NHS BLOOD AND TRANSPLANT

ORGAN DONATION AND TRANSPLANTATION DIRECTORATE

KIDNEY ADVISORY GROUP

OUT OF HOUR TRANSPLANTS VS IN HOUR TRANSPLANTS OUTCOMES

INTRODUCTION

1 This paper summarises the transplant activity of centres during day time and night time hours and compares the five-year outcomes of these two groups.

DATA

2 Data were obtained from the UK Transplant Registry on all kidney only transplants performed in the UK between 1 April 2014 and 31 March 2019. The time the kidney was perfused with recipient blood was used to determine whether the transplant occurred during day time or night time hours, with day time being defined as 8am-8pm. Patients where the kidney perfusion time was missing were excluded from the analysis.

METHODS

3 Unadjusted univariate analysis was performed using the Kaplan-Meier method to estimate five-year graft and patient survival of first adult deceased donor kidney transplants performed during day time and night time hours. The survival curves were compared using log rank tests.

4 Multivariable Cox proportional hazards models were constructed for first adult deceased donor transplants with five-year graft survival as the outcome of interest.

5 The donor, recipient and transplant factors investigated were: donor factors (age, type, past hypertension history, eGFR at retrieval, cause of death, length of hospital stay, gender, blood group and ethnicity), recipient factors (age at transplant, gender, blood group, ethnicity, height, weight, dialysis status at registration, time on dialysis, primary renal disease) and transplant factors (level of HLA mismatch, CRF at transplant, financial year of transplant, cold ischaemia time and waiting time).

6 Factors were identified as important by comparing the log likelihood ratio statistic of nested models and p-values of 0.05 or less were considered significant.

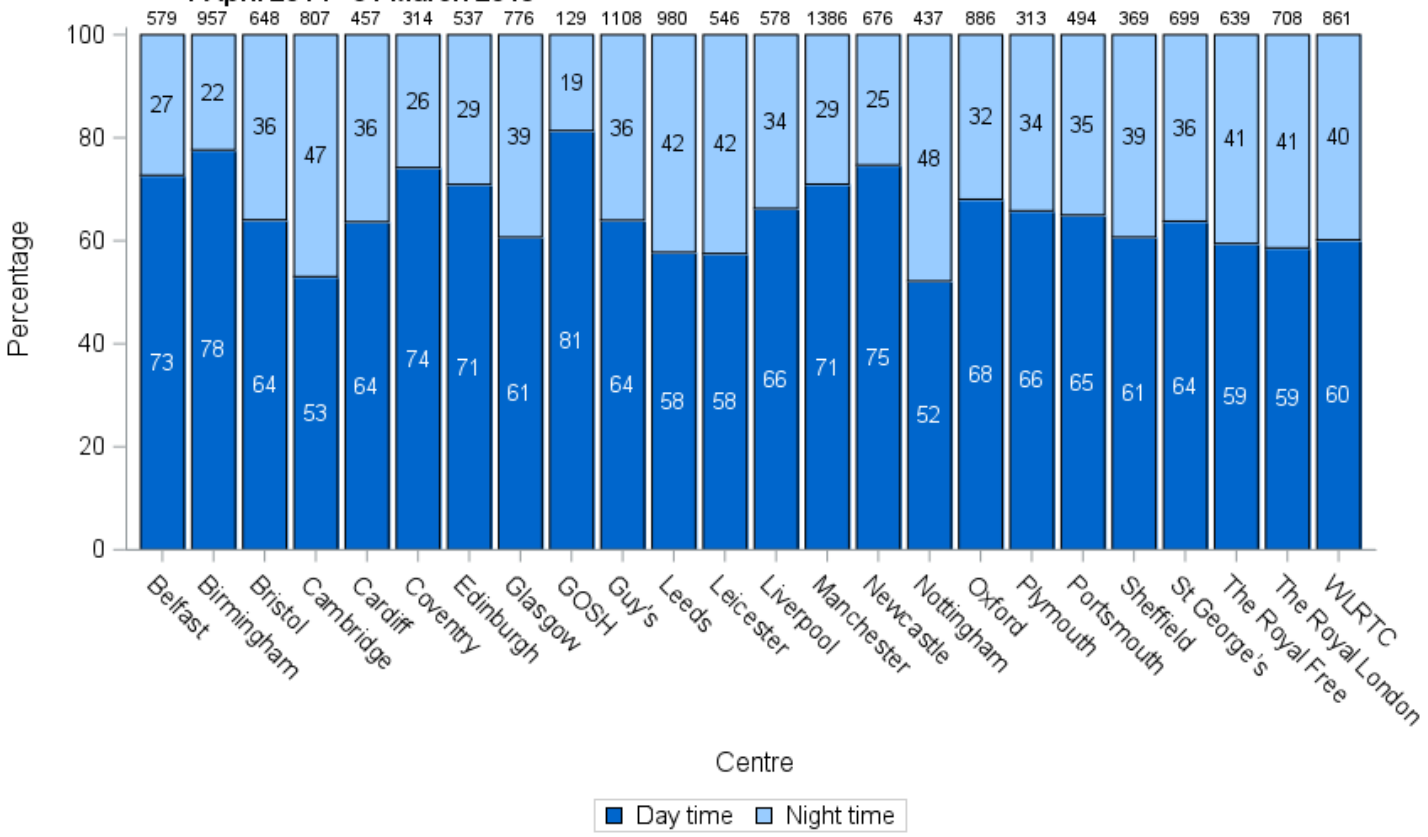
RESULTS

7 **Table 1** and **Figure 1** show the number of all kidney only transplants performed during the day time and night time hours by centre over the last five years. The proportion of transplants that are performed during the night varies from 19% at GOSH to 48% at Nottingham.

Table 1 **Number of kidney only transplants performed during the day and night by centre, 1 April 2014 – 31 March 2019**

Centre	Day time ≥8am and <8pm		Night time ≥8pm and <8am		Total
	N	%	N	%	
Belfast	421	73	158	27	579
Birmingham	743	78	214	22	957
Bristol	415	64	233	36	648
Cambridge	428	53	379	47	807
Cardiff	291	64	166	36	457
Coventry	233	74	81	26	314
Edinburgh	381	71	156	29	537
GOSH	105	81	24	19	129
Glasgow	471	61	305	39	776
Guy's	709	64	399	36	1108
Leeds	566	58	414	42	980
Leicester	314	58	232	42	546
Liverpool	383	66	195	34	578
Manchester	984	71	402	29	1386
Newcastle	505	75	171	25	676
Nottingham	228	52	209	48	437
Oxford	603	68	283	32	886
Plymouth	206	66	107	34	313
Portsmouth	321	65	173	35	494
Sheffield	224	61	145	39	369
St George’s	446	64	253	36	699
The Royal Free	380	59	259	41	639
The Royal London	415	59	293	41	708
WLRTC	518	60	343	40	861
Total	**10290**	**65**	**5594**	**35**	**15884**

Figure 1 **Number of kidney only transplants performed during the day time and night time hours by centre, 1 April 2014 - 31 March 2019**



8 **Table 2** shows the number of all kidney only transplants performed during the night time hours. For transplants that are performed during the night, typically the largest proportions occur between 8pm and midnight and midnight and 4am, with fewer transplants occurring between 4 and 8am.

Table 2 **Number of kidney only transplants performed during the night time hours by centre and time, 1 April 2014 – 31 March 2019**

Centre	Night time hours ≥8pm and <12am		≥12am and <4am		≥4am and <8am		Night time total
	N	%	N	%	N	%	
Belfast	84	53	56	35	18	11	158
Birmingham	117	55	86	40	11	5	214
Bristol	114	49	95	41	24	10	233
Cambridge	106	28	151	40	122	32	379
Cardiff	56	34	69	42	41	25	166
Coventry	46	57	30	37	5	6	81
Edinburgh	64	41	63	40	29	19	156
GOSH	7	29	10	42	7	29	24
Glasgow	134	44	131	43	40	13	305
Guy's	150	38	156	39	93	23	399
Leeds	167	40	133	32	114	28	414
Leicester	98	42	87	38	47	20	232
Liverpool	76	39	77	39	42	22	195
Manchester	146	36	147	37	109	27	402
Newcastle	91	53	65	38	15	9	171
Nottingham	102	49	69	33	38	18	209
Oxford	114	40	112	40	57	20	283
Plymouth	59	55	32	30	16	15	107
Portsmouth	61	35	66	38	46	27	173
Sheffield	50	34	67	46	28	19	145
St George’s	105	42	91	36	57	23	253
The Royal Free	88	34	101	39	70	27	259
The Royal London	103	35	126	43	64	22	293
WLRTC	131	38	123	36	89	26	343
Total	**2269**	**41**	**2143**	**43**	**1182**	**21**	**5594**

9 **Figure 2** and **3** show the unadjusted five-year graft and patient survival estimates by time of day for first adult deceased donor transplants performed between 1 April 2010 – 31 March 2014. **Figure 2** illustrates there was no evidence of a difference in five-year graft survival between transplants performed during the day and night (p=0.52, 1 degree of freedom).

10 Similarly, **Figure 3** illustrates there was no evidence of a difference in five-year patient survival between transplants performed during the day and night (p=0.13, 1 degree of freedom).

Figure 2

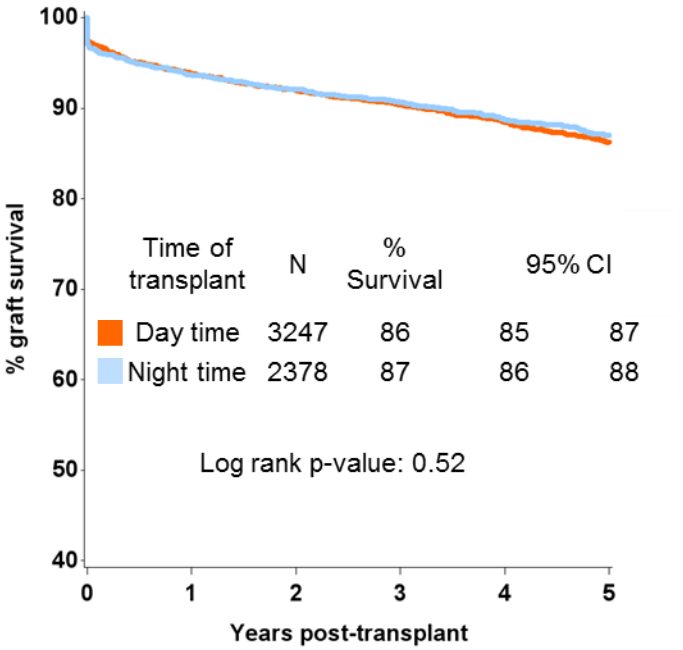
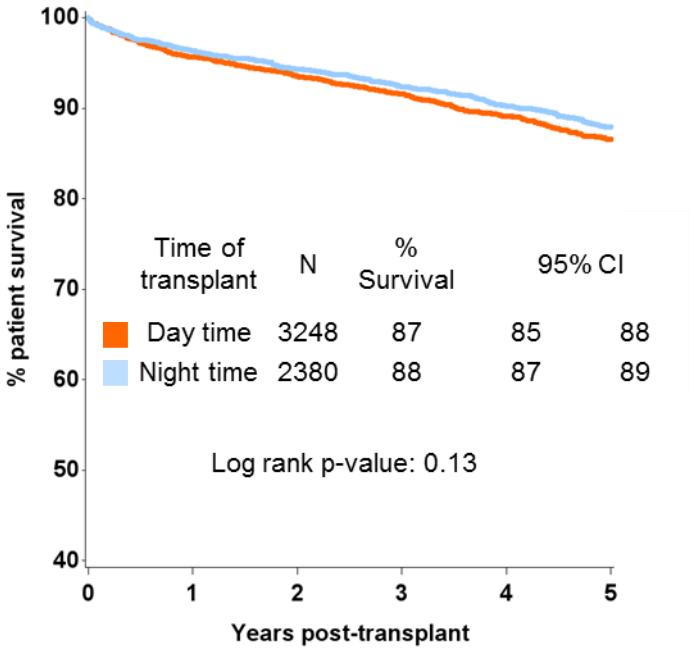


Figure 3



11 **Table 3** shows the graft outcome of those transplanted between 1 April 2010 – 31 March 2014. The data suggests there was some evidence of a difference in graft outcome between transplants performed during the day and night, p=0.06. The data suggests that a higher proportion of day time transplants resulted in delayed graft function than night time transplants, and a lower proportion resulted in either immediate function or primary non-function.

Table 3 **Graft outcome following transplantation during the day and night, 1 April 2010 – 31 March 2014**

Time of day of transplant	Graft outcome								Total
	Immediate		Delayed		PNF		Unknown		
	N	%	N	%	N	%	N	%	
Day time	2062	64	888	28	63	2	197	6	3210
Night time	1547	66	613	26	65	3	123	5	2348
Total	3609		1501		128		320		5558

12 A multivariable Cox proportional hazards model was constructed to compare five-year graft survival outcomes of first adult deceased donor transplants performed during the day and night between 1 April 2010 – 31 March 2014. After model selection the factors identified as affecting five-year graft survival were: donor past hypertension history, primary renal disease, recipient ethnicity, recipient dialysis status at registration, level of HLA mismatch, donor type, donor age, time on dialysis, cold ischaemic time, donor eGFR at retrieval and recipient age.

13 After adjusting for these factors, the time of day transplantation occurred was found not to significantly affect five-year graft survival, p=0.69 (**Table 4**).

Table 4 **Cox proportional hazards model for five-year graft survival following kidney transplant**

Factor	Level	N	HR	95% CI	p-value
Time of transplant	Day time	3210	1		0.69
	Night time	2348	0.97	(0.83-1.13)	

SUMMARY

14 Over the last five years 65% of all kidney only transplants were performed during day time hours (≥8am and <8pm) and 35% were performed during the night (≥8pm and <8am).

15 Of those performed during the night, the largest proportions occurred between 8pm and midnight and midnight and 4am, with fewer transplants occurring between 4 and 8am.

16 The univariate analysis indicated there was no evidence of a difference in five-year graft or patient survival of transplants performed during the day and night (p=0.52, p=0.13 respectively).

17 After adjusting for factors found to significantly affect five-year graft survival, there was no evidence of a difference in five-year graft survival between transplants that occurred during the day and night, p=0.69.

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