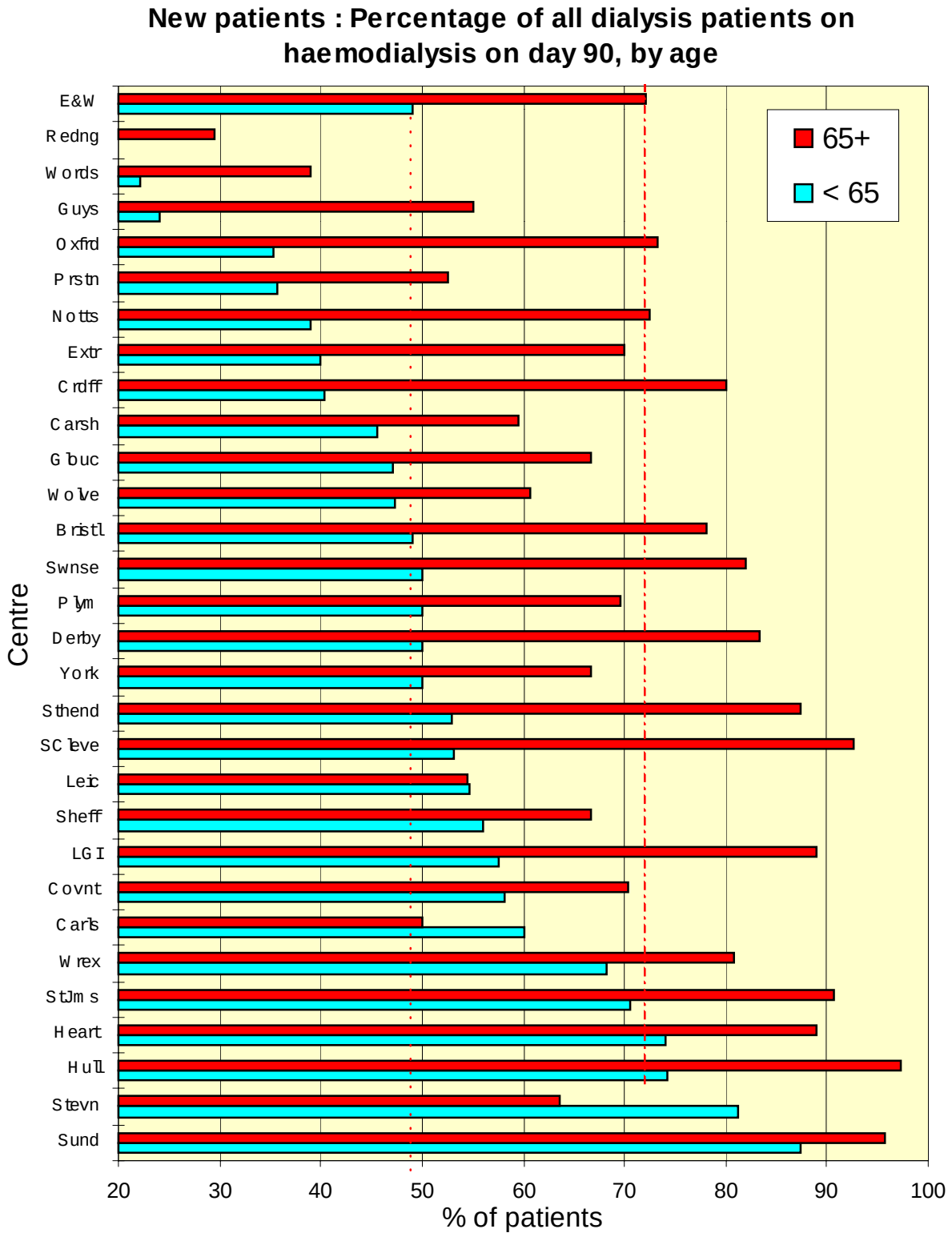

Figure 4.4: New patients - % of all dialysis patients on haemodialysis on day 90, by age

By day 90, 53 % of patients were established on haemodialysis, 35% on peritoneal dialysis, 1.6% transplanted, 0.3% stopped treatment without recovery, 8.8% died and 1.3% transferred out to a non-Registry centre.

The first change of treatment modality

This analysis includes the 2191 patients from the 23 E&W centres and 11 Scottish centres who started RRT on dialysis in 1999 and analyses the first change in modality in the 12 months from the established modality at day 90.

Change of treatment modality within the first year

Established on Haemodialysis		
Modality	*No of patients*	*Percentage*
Remains on HD	899	68
Changed to PD	46	4
Transplanted	70	5
Transferred out elsewhere	8	0.6
Recovered	16	1.2
Stopped Treatment (died)	15	1.1
Died (no change in modality)	262	20

Table 4.10: HD patients at 90 days: changes in modality in subsequent year

The results in Table 4.10 are almost identical to those in the 2000 Report although only 4% changed to PD in the first year rather than the 6% reported previously

Established on Peritoneal Dialysis		
Modality	*No of patients*	*Percentage*
Remains on PD	558	65
Change to HD	117	14
Transplanted	84	10
Transferred out elsewhere	7	0.8
Recovered	7	0.8
Stopped Treatment (died)	3	0.4
Died (no change in modality)	87	10

Table 4.11: PD patients at 90 days: changes in modality in one year

The results in Table 4.11 are identical to those in the 2000 Report.

The consistency of this data with the change from 912 patients to 2478 covering more varied regions of the country strongly suggests that this practice is reflective of the UK as a whole.

First modality change over 2 years

Only centres on the Registry in 1998 had a full annual cohort of patients available for a 2-year follow up period. The analysis includes 2123 patients.

Patients who were on haemodialysis after the first 90 days

These figures are similar to those in last year's Report except for a marked fall in the percentage of patients transplanted - from 9% at one year and 18% at 2 years down to 3% and 7% respectively (table 4.12). This fall is probably explained by the increased waiting lists for transplantation without a corresponding increase in the transplant rate.

Established on Haemodialysis	**At end of 1 year**		**At end of 2 years**	
First Change in Modality	**No. of Patients**	**% of Patients**	**No. of Patients**	**% of Patients**
Remains on HD	868	70	623	50
Changed to PD	55	4	63	5
Transplanted	61	5	130	10
Transferred out elsewhere	6	0.5	8	0.6
Recovered	14	1	20	1.6
Stopped Treatment (died)	27	2	35	3
Died (with no change in modality)	212	17	364	29
Total	1243		1243	

Table 4.12: Changes in modality over the first 2 years for patients on HD

Patients who were on peritoneal dialysis after the first 90 days

Established on PD	**At end of 1 year**		**At end of 2 years**	
First Change in Modality	**No. of Patients**	**% of Patients**	**No. of Patients**	**% of Patients**
Remains on PD	557	63	351	40
Changed to HD	142	16	211	24
Transplanted	85	10	152	17
Transferred out	5	0.6	6	0.7
Recovered	6	0.7	10	1
Stopped Treatment (died)	2	0.2	3	0.3
Died (with no change in modality)	83	9	147	17
Total	880		880	

Table 4.13: Changes in modality over the first 2 years for patients on PD

These data confirm the findings in the Report 2000, even though this previous report was on a smaller data set. Compared with last year there is a fall in the percentage of patients transplanted at one year from 11% to 7% and at 2 years from 20% down to 13% (table 4.13). This has been reflected in a greatly increased shift from PD to HD. The PD technique survival has effectively remained the same at 66% at one year and 41% at 2 years, but this was maintained at the expense of an increased shift to HD from 11% to 17% at one year and 20% to 24% at 2 years. The continual future rise in transplant waiting lists will have HD resource implications. As patients stay longer on PD, more of the inadequately dialysed patients will have to be transferred to HD.
Few centres appear to be recoding withdrawal of treatment prior to death.

Survival of new patients starting renal replacement therapy

The revised renal standards document concluded that *"it is hard to set survival standards at present because these should be age sex and co-morbidity adjusted and this is not yet possible from Registry data. The last Standards document recommended at least 90% survival of patients 18-55 with standard primary renal disease. This may have been too low as the rate in participating centres in the Registry was 97%, though numbers were small. "*

Standard Primary Renal Disease is a definition from EDTA which excludes patients with renal disease due to diabetes and other systemic diseases. It is more widespread practice to simply exclude diabetics, so we have also quoted these figures to allow comparison with reports from other registries.

All the one and two year survival figures quoted in this chapter are from the first day of dialysis, not day 90 as quoted from the USA.

Comparison with the Standard recommendation

Patients 18-55 - One Year Survival (95% CI)		
First Treatment	*Standard Primary Renal Disease* **1999**	**All Diseases Except Diabetes 1999**
All	92.8 (90.5-95.2)	91.7 (89.5-93.9)
Haemodialysis	89.2 (95.9-93.5)	87.4 (83.6-91.2)
Peritoneal dialysis	97.5 (95.0-100)	98.0 (96.0-100)

Table 4.14: One Year Patients Survival – patients age 18-55, 1999 cohort

These survival figures are not as high as the revised standards document quotes from the Registry.

Survival of all new patients

As shown before, a high proportion (46%) of deaths within the first year occur within the first 90 days (tables 4.15, 4.16), a period excluded from the USA registry report.

Age	**Deaths/No of new patients**	**KM Survival Analysis (%)**	**KM 95% Confidence Interval**
< 65	66/1337	95	94-96
≥ 65	208/1232	83	81-85
All	274/2569	89	88-90

Table 4.15: 90-day survival of new patients, 1999 cohort

Age	Deaths/No of new patients	KM Survival Analysis (%)	KM 95% Confidence Interval	Death Rate Per 100 Patient Years
< 65	180/1337	86	84-88	14.7
≥ 65	418/1232	66	63-69	41.8
All	598/2569	76	75-78	27.0

Table 4.16: One Year Survival of new patients, 1999 cohort

Age	Numbers of patients			KM survival		KM 95% CI
	3/12	1 year	2 years	1 year	2 year	2 year survival
<65	67/1282	163/1282	263/1282	87%	79%	77-81
≥ 65	217/1129	399/1129	583/1129	64%	47%	44-50
All	284/2411	562/2411	846/2411	76%	64%	62-66

Table 4.17: Two-year survival of new patients, 1998 cohort

The high proportion of first year deaths which occurs in the first 90 days also differs between age groups. This renders correction for age, gender, and diagnosis, using the Cox proportional hazards method, difficult. Further detailed analysis of patterns of death and the implications for standardisation of data and comparison between registries is presented in chapter 9.

Age distributions and relative risk of death

Age band	Increased risk of death
45-54	18.5
55-64	14.6
65-74	9.1
>75	4.5

Table 4.18: Increased risk of death within one year of starting dialysis – non-diabetics

Table 4.18 shows the increased risk of death for non-diabetic dialysis patients compared with people of the same age in the general population. These data are similar to those published by Mignon et al in 1993

References

Mignon, F., Michel, C., Mentre, F., and Viron, B. (1993). Worldwide demographics and future trends of the management of renal failure in the elderly. Kidney International, 43(Supplement 41), S18–26.