
UK Renal Registry 16th Annual Report: Chapter 4 Demography of Patients Wait- listed for Renal Transplantation in the UK: National and Centre-specific Analyses

Rishi Pruthi^a, Rachel Hilton^b, Laura Pankhurst^c, Nizam Mamode^b, Alex Hudson^c,
Paul Roderick^d, Rommel Ramanan^e

^aUK Renal Registry, Bristol, UK; ^bGuys & St Thomas' Hospital, London, UK; ^cOrgan Donation and Transplantation Directorate, NHS Blood and Transplant, Bristol, UK; ^dSouthampton University, Southampton, UK; ^eSouthmead Hospital, Bristol, UK

Key Words

Blood group · Calculated reaction frequency · Demography · End stage renal disease · Established renal failure · Ethnicity · Kidney allocation · Match grade · Prevalence · Renal replacement therapy · Transplantation · Transplant waiting list · Wait listing times

Summary

- There were 6,699 patients registered on the active transplant list for kidney only transplantation at the beginning of 2011.
- The UK population prevalence rate for listing for kidney transplantation was 107 pmp compared with a dialysis prevalence rate of 424 pmp, with wide inter-centre variation.
- A quarter of the patients listed (25%) were from ethnic minority groups (Black or South Asian). Only 10% (61/593) of Black patients were pre-emptively listed compared to 16% of Asian and 17% of White patients.
- The median age of prevalent listed patients on dialysis was 53 years, which was significantly lower than the median age of the prevalent haemodialysis (HD) patients (66.3 years) and those on peritoneal dialysis (PD) (61.7 years), $p < 0.0001$.
- The proportion of patients listed aged 70 or more was 8% in England, 11% in Wales, 7% in Northern Ireland and 6% in Scotland, with wide variation between centres.
- Of patients listed, 50% had blood group type O, whilst blood group AB was the least common accounting for just 3% of listed patients. The percentage of patients listed with blood group B showed inter-centre variation with some centres having more than a quarter of patients listed with blood group B.
- Of all patients listed for kidney transplantation, 43% were sensitised (cRF ≥ 10), with nearly a quarter (23%) of all patients listed being highly sensitised (cRF ≥ 85). Patients listed on haemodialysis had the largest proportion of highly sensitised patients with 30% having a cRF ≥ 85 , whilst only 8% of patients listed pre-emptively were highly sensitised.
- Adult White patients had significantly shorter waiting times (1098 days, CI: 1071–1125) as compared to Black patients (1,396 days, CI: 1,301–1,491) or Asian patients (1411 days, CI: 1,334–1,488).
- Median waiting times in highly sensitised patients (2,218 days CI: 1,958–2,478) was more than twice that seen in patients who were not sensitised (1,063 days CI: 1,039–1,087).

Introduction

For suitable patients with established renal failure (ERF), renal transplantation is accepted as the optimal modality of renal replacement therapy, conferring both better quality of life and better life expectancy than dialysis. In the UK, after completing necessary medical and surgical assessment (guided by national guidelines [1]), 'suitable' patients are listed for transplantation on the UK Transplant Registry at NHSBT (National Health Service Blood and Transplant). The number of people registered on this database however are far greater than the number of donor organs available in the UK which has led to the development and implementation of an allocation policy for deceased donor kidneys. This policy aims to ensure equity of allocation whilst taking into account the importance of achieving a good match between donor and recipient.

Allocation policy

All kidneys from deceased donors whose death has been defined by brain-stem death criteria are allocated through the national allocation scheme managed by NHSBT. The current scheme was implemented in 2006 to meet agreed objectives and address issues of inequity of access to transplantation and utilises an evidence-based computer algorithm [2, 3]. This is based on a tier system, with all patients listed for kidney transplantation being allocated into one of five tiers (figure 4.1). Paediatric patients are prioritised within Tiers A and B according to waiting time, whilst within tiers C, D and E patients are prioritised according to a points based system (highest score first), based on seven elements.

These are: waiting time, HLA match and age combined, donor-recipient age difference, geographical location of patient relative to donor, HLA-DR homozygosity, HLA-B homozygosity and blood group match (figure 4.1). Full details of the allocation policy can be accessed at: http://www.odt.nhs.uk/pdf/kidney_allocation_policy.pdf.

Whilst the analysis of these variables at a centre level is beyond the scope of a UK Renal Registry (UKRR) report, this report aims to provide clinicians with a better understanding of the 'make-up' of the UK Transplant Registry by:

- (i) Defining the prevalence rates of listing, for individual UK countries and by age group
- (ii) Providing centre level analysis of listing patterns by age group, ethnicity, gender, calculated HLA antibody reaction frequency (cRF), matchability score, blood group and primary renal disease (PRD)
- (iii) Providing median waiting times by ethnicity, blood group and calculated HLA antibody reaction frequency (cRF).

Clinicians may find these analyses provide a better understanding of their practice patterns and service needs.

Methods

These analyses relate to the prevalent patients active on the transplant waiting list in the UK at the beginning of 2011. The cohort was defined as all patients listed for renal transplantation

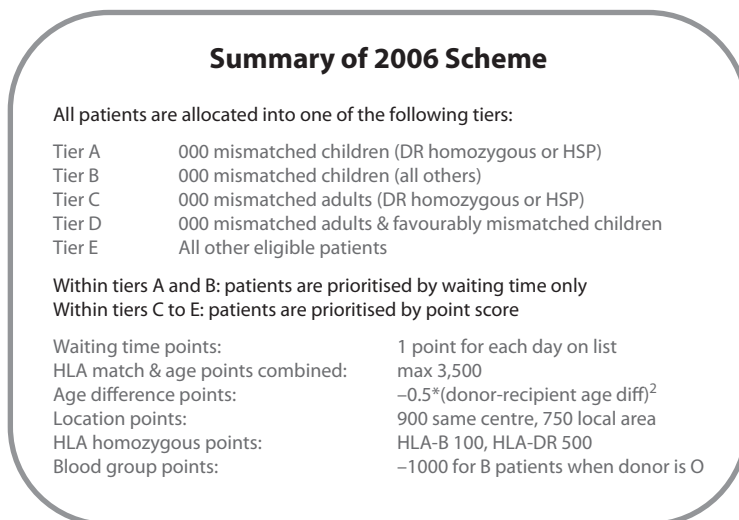


Fig. 4.1. Summary of national allocation scheme

Table 4.1. Prevalence of registration for kidney transplantation and dialysis in the UK on 01/01/2011 (including children <18 years)

	England	N Ireland	Scotland	Wales	UK
Total estimated population, mid-2010 (millions)*	52.2	1.8	5.2	3.0	62.3
Total number registered for transplantation	5,748	178	533	240	6,699
Prevalence rate registration for transplantation (pmp)	110	98	102	79	107
Prevalence rate dialysis (pmp)	424	440	415	436	424

*Data from the Office for National Statistics, National Records of Scotland and the Northern Ireland Statistics and Research Agency
pmp = per million population

on the UK Transplant Registry at NHSBT on 1st January 2011. Prevalent listed patients were extracted from the NHSBT database. Patients that had commenced dialysis were matched to the UKRR database. Patients were allocated to renal centres based on the origin of their data returns to the UKRR as opposed to their post-code. Population estimates were obtained from the UK Office of National Statistics (ONS) [4], the National Records of Scotland (NRS) [5] and the Northern Ireland Statistic and Research Agency (NISRA) [6]. Crude prevalence rates were calculated per million population (pmp) and centre level analyses were performed following a merge of data between NHSBT and the UKRR allowing listed patients to be re-allocated to their main renal centre.

The prevalence rate per million population for each centre was calculated using a derived catchment population. For a full description of the methodology used to estimate the catchment populations see appendix E: Methodology for Estimating Catchment Populations (www.renalreg.com). For Scotland, mid-2010 populations of Health Boards (HBs) (from the General Register Office for Scotland) were converted to centre level populations using an approximate mapping of renal centres to HBs supplied by the Scottish Renal Registry. Estimates of the catchment populations in Northern Ireland were supplied by personal communication from Dr D Fogarty.

Throughout this chapter, haemodialysis refers to all modes of HD treatment, including haemodiafiltration (HDF). Several centres reported significant numbers of patients on HDF, but other centres did not differentiate this treatment type in their UKRR returns. Prevalent patients listed for transplantation were examined by gender, ethnicity, age group, primary renal disease, blood group, match grade and calculated HLA antibody reaction frequency (Report appendix H: Coding (www.renalreg.com)). Analyses were done for the UK as a whole, by UK country, at centre level and split by treatment modality as appropriate.

Match grade was calculated for each listed patient by NHSBT using a pool of 10,000 donors that were blood group identical, HLA compatible and 000 or favourably (100, 010, 110) HLA mismatched. The match count was then converted into a standardised score, and categorised as: easy to match (1–3), moderate to match (4–7) and difficult to match (8–10). UK and centre analyses were performed using the three generated categories.

Calculated HLA antibody reaction frequency (cRF) for each patient was determined by NHS Blood & Transplant-Organ Donation and Transplantation Directorate (NHSBT-ODT) from the unacceptable HLA specificities reported for each patient. The unacceptable specificities were compared with the HLA types of blood group identical donors from a pool of 10,000 UK donors

and the resulting HLA antibody reaction frequency (cRF) was expressed as a percentage of HLA incompatible donors. These were then categorised into five groups: '0–9%', '10–29%', '30–84%', and '≥85%'; '0–9%' was classed as being un-sensitised, and '≥85%' was classed as being highly sensitised.

Chi-squared test, Fisher's exact test and Kruskal Wallis tests were used as appropriate to test for significant differences between groups. The data were analysed using SAS 9.3.

Results

Prevalent patient numbers listed for transplantation

There were 6,699 patients registered on the active transplant list for kidney only transplantation at the beginning of 2011, giving a UK population prevalence rate for listing for kidney transplantation of 107 pmp compared with a dialysis prevalence rate of 424 pmp (table 4.1). There were no significant differences in prevalence rates for dialysis in all four of the UK countries; however prevalence rates for listing were significantly lower in Wales at 79 pmp. This may be explained by the higher prevalence rate of dialysis for patients aged >80 seen in Wales who are less likely to be listed. Figure 4.2 shows that Northern Ireland had a higher prevalence rate for listing patients aged 65+ compared with the other UK countries, mirroring the trend seen in prevalence of dialysis patients in UK countries (chapter 2).

Prevalent patients listed for transplantation by RRT modality and centre

The number of prevalent patients listed for transplantation in each renal centre and the distribution of their treatment modalities varied widely (table 4.2). Many factors including geography, local population density, age distribution, ethnic composition, prevalence of diseases predisposing to kidney disease and the social deprivation index of that population may contribute to

Table 4.2. Number of prevalent listed patients by treatment modality and centre on 01/01/2011

Centre	HD	PD	Total number listed on dialysis	Catchment population (millions)	Rate of patients listed on dialysis	
					pmp	95% CI
England						
B Heart	94	13	107	0.74	145	(118–172)
B QEH ^a	208	72	280	1.70	165	(145–184)
Basldn	12	3	15	0.42	36	(18–54)
Bradfd	30	17	47	0.65	72	(51–93)
Brightn	45	21	66	1.30	51	(39–63)
Bristol ^a	83	26	109	1.44	76	(62–90)
Camb ^a	45	6	51	1.16	44	(32–56)
Carlis	13	4	17	0.32	53	(28–78)
Carsh	93	31	124	1.91	65	(53–76)
Chelms	15	13	28	0.51	55	(35–75)
Colchr	14	0	14	0.30	47	(22–71)
Covnt ^a	64	18	82	0.89	92	(72–112)
Derby	36	26	62	0.70	88	(66–110)
Donc	34	9	43	0.41	105	(74–136)
Dorset	59	19	78	0.86	91	(70–111)
Dudley	25	23	48	0.44	109	(78–139)
Exeter	38	22	60	1.09	55	(41–69)
Glouc	23	15	38	0.59	65	(44–85)
Hull	45	17	62	1.02	61	(46–76)
Ipswi	8	10	18	0.40	45	(24–66)
Kent	60	25	85	1.22	69	(55–84)
L Barts ^a	134	61	195	1.83	107	(92–122)
L Guys ^a	100	16	116	1.08	107	(88–127)
L Kings	72	30	102	1.17	87	(70–104)
L Rfree ^a	166	26	192	1.52	126	(109–144)
L St.G ^a	48	13	61	0.80	76	(57–96)
L West ^a	330	14	344	2.40	143	(128–159)
Leeds ^a	111	41	152	1.67	91	(77–105)
Leic ^a	235	71	306	2.44	126	(112–140)
Liv Ain	19	1	20	0.48	41	(23–59)
Liv RI ^a	82	25	107	1.00	107	(87–127)
M RI ^a	115	35	150	1.53	98	(82–114)
Middlbr	58	9	67	1.00	67	(51–83)
Newc ^a	41	25	66	1.12	59	(45–73)
Norwch	40	13	53	0.79	67	(49–86)
Nottm ^a	80	48	128	1.09	118	(97–138)
Oxford ^a	81	43	124	1.69	73	(60–86)
Plymth ^{ab}	20	13	33	0.47	70	(46–94)
Ports ^a	143	44	187	2.02	92	(79–106)
Prestn	94	30	124	1.49	83	(68–98)
Redng	64	37	101	0.91	111	(89–133)
Salford	99	49	148	1.49	99	(83–115)
Sheff ^a	114	19	133	1.37	97	(80–113)
Shrew	26	8	34	0.50	68	(45–91)
Stevng	83	14	97	1.20	81	(65–97)
Sthend	11	8	19	0.32	60	(33–87)
Stoke	54	20	74	0.89	83	(64–102)
Sund	34	11	45	0.62	73	(52–94)
Truro	28	8	36	0.41	87	(59–116)
Wirral	29	10	39	0.57	68	(47–90)
Wolve	36	19	55	0.67	82	(61–104)
York	28	5	33	0.49	67	(44–90)

Table 4.2. Continued

Centre	HD	PD	Total number listed on dialysis	Catchment population (millions)	Rate of patients listed on dialysis	
					pmp	95% CI
Northern Ireland						
Antrim	11	3	14	0.30	47	(22–71)
Belfast ^a	50	12	62	0.55	113	(85–141)
Newry	20	3	23	0.28	82	(49–116)
Ulster	11	0	11	0.30	37	(15–58)
West NI	36	5	41	0.35	117	(81–153)
Scotland						
Abrdn	37	11	48	0.60	80	(57–103)
Airdrie	27	3	30	0.56	54	(34–73)
D & Gall	10	2	12	0.15	80	(35–125)
Dundee	16	7	23	0.41	56	(33–79)
Dunfn	19	7	26	0.37	70	(43–97)
Edinb ^a	69	22	91	0.96	95	(75–114)
Glasgw ^a	186	24	210	1.51	139	(120–158)
Inverns	14	7	21	0.34	62	(35–88)
Klmarnk	24	11	35	0.37	95	(63–126)
Wales						
Bangor	14	4	18	0.22	83	(44–121)
Cardff ^a	64	29	93	1.42	65	(52–79)
Clwyd	11	2	13	0.19	69	(31–106)
Swanse	45	12	57	0.89	64	(48–81)
Wrexm	8	6	14	0.24	58	(28–89)
England	3,619	1,156	4,775			
N Ireland	128	23	151			
Scotland	402	94	496			
Wales	142	53	195			
UK	4,291	1,326	5,617			

Centres prefixed ‘L’ are London centres

The numbers of patients calculated for each country quoted above differ marginally from those quoted elsewhere when patients are allocated to areas by their individual postcodes, as some centres treat patients from across national boundaries

^aTransplant centres

^bThe catchment population for Plymouth may be too low, see appendix E

this. Many of these factors are also likely to be the cause behind the wide inter-centre variation seen in listing patients pre-emptively between transplant centres with a range of 11 to 125 patients listed across 24 transplanting centres (table 4.3).

Case mix in prevalent wait-listed patients

Gender

Table 4.4 shows that the gender distribution of patients listed for transplantation was similar to that seen in the prevalent dialysis population with 59% of patients listed

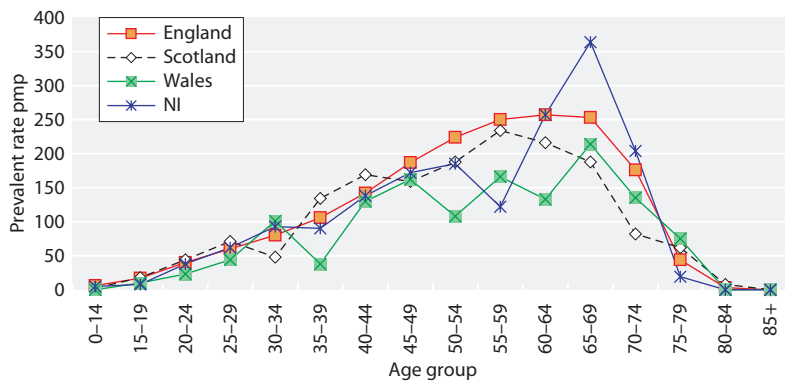


Fig. 4.2. Prevalence rates of registration for kidney transplantation in the UK per million population by age group and UK country on 01/01/2011

Table 4.3. Number of prevalent listed patients pre-emptively listed by transplant centre on 01/01/2011

Transplant centre	Number of pre-emptive listed patients
M RI	125
B QEH	112
Leic	97
L Guys	71
Bristol	67
L Rfree	61
L St.G	56
L West	56
Leeds	50
Oxford	49
Camb	34
Liv RI	33
Nottm	31
Newc	30
Sheff	30
Ports	30
Cardiff	29
Belfast	27
Glasgw	19
L Barts	18
Edin	16
Plymth	15
L GOSH	15
Covnt	11
UK	1,082

being male. There was wide inter-centre variation with a range of 37–91%, and only 11 centres had a preponderance of women listed (figure 4.3). Sub-analysis by modality did not show any significant gender differences.

Ethnicity

Ethnicity completeness for prevalent listed patients in the UK was 100% at the beginning of 2011 across all UK countries. Table 4.4 shows that a quarter of the patients listed (25%) were from ethnic minority groups (Black or South Asian) which compared to 12% of the UK general population who were designated as belonging to an ethnic minority. Whilst there was little difference across modalities, Black patients were seen to have the lowest proportion of pre-emptively listed patients, with only 10% (61/593) of listed Black patients being pre-emptively listed compared to 17% (817/4,835) and 16% (175/1,089) of White and South Asian listed patients respectively. Amongst renal centres there was wide variation between centres with respect to the proportion of patients listed from ethnic minorities (table 4.5, figure 4.4), ranging from zero percent (0%) in 12 centres to over 50% in London Barts (72%), London West (70%), London St Georges (69%), London Kings (69%), London Royal Free (65%), Birmingham Heartlands (61%) and London Guys (53%).

Age

The median age of prevalent listed patients on dialysis at 1st January 2011 was 53 years, which was significantly lower than the median age of the prevalent HD patients (66.3 years) and those on PD (61.7 years), $p < 0.0001$. As for those listed pre-emptively the median age was slightly lower than those on dialysis at 52 years. Table 4.4 shows that 79% of the UK prevalent listed

Table 4.4. Number and percentage of prevalent listed patients and their modalities by gender, ethnicity and age group on 01/01/2011

		Modality							
		HD		PD		Pre-emptive		Total	
		N	%	N	%	N	%	N	%
Gender	Male	2,595	60	724	55	614	57	3,933	59
	Female	1,696	40	602	45	468	43	2,766	41
Ethnicity	White	2,968	69	1,050	79	817	76	4,835	72
	Asian	738	17	176	13	175	16	1,089	16
	Black	461	11	71	5	61	6	593	9
	Other	124	3	29	2	29	3	182	3
Age group	0–17	20	0	24	2	52	5	96	1
	18–34	511	12	148	11	111	10	770	11
	35–49	1,265	29	380	29	303	28	1,948	29
	50–59	1,098	26	356	27	261	24	1,715	26
	60–69	1,024	24	334	25	300	28	1,658	25
	70+	373	9	84	6	55	5	512	8

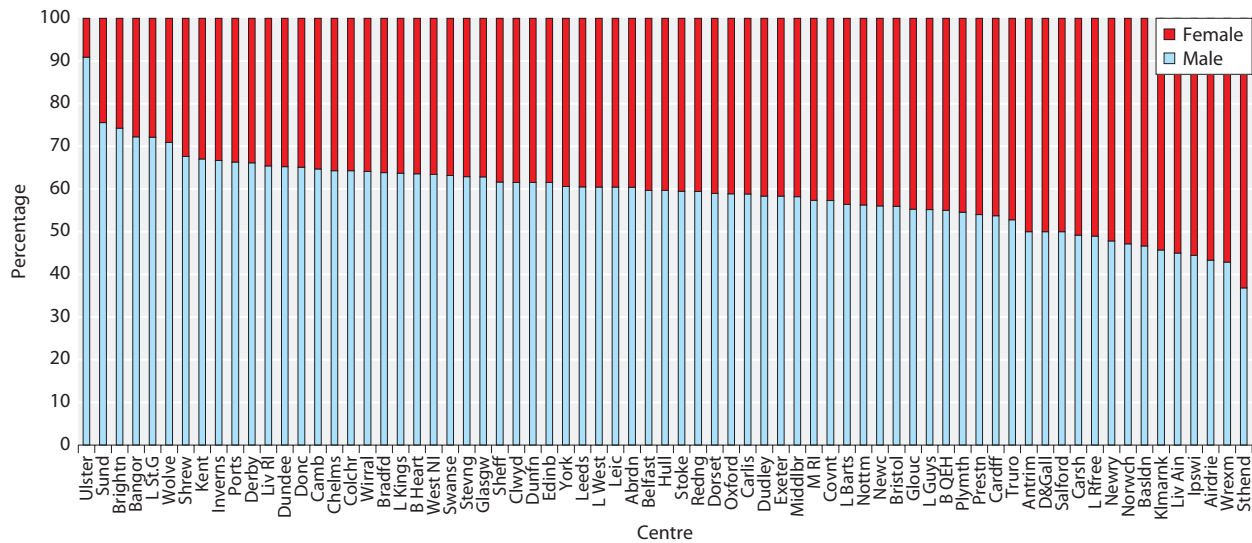


Fig. 4.3. Percentage of prevalent listed patients by gender and centre on 01/01/2011

Table 4.5. Ethnicity of prevalent listed patients by centre on 01/01/2011

Centre	N	Ethnicity							
		White		Asian		Black		Other	
		N	%	N	%	N	%	N	%
England									
Basldn	15	13	87	1	7	1	7	0	0
B Heart	107	42	39	54	50	10	9	1	1
B QEH	280	151	54	91	33	30	11	8	3
Bradfd	47	25	53	21	45	1	2	0	0
Brightn	66	54	82	4	6	4	6	4	6
Bristol	109	86	79	6	6	8	7	9	8
Camb	51	44	86	4	8	2	4	1	2
Carlis	17	17	100	0	0	0	0	0	0
Carsh	124	74	60	18	15	18	15	14	11
Chelms	28	23	82	1	4	1	4	3	11
Colchr	14	13	93	0	0	0	0	1	7
Covnt	82	52	63	22	27	5	6	3	4
Derby	62	48	77	11	18	3	5	0	0
Donc	43	42	98	1	2	0	0	0	0
Dorset	78	76	97	2	3	0	0	0	0
Dudley	48	38	79	7	15	3	6	0	0
Exeter	60	60	100	0	0	0	0	0	0
Glouc	38	35	92	2	5	1	3	0	0
Hull	62	56	90	2	3	2	3	2	3
Ipswi	18	16	89	0	0	1	6	1	6
Kent	85	84	99	0	0	1	1	0	0
Leeds	152	97	64	38	25	9	6	8	5
Leic	306	209	68	79	26	16	5	2	1
Liv Ain	20	19	95	1	5	0	0	0	0
Liv RI	107	95	89	1	1	5	5	6	6
L Barts	195	55	28	78	40	54	28	8	4
L Guys	116	55	47	4	3	52	45	5	4
L Kings	102	32	31	14	14	51	50	5	5
L Rfree	192	68	35	48	25	70	36	6	3

Table 4.5. Continued

Centre	N	Ethnicity							
		White		Asian		Black		Other	
		N	%	N	%	N	%	N	%
L St.G	61	19	31	18	30	18	30	6	10
L West	344	104	30	143	42	77	22	20	6
M RI	150	103	69	33	22	11	7	3	2
Middlbr	67	64	96	2	3	1	1	0	0
Newc	66	61	92	4	6	0	0	1	2
Norwch	53	50	94	2	4	0	0	1	2
Nottm	128	106	83	7	5	12	9	3	2
Oxford	124	89	72	21	17	10	8	4	3
Plymth	33	32	97	0	0	0	0	1	3
Ports	187	161	86	10	5	10	5	6	3
Prestn	124	100	81	21	17	2	2	1	1
Redng	101	60	59	32	32	8	8	1	1
Salford	148	111	75	31	21	4	3	2	1
Sheff	133	119	89	8	6	5	4	1	1
Shrew	34	31	91	1	3	2	6	0	0
Sthend	19	15	79	1	5	2	11	1	5
Stevng	97	69	71	16	16	10	10	2	2
Stoke	74	65	88	6	8	2	3	1	1
Sund	45	43	96	1	2	0	0	1	2
Truro	36	35	97	0	0	0	0	1	3
Wirral	39	33	85	3	8	1	3	2	5
Wolve	55	37	67	16	29	2	4	0	0
York	33	32	97	0	0	0	0	1	3
N Ireland									
Antrim	14	14	100	0	0	0	0	0	0
Belfast	62	60	97	1	2	0	0	1	2
Newry	23	22	96	0	0	0	0	1	4
Ulster	11	11	100	0	0	0	0	0	0
West NI	41	41	100	0	0	0	0	0	0
Scotland									
Abrdn	48	45	94	2	4	1	2	0	0
Airdrie	30	30	100	0	0	0	0	0	0
D & Gall	12	12	100	0	0	0	0	0	0
Dundee	23	22	96	1	4	0	0	0	0
Dunfn	26	26	100	0	0	0	0	0	0
Edinb	91	88	97	2	2	0	0	1	1
Glasgw	210	193	92	12	6	4	2	1	0
Inverns	21	21	100	0	0	0	0	0	0
Klmarnk	35	33	94	1	3	0	0	1	3
Wales									
Bangor	18	18	100	0	0	0	0	0	0
Cardff	93	83	89	7	8	1	1	2	2
Clwyd	13	13	100	0	0	0	0	0	0
Swanse	57	54	95	2	4	1	2	0	0
Wrexm	14	14	100	0	0	0	0	0	0
England	4,775	3,218	67	886	19	525	11	146	3
Northern Ireland	151	148	98	1	1	0	0	2	1
Scotland	496	470	95	18	4	5	1	3	1
Wales	195	182	93	9	5	2	1	2	1
UK	5,617	4,018	72	914	16	532	9	153	3

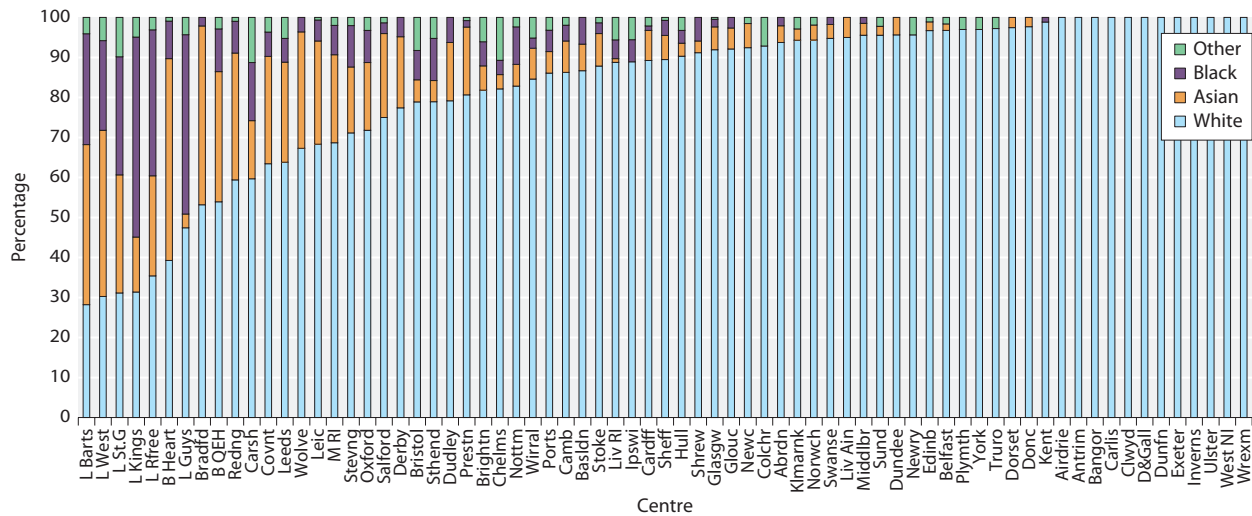


Fig. 4.4. Ethnicity of prevalent listed patients by centre on 01/01/2011

population was aged between 35–69 years, with only 8% of patients aged 70 or above. The proportion of patients listed aged 70 or more was 8% in England, 11% in Wales, 7% in Northern Ireland and 6% in Scotland

(table 4.6). Analysis by centre (table 4.6) showed wide variation in the proportion of patients listed aged 70 or above by centre with four centres (Basildon, Colchester, Ipswich and London Barts) listing no patients, compared

Table 4.6. Number and percentage of prevalent listed patients in each age group by centre on 01/01/2011

Centre	Age group (years)											
	0–17		18–34		35–49		50–59		60–69		70+	
	N	%	N	%	N	%	N	%	N	%	N	%
England												
Basldn			1	7	5	33	6	40	3	20		
B Heart			17	16	27	25	27	25	24	22	12	11
B QEH	4	1	38	14	73	26	90	32	60	21	15	5
Bradfd			11	23	15	32	10	21	8	17	3	6
Brightn	1	2	7	11	16	24	16	24	17	26	9	14
Bristol	3	3	12	11	35	32	23	21	29	27	7	6
Camb			5	10	17	33	16	31	8	16	5	10
Carlisle			2	12	5	29	4	24	5	29	1	6
Carsh			12	10	37	30	28	23	37	30	10	8
Chelms			3	11	8	29	9	32	7	25	1	4
Colchr					3	21	2	14	9	64		
Covnt			6	7	24	29	27	33	19	23	6	7
Derby			8	13	15	24	15	24	20	32	4	6
Donc			6	14	10	23	10	23	13	30	4	9
Dorset			7	9	17	22	12	15	26	33	16	21
Dudley			5	10	15	31	15	31	11	23	2	4
Exeter			4	7	16	27	15	25	22	37	3	5
Glouc			5	13	10	26	9	24	9	24	5	13
Hull			8	13	21	34	16	26	15	24	2	3
Ipswi			4	22	8	44	5	28	1	6		
Kent			8	9	17	20	23	27	31	36	6	7
Leeds	10	7	22	14	47	31	36	24	26	17	11	7
Leic			31	10	71	23	67	22	95	31	42	14
Liv Ain			4	20	5	25	4	20	4	20	3	15
Liv RI			14	13	39	36	30	28	19	18	5	5
L Barts			30	15	63	32	71	36	31	16		

Table 4.6. Continued

Centre	Age group (years)											
	0-17		18-34		35-49		50-59		60-69		70+	
	N	%	N	%	N	%	N	%	N	%	N	%
L Guys	1	1	14	12	42	36	32	28	19	16	8	7
L Kings			11	11	37	36	30	29	22	22	2	2
L Rfree			20	10	68	35	44	23	40	21	20	10
L St.G			7	11	19	31	9	15	17	28	9	15
L West	2	1	25	7	86	25	102	30	82	24	47	14
M RI			13	9	57	38	43	29	26	17	11	7
Middlbr			10	15	19	28	18	27	14	21	6	9
Newc	2	3	9	14	8	12	19	29	23	35	5	8
Norwch			7	13	13	25	12	23	18	34	3	6
Nottm	14	11	16	13	38	30	26	20	28	22	6	5
Oxford			12	10	36	29	39	31	30	24	7	6
Plymth			6	18	5	15	9	27	12	36	1	3
Ports			18	10	43	23	38	20	54	29	34	18
Prestn			18	15	34	27	38	31	29	23	5	4
Redng			8	8	35	35	28	28	23	23	7	7
Salford	1	1	19	13	42	28	40	27	38	26	8	5
Sheff			18	14	42	32	39	29	27	20	7	5
Shrew	1	3	7	21	13	38	5	15	7	21	1	3
Sthend			1	5	10	53	3	16	4	21	1	5
Stevng			12	12	35	36	20	21	20	21	10	10
Stoke			10	14	21	28	21	28	16	22	6	8
Sund			7	16	19	42	8	18	6	13	5	11
Truro			2	6	6	17	8	22	14	39	6	17
Wirral			6	15	9	23	14	36	7	18	3	8
Wolve			6	11	16	29	14	25	16	29	3	5
York			2	6	12	36	10	30	5	15	4	12
Northern Ireland												
Antrim					3	21	1	7	8	57	2	14
Belfast			12	19	19	31	12	19	18	29	1	2
Newry			5	22	6	26	2	9	9	39	1	4
Ulster			2	18	3	27	2	18	3	27	1	9
West NI			5	12	10	24	8	20	13	32	5	12
Scotland												
Abrdn			8	17	15	31	14	29	8	17	3	6
Airdrie			4	13	11	37	7	23	6	20	2	7
D & Gall					5	42	3	25	3	25	1	8
Dundee			1	4	9	39	5	22	5	22	3	13
Dunfn			2	8	6	23	10	38	6	23	2	8
Edinb	1	1	9	10	34	37	20	22	21	23	6	7
Glasgw	3	1	26	12	71	34	62	30	38	18	10	5
Inverns			3	14	3	14	6	29	8	38	1	5
Klmarnk			6	17	8	23	6	17	14	40	1	3
Wales												
Bangor			2	11	6	33	1	6	6	33	3	17
Cardff	1	1	12	13	31	33	21	23	20	22	8	9
Clwyd			2	15	5	38	2	15	3	23	1	8
Swanse			5	9	12	21	13	23	19	33	8	14
Wrexm			1	7	4	29	4	29	4	29	1	7
England	39	1	554	12	1,384	29	1,255	26	1,146	24	397	8
N Ireland	0	0	24	16	41	27	25	17	51	34	10	7
Scotland	4	1	59	12	162	33	133	27	109	22	29	6
Wales	1	1	22	11	58	30	41	21	52	27	21	11
UK	44	1	659	12	1,645	29	1,454	26	1,358	24	457	8

The numbers of patients calculated for each country quoted above differ marginally from those quoted elsewhere when patients are allocated to areas by their individual postcodes, as some centres treat patients from across national boundaries

Blank cells denote no patients listed for that age group within corresponding centre

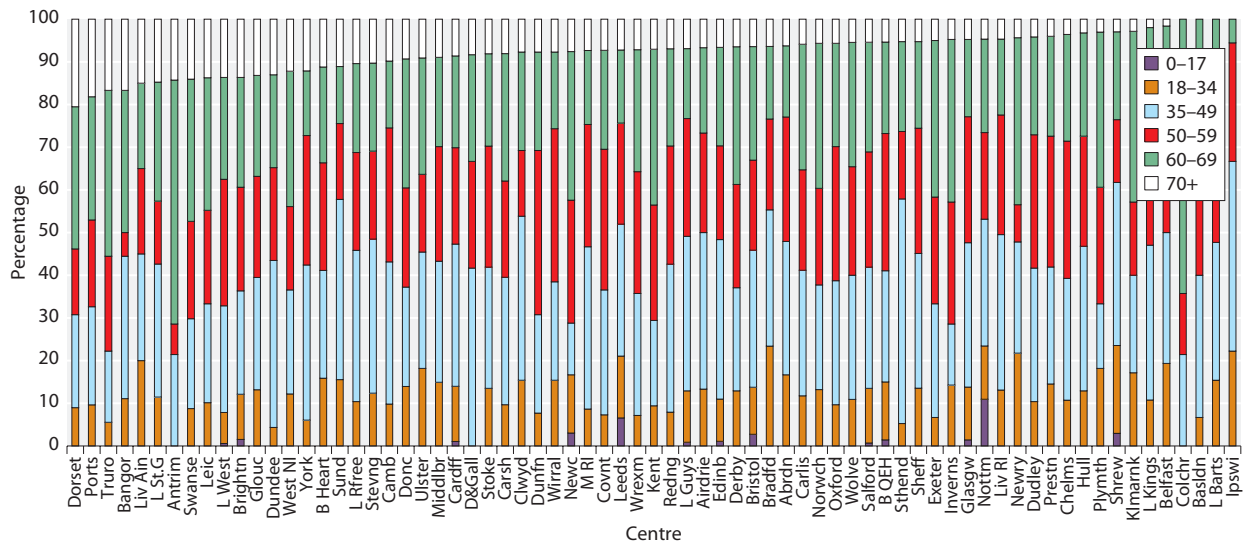


Fig. 4.5. Percentage of listed patients in each age group on 01/01/2011 by centre

to Dorset, Portsmouth, Truro and Bangor, where more than a sixth of their listed patients were aged 70 or more (figure 4.5). These differences may be due to variation in local listing practices, although could also reflect variation in the ethnic make-up of the catchment population and the social deprivation index of the local population.

Primary renal diagnosis

Data for primary renal diagnosis (PRD) were not complete for 3% of patients (table 4.7) and there remained a marked inter-centre difference in completeness of data returns for PRD to the UKRR. Glomerulonephritis (GN) was the most common PRD amongst

patients listed for transplantation on 1st January 2011 at 22% (table 4.7), whilst hypertension only accounted for 7% and renovascular disease only 2%. This may be explained by the fact that younger patients (age <65 years) who are more likely to be listed are more likely to have GN or pyelonephritis and less likely to have renovascular disease or hypertension as the cause of their renal failure which are more prominent in older age.

Diabetes accounted for just 10% of listed patients, lower than the 15% seen in prevalent patients.

Amongst patients pre-emptively listed the most common diagnosis was polycystic kidney disease (PKD), which is probably a reflection of the fact that these patients are often known to renal services for many

Table 4.7. Number and percentage of prevalent listed patients and their modalities by primary renal diagnosis on 01/01/2011

Primary renal diagnosis	Modality							
	HD		PD		Pre-emptive		Total	
	N	%	N	%	N	%	N	%
Diabetes	463	11	114	9	41	6	618	10
Glomerulonephritis	926	22	323	24	124	20	1,373	22
Hypertension	311	7	83	6	26	4	420	7
Missing	127	3	40	3	47	7	214	3
Other	709	17	212	16	84	13	1,005	16
Polycystic kidney disease	493	11	189	14	131	21	813	13
Pyelonephritis	489	11	126	10	72	11	687	11
Renovascular	89	2	21	2	8	1	118	2
Uncertain	684	16	218	16	103	16	1,005	16

Table 4.8. Number and percentage of prevalent listed patients and their modalities by blood group, match grade and cRF group on 01/01/2011

		Modality							
		HD		PD		Pre-emptive		Total	
		N	%	N	%	N	%	N	%
Blood group	O	2,189	51	639	48	517	48	3,345	50
	A	1,290	30	475	36	373	35	2,138	32
	B	684	16	181	14	154	14	1,019	15
	AB	128	3	31	2	37	3	196	3
Match grade	Easy	1,175	27	482	36	422	39	2,079	31
	Moderate	1,684	39	601	45	492	46	2,777	41
	Difficult	1,432	33	243	18	167	15	1,842	28
cRF group	0 to <10	2,191	51	833	63	767	71	3,791	57
	10 to <30	172	4	75	6	57	5	304	5
	30 to <85	644	15	229	17	174	16	1,047	16
	85 to 100	1,284	30	189	14	83	8	1,556	23

years prior to starting dialysis allowing their timely work up to be pre-emptively listed.

Blood group

Table 4.8 shows that 50% of patients listed had blood group type O, whilst blood group AB was the least common accounting for just 3% of listed patients. The percentage of patients listed with blood group B (who are known to have the longest median waiting times) showed inter-centre variation (see table 4.9, figure 4.6) with some centres having more than a quarter of patients listed with blood group B (London St George's 31% and London West 26%) whilst four centres had none (Antrim, Basildon, Colchester, Truro). This may partly be due to the ethnic make-up of the catchment population with both London West and St George's having a large non-White prevalent dialysis population. Additionally the actual number of patients listed in Antrim, Basildon, Colchester and Truro were quite small, which may explain why all blood groups were not represented in their listed patients.

Calculated HLA antibody reaction frequency (cRF) and match grade

Table 4.8 shows that 43% of all patients listed for kidney transplantation on the 1st January 2011 were sensitised (cRF ≥ 10). Patients on haemodialysis had the largest proportion of sensitised patients with 49% having a cRF ≥ 10 , whilst only 29% of patients listed

pre-emptively were sensitised. This is likely a reflection of haemodialysis patients having an increased risk of exposure to sensitising events (e.g. blood transfusions) relating to dialysis complications and access procedures as compared to those listed pre-emptively and also selective enrichment of the HD population with patients with previous failed transplants (due to longer RRT vintage). Similar reasons are also likely to account for the disparity seen in distribution of highly sensitised patients (cRF ≥ 85) which constitute nearly a quarter (23%) of all patients listed for transplantation. Patients listed on haemodialysis had the largest proportion of highly sensitised patients with 30% having a cRF ≥ 85 , whilst only 8% of patients listed pre-emptively were highly sensitised.

Centre analysis highlighted wide variation in the proportion of highly sensitised patients listed (table 4.10, figure 4.7) ranging from 50% of patients or more in Ipswich and Liverpool Aintree, to only 9% in Wolverhampton.

Similar trends were also noted when analysing match scores by modality (table 4.8) with those listed on haemodialysis having the greatest proportion of patients that were difficult to match (33%) as compared to those who were pre-emptively listed (15%). Centre variation was also seen in the proportion of patients that were difficult to match ranging from 48% of patients at London Royal Free, to only 13% at Wolverhampton (table 4.10, figure 4.8).

Table 4.9. Number and percentage of prevalent listed patients in each blood group by centre on 01/01/2011

Centre	Blood group							
	O		A		B		AB	
	N	%	N	%	N	%	N	%
England								
Basldn	9	60	6	40				
B Heart	44	41	33	31	24	22	6	6
B QEH	116	41	94	34	63	23	7	3
Bradfd	26	55	11	23	10	21		
Brighntn	31	47	24	36	9	14	2	3
Bristol	54	50	37	34	16	15	2	2
Camb	29	57	16	31	4	8	2	4
Carlis	11	65	3	18	3	18		
Carsh	73	59	31	25	18	15	2	2
Chelms	13	46	13	46	2	7		
Colchr	7	50	7	50				
Covnt	36	44	28	34	13	16	5	6
Derby	29	47	20	32	13	21		
Donc	22	51	17	40	4	9		
Dorset	48	62	27	35	2	3	1	1
Dudley	25	52	15	31	8	17		
Exeter	27	45	28	47	4	7	1	2
Glouc	18	47	18	47	2	5		
Hull	30	48	23	37	3	5	6	10
Ipswi	11	61	5	28	2	11		
Kent	47	55	25	29	12	14	1	1
Leeds	82	54	42	28	23	15	5	3
Leic	148	48	89	29	53	17	16	5
Liv Ain	13	65	5	25	1	5	1	5
Liv RI	55	51	40	37	8	7	4	4
L Barts	90	46	58	30	44	23	3	2
L Guys	58	50	40	34	13	11	5	4
L Kings	48	47	30	29	17	17	7	7
L Rfree	92	48	49	26	46	24	5	3
L St.G	23	38	17	28	19	31	2	3
L West	171	50	71	21	89	26	13	4
M RI	80	53	46	31	21	14	3	2
Middlbr	39	58	23	34	2	3	3	4
Newc	32	48	18	27	15	23	1	2
Norwch	28	53	22	42	3	6		
Nottm	80	63	38	30	10	8		
Oxford	54	44	47	38	19	15	4	3
Plymth	21	64	10	30	2	6		
Ports	80	43	79	42	20	11	8	4
Prestn	67	54	28	23	23	19	6	5
Redng	49	49	36	36	13	13	3	3
Salford	71	48	49	33	25	17	3	2
Sheff	60	45	59	44	10	8	4	3
Shrew	17	50	13	38	3	9	1	3
Sthend	11	58	4	21	4	21		
Stevng	50	52	29	30	16	16	2	2
Stoke	34	46	29	39	8	11	3	4
Sund	31	69	10	22	4	9		
Truro	17	47	19	53				
Wirral	16	41	16	41	7	18		
Wolve	31	56	17	31	7	13		
York	17	52	9	27	5	15	2	6

Table 4.9. Continued

Centre	Blood group							
	O		A		B		AB	
	N	%	N	%	N	%	N	%
N Ireland								
Antrim	6	43	8	57				
Belfast	34	55	17	27	10	16	1	2
Newry	15	65	4	17	2	9	2	9
Ulster	5	45	5	45	1	9		
West NI	23	56	15	37	3	7		
Scotland								
Abrdn	29	60	12	25	7	15		
Airdrie	17	57	8	27	5	17		
D&Gall	6	50	2	17	3	25	1	8
Dundee	11	48	7	30	4	17	1	4
Dunfn	21	81	4	15	1	4		
Edinb	51	56	23	25	16	18	1	1
Glasgw	116	55	48	23	39	19	7	3
Inverns	15	71	4	19	2	10		
Klmarnk	19	54	10	29	4	11	2	6
Wales								
Bangor	10	56	7	39	1	6		
Cardff	38	41	38	41	13	14	4	4
Clwyd	6	46	4	31	3	23		
Swanse	28	49	20	35	8	14	1	2
Wrexm	7	50	6	43	1	7		
England	2,371	50	1,523	32	742	16	139	3
Northern Ireland	83	55	49	32	16	11	3	2
Scotland	285	57	118	24	81	16	12	2
Wales	89	46	75	38	26	13	5	3
UK	2,828	50	1,765	31	865	15	159	3

Blank cells denote no patients listed for that blood group within corresponding centre

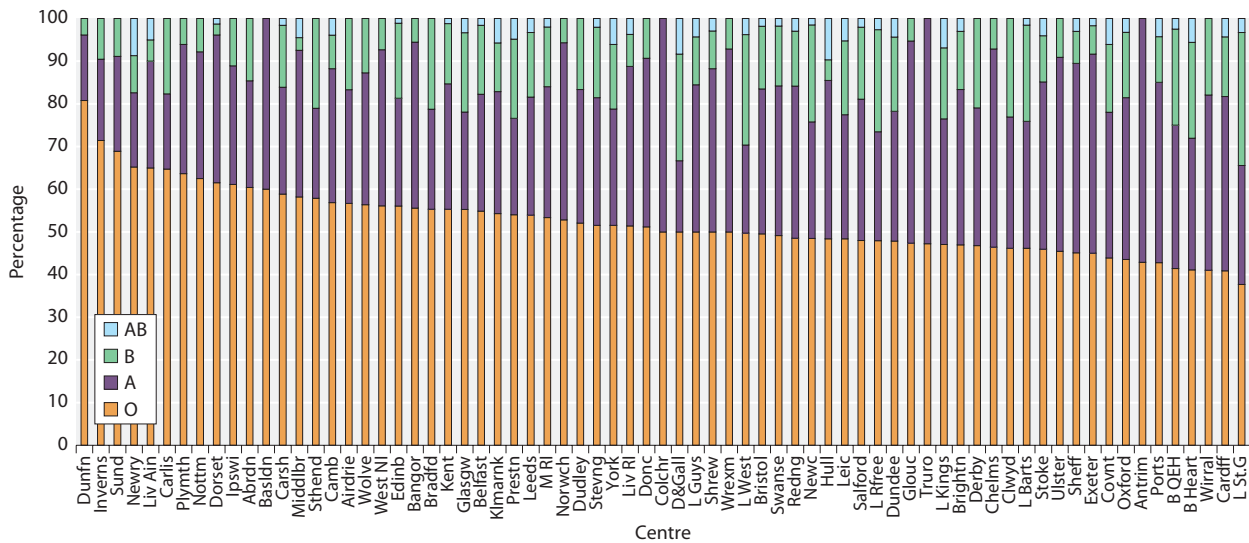


Fig. 4.6. Percentage of listed patients by blood group on 01/01/2011 by centre

Table 4.10. Centre analysis of number and percentage of prevalent listed patients by cRF and match score on 01/01/2011

Centre	cRF Group								Match score					
	0 to <10		10 to <30		30 to <85		85 to 100		Easy		Moderate		Difficult	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
England														
Basldn	9	60			4	27	2	13	5	33	7	47	3	20
B Heart	63	59	8	7	13	12	23	22	23	22	54	50	30	28
B QEH	137	49	12	4	46	16	85	30	70	25	119	43	91	33
Bradfd	23	49	2	4	10	21	12	26	11	23	23	49	13	28
Brightn	47	71	2	3	9	14	8	12	24	36	27	41	15	23
Bristol	66	61	3	3	14	13	26	24	29	27	50	46	30	28
Camb	20	39	7	14	7	14	17	33	12	24	20	39	19	37
Carlis	7	41			7	41	3	18	7	41	5	29	5	29
Carsh	60	48	6	5	20	16	38	31	32	26	46	37	46	37
Chelms	14	50	2	7	6	21	6	21	7	25	13	46	8	29
Colchr	8	57			4	29	2	14	4	29	6	43	4	29
Covnt	41	50	2	2	15	18	24	29	28	34	23	28	31	38
Derby	33	53	7	11	10	16	12	19	18	29	29	47	15	24
Donc	27	63	3	7	4	9	9	21	18	42	16	37	9	21
Dorset	40	51	6	8	10	13	22	28	36	46	22	28	20	26
Dudley	25	52	2	4	8	17	13	27	16	33	19	40	13	27
Exeter	30	50	1	2	11	18	18	30	20	33	22	37	18	30
Glouc	23	61	1	3	6	16	8	21	16	42	16	42	6	16
Hull	33	53	2	3	11	18	16	26	20	32	20	32	22	35
Ipswi	5	28	2	11	2	11	9	50	6	33	6	33	6	33
Kent	53	62	3	4	13	15	16	19	31	36	37	44	17	20
Leeds	66	43	6	4	23	15	57	38	42	28	58	38	52	34
Leic	201	66	2	1	66	22	37	12	102	33	136	44	68	22
Liv Ain	7	35	1	5	1	5	11	55	7	35	5	25	8	40
Liv RI	52	49	3	3	22	21	30	28	38	36	37	35	32	30
L Barts	122	63	7	4	30	15	36	18	36	18	105	54	54	28
L Guys	57	49	10	9	14	12	35	30	19	16	53	46	44	38
L Kings	61	60	2	2	19	19	20	20	22	22	49	48	31	30
L Rfree	80	42	12	6	33	17	67	35	25	13	75	39	92	48
L St.G	35	57	6	10	7	11	13	21	10	16	24	39	27	44
L West	264	77	5	1	28	8	47	14	83	24	172	50	89	26
M RI	63	42	5	3	32	21	50	33	33	22	61	41	56	37
Middlbr	30	45	6	9	11	16	20	30	17	25	26	39	24	36
Newc	31	47	4	6	5	8	26	39	23	35	20	30	23	35
Norwch	23	43	6	11	9	17	15	28	22	42	12	23	19	36
Nottm	68	53	5	4	25	20	30	23	40	31	61	48	27	21
Oxford	58	47	8	6	14	11	44	35	32	26	50	40	42	34
Plymth	17	52	1	3	6	18	9	27	15	45	10	30	8	24
Ports	109	58	2	1	29	16	47	25	64	34	64	34	59	32
Prestn	52	42	7	6	29	23	36	29	40	32	41	33	43	35
Redng	53	52	7	7	12	12	29	29	29	29	40	40	32	32
Salford	59	40	3	2	39	26	47	32	42	28	56	38	50	34
Sheff	58	44	9	7	24	18	42	32	41	31	54	41	38	29
Shrew	16	47			7	21	11	32	10	29	13	38	11	32
Sthend	12	63			2	11	5	26	6	32	8	42	5	26
Stevng	54	56	4	4	12	12	27	28	29	30	40	41	28	29
Stoke	36	49	8	11	10	14	20	27	27	36	25	34	22	30
Sund	20	44	2	4	10	22	13	29	15	33	17	38	13	29
Truro	16	44	1	3	6	17	13	36	13	36	10	28	13	36
Wirral	20	51	4	10	4	10	11	28	10	26	17	44	12	31
Wolve	37	67	6	11	7	13	5	9	27	49	21	38	7	13
York	15	45	2	6	3	9	13	39	7	21	16	48	10	30

Table 4.10. Continued

Centre	cRF Group								Match score					
	0 to <10		10 to <30		30 to <85		85 to 100		Easy		Moderate		Difficult	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
N Ireland														
Antrim	9	64			1	7	4	29	6	43	5	36	3	21
Belfast	28	45			11	18	23	37	23	37	18	29	21	34
Newry	11	48			5	22	7	30	4	17	13	57	6	26
Ulster	7	64	2	18			2	18	6	55	3	27	2	18
West NI	25	61	3	7	8	20	5	12	13	32	21	51	7	17
Scotland														
Abrdn	33	69	2	4	3	6	10	21	15	31	21	44	12	25
Airdrie	20	67	1	3	4	13	5	17	10	33	12	40	8	27
D&Gall	6	50			1	8	5	42	4	33	4	33	4	33
Dundee	15	65	2	9			6	26	8	35	11	48	4	17
Dunfn	16	62			3	12	7	27	12	46	6	23	8	31
Edinb	46	51	5	5	9	10	31	34	33	36	31	34	27	30
Glasgw	112	53	6	3	27	13	65	31	71	34	86	41	53	25
Inverns	13	62			2	10	6	29	8	38	9	43	4	19
Klmarnk	15	43	2	6	2	6	16	46	9	26	12	34	14	40
Wales														
Bangor	9	50	2	11	4	22	3	17	8	44	7	39	3	17
Cardff	53	57	3	3	13	14	24	26	35	38	38	41	20	22
Clwyd	4	31			4	31	5	38	4	31	4	31	5	38
Swanse	41	72	2	4	5	9	9	16	26	46	23	40	8	14
Wrexm	5	36	2	14	2	14	5	36	3	21	5	36	6	43
England	2,556	54	215	5	769	16	1,235	26	1,359	28	1,956	41	1,460	31
Northern Ireland	80	53	5	3	25	17	41	27	52	34	60	40	39	26
Scotland	276	56	18	4	51	10	151	30	170	34	192	39	134	27
Wales	112	57	9	5	28	14	46	24	76	39	77	39	42	22
UK	3,024	54	247	4	873	16	1,473	26	1,657	29	2,285	41	1,675	30

Blank cells denote no patients listed for that category within corresponding centre

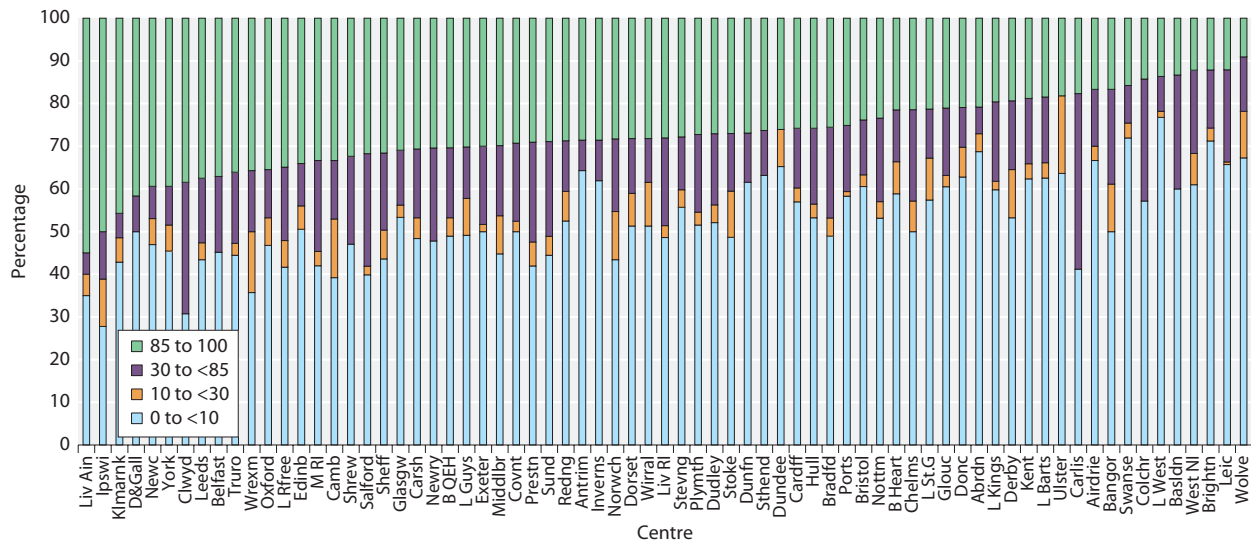


Fig. 4.7. Centre analysis of the percentage of patients listed by calculated reaction frequency group (cRF) on 01/01/2011

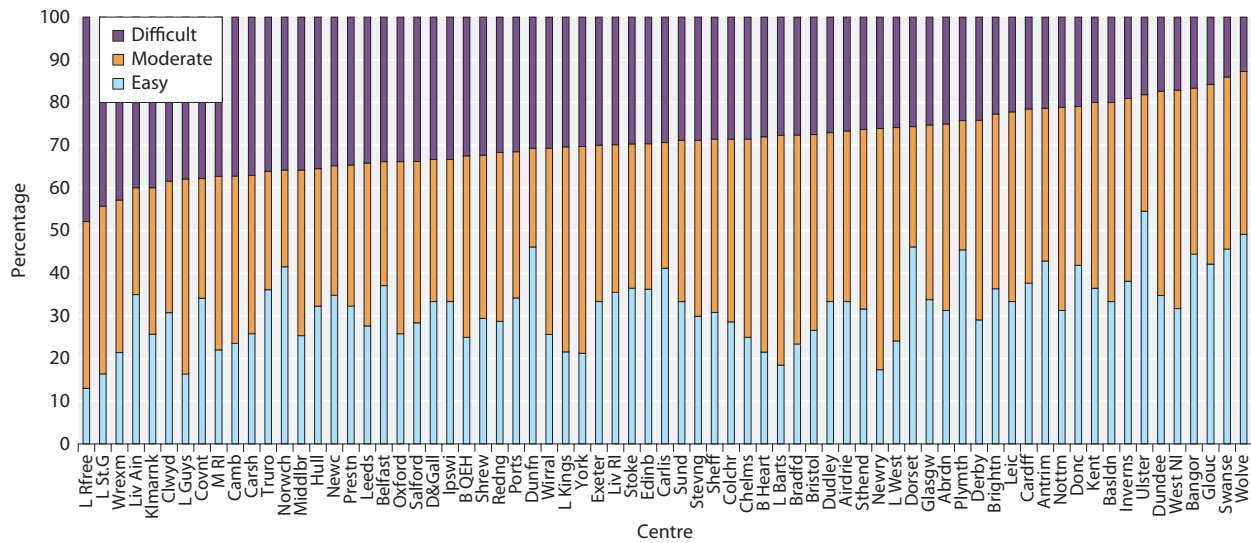


Fig. 4.8. Centre analysis of the percentage of patients listed by match score on 01/01/2011

Median waiting times

The median waiting times for receiving a deceased DBD kidney via the national allocation scheme are shown by ethnicity, blood group and cRF in tables 4.11, 4.12 and 4.13 respectively. These times were calculated using patients registered for kidney only transplants in the UK between 1st January 2006 and 31st December 2009. The overall median waiting time was 1,160 days for an adult (aged ≥18 years at time of registration) and 339 days for a paediatric patient (aged <18 years at time of registration). Due to the allocation algorithm stratifying patients on level of sensitisation and the

need to match donor and recipient blood groups waiting times are seen to differ across ethnicity, blood groups and level of sensitisation. Adult White patients were seen to have significantly shorter waiting times (1,098 days, CI: 1,071–1,125) as compared to Black patients (1,396 days, CI: 1,301–1,491) or Asian patients (1,411 days, CI: 1,334–1,488) with similar trends seen across paediatric ethnic groups (table 4.11).

Across blood groups, adult patients with blood group O (1,373 days) and B (1,343 days) were seen to have significantly longer waiting times than those with blood group A (931 days) or AB (607 days). These differences were not seen to be significant across paediatric patients (table 4.12).

Table 4.11. Median waiting time to kidney only transplant in the UK by ethnicity, for patients registered 1st January 2006 to 31st December 2009

Ethnicity	Patients registered N	Waiting time (days)	
		Median	95% CI
Adult			
White	6,899	1,098	(1,071–1,125)
South Asian	1,252	1,411	(1,334–1,488)
Black	667	1,396	(1,301–1,491)
Other	236	1,209	(1,046–1,372)
Total	9,054	1,160	(1,136–1,184)
Paediatric			
White	248	266	(212–320)
South Asian	73	542	(458–626)
Black	18	623	(361–885)
Other	11	276	(33–519)
Total	350	339	(263–415)

Table 4.12. Median waiting time to kidney only transplant in the UK by blood group, for patients registered 1st January 2006 to 31st December 2009

Blood group	Patients registered N	Waiting time (days)	
		Median	95% CI
Adult			
O	4,066	1,373	(1,335–1,411)
A	3,364	931	(899–963)
B	1,259	1,343	(1,287–1,399)
AB	365	607	(521–693)
Total	9,054	1,160	(1,136–1,184)
Paediatric			
O	168	410	(294–526)
A	121	269	(161–377)
B	48	241	(128–354)
AB	13	504	(0–1,101)
Total	350	339	(263–415)

Table 4.13. Median waiting time to kidney only transplant in the UK by sensitisation at registration, for patients registered 1st January 2006 to 31st December 2009

Level of sensitisation	Patients registered N	Waiting time (days)	
		Median	95% CI
Adult			
0–9	6,731	1,063	(1,039–1,087)
10–29	308	1,148	(1,014–1,282)
30–84	1,297	1,475	(1,400–1,550)
85+	718	2,218	(1,958–2,478)
Total	9,054	1,160	(1,136–1,184)
Paediatric			
0–9	217	299	(212–386)
10–29	15	138	(2–274)
30–84	91	312	(215–409)
85+	27	1,241	(836–1,646)
Total	350	339	(263–415)

Table 4.13 shows that the level of sensitisation also has an impact on median waiting times with waiting times in highly sensitised patients (2,218 days CI: 1,958–2,478) being more than twice that seen in patients who were not sensitised (1,063 days CI: 1,039–1,087), which was highly significant $p \leq 0.0001$. This trend was also seen in paediatric listed patients with highly sensitised paediatric patients having a significantly longer median waiting time of 1,241 days as compared to 299 days in paediatric patients who were not sensitised.

Summary

Inter-centre variation exists in the number of patients wait-listed (both pre-emptively and after commencing dialysis) and in the proportion listed across different ethnic groups, age and blood groups. This may reflect differences in geography, local population density, age distribution, ethnic composition, prevalence of diseases predisposing to kidney disease and the social deprivation index of that population as well as individual centre practice patterns. Significant unexplained inter-centre variation was also seen in the proportion of patients listed that were highly sensitised.

Median waiting times are seen to differ significantly across blood groups, degree of sensitisation and ethnic groups, with differences in blood group being one probable factor in explaining the differences in median waiting times seen amongst the major ethnic groups.

Conflicts of interest: none

References

- 1 Renal Association Clinical Practice Guidelines Committee: Assessment of the Potential Kidney Transplant Recipient, 5th Edition. 2011. <http://www.renal.org/Clinical/GuidelinesSection/AssessmentforRenalTransplantation.aspx>
- 2 UK Kidney Transplantation: organ allocation policy. http://www.odt.nhs.uk/pdf/kidney_allocation_policy.pdf
- 3 http://www.odt.nhs.uk/pdf/kidney_allocation_policy.pdf
- 4 Office for National Statistics. www.statistics.gov.uk
- 5 National Records of Scotland. <http://www.nrscotland.gov.uk/>
- 6 Northern Ireland Statistics and Research Agency. <http://www.nisra.gov.uk/>