NHS BLOOD AND TRANSPLANT

PAEDIATRIC SUB-GROUP OF THE KIDNEY ADVISORY GROUP

REVIEW OF 2019 KIDNEY OFFERING SCHEME

INTRODUCTION

1 On 11th September 2019 a new kidney offering scheme was introduced in the UK to reflect the changing donor pool which had led to a higher rate of offer declines and an increasing number of DCD donors. The scheme was designed to meet several key objectives identified through reviewing the past Kidney Allocation Scheme introduced in April 2006, comparing alternative schemes across the world, looking at the philosophies in allocation, and understanding whether improvements could be made in histocompatibility and immunogenetics. Input was received from clinicians, patient groups and lay members across the UK.

2 All deceased donor kidneys are now offered using national rules through a two-tier offering sequence

Tier A – Patients with a matchability score = 10, 100% cRF or ≥7 years waiting time
Tier B – All other patients

Tier A patients are prioritised by matchability score and waiting time.
Tier B patients are prioritised by a point score including:

- donor-recipient risk index combinations
- Waiting time from earliest of dialysis or activation on the list
- tissue match and age combined
- location
- matchability score
- total HLA mismatch
- blood-group match
- donor-recipient age match

3 As with all changes to allocation protocols, the national Kidney Offering Scheme will be carefully monitored for effectiveness and any unforeseen consequences. Paediatric activity over the first 3 years is presented here. The SARS coronavirus 2 (SARS-CoV-2) pandemic led to centre closures from March 2020. In response to the centre closures, the offering scheme was amended between 31 March and 15 June 2020 so that offers to Tier B patients would be centre choice. Named patient-based offering remained in Tier A. Data from this period is excluded from the analysis.

DATA

4 Data on all deceased donor paediatric kidney offers and transplants, and the waiting list between 11th September 2016 – 10th September 2022 were extracted from the UK Transplant Registry. The data were split into two 3-year periods to compare activity from before the start of the new scheme and since the start of the new scheme. Some sections of the analysis use data up to 31st March 2023.

SUMMMARY

5 Simulations prior to the introduction of the 2019 KOS predicted that waiting times for paediatrics would increase after the introduction of the new scheme. It also predicted that paediatric transplant numbers would initially drop with the start of the new scheme but increase again by the third quarter of the scheme.

6 Overall, transplant activity in paediatric recipients has fallen in the first three years of the new scheme compared to the three years prior to the new scheme, however, transplant activity for adults has also fallen in the same period. Paediatric recipients and paediatric transplants make up similar proportions of the waiting list and transplants both before and after the 2019 KOS, at around 2% of the waiting list and 2.6% of all deceased donor transplants (2.8% under 2006 KOS).

7 The quality of offers made to paediatric patients has improved, with a higher proportion of D1 donor kidneys being offered. However, the first three years of the new scheme has not seen a change in the offer decline rate, with around half of all offers still being declined. Offers declined due to recipient reasons and uncategorised reasons have increased in the first three years of the 2019 KOS, compared to the previous three years. Whereas offers declined due to the donors' past history have decreased in the same period.

8 Waiting times have increased for paediatric patients over the past 11 years, when looking at waiting times (including dialysis time before registration and suspended time). For paediatric patients registered between April 2015 and March 2019, the median waiting time (including dialysis and suspension) was 740 (95% CI 673 – 807) days.

FUTURE MONITORING

9 Similar data could be provided at future KAGPSG meetings to continue monitoring the scheme.

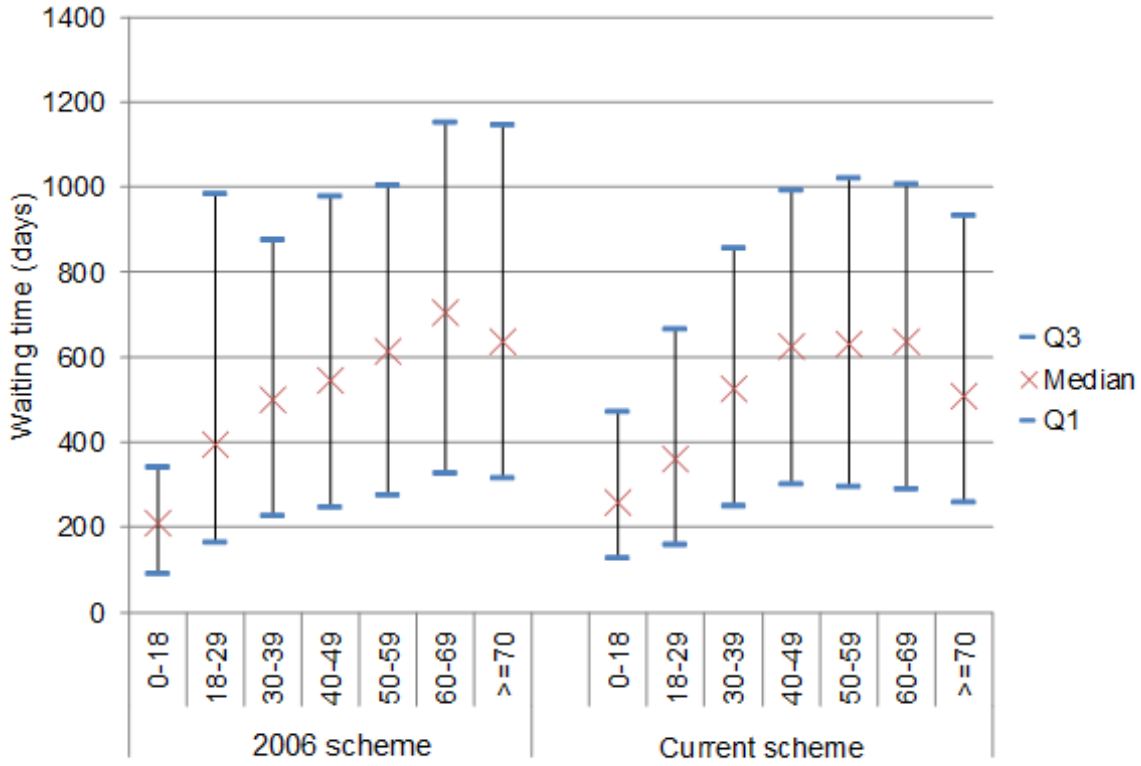
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SIMULATIONS

1 The simulated data in this section has been taken directly from work done prior to the start of the 2019 KOS.

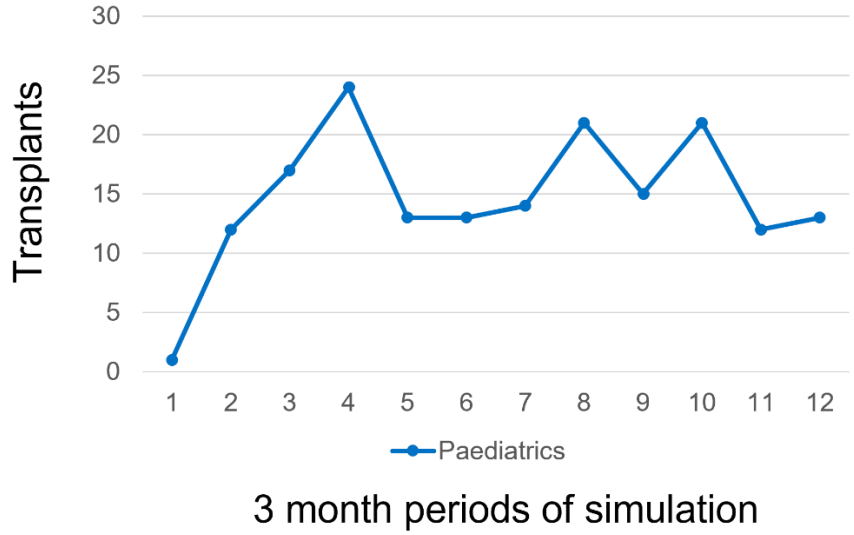
2 **Figure 1.1** shows the predicted median active waiting time of patients on the waiting list 4 years after the start of the 2019 KOS, by age group. It was predicted that waiting times for paediatric patients would increase from around 200 days to around 250 days.

Figure 1.1 – Predicted waiting time on list at end of year 4 before implementation of 2019 KOS



3 **Figure 1.2** shows the simulated number of transplants for paediatric recipients by quarter, after the introduction of the new scheme. It was predicted that transplant activity would drop with the start of the scheme but recover after the third quarter, with some fluctuation across quarters.

Figure 1.2 – Simulated transplants by quarter

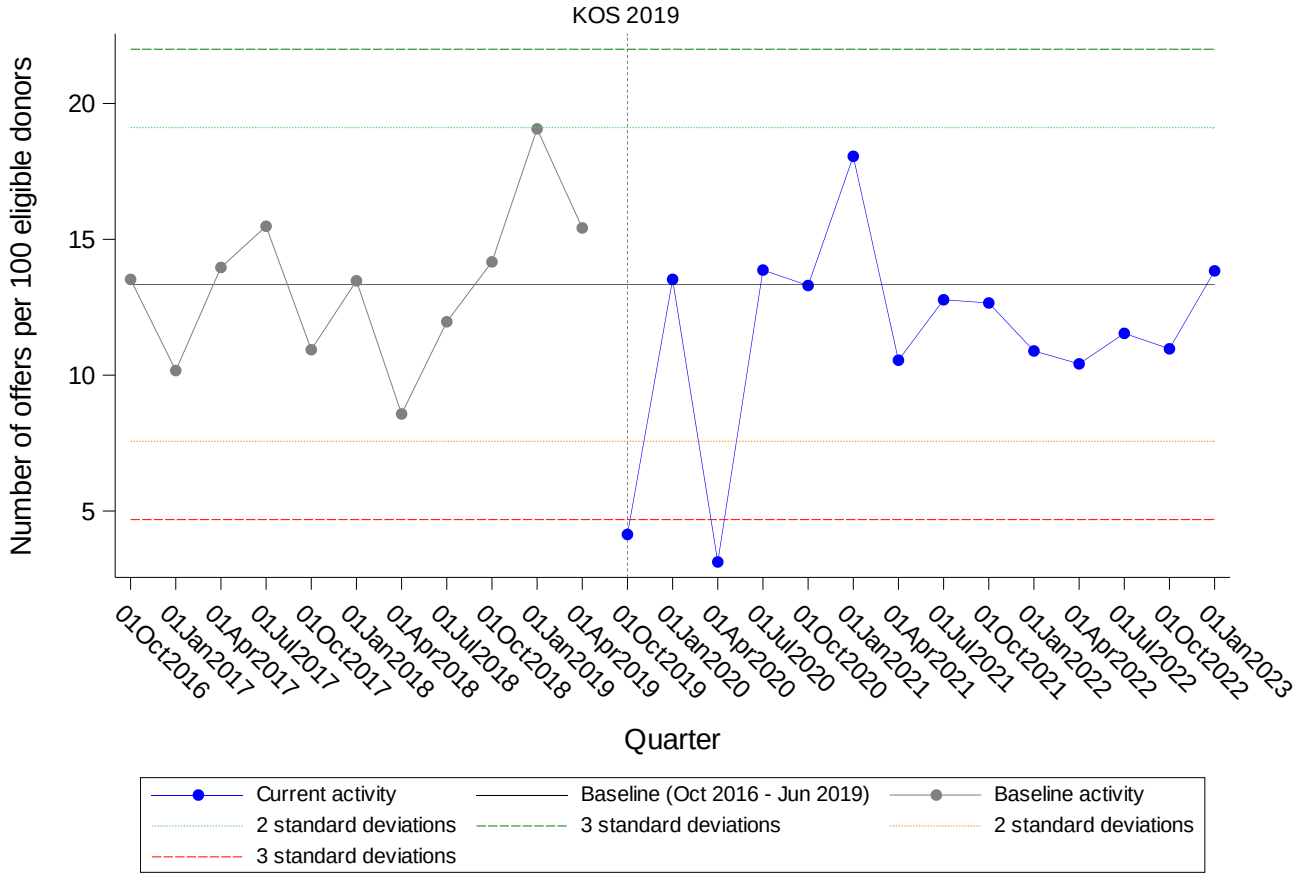


OFFERS

4 **Figure 2.1** presents a statistical process control chart of offers per 100 eligible donors to paediatric patients between 1 October 2019 and 31 March 2023. A baseline period prior to the change in scheme, from 1 October 2016 to 30 June 2019, is also shown here and is used to calculate a baseline quarterly average. Control chart limits are defined using 2- and 3-standard deviations above and below this baseline average. If current activity falls outside the lower limits this would suggest possible deviation from the baseline. Eligible donors are defined as those meeting the age criteria for paediatric donation.

5 As predicted with simulations prior to the introduction of the 2019 offering scheme, there was an initial decline in activity for paediatric offering. This was due to the priority given to difficult to match recipients that had accumulated under the previous kidney offering scheme. There was another decline in April 2020 due to the COVID-19 pandemic. Note that the offering scheme was amended between 31 March and 15 June 2020 so that offers to Tier B patients would be centre choice. In both time periods, quarterly variation in activity can be observed, both above and below the baseline rate. However, from July 2020 activity does not cross lower limit lines, indicating no deviation from baseline activity after the decline at the start of the scheme.

Figure 2.1 – Chart illustrating offers per 100 eligible donors to paediatric patients, 1 October 2019 – 31 March 2023



6 **Table 2.1** shows the number and percentage of all offers made to paediatric patients at each centre, for both the three years prior to and since the new scheme. Number and rates of offers accepted and used and, offers declined or not used in the intended recipient are also shown here. To account for the decline in organ donors, the total number of eligible donors, defined by those who meet the age criteria for paediatric donation, and offers per 100 eligible donors for each period are also shown here.

7 The number of paediatric offers decreased from 328 between 2016 and 2019 to 260 between 2019 and 2022; as did the number of offers per 100 eligible donors, from 12.0 to 10.1. There was little difference between the offer decline rate in the two periods, at 51% and 52% in the earlier and later periods respectively. When comparing variation between the periods at individual centres, it is important to keep in mind that numbers are small.

Table 2.1 Centre specific kidney offers for named recipients

	Total offers		**Offer accepted, used**		**Offer declined or not used in intended recipient**	
11 Sep 2016 – 10 Sep 2019*	N	% of all offers	N	%	N	%
Belfast	1	0	1	100	-	-
Birmingham	41	13	18	44	23	56
Bristol	47	14	16	34	31	66
Glasgow	16	5	10	63	6	38
Leeds	33	10	18	55	15	45
London, GOS	51	16	28	55	23	45
London, Evelina	43	13	21	49	22	51
Manchester	28	9	17	61	11	39
Newcastle	17	5	6	35	11	65
Nottingham	42	13	20	48	22	52
Adult units	9	3	5	56	4	44
TOTAL	**328**	**100**	**160**	**49**	**168**	**51**
Total eligible donors	**2724**					
Offers per 100 eligible donors	**12.0**					
11 Sep 2019 – 10 Sep 2022*						
Belfast	0	-	0	-	0	-
Birmingham	45	17	25	56	20	44
Bristol	40	15	15	38	25	63
Glasgow	8	3	6	75	2	25
Leeds	15	6	7	47	8	53
London, GOS	31	12	20	65	11	35
London, Evelina	27	10	13	48	14	52
Manchester	27	10	20	74	7	26
Newcastle	16	6	5	31	11	69
Nottingham	45	17	13	29	32	71
Adult units	6	2	2	33	4	67

TOTAL	**260**	**100**	**126**	**48**	**134**	**52**
Total eligible donors	**2584**					
Offers per 100 eligible donors	**10.1**					

*excluding 31 March – 15 June (for 2019 and 2020)
Offers are defined as all offers made, where the kidney was retrieved

8 **Table 2.2** shows the number and percentage of all offers declined by reason for decline, for both the three years prior to and since the new scheme. Fewer offers are being declined due to donor reasons, with declines due to donor's past history having dropped from 39% of all declines to 20% of all declines. There were increases in recipient reasons including 'Recipient unfit', centre reasons and 'Other' reasons. The increase in 'Other' reasons is mainly due to COVID-19 related reasons for decline.

Table 2.2 - Reasons for decline of named kidney offers

Reason	**11 Sep 2016 – 10 Sep 2019***		**11 Sep 2019 – 10 Sep 2022***	
	No. of declined offers	**% of all declined offers**	**No. of declined offers**	**% of all declined offers**
Donor unsuitable - cause of death	2	1	1	1
Donor unsuitable - age	9	5	8	6
Donor unsuitable - past history	66	39	27	20
Donor unsuitable - size	7	4	3	2
Donor unsuitable - virology	3	2	1	1
Poor function	26	15	21	16
Infection	4	2	1	1
Tumour	1	1	2	1
All donor reasons	118	70	64	48
Recipient unfit	5	3	10	7
No suitable recipient	1	1	.	.
Recipient unavailable	1	1	4	3
Recipient refused	3	2	1	1
Recipient did not need transplant	8	5	2	1
Better match required	1	1	3	2
X match positive	1	1	4	3
HLA/ABO type	.	.	1	1
All recipient reasons	20	12	25	19
Anatomical	6	4	7	5
Poor perfusion	1	1	1	1
Ischaemia time too long - cold	7	4	3	2
Organ damaged	3	2	2	1
All organ reasons	17	10	13	10
Centre already retrieving/transplanting	1	1	2	1
No beds	.	.	2	1
Distance	.	.	1	1
Other centre reason	1	1	.	.
All centre reasons	2	1	5	4

Other	11	7	26	19
TOTAL	**168**	**100**	**134**	**100**

*excluding 31 March – 15 June (for 2019 and 2020)

9 **Table 2.3** shows the outcomes of kidneys declined by any centre, for the two 3-year periods prior to and since the new scheme. This table shows the number of donors rather than the number of kidneys. There were high rates of transplantation and survival at 3 months for the kidneys that were declined, with similar rates in both periods.

Table 2.3 Offer decline outcomes

	No. donors declined (by any centre)	Declined donors' kidney transplanted	% transplanted	Grafts surviving at 3 months	% surviving at 3 months
11 Sep 2016 - 10 Sep 2019*	145	127	88	124	98
11 Sep 2019 - 10 Sep 2022*	115	103	90	101	98

*excluding 31 March – 15 June (for 2019 and 2020)
Donors include only those where the kidney was retrieved

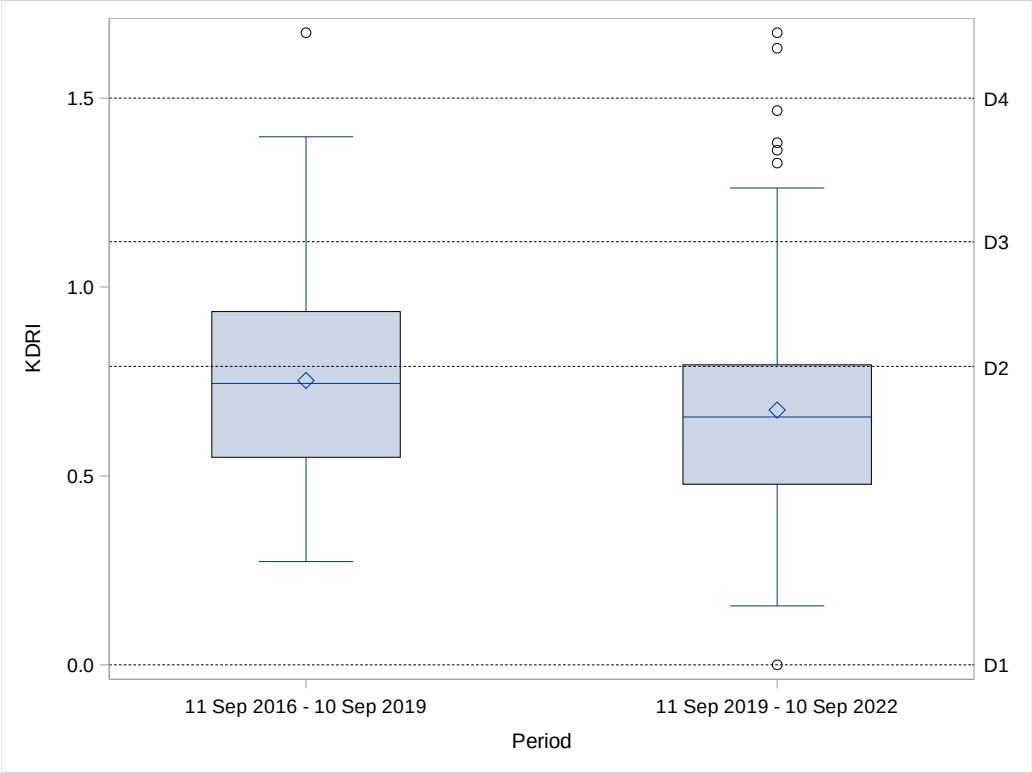
10 **Table 2.4 and Figure 2.2** show the quality of paediatric offers for the two 3-year periods prior to and since the new scheme. Donor risk index groups, D1 to D4, are used here to show the quality of offers. The quality of offers has improved since the new scheme, with D1 donors making up 74% of donors in the new scheme compared to 56% of donors in the previous period.

Table 2.4 Quality of offers – number of donors by donor risk index group

DRI group	11 Sep 2016 - 10 Sep 2019*		11 Sep 2019 - 10 Sep 2022*	
	N	%	N	%
D1	159	56	168	74
D2	106	37	49	22
D3	20	7	8	4
D4	1	0	2	1
Total	**286**	**100**	**227**	**100**

*excluding 31 March – 15 June (for 2019 and 2020)

Figure 2.2 Quality of offers



11 **Table 2.5** show the number of offers per patient for the two 3-year periods prior to and since the new scheme. The offers per patient are similar in the two periods at 1.63 and 1.58 in 2016-2019 and 2019-2022 respectively.

Table 2.5 Offers per patient

	Total offers	Patients receiving offers	Offers per patient
11 Sep 2016 - 10 Sep 2019*	328	201	1.63
11 Sep 2019 - 10 Sep 2022*	260	165	1.58

*excluding 31 March – 15 June (for 2019 and 2020)e

12 **Table 2.6** shows number of offers by whether they were favourably matched offers, for the two 3-year periods prior to and since the new scheme. Favourably matched offers include only 000, 100, 110 and 010 mismatch grades. The percentage of favourably matched offers declined from 74% to 67% of all offers.

Table 2.6 Favourably matched offers

	11 Sep 2016 - 10 Sep 2019*		11 Sep 2019 - 10 Sep 2022*	
	N	%	N	%
Favourably matched offers[1]	244	74	171	67
All other offers	84	26	86	33

[1] Favourably matched offers include only 000, 100, 110, 010
*excluding 31 March – 15 June (for 2019 and 2020)

Table 2.7 shows number of offers by their HLA mismatch level, for the two 3-year periods prior to and since the new scheme. The percentage of level 1 offers remained similar, but level 2 offers increased from 73% in 2016-2019 to 83% in 2019-2022 of all offers. Although there was a decrease in the percentage of level 3 offers, from 22% in 2016-2019 to 7% in 2019-2022, level 4 offers increased from 0% to 4%. These mismatch levels were redefined for the 2019 KOS, and it is this new definition has been used below.

Table 2.7 Offers by mismatch level

	11 Sep 2016 - 10 Sep 2019*		11 Sep 2019 - 10 Sep 2022*	
HLA mismatch level	N	%	N	%
1	17	5	16	6
2	238	73	213	83
3	73	22	19	7
4	-	0	9	4

See Appendix Table 2 for mismatch level categorisation
*excluding 31 March – 15 June (for 2019 and 2020)

TRANSPLANT WAITING LIST

13 **Table 3.1** shows a demographic summary of the paediatric transplant waiting list before the new scheme on 1 September 2019 and after the new scheme on 1 Mar 2023. The matchability breakdown is not shown for the earlier period as it is not comparable to the later period. There were 10 more active patients waiting in March 2023 compared to September 2019. The waiting list in the new scheme had a lower proportion of highly sensitised patients on the list compared to September 2019. Waiting times for patients on the list are shown both as active waiting times, and including time on dialysis prior to registration and suspended time. Waiting time including dialysis and suspension has increased for those on the list, with the percentage of patients waiting two or more years having increased from 29% in 2019 to 37% in 2023. Active waiting time also increased, with 11% of patients on the list waiting two or more years in September 2019 compared to 14% in March 2023.

Table 3.1 – Wating list demographics - Paediatrics only

Factor	**Level**	1 Sep 2019		1 Mar 2023	
Number of active recipients		94		104	
		N	**%**	**N**	**%**
Highly sensitised	Yes	19	20	10	10
Sensitisation At tx	0-9	43	46	64	62
	10-39	9	10	11	11
	40-59	9	10	7	7
	60-84	14	15	11	11
	85-94	6	6	2	2
	95-99	7	7	3	3
	100	6	6	5	5
	Missing			1	1
Waiting time (inc. dialysis and suspension)	<1 year	33	35	30	29
	1-2 years	34	36	34	33
	2-3 years	11	12	20	19
	3+ years	16	17	19	18
	Missing			1	1
Active waiting time	<1 year	67	71	55	53
	1-2 years	17	18	34	33
	2+ years	10	11	15	14
Matchability	Easy (1-3)			27	26
	Moderate (4-7)			50	48
	Difficult (8-10)			27	26
	Missing				
Blood group	O	53	56	52	50
	A	16	17	27	26
	B	22	23	21	20
	AB	3	3	4	4

Sex	Male	51	54	60	58
	Female	42	45	44	42
	Not reported	1	1	.	.
Ethnicity	White	45	48	47	45
	Asian	32	34	37	36
	Black	8	9	9	9
	Other	5	5	8	8
	Not reported	4	4	3	3

*excluding 31 March – 15 June (for 2019 and 2020)

14 **Table 3.2** shows an age group breakdown of all recipients on the transplant waiting list before the new scheme on 1 September 2019 and after the new scheme on 1 March 2023. In September 2019, 1.9% of the waiting list consisted of paediatric patients, this remained similar in March 2023 at 2.0%.

Table 3.2 – Wating list demographics – all recipients

Age group	1 Sep 2019		1 Mar 2023	
	N	%	N	%
<18	94	1.9	104	2.0
18-29	293	6.0	311	5.8
30-39	545	11.1	619	11.6
40-49	917	18.6	1068	20.1
50-59	1405	28.5	1564	29.4
60-69	1202	24.4	1267	23.8
>=70	467	9.5	386	7.3
All	**4923**	**100**	**5319**	**100**

15 **Table 3.3** shows waiting time, including dialysis and suspension, for paediatric patients on the transplant waiting list at 6-monthly time points between July 2021 and January 2023. Between 30% and 36% of patients on the list had been waiting less than 1 year, between 26% and 32% were waiting 1-2 years, 17% to 23% were waiting 2-3 years and 14% to 21% were waiting three or more years. Small numbers of paediatric patients could cause greater fluctuation in percentages between the time periods.

Table 3.3 – Wating list waiting times – biannually

Waiting time	Jul 2021		Jan 2022		Jul 2022		Jan 2023	
	N	%	N	%	N	%	N	%
<1 year	33	30	32	34	38	33	37	36
1-2 years	31	28	30	32	34	30	27	26
2-3 years	25	23	18	19	20	17	17	17
3+ years	21	19	13	14	23	20	22	21
All	110	100	93	100	115	100	103	100

16 **Table 3.4** shows median active waiting times for paediatric and adult patients registered on the list between 2012 and 2019. The number of patients registered in each 4-year financial period, and the median and 95% CI for waiting time in days are presented. Waiting times for later periods cannot be calculated yet due to insufficient time having passed since registration. Median active waiting time for paediatric patients remained similar during this period, at 287 days in 2012-2016 to 282 days in 2015-2019. Whereas active waiting times for adult patients decreased from 706 days to 550 days.

Table 3.4 – Median <u>active</u> waiting time

Registration period (financial years)	Paediatric patients			Adult patients		
		Waiting time (days)			Waiting time (days)	
	Number of patients registered	Median	95% CI	Number of patients registered	Median	95% CI
2012 - 2016	235	287	200 - 374	9584	706	689 - 723
2013 - 2017	265	291	206 - 376	10082	633	619 - 647
2014 - 2018	260	258	188 - 328	10472	589	575 - 603
2015 - 2019	288	282	220 - 344	10890	550	536 - 564

17 **Table 3.5** shows median waiting times, including dialysis and suspended time, for paediatric and adult patients registered on the list between 2012 and 2019. The number of patients registered in each 4-year financial period, and the median and 95% CI for waiting time in days are presented. Waiting times for later periods cannot be calculated yet due to insufficient time having passed since registration. Median waiting time for paediatric patients increased during this period, from 656 days to 740 days. Whereas waiting times for adult patients decreased from 1277 days to 1134 days.

Table 3.5 – Median waiting time (including dialysis and suspension)

Registration period (financial years)	Paediatric patients			Adult patients		
		Waiting time (days)			Waiting time (days)	
	Number of patients registered	Median	95% CI	Number of patients registered	Median	95% CI
2012 - 2016	237	656	559 - 753	9565	1277	1248 - 1306
2013 - 2017	267	671	589 - 753	10088	1181	1153 - 1209
2014 - 2018	264	671	595 - 747	10475	1145	1120 - 1170
2015 - 2019	287	740	673 - 807	10902	1134	1110 - 1158

18 **Table 3.6** shows the number and percentage of transplants performed for paediatric patients registered in each financial year between April 2015 and March 2022. Numbers of patients transplanted within 1, 2 and 3 years from registration are presented, and numbers are omitted if insufficient time has passed since registration. The number of patients registered to the list is similar in all but two of the periods. Around half of patients registered between April 2015 and March 2019 were

transplanted within 1 year, and after a decline in transplantation rates between 2019 and 2021, this increased to 48% for those registered between April 2021 and March 2022. Transplantation rates within 2 and 3 years from registration fell for those registered after April 2018. Insufficient time has passed to see whether rates will recover for those in the latest financial years.

Table 3.6 – Patients transplanted within 3 years from listing

Registration period	Patients registered	Transplanted within 1 year		Transplanted within 2 years		Transplanted within 3 years	
		N	%	N	%	N	%
Apr 2015 – Mar 2016	63	33	52	46	73	57	90
Apr 2016 – Mar 2017	81	42	52	65	80	75	93
Apr 2017 – Mar 2018	60	39	65	51	85	54	90
Apr 2018 – Mar 2019	88	44	50	54	61	73	83
Apr 2019 – Mar 2020	68	25	37	37	54	53	78
Apr 2020 – Mar 2021	59	23	39	36	61	-	-
Apr 2021 - Mar 2022	61	29	48	-	-	-	-

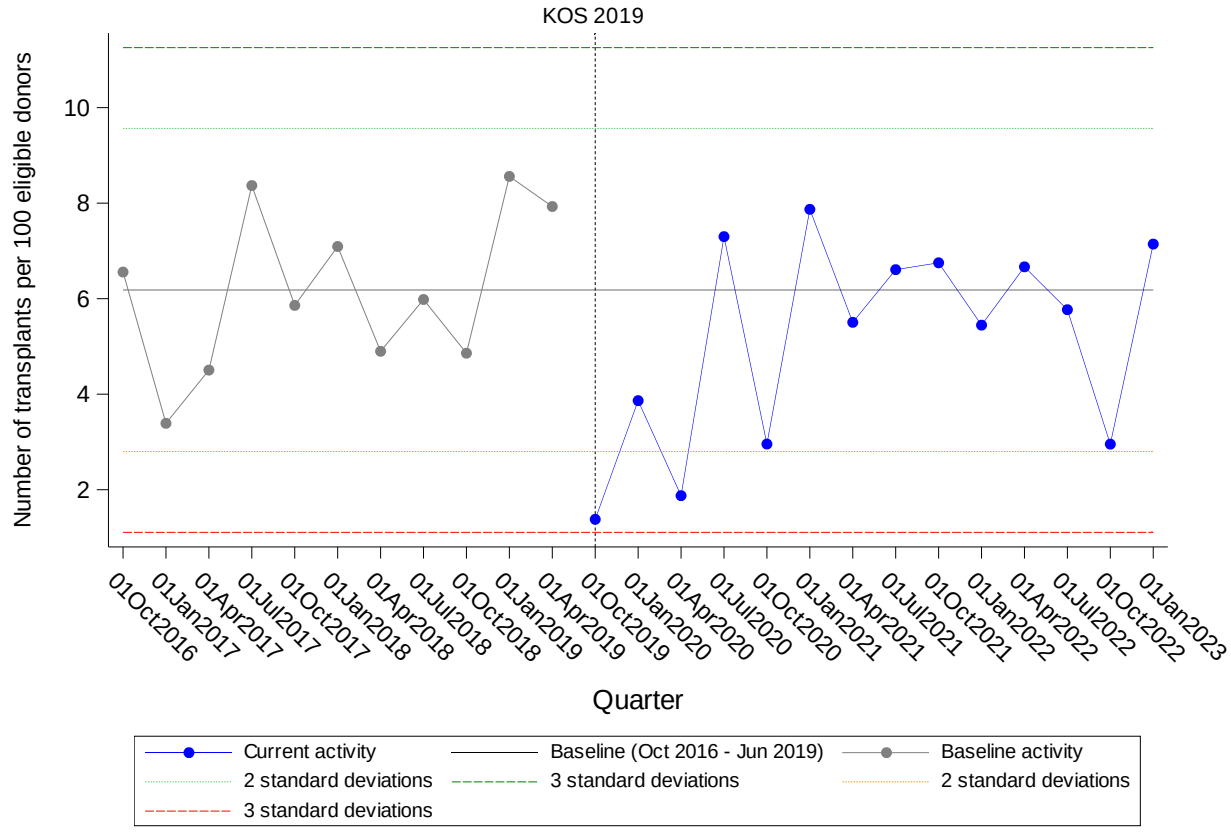
TRANSPLANT ACTIVITY

19 This section looks only at deceased donor transplants, where kidneys were allocated through the 2019 KOS.

20 **Figure 4.1** presents a statistical process control chart of transplants per 100 eligible donors to paediatric patients between 1 October 2019 and 31 March 2023. A baseline period prior to the change in scheme, from 1 October 2016 to 30 June 2019, is also shown here and is used to calculate a baseline quarterly average. Control chart limits are defined using 2- and 3-standard deviations above and below this baseline average. If current activity falls outside the lower limits this would suggest possible deviation from the baseline. Eligible donors are defined as those meeting the age criteria for paediatric donation.

21 As predicted with simulations prior to the introduction of the 2019 offering scheme, there was an initial decline in activity for paediatric transplants. There was then another decline in April 2020 due to the COVID-19 pandemic. However, from January 2021 activity moves around the baseline rate and does not cross lower limit lines, indicating no deviation from baseline activity after the decline at the start of the scheme.

Figure 4.1 – Chart illustrating transplants per 100 eligible donors to paediatric patients, 1 October 2019 – 31 March 2023



22 **Table 4.1** shows the number and percentage of all paediatric transplants by centre and donor type, for the two 3-year periods prior to and since the new scheme. Overall

activity for the paediatric and adult groups are also presented here. The number of transplants fell for both paediatric and adult groups in the period from September 2019 to September 2022, compared September 2016 to September 2019. With paediatric transplants decreasing from 162 in 2016-2019 to 134 in 2019-2022. However, paediatric transplants make up a similar proportion of all transplants in both periods, at 2.8% in 2016-2019 and 2.6% in 2019-2022.

Table 4.1 - Centre specific kidney only activity, by donor type

	11 Sep 2016 - 10 Sep 2019*						11 Sep 2019 – 10 Sep 2022*					
	Transplants						Transplants					
Donor type:	DBD		DCD		Total		DBD		DCD		Total	
	N	%	N	%	%	%	N	%	N	%	N	%
Belfast	1	1	1	11	2	1	.	.	.	.	.	.
Birmingham	19	12	.	.	19	12	16	16	8	22	24	18
Bristol	16	10	.	.	16	10	11	11	5	14	16	12
Glasgow	8	5	2	22	10	6	6	6	3	8	9	7
Leeds	18	12	.	.	18	11	6	6	1	3	7	5
London, GOS	28	18	.	.	28	17	18	19	5	14	23	17
London, Evelina	20	13	1	11	21	13	11	11	3	8	14	10
Manchester	15	10	3	33	18	11	14	14	6	16	20	15
Newcastle	6	4	.	.	6	4	3	3	1	3	4	3
Nottingham	17	11	2	22	19	12	10	10	3	8	13	10
Adult units	5	3	.	.	5	3	2	2	2	5	4	3
All paediatrics	153	4.3	9	0.4	162	2.8	97	3.0	37	1.9	134	2.6
All adults	3409	96	2249	100	5658	97	3129	97	1876	98	5005	97
TOTAL	3562	100	2258	100	5820	100	3226	100	1913	100	5139	100

*excluding 31 March – 15 June (for 2019 and 2020)

23 **Table 4.2** shows a demographic summary of the paediatric transplants in the periods September 2016 to September 2019 and September 2019 to September 2022. The matchability breakdown is not shown for the earlier period as it is not comparable to the later period. Tier breakdown is not shown for the earlier period as this tier system did not exist before the 2019 KOS. Highly sensitised recipients make up a higher proportion of transplants in the more recent period, at 10% of all transplants in 2019-2022 compared to 6% in 2016-2019. There was a lower proportion of transplants where the donor-recipient age difference was greater than 25 years, with 31% in 2019-2022 compared to 40% in 2016-2019. Waiting times have increased and fewer recipients are waiting less than 1 year, at 19% in 2019-2022 compared to 36% in 2016-2019.

Table 4.2 – Demographic parameters of paediatric transplant recipients, , September 2016 to September 2022

Factor	Level	11 Sep 2016 - 10 Sep 2019*		11 Sep 2019 – 10 Sep 2022*	
Number of transplants		162		134	
		N	**%**	**N**	**%**
Highly sensitised	Yes	9	6	14	10
Sensitisation At tx	0-9	105	65	89	66
	10-39	18	11	11	8
	40-59	13	8	10	7
	60-84	17	10	10	7
	85-94	5	3	6	4
	95-99	4	2	6	4
	100	.	.	2	1
Waiting time (including dialysis and suspension)	<1 year	58	36	26	19
	1-2 years	29	18	33	25
	2-3 years	41	25	41	31
	3+ years	34	21	34	25
Matchability	Easy (1-3)			61	46
	Moderate (4-7)			50	37
	Difficult (8-10)			23	17
	Missing				
Blood group	O	64	40	65	49
	A	61	38	44	33
	B	25	15	16	12
	AB	12	7	9	7
Donor-recipient age difference	<15 years	45	28	45	34
	15-25 years	52	32	47	35
	>25 years	65	40	42	31
Sex	Male	98	60	72	54
	Female	63	39	62	46
	Not reported	1	1		
Tier	A			6	4
	B			128	96
Ethnicity	White	89	55	76	57
	Asian	45	28	27	20
	Black	18	11	15	11
	Other	9	6	9	7
	Not reported	1	1	7	5

*excluding 31 March – 15 June (for 2019 and 2020)

APPENDIX

Appendix Table 1 – Paediatric waiting list, by mismatch grade at listing

HLA mismatch grade	1 September 2019		1 March 2023	
	N	%	N	%
**02	36	38	42	40
1100	24	26	13	13
2210	6	6	6	6
**11	6	6	0	0
2220	5	5	6	6
2**2	5	5	4	4
**13	4	4	12	12
***3	4	4	4	4
1110	2	2	10	10
**12	1	1	5	5
**03	1	1	1	1
1210	0	0	1	1

Note that HLA mismatch grades use asterisks to allow different levels of mismatch for that loci. The fourth digit in the code represents the maximum number the asterisks should sum to. For example, **02 would allow for mismatch grades 200, 020, 110, 100, 010 and 000.

Appendix Table 2 - HLA mismatch levels for HLA-A, B and DR

Level	HLA mismatch summary	HLA mismatch combinations included
1	000	000
2	[0 DR and 0/1 B] or [1 DR and 0 B]	100, 010, 110, 200, 210, 001, 101, 201
3	[0 DR and 2 B] or [1 DR and 1 B]	020, 120, 220, 011, 111, 211
4	[1 DR and 2 B] or [2 DR]	021, 121, 221, 002, 102, 202, 012, 112, 212, 022, 122, 222