

The Provision of Renal Replacement Therapy for adults in the UK 1998

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Introduction

During the last ten years there has been a continuing substantial increase in the number of patients receiving renal replacement therapy in the UK. The 1993 National Renal Review returned a figure for England of 396 people per million population (p.m.p.)¹; the report of 1995 returned 476 p.m.p.², and the number is currently estimated to be over 500 p.m.p.³. Similar trends have been observed in Wales³ and Scotland⁴. The figure in the USA is 909 p.m.p.⁵

The number receiving therapy will depend on acceptance rates for therapy, which relate to the incidence of disease and selection for treatment, and on survival of those receiving treatment.

The acceptance rate of new patients requiring RRT is rising throughout the world. In the UK, there has been more than a four-fold increase since 1980³. It was shown that the annual acceptance rate of new patients starting renal therapy in England rose from 67 p.m.p. in 1991-92 to 82 p.m.p. in 1995². Data from the UK Renal Registry suggest that this rise has continued, possibly to over 90 p.m.p.³. The acceptance rate in 1995 in Wales was 109 p.m.p.³ and was 102 p.m.p. in Scotland in 1998⁴. The total acceptance rate needed to meet the demands for RRT is not known, and may be rising. Attitudes towards accepting patients have become more liberal as the therapies have been shown to be effective in older people and those with other co-morbid conditions. In the UK in 1980, very few people over the age of 65 received RRT, now approximately 50% of patients starting therapy are over 65³. The incidence of ESRF is age related, rising in Britain from 58 p.m.p./year in those aged 20-49 to 588 p.m.p./year in those over 80⁶. In the USA, the total annual acceptance rate is 242 p.m.p. reaching almost 1000 p.m.p. in the over 70s⁵. Population projections suggest a further increase in the number of people aged 65 and older which would lead to a significant growth in demand for RRT.

Beside age-related considerations, ethnicity associated changes are also foreseen. In the UK, the acceptance rate in both black and Indo-Asian populations aged under 55 is at least three times that of whites⁷. The equivalent rate in the over 65 age group was up to six times that of whites. In the USA the acceptance rate for African-Americans (758 p.m.p./year) is almost five fold that of whites (185 p.m.p./year)⁸. In the UK, as in many other countries, ethnic minority populations have a lower median age than whites, and as these populations mature over the next two decades this will lead to a further significant increase in demand for RRT⁹.

In the USA, the prognosis of patients starting RRT (considering standardised mortality) is improving every year⁸, a pattern thought to be occurring throughout the world. National recommendations for standards of care in RRT were published by the Renal Association^{10,11} with the aim of improving survival. The 1995 national review documented some improvement in the processes of care from 1993, with a wide variation between individual renal units in England and Wales. Thus the number of patients starting RRT each year continues to outnumber those dying, with a subsequent continuing rise in the

number of prevalent patients receiving RRT. Simulation modelling suggests that the acceptance rate and the number of prevalent patients will continue to rise and a steady state will not be reached for at least another ten years ¹².

Provision of facilities for renal care will have to change with expanding numbers of patients, both in volume and in patterns of provision. Although the number of main renal units remained stable between 1993 and 1995 there was an increase in the treatment shifts, number of permanent dialysis stations, temporary haemodialysis stations and satellite units. Satellite units in particular have expanded tremendously in the last ten years. The proportion of dialysis patients on haemodialysis had increased to 50%. This was probably due to lower transplantation rates, and an increasing population of elderly patients who are less likely to be fit for transplantation.

Thus the cumulative number of patients receiving treatment is rising progressively with ever increasing demands on resources. In the UK, the cost of RRT consumes 2% of the NHS budget and this is predicted to reach 3% within five years. In the USA, the annual cost is estimated to be in excess of \$ 15 billions ⁸. For health care planning purposes it is clearly important to have a clear understanding of changes in this high cost therapy, and to ensure that there is equity of access to care throughout the UK. Hence this further review of RRT therapy in the UK was commissioned.

Its primary aim was to determine for the first time the provision of RRT throughout the UK using data from all the renal units functioning on 31/12/98. Secondary aims were to document time trends of provision in the 1990s using the existing surveys conducted in 1993 and 1995 in England and 1995 in Wales, and to compare RRT provision with other developed countries.

Methods

The Department of Health funded this project. This survey to further document the provision of renal care in the United Kingdom to the end of 1998 was conducted with support from the UK Renal Registry. A questionnaire was sent to all adult renal units in the United Kingdom. Scotland and Northern Ireland were included in the survey for the first time. Information was sought on numbers and grades of medical and nursing staff, structure of care, key processes of treatment (including some recommended by the Renal Association, namely bicarbonate dialysis and disconnect catheter for peritoneal dialysis), numbers of prevalent patients (stock) at the end of 1998, new patients accepted on to RRT 1996-98, and the number of transplants performed 1996-98. Information was also sought on the number of patients on erythropoietin treatment and the number of patients on RRT who were Hepatitis B and Hepatitis C positive.

The questionnaires were first distributed in January 1999. Initial responses were slow and patchy and it was necessary to resend the questionnaire to many units. In over half the units, missing items of data, especially on details of staffing, were obtained by subsequent telephone contacts which were often multiple. Two units needed a site visit in order to obtain the data. The final validated data were not complete until August 2000. Eventually data were obtained from all the 71 identified renal units in the U.K.

The data were entered onto an Excel spreadsheet and analysed using this and SAS software. The office for National Statistics (ONS) mid-year population estimates for England and Wales and the mid-year population estimates published by the Registrar General for Scotland were used to calculate the population denominators for the acceptance and prevalence per million population rates. 95% confidence intervals are shown for the acceptance rates, prevalence rates and some of the process measures. To determine whether the variation in acceptance and prevalence rates was statistically significant between England, Wales, Scotland and Northern Ireland Poisson regression analysis was used.

Consultant staff Whole Time Equivalent (WTE) were based on the total number of sessions divided by a weighted average of total sessions reported.

Checks were made to ensure that satellite units, which were being shared by more than one main unit were not double counted.

Data were compared with those collected for the 1993 National Renal Review, and 1995 national survey and with data obtained by the UK Renal Registry and the Scottish Renal Registry. Any discrepancies with data held by the registries were carefully investigated in what proved to be a useful validation process. The data for international comparisons was collated based on a similar review published

By the USRDS ¹³ with additional data from reports held by the Renal Registry, including reports from the Australian, Scandinavian, Dutch, Canadian, and Scottish registries.

Individual unit's responses are shown by region in the appendix

Results

New patients starting renal replacement therapy

The current acceptance data for new patients is shown in table 1. There was statistically significant variation between the acceptance rates pmp in England, Wales, Scotland and N. Ireland ($\text{Chi}^2 = 40.7$, d.f = 3, $p < 0.0001$, obtained using Poisson regression). The rate is lowest in England despite the higher ethnic minority population suggesting that unmet need is greatest here. (Age standardised rates cannot be derived as yet, which would be more informative. This will be possible when the Registry has UK coverage and individual patient data is available to provide age sex population rates).

The acceptance rate is progressively rising (table 2), as is the proportion of new patients who are over 65 or diabetic (table 3). Trends in England, Scotland and Wales are illustrated in figure 1.

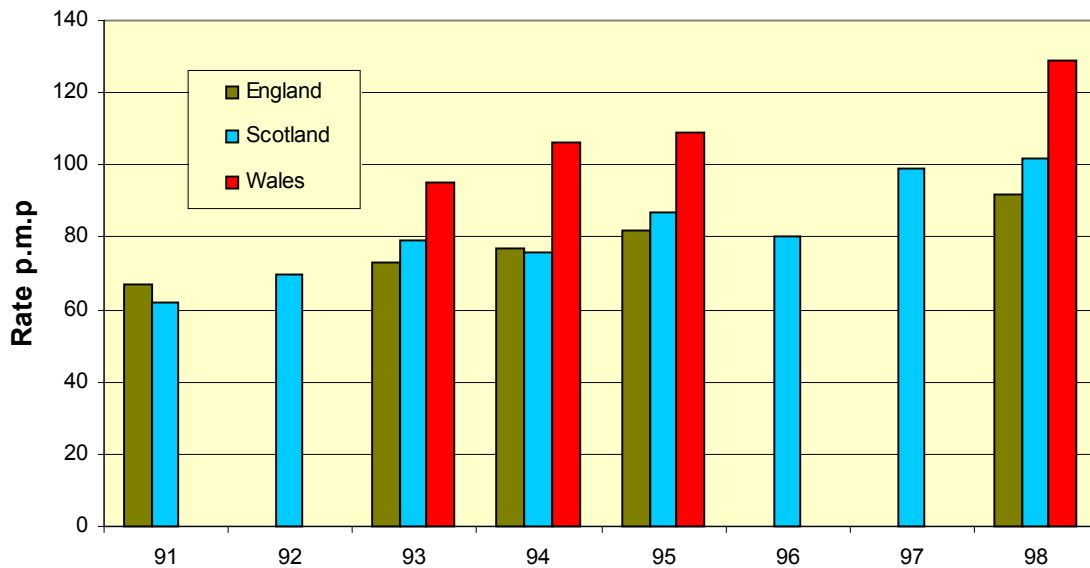
Table 1: Acceptance data for new patients accepted onto renal replacement therapy in the UK 1998

	England	Wales	Scotland	N. Ireland	Total UK
No of units with complete data	52	5	11	3	71
Patient numbers	4,566	374	536	181	5,657
Unit median (range)	79 (28-228)	49 (35-147)	53 (19-86)	N/A	70 (19-228)
Acceptance rate pmp (95% CI)	92 (90-95)	128 (115-141)	105 (96-114)	107 (92-124)	96 (93-98)

Changes in acceptance rates in England and Wales 1993-1998

The acceptance rates in the UK have steadily risen as is shown in tables 2 and 3 and illustrated in figure 1.

Figure 1: Acceptance rate in England, Scotland and Wales 1991-98



(Data from 1993 National Renal Review, 1995 and 1998 surveys and Scottish Renal Registry Report).

Table 2: Acceptance data for new patients accepted onto renal replacement therapy 1993-1998 in England and Wales: questionnaire data

Acceptance data:	England	Wales	Scotland*
1991/2 patient numbers	3,247	-	317
1991/2 rate pmp	67	-	62
Unit median (range)	60 (15-138)	-	-
No. of units with complete data	52	-	11
1993 patient numbers	3,544	275	404
1993 rate pmp	73	95	79
Unit median (range)	64 (7-158)	25 (21-134)	-
No. of units with complete data	46	5	11
1994 patient numbers	3,739	308	388
1994 rate pmp	77	106	76
Unit median (range)	63 (4-169)	29 (20-142)	-
No. of units with complete data	47	5	11
1995 patient numbers	3,726	318	445
1995 rate pmp	82	109	87
Unit median (range)	72 (11-163)	27 (20-152)	-
No. of units with complete data	49	5	11
1998 patient numbers	4,566	374	536
1998 rate pmp	92	128	105
Unit median (range)	79 (28-228)	49 (35-147)	53 (19-86)
No of units with completed data	52	5	11

Note in the 1993 National Renal Review the average annual acceptance rate for 1991/2 was originally lower at 65 pmp than the rate quoted. In the 1993 review, individual patient data were used to produce the acceptance rates; all patients not resident in England (including Welsh & Scottish patients), under 16s, and duplicate records were excluded.

**Pre 1998 data from Scottish renal registry*

Table 3: Changing profile of patients accepted onto renal replacement therapy in the UK

	% over 65	% diabetic
1976-78 (UK)	1	2
1982-84 (UK)	11	8
1986-88 (UK)	23	12
1991-92 (England)	37	14
1995 (England and Wales)	39	15
1998 (UK)	47	19

Sources: EDTA 1976-1988, 1993 and 1995, National Renal Surveys 1991-1998

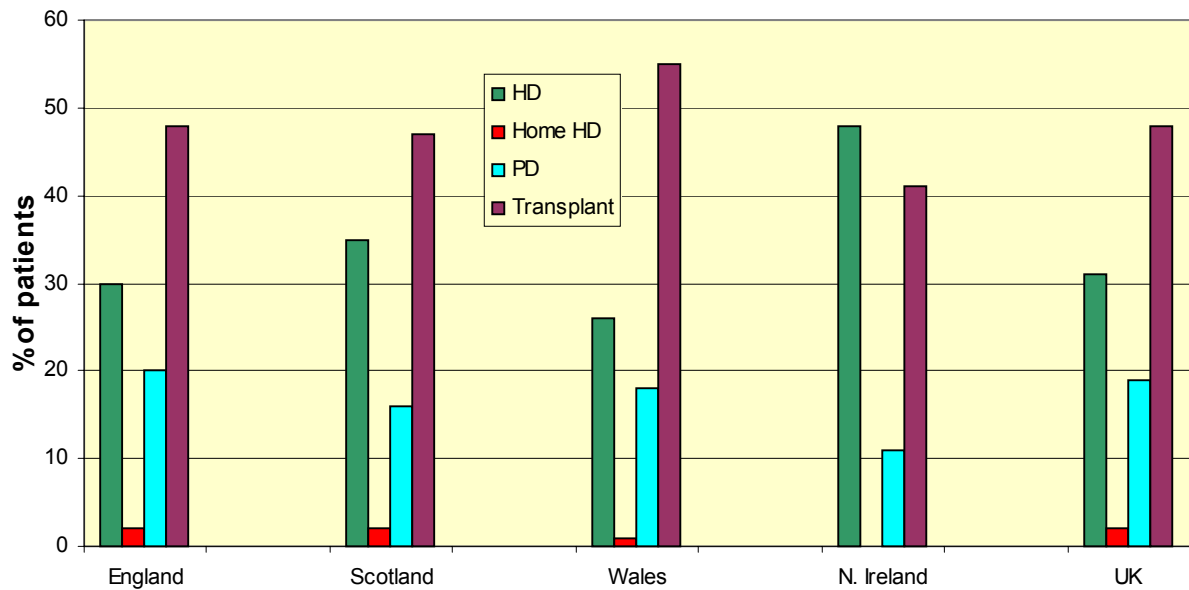
Prevalent patients receiving renal replacement therapy 31/12/98

The UK is now treating over 30,000 patients with end stage renal failure, at a rate of 522 per million population (table 4). There was statistically significant variation between the prevalence rates p.m.p. in England, Scotland, Wales and Northern Ireland ($\text{Chi}^2 = 49.4$, d.f = 3, $p < 0.0001$, obtained using Poisson regression). England has a significantly lower rate than either Wales or Scotland. The quoted prevalence for Scotland is marginally lower than that quoted in the Scottish Renal Registry report. The Scottish Registry figures included paediatric patients.

Table 4: Patients receiving Renal Replacement Therapy in the UK – Dec 31 1998

	England 1998	Wales 1998	Scotland 1998	N. Ireland 1998	Total UK 1998
No. of units	52	5	11	3	71
Patient numbers	25,892	1,716	2,798	941	31,347
Rate pmp (95% CI)	523 (517-530)	585 (558-613)	546 (526-567)	557 (408-472)	529 (520-532)
Modality:(%total patients)					
Haemodialysis	7,788 (30%)	451 (26%)	976 (35%)	356 (38%)	9,571 (30%)
Home haemodialysis	516 (2%)	17 (1%)	69 (2%)	0	602 (2%)
Peritoneal dialysis	5,101 (20%)	301 (18%)	441 (16%)	84 (9%)	5,927 (19%)
Transplants	12,487 (48%)	947 (55%)	1,312 (47%)	501 (53%)	15,247 (49%)
Total patients	25,892	1,716	2,798	941	31,347

Figure 2: Modality pattern of patients on renal replacement therapy in the UK –31/12/1998



The predominant modality of dialysis is unit-based haemodialysis. The proportions of haemodialysis to peritoneal dialysis patients are similar in England and Wales, but in Scotland and Northern Ireland there is a considerably greater trend towards haemodialysis therapy (Fig 2).

Changes in prevalence 1993-1998

The changes in the numbers and distribution of prevalent patients 1993 to 1998 are shown in table 5 and illustrated in figure 3. When the numbers of patients in England with a renal transplant in 1998 were compared with 1995 there initially appeared to be only a marginal increase. Further investigation revealed a discrepancy in returns from the North West region. Enquiries revealed a duplication of reporting of many transplant patients for the 1995 survey: the 1995 figure has been corrected in this report.

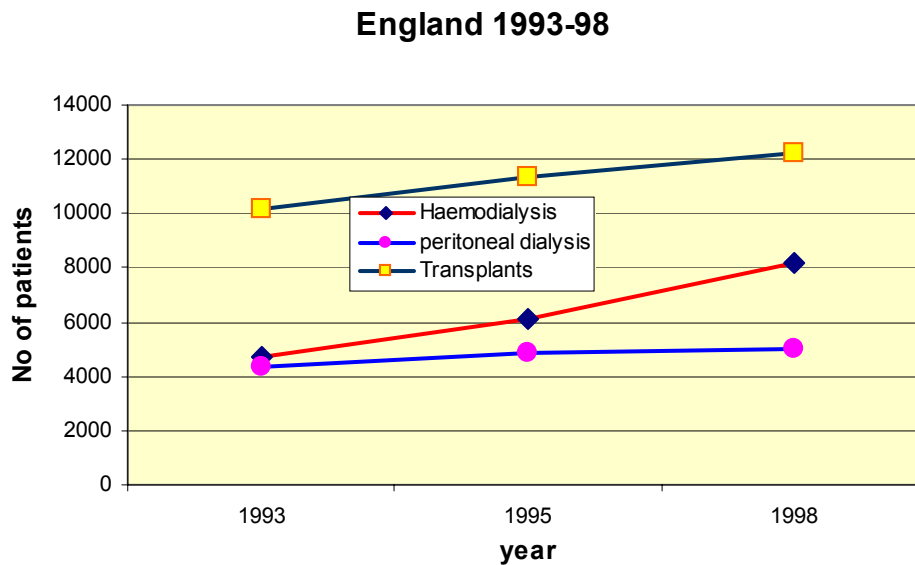
The general pattern is for the greatest absolute and proportional increase to be in unit based haemodialysis. Whilst the numbers receiving transplantation and PD continue to rise the growth is much less and there have been proportional falls in these modalities. The proportion of transplant patients from Wales appears to be rising, even in the face of the high acceptance rate for renal replacement therapy.

Table 5: Patients receiving renal replacement therapy in England (1993-1998) and Wales (1995-98)

	England 1993	England corrected 1995*	England 1998	Wales 1995	Wales 1998
No. of units	52	51	52	5	5
Patient numbers	19,212	22,322	25,892	1,560	1,716
Rate pmp	396	458	523	535	585
Modality:(%total patients)					
Haemodialysis	3,899 (20%)	5,383(24%)	7,788(30%)	388 (27%)	451 (26%)
Home haemodialysis	806 (4%)	725 (3%)	516 (2%)	33 (2%)	17 (1%)
Peritoneal dialysis	4,340 (23%)	4,880(22%)	5101 (20%)	314 (22%)	301 (18%)
Transplants	10,167 (53%)	11,334 (51%)	12,487 (48%)	685 (48%)	947 (55%)
Total patients	19,212	22,322	25,892	1,420	1,716

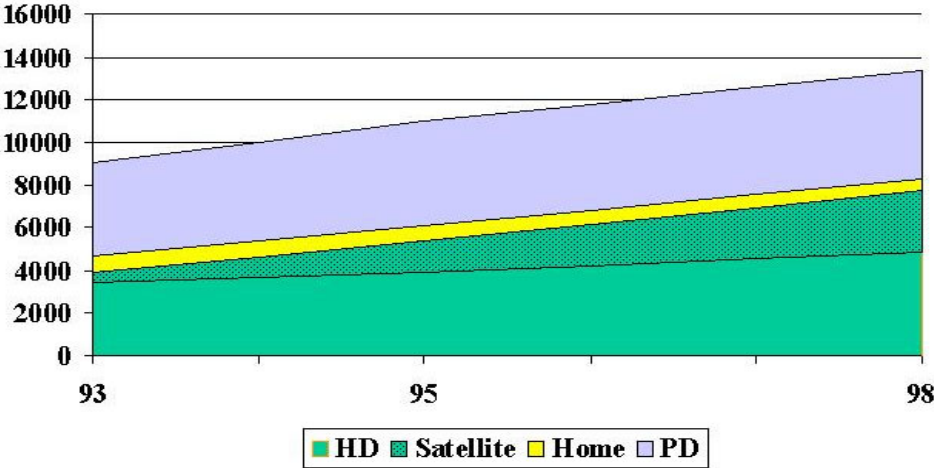
*Stock data 1995 corrected to take account of missing data from units in England.
Error in transplant data 1995 corrected from previous report.

Figure 3: Number of patients on each modality - England 1993-98



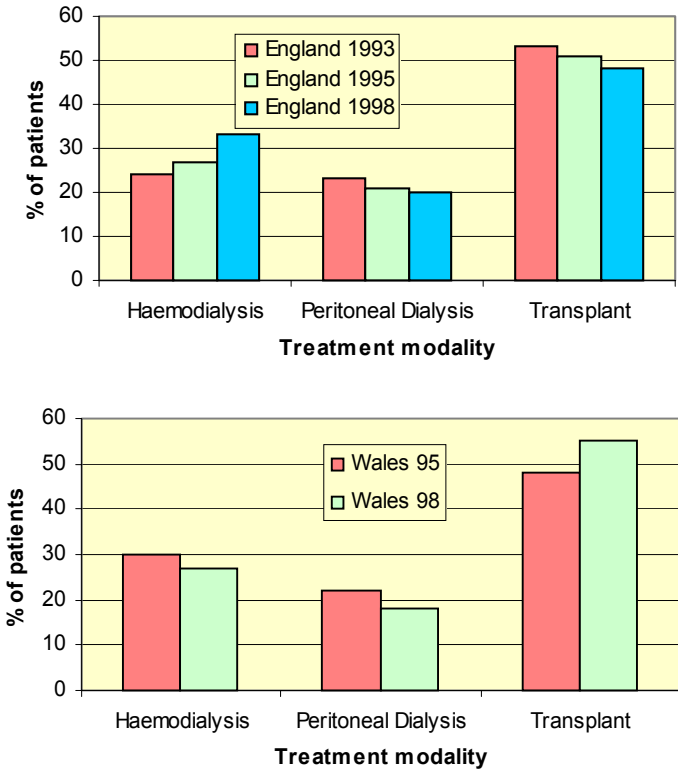
The area of greatest proportional growth is satellite-based haemodialysis (fig 4). 36% of haemodialysis stations and 31% of haemodialysis patients are now in satellite units.

Figure 4: Number of patients on each modality of dialysis - England 1993-9



Changes in England and Wales are shown in figure 5

Figure 5: Changes in proportion of patients receiving each modality of renal replacement therapy in England and Wales 1993-1998



Renal unit facilities

Renal unit facilities at the end of 1998 are summarised in table 6. "Temporary" haemodialysis stations were defined as stations which were not part of an official allocation, but which had been temporarily created in order to deal with excessive patient loads. These were usually in in-patient areas. Overall 5% of haemodialysis is being carried out in such facilities, although less use was made of temporary stations in Northern Ireland and none in Wales. Of permanent haemodialysis stations, 38% were in satellite units. There is clearly a large variation in patterns of care as illustrated by a wide variation in the number of haemodialysis stations per renal unit or satellite unit (tables 6 and 7).

Table 6: Renal unit facilities in the UK – 31/12/1998

	England 1998	Wales 1998	Scotland 1998	N. Ireland 1998	Total UK 1998
Main renal units	52	5	11	3	71
Units per million population	1.1	1.7	2.1	1.8	1.2
Total beds	1,210	93	195	44	1,542
Unit no of beds median (range)	22 (0-64)	15 (0-38)	17 (0-35)	16 (4-24)	22 (0-64)
Beds per million population	24	32	38	26	26
Haemodialysis					
Unit no of fixed stations median (range)	19 (7-55)	16 (10-23)	18 (9-39)	16 (6-40)	18 (6-55)
Fixed stations	1021	83	210	62	1376
Satellite stations (proportion of satellite to total number of stations)	761 (40%)	47 (36%)	24 (9%)	10 (14%)	842 (36%)
Temporary stations	108	0	13	2	123
Total HD stations	1,890	130	247	74	2,341
Stations per million population	38	44	48	44	40
Ratio Hospital: Satellite stations	1.5:1	1.8:1	9.3:1	6.4:1	1.8:1
HD shifts / week	891	69	175	48	1,183
Unit median (range)	18 (12-24)	12 (12-18)	18 (12-19)	18 (12-18)	18 (12-24)

Table 7: Satellite dialysis units in the UK – 31/12/1998

Satellite units:	England 1998	Wales 1998	Scotland 1998	N. Ireland 1998	Total UK 1998
Current satellites	73	4	5	1	83
No. units with current satellites	36	2	3	1	42
Unit range	0-5	0-3	0-2	0-1	0-5
Planned new satellites	28	2	5	0	35
No. Units with planned satellites	25	2	4	0	31
No. of units without satellites planning to start a satellite centre	7	1	3	0	11
Unit range	0-2	0-2	0-2	0	0-2
Total patients in satellite units	2,847	194	102	39	3,182
Median per satellite (range)	35 (6-160)	49 (36-60)	16 (3-52)	39	36 (3-160)
Total HD stations in satellite unit	761	47	24	10	842
Median per satellite (range)	8 (3-41)	13(9-13)	4 (2-9)	10	9 (2-41)

Changes in renal facilities in England and Wales 1993-1998

Despite the large growth in patient numbers there has been no growth in the number of renal units in England and Wales (table 7). The number of renal units per million population is markedly lower in England than in Scotland, Wales or Northern Ireland (Table 6). The expansion in patient numbers, especially haemodialysis patients, has been accommodated by increasing the number of haemodialysis stations available within main renal units and the shifts worked, and in England and Wales by a massive expansion of satellite unit provision, both in numbers and size of satellite units (tables 7,8,9).

Table 8: Changes in renal unit facilities in England 1993-98 and Wales 1995-98

	England 1993	England 1995	England 1998	Wales 1995	Wales 1998
Main renal units	52	51*	52	5	5
Total HD stations	932	1,423	1,890	97	130
Unit no fixed of stations median (range)	15 (3-55)	23 (7-86)	19 (7-55)	13 (10-35)	16 (10-23)
Fixed stations	743	832	1021	65	83
Satellite stations	189	472	761	28	47
Temporary stations	N/A	119	108	4	0
HD shifts / week	694	856	891	62	69
Unit median (range)	12 (0-31)	18 (8-35)	18 (12-24)	16 (12-18)	12 (12-18)

* facilities data based on returns from 50 renal units

Table 9: Changes in satellite haemodialysis provision in England (1993-1998) and Wales (1995-98)

Satellite units:	England 1993	England 1995	England 1998	Wales 1995	Wales 1998
Current satellites	36	60	73	3	4
No. units with current satellites	17	30	36	2	2
Unit range	1-6	1-5	1-5	1-2	1-3
Planned satellites	14	37	28	5	2
No. units with planned satellites	9	28	25	5	2
No. of planned satellites where unit has no existing satellites	5	8	7	1	1
Unit range	0-3	0-3	0-2	0-2	0-2
Total patients in satellite units	476	1476	2,847	64	194
Median per satellite (range)	15 (1-41)	24 (1-68)	35 (6-160)	32 (25-39)	49 (36-60)
Total HD stations in satellite unit	189	472	761	28	47
Median per satellite (range)	6 (2-10)	7 (2-31)	8 (3-41)	8 (6-14)	13 (9-13)

Staffing in renal units

Details of staffing in renal units are shown in tables 10, 11 and 12. Relating the changes in WTE staffing in England to the changes in patient numbers, there has been very little change in the ratio of renal replacement therapy patients or dialysis patients per consultant nephrologist.

Table 10: Medical staffing in renal units in the UK 1998

	England 1998	Scotland 1998	Wales 1998	N. Ireland 1998	UK 1998
Consultant nephrologists:					
Numbers	192	33	12	9	246
Number p.m.p.	3.9	6.4	4.1	5.3	4.2
No. of units	52	11	5	3	71
Average per unit	3.7	3.0	2.4	3	3.5
WTE nephrology*	139.7	18.1	6.8	7.9	172.5
WTE p.m.p.	2.8	3.5	2.3	4.7	2.9
Transplant surgeons:					
Numbers	69	12	3	1	85
Number p.m.p.	1.4	2.3	1.0	0.6	1.4
No. of units	24	3	1	1	31
WTE transplant surgeons ^s	35.8	3.5	2.1	1.1	42.5
WTE p.m.p.	0.7	0.7	0.7	0.7	0.7
Associate specialists	13	1	5	0	19
Staff Grade	18	8	1	0	27
Clinical Assistants	7	0	2	0	9
Senior Registrars/Lecturers	9	1	0	1	11
Clinical Research Fellows	49	8	0	2	59
Registrars/Lecturers	117	15	8	2	142
SHOs	144	25	11	6	186
HO	35	4	3	3	45

* Units varied in the number of sessions included in a full time week - 10.64 sessions was taken as the weighted average.

^s Units varied in the number of sessions included in a full time week -10.43 sessions was taken as the weighted average.

Table 11: Professions allied to medicine staffing in renal units in the UK 31/12/1998

	England 1998	Scotland 1998	Wales 1998	N. Ireland 1998	UK 1998
Nursing Staff:					
WTE	1555.6	422	74.8	87.4	2139.8
No. of units	52	11	5	3	71
Median (range)	22 (9.5-142.8)	32 (10.7-108)	14 (11-20.8)	15 (11-61.4)	21.6 (9.2-142.8)
% of nurses with ENB qualification	53%	NA	49%	46%	52%
Ratio of nurses to main unit HD patients	0.3	0.5	0.3	0.3	0.5
Ratio of nurses to non nursing trained staff	2.6	7.2	2.5	4.6	3
Non nursing trained staff:					
WTE	606.6	58.5	30	19	714.1
No. of units	52	11	5	3	71
Median (range)	8.2 (0-76.9)	5.8 (0-12)	5 (3-10)	5.8 (0-12)	8 (0-76.9)
Dieticians					
numbers WTE	88.4	14.3	5.5	4.2	112.4
No. of units	52	11	5	3	71
Average per unit	1.7	1.3	1.1	1.4	1.6
Social workers					
numbers WTE	42.6	5.4	3.8	3.1	54.9
No. of units	52	11	5	3	71
Average per unit	0.8	0.5	0.8	1	0.8
Technicians					
numbers WTE	150	21.5	8	8.3	187.8
No. of units	52	11	5	3	71
Average per unit	2.9	2	1.6	2.8	2.6

Changes in staffing in England and Wales 1993-1998

Table 12: Changes in staffing in renal units in England and Wales 1993-8

	England 1993	England 1995	England 1998	Wales 1995	Wales 1998
Consultants nephrologists:					
Numbers	129	151	192	11	12
No. of units	52	50	52	5	5
Average per unit	2	3	3.7	2	2.4
WTE nephrology*	-	98.4	139.7	5.5	6.8
Transplant surgeons:					
Numbers	60	55	69	2	3
No. of units	28	24	24	1	1
WTE transplant surgeons [§]	-	24.4	35.8	1.4	2.1
Associate specialists	8	9	13	3	5
Staff Grade	8	15	18	2	1
Clinical Assistants	13	13	7	5	2
Senior Registrars/Lecturers	37	36	9	2	0
Clinical Research Fellows	25	35	49	0	0
Registrars/Lecturers	62	70	117	4	8
SHOs	122	131	144	10	11
HO	29	27	35	2	3
Dieticians numbers WTE	-	70.5	88.4	5	5.5
No. of units	-	49	52	5	5
Average per unit	-	1.4	1.7	1	1.1
Social workers numbers WTE	-	32.9	42.6	2.7	3.8
No. of units	-	49	52	5	5
Average per unit	-	0.7	0.8	2.7	0.8
Technicians numbers WTE	-	156.5	150	11	8
No. of units	-	49	52	5	5
Average per unit	-	3.2	2.9	2.2	1.6

* Units varied in the number of sessions included in a week - 10.65 sessions was taken as the weighted average for 1995 and 10.64 for 1998.

§ Units varied in the number of sessions included in a week - 10.62 sessions was taken as the weighted average for 1995 and 10.43 for 1998.

Processes of care

Some information on processes of care is listed in tables 13-15. A large number of haemodialysis patients in Northern Ireland are still retained on twice weekly dialysis. The reasons for this are not clear. As reported in many other studies haemodialysis patients are more likely to need Erythropoietin than peritoneal dialysis patients.

Table 13: Process measures of dialysis care for renal units in the UK 1998

Process measures	England 1998	Scotland 1998	Wales 1998	N. Ireland 1998	UK 1998
% of dialysis patients on hospital/satellite HD	58%	66%	59%	83%	59%
Unit median (range)	58% (30-100%)	67% (40-77%)	62% (56-69%)	N/A	61% (30-100%)
Units	52	11	5	3	71
% of HD patients on bicarbonate	99.6%	100%	98%	100%	99.6%
Unit median (range)	100% (90-100%)	100% (100-100%)	100% (94-100%)	N/A	100%(90-100%)
Units	52	11	5	3	71
% of HD patients on Erythropoietin (95% CI)	80% (79-81%)	79% (76-81%)	87% (84-90%)	87% (83-90%)	80% (80-81%)
Unit median (range)	80% (10-99%)	80% (50-99%)	88% (83-90%)	N/A	83% (10-100%)
Units	51	11	5	3	70
% of HD patients on thrice weekly	92%	99.8%	96%	65%	92%
Unit median (range)	96% (14-100%)	100% (99-100%)	99% (92-100%)	N/A	97% (14-100%)
Units	51	10	5	3	69
% of HD patients using : (95% CI)					
Standard membrane	10% (9-11%)	9% (7-11%)	0%	0%	9% (8-9%)
Modified cellulose	53% (52-54%)	47% (44-50%)	17% (14-20%)	86% (82-89%)	52% (51-53%)
Synthetic membrane	38% (36-39%)	45% (41-48%)	83% (80-87%)	14% (11-18%)	39% (39-41%)
Units	50	10	5	3	68
% of CAPD patients with disconnect (95% CI)	93% (93-94%)	100% (100-100%)	90% (86-94%)	100% (100-100%)	94% (93-94%)
Unit median (range)	100% (0-100%)	100% (100-100%)	100% (72-100%)	N/A	100% (0-100%)
Units	52	11	5	3	71
% of PD patients on Erythropoietin (95% CI)	64% (63-66%)	64% (59-68%)	56% (50-61%)	55% (44-66%)	64% (62-65%)
Unit median (range)	62% (10-100%)	60% (25-90%)	62% (29-100%)	N/A	61% (10-100%)
Units	51	10	5	3	69

HD=haemodialysis, PD =peritoneal dialysis

Changes in processes of care in England and Wales 1993-1998

As can be seen from tables 14 and 15 there seems to have been a steady improvement in the measured processes of care in England and Wales from 1993 to 1998.

Table 14: Changes in process measures of dialysis care for renal units in England 1993-1998

Process measures	England 1993	England 1995	England 1998
% of HD patients on bicarbonate (patients)	71% (3,168)	89% (4,870)	99.6%
Unit median (range)	87% (0-100%)	100% (44-100%)	100% (90-100%)
Units	51	47	52
% of all dialysis patients on Erythropoietin (patients)	43% (3870)	59% (5,914)	74%
Unit median (range)	42% (12-74%)	60% (25-83%)	75% (10-97%)
Units	52	48	50
% of PD patients with disconnect catheters (patients)	64% (2,766)	79% (3,349)	93%
Unit median (range)	79% (0-100%)	92% (0-100%)	100% (0-100%)
Units	51	46	52
% of HD patients on thrice weekly (patients)	75% (2,938)	82% (4,074)	92%
Unit median (range)	86% (0-100%)	90% (10-100%)	96% (14-100%)
Units	52	48	51
% of dialysis patients on hospital/satellite HD (patients)	43% (3,899)	50% (4,419)	58%
Unit median (range)	42% (13-93%)	52% (27-100%)	58% (30-100%)
Units	52	49	51
% of HD patients using (patients):			
standard membrane	-	29.5% (1,633)	10%
modified cellulose	-	45.5% (2,522)	53%
synthetic membrane	-	25% (1,405)	37%
Units	-	47	50

HD=haemodialysis, PD =peritoneal dialysis

Table 15: Changes in process measures of dialysis for renal units in Wales 1995-98

Process measures	Wales 1995	Wales 1998
% of HD patients on bicarbonate (patients)	77% (326)	98.4%(484)
Unit median (range)	88% (58-100%)	100% (94-100%)
Units	5	5
% of all dialysis patients on Erythropoietin (patients)	48% (326)	75%
Unit median (range)	58% (32-66%)	75% (67-92%)
Units	4	5
% of PD patients with disconnect catheters (patients)	64% (201)	90%
Unit median (range)	100% (46-100%)	100%(72-100%)
Units	5	5
% of HD patients on thrice weekly (patients)	77% (299)	96%
Unit median (range)	88% (53-98%)	99%(92-100%)
Units	5	5
% of dialysis patients on hospital/satellite HD (patients)	52% (356)	59%
Unit median (range)	56% (48-74%)	62% (56-69%)
Units	4	5
% of HD patients using (patients):		
standard membrane	44%(104)	0%
modified cellulose	29% (70)	17%
synthetic membrane	27% (66)	83%
Units	4	5

HD=haemodialysis, PD =peritoneal dialysis

Prevalence of hepatitis in patients on renal replacement therapy.

Hepatitis C

Renal units reported they had between 0% and 7% of patients as hepatitis C positive. Overall less than 2% of renal replacement therapy patients in the UK are hepatitis C positive.

Hepatitis B

Renal units reported they had between 0 and 5% of patients as hepatitis B antigen positive, with the large majority having no positive patients. Overall less than 1% of UK patients on renal replacement therapy are hepatitis B positive.

Factors restricting development of renal services

The questionnaire contained a section requesting information on factors which had constrained what was considered necessary development to meet the needs of the local population. The replies are summarised below in table 16.

Table 16: Constraining factors (of the responding units)

Constraining factor	% of units
Nursing staff	66
Nephrology consultant recruitment	14
Capital funding	77
Revenue funding	70
Surgical staff	24
Access provision	43
Medical manpower	36
Physical space	74

The number of units responding to each question varied between 63 and 66

Regional Comparisons

The prevalence and acceptance rates for patients on renal therapy in different regions are shown in tables 17 and 18. These data do not take account of cross-regional boundary flows, nor differences in the key population characteristics such as age and ethnic minority distribution.

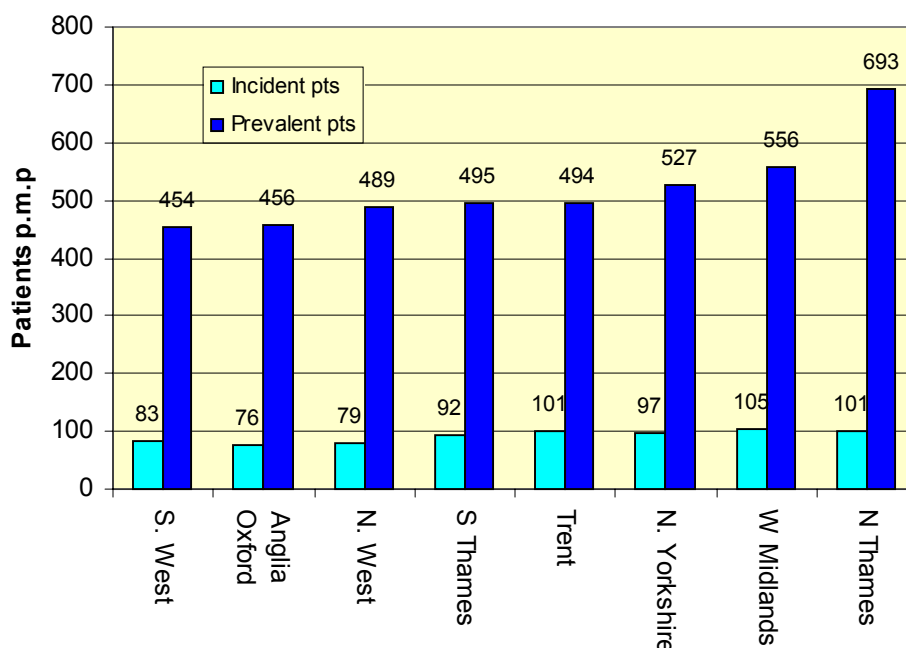
Table 17: Regional treatment rates 1998 pmp

	Acceptances	Stock
South West	83	454
Anglia Oxford	76	456
North West	79	489
S Thames	92	495
Trent	101	494
Northern Yorkshire	97	527
W Midlands	105	556
N Thames	107	693
England	92	523
Scotland	105	546
Wales	128	585
N. Ireland	107	439

Table 18: Changes in regional treatment rates p.m.p. 1995-8

Region	Acceptances		Stock	
	1995	1998	1995	1998
South West	72	83	381	454
Anglia Oxford	64	76	425	456
North West	84	79	441	489
S Thames	76	92	420	495
Trent	84	101	470	494
Northern Yorkshire	80	97	421	527
W Midlands	92	105	470	556
N Thames	105	107	608	693
England	82	92	458	523
Wales	109	128	487	585

Figure 6: Incidence and prevalence rates (p.m.p.) of RRT patients in various regions in England 1998.



Some comparisons between regions in the facilities for dialysis are shown in table 19. There are considerable disparities, which are not easily explained on the basis of age distribution or ethnic mix.

Table 19: Regional rates of supply of RRT facilities and staff 31/12/1998

	Units	Satellites	HD stations* pmp (Main units)	HD stations pmp (Satellite units)	WTE consultant Nephrologist pmp
South West	7	13	18	16	2.8
Anglia Oxford	5	4	16	7	1.8
N Thames	8	11	33	26	3.4
S Thames	6	7	22	8	3.5
Northern Yorkshire	10	11	27	12	2.9
North West	5	13	15	16	2.6
Trent	4	7	23	13	2.2
W Midlands	7	7	28	24	3.4
England	52	73	23	15	2.8
Wales	5	4	28	16	2.3
Scotland	11	5	44	5	3.5
N. Ireland	3	1	38	6	4.7

**figure includes temporary stations*

International comparisons

Some useful international comparisons are shown in tables 19 and 20.

Table 20: Prevalence and incidence of RRT in several countries

Country	Year	Population	Prevalence ESRD p.m.p.	Prevalent Dialysis p.m.p.	Incidence ESRD p.m.p.	% incident ESRD with diabetes
Australia	1998	18,750,982	555.0	295.0	85.0	22
Austria	1998	8,091,000	668.0	349.0	125.0	30.6
Canada	1997	30,286,268	609.9	371.4	152.0	28.9
Germany	1998	82,037,000	764.0	585.0	148.0	35.0
Italy	1997	57,563,356	757.0	589.0	119.0	15.0
Netherlands	1998	15,654,192	583.0	290.0	93.0	15.7
New Zealand	1998	3,792,000	541.0	295.0	96.0	44.0
Norway	1998	4,445,000	526.8	122.9	91.1	10.2
Sweden	1998	8,854,322	668.0	304.0	119.0	23.0
United Kingdom	1998	59,236,522	522.0	271.8	96.0	19.0
USA	1998	270,299,000	1,177.0	909.8	320.0	39.8

Table 21: Modality pattern in several countries

Country	Year	Dialysis patients			% ESRD with Transplant	New Transplant	New Tx from living donor
		% unit haemodialysis	%CAPD/CCPD	% Home haemodialysis			
Australia	1998	60	28	12	47.0	517	160
Austria	1998	91.8	8.0	0.2	47.0	375	50
Canada	1997	66.5	29.6	3.9	39.1	1,010	285
Germany	1998	92.6	6.1	1.3	23.4	2,340	343
Italy	1997	86	10.0	4.0	20.0	1,190	-
Netherlands	1998	68.4	29.6	2.0	50.3	480	95
New Zealand	1998	26	56.0	18.0	46.0	106	31
Norway	1998	80.7	18.3	1.0	76.7	203	78
Sweden	1998	87	12.0	1.0	54.0	356	120
United Kingdom	1998	59.7	36.5	3.8	48.0	1,349	247
USA	1998	88.5	10.2	1.3	29.0	12,956	4,026

Discussion

The acceptance rate in England seems to lag behind the others. This is surprising, as it would be expected to be high given the larger ethnic minority populations. The increase in acceptance rate in England over the last three years is in the region of 4% per annum. Despite the fact that Wales and Scotland had an already higher acceptance rate in 1995, the annual growth there has been even greater.

There have been significant trends in the type of patients being treated by RRT with a liberalisation of referral and acceptance to increase the rates of patients being treated who are elderly and/or with co-morbidity. The remaining unmet need for RRT, most evident in England, will be in these groups. This raises complex issues about equity of access to RRT and the effectiveness of RRT in terms of survival and quality of life on dialysis. The UK Registry will be well placed to evaluate such issues.

Overall the stock of patients alive on renal replacement therapy seems to be growing at around 4-6% per annum. In England the absolute and relative growth rate is greatest for haemodialysis patients, especially in satellite units. Of the 3599 increased number of haemodialysis patients from 1993 to 1998, 66% were in satellite units. This is 37% of the total increase in RRT patients. The total number of peritoneal dialysis patients is only growing very slowly. Total numbers receiving home haemodialysis are falling and this is now a very tiny proportion of the total patients on therapy. Whilst home haemodialysis is still declining, home based therapy, which included most forms of peritoneal dialysis, still contributes a substantial proportion of the total (40%)(table3). With the growth of satellite units, which provide treatment nearer to patient's homes, treatment may be generally more convenient for patients.

The proportion of patients with a functioning transplant has fallen to below 50% for the first time. The proportion of patients with a functioning renal transplant is the result of the balance between the rate of renal transplantation and the rate of acceptance of new patients. Organ donor rates in the UK have fallen slightly in recent years (UKTSSA), and although there has been an increase in live donor renal transplantation, the overall renal transplant rate has marginally declined. This has happened during this observed period of growth in the numbers of new patients accepted for therapy. In addition many of the new patients are older with many co-morbid conditions and are not suitable for transplantation.

The size of renal units varies considerable (table 6). In Scotland there are more units per million population, possibly as a result of a widely scattered population. The size of satellite units is highly variable (table 7). It is known that the pattern of care in satellite units varies considerably, from units which have near permanent medical attendance to those which have intermittent regular visits from a doctor. Over half the units now have satellite haemodialysis units (42/71), with more planned, such that 53 of the 71 units should have satellites within three or four years. It is noticeable however that the planned expansion of satellite units reported in 1995 has not been fully realised. Only 14 of the 33 satellite units then planned have come to fruition in the subsequent three years. This major growth area of dialysis has never been systematically studied, but is currently the subject of review in a project funded by the Department of Health's Health Technology Assessment R&D scheme.

The increase in number of patients has not been matched by an increase in the number of renal units, despite the expansion of satellite units. This is well shown by the figures from England in table 22. Whilst the number of haemodialysis patients has doubled, there has been no increase in the number of renal units, they have simply become larger, by nearly 40%. The number of satellite units has doubled with a trebling of the number of haemodialysis stations available in them. Thus whilst maintenance dialysis facilities do seem to be more dispersed, access to full nephrological care remains geographically limited.

Table 22: Relative changes in haemodialysis patients and facilities in England 1993-1998

Year	1993	1995	1998	% increase
Haemodialysis pats.	3899	5383	7788	100%
Renal units	52	51	52	0
HD stations in main units	743	832	1021	37%
Satellite units	36	60	73	103%
HD stations in satellites	189	472	761	303%

Most renal units do not care for transplant patients. Relating the changes in WTE staffing in England to the changes in dialysis patient numbers, there has been very little change in the ratio of dialysis patients per consultant, but the number of non-consultant medical nephrology staff has not risen proportionately (Table 23). However the patients now being treated are older and more complex and more time-consuming than those being treated in the early 90's. Furthermore it was demonstrated that nephrology staffing in the UK in 1991 lagged well behind that in other developed countries []. There does not appear to have been any significant catch up since then. It appears that Scotland has more nephrologists per million population than England or Wales (Table 10).

Table 23: Changes in patient number and medical staff in England 1993-98

	1993	1998	% increase
Consultant nephrologists	129	192	49
Non-Consultant nephrologists	29	38	31
Trainee nephrologists	99	126	27
Dialysis Patients	9,045	13,405	48

There were no sequential data available on nursing staff. The 1995 review did show qualitatively that nursing shortages were a major barrier to expansion, and this survey shows that this is now an even greater problem.

From the information on processes of care in tables 13,14, and 15 it can be seen that there is a welcome shift towards evidence based practice, with use of bicarbonate haemodialysis and disconnect peritoneal dialysis. The shift from standard cuprophane cellulose membranes to synthetic membranes reflects the increasing evidence that synthetic membranes induce less inflammatory response, and are likely to lead to a reduction in some of the long-term complications of dialysis, particularly joint and other problems related to dialysis amyloid.

The regional variation in acceptance and stock rates seen in tables 17 and 18 should be interpreted with caution as some regions, such as London with high ethnic minority groups, or others with a disproportionately elderly population, would be expected to have higher treatment rates than others. The provision of facilities per million population (table 19) also shows considerable variation. This partly reflects historical patterns of development of renal services but over time provision should become more in line with population need.

Summary

There has been a continuing growth in renal replacement therapy in the UK. From 1993 to 1998 the number of patients receiving renal replacement therapy in England increased by 35% from 19,212 to 25,892. There has been a continuing increase in acceptance rates for renal replacement therapy in all parts of the United Kingdom with lower rates found in England than Scotland or Wales. The main growth area has been in haemodialysis. There has been no expansion of renal units although they have become larger and work more shifts per day. The most marked area of expansion is in the provision of satellite haemodialysis. Home haemodialysis continues to dwindle and now represents only 2% of dialysis carried out. There is a small absolute growth in numbers receiving peritoneal dialysis but it is becoming a decreasing proportion of the whole. Transplant patients have fallen for the first time to less than 50% of the total renal replacement therapy population, partly due to a limitation in organ supply.

Individual renal units appear to be working at a faster pace with more shifts per day, and rising numbers of patients in both satellite and main units. Consultant manpower is keeping up with growth in terms of simple numbers, but may not be growing sufficiently to cope with the growing complexity of patients now being treated. International comparisons on staffing suggest that the provision of nephrologists in the UK is well below norms found in other European countries.

Overall England lacks behind in acceptance of new patients for dialysis despite the expected higher level of need for renal replacement therapy due to the larger proportion of ethnic minority groups. This suggests that there is still some way to go-before need is met in England, with the consequence that the time to reach a steady state prevalent pool will be longer. It is unlikely that the transplant programme will be able to cope with this demand even with welcome moves to enhance both the live donation programme and the effectiveness of the cadaver programme. Haemodialysis provision will be the mainstay: this could be partly met by continuing to increase the number of satellite units but the need for more main units to provide equitable access to the full range of facilities for a predominantly elderly population needs to be reviewed.

It is encouraging that there seems to be a general improvement in the quality and process of dialysis carried out. Regional comparisons show wide variation in the acceptance rates for RRT, the prevalence rates for RRT, and the provision of staff and resources which are not easily explained on the basis of known variations in age distribution or ethnic mix of populations

As more renal units join the National Renal Registry considerably more detailed data on patient characteristics and quality of care will become available. National coverage and postcode matching to geographical areas will allow more detailed assessment of, for example, equity of provision by age sex and DHA age sex standardised rates. With the addition of a relatively simple questionnaire to ascertain details of staffing it should be possible to regularly produce further and more detailed reviews of services for renal failure in the UK in future years.

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Appendix

Facilities by unit 1998

Region	No. of Beds	No. of fixed HD stations	No. of temp. HD stations	No. of satellite HD stations	No. of current satellites	No. dialysis shifts per week
Anglia & Oxford	10	13	0	0	0	15
Anglia & Oxford	20	24	0	0	0	18
Anglia & Oxford	0	10	0	0	0	18
Anglia & Oxford	6	17	4	6	1	18
Anglia & Oxford	40	18	0	32	3	18
Northern Ireland	24	40	2	10	1	18
Northern Ireland	4	6	0	0	0	18
Northern Ireland	16	16	0	0	0	12
North Thames	35	18	0	0	0	15
North Thames	18	20	4	23	2	13
North Thames	25	20	4	0	0	18
North Thames	20	20	0	16	1	18
North Thames	0	16	0	0	0	18
North Thames	38	31	0	71	2	18
North Thames	46	55	2	45	3	18
North Thames	44	38	6	31	3	18
North West	13	28	0	35	5	21
North West	35	14	3	20	3	18
North West	23	14	1	0	0	18
North West	30	18	5	26	2	15
North West	22	12	1	26	3	17
North Yorkshire	22	10	0	5	1	15
North Yorkshire	0	12	0	0	0	12
North Yorkshire	24	20	0	11	1	18
North Yorkshire	10	12	1	0	0	24
North Yorkshire	20	15	4	16	2	24
North Yorkshire	6	7	0	3	1	15
North Yorkshire	13	15	2	0	0	18
North Yorkshire	37	20	1	35	5	18
North Yorkshire	37	19	2	0	0	24
North Yorkshire	23	31	0	6	1	12
Scotland	8	16	1	0	0	18
Scotland	8	12	2	6	1	12
Scotland	35	39	0	0	0	18
Scotland	29	18	6	0	0	18
Scotland	14	30	0	0	0	12
Scotland	0	10	0	0	0	15
Scotland	17	14	0	0	0	12
Scotland	32	22	0	7	2	19
Scotland	27	21	3	11	2	18
Scotland	17	19	1	0	0	18
Scotland	8	9	0	0	0	15

Facilities by unit 1998 contd.

Region	No. of Beds	No. of fixed HD stations	No. of temp. HD stations	No. of satellite HD stations	No. of current satellites	No. dialysis shifts per week
South Thames	24	19	1	11	1	18
South Thames	24	27	0	14	2	15
South Thames	21	14	2	7	1	12
South Thames	46	46	5	10	1	18
South Thames	16	15	4	0	0	18
South Thames	30	20	0	15	2	18
South & West	10	11	4	10	1	12
South & West	40	12	6	48	4	18
South & West	14	8	3	5	1	18
South & West	0	25	0	0	0	12
South & West	15	8	3	11	2	18
South & West	39	17	5	31	5	18
South & West	22	14	6	0	0	12
Trent	26	26	4	12	1	18
Trent	52	24	7	25	3	20
Trent	22	20	0	0	0	18
Trent	45	30	7	28	3	18
Wales	30	10	0	0	0	15
Wales	0	14	0	0	0	18
Wales	10	16	0	0	0	12
Wales	15	23	0	13	1	12
Wales	38	20	0	34	3	12
West Midlands	24	19	3	0	0	18
West Midlands	28	26	0	0	0	18
West Midlands	6	17	4	21	1	15
West Midlands	15	19	4	33	3	18
West Midlands	10	20	0	0	0	12
West Midlands	0	19	0	31	1	19
West Midlands	64	18		43	2	18
Total	1542	1376	123	843	83	1183

Acceptance by unit 1998

Region	No. of new patients	% with diabetic nephropathy	% aged over 65
Anglia & Oxford	32	16	61
Anglia & Oxford	92		36
Anglia & Oxford	85	22	45
Anglia & Oxford	61	12	50
Anglia & Oxford	143	8	43
Northern Ireland	154	18	43
Northern Ireland*			
Northern Ireland	27	19	44
North Thames	31	11	48
North Thames	60		
North Thames	40		43
North Thames	55	20	30
North Thames	45	24	40
North Thames	112		45
North Thames	228	50	
North Thames	181		48
North West	193		45
North West	53		
North West	74	16	39
North West	129	34	50
North West	72	14	38
North Yorkshire	31	26	16
North Yorkshire	0		
North Yorkshire	111	10	55
North Yorkshire	28	31	50
North Yorkshire	85	5	40
North Yorkshire	37	16	51
North Yorkshire	47	17	40
North Yorkshire	79	13	48
North Yorkshire	101	3	35
North Yorkshire	89		40
Scotland	36	17	44
Scotland	31	16	55
Scotland	85	9	47
Scotland	61	13	47
Scotland	55	24	35
Scotland	19	21	47
Scotland	22	9	32
Scotland	53	17	60
Scotland	86	13	45
Scotland	60	17	58
Scotland	28	14	32

**data has been included with the unit above.*

Acceptance by unit 1998 contd.

Region	No. of new patients	% with diabetic nephropathy	% aged over 65
South Thames	104	19	44
South Thames	113		50
South Thames	64		33
South Thames	136		35
South Thames	124		
South Thames	97	27	42
South & West	54	11	37
South & West	122	16	52
South & West	36	20	47
South & West	49	4	63
South & West	84	4	62
South & West	144	15	47
South & West	68	10	61
Trent	135	27	39
Trent	183	20	40
Trent	66		40
Trent	132	19	65
Wales	49	20	45
Wales	35		60
Wales	39	10	51
Wales	104	16	66
Wales	147	27	65
West Midlands	63		47
West Midlands	87	21	41
West Midlands	70		
West Midlands	76	20	53
West Midlands	35	15	38
West Midlands	41	29	46
West Midlands	189	14	50
Total	5657	19	47

Prevalent patients by unit 1998

Region	% on Sat/ Hosp HD	% on Home HD	% on PD	% on transplant	Total stock
Anglia & Oxford	28	0	37	35	195
Anglia & Oxford	18	2	22	59	646
Anglia & Oxford	35	0	65	0	163
Anglia & Oxford	43	2	20	34	293
Anglia & Oxford	21	3	15	60	1191
Northern Ireland	49	0	12	39	630
Northern Ireland*					
Northern Ireland	41	0	7	51	111
North Thames	73	0	27	0	123
North Thames	26	5	11	58	587
North Thames	23	0	18	58	515
North Thames	58	0	22	20	370
North Thames	100	0	0	0	71
North Thames	49	0	6	45	802
North Thames	30	2	23	46	1439
North Thames	33	1	22	44	980
North West	30	1	12	58	1209
North West	21	8	16	55	495
North West	16	2	35	46	362
North West	12	2	26	61	733
North West	40	2	27	31	430
North Yorkshire	63	0	37	0	108
North Yorkshire					0
North Yorkshire	35	1	9	55	444
North Yorkshire	73	3	24	0	96
North Yorkshire	40	4	22	34	404
North Yorkshire	28	0	17	55	156
North Yorkshire	38	0	10	51	239
North Yorkshire	30	1	10	58	776
North Yorkshire	23	0	6	71	727
North Yorkshire	37	0	19	43	391
Scotland	46	2	32	20	131
Scotland	76	1	22	0	85
Scotland	18	0	11	71	960
Scotland	73	0	27	0	166
Scotland	61	23	16	0	182
Scotland	27	1	43	29	89
Scotland	65	0	35	0	74
Scotland	32	3	9	56	292
Scotland	29	2	10	59	527
Scotland	38	1	18	42	237
Scotland	67	0	22	11	55

**data has been included with the unit above*

Prevalent patients by unit 1998 contd.

Region	% on Sat/ Hosp HD	% on Home HD	% on PD	% on transplant	Total stock
South Thames	22	1	30	47	683
South Thames	27	12	23	38	428
South Thames	27	0	32	42	339
South Thames	17	2	21	59	1151
South Thames	18	0	17	65	357
South Thames	32	1	26	42	460
South & West	30	0	27	43	243
South & West	28	7	12	53	830
South & West	69	0	31	0	108
South & West	50	0	21	30	179
South & West	26	1	20	53	409
South & West	22	0	16	62	897
South & West	27	1	14	58	363
Trent	31	0	20	49	683
Trent	28	3	29	40	911
Trent	58	1	40	0	154
Trent	35	5	18	42	786
Wales	32	2	12	54	107
Wales	57	0	34	8	119
Wales	44	0	23	33	104
Wales	29	2	19	50	436
Wales	19	1	15	66	950
West Midlands	29	0	26	45	410
West Midlands	27	2	26	45	489
West Midlands	44	0	22	34	234
West Midlands	47	7	10	36	389
West Midlands	25	4	30	40	166
West Midlands	34	2	31	33	232
West Midlands	35	1	16	48	1046
Total	31	2	19	38	31147

Staffing data by unit 1998

Region	No. of nephrology consultants	No. of Tx surgeons	No. of asso. spec.	No. of staff grades	No. of clin. ass.	No. of sen. reg.	No. of clin. res. fel.	No. of spec. reg.	No. of SHOs	No. of HOs
Anglia & Oxford	2	0	0	0	1	0	0	0	1	0
Anglia & Oxford	4	4	0	0	0	0	4	3	2	0
Anglia & Oxford	1	0	1	0	0	0	0	1	2	1
Anglia & Oxford	3	0	0	0	0	0	0	1	0	0
Anglia & Oxford	6	2	0	1	0	0	1	4	5	0
Northern Ireland	6	1	0	0	0	1	2	2	4	3
Northern Ireland	1	0	0	0	0	0	0	0	1	0
Northern Ireland	2	0	0	0	0	0	0	0	1	0
North Thames	2	0	0	0	0	0	0	1	2	3
North Thames	4	2	0	0	0	0	1	3	6	0
North Thames	5	3	0	0	0	0	0	0	0	0
North Thames	3	1	1	1	0	0	1	3	2	0
North Thames	2	0	0	0	0	0	0	1	1	0
North Thames	3	2	0	0	0	0	4	2	6	0
North Thames	6	2	1	0	0	0	4	5	6	0
North Thames	9	3	0	0	0	0	1	7	6	2
North West	5	3	2	0	0	0	0	5	5	0
North West	3	0	1	1	0	1	0	2	2	3
North West	4	0	0	0	0	0	0	3	3	2
North West	6	4	0	1	1	3	3	1	2	2
North West	3	1	0	3	0	0	0	2	2	1
North Yorkshire	2	0	0	1	0	0	0	1	1	2
North Yorkshire	2	0	0	0	0	0	0	1	0	0
North Yorkshire	4	0	0	0	0	0	0	2	4	0
North Yorkshire	2	0	0	0	0	0	2	1	1	1
North Yorkshire	3	0	0	1	0	0	0	3	3	2
North Yorkshire	2	0	0	0	0	0	0	1	2	1
North Yorkshire	3	0	0	0	1	0	0	1	2	1
North Yorkshire	3	3	0	0	0	0	3	5	6	0
North Yorkshire	3	3	1	0	2	1	6	1	4	0
North Yorkshire	3	0	0	0	0	1	2	4	2	0
Scotland	2	0	0	1	0	0	0	0	1	0
Scotland	1	0	0	0	0	0	0	0	1	1
Scotland	5	4	1	2	0	0	4	3	6	1
Scotland	3	0	0	0	0	0	2	1	4	2
Scotland	2	0	0	0	0	0	0	1	3	0
Scotland	1	0	0	1	0	0	0	0	0	0
Scotland	2	0	0	1	0	0	0	0	0	0
Scotland	5	3	0	0	0	0	2	3	2	0
Scotland	8	5	0	0	0	0	0	5	7	0
Scotland	3	0	0	1	0	1	0	2	1	0
Scotland	1	0	0	2	0	0	0	0	0	0

Staffing data by unit 1998 contd.

Region	No. of nephrology consultants	No. of Tx surgeons	No. of asso. spec.	No. of staff grades	No. of clin. ass.	No. of sen. reg.	No. of clin. res. fel.	No. of spec. reg.	No. of SHOs	No. of HOs
South Thames	6	1	0	0	0	0	0	5	3	0
South Thames	3	1	0	1	0	0	0	2	2	1
South Thames	3	2	2	0	0	0	0	2	2	0
South Thames	8	3	0	0	0	0	0	4	8	0
South Thames	4	2	0	0	0	1	0	4	3	0
South Thames	4	0	1	1	0	0	0	3	7	0
South & West	2	0	0	1	0	0	0	0	1	0
South & West	5	4	0	0	0	1	2	2	5	0
South & West	2	0	0	1	0	0	0	1	0	0
South & West	2	0	0	1	0	0	0	1	2	2
South & West	3	0	1	1	0	0	1	1	1	0
South & West	6	4	0	0	0	0	3	6	7	0
South & West	2	5	1	0	0	0	0	1	4	2
Trent	3	3	0	0	0	0	1	3	3	0
Trent	6	3	0	1	0	0	5	3	3	3
Trent	1	0	0	0	0	0	0	1	2	1
Trent	6	3	1	1	0	0	0	3	5	1
Wales	1	0	1	0	0	0	0	1	1	1
Wales	2	0	1	0	0	0	0	1	1	1
Wales	2	0	0	1	0	0	0	1	2	1
Wales	2	0	1	0	1	0	0	1	2	0
Wales	5	3	2	0	1	0	0	4	5	0
West Midlands	4	0	0	1	0	0	0	0	0	0
West Midlands	5	2	0	0	0	1	3	2	2	0
West Midlands	3	0	0	0	2	0	0	2	1	0
West Midlands	4	0	0	0	0	0	0	2	1	0
West Midlands	2	0	0	0	0	0	0	0	0	0
West Midlands	3	0	0	0	0	0	0	1	2	1
West Midlands	7	3	0	0	0	0	2	4	2	3
Total	246	85	19	27	9	11	59	142	186	45

Process measures by unit 1998

Region	% of dialysis on hosp/sat HD	% HD 3x a week	% of HD on epo	% of HD on bicarb.	% on standard mem.	% on modified mem.	% on synthetic mem	% of CAPD on disconnect	% of PD on epo
Anglia & Oxford	43	91	80	100	0	100	0	100	85
Anglia & Oxford	44	76	79	100	0	100	0	100	57
Anglia & Oxford	35	97	52	100	0	100	0	100	61
Anglia & Oxford	66	68	90	100	0	100	0	100	75
Anglia & Oxford	53	98	88	100	0	0	100	100	73
Northern Ireland	82	65	85	100	0	95	5	100	55
Northern Ireland*									
Northern Ireland	89	70	100	100	0	17	83	100	50
North Thames	73	80	88	100	0	100	0	100	52
North Thames	61	99	98	100	0	0	100	80	90
North Thames	56	96	95	100	0	100	0	100	60
North Thames	73	94	80	100	0	0	100	100	30
North Thames	100	96	50	100	0	0	100	0	63
North Thames	88	100	95	100				100	90
North Thames	55	95	89	100	0	100	0	98	82
North Thames	59	100	85	100				100	75
North West	70	100	66	100	90	0	10	100	59
North West	46	85	10	99	65	10	25	0	10
North West	30	100	60	100	0	0	100	98	80
North West	30	91	68	98	0	0	100	98	52
North West	58	94	90	90	5	10	85	74	70
North Yorkshire	63	93	70	100	0	29	71	100	60
North Yorkshire									
North Yorkshire	71	94	76	100	0	0	100	100	51
North Yorkshire	73	99	71	100	0	100	0	100	52
North Yorkshire	59	89	71	100	0	0	100	100	54
North Yorkshire	63	96	87	100	0	96	4	100	58
North Yorkshire	78	91	87	100	0	0	100	100	75
North Yorkshire	73	97	95	98	0	90	10	95	80
North Yorkshire	79	93	96	100	0	100	0	100	100
North Yorkshire	66	14	75	98	100	0	0	60	90
Scotland	58	100	80	100	0	40	60	100	
Scotland	77	100	99	100	0	95	5	100	58
Scotland	58	99	80	100	50	0	50	100	80
Scotland	75		95	100				100	60
Scotland	61	100	75	100	0	50	50	100	50
Scotland	40	100	95	100	0	100	0	100	60
Scotland	65	100	80	100	0	90	10	100	90
Scotland	72	100	70	100	0	100	0	100	60
Scotland	72	100	50	100	0	50	50	100	25
Scotland	67	100	95	100	0	0	100	100	75
Scotland	74	100	90	100	0	0	100	100	70

*data has been included with the unit above

Process measures by unit 1998 contd.

Region	% of dialysis on hosp/ sat HD	% of HD on 3 times a week	% of HD on epo	% of HD on bicarb.	% on standard mem.	% on modified mem.	% on synthetic mem	% of CAPD on disconnect	% of PD on epo
South Thames	45	93	99	100	0	95	5	100	81
South Thames	43	87	80	100	0	100	0	95	80
South Thames	46	100	86	100	0	100	0	100	76
South Thames	42	97		100	0	100	0	100	
South Thames	47	100	56	100	0	100	0	100	37
South Thames	51	99	80	100	0	100	0	100	58
South & West	53	100	88	100	0	84	16	100	69
South & West	60	91	79	100	0	100	0	38	58
South & West	69	97	57	100	0	80	20	91	62
South & West	71	87	74	100	0	0	100	84	37
South & West	56	100	25	100	0	0	100	100	51
South & West	63	57	87	100	0	75	25	95	77
South & West	58	96	80	100	0	97	3	100	81
Trent	62	92	41	100	0	0	100	100	28
Trent	44	99	83	100	0	100	0	99	50
Trent	58	98	80	100	0	100	0	100	50
Trent	57	100	76	100	57	5	38	76	35
Wales	69	100	88	100	0	100	0	100	100
Wales	62	99	88	100	0	0	100	100	63
Wales	66	94	87	100	0	100	0	100	29
Wales	58	99	83	94	0	0	100	72	62
Wales	56	92	90	100	0	0	100	99	50
West Midlands	51	98	90	100	0	0	100	100	57
West Midlands	49	88	75	100	0	95	5	100	56
West Midlands	75	100	75	100	0	91	9	100	75
West Midlands	72	97	84	100	0	100	0	100	67
West Midlands	42		88	96	0	50	50	100	80
West Midlands	49	86	95	100	0	0	100	70	80
West Midlands	67	98	96	100	0	0	100	93	85
Total	41	92	80	100	9	52	40	94	64