Chapter 6: The National Dialysis Access Survey – preliminary results

Summary

This preliminary report is based on returns from 62 of 72 renal centres, covering 62 main centres and 119 satellite haemodialysis renal units.

- Including PD patients, 13,343 (77%) of prevalent patients were having dialysis therapy delivered by definitive access, variation between centres from 52–95%. For HD patients only, definitive access was used in 69%, range from 44–94%.
- 55% had been referred to the renal centre more than 12 months before initiation of RRT, 35% less than 6 months before RRT and 30% less than 3 months.
- 45% of all patients commenced renal replacement therapy using definitive access. Of patients commencing on HD, only 31% commenced with definitive access.
- Of those known to the renal units for a year or more, only half started HD with definitive access.
- Of the patients known to the renal units more than 6 months before starting RRT, only 13% are not referred for access within 6 months of first RRT.
- Dialysis programme size did not affect rates of definitive access.
- 5% of patients currently receiving haemodialysis were in-patients (between centre range 0–14%), of which 29% of episodes were considered to be related to vascular access issues (range 0% of HD patients to 7%).
- The data presented suggest that over 320,000 bed days are utilised by HD patients per annum across the UK.
- Per hundred patients in a centre, the number of Staphylococcal systemic infections per annum varies from 2.3 to 33.8, average 13; the figures for MRSA alone being from 0 to 21.5, average 4. This is likely to be an underestimate.
- These data suggest that patients on haemodialysis may contribute 8–10% of all cases of MRSA bacteraemia in the UK.

Introduction

Despite recognition of the need for high quality access in the treatment of patients with established renal failure, haemodialysis patients often receive their therapy via access associated with a higher morbidity and mortality[1]. The Renal National Service framework recognises the importance of vascular access in the preparation of patients with established renal failure in Standard 3 from the 1st part:

> ***All children, young people and adults with established renal failure are to have timely and appropriate surgery for permanent vascular or peritoneal dialysis access, which is monitored and maintained to achieve its maximum longevity***[2].

Two pilots have been commissioned from Queen Elizabeth Hospital, Birmingham and the Royal Devon and Exeter Hospital: within these sets the vascular access pathway was analysed and an attempt made to redesign the process[3]. Despite this focus there is a widespread belief that renal units and commissioners across the United Kingdom are not able to achieve the standard and do not fully understand the areas of difficulty. In recognition of this the Renal Association, in conjunction with Kidney Research UK (formerly National Kidney Research Fund), commissioned and developed a survey to examine the provision and attainment of dialysis related access across the United Kingdom. This was intended to be a survey of all renal units and all patients receiving dialysis. This preliminary report is based on returns from 62 of 72 renal centres, covering 62 main centres and 119 satellite haemodialysis units (Table 6.1).

Table 6.1: Units contributing to the dataset
62 centres included in analysis

Country	Hospital name	Abbreviation
England	Addenbrookes Hospital, Cambridge	Camb
	Arrowe Park Hospital, Wirral	Wirrl
	Barts and the London Hospital	Barts
	Basildon Hospital	Basldn
	Birmingham Childrens Hospital	BirmCh
	Broomfield Hospital, Chelmsford	Chelms
	Cumberland Infirmary, Carlisle	Carls
	Derby City General Hospital	Derby
	Derriford Hospital, Plymouth	Plym
	Freeman Hospital, Newcastle	Newc
	Gloucester Royal Hospital	Glouc
	Guy's and St Thomas's Hospital, London	Guys
	Heartlands Hospital, Birmingham	Heart
	Hope Hospital, Manchester	ManWst
	Hull Royal Infirmary	Hull
	Ipswich Hospital	Ipswi
	James Cook University Hospital, Middlesbrough	Middlbr
	Kent & Canterbury Hospital	Kent
	Kings College Hospital, London	Kings
	Leeds General Infirmary	LGI
	Leicester General Hospital	Leic
	Lister Hospital, Stevenage	Stevn
	New Cross Hospital, Wolverhampton	Wolve
	Norfolk & Norwich University Hospital	Norwch
	Northern General Hospital, Sheffield	Sheff
	Nottingham City Hospital	Nottm
	Oxford Radcliffe Hospital	Oxfrd
	Queen Elizabeth Hospital, Birmingham	QEH
	Royal Berkshire Hospital, Reading	Redng
	Royal Cornwall Hospital, Truro	Truro
	Royal Liverpool University Hospital	Livrpl
	Royal Preston Hospital	Prstn
	Royal Sussex County Hospital, Brighton	Bright
	Russells Hall Hospital, Dudley	Dudley
	Southend Hospital	Sthend
	Southmead Hospital, Bristol	Bristl
	St George's Hospital, London	StGrge
	St Helier Hospital, Carshalton	Carsh
	St James's University Hospital, Leeds	StJms
	St Lukes Hospital, Bradford	Bradf
	University Hospital Aintree	Aintre
	University Hospital of North Staffordshire	Stoke
	Walsgrave Hospital, Coventry	Covnt
	Wrexham Maelor Hospital	Wrexm
	York District General Hospital	York
Wales	Morriston Hospital, Swansea	Swnse
	Ysbyty Glan Clwyd	Clwyd
	Ysbyty Gwynedd	Bangr

Table 6.1: (continued)
62 centres included in analysis

Country	Hospital name	Abbreviation
Scotland	Aberdeen Royal Infirmary	Abrdn
	Crosshouse Hospital, Kilmarnock	Klmarnk
	Dumfries & Galloway Royal Infirmary	D&Gall
	Edinburgh Royal Infirmary	Edinb
	Glasgow Royal Infirmary including Stobhill	GlasRI
	Glasgow Western Infirmary	GlasWI
	Monklands District General Hospital, Airdrie	Airdr
	Ninewells Hospital & Medical School, Dundee	Dunde
	Queen Margaret Hospital, Dunfermline	Dunfn
	Raigmore Hospital, Inverness	Inver
N Ireland	Antrim Hospital	Antrim
	Belfast City Hospital	Belfast
	Tyrone County Hospital	Tyrone
	Ulster Hospital	Ulster

Methodology

The 'vascular access survey' was developed by the Clinical Affairs Board of the Renal Association, under the chairmanship of the President and Clinical Vice President. Kidney Research UK provided input and assisted with the construction of the organisational question set. Initial drafts of the survey were then presented to the Renal Clinical Directors' Forum for further feedback and agreement for circulation and completion. The initial survey was then mailed to all renal unit Clinical Directors in March 2005. Table 6.1 details returns.

It was clear from early discussion with Clinical Directors that this was a major undertaking, as in many renal units many of the data had to be extracted from paper records: the Renal Association is grateful for the efforts made by participating renal units.

The survey questionnaire is in Appendix G, it was divided into 4 sections: Prevalent patients, Incident patients, Incident 6 month follow up and Organisational data.

Prevalent data

The initial section was a simple census count of all patients undergoing dialysis therapy on 31st March 2005 with details of their access.

In addition, it was felt useful to look at markers of morbidity within the ERF population which may be related to access problems. These markers had to be easily defined, and accessible to data collection: two markers were chosen.

1. Infection is considered to be a major consequence of venous catheters used for haemodialysis. Staph. aureus species bacteraemias are associated with considerable morbidity within the dialysis programme, resulting in important complications such as endocarditis or spinal abscess. National coverage of methicillin resistant Staphylococcal aureus (MRSA) rates within acute trusts has received considerable public interest. MRSA bacteraemia rates are a matter of public record and are reported centrally (Department of Health: MRSA surveillance system: Results, 2005, available at www.doh.gov.uk). Renal units are widely considered to be a major determinant of MRSA bacteraemia rates within a Trust.

   Data on Staph. aureus bacteraemia should have been available to renal units. A return on absolute numbers of MRSA and total Staph. aureus bacteraemia for 2004 was requested. This will probably be an underestimate, since it was not felt possible to collate data on haemodialysis patients either admitted or diagnosed in acute trusts outside the main renal unit trust.

2. The second morbidity marker requested was targeted at bed utilisation. Renal units were requested to report the number of chronic patients receiving haemodialysis who were an in-patient at 9 a.m., 1st April 2005, and to estimate the number deemed to be related to vascular access. The definition of the subgroup was left to the discretion of the Clinical Director, but included infection, placement of access and failure of access. Again this marker will be an underestimate of the total in patient burden for patients with established renal failure. It did not always include patients under the care of teams outside nephrology within the same trust, nor include patients in other trusts.

Incident data

Key within the Renal NSF are quality standards around patient preparation for renal replacement therapy. The consistent impression is that many patients commence renal replacement therapy poorly prepared for treatment. Many factors are felt to influence preparation, but key considerations are late referral to nephrology units, inadequate appreciation of rate of progression of renal impairment, delayed referral for vascular access formation and transplantation, and service shortfalls (eg lack of diagnostics, surgeons or operating capacity). The key components and problems of this patient pathway cross health care boundaries, and problems may differ between health care communities. Much work has been done via the Vascular Access (VA) pilots in Exeter and Birmingham subsequent to the design of the VA survey in identifying key components of this pathway. The survey does measure current performance and was designed to dissect out key areas of service shortfall.

Data were requested on new starters to renal replacement therapy, plus patients reaching established renal failure following renal transplant failure. Renal units were asked to record all such patients during April 2005. Requested data included age, gender, ethnicity and cause of renal failure. To understand the management of the patient, data were also requested on the date of referral to the renal service, when referred to a vascular surgeon and whether the patient was listed for renal transplantation. Finally, the date of first renal replacement therapy and the type of access used at first renal replacement therapy were recorded.

Transplantation listing was also useful as a marker of general preparation of the patient, and covered standard 5 of the Renal NSF. In renal units with large living donor transplant programmes this may be slightly misleading, as the majority of these patients are never listed for transplantation.

Six month follow up

To further assess the organisation of the vascular access pathway follow up, data on the patients from the April cohort will be sought. No analysis from this information is available at the time of writing, but will be included in further reports. One-year follow up data will also be requested. The data include access type at census date, mortality information and transplant status.

Organisational data set

In conjunction with Kidney Research UK (formerly the NKRF), a series of questions were devised to look at work force issues, organisation and service capacity. Again, data will not be presented within this report, pending further analysis and discussion with Kidney Research UK.

Overall, the survey was targeted at vascular access provision. However the data set yielded information relevant to several other areas of the Renal NSF. Table 6.2 summarises these.

Table 6.2: Data relevant to other areas of the Renal NSF

Survey Section	Data set	Renal NSF (Standard*)	Other areas
Prevalent data set	Prevalent census	Choice (two)	National measure
	Infection	Clinical Standards (four)	Emergency bed day target
	Bed days		
Incident	Late referral	CKD care	
	Preparation	Choice (two)	
	Access at 1st RRT	Access (three)	
	Transplant listing	Transplant (five)	
6 and 12 month follow up	Access	Standard (three and four)	High level process measure
	Transplant listing	Transplant (five)	
Organisational data			Workload
			Organisation (pilot site data)

*The number in brackets relates to the NSF Standard number.

Results

Prevalent data

Modality and access data

A total of 17,409 prevalent dialysis patients are included in this report, 11,999 patients in main renal units and 5,338 in satellite HD units, from 62 main renal units and 119 satellite HD units throughout the UK. Peritoneal dialysis comprised 24% of reported dialysis patients – only 2 renal units (Oxford and LGI) reported PD patients outside the main unit. The detailed data are shown in Table 6.3 and Figure 6.1. For comparison, the 2004 Renal Registry report is based on 32,000 patients: 45% with a transplant, 42% on haemodialysis, and 13% on peritoneal dialysis, with peritoneal dialysis patients comprising 24% of the total dialysis patients.

Including PD patients, 13,343 (77%) of prevalent patients were having dialysis therapy delivered by definitive access (HD definitive access defined as AVF or AVG). Raw data are given in Table 6.4. Of all HD patients, 66% had an arteriovenous fistula (AVF) and 4% an arteriovenous graft (AVG); 28% used tunnelled and 2% venous catheters. Not surprisingly satellite units, which tend to treat more stable patients, had a lower proportion of haemodialysis patients using catheters (22%) than main units (35%).

PD utilisation varied from 4–40% between centres (excluding Paediatric units). Including PD patients, definitive access (PD, AVF and AVG) was achieved in a range from 52–95% of patients in different centres, median 78%. For HD patients only, definitive access was present in a range from 44–94%. Usage of AVG was the most variable, varying from 0–21% of HD

Table 6.3: Prevalent patients; summary

Main renal units	N	%	Range (N)
Total main units	62		
Total dialysis pts	12,071		
Total PD	4,105	34.0	2–214
Total HD	7,966	66.0	14–303
HD (AVF)	4,800	60.8	9–202
HD (Graft)	331	4.2	0–42
HD (Tunnel)	2,535	32.1	2–119
HD (Non Tunnel)	201	2.5	0–28
HD (Other)	27	0.3	0–8
Satellite renal units	**N**	**%**	**Range (N)**
Total satellite units	119		
Total HD pts	5,294		2–131
HD (AVF)	3,831	72.8	1–102
HD (Graft)	241	4.6	0–15
HD (Tunnel)	1,078	20.5	0–46
HD (Non Tunnel)	57	1.1	0–8
HD (Other)	53	1.0	0–22
Total	**N**	**%**	
Total pts	17,365		
Total PD pts	4,105	23.6	
Total HD pts	13,260	76.4	
HD (AVF)	8,631	65.6	
HD (Graft)	572	4.3	
HD (Tunnel)	3,613	27.5	
HD (Non Tunnel)	258	2.0	
HD (Other)	80	0.6	

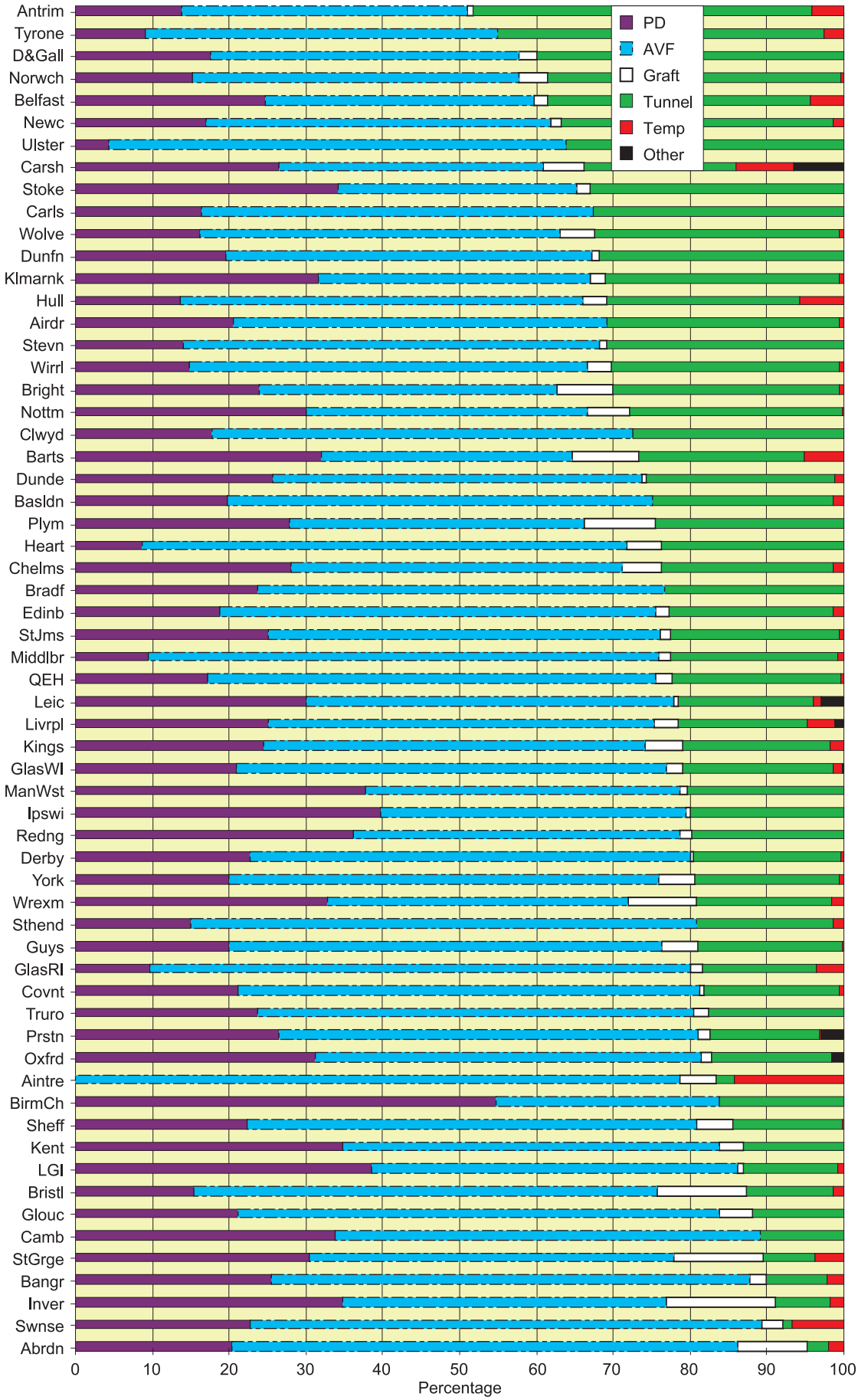

Figure 6.1: Distribution of patients by access by centre (main unit + satellite)

Table 6.4: Prevalent dialysis patient numbers, by centre and access type (1st April 2005)

Hospital name	Total PD	Total HD	Total HD (native AVF)	Total HD (graft)	Total HD (tunnelled line)	Total HD (temporary line)	Total HD (other access)	% PD	% HD	% definitive access	% HD definitive access
Aberdeen	43	168	139	19	6	4	0	20.4	79.6	95.3	94.05
Swansea	77	262	226	9	4	23	0	22.7	77.3	92.0	89.69
Inverness	39	73	47	16	8	2	0	34.8	65.2	91.1	86.30
Bangor	23	67	56	2	7	2	0	25.6	74.4	90.0	86.57
St Georges	58	132	90	22	13	7	0	30.5	69.5	89.5	84.85
Cambridge	75	147	123	0	24	0	0	33.8	66.2	89.2	83.67
Gloucester	34	127	101	7	19	0	0	21.1	78.9	88.2	85.04
Bristol	70	382	272	53	51	6	0	15.5	84.5	87.4	85.08
LGI	98	156	121	2	31	2	0	38.6	61.4	87.0	78.85
Kent	101	189	142	9	38	0	0	34.8	65.2	86.9	79.89
Sheffield	158	547	412	33	100	2	0	22.4	77.6	85.5	81.35
Birmingham Childrens	17	14	9	0	5	0	0	54.8	45.2	83.9	64.29
Aintree	0	42	33	2	1	6	0	0.0	100.0	83.3	83.33
Oxford	142	312	228	6	71	0	7	31.3	68.7	82.8	75.00
Preston	111	307	228	6	60	1	12	26.6	73.4	82.5	76.22
Truro	46	148	110	4	34	0	0	23.7	76.3	82.5	77.03
Coventry	65	243	185	2	54	2	0	21.1	78.9	81.8	76.95
Glasgow RI	31	286	223	5	47	11	0	9.8	90.2	81.7	79.72
Guys	99	399	281	24	93	1	0	19.9	80.1	81.1	76.44
Southend	22	124	96	0	26	2	0	15.1	84.9	80.8	77.42
Wrexham	41	84	49	11	22	2	0	32.8	67.2	80.8	71.43
York	29	116	81	7	27	1	0	20.0	80.0	80.7	75.86
Derby	58	198	147	1	49	1	0	22.7	77.3	80.5	74.75
Reading	95	168	112	4	52	0	0	36.1	63.9	80.2	69.05
Ipswich	68	103	68	1	34	0	0	39.8	60.2	80.1	66.99
ManWst	150	248	163	4	81	0	0	37.7	62.3	79.6	67.34
Glasgow WI	73	277	196	8	68	4	1	20.9	79.1	79.1	73.65
Kings	85	262	172	17	67	6	0	24.5	75.5	79.0	72.14
Liverpool	112	335	225	14	75	16	5	25.1	74.9	78.5	71.34
Leicester	210	487	333	4	122	7	21	30.1	69.9	78.5	69.20
QEH	140	674	475	17	178	4	0	17.2	82.8	77.6	73.00
Middlesbrough	25	237	174	4	57	2	0	9.5	90.5	77.5	75.11
St James	146	435	296	8	127	4	0	25.1	74.9	77.5	69.89
Edinburgh	51	222	155	5	58	4	0	18.7	81.3	77.3	72.07
Bradford	49	157	109	0	48	0	0	23.8	76.2	76.7	69.43
Chelmsford	38	97	58	7	30	2	0	28.1	71.9	76.3	67.01
Heartlands	29	308	213	15	80	0	0	8.6	91.4	76.3	74.03
Plymouth	42	109	58	14	37	0	0	27.8	72.2	75.5	66.06
Basildon	30	122	84	0	36	2	0	19.7	80.3	75.0	68.85
Dundee	45	130	84	1	43	2	0	25.7	74.3	74.3	65.38
Barts	214	455	218	58	144	35	0	32.0	68.0	73.2	60.66
Clwyd	13	60	40	0	20	0	0	17.8	82.2	72.6	66.67
Nottingham	132	307	160	25	121	1	0	30.1	69.9	72.2	60.26
Brighton	91	289	147	28	112	2	0	23.9	76.1	70.0	60.55
Wirral	28	161	98	6	56	1	0	14.8	85.2	69.8	64.60
Stevenage	53	324	204	4	116	0	0	14.1	85.9	69.2	64.20
Airdrie	36	139	85	0	53	1	0	20.6	79.4	69.1	61.15
Hull	43	274	166	10	80	18	0	13.6	86.4	69.1	64.23
Kilmarnock	50	108	56	3	48	1	0	31.6	68.4	69.0	54.63
Dunfermline	21	86	51	1	34	0	0	19.6	80.4	68.2	60.47
Wolverhampton	54	279	156	15	106	2	0	16.2	83.8	67.6	61.29

Table 6.4: (continued)

Hospital name	Total PD	Total HD	Total HD (native AVF)	Total HD (graft)	Total HD (tunnelled line)	Total HD (temporary line)	Total HD (other access)	% PD	% HD	% definitive access	% HD definitive access
Carlisle	15	77	47	0	30	0	0	16.3	83.7	67.4	61.04
Stoke	107	206	97	6	103	0	0	34.2	65.8	67.1	50.00
Carshalton	139	386	181	28	103	40	34	26.5	73.5	66.3	54.15
Ulster	2	45	28	0	17	0	0	4.3	95.7	63.8	62.22
Newcastle	46	226	122	4	96	4	0	16.9	83.1	63.2	55.75
Belfast	86	262	122	6	119	15	0	24.7	75.3	61.5	48.85
Norwich	49	272	136	12	123	1	0	15.3	84.7	61.4	54.41
Dumfries	15	70	34	2	34	0	0	17.6	82.4	60.0	51.43
Tyrone	11	109	55	0	51	3	0	9.2	90.8	55.0	50.46
Antrim	20	125	54	1	64	6	0	13.8	86.2	51.7	44.00

Renal units are listed in order of percentage of patients with definitive access.

patients between centres. Adult centre sizes ranged from 42–814 prevalent dialysis patients. Dialysis programme size did not affect rates of definitive access – the four renal units with total dialysis populations over 600 achieved rates of 73–86% of all dialysis patients with PD rates from 17–32%. The three renal units which achieved 90% or more of all dialysis patients with definitive access – Aberdeen, Bangor, Swansea and Inverness – had dialysis populations of 211, 90, 339 and 112 respectively.

Morbidity data

Two items of data were returned for this section – number of haemodialysis patients who were in-patients on 31st March 2005, and Staph. aureus bacteraemias reported during 2004.

In-patient census data

On 31st March 2005, 673 (5%) patients currently receiving haemodialysis were in-patients, of which 166 episodes (29%) were considered to be related to vascular access issues (Table 6.5). Individual unit numbers ranged from 0–48 HD as in-patients, ranging from 0–14% of the haemodialysis populations, average 5%. Access related admissions ranged from 0–19 patients, range from 0–7% of the HD populations, average 1.7% of patients.

During 2004, 1,576 episodes of Staph. aureus bacteraemia were recorded in haemodialysis patients from the 54 centres with available data, with a wide range between centres from 1–103 episodes: of these, 462 (29%) were MRSA bacteraemias, range 0–32 (Table 6.5).

Not surprisingly there was a correlation between centre haemodialysis patient numbers and Staph. aureus bacteraemias (Figure 6.2, $R^2 = 0.42$), but not with MRSA (Figure 6.3, $R^2 = 0.18$). The weak correlations suggest that other factors are also important in determining bacteraemia in haemodialysis patients: in the case of MRSA nearly 80% of the variation is due to factors other than centre size. Local practice may influence infection rates, but the data source may also have varied between renal units. It is possible that renal units who reported the number of infections from their own records rather than from those of the microbiology department under-reported the number of bacteraemias. Thus the true incidence may be higher than suggested here. This will be investigated for the final report. Similar considerations apply to the relationship between the number of venous catheters in a renal unit and the absolute number of Staphylococcal bacteraemias (Figure 6.4).

Table 6.5 shows a calculation for each renal unit of the number of Staphylococcal bacteraemias per annum per hundred patients in the renal unit – this varies from 2.3 to 33.8, average 13, the figures for MRSA alone being from 0 to 21.5, average 4.

Many centres of necessity excluded episodes diagnosed and treated outside the main

Table 6.5: Bacteraemias and admissions in prevalent HD patients

Renal unit	Total HD (main + satl)	HD (main unit)	HD (satl unit)	Staph. aureus	No. MRSA Bacte-raemia	Staph. aureus per 100 pats	MRSA per 100 pats	% MRSA	No. in-pats	In-pats for VA reasons	% of HD pats in-pats	% HD access admiss
Aberdeen	168	129	39	8	5	4.8	3.0	63	7	0	4	0
Aintree	42	17	25	5	2	11.9	4.8	40	5	0	12	0
Airdrie	139	139	0	32	9	23.0	6.5	28	2	0	1	0
Antrim	125	125	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Bangor	67	67	0	3	2	4.5	3.0	67	1	0	1	0
Barts	455	303	152	78	8	17.1	1.8	10	30	11	7	2
Basildon	122	122	0	14	3	11.5	2.5	21	n/a	n/a	n/a	n/a
Belfast	262	262	0	28	11	10.7	4.2	39	25	12	10	5
Birmingham Childrens	14	14	0	1	0	7.1	0.0	0	0	0	0	0
Bradford	157	123	34	11	4	7.0	2.5	36	5	1	3	1
Brighton	289	191	98	27	10	9.3	3.5	37	7	1	2	0
Bristol	382	84	298	57	18	14.9	4.7	32	19	4	5	1
Cambridge	147	147	0	n/a	n/a	n/a	n/a	n/a	4	0	3	0
Carlisle	77	67	10	9	5	11.7	6.5	56	6	4	8	5
Carshalton	386	223	163	103	32	26.7	8.3	31	48	14	12	4
Chelmsford	97	97	0	18	7	18.6	7.2	39	10	3	10	3
Clwyd	60	60	0	20	3	33.3	5.0	15	4	0	7	0
Coventry	243	141	102	24	2	9.9	0.8	8	5	2	2	1
Dumfries	70	70	0	15	2	21.4	2.9	13	2	1	3	1
Derby	198	198	0	23	5	11.6	2.5	22	8	0	4	0
Dudley	106	72	34	n/a	n/a	n/a	n/a	n/a	7	1	7	1
Dundee	130	130	0	44	28	33.8	21.5	64	8	1	6	1
Dunfermline	86	54	32	8	3	9.3	3.5	38	3	1	3	1
Edinburgh	222	155	67	n/a	n/a	n/a	n/a	n/a	16	3	7	1
Glasgow RI	286	101	185	46	15	16.1	5.2	33	19	3	7	1
Glasgow WI	277	198	79	79	32	28.5	11.6	41	n/a	n/a	n/a	n/a
Gloucester	127	127	0	19	7	15.0	5.5	37	9	0	7	0
Guys	399	89	310	16	10	4.0	2.5	63	17	6	4	2
Heartlands	308	123	185	24	7	7.8	2.3	29	17	3	6	1
Hull	274	140	134	46	4	16.8	1.5	9	9	3	3	1
Inverness	73	65	8	10	1	13.7	1.4	10	1	0	1	0
Ipswich	103	103	0	6	4	5.8	3.9	67	7	0	7	0
Kent	189	82	107	9	3	4.8	1.6	33	9	2	5	1
Kilmarnock	108	108	0	4	1	3.7	0.9	25	10	2	9	2
Kings	262	128	134	n/a	17	n/a	6.5	n/a	14	8	5	3
Leicester	487	176	311	50	12	10.3	2.5	24	13	5	3	1
LGI	156	93	63	4	1	2.6	0.6	25	3	2	2	1
Liverpool	335	188	147	15	n/a	4.5	n/a	n/a	36	17	11	5
ManWst	248	130	118	49	25	19.8	10.1	51	19	3	8	1
Middlesbrough	237	103	134	30	12	12.7	5.1	40	9	3	4	1
Newcastle	226	226	0	48	16	21.2	7.1	33	15	4	7	2
Norwich	272	217	55	54	12	19.9	4.4	22	37	19	14	7
Nottingham	307	182	125	19	2	6.2	0.7	11	20	4	7	1
Oxford	312	163	149	29	8	9.3	2.6	28	6	0	2	0
Plymouth	109	109	0	22	8	20.2	7.3	36	7	3	6	3
Preston	307	131	176	24	10	7.8	3.3	42	25	0	8	0
QEH	674	213	461	49	16	7.3	2.4	33	30	5	4	1
Reading	168	85	83	6	2	3.6	1.2	33	7	1	4	1
Sheffield	547	286	261	70	15	27.6	2.7	10	10	4	2	1
Stevenage	324	106	218	55	6	17.0	1.9	11	18	4	6	1
St Georges	132	119	13	3	1	2.3	0.8	33	5	2	4	2
Southend	124	124	0	13	3	10.5	2.4	23	5	1	4	1

Table 6.5: (continued)

Renal unit	Total HD (main + satl)	HD (main unit)	HD (satl unit)	Staph. aureus	No. MRSA Bacte-raemia	Staph. aureus per 100 pats	MRSA per 100 pats	% MRSA	No. in-pats	In-pats for VA reasons	% of HD pats in-pats	% HD access admiss
St James	435	218	217	19	1	4.4	0.2	5	11	3	3	1
Stoke	206	134	72	n/a	16	n/a	7.8	n/a	20	9	10	4
Swansea	262	158	104	73	11	27.9	4.2	15	12	2	5	1
Truro	148	76	72	n/a	n/a	n/a	n/a	n/a	5	0	3	0
Tyrone	109	109	0	11	5	10.1	4.6	45	3	1	3	1
Ulster	45	45	0	3	0	6.7	0.0	0	0	n/a	0	n/a
Wirral	161	86	75	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wolverhampton	279	94	185	43	11	15.4	3.9	26	16	10	6	4
Wrexham	84	84	0	7	6	8.3	7.1	86	2	1	2	1
York	116	57	59	12	3	10.3	2.6	25	5	4	4	3

N/A = not available.

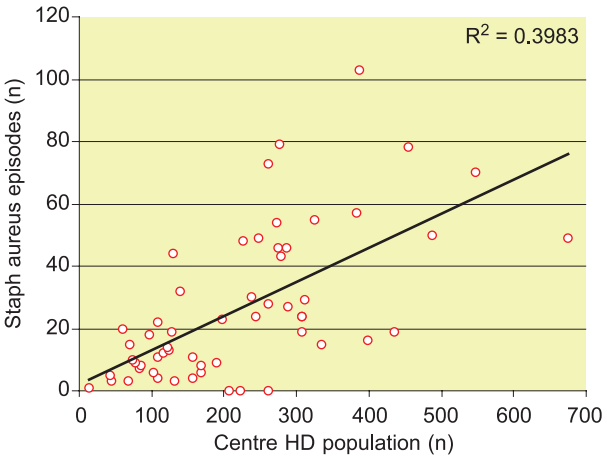

Figure 6.2: Relationship between numbers of haemodialysis patients in a centre and Staph. aureus bacteraemias

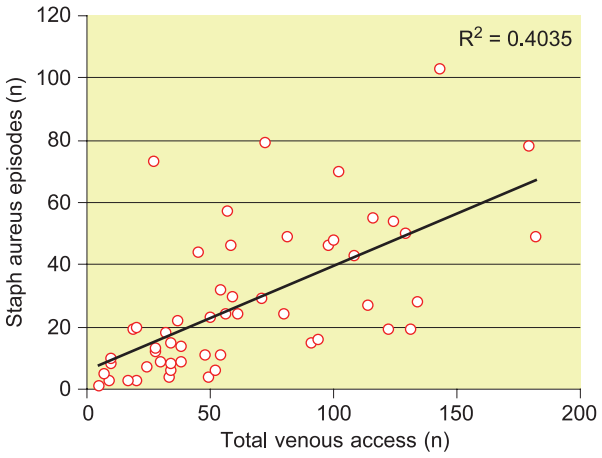

Figure 6.4: Relationship between number of venous catheters in a centre and number Staph. aureus bacteraemias

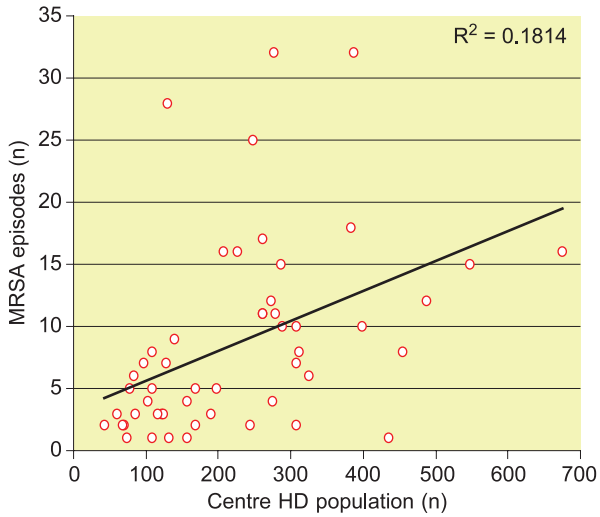

Figure 6.3: Relationship between number of haemodialysis patients in a centre and number MRSA bacteraemias

centre. This is another potential source of under-reporting of infection rates.

Incident data

Modality and access data

During April 2005, 457 incident patients from 62 renal units were reported. Renal units reported between 1 and 25 patients, which generally related to the size of the catchment population (Figure 6.5). Primary renal disease is detailed in Figure 6.6, and is similar to the data for the whole registry, although diabetic nephropathy is rather low. There is a disappointingly high rate of late referral in the diabetics (vide infra), a group under continuing medical surveillance. Gender ratio was 1.5 : 1 male to female (275 : 181). Ethnicity was

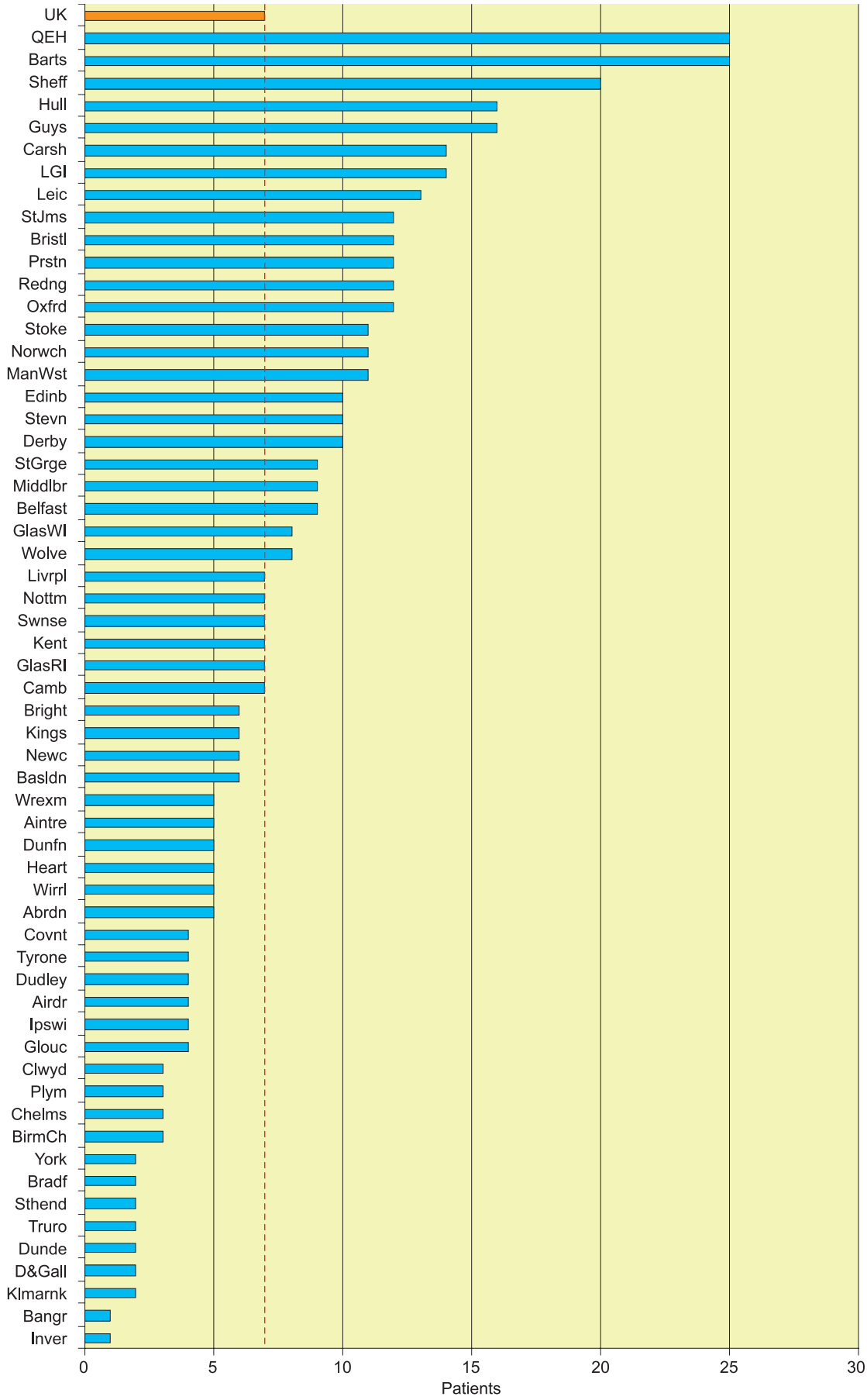

Figure 6.5: Number of incident patients per unit, April 2005

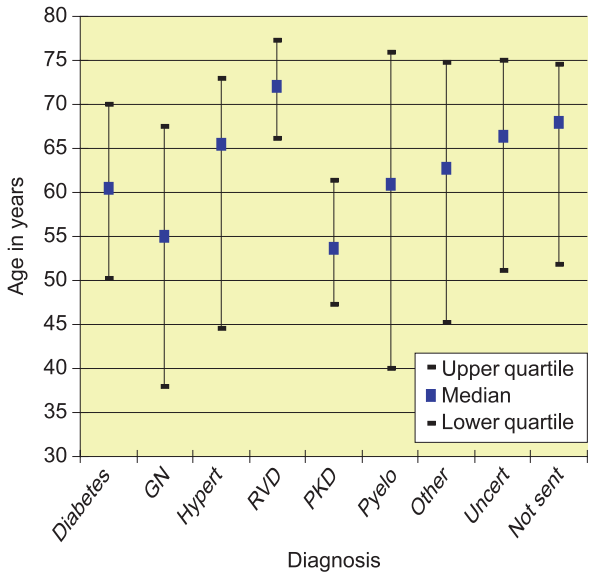

Figure 6.6: Incident patients: age, and primary renal disease

consistent with national data and is detailed in Table 6.6. The median age was 63 years (upper quartile 74, lower quartile 47) (Figure 6.6).

Overall the first modality of therapy was transplantation in 4% (n = 17), peritoneal dialysis in 19% (n = 86) and haemodialysis in 77%, (n = 351) (Table 6.7). Modality was not recorded in three cases. Combining PD, transplantation, AVF and AVG, 45% of patients commenced therapy using definitive access (n = 196). Of patients commencing on HD, only 31% commenced with definitive access (AVF, n = 104; 30%, and AVG, n = 6; 2%) (Table 6.8): Referral for potential transplantation was poorer – 46 (10%) patients were active on the transplant list at first RRT. In renal units with large living donor transplant programmes this may be slightly misleading, as the majority of such patients are never listed for transplantation.

Table 6.6: Ethnicity of incident patients (N = 455)

Ethnicity	Frequency	Percent
Asian	42	9
Black	19	4
Chinese	4	1
Other	6	1
Unknown	3	1
Caucasian	381	84
Missing data = 2		

Table 6.7: Incident patients: 1st treatment modality

Modality	Frequency	Percent
HD	351	77
PD	86	19
Transplant	17	4
Missing data = 3		

Table 6.8: Incident HD patients: Access

Access type	Frequency	Percent
Total HD	351	
AVF	104	30
AVG	6	2
Non tunnel	126	36
Tunnel	115	33

Time of first presentation to nephrology services

Renal units returned data on date of first presentation to nephrology services and date of referral for access. The time from those time points to first RRT was extracted. These data are summarised in Table 6.9.

Overall, data for first contact with nephrology services was unrecorded in only 30 patients. Of the remaining 427, 55% had been referred 12 months or more prior to initiation of RRT, 35% less than 6 months before RRT and 29% (n = 125) reached renal replacement therapy within 3 months of first contact.

Given the small numbers in this study, primary renal disease did not significantly affect the probability of early referral to the renal unit although there was a trend to earlier referral for glomerular pathology, pyelonephritis and hypertension, and diabetes was associated with the lowest proportion (other than missing primary renal disease) (Figure 6.7). The data set

Table 6.9: Time from referral to renal services to 1st RRT

Months	n	%
0–3m	125	29.3
3–6m	23	5.4
6–12m	46	10.8
12m+	233	54.6
Total	**427**	
Missing data	30	

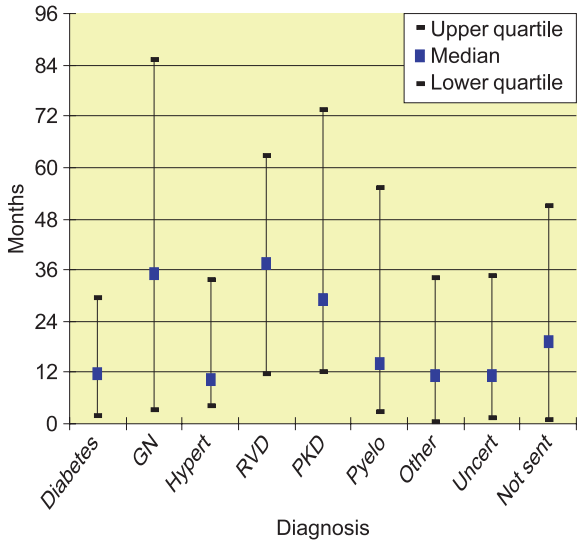

Figure 6.7: Time from first referral to RRT by diagnosis

for those referred for transplantation is too small for adequate analysis of referral dates.

Time of first referral and dialysis modality

As the time from first contact with the renal team, prior to starting renal replacement therapy increases, a higher proportion of patients start on PD. This rises from 11% for those patients with less than 3 months contact to 27% for patients known for 24 months or more (Table 6.10). It appears that relatively little use is being made of PD as an alternative to venous catheters in those patients presenting late. For patients starting on PD the median time between first referral and RRT was 868 days, for HD starters 343 days: 109 patients of 351 total incident patients presented at less than 100 days (31%).

Time of first referral and initial haemodialysis access

The relationship between time of first referral and haemodialysis access first used is shown in Table 6.11.

It is disappointing that of those known for a year or more, only half started HD with definitive access (AVF + AVG), 50% started HD on temp access. For those commencing RRT via an AVF (n = 104) the median time from presentation was 888 days, with 6 patients presenting less than 100 days before RRT. Only 6 incident patients utilised AVG. For those starting with tunnelled venous catheters, the median time was 255 days. The majority of these patients had presented more than 6 months before 1st RRT – 54% (63 of 115) patients. For those commencing via temporary

Table 6.10: Time of first referral and starting dialysis modality

Months from 1st contact	HD %	PD %	HD (N)	PD (N)	Total
<3m	89	11	108	13	121
3 – <6m	78	22	18	5	23
6 – <9m	84	16	21	4	25
9 – <12m	80	20	12	3	15
12 – <24m	78	22	46	13	59
⩾24m	73	27	123	45	168
Total	**80**	**20**	**328**	**83**	**411**

Table 6.11: Time since 1st contact and access type in HD patients

Months from 1st contact	AVF	AVG	Non-tunnel	Tunnel	% catheter	Total
<3m	6	1	65	36	94	108
3 – <6m	4	0	5	9	78	18
6 – <9m	8	0	3	10	62	21
9 – <12m	2	0	3	7	83	12
12 – <24m	22	1	13	10	50	46
⩾24m	58	4	25	36	50	123
Total	**100**	**6**	**114**	**108**	**68**	**328**

venous catheters, the median presentation interval was 42 days. It is notable that 44 of these 126 patients (35%) had been seen more than 6 months prior to first RRT.

Referral for vascular access

Of the total haemodialysis incident group (n = 351) 165 had been referred for access, but the date of referral was available for only 123. The data set does require further analysis to understand the missing data – it may be truly unknown, not recorded because the patient had access or a transplant or may reflect a weakness in the survey layout.

Study of the patients starting on HD who had been seen by the renal service at least 6 months before starting RRT gives insight into performance by renal services in cases where there had been an opportunity to intervene to provide access. The data are summarised in Table 6.12. Of these 198 patients, 157 patients had data available on time of referral for vascular access: only 33% had been referred for access more than 6 months before starting RRT, and only 48% more than 3 months. This demonstrates a significant lag between referral to the renal unit and referral for access, resulting in avoidable late access referral, and with the subsequent delays in surgery and time for access to mature, explains the poor achievement of definitive access at start of RRT. The large proportion of missing data hampers further analysis.

Table 6.12: Referral for vascular access in patients starting on HD referred to renal services more than 6 months before RRT

Total	**198**	**%**
Access referral unknown	11	6
Of those known:		
Not referred	62	33
Referred	125	67
Referral date known	95	76
Referral time before RRT: (157 pts with data)		
Not referred	62	39
<3months	20	13
3–6 months	24	15
6–12 months	28	18
>12 months	23	15

Discussion

Amongst haemodialysis patients infection and in-patient loads are high. The data presented suggest that over 320,000 bed days are utilised by HD patients per annum across the UK.

Overall, nearly one third of prevalent haemodialysis patients utilise some form of venous catheter for vascular access. Such patients are at risk of systemic sepsis, of which Staph. aureus is a major cause, although the data do not demonstrate a clear correlation between venous catheter usage and Staphylococcal bacteraemia; this may reflect problems with data collection and other important local confounding factors.

Renal units continue to be a major source of infection control issues for acute trusts. These 62 renal units reported 1,495 episodes of Staph. aureus septicaemia in haemodialysis patients in 2004, of which 462 were MRSA. The MRSA surveillance data reported 7,212 episodes for trusts in England and Wales (www.doh.gov.uk) for 2003/2004. Extrapolating from these data it appears that patients on haemodialysis may contribute 8–10% of all cases of MRSA septicaemia, rendering renal replacement therapy a strong risk factor for MRSA. The implications are serious for patients and for resource use: each episode requires at least two weeks of intravenous therapy, and is associated with considerable morbidity.

For an individual patient, the pathway towards renal replacement therapy consists of several components. Patients must be first identified in either primary or secondary care, referred to renal services, prepared for RRT (including referral for access and transplantation), initiated on to RRT and then maintained. Evidence from this survey suggests that all aspects of this pathway prior to the initiation of dialysis are subject to delay.

First, only 55% of patients were known to renal services more than 1 year before RRT commences. Even in patients with disease processes known to result in renal failure such as diabetes, referral occurs late. It is unlikely that all renal disease will be picked up in good time, but this suggests groups at high-risk of

established renal failure are still poorly served. The current focus afforded by the adoption of the KDOQI CKD classification may improve this part of the pathway.

Second, once patients are referred to nephrology, further delays occur. Many patients begin dialysis on either temporary (non-tunnelled) or tunnelled vascular access. The median time from first contact to first RRT for patients commencing HD was about 1 year. The optimum time for referral for vascular access can be difficult to judge for a number of factors. For example, the rate of renal decline may be difficult to predict. The preferred timing of placement is also unclear – place too late and it will not be ready, place too early and it may fail whilst the patient is waiting. Nevertheless it is disappointing that of the patients known to the renal units more than 6 months before starting RRT, where data are available only 33% are referred for access within less than 6 months of first RRT: this is rarely sufficient time to provide patients with functioning vascular access, even with ideal surgical pathways.

The third delay has not been analysed – no data on surgical capacity have been presented, but deficits here may represent a further challenge to this later part of the pathway. Such capacity should include the radiology component of service.

Once a patient is established on renal replacement therapy complications, should be minimised and both potential and actual access should be maintained. This survey does not address surveillance of vascular access to reduce access failure, but does show that infection rates are high and that access problem associated hospitalisation rates are high.

The lessons from the Vascular Access pilots are yet to be applied in nephrological practice. There are many issues that cross health care boundaries, particularly around late referral.

At the end of this pathway, only 43% of all patients and 31% of haemodialysis starters commence RRT with definitive access (either an AVF or AVG). Pre-emptive transplantation, despite its recommendation in the NSF, occurs in only 3% of patients, and only 9% are listed for transplantation at the start of dialysis. Fewer than 5% of renal units recorded a pre-emptive transplant in this short one-month period.

The survey demonstrates that such data collection was difficult, with a lack of agreed definitions, and little or no IT capability for it within many renal units. For renal units and commissioners to understand local issues clearly requires data, and to acquire that data requires agreement on a dataset and resource to collect and maintain it.

Summary and recommendations

The data as presented show a mixed bag of good, indifferent and poor service delivery. Whilst there would appear to be pockets of good practice, too many patients are presented to renal services late, too few are worked up for transplantation or access in a timely fashion, and many require hospitalisation for complications related to vascular access. This is a preliminary analysis and the second set of data has now been requested from renal units, looking at outcome of both access and patients at 6 months. This will allow further analysis of the patient pathway, and integration of patient outcome with that.

What are the key drivers to improve these aspects of the care of patients with established renal failure?

Firstly, if renal centres believe this is an important issue, data collection issues must be resolved.

Secondly, renal networks and commissioners must join in ownership of this aspect of renal services.

Thirdly, universal agreement on the currency of the problem must be agreed, to allow comparative performance to be assessed.

At present, nephrologists quote late referral and capacity issues as prime problems, surgeons quote capacity and delayed referral from nephrologists, and little work is carried out in

the field of vascular access preservation. At the end are patients who are poorly served.

It is suggested that the following should be considered.

Firstly, a modified version of this survey is undertaken as an annual exercise by the entire United Kingdom, via the Renal Association UK Renal Registry, pending the development of regular provision of the relevant data through the normal Registry channels. Essentially, an annual return of vascular access details and morbidity for incident and prevalent patients should be made to the Registry. Renal units should obtain microbiological data from Microbiology departments, and not rely solely on local records.

Secondly, local reporting to networks and commissioners, with subsequent audit, must be considered. This could include reporting of demographics, diagnosis and key timeline points (first presentation, access referral, transplantation status and access at first RRT). Then networks should provide breach reports on all patients commencing RRT without agreed definitive access, to inform and provide data for local action and national audit. Ultimately, as reporting of these data to the Registry is developed, the Registry will be able to support this activity.

Finally, there is need for agreed definitions and markers of quality of care for access, to develop recommended measures of care for dialysis access: these ''standards'' should balance achievability with challenge. Such auditable markers might influence and deliver improvement across the entire scope of the Renal NSF. The ability to use them to analyse the patient journey may allow individual networks of commissioners and providers to target resource appropriately.

Acknowledgements

Thank you to everyone involved in the collection of this data, the effort required to supply it is appreciated.

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