

NHS BLOOD AND TRANSPLANT

NATIONAL LIVER OFFERING SCHEME

THIRTY MONTH REVIEW

SUMMARY

1. BACKGROUND

- 1.1. The new National Liver Offering Scheme (NLOS) was introduced on 20 March 2018 for donation after brain death (DBD) donors and mainly for liver offers to named patients. Offering of livers from donors after circulatory death (DCD) has not changed and remains on a centre-specific basis rather than on a patient specific basis. This report examines the impact of the new DBD scheme on patients on the waiting list, livers offered and transplant activity.
- 1.2. It should be noted that this report may not include all data due to delays in reporting.
- 1.3. Updated Kidney Offering Scheme and Pancreas Offering Scheme were introduced on 11 September 2019. Unfortunately, an unexpected and untested change was introduced to the NLOS at the same time which affected the number of patients that appeared as named elective patients on matching run. This change was removed on the 19 September 2019 and this report includes this period in all analyses apart from in the flow chart in **Figure 12B**.
- 1.4. Due to the impact of COVID-19, it was agreed by OTDT Medical team and the Liver Advisory Group chair on 27 March 2020 that liver centres should consider an elective named patient offer for any patient when offered and not just the named patient. It was also agreed that a kidney would not be held back if a liver/kidney patient was in the top 3 named elective patients. There were no changes to the DCD offering scheme and the changes to the DBD offering scheme ceased on 9 July 2020 when named patient offering recommenced. This period is excluded from part of the liver offering section.

2. DATA AND METHODS

- 2.1. **Table S1** shows the time period and inclusion and exclusion criteria for the aspects of the offering scheme examined in this report. NHS Group 2 registrations and transplants were excluded throughout the report along with registrations, offers and transplants for intestinal patients not requiring a liver. Super-urgent and elective registrations were included in all aspects apart from the transplant list activity section as were adult and paediatric registrations and transplants.

Table S1 Inclusion and exclusion criteria for the aspects of NLOS examined in this report			
Section	Time period	Inclusions	Exclusions
Registration activity	<ul style="list-style-type: none"> 20 September 2015 to 19 March 2018 (<i>thirty months prior</i>, N=2870) 20 March 2018 to 19 September 2020 (<i>thirty months post</i>, N=2905) 	<ul style="list-style-type: none"> New active/suspended registrations 	<ul style="list-style-type: none"> Dublin registrations NHS Group 2 registrations
One and three month post-registration outcome	<ul style="list-style-type: none"> 20 September 2015 to 19 December 2017 (<i>twenty-seven months prior</i>, N=2113) 20 March 2018 to 19 June 2020 (<i>twenty-seven months post</i>, N=2122) 	<ul style="list-style-type: none"> Active and suspended Adult elective liver and liver/kidney registrations 	<ul style="list-style-type: none"> Dublin registrations NHS Group 2 registrations Intestinal registrations
Six months post-registration outcome	<ul style="list-style-type: none"> 20 September 2015 to 19 September 2017 (<i>twenty-four months prior</i>, N=1850) 20 March 2018 to 19 March 2020 (<i>twenty-four months post</i>, N=1965) 	<ul style="list-style-type: none"> Active and suspended Adult elective liver and liver/kidney registrations 	<ul style="list-style-type: none"> Dublin registrations NHS Group 2 registrations Intestinal registrations
Transplant list activity	<ul style="list-style-type: none"> Patients active/ suspended on 19 March 2018 (N=418) 20 March 2018 to 19 September 2020 (N=2364) 	<ul style="list-style-type: none"> Active and suspended Adult elective liver and liver/kidney registrations 	<ul style="list-style-type: none"> Dublin registrations NHS Group 2 registrations Intestinal registrations
Liver offering	<ul style="list-style-type: none"> <i>Thirty months prior</i>, N=4625 (2224 DBD and 2401 DCD) <i>Thirty months post</i>, N=4682 (2398 DBD and 2284 DCD) 	<ul style="list-style-type: none"> UK deceased donors whose liver was offered for transplantation Offers to Dublin for super-urgent patients 	<ul style="list-style-type: none"> Intestinal offers regardless of whether patients required a liver Offers declined due to the patient accepting previously offered liver Offers to Dublin for elective patients
Transplant activity	<ul style="list-style-type: none"> <i>Thirty months prior</i>, N=2429 (1905 DBD and 524 DCD) <i>Thirty months post</i>, N=2337 (1907 DBD and 430 DCD) 	<ul style="list-style-type: none"> UK transplants 	<ul style="list-style-type: none"> Transplants performed at Dublin Intestinal transplants for patients not requiring a liver NHS Group 2 transplants
Ninety day post-transplant survival	<ul style="list-style-type: none"> 20 December 2015 to 19 March 2018 (<i>twenty-seven months prior</i>, N=1199 for DBD and 435 for DCD) 20 March 2018 to 19 June 2020 (26 March 2020) (<i>twenty-seven months post</i>, N=1108 for DBD and 344 for DCD) 	<ul style="list-style-type: none"> UK Adult elective liver and liver/kidney transplants 	<ul style="list-style-type: none"> Transplants performed at Dublin Intestinal transplants for patients not requiring a liver NHS Group 2 transplants

3. RESULTS

REGISTRATION ACTIVITY

- 3.1. There were 2905 new NHS Group 1 liver registrations in the UK in the first thirty months of the scheme. (**Table 1**)
- 3.2. There was a 1% increase in elective and 4% in super-urgent registrations between the thirty months pre and post NLOS introduction. There was also a small increase in adult elective CLD registrations (5%) in the thirty months post NLOS but the number of HCC registrations (including HCC downstaging) were similar in the two time periods (453 and 438 respectively). The number of new variant syndrome registrations has decreased from 185 in the thirty months prior to 146 in the thirty months post. (**Table 3**)
- 3.3. Ninety-two percent of the new adult elective registrations in the first thirty months of NLOS were for first graft compared with 91% in the thirty months prior (**Table 4**).
- 3.4. There was no statistically significant increase in the median age of new adult elective registrations (55 in both time periods). (**Table 5**)

POST-REGISTRATION OUTCOME

- 3.5. There were 2122 adult elective registrations in the subset of patients registered in the first twenty-seven months post-NLOS. One thousand and sixty seven (50%) of the 2122 registrations received a transplant within three months of registration. The corresponding three-month transplant rate for patients registered in the equivalent 27 months in 2015/2017 was 45%. (**Table 6**)
- 3.6. The proportion of patients who either died on the list or were removed due to condition deterioration in the first three months was lower in the 27 months post NLOS than 27 months prior (3% and 5% respectively). This reduction was also seen in the six-month registration outcome for a subset who were registered in two 24 month periods (5% and 8% respectively). The decrease in mortality rate was observed across all type of patients (apart from for HCC), age groups and whether or not the patient was registered for their first transplant. (**Figures 3, 4 and 5**).

TRANSPLANT LIST ACTIVITY

- 3.7. Four hundred and eighteen adult elective NHS Group 1 patients were active on the transplant list on 19 March 2018. A lower percentage of those active on the list have received a liver transplant compared with new registrations during the time (64% compared with 69%) (**Table 7**).

- 3.8. There was a significant difference in registration outcome for CLD, HCC and variant syndrome patients. **(Figure 7)**
- 3.9. Two hundred and ten patients (8%) active on the transplant list during the first thirty months either died on the list or were removed due to condition deteriorated. An additional 153 patients were removed due to either their condition improving (N=87 (57%)) or other reasons detailed in **Table 7A**.

LIVER OFFERING

- 3.10. Overall, 2398 DBD livers and 2284 DCD livers were offered in the first thirty months of the scheme. For DBD donors, 2075 (87%) were retrieved and 1802 (87% of those retrieved) were transplanted. For DCD donors, 631 (28%) were retrieved and 428 (68% of those retrieved) were transplanted. The proportions retrieved were similar to the thirty months prior for DBD donors. **(Table 9)**
- 3.11. **Figures 12a and 12b** in the main paper show the number of DBD livers offered during the first twenty-four months at each stage of the liver offering pathway. Livers offered during COVID are included in **Figure 12a** but excluded at the elective stage of **Figure 12b**. Three hundred and thirty seven livers were either accepted and transplanted or declined and not offered on prior to the elective section of the offering pathway.
- 3.12. Of the 1877 DBD livers offered to the elective section that were not offered only to paediatric centres and not offered during the first wave of COVID-19 in 2020, 1689 (90%) were allocated to the elective CLD/HCC pathway and 188 (10%) were randomly allocated to the variant syndrome pathway which is consistent with the percentages used in the probabilistic prioritisation of the elective list.
- 3.13. Eight hundred and eighty three livers (not accepted by higher tiers) offered to named elective CLD/HCC were accepted and transplanted while 80 livers offered to the named elective variant syndrome pathway were accepted and transplanted.
- 3.14. Eight hundred and twenty five livers declined by all stages were fast-tracked and 342 were accepted and transplanted.
- 3.15. There were 10768 DBD liver offers (excluding intestinal offers) made to UK centres during the first thirty months of the scheme which was an increase of 60% compared with the thirty months prior. All centres saw an increase in offers with two centres observing a greater than 90% increase in offers. **(Table 11)**
- 3.16. 3407 (31%) of the 10768 offers made in the first 30 months post NLOS were to named elective liver recipients (excluding offers made during COVID-19 in 2020). The number of named patient offers per donor ranged between 1 and 10 with a median of two offers per donor. The number of

named offers per patient ranged between 1 and 27 with a median of two offers per patient. Sixteen patients at 6 centres were offered more than 10 livers (8 were offered 11 livers, 2 were offered 12 livers, 3 were offered 13 livers, 2 were offered 14 livers and 1 was offered 27 livers).

TRANSPLANT ACTIVITY

- 3.17. There has been a 8% increase in the number of DBD super-urgent transplants (241 and 261 respectively). (**Table 19**)
- 3.18. One hundred and forty one of the 1471 adult elective liver and liver/kidney transplants performed in the first 30 months were performed in the UK between 27 March 2020 and 9 July 2020. These transplants are **excluded** from the transplant section as DBD livers were not offered through the National Liver Offering Scheme due to COVID-19 and both DBD and DCD livers were offered to clinically urgent patients.
- 3.19. For DBD transplants, there was evidence of a statistically significant association between time period and age group ($p=0.0002$), disease group ($p<0.0001$), transplant centre ($p=0.0075$), zonal ($p<0.0001$), type of patient ($p=0.002$) and blood group compatibility ($p=0.0002$). (**Table 20 and 21**).
- 3.20. For DCD transplants, there was evidence of a statistically significant association between time period and disease group ($p=0.0005$), transplant centre ($p<0.0001$), type of patient ($p=0.0005$) and blood group compatibility ($p=0.0004$). There was no evidence of a statistically significant association for age group and zonal transplants ($p=0.2$ for both). (**Table 20 and 21**).
- 3.21. There was a statistically significant increase in cold ischaemia time for adult elective DBD transplants when comparing the thirty months pre and post (median CIT 8.58 hours and 9.06 respectively, $p<0.0001$). However, this may be due to the inclusion of periods of machine perfusion which is not currently collected on the liver transplant record form. (**Figure 14**)
- 3.22. There was no significant difference in ninety-day DBD and DCD patient survival ($p\text{-value}=0.24$ and 0.16 respectively) (**Figure 18**)
- 3.23. There were no significant difference at a 5% significance level in ninety-day graft or transplant survival for either DBD or DCD transplants (**Figures 20, 21, 22 and 23**)

NHS BLOOD AND TRANSPLANT

NATIONAL LIVER OFFERING SCHEME

THIRTY MONTH REVIEW

1. BACKGROUND

- 1.1. The new National Liver Offering Scheme (NLOS) was introduced on 20 March 2018 for donation after brain death (DBD) donors and mainly for liver offers to named patients. Offering of livers from donors after circulatory death (DCD) has not changed and remains on a centre-specific basis rather than on a patient specific basis. This report examines the impact of the new DBD scheme on patients on the waiting list, livers offered and transplant activity.
- 1.2. It should also be noted that this report may not include all data due for the first thirty months due to delays in reporting.
- 1.3. The updated Kidney Offering Scheme and Pancreas Offering Scheme were introduced on 11 September 2019. Unfortunately, an unexpected and untested change was introduced to the NLOS at the same time which affected the number of patients that appeared as named elective patients on matching run. This change was removed on the 19 September 2019 and this report includes this period in all analyses apart from in the flow chart in **Figure 12B**.
- 1.4. Due to the impact of COVID-19, it was agreed by OTDT Medical team and the Liver Advisory Group chair on 27 March 2020 that liver centres should consider an elective named patient offer for any patient when offered and not just the named patient. It was also agreed that a kidney would not be held back if a liver/kidney patient was in the top 3 named elective patients. There were no changes to the DCD offering scheme and the National Liver Offering Scheme resumed on 9 July 2020.

2. DATA AND METHODS

2.1. REGISTRATION ACTIVITY AND POST-REGISTRATION OUTCOME

- 2.1.1. Data on 5775 new active/suspended NHS Group 1 registrations on the UK liver transplant list between 20 September 2015 and 19 September 2020 were obtained from the UK Transplant Registry on 1 October 2020. Patients registered in Dublin or as NHS Group 2 were excluded as such elective patients would only be offered a liver if all UK transplant centres declined the offer.
- 2.1.2. One and three month registration outcome was examined for a registrations either between 20 September 2015 and 19 December 2017 (N=2113) or between 20 March 2018 and 19 June 2019 (N=2122).
- 2.1.3. Six month registration outcome was also examined for a subset registered either between 20 September 2015 and 19 September 2017 (N=1850) or between 20 March 2018 and 19 March 2020 (N=1965).

2.2. TRANSPLANT LIST ACTIVITY

- 2.2.1. Data on 2782 patients who were either active/suspended on the UK liver transplant list on 19 March 2018 or registered between 20 March 2018 and 19 September 2020 were obtained from the UK Transplant Registry on 1 October 2020. Patients registered in Dublin were excluded.

2.3. LIVER OFFERING

- 2.3.1. Data on 9307 deceased donors (4622 DBD and 2685 DCD) from the UK whose liver was offered for transplantation between 20 September 2015 and 19 September 2020 were obtained from the UK Transplant Registry on 1 October 2020. Intestinal offers were excluded regardless of whether they required a liver or not. The data was split into two time periods:
 - 2.3.1.1. 20 September 2015 to 19 March 2018 (*previous thirty months*)
 - 2.3.1.2. 20 March 2018 to 19 September 2020 (*since NLOS implementation*).

2.4. TRANSPLANT ACTIVITY AND POST-TRANSPLANT SURVIVAL

- 2.4.1. Data on 4766 deceased donor liver transplants (3812 DBD and 954 DCD) performed in the UK between 20 March 2016 and 19 March 2020 were also obtained from the UK Transplant Registry on 1 October 2020. Intestinal transplants involving the liver were included. The data was also split into the same two time periods as the liver offering section.

3. RESULTS

3.1. REGISTRATION ACTIVITY - OVERALL

3.1.1. **Figure 1** shows the number of new NHS Group 1 registrations on the UK liver transplant list between 20 September 2015 and 19 September 2020 by quarter and urgency status while **Table 1** compares the thirty months pre and post the introduction of NLOS. Although there has been an increase in elective registrations since NLOS was introduced, there was no statistically significant association between the two time periods and registration type (Fishers exact p-value=0.7).

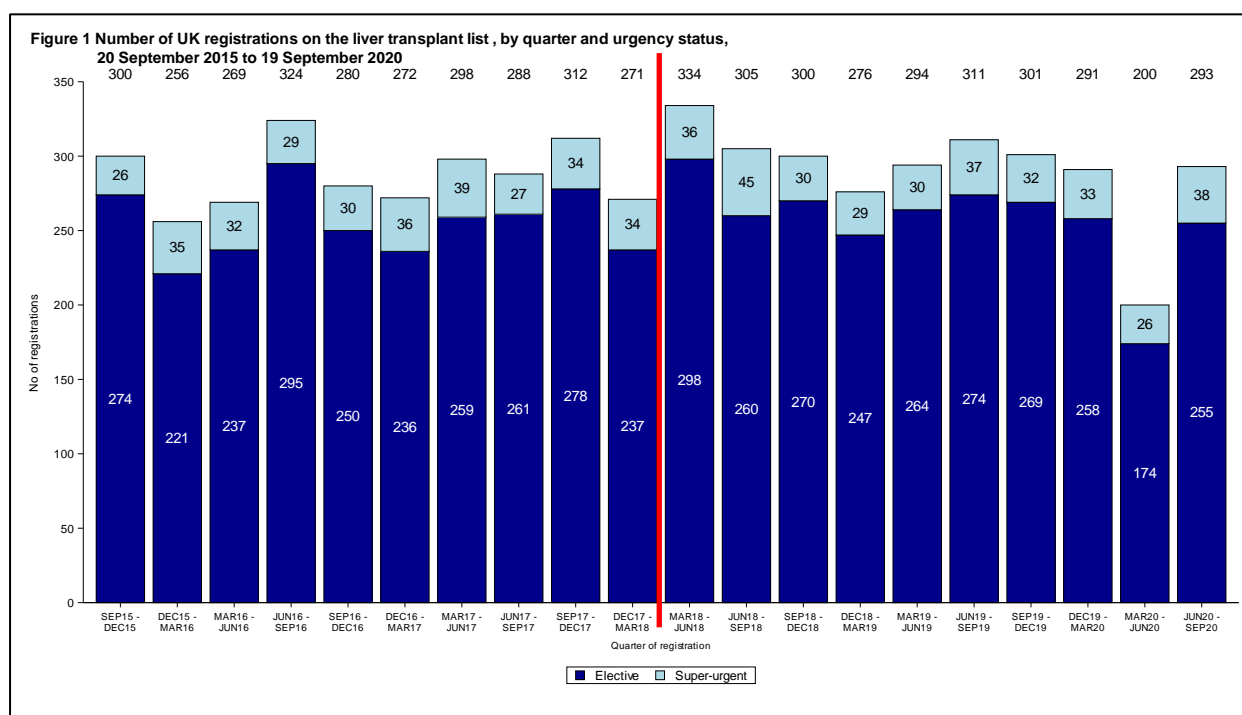


Table 1 Urgency status by time period for all NHS Group 1 liver registrations in the UK, 20 September 2015 to 19 September 2020

Urgency status	Thirty months prior	Thirty months post	Total
Elective	2548 (89)	2569 (88)	5117 (89)
Super-urgent	322 (11)	336 (12)	658 (11)
Total	2870 (100)	2905 (100)	5775 (100)

3.2. REGISTRATION ACTIVITY - SUPER-URGENT

3.2.1. **Table 2** compares the thirty months pre and post the introduction of NLOS by super-urgent category. There was no significant association between super-urgent categories and the two time periods (Chi-squared p-value=0.12). The proportion of patients registered as either category 8 (HAT on days 0 to 21) or 9 (Early graft dysfunction on days 0 to 7) was 29% and 24% in the time periods prior and post respectively. **Appendix A** shows the descriptions of each categories.

Table 2 Super-urgent category by time period for super-urgent registrations in the UK, 20 September 2015 to 19 September 2020			
Super-urgent category	Thirty months prior	Thirty months post	Total
1	7 (2)	10 (3)	17 (3)
2	23 (7)	24 (7)	47 (7)
3	15 (5)	21 (6)	36 (5)
4	7 (2)	4 (1)	11 (2)
5	24 (7)	10 (3)	34 (5)
6	109 (34)	131 (39)	240 (36)
7	22 (7)	16 (5)	38 (6)
8	50 (16)	38 (11)	88 (13)
9	42 (13)	43 (13)	85 (13)
10	6 (2)	10 (3)	16 (2)
20	11 (3)	17 (5)	28 (4)
Not reported	6 (2)	12 (4)	18 (3)
Total	322 (100)	336 (100)	658 (100)

3.2.2. **Table 2a** compares the thirty months pre and post the introduction of NLOS by transplant number and graft number. A higher proportion of patients were registered for their second liver transplant in the thirty months prior than during the thirty months post (26% and 25% respectively). Of the patients registered for a second graft, 73% of those registered in the thirty months post had received a DBD transplant as their first transplant compared with 58% in the thirty months prior.

Table 2a Transplant number and type of previous graft by time period for super-urgent registrations in the UK, 20 September 2015 to 19 September 2020			
Registered for	Thirty months prior	Thirty months post	Total
First transplant	225 (70)	241 (72)	466 (71)
Second transplant	83 (26)	85 (25)	168 (26)
First was a DBD tx	48 (58)	62 (73)	110 (65)
First was a DCD tx	29 (35)	20 (24)	49 (29)
First was a living donor tx	6 (7)	3 (4)	9 (5)
Third transplant	13 (4)	10 (3)	23 (3)
Fourth transplant	0 (0)	0 (0)	0 (0)
Fifth transplant	1 (0)	0 (0)	1 (0)
Total	322 (100)	336 (100)	658 (100)

3.3. REGISTRATION ACTIVITY - ELECTIVE

3.3.1. **Table 3** compares the thirty months pre and post the introduction of NLOS for NHS Group 1 elective registrations by age and type of patient. There was no statistically significant associations between patient age and the two time periods (Fishers exact p-value=0.65).

Table 3 Type of elective patient by time period for elective registrations in the UK, 20 September 2015 to 19 September 2020			
Type of patient	Thirty months prior	Thirty months post	Total
Overall	2548 (100)	2569 (100)	5117 (100)
<i>Adult elective¹</i>	2335 (92)	2364 (92)	4699 (92)
CLD	1694 (73)	1772 (75)	3466 (74)
HCC	440 (19)	409 (17)	849 (18)
HCC downstaging	13 (1)	29 (1)	42 (1)
Variant syndrome	185 (8)	146 (6)	331 (7)
Hepatoblastoma	0 (0)	1 (0)	1 (0)
Liver and cardiothoracic	3 (0)	7 (0)	10 (0)
<i>Paediatric elective²</i>	213 (8)	205 (8)	418 (8)
Hepatoblastoma	11 (5)	27 (13)	38 (9)
Non hepatoblastoma	202 (95)	177 (86)	379 (91)
Liver and cardiothoracic	0 (0)	1 (0)	1 (0)

¹ Includes 9 CLD and 3 HCC patients aged 17 years or over and weighing 40kg or under (5 in the thirty months prior and 7 in the thirty months post); 7 were dual-listed as small adults (3 in the thirty months prior and 4 in the thirty months post)

² Includes 72 non hepatoblastoma patients aged less than 17 years and weighing 40kg or over (39 in the thirty months prior and 33 in the thirty months post); 35 were dual-listed as large paediatrics (5 in the thirty months prior and 30 in the thirty months post)

3.3.2. **Table 4** compares the thirty months pre and post the introduction of NLOS for each type of adult patient registered over the last 60 months by transplant number. The majority of patients were registered for a first liver transplant and there were no statistically significant associations between graft number and the two time periods (Fishers exact p-value=0.50).

3.3.3. All but two of the HCC patients were registered for a first graft. Both patients registered for a second graft had a UKELD less than 49, encephalopathy grade 0 and no current ascites.

Table 4 Transplant number by time period for adult elective registrations in the UK, 20 September 2015 to 19 September 2020

	Thirty months prior	Thirty months post	Total
CLD¹ (Fishers exact p-value=0.74)			
1 st graft	1509 (89)	1587 (90)	3096 (89)
2 nd graft	151 (9)	156 (9)	307 (9)
3 rd graft	27 (2)	26 (1)	53 (2)
4 th graft	6 (0)	3 (0)	9 (0)
6 th graft	1 (0)	0 (0)	1 (0)
HCC (Fishers exact p-value>0.99)			
1 st graft	439 (100)	408 (100)	847 (100)
2 nd graft	1 (0)	1 (0)	2 (0)
Variant syndrome (Fishers exact p-value=0.63)			
1 st graft	163 (88)	134 (92)	297 (90)
2 nd graft	19 (10)	11 (8)	30 (9)
3 rd graft	1 (1)	1 (1)	2 (1)
4 th graft	2 (1)	0 (0)	2 (1)
Overall adult elective² (Fishers exact p-value=0.50)			
1 st graft	2127 (91)	2166 (92)	4293 (91)
2 nd graft	171 (7)	168 (7)	339 (7)
3 rd graft	28 (1)	27 (1)	55 (1)
4 th graft	8 (0)	3 (0)	11 (0)
6 th graft	1 (0)	0 (0)	1 (0)
Total	2335 (100)	2364 (100)	4699 (100)

¹ One patient dual-listed was registered for a second graft and two patients for a first graft in the thirty months prior whilst two were registered for a first graft and one for a second graft and one for a third graft in the thirty months post

² Includes HCC downstaging and liver and cardiothoracic patients all of whom were registered for first graft

3.3.4. **Table 5** shows compares the median and interquartile age at registration for the thirty months pre and post the introduction of NLOS for each type of adult patient registered over the last 60 months. There were no statistically significant differences in the median recipient age (Kruskal-Wallis p-value \geq 0.21).

Table 5 Median (IQR) age by time period for adult elective NHS Group 1 registrations in the UK, 20 September 2015 to 19 September 2020

	Thirty months prior	Thirty months post	Total
CLD¹ (Kruskal-Wallis p-value=0.19)			
N	1694	1772	3466
Median (IQR)	53 (44 - 60)	54 (44 - 61)	54 (44 - 61)
Range	17 - 76	17 - 74	17 - 76
HCC (Kruskal-Wallis p-value=0.53)			
N	440	409	849
Median (IQR)	60 (55 - 65)	61 (56 - 66)	61 (55 - 65)
Range	18 - 75	19 - 73	18 - 75
Variant syndrome (Kruskal-Wallis p-value=0.71)			
N	185	146	331
Median (IQR)	49 (36 - 57)	49 (38 - 57)	49 (37 - 57)
Range	17 - 72	18 - 70	17 - 72
Overall adult elective² (Kruskal-Wallis p-value=0.21)			
N	2335	2364	4699
Median (IQR)	55 (46 - 62)	55 (46 - 62)	55 (46 - 62)
Range	17 - 76	17 - 74	17 - 76

¹ There were three patients dual-listed in the thirty months prior, one was aged 27 and weighed 39kg, the other was aged 30 and also weighed 39kg, the third was aged 25 and weighed 37kg. There were 4 dual listed patients registered in the thirty months post, one was 20 years old and weighed 40kg, another patient was 26 years and weighed 39.6kg, another was aged 23 and weight 40kg, and the final was aged 59 and weighed 39.2kg at registration

² Includes HCC downstaging and liver and cardiothoracic patients

3.4. POST-REGISTRATION OUTCOME

3.4.1. **Table 6 and Figure 2** shows the one and three-month registration outcome for adult elective NHS Group 1 liver patients registered in the twenty-seven months since the implementation of the NLOS along with the equivalent twenty-seven month period in 2015/2017. There were 2122 adult elective registrations in the first twenty-seven months of NLOS and 1067 (50%) received a transplant within 3 months of registration. The corresponding three-month transplant rate for patients registered during the equivalent twenty-seven months in 2015/2017 was 45%. There were statistically significant differences between the time periods and registration outcome at one month and three month (Fishers exact p-value<0.0001 for both).

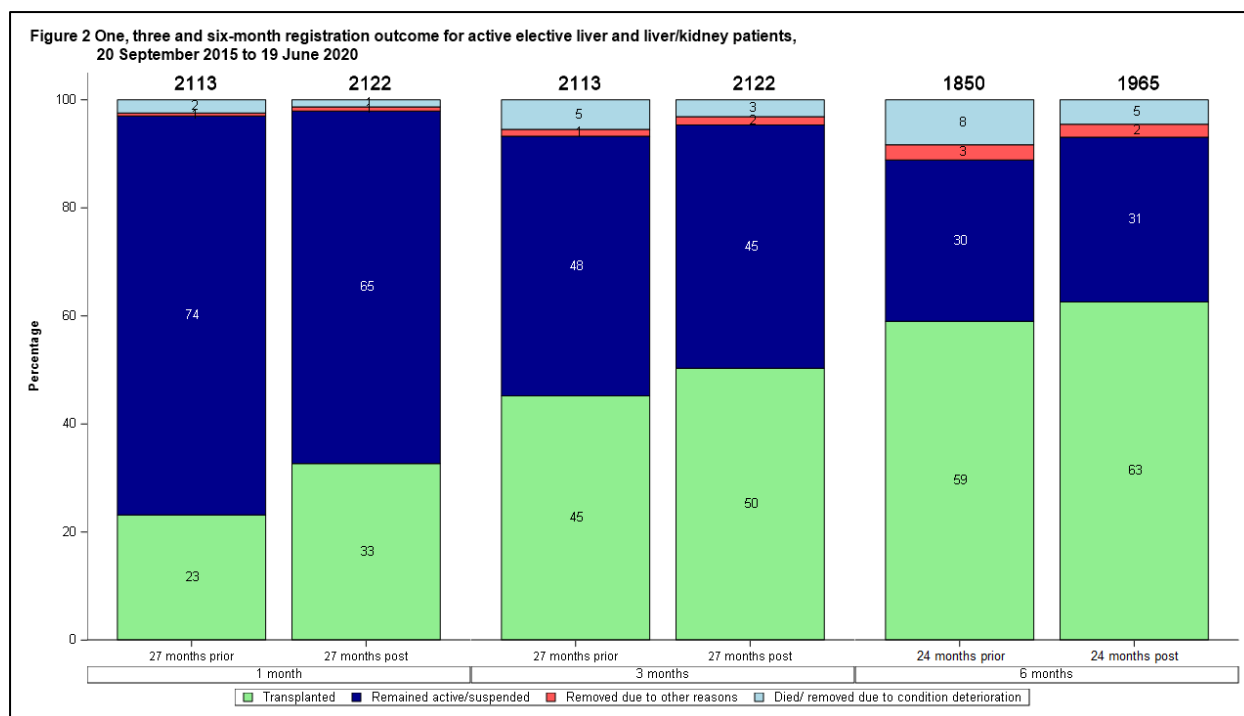
3.4.2. **Table 6 and Figure 2** also show the six-month registration outcome for adult elective patients registered during the first twenty-four months of NLOS and the equivalent twenty-four month period in 2015/2017. There were statistically significant differences between the two time periods and registration outcome at six months (Fishers exact p-value<0.0001). 1229 (63%) of the 1965 registrations were transplanted within 6 months compared with 59% in the twenty-four months prior. However, the proportion of patients who either died on the list or were removed due to condition deterioration within six months was 5% in the twenty-four months post compared with 8% in the twenty-four months prior.

Table 6 Registration outcome for adult elective NHS Group 1 registrations on the UK liver transplant list, 20 September 2015 to 19 June 2020

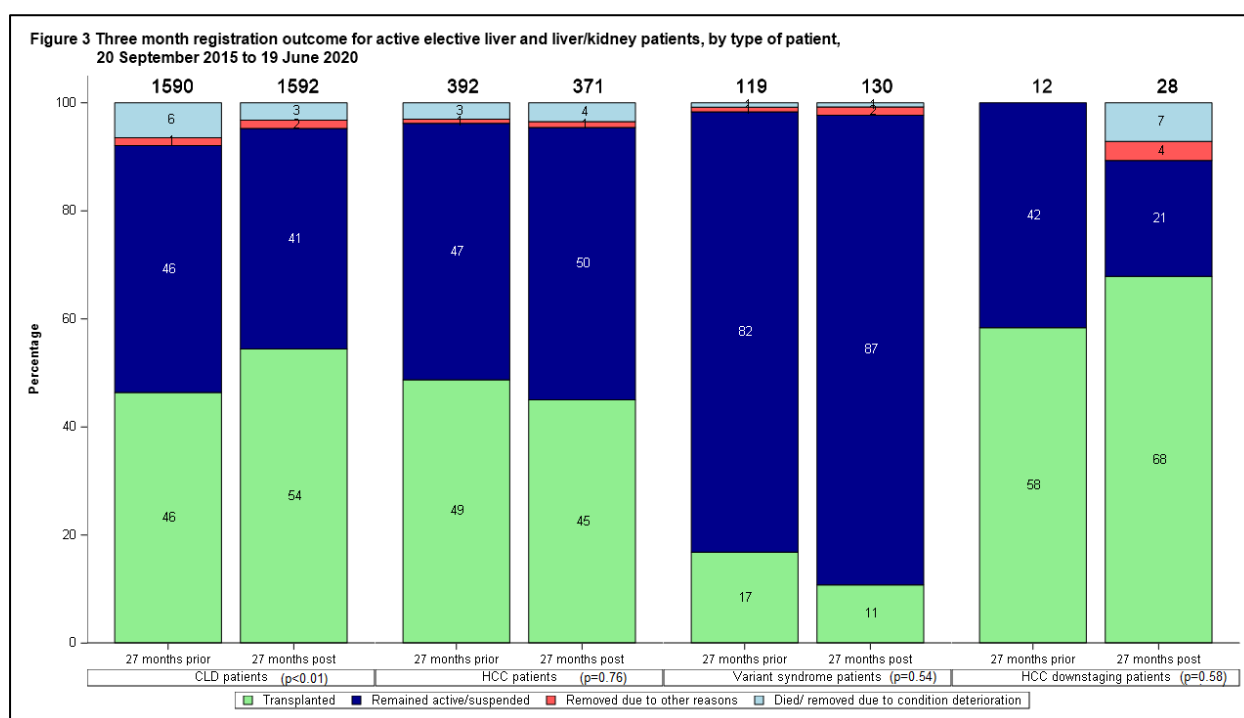
Registration outcome	One-month outcome ¹		Three-month outcome ¹		Six-month outcome ²	
	27 months prior	27 months post	27 months prior	27 months post	24 months prior	24 months post
Remained active/suspended	1561 (74)	1385 (65)	1015 (48)	956 (45)	553 (30)	600 (31)
Died/ removed due to condition deterioration	52 (2)	28 (1)	116 (5)	67 (3)	154 (8)	89 (5)
Removed due to other reasons	11 (1)	16 (1)	27 (1)	32 (2)	52 (3)	47 (2)
Transplanted	489 (23)	693 (33)	955 (45)	1067 (50)	1091 (59)	1229 (63)
Total	2113 (100)	2122 (100)	2113 (100)	2122 (100)	1850 (100)	1965 (100)
Fishers exact p-value	<0.0001		<0.0001		<0.0001	

¹ 20 September 2015 to 19 December 2017 (prior) and 20 March 2018 to 19 June 2020 (post)

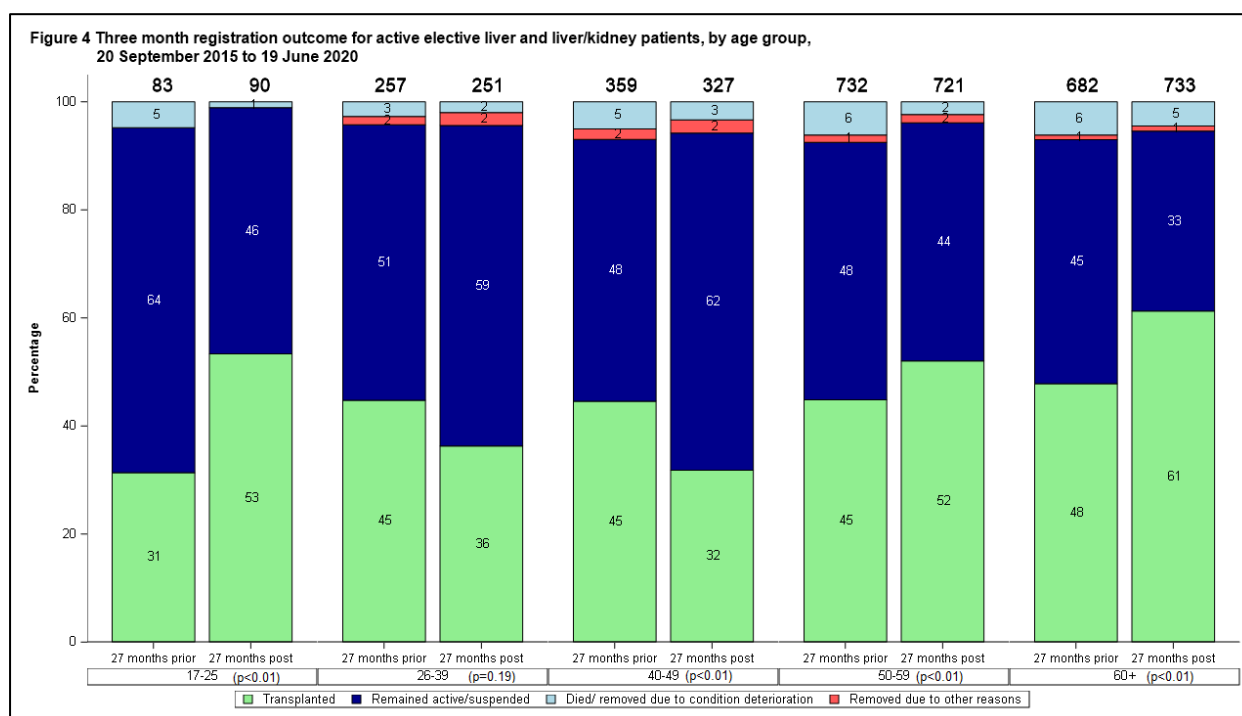
² 20 September 2015 to 19 September 2017 (prior) and 20 March 2018 to 19 March 2020 (post)



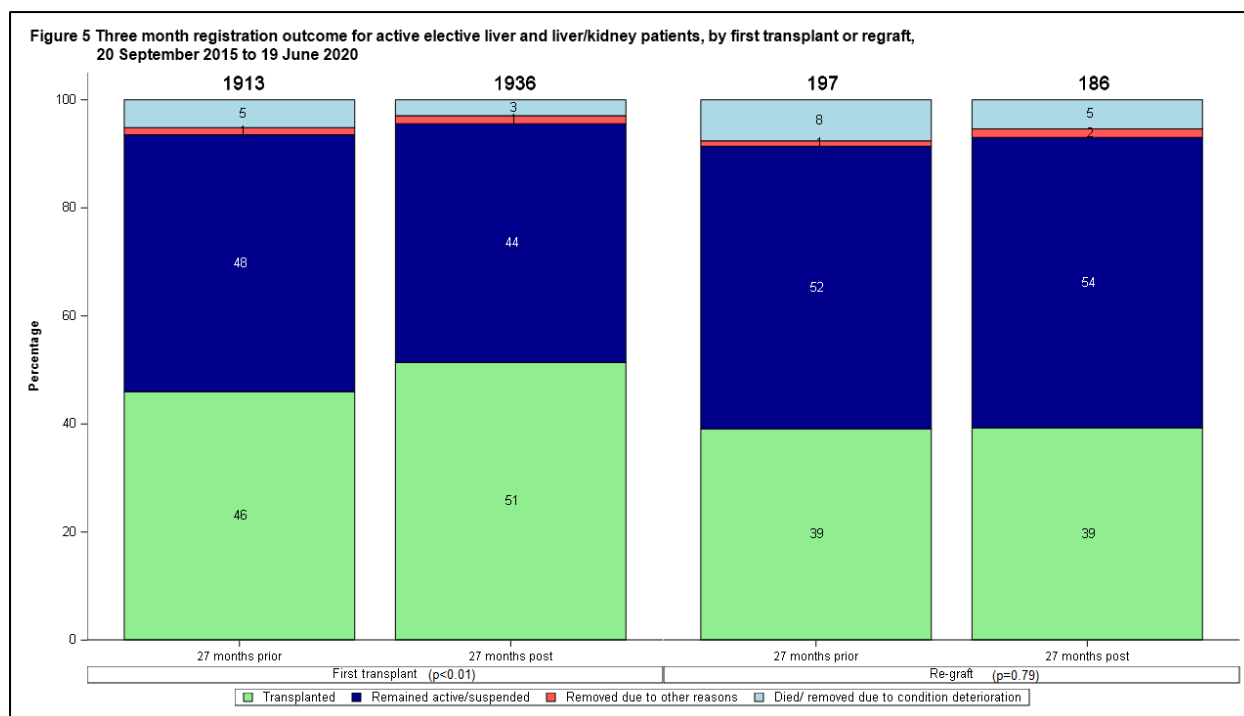
3.4.3. **Figure 3** shows the three-month registration outcome by time period and type of adult elective patient. A higher proportion of new CLD and HCC downstaging registrations post NLOS were transplanted in the first three months post-registration than registrations during the same period in 2015/2017. There was a statistically significant association between three-month registration outcome and time period of registration for CLD patients (Fishers exact p-value<0.01) but not for HCC, variant syndrome, and HCC downstaging patients (Fishers exact p-value \geq 0.54). Equivalent charts for six-month are presented in **Figure B1** in **Appendix B** and show consistent results with the three-month outcome chart.



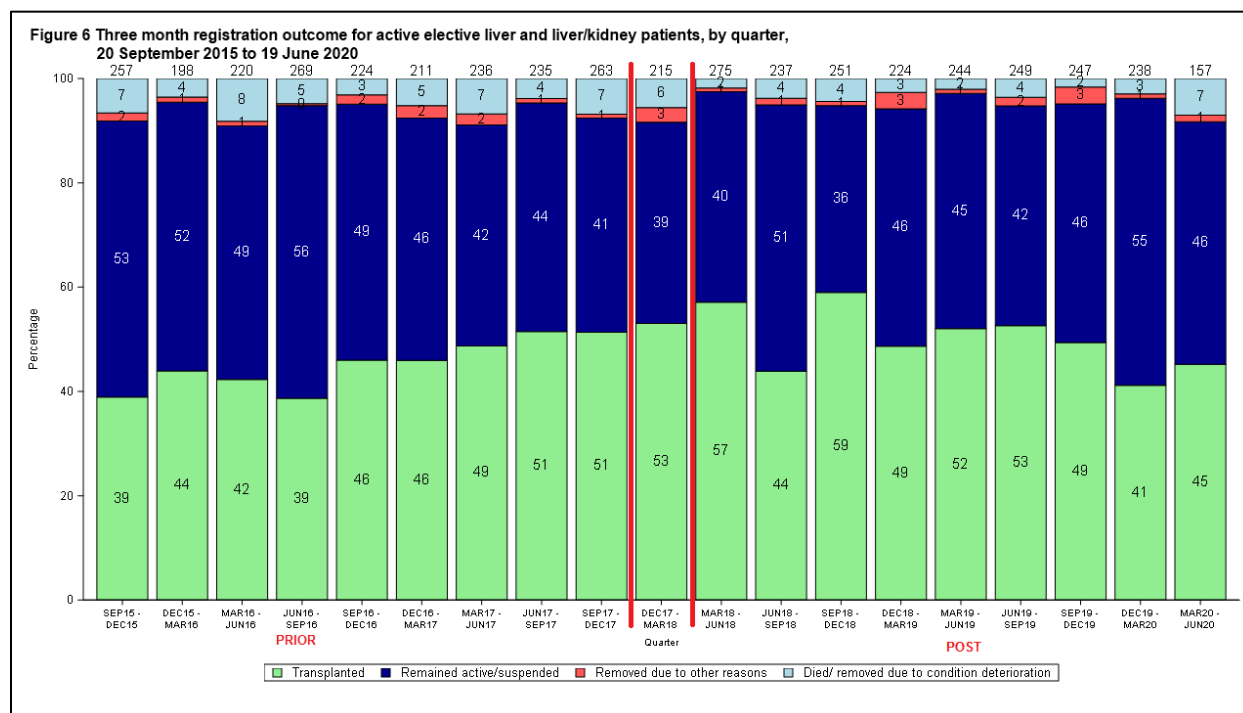
3.4.4. **Figure 4** shows the three-month registration outcome by time period and age group. A higher proportion of patients aged either 17-29, 50-59 or 60+ years registered post NLOS were transplanted in the first three months post-registration than registrations during the same period in 2015/2017. There was a statistically significant association between registration outcome and time period of registration for all age groups apart from patients aged 25-39 years. Equivalent charts for six-month are presented in **Figure B2** in **Appendix B** and show consistent results with the three-month outcome chart.



3.4.5. **Figure 5** shows the three-month registration outcome by time period and whether the patient was registered for a first graft or regrant. A higher proportion of first graft patients registered post NLOS were transplanted in the first three months post-registration than registrations during the same period in 2015/2017. There was a statistically significant association between registration outcome and time period of registration for patients registered for a first graft but not for regrant patients (Fishers exact p -value < 0.01 and 0.79 respectively). Equivalent charts for six-month are presented in **Figure B3** in **Appendix B** and show consistent results with the three-month outcome chart.



3.4.6. **Figure 6** shows the three-month registration outcome by quarter. The mortality rate in the first three months ranged between 2% and 7% in the quarters since the introduction of NLOS compared with between 3% and 8% in the quarters prior. Equivalent charts for six-month are presented in **Figure B4** in **Appendix B** and show consistent results with the three-month outcome chart.



3.5. TRANSPLANT LIST ACTIVITY

3.5.1. **Table 7** shows the outcome for 418 adult elective NHS Group 1 liver patients on the list on 19 March 2018 along with those patients joining the adult elective list in the thirty months since the implementation of the NLOS. Since the scheme was implemented, 2364 adult elective patients joined the liver transplant list and 1648 (69%) of the 2364 patients have received a transplant. The corresponding transplant rate for patients active on the list on 19 March 2018 was 64%.

3.5.2. **Table 7** also shows that 210 adult elective liver patients, either active/suspended on the list on 19 March 2018 or registered in the first thirty months, either passed away while on the transplant list or were removed due to their condition deteriorating between 20 March 2018 and 1 October 2020. Eighty-three of the 210 patients died on the list while 127 patients were removed due to their condition deteriorating. Sixteen of the 127 patients died after being removed; six of the patients were active on the transplant list on 19 March 2018.

3.5.3. It should, however, be noted that there may be a delay in centres informing NHSBT of patient deaths.

Table 7 Adult elective NHS group 1 liver transplant list and new registrations in the UK, 20 March 2018 to 19 September 2020 as at 27 September 2020			
Outcome of patient at 16 April 2020	Active and suspended patients at 19 March 2018 N (%)	New registrations between 20 March 2018 and 19 September 2020¹ N (%)	Total N (%)
Remained active/ suspended	41 (10)	464 (20)	505 (18)
Transplanted	266 (64)	1648 (69)	1914 (69)
Removed due to other reasons	68 (16)	85 (4)	153 (5)
Died/ removed due to condition deteriorated	43 (10)	167 (7)	210 (8)
TOTAL	418 (100)	2364 (100)	2782 (100)

¹ Includes re-registrations for second or subsequent transplants

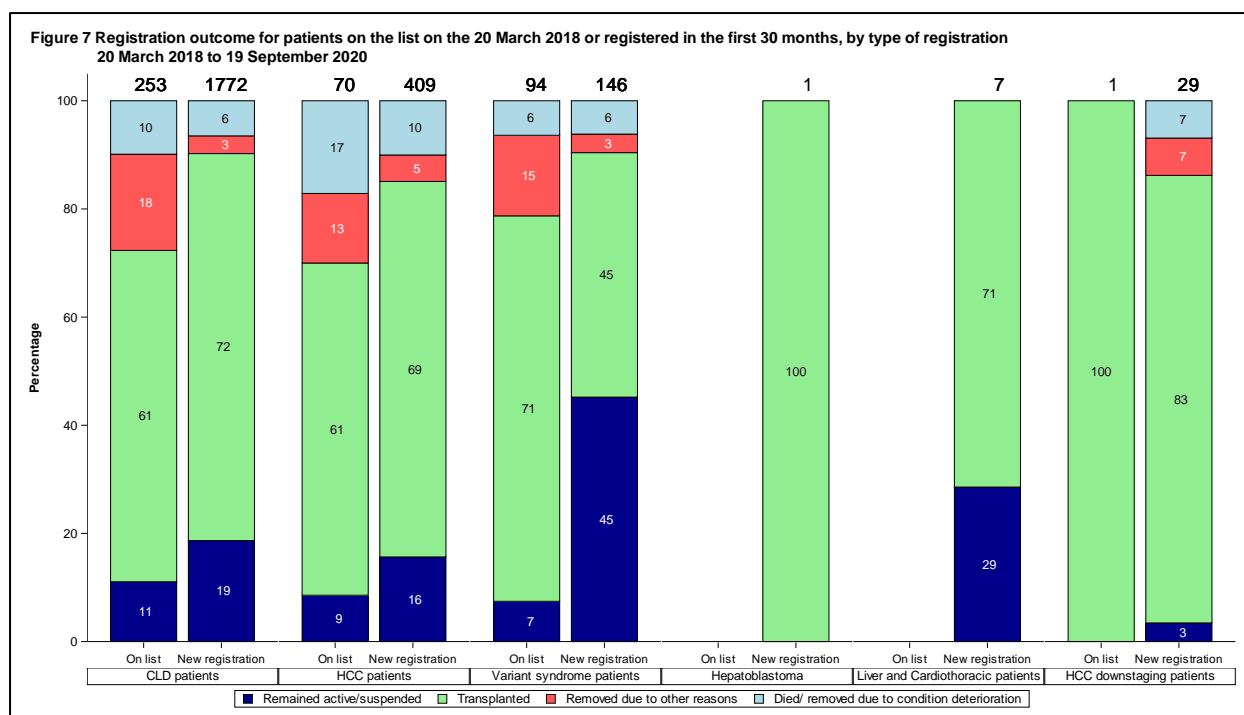
3.5.4. **Table 7A** shows the reasons for removals for the 153 patients removed from the list due to reasons other than condition deterioration. Forty four patients on the list on 20 March 2018 and 43 new registrations were removed from the list due to condition improved whilst 34 were removed due to either patient/ parent request or non-compliance.

Table 7A Reason for removal for 153 adult elective NHS group 1 liver transplant list and new registrations in the UK removed from the list for reasons other than condition deterioration, 20 March 2018 to 19 September 2020 as at 1 October 2020

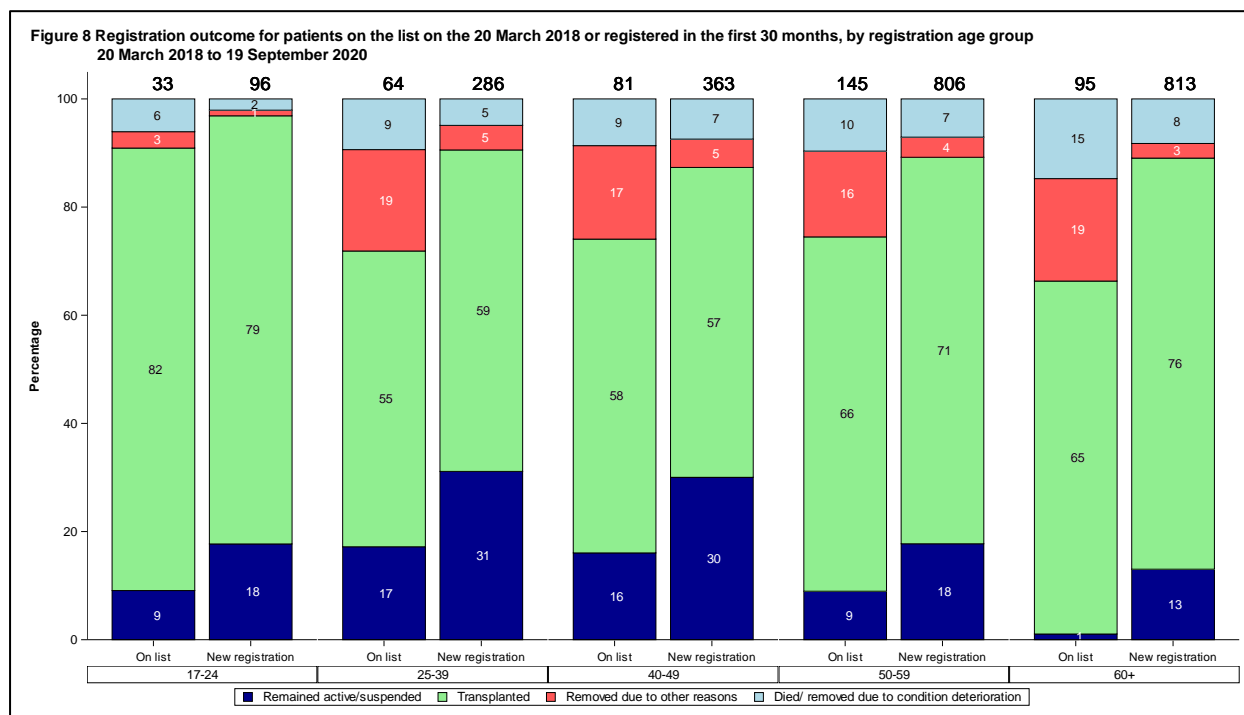
	Active and suspended patients at 19 March 2018 N (%)	New registrations between 20 March 2018 and 19 September 2020 ¹ N (%)	Total N (%)
Condition improved	44 (65%)	43 (51%)	87 (57)
Patient/parent request	8 (12%)	5 (6%)	13 (9)
Patient/ non-compliant	8 (12%)	13 (15%)	21 (14)
Registered on super-urgent list	0 (0%)	4 (5%)	4 (3)
Patient fallen outside of agreed listing criteria	1 (1%)	6 (7%)	7 (5)
Other	7 (10%)	14 (16%)	21 (14)
TOTAL	68 (100)	85 (100)	153 (100)

¹ Includes re-registrations for second or subsequent transplants

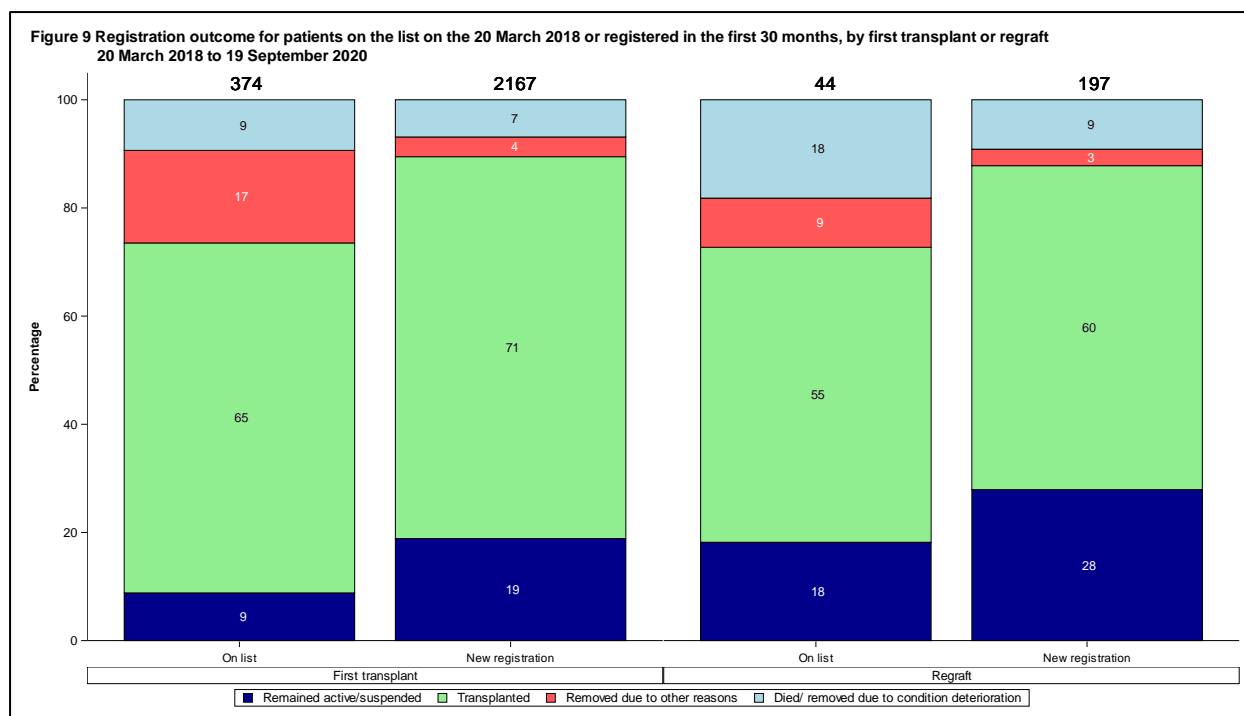
3.5.5. **Figure 7** shows the registration outcome by whether the patients were on the list on 20 March 2018 and type of adult elective patient. A higher proportion of new CLD and HCC registrations were transplanted in the first thirty months than patients on the list on 20 March 2018. Due to the offering scheme, a higher proportion of variant syndrome patients on the list were transplanted compared with new registrations. There were statistically significant associations between registration outcome and time period of registration for, separately, CLD, HCC and variant syndrome patients (Fishers exact p-value<0.006).



3.5.6. **Figure 8** shows the registration outcome by whether the patients were on the list on 20 March 2018 and age group. A higher proportion of new registrations were transplanted in the first thirty months than patients on the list on 20 March 2018 in all age groups apart from 17-24 and 40-49 year olds. There were statistically significant associations between registration outcome and time period of registration for all age groups apart from those aged 17-24 years (Fishers exact p-value<0.001 for 25-39, 40-49, 50-59, 60+ and p-value=0.25 for 17-24).



3.5.7. **Figure 9** shows the registration outcome by whether the patients were on the list on 20 March 2018 and whether the patients were registered for their first transplant or regrant. A higher proportion of new registrations were transplanted in the first thirty months than patients on the list on 20 March 2018 for first registrations, and regrafts. There was a statistically significant association between registration outcome and time period of registration for first grafts (Fishers exact p-value<0.0001) but not for regrafts (Fishers exact p-value=0.06).



3.5.8. Twenty-five patients listed for a regrant, either on the list on 20 March 2018 or registered during the thirty months post NLOS, were removed from the transplant list (regardless of reason). Of these twenty-five patients, ten were on the list on the 20 March 2018 and fifteen were registered in the first thirty months of NLOS. **Table 8** shows the reasons for removal from the transplant list for each of the 25 patients. Patients highlighted in orange have been removed from the list since the last report (N=3).

Table 8 Reasons for removal for 25 regrant patients removed from the transplant list

Patient number	Centre	Month removed	Time from previous tx	Time on the list	Reason for removal	Other reasons given
Patients on the list on 20 March 2018						
1	Birmingham	March 2018	1940	2562	Condition deteriorated	Deterioration of Hocum therefore not fit for OLTx
2	Kings	May 2018	1178	266	Condition improved	
3	Birmingham	July 2018	1106	247	Condition improved	
4	Kings	August 2018	40	596	Condition deteriorated	Awaiting cardiology review, episode of SVT yesterday
5	Kings	May 2018	527	212	Condition deteriorated	
6	Royal Free	March 2019	2220	392	Condition improved	
7	Cambridge	February 2019	1903	337	Condition deteriorated	Further investigations required for anaemia and cardiac function
8	Birmingham	November 2019	5275	879	Condition deteriorated	Pt requires full assessment for retransplant now, after a long period of suspension on the waiting list since Aug 2018. Deemed medically too high risk to receive a transplant
9	Kings	February 2020	808	604	Condition deteriorated	Requires Haematology review and bone marrow biopsy due to neutropenia.
10	Birmingham	July 2020	5537	764	Other	Patient now for palliative care in their local hospital
Patient registered between 20 March 2018 and 19 September 2020						
11	Kings	December 2018	2799	24	Condition deteriorated	Has extra hepatic collections, needs addressing
12	Kings	April 2018	1245	2	Other	At patients request
13	Kings	Sept 2018	1220	55	Condition deteriorated	Patient developed lung cancer
14	Royal Free	April 2019	2736	6	Condition deteriorated	Patient has deteriorated and is no longer a transplant candidate.
15	Birmingham	June 2019	2564	74	Condition improved	
16	Cambridge	Sept 2019	158	150	Condition deteriorated	HCC in nodes outside liver
17	Royal Free	October 2019	3351	66	Condition deteriorated	Patient has developed multi-organ failure, rising lactate in the context of sepsis.
18	Cambridge	December 2019	49	13	Condition improved	Clinically improving. No longer has an indication for transplant
19	Edinburgh	January 2020	179	117	Condition Deteriorated	HCC metastases
20	Kings	February 2020	7655	164	Condition Deteriorated	super urgent request sent through via National appeal. OPA 13.2.20
21	Royal Free	February 2020	103	30	Condition improved	
22	Cambridge	February 2020	645	93	Condition improved	
23	Newcastle	March 2020	6929	10	Condition deteriorated	
24	Kings	July 2020	2907	609	Condition deteriorated	
25	Cambridge	Sept 2020	56	1	Condition improved	Not clinically urgent

3.6. LIVER OFFERING

- 3.6.1. **Table 9** shows the overall UK deceased donor liver offering outcome between 20 September 2015 and 19 September 2020, by donor type and time period. In the first thirty months of the scheme, 2398 DBD livers were offered for transplantation compared with 2224 during the thirty months prior to the implementation. Of the 2398 livers offered, 2075 (87%) were retrieved for the purposes of transplantation and 1802 (87%) were transplanted (all but 13 were transplanted in the UK). The proportion of DBD livers offered and retrieved is very similar to the percentage for the thirty months prior to the introduction of the new scheme.
- 3.6.2. Solid organs were not retrieved from 263 DBD donors and 1330 DCD donors whose liver was offered for transplantation. **Table 9**, therefore, also shows the liver offering outcome for donors where at least one solid organ was retrieved for the purposes of transplantation.
- 3.6.3. **Table 10** shows, separately, the reasons for not offering, not retrieving and not transplanting livers by donor type and time period. The number in brackets are the corresponding values for solid organ donors where at least one organ was retrieved for the purposes of transplantation.
- 3.6.4. During the first thirty months, 31 DBD livers were not offered due to consent/ authorisation being refused by either the family or coroner. The main reason for declining and not retrieving was organ unsuitable (n=148) and other reasons (n=85).
- 3.6.5. Two hundred and seventy three DBD livers were retrieved for the purposes of transplantation but were not transplanted in the first thirty months of the new scheme. 185 of these 273 livers were not transplanted due to other reasons whilst 66 were not transplanted due to organ unsuitable, 14 due to donor medical history, 6 due to poor function and two due to donor non-medical reasons.
- 3.6.6. All thirteen livers transplanted overseas in the first thirty months were transplanted into super-urgent patients in Dublin.

Table 9 Overall deceased donor liver offering outcome, 20 September 2015 to 19 September 2020, as at 1 October 2020

	DBD liver		DCD liver	
	Thirty months prior	Thirty months post	Thirty months prior	Thirty months post
1. ALL DECEASED DONORS				
Number donors	2422	2578	2912	2802
Liver not offered for donation	198 (8)	180 (7)	511 (18)	518 (18)
Liver offered for donation	2224 (92)	2398 (93)	2401 (82)	2284 (82)
Liver not retrieved (% offered)	279 (13)	323 (13)	1637 (68)	1649 (72)
Liver retrieved (% offered)	1945 (87)	2075 (87)	764 (32)	631 (28)
Liver transplanted overseas (% retrieved)	12 (1)	13 (1)	0 (0)	0 (0)
Liver transplanted in the UK (% retrieved)	1757 (90)	1789 (86)	524 (69)	428 (68)
Liver not transplanted (% retrieved)	176 (9)	273 (13)	240 (31)	203 (32)
Liver used for research (% not transplanted)	121 (69)	122 (45)	164 (68)	105 (51)
2. ALL SOLID ORGAN DONORS				
Number donors	2170	2315	1513	1472
Liver not offered for donation	77 (4)	64 (3)	89 (6)	101 (7)
Liver offered for donation	2093 (96)	2251 (97)	1424 (94)	1371 (93)
Liver not retrieved (% offered)	148 (7)	176 (8)	660 (46)	740 (54)
Liver retrieved (% offered)	1945 (93)	2075 (92)	764 (54)	631 (46)
Liver transplanted overseas (% retrieved)	12 (1)	13 (1)	0 (0)	0 (0)
Liver transplanted in the UK (% retrieved)	1757 (90)	1789 (86)	524 (69)	428 (68)
Liver not transplanted (% retrieved)	176 (9)	273 (13)	240 (31)	203 (32)
Liver used for research (% not transplanted)	121 (69)	122 (45)	164 (68)	105 (51)

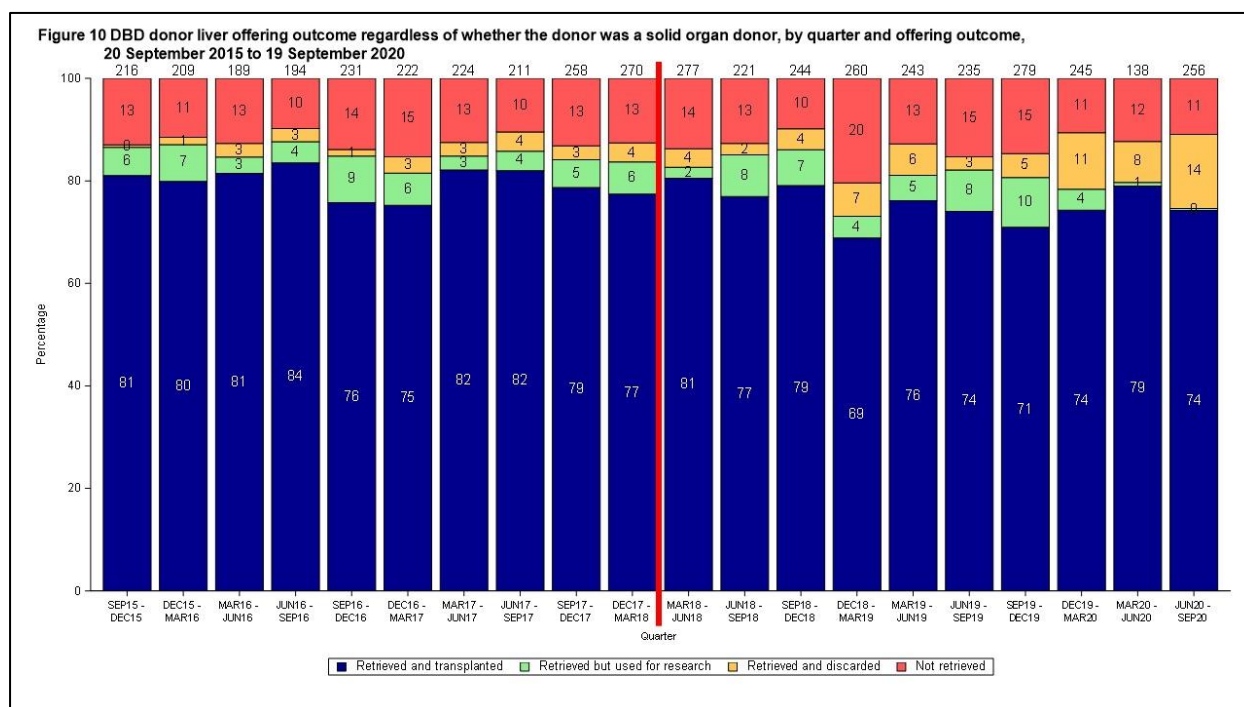
Table 10 Reasons for non-retrieval and non-use of livers from deceased donors (solid organ donors), 20 September 2015 to 19 September 2020, as at 1 October 2020

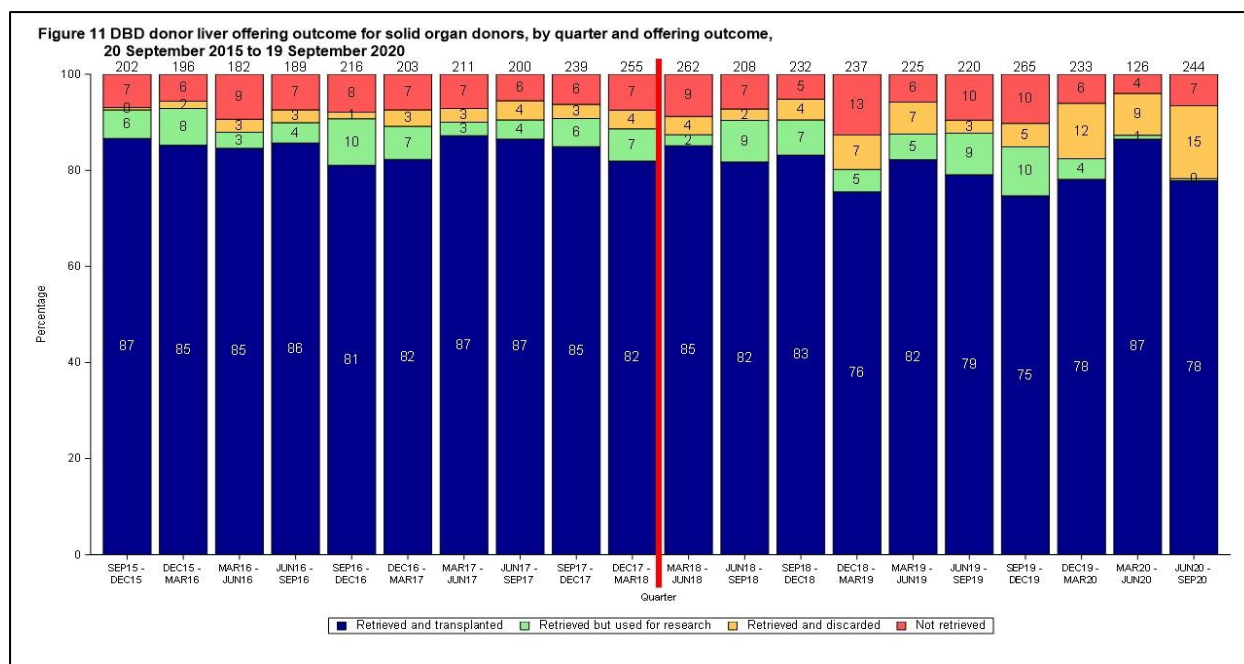
	DBD liver		DCD liver	
	Thirty months prior	Thirty months post	Thirty months prior	Thirty months post
REASONS NOT OFFERED				
Family permission not sought	1 (1)	1 (1)	5 (2)	3 (3)
Family permission refused	47 (25)	20 (10)	74 (13)	26 (8)
Permission refused by coroner	35 (15)	10 (6)	26 (5)	22 (10)
Donor unsuitable - age	2 (2)	0 (0)	27 (8)	16 (9)
Donor unsuitable - past history	52 (28)	45 (37)	144 (49)	118 (50)
Donor unstable	4 (0)	2 (0)	16 (1)	3 (1)
Donor unsuitable - size	0 (0)	0 (0)	0 (0)	1 (1)
Poor function	3 (2)	10 (9)	24 (7)	28 (13)
Infection	0 (0)	0 (0)	4 (0)	1 (0)
Other disease	0 (0)	0 (0)	0 (0)	1 (0)
Organ damaged	0 (0)	0 (0)	0 (0)	1 (1)
Ischaemia time too long - warm	0 (0)	0 (0)	0 (0)	1 (1)
Donor unsuitable - virology	5 (1)	0 (0)	2 (0)	1 (.)
Donor unsuitable - medical reason	1 (1)	0 (0)	2 (0)	0 (0)
Other	20 (2)	8 (1)	84 (4)	51 (4)
Not reported	28 (0)	84 (0)	103 (0)	245 (0)
Total not offered	198 (77)	180 (64)	511 (89)	518 (101)
REASONS FOR NON-RETRIEVAL				
<i>Donor</i>				
Donor unsuitable - medical	31 (4)	31 (7)	24 (2)	32 (8)
Donor unsuitable - non medical	13 (3)	14 (8)	62 (32)	57 (38)
Donor age	7 (5)	7 (6)	321 (134)	399 (189)
<i>Organ</i>				
Organ unsuitable - clinical	129 (76)	148 (93)	392 (204)	432 (231)
Poor function	32 (24)	38 (23)	128 (70)	112 (68)
<i>Other</i>				
Other	67 (36)	85 (39)	710 (218)	621 (206)
Total offered, not retrieved	279 (148)	323 (176)	1637 (660)	1653 (740)
REASONS RETRIEVED BUT NOT TRANSPLANTED				
<i>Donor</i>				
Donor unsuitable - medical	10 (10)	14 (14)	10 (10)	9 (9)
Donor unsuitable - non medical	2 (2)	2 (2)	1 (1)	2 (2)
Donor age	0 (0)	0 (0)	0 (0)	0 (0)
<i>Organ</i>				
Organ unsuitable - clinical	55 (55)	66 (66)	69 (69)	45 (45)
Poor function	1 (1)	6 (6)	0 (0)	2 (2)
<i>Other</i>				
Other	108 (108)	185 (185)	160 (160)	145 (145)
Total retrieved, not transplanted	176 (176)	273 (273)	240 (240)	203 (203)

3.6.7. **Figure 10** shows the DBD liver offering outcome for all livers offered regardless of whether any solid organs were retrieved for the purposes of transplantation. **Figure 10** shows that 277 livers were offered during the first quarter of NLOS which was the second highest number of livers offered during the 5 year period.

3.6.8. The percentage of organs retrieved and transplanted per quarter ranged from 75% to 84% in the thirty months prior and 69% to 81% in the thirty months post the introduction of NLOS. The percentage of livers retrieved and used for research ranged between 3% and 9% in the thirty months prior and 0% to 10% for the thirty months post the introduction of NLOS.

3.6.9. **Figure 11** shows the equivalent information for all solid organ donors where the liver was offered for transplantation and at least one organ (not necessarily the liver) was retrieved for the purposes of transplantation.



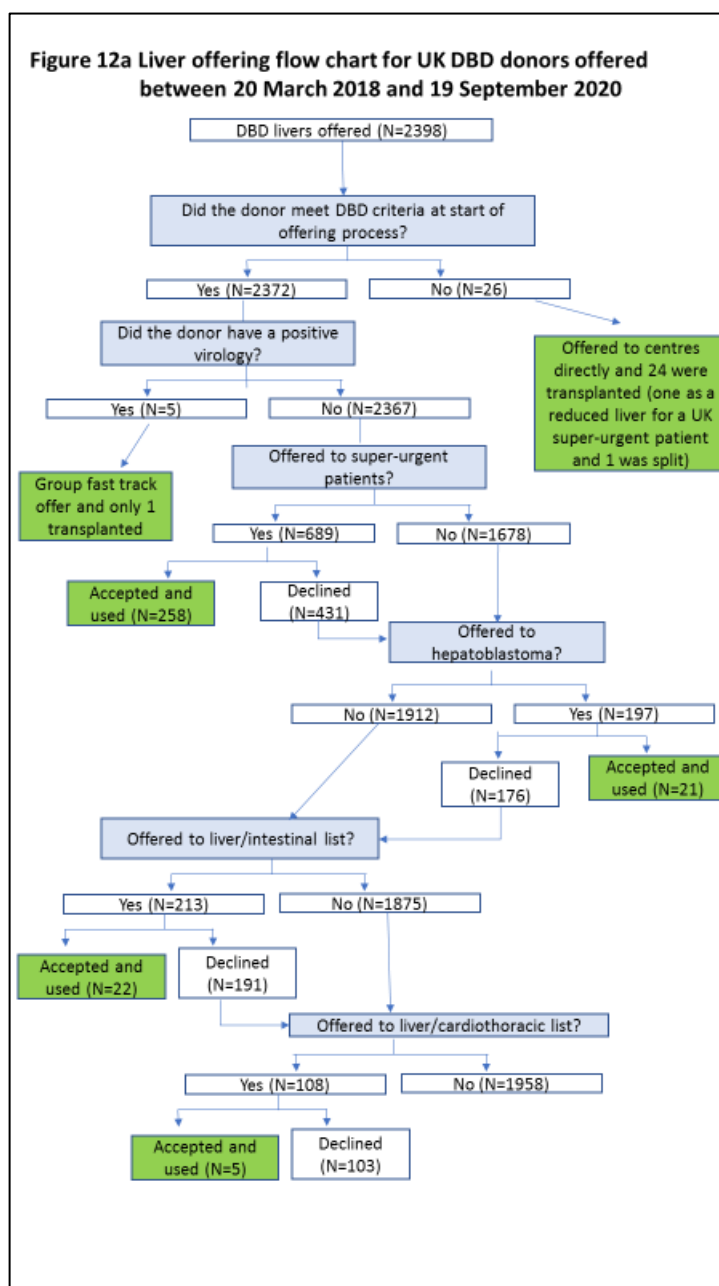


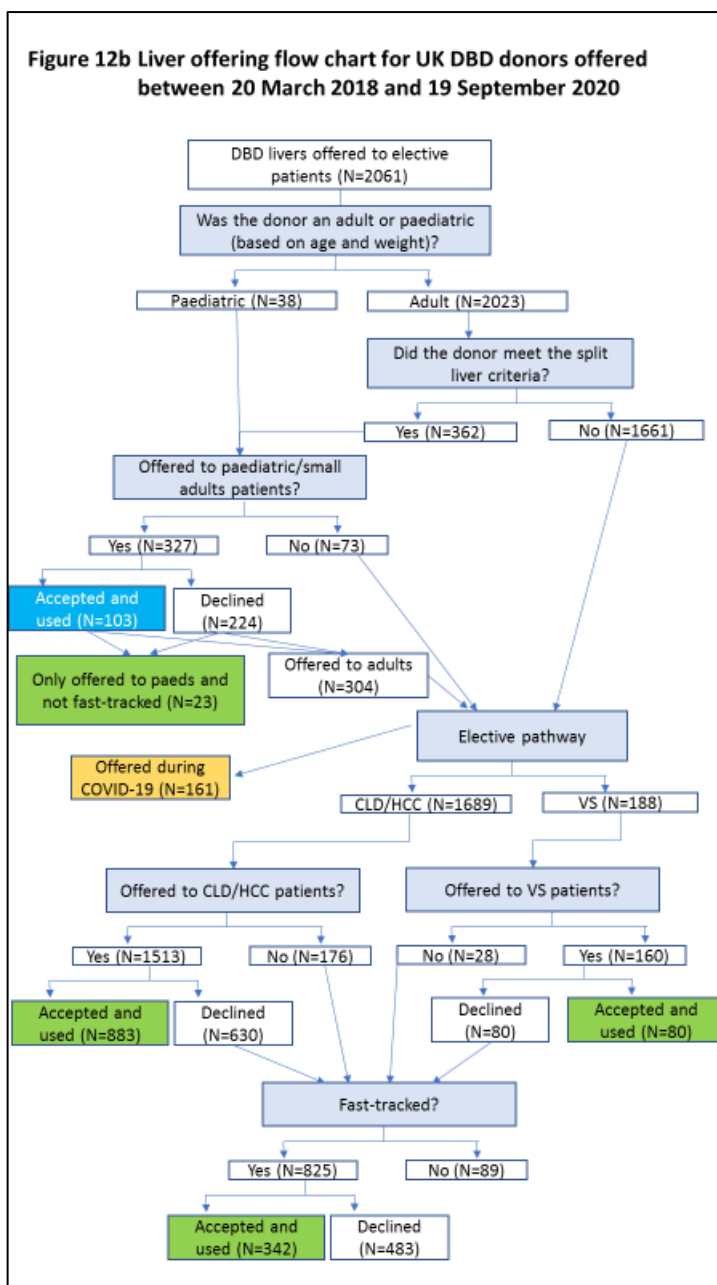
- 3.6.10. **Figure 12a** show the number of livers offered during the first thirty months of the new scheme at each stage of the liver offering pathway up to and including the liver and cardiothoracic section. Livers offered during COVID are included in **Figure 12a** but excluded at the elective stage of **Figure 12b**. 26 of the 2398 donors did not meet the DBD criteria at the start of the offering process and 24 were retrieved and transplanted. These livers are hence excluded from the offering pathway.
- 3.6.11. Livers from 258 donors meeting the DBD criteria were accepted and transplanted into super-urgent patients (including 13 super-urgent patients in Dublin). One hundred and ninety seven livers were offered to hepatoblastoma patients and 21 were accepted and transplanted. Two hundred and thirteen livers were offered to the liver and intestinal list and 22 were accepted and transplanted. Please note that a liver accepted and used at any stage may have been provisionally offered on to elective patients or fast-tracked before being accepted and used. These have not been included in the number of livers offered in later stages along with livers that may have been accepted, split and transplanted into two patients.
- 3.6.12. One hundred and eight livers were offered to liver and cardiothoracic patients and five were accepted and transplanted combined liver and cardiothoracic patients.
- 3.6.13. **Figure 12b** shows the number of livers that were offered to elective patients and hadn't been accepted and used for super-urgent, hepatoblastoma, liver/intestinal and liver/cardiothoracic patients. Of the 2061 livers offered to elective patients, 2023 were adult donors and 38 were paediatric donors (aged less than 16 years or weighing 40 kg or less). 362 adult donors met the split criteria and 327 livers were offered to paediatric centres for paediatric/small adult patients.

103 of the 327 livers were accepted and transplanted. Twenty-three livers were only offered to paediatric patients and not offered to elective adult patient or fast-tracked.

3.6.14. 161 livers were offered to elective patients between 27 March and 9 July 2020.

3.6.15. Ninety-percent of livers offered to elective patients were randomly allocated to the elective CLD/HCC pathway while ten percent were allocated to the variant syndrome pathway. Of the 1689 livers allocated to the CLD/HCC pathway, 1513 (90%) were offered to named patients and 883 (58%) were accepted and transplanted. Of the 188 livers allocated to the VS pathway, 160 (85%) were offered and 80 (50%) were accepted and transplanted.





3.6.16. **Table 11** shows the number of liver offers made to each UK liver transplant centre in either the thirty months prior to the new scheme or during the first thirty months of the new scheme. Livers offered to intestinal patients have been excluded. The number of offers made to UK liver transplant centres has increased by 60% from 6725 to 10768.

Table 11 Number of DBD liver only offers (excludes intestinal offers) per UK transplant centre, 20 September 2015 to 19 September 2020

Centre offered	Thirty months prior to NLOS		Thirty months post NLOS		% increase in offers
	No. of offers (no. of donors)	Median number (IQR) of offers per donor	No. of offers (no. of donors)	Median number (IQR) of offers per donor	
A. All liver offers					
Newcastle	789 (752)	1 (1, 1)	1105 (962)	1 (1, 1)	40%
Leeds	1129 (998)	1 (1, 1)	1659 (1239)	1 (1, 2)	47%
Cambridge	798 (738)	1 (1, 1)	1146 (956)	1 (1, 1)	44%
Royal Free	887 (803)	1 (1, 1)	1255 (1046)	1 (1, 1)	41%
Kings College	1155 (1007)	1 (1, 1)	2293 (1527)	1 (1, 2)	99%
Birmingham	1103 (952)	1 (1, 1)	2092 (1432)	1 (1, 2)	90%
Edinburgh	864 (811)	1 (1, 1)	1218 (1033)	1 (1, 1)	41%
Total	6725 (2224)	2 (1, 5)	10768 (2399)	3 (1, 7)	60%
B. All liver offers for livers ultimately transplanted					
Newcastle	407 (388)	1 (1, 1)	568 (495)	1 (1, 1)	40%
Leeds	727 (640)	1 (1, 1)	972 (727)	1 (1, 2)	34%
Cambridge	428 (389)	1 (1, 1)	624 (527)	1 (1, 1)	46%
Royal Free	500 (453)	1 (1, 1)	665 (550)	1 (1, 1)	33%
Kings College	738 (637)	1 (1, 1)	1446 (989)	1 (1, 2)	96%
Birmingham	712 (608)	1 (1, 1)	1305 (920)	1 (1, 2)	83%
Edinburgh	491 (458)	1 (1, 1)	630 (533)	1 (1, 1)	28%
Total	4003 (1743)	1 (1, 3)	6210 (1774)	2 (1, 5)	55%

3.6.17. **Table 12** shows, for livers that were ultimately transplanted, the outcome of liver offers made to each UK liver transplant centre in either the thirty months prior to the new scheme or during the first thirty months of the new scheme. It also shows the offer outcome after excluding fast-track offers that were not accepted and transplanted (ie declined or accepted and not used fast-track offers) as well as livers offered from either DCD or positive virology donors. It should be noted that offers of left and right lobes are included. The proportion of offers accepted and not used has increased for both all liver only offers and all offers excluding non-transplanted fast-track offers.

Table 12 Offer outcome for DBD livers that were offered and ultimately transplanted, 20 September 2015 to 19 September 2020, by centre, time period and offer outcome

Centre offered	Declined	Thirty months prior to NLOS (N (%))			Declined	Thirty months post to NLOS (N (%))		
		Accepted but subsequently declined	Accepted and transplanted	Total		Accepted but subsequently declined	Accepted and transplanted	Total
A. All liver only offers								
Newcastle	308 (76)	9 (2)	90 (22)	407 (100)	480 (85)	16 (3)	72 (13)	568 (100)
Leeds	386 (53)	39 (5)	302 (42)	727 (100)	620 (64)	104 (11)	248 (26)	972 (100)
Cambridge	223 (52)	16 (4)	189 (44)	428 (100)	420 (67)	40 (6)	164 (26)	624 (100)
Royal Free	245 (49)	19 (4)	236 (47)	500 (100)	359 (54)	83 (12)	223 (34)	665 (100)
Kings College	282 (38)	36 (5)	420 (57)	738 (100)	826 (57)	150 (10)	470 (33)	1446 (100)
Birmingham	262 (37)	33 (5)	417 (59)	712 (100)	642 (49)	165 (13)	498 (38)	1305 (100)
Edinburgh	275 (56)	8 (2)	208 (42)	491 (100)	384 (61)	57 (9)	189 (30)	630 (100)
Total	1981 (49)	160 (4)	1862 (47)	4003 (100)	3731 (60)	615 (10)	1864 (30)	6210 (100)
B. Excluding fast-track offers that were not accepted and transplanted or all positive virology/ DCD offers								
Newcastle	255 (72)	9 (3)	90 (25)	354 (100)	221 (72)	14 (5)	70 (23)	305 (100)
Leeds	335 (50)	37 (5)	302 (45)	674 (100)	439 (56)	98 (13)	244 (31)	781 (100)
Cambridge	179 (47)	15 (4)	189 (49)	383 (100)	245 (56)	33 (8)	161 (37)	439 (100)
Royal Free	200 (44)	18 (4)	236 (52)	454 (100)	204 (41)	78 (16)	219 (44)	501 (100)
Kings College	250 (35)	35 (5)	420 (60)	705 (100)	652 (52)	139 (11)	462 (37)	1253 (100)
Birmingham	226 (33)	33 (5)	417 (62)	676 (100)	508 (44)	152 (13)	495 (43)	1155 (100)
Edinburgh	214 (50)	8 (2)	208 (48)	430 (100)	170 (41)	53 (13)	188 (46)	411 (100)
Total	1659 (45)	155 (4)	1862 (51)	3676 (100)	2439 (50)	567 (12)	1839 (38)	4845 (100)

- 3.6.18. 3407 (31%) of the 10768 offers made in the first 30 months post NLOS were to named recipients. All offers between 27 March and 9 July are excluded as centres were offered livers for any clinically urgent patient rather than named patients.
- 3.6.19. The number of named patient offers per donor ranged between 1 and 10 with a median of two named patient offers per donor. The number of named offers per patient ranged between 1 and 27 with a median of two offers per patient. Sixteen patients at 6 centres were offered 11 or more livers in the thirty month time period (eight were offered 11 livers, 2 were offered 12 livers, 3 were offered 13 livers, 2 were offered 14 livers and 1 was offered 27 livers).
- 3.6.20. **Table 13** shows the outcome of named patient liver offers made during the first thirty months of the new scheme by type of patient and, for Chronic Liver Disease (CLD) patients, aetiology. It also shows the offer outcome after excluding named patients offers for livers that were ultimately not transplanted. Overall, forty-eight percent of named patient offers were accepted and 29% were accepted and transplanted. The number of transplants will not agree with the flow chart in **Figure 12A** as **Table 13** includes all elective named patient offers and will include livers that were offered as a right lobe after being accepted for super-urgent and hepatoblastoma patients.
- 3.6.21. **Table 14** shows the outcome of named patient liver offers made during the first thirty months of the new scheme by type of patient and centre for CLD/HCC patients while **Table 14A** shows the equivalent information for variant syndrome patients. The proportion transplanted by centre ranged between 17% and 34% for elective CLD/HCC patients and 10% to 39% for elective variant syndrome patients.
- 3.6.22. **Table 15** shows the outcome of named patient liver offers made during the first thirty months of the new scheme by type of patient and blood group, separately, for CLD/HCC patients and variant syndrome patients.
- 3.6.23. **Table 16** shows the outcome of HCC named patient liver offers made during the first thirty months of the new scheme by UKELD, current ascites and encephalopathy grade. The majority of patients offered a liver had a UKELD of 54 or greater at offering and had no or mild ascites and encephalopathy grade 0.

Table 13 Offer outcome for named elective patient offers made between 20 March 2018 and 19 September 2020 (excluding 27 March 2020 to 9 July 2020), by aetiology

Type of patient	Disease group Disease group	Offer outcome for all named patient offers				Offer outcome for all named patient offers for livers that were ultimately transplanted			
		Declined	Accepted but not used	Transplanted	Total	Declined	Accepted but not used	Transplanted	Total
Chronic Liver Disease (CLD)	Hepatitis C	51 (56)	14 (15)	26 (29)	91	26 (43)	9 (15)	26 (43)	61
	ALD	429 (48)	190 (21)	271 (30)	890	234 (40)	80 (14)	271 (46)	585
	Hepatitis B	14 (42)	2 (6)	17 (52)	33	13 (42)	1 (3)	17 (55)	31
	PSC	148 (49)	66 (22)	90 (30)	304	92 (43)	33 (15)	90 (42)	215
	PBC	119 (49)	46 (19)	80 (33)	245	72 (40)	26 (15)	80 (45)	178
	AID	157 (53)	52 (18)	85 (29)	294	100 (47)	30 (14)	85 (40)	215
	Metabolic	344 (56)	99 (16)	171 (28)	614	194 (47)	50 (12)	171 (41)	415
	Other	46 (58)	14 (18)	19 (24)	79	30 (52)	9 (16)	19 (33)	58
	Retransplant	243 (62)	65 (16)	87 (22)	395	159 (55)	43 (15)	87 (30)	289
Hepatocellular carcinoma (HCC)		63 (47)	26 (19)	45 (34)	134	38 (39)	14 (14)	45 (46)	97
Total elective CLD/HCC		1614 (52)	574 (19)	891 (29)	3079	958 (45)	295 (14)	891 (42)	2144
Variant syndrome		187 (57)	61 (19)	80 (24)	328	125 (53)	33 (14)	80 (34)	238
Total named patient offers		1801 (52)	635 (19)	971 (29)	3407	1083 (45)	328 (14)	971 (41)	2382

Table 14 Offer outcome for named elective CLD/HCC patient offers made between 20 March 2018 and 19 September 2020 (excluding 27 March 2020 to 9 July 2020), by aetiology and centre

Type of patient	Centre	Offer outcome for all named patient offers				Offer outcome for all named patient offers for livers that were ultimately transplanted			
		Declined	Accepted but not used	Transplanted	Total	Declined	Accepted but not used	Transplanted	Total
Chronic Liver Disease (CLD)	Newcastle	189 (75)	22 (9)	40 (16)	251	117 (71)	7 (4)	40 (24)	164
	Leeds	171 (49)	72 (21)	104 (30)	347	92 (40)	36 (16)	104 (45)	232
	Cambridge	206 (61)	47 (14)	84 (25)	337	124 (53)	25 (11)	84 (36)	233
	Royal Free	195 (49)	90 (23)	111 (28)	396	126 (42)	61 (20)	111 (37)	298
	Kings								
	College	378 (55)	118 (17)	193 (28)	689	229 (49)	45 (10)	193 (41)	467
	Birmingham	259 (42)	148 (24)	213 (34)	620	137 (32)	79 (18)	213 (50)	429
	Edinburgh	153 (50)	51 (17)	101 (33)	305	95 (42)	28 (13)	101 (45)	224
Hepatocellular carcinoma (HCC)	Newcastle	0 (0)	1 (25)	3 (75)	4	0 (0)	0 (0)	3 (100)	3
	Leeds	9 (36)	9 (36)	7 (28)	25	5 (28)	6 (33)	7 (39)	18
	Cambridge	13 (81)	0 (0)	3 (19)	16	9 (75)	0 (0)	3 (25)	12
	Royal Free	7 (37)	3 (16)	9 (47)	19	5 (31)	2 (13)	9 (56)	16
	Kings								
	College	14 (52)	5 (19)	8 (30)	27	9 (47)	2 (11)	8 (42)	19
	Birmingham	13 (57)	3 (13)	7 (30)	23	6 (40)	2 (13)	7 (47)	15
	Edinburgh	7 (35)	5 (25)	8 (40)	20	4 (29)	2 (14)	8 (57)	14
Total elective CLD/HCC	Newcastle	189 (74)	23 (9)	43 (17)	255	117 (70)	7 (4)	43 (26)	167
	Leeds	180 (48)	81 (22)	111 (30)	372	97 (39)	42 (17)	111 (44)	250
	Cambridge	219 (62)	47 (13)	87 (25)	353	133 (54)	25 (10)	87 (36)	245
	Royal Free	202 (49)	93 (22)	120 (29)	415	131 (42)	63 (20)	120 (38)	314
	Kings								
	College	392 (55)	123 (17)	201 (28)	716	238 (49)	47 (10)	201 (41)	486
	Birmingham	272 (42)	151 (23)	220 (34)	643	143 (32)	81 (18)	220 (50)	444
	Edinburgh	160 (49)	56 (17)	109 (34)	325	99 (42)	30 (13)	109 (46)	238

Table 14A **Offer outcome for named elective variant syndrome patient offers made between 20 March 2018 and 19 September 2020 (excluding 27 March 2020 to 9 July), by aetiology and centre**

Type of patient	Centre	Offer outcome for all named patient offers				Offer outcome for all named patient offers for livers that were ultimately transplanted			
		Declined	Accepted but not used	Transplanted	Total	Declined	Accepted but not used	Transplanted	Total
Variant syndrome	Newcastle	7 (70)	2 (20)	1 (10)	10	4 (67)	1 (17)	1 (17)	6
	Leeds	29 (59)	6 (12)	14 (29)	49	19 (50)	5 (13)	14 (37)	38
	Cambridge	8 (50)	5 (31)	3 (19)	16	5 (56)	1 (11)	3 (33)	9
	Royal Free	8 (44)	3 (17)	7 (39)	18	6 (40)	2 (13)	7 (47)	15
	Kings								
	College	90 (63)	27 (19)	27 (19)	144	66 (61)	16 (15)	27 (25)	109
	Birmingham	30 (45)	14 (21)	23 (34)	67	15 (34)	6 (14)	23 (52)	44
	Edinburgh	15 (63)	4 (17)	5 (21)	24	10 (59)	2 (12)	5 (29)	17

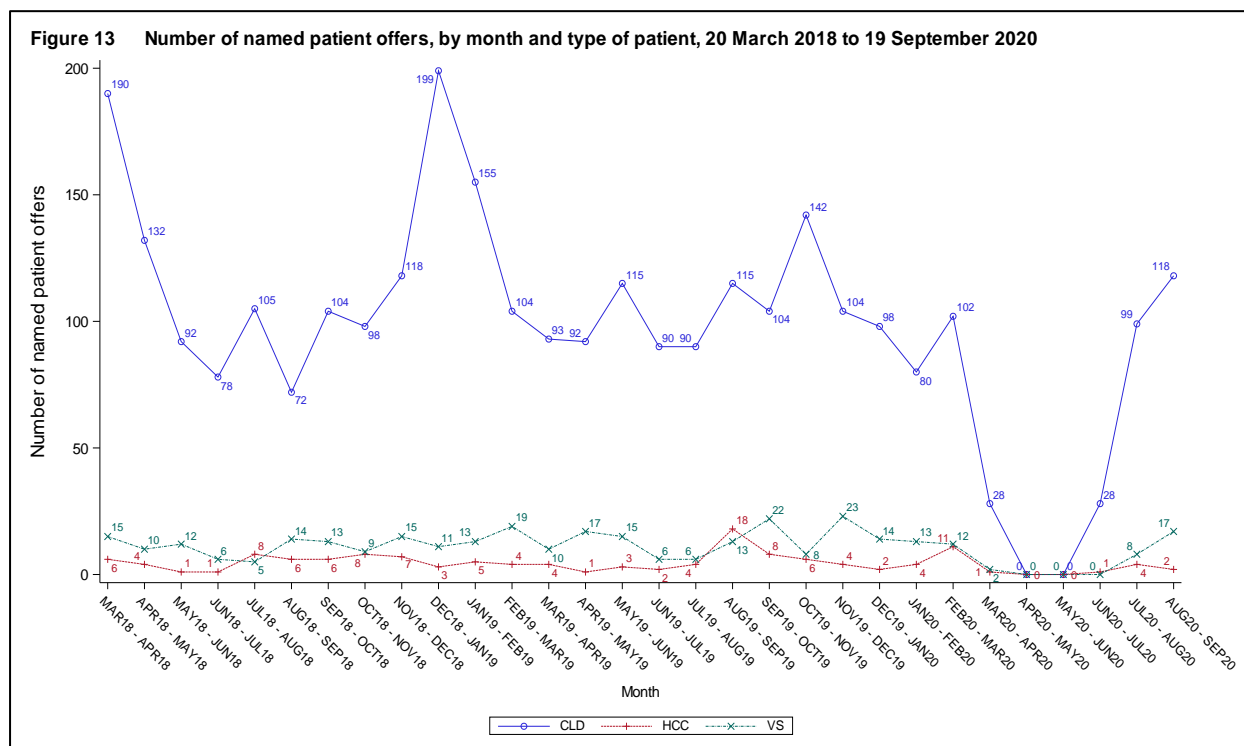
Table 15 Offer outcome for named elective CLD/HCC patient offers made between 20 March 2018 and 19 September 2020 (excluding 27 March 2020 to 9 July 2020), by aetiology and blood group

Type of patient	Blood group	Offer outcome for all named patient offers				Offer outcome for all named patient offers for livers that were ultimately transplanted			
		Declined	Accepted but not used	Transplanted	Total	Declined	Accepted but not used	Transplanted	Total
Chronic Liver Disease (CLD)	O	670 (54)	219 (18)	341 (28)	1230	420 (47)	125 (14)	341 (38)	886
	A	653 (52)	243 (19)	361 (29)	1257	380 (44)	120 (14)	361 (42)	861
	B	134 (49)	54 (20)	86 (31)	274	68 (38)	23 (13)	86 (49)	177
	AB	94 (51)	32 (17)	58 (32)	184	52 (42)	13 (11)	58 (47)	123
Hepatocellular carcinoma (HCC)	O	24 (50)	10 (21)	14 (29)	48	16 (46)	5 (14)	14 (40)	35
	A	30 (53)	7 (12)	20 (35)	57	16 (41)	3 (8)	20 (51)	39
	B	5 (36)	6 (43)	3 (21)	14	3 (33)	3 (33)	3 (33)	9
	AB	4 (27)	3 (20)	8 (53)	15	3 (21)	3 (21)	8 (57)	14
Total elective CLD/HCC	O	694 (54)	229 (18)	355 (28)	1278	436 (47)	130 (14)	355 (39)	921
	A	683 (52)	250 (19)	381 (29)	1314	396 (44)	123 (14)	381 (42)	900
	B	139 (48)	60 (21)	89 (31)	288	71 (38)	26 (14)	89 (48)	186
	AB	98 (49)	35 (18)	66 (33)	199	55 (40)	16 (12)	66 (48)	137
Variant syndrome	O	119 (60)	35 (18)	46 (23)	200	82 (57)	17 (12)	46 (32)	145
	A	56 (53)	21 (20)	29 (27)	106	39 (49)	12 (15)	29 (36)	80
	B	7 (44)	5 (31)	4 (25)	16	3 (27)	4 (36)	4 (36)	11
	AB	5 (83)	0 (0)	1 (17)	6	1 (50)	0 (0)	1 (50)	2

Table 16 Offer outcome for named elective HCC patient offers between 20 March 2018 and 19 September 2020 (excluding 27 March 2020 to 9 July 2020), by UKELD, ascites and encephalopathy grade

Ascites and encephalopathy grade	Offer outcome for all named patient offers				Offer outcome for all named patient offers for livers that were ultimately transplanted			
	Declined	Accepted but not used	Transplanted	Total	Declined	Accepted but not used	Transplanted	Total
UKELD < 49								
No ascites and encephalopathy grade 0	8 (44)	2 (11)	8 (44)	18	2 (18)	1 (9)	8 (73)	11
TOTAL	8 (44)	2 (11)	8 (44)	18	2 (18)	1 (9)	8 (73)	11
UKELD 49 - 53								
No ascites and encephalopathy grade 0	7 (39)	3 (17)	8 (44)	18	4 (29)	2 (14)	8 (57)	14
Mild ascites and encephalopathy grade 0	2 (50)	2 (50)	0 (0)	4	2 (50)	2 (50)	0 (0)	4
Moderate ascites and encephalopathy grade 1	0 (0)	0 (0)	1 (100)	1	0 (0)	0 (0)	1 (100)	1
TOTAL	9 (39)	5 (22)	9 (39)	23	6 (32)	4 (21)	9 (47)	19
UKELD 54 or over								
No ascites and encephalopathy grade 0	13 (48)	6 (22)	8 (30)	27	8 (44)	2 (11)	8 (44)	18
Mild ascites and encephalopathy grade 0	17 (55)	6 (19)	8 (26)	31	13 (52)	4 (16)	8 (32)	25
Moderate ascites and encephalopathy grade 0	6 (60)	0 (0)	4 (40)	10	4 (50)	0 (0)	4 (50)	8
Severe ascites and encephalopathy grade 0	1 (100)	0 (0)	0 (0)	1	1 (100)	0 (0)	0 (0)	1
No ascites and encephalopathy grade 1	3 (38)	3 (38)	2 (25)	8	1 (20)	2 (40)	2 (40)	5
Mild ascites and encephalopathy grade 1	5 (63)	0 (0)	3 (38)	8	2 (40)	0 (0)	3 (60)	5
Moderate ascites and encephalopathy grade 1	1 (14)	4 (57)	2 (29)	7	1 (25)	1 (25)	2 (50)	4
Severe ascites and encephalopathy grade 1	0 (0)	0 (0)	1 (100)	1	0 (0)	0 (0)	1 (100)	1
TOTAL	46 (49)	19 (20)	28 (30)	93	30 (45)	9 (13)	28 (42)	67
OVERALL								
No ascites and encephalopathy grade 0	28 (44)	11 (17)	24 (38)	63	14 (33)	5 (12)	24 (56)	43
Mild ascites and encephalopathy grade 0	19 (54)	8 (23)	8 (23)	35	15 (52)	6 (21)	8 (28)	29
Moderate ascites and encephalopathy grade 0	6 (60)	0 (0)	4 (40)	10	4 (50)	0 (0)	4 (50)	8
Severe ascites and encephalopathy grade 0	1 (100)	0 (0)	0 (0)	1	1 (100)	0 (0)	0 (0)	1
No ascites and encephalopathy grade 1	3 (38)	3 (38)	2 (25)	8	1 (20)	2 (40)	2 (40)	5
Mild ascites and encephalopathy grade 1	5 (63)	0 (0)	3 (38)	8	2 (40)	0 (0)	3 (60)	5
Moderate ascites and encephalopathy grade 1	1 (13)	4 (50)	3 (38)	8	1 (20)	1 (20)	3 (60)	5
Severe ascites and encephalopathy grade 1	0 (0)	0 (0)	1 (100)	1	0 (0)	0 (0)	1 (100)	1

3.6.24. **Figure 13** shows the number of named patient offers by month and type of patient. The median number of CLD named patient offers per month, excluding offers between 20 March and 19 July 2020, was 104 and ranged between 72 and 199 whilst the median number of HCC offers per month was 4 and ranged between 1 and 11 excluding the month between 20 August 2019 and 19 September 2019 due to issues with NLOS.



3.6.25. **Table 17** shows the median Transplant Benefit Score (TBS) at time of offer for named elective CLD patient offers by, separately, aetiology, blood group and centre. Overall, the median TBS was 1164 days and ranged between -156 and 1627 days. The median TBS ranged between 979 days for other aetiology and 1254 days for Autoimmune and cryptogenic disease (AID). For blood group, the median TBS ranged between 975 days for blood group AB and 1223 days for blood group O.

Table 17 Median (Range) Transplant Benefit Score (TBS) for named elective chronic liver disease (CLD) patient offers, 20 March 2018 to 19 September 2020 (excluding 27 March 2020 to 9 July 2020)

	Number of offers	Median TBS	Interquartile range	Range
Disease group				
Hepatitis C	91	1093.48194	919 - 1292	-43 - 1431
ALD	890	1225.64666	1043 - 1341	-138 - 1591
Hepatitis B	33	1218.06168	998 - 1392	748 - 1617
PSC	304	1171.38475	1049 - 1309	-156 - 1560
PBC	245	1083.04247	990 - 1211	484 - 1452
AID	294	1253.85698	1044 - 1359	-93 - 1620
Metabolic	614	1180.87977	1038 - 1312	235 - 1627
Other	79	979.31403	836 - 1101	-118 - 1480
Retransplant	395	1104.97634	1005 - 1223	9 - 1512
Blood group				
O	1230	1223.40167	1091 - 1347	106 - 1627
A	1257	1123.06302	968 - 1280	-118 - 1620
B	274	1137.08252	992 - 1278	96 - 1520
AB	184	975.40179	732 - 1227	-156 - 1551
Centre				
Newcastle	251	1211.83046	1036 - 1311	11 - 1592
Leeds	347	1147.76098	1016 - 1306	-156 - 1574
Cambridge	337	1203.12373	1022 - 1304	235 - 1591
Royal Free	396	1171.41758	1008 - 1318	96 - 1562
Kings College	689	1157.25340	1020 - 1321	-118 - 1627
Birmingham	620	1157.83910	1018 - 1301	23 - 1617
Edinburgh	305	1131.87062	1009 - 1289	106 - 1620
OVERALL	2945	1163.93360	1017 - 1307	-156 - 1627

3.6.26. **Table 18** shows the median Transplant Benefit Score (TBS) at time of offer for named elective HCC patient offers by, separately, blood group, centre, UKELD group, current ascites and encephalopathy grade. The median TBS ranged between 515 days for blood group AB and 1132 days for blood group O.

Table 18

Median (Range) Transplant Benefit Score (TBS) for named elective hepatocellular carcinoma (HCC) patient offers, 20 March 2018 to 19 September 2020 (excluding 27 March 2020 to 9 July 2020)

	Number of offers	Median TBS	Interquartile range	Range
Blood group				
O	48	1132.14643	1059 - 1290	23 - 1450
A	57	998.65225	810 - 1238	-75 - 1493
B	14	935.47610	676 - 1111	50 - 1289
AB	15	515.29780	-55 - 603	-256 - 1011
Centre				
Newcastle	4	1161.33589	489 - 1329	-55 - 1369
Leeds	25	967.38588	889 - 1164	93 - 1246
Cambridge	16	1269.85060	861 - 1401	30 - 1493
Royal Free	19	901.95642	403 - 1313	-256 - 1414
Kings College	27	1058.44856	791 - 1154	-198 - 1319
Birmingham	23	980.25665	549 - 1111	-75 - 1350
Edinburgh	20	1073.31382	922 - 1165	182 - 1450
UKELD group				
<49	18	206.25655	23 - 474	-256 - 1016
49-53	23	809.96870	597 - 980	-198 - 1360
≥ 54	93	1111.16189	976 - 1275	30 - 1493
UKELD, Current ascites and encephalopathy grade				
<49				
No ascites and encephalopathy grade 0	18	206.25655	23 - 474	-256 - 1016
49 - 53				
No ascites and encephalopathy grade 0	18	856.02299	610 - 999	-198 - 1360
Mild ascites and encephalopathy grade 0	4	756.81151	240 - 942	-118 - 967
Moderate ascites and encephalopathy grade 1	1	603.31420	603 -	603 - 603
≥ 54				
No ascites and encephalopathy grade 0	27	1110.59713	1049 - 1230	934 - 1319
Mild ascites and encephalopathy grade 0	31	1274.59424	902 - 1369	515 - 1493
Moderate ascites and encephalopathy grade 0	10	1094.30878	1062 - 1164	642 - 1450
Severe ascites and encephalopathy grade 0	1	855.00706	855	855
No ascites and encephalopathy grade 1	8	935.47610	643 - 990	30 - 1437
Mild ascites and encephalopathy grade 1	8	1058.00760	917 - 1164	676 - 1287
Moderate ascites and encephalopathy grade 1	7	1157.29854	986 - 1289	791 - 1350
Severe ascites and encephalopathy grade 1	1	1163.56961	1164	1164
OVERALL	134	1031.31126	721 - 1229	-256 - 1493

3.7. TRANSPLANT ACTIVITY

3.7.1. **Table 19** shows the urgency status and age group of DBD and DCD liver transplants performed in the UK during the two time periods of interest. Although a higher proportion of super-urgent transplants were performed in the first thirty months of the new NLOS than during the thirty months prior to the new scheme, there was no evidence of a statistically significant difference for DBD liver and liver/kidney transplants (overall Fishers exact p-value=0.9 for adult patients and 0.11 for paediatric), Highlighted in red are the transplants that will be analysed further in the rest of the section.

Table 19 Urgency status and age group for deceased donor liver transplants performed in the UK, 20 September 2015 to 19 September 2020, as at 1 October 2020

	DBD liver		DCD liver	
	Thirty months prior N (%)	Thirty months post N (%)	Thirty months prior N (%)	Thirty months post N (%)
Adult elective liver and liver/kidney	1480 (77.7)	1471 (77.1)	503 (96)	418 (97.2)
Adult elective Multivisceral	12 (0.6)	11 (0.6)	0 (0)	0 (0)
Adult elective liver/ cardiothoracic	2 (0.1)	5 (0.3)	0 (0)	0 (0)
Adult super-urgent liver and liver/kidney	211 (11.1)	213 (11.2)	5 (1)	5 (1.2)
Adult super-urgent Multivisceral	2 (0.1)	0 (0)	0 (0)	0 (0)
Paediatric elective liver and liver/kidney	160 (8.4)	156 (8.2)	16 (3.1)	5 (1.2)
Paediatric elective Multivisceral	10 (0.5)	8 (0.4)	0 (0)	0 (0)
Paediatric super-urgent liver and liver/kidney	28 (1.5)	43 (2.3)	0 (0)	2 (0.5)
Total UK transplants	1905 (100)	1907 (100)	524 (100)	430 (100)

3.7.2. One hundred and forty one of the 1471 adult elective liver and liver/kidney transplants were performed in the UK between 27 March 2020 and 9 July 2020. These transplants are **excluded** from the rest of the section as DBD livers were not offered through the National Liver Offering Scheme due to COVID-19 and both DBD and DCD livers were offered to clinically urgent patients.

3.7.3. **Table 20** and **Table 21** show the demographics of adult elective liver and liver/kidney DBD and DCD transplants performed in the UK during the two time periods of interest excluding transplants performed between 27 March and 9 July 2020. For both DBD and DCD transplants, there was no evidence of a statistically significant association between time period and transplant type (p=0.4 DBD, 0.3 DCD), type of liver transplanted for DBD (p=0.19) and gender (p=0.10 DBD, 0.2 DCD).

3.7.4. For DBD transplants, there was evidence of a statistically significant association between time period and age group (p=0.0002), disease group (p<0.0001), transplant centre (p=0.0075), zonal (p<0.0001), type of patient (p=0.002) and blood group compatibility (p=0.0002).

3.7.5. For DCD transplants, there was evidence of a statistically significant association between time period and disease group (p=0.0005), transplant centre (p<0.0001), type of patient (p=0.0005) and

blood group compatibility ($p=0.0004$). There was no evidence of a statistically significant association for age group and zonal transplants ($p=0.2$ for both).

Table 20 Adult elective liver and liver/kidney transplants performed in the UK using livers from deceased donors, 20 September 2015 to 19 September 2020 (excluding 27 March to 9 July 2020) as at 1 October 2020

	DBD liver		DCD liver	
	Thirty months prior N (%)	Thirty months post N (%)	Thirty months prior N (%)	Thirty months post N (%)
Total	1480	1353	503	395
Transplant Type				
Liver only	1441 (97.4)	1324 (97.9)	503 (100)	394 (99.7)
Liver & kidney	39 (2.6)	29 (2.1)	0 (-)	1 (0.3)
Type of Liver transplanted				
Whole liver	1366 (92.3)	1265 (93.5)	503 (100)	395 (100)
Split liver	114 (7.7)	87 (6.4)	0 (-)	0 (-)
Reduced liver	0 (-)	1 (0.1)	0 (-)	0 (-)
Recipient Age Group				
17-25 years	76 (5.1)	79 (5.8)	9 (1.8)	10 (2.5)
26-39 years	198 (13.4)	139 (10.3)	29 (5.8)	36 (9.1)
40-49 years	240 (16.2)	155 (11.5)	81 (16.1)	55 (13.9)
50-59 years	476 (32.2)	461 (34.1)	195 (38.8)	144 (36.5)
60-69 years	462 (31.2)	495 (36.6)	172 (34.2)	143 (36.2)
70+ years	28 (1.9)	24 (1.8)	17 (3.4)	7 (1.8)
Recipient Sex				
Male	956 (64.6)	834 (61.6)	319 (63.4)	266 (67.3)
Female	524 (35.4)	519 (38.4)	184 (36.6)	129 (32.7)
Type of Patient				
CLD	1100 (74.3)	1064 (78.6)	332 (66)	218 (55.2)
HCC	252 (17)	162 (12)	153 (30.4)	158 (40)
VS	119 (8)	116 (8.6)	15 (3)	8 (2)
HCC downstaging	9 (0.6)	11 (0.8)	3 (0.6)	11 (2.8)
Robert's Disease Group				
HCC	261 (17.6)	173 (12.8)	156 (31)	169 (42.8)
HCV	54 (3.6)	32 (2.4)	16 (3.2)	7 (1.8)
ALD	342 (23.1)	353 (26.1)	128 (25.4)	86 (21.8)
HBV	23 (1.6)	21 (1.6)	8 (1.6)	3 (0.8)
PSC	182 (12.3)	140 (10.3)	45 (8.9)	32 (8.1)
PBC	87 (5.9)	113 (8.4)	55 (10.9)	27 (6.8)
AID	91 (6.1)	114 (8.4)	28 (5.6)	13 (3.3)
NAFLD	136 (9.2)	160 (11.8)	47 (9.3)	25 (6.3)
Metabolic (excluding NAFLD)	28 (1.9)	41 (3)	6 (1.2)	4 (1)
Other	129 (8.7)	94 (6.9)	9 (1.8)	18 (4.6)
Retransplant	147 (9.9)	112 (8.3)	5 (1)	11 (2.8)
Transplant Centre				
Newcastle	80 (5.4)	56 (4.1)	14 (2.8)	7 (1.8)
Leeds	230 (15.5)	164 (12.1)	58 (11.5)	50 (12.7)
Cambridge	159 (10.7)	133 (9.8)	85 (16.9)	83 (21)
Royal Free	196 (13.2)	187 (13.8)	34 (6.8)	68 (17.2)
Kings College	305 (20.6)	315 (23.3)	130 (25.8)	91 (23)
Birmingham	319 (21.6)	345 (25.5)	137 (27.2)	77 (19.5)
Edinburgh	191 (12.9)	153 (11.3)	45 (8.9)	19 (4.8)

Table 21 Adult elective liver and liver/kidney transplants performed in the UK using livers from deceased donors, 20 September 2015 to 19 September 2020 (excluding 27 March to 9 July 2020) as at 1 October 2020

	DBD liver		DCD liver	
	Thirty months prior	Thirty months post	Thirty months prior	Thirty months post
	N (%)	N (%)	N (%)	N (%)
Total UK adult elective liver & liver/kidney transplants	1480	1353	503	395
Liver Transplant Number				
First liver transplant	1333 (90.1)	1240 (91.6)	498 (99)	384 (97.2)
Second	119 (8)	99 (7.3)	4 (0.8)	11 (2.8)
Third	21 (1.4)	11 (0.8)	1 (0.2)	0 (-)
Fourth	6 (0.4)	3 (0.2)	0 (-)	0 (-)
Sixth	1 (0.1)	0 (-)	0 (-)	0 (-)
Blood Group Compatibility				
Identical	1458 (98.5)	1301 (96.2)	500 (99.4)	379 (95.9)
Compatible	21 (1.4)	52 (3.8)	2 (0.4)	16 (4.1)
Incompatible	1 (0.1)	0 (-)	1 (0.2)	0 (-)
Zonal Transplants				
Non zonal	393 (26.6)	1080 (79.8)	182 (36.2)	158 (40)
Zonal	1087 (73.4)	273 (20.2)	321 (63.8)	237 (60)
Blood group matching (D=donor, R=recipient)				
DO, RO	633 (42.8)	603 (44.6)	248 (49.3)	170 (43)
DO, RA	1 (0.1)	3 (0.2)	0 (-)	3 (0.8)
DO, RB	4 (0.3)	6 (0.4)	1 (0.2)	10 (2.5)
DO, RAB	0 (-)	0 (-)	0 (-)	1 (0.3)
DA, RO	1 (0.1)	0 (-)	1 (0.2)	0 (-)
DA, RA	634 (42.8)	529 (39.1)	200 (39.8)	169 (42.8)
DA, RAB	16 (1.1)	35 (2.6)	1 (0.2)	1 (0.3)
DB, RB	150 (10.1)	124 (9.2)	43 (8.5)	30 (7.6)
DB, RAB	0 (-)	8 (0.6)	0 (-)	1 (0.3)
DAB, RAB	41 (2.8)	45 (3.3)	9 (1.8)	10 (2.5)

3.7.6. **Table 22** shows the median waiting time to transplant for the adult elective transplants performed in the UK during the two time periods of interest (excluding 27 March to 9 July 2020) by donor type, transplant centre, blood group and type of patient. Overall, the median time to transplant was statistically significantly lower for DBD transplants performed during the thirty months post NLOS compared with the thirty months prior (39 and 79.5 days respectively, Kruskal-Wallis p-value<0.0001). The median time to DCD transplants was slightly lower in the thirty months post NLOS compared with the thirty months prior (53 and 64 days respectively) but this was borderline statistically significant (Kruskal-Wallis p-value=0.06).

Table 22 Median (IQR; range) time to transplant (days) for adult elective liver and liver/kidney transplants performed in the UK using livers from deceased donors, 20 September 2015 to 19 September 2020 (excluding 27 March to 9 July 2020) as at 1 October 2020

	DBD						DCD					
	N	Thirty months prior Median (IQR)	Range	N	Thirty months post Median (IQR)	Range	N	Thirty months prior Median (IQR, range)	Range	N	Thirty months post Median (IQR, range)	Range
Overall	1474	79.5 (27 - 220)	0 - 2307	1352	39 (9 - 140)	0 - 1711	503	64 (24 - 178)	0 - 1026	395	53 (20 - 135)	0 - 1101
Type of patient												
CLD	1096	73 (25 - 198.5)	0 - 1727	1063	27 (7 - 96)	0 - 1593	332	65 (24 - 178)	0 - 875	218	54 (18 - 130)	0 - 1101
HCC	251	79 (29 - 200)	1 - 1030	162	64.5 (27 - 151)	0 - 739	153	61 (25 - 154)	0 - 1026	158	51.5 (23 - 142)	2 - 607
VS	119	243 (74 - 576)	2 - 2307	116	353.5 (160.5 - 668)	2 - 1711	15	257 (38 - 381)	7 - 870	8	111 (58 - 260.5)	5 - 559
HCC downstaging	8	89.5 (70.5 - 112)	16 - 384	11	22 (10 - 65)	4 - 204	3	51 (13 - 55)	13 - 55	11	39 (12 - 55)	11 - 323
Centre												
Newcastle	79	51 (15 - 116)	1 - 738	56	39 (15 - 106)	1 - 517	14	92 (25 - 168)	5 - 347	7	154 (103 - 452)	22 - 588
Leeds	229	57 (24 - 176)	1 - 1402	164	35.5 (9 - 127)	1 - 1405	58	68 (24 - 185)	0 - 1026	50	38.5 (12 - 99)	2 - 565
Cambridge	157	87 (32 - 221)	0 - 1343	132	23.5 (9 - 69)	1 - 760	85	65 (27 - 192)	0 - 870	83	46 (18 - 110)	2 - 625
Royal Free	195	110 (49 - 256)	0 - 945	187	33 (9 - 112)	0 - 1261	34	97.5 (35 - 185)	1 - 369	68	55 (23 - 141.5)	2 - 693
Kings College	305	138 (58 - 324)	1 - 1813	315	49 (10 - 193)	1 - 1711	130	120.5 (47 - 245)	4 - 776	91	79 (27 - 197)	3 - 1101
Birmingham	318	59.5 (21 - 179)	0 - 2307	345	50 (9 - 161)	0 - 1657	137	38 (16 - 93)	0 - 548	77	44 (16 - 98)	0 - 487
Edinburgh	191	53 (19 - 131)	0 - 1835	153	37 (9 - 122)	1 - 1124	45	55 (22 - 190)	0 - 808	19	51 (38 - 224)	6 - 383
Recipient blood group												
O	631	117 (39 - 314)	0 - 2307	602	57.5 (12 - 207)	0 - 1711	249	106 (33 - 229)	0 - 1026	170	64.5 (26 - 175)	0 - 1101
A	634	56.5 (20 - 134)	0 - 1321	532	26 (7 - 93.5)	0 - 1056	200	44 (18 - 97.5)	0 - 711	172	44 (18 - 84)	2 - 588
B	152	138.5 (59 - 322)	0 - 1813	130	61 (17 - 151)	2 - 1518	44	101.5 (40 - 216.5)	4 - 783	40	96 (37 - 177)	2 - 607
AB	57	38 (14 - 103)	0 - 540	88	26.5 (7 - 65.5)	1 - 466	10	41 (9 - 111)	3 - 183	13	23 (8 - 84)	6 - 111

- 3.7.7. **Figure 14** show the overall cold ischaemia time for the two time periods for DBD transplants while **Figure 15** shows the cold ischaemia time for each centre. **Figures 16** and **Figure 17** show the equivalent information for DCD donor transplants. There was no statistically significant difference in the overall median cold ischaemia time for DCD transplants (Kruskal-Wallis p-value=0.5).
- 3.7.8. There was a statistically significant difference in the cold ischaemia time for adult elective DBD transplants when comparing the first thirty months with the previous thirty months ($p < 0.0001$). However, it should be noted that these results will change as NHSBT has not received all the first week transplant record forms which collect the cold ischaemia time. It should also be noted that this analysis does not adjust for whether machine perfusion was used.

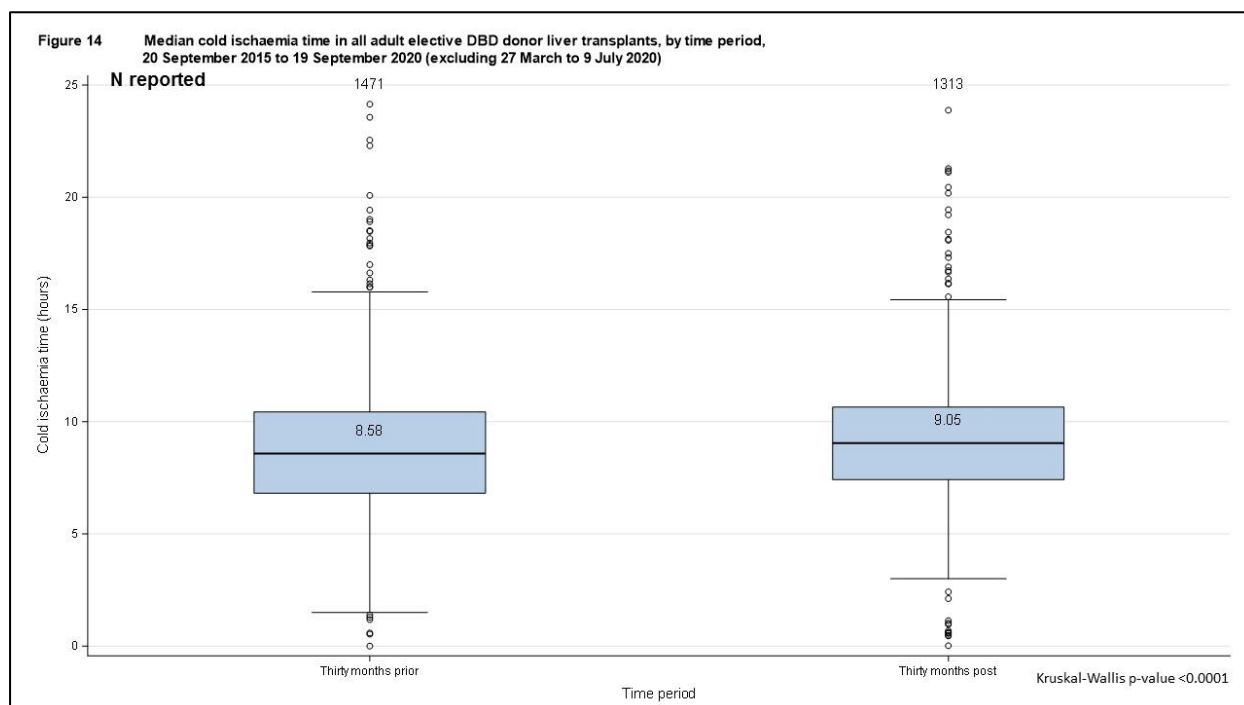


Figure 15 Median cold ischaemia time in all adult elective DBD donor liver transplants, by transplant centre, 20 September 2015 to 19 September 2020 (excluding 27 March to 9 July 2020)

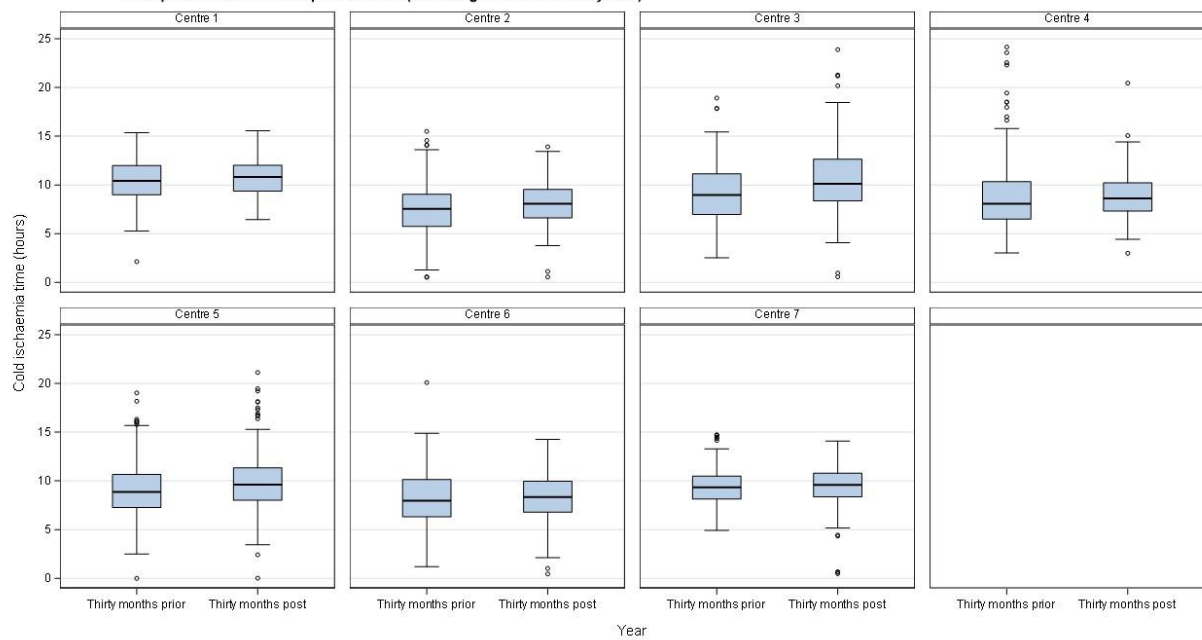
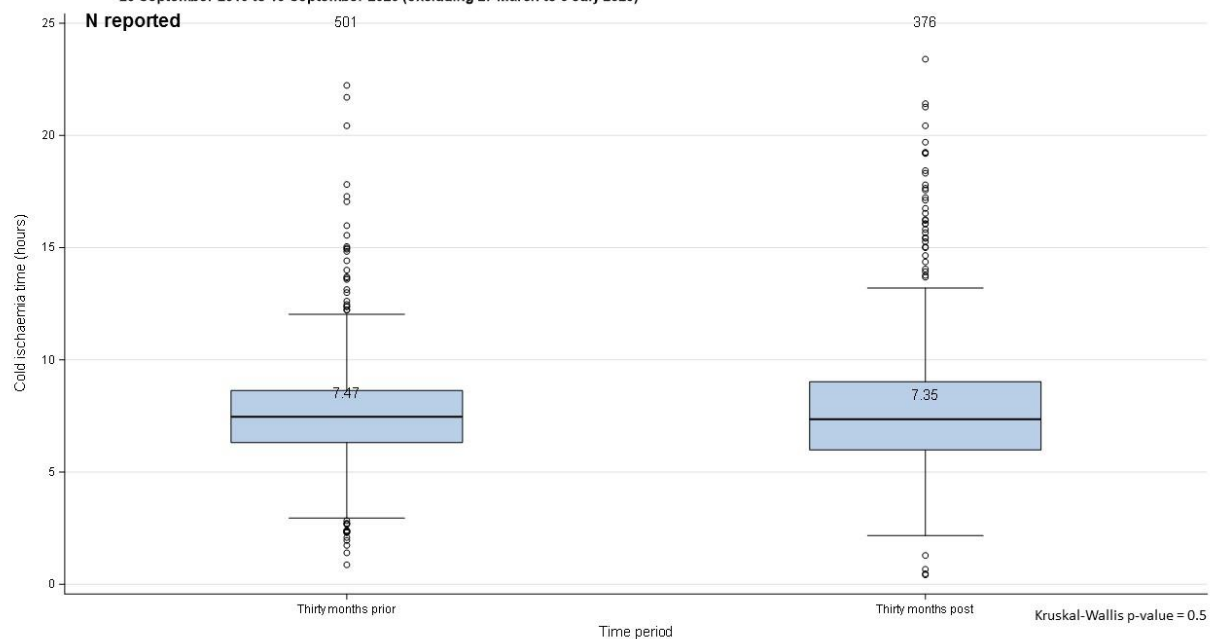
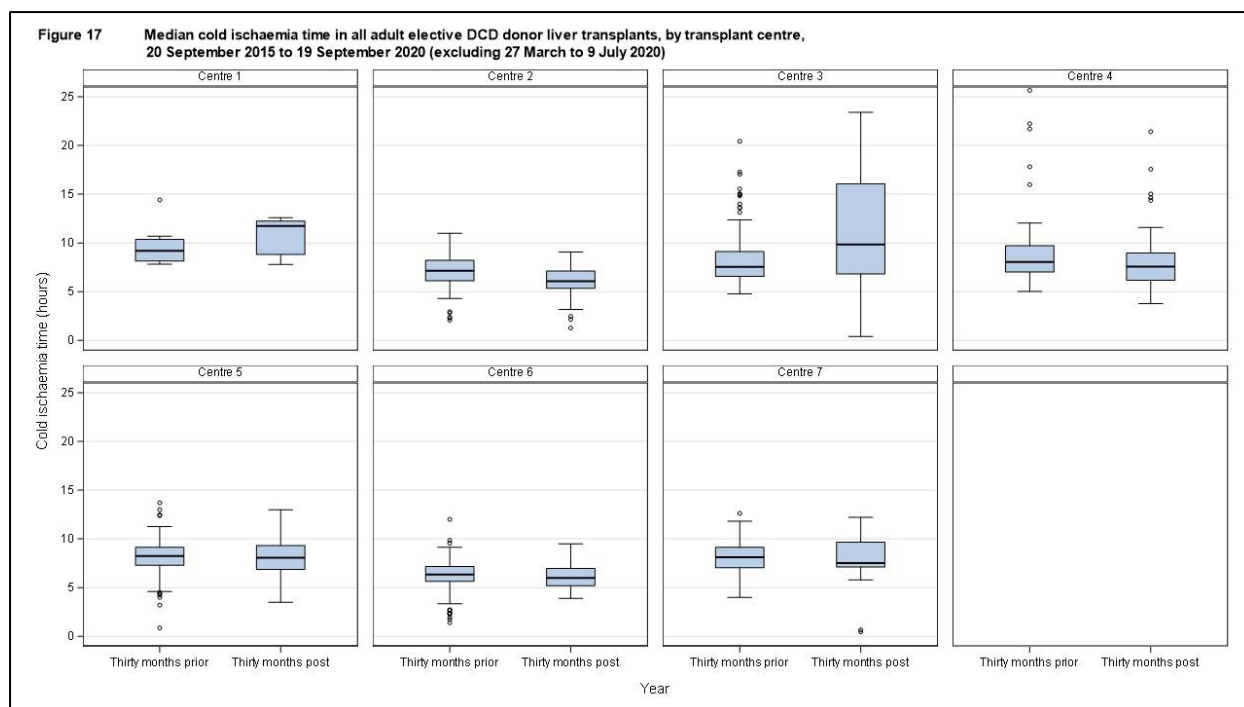


Figure 16 Median cold ischaemia time in all adult elective DCD donor liver transplants, by time period, 20 September 2015 to 19 September 2020 (excluding 27 March to 9 July 2020)





3.8. NINETY-DAY POST-TRANSPLANT SURVIVAL

3.8.1. **Figure 18** shows the unadjusted ninety-day patient survival by time period and donor type for transplants performed in either the twenty-seven months prior to NLOS or in the first twenty-seven months of NLOS while **Table 23** shows the survival estimates and confidence intervals by blood group and type of patient. Transplants performed on or after 26 March 2020 were excluded either due to offering during COVID-19 or so that all transplants had a minimum of 90 days post-transplant. Patient survival was defined as the time from first transplant to death or last known survival reported to NHSBT irrespective of whether the patient received a retransplant after their first transplant.

3.8.2. For DBD transplants, there was no overall statistically significant difference between the two time periods in 90-day patient survival (Log-rank p-value=0.24). However, there was a statistically significant difference in ninety-day survival for blood group O patients (log-rank p-value=0.007. There were no statistically significant differences between the two time periods for CLD and HCC (log rank p-value \geq 0.4) and for the individual centres apart from centre 7 (log rank p-value \geq 0.2).

3.8.3. For DCD transplants, there was no overall statistically significant difference at a 5% significance level overall between the two time periods in 90-day patient survival (Log-rank p-value=0.16). There were no statistically significant differences between the two time periods for the four types of patients (log rank p-value \geq 0.2), blood groups (log rank p-value \geq 0.15) and for the individual centres (log rank p-value \geq 0.15).

3.8.4. **Figure 19** shows the unadjusted ninety-day patient survival by year and donor type for transplants performed between 20 March 2013 and 26 March 2020. There were no statistically significant differences in patient survival between the time periods for DBD and DCD (log-rank p-value=0.6 and 0.5 respectively).

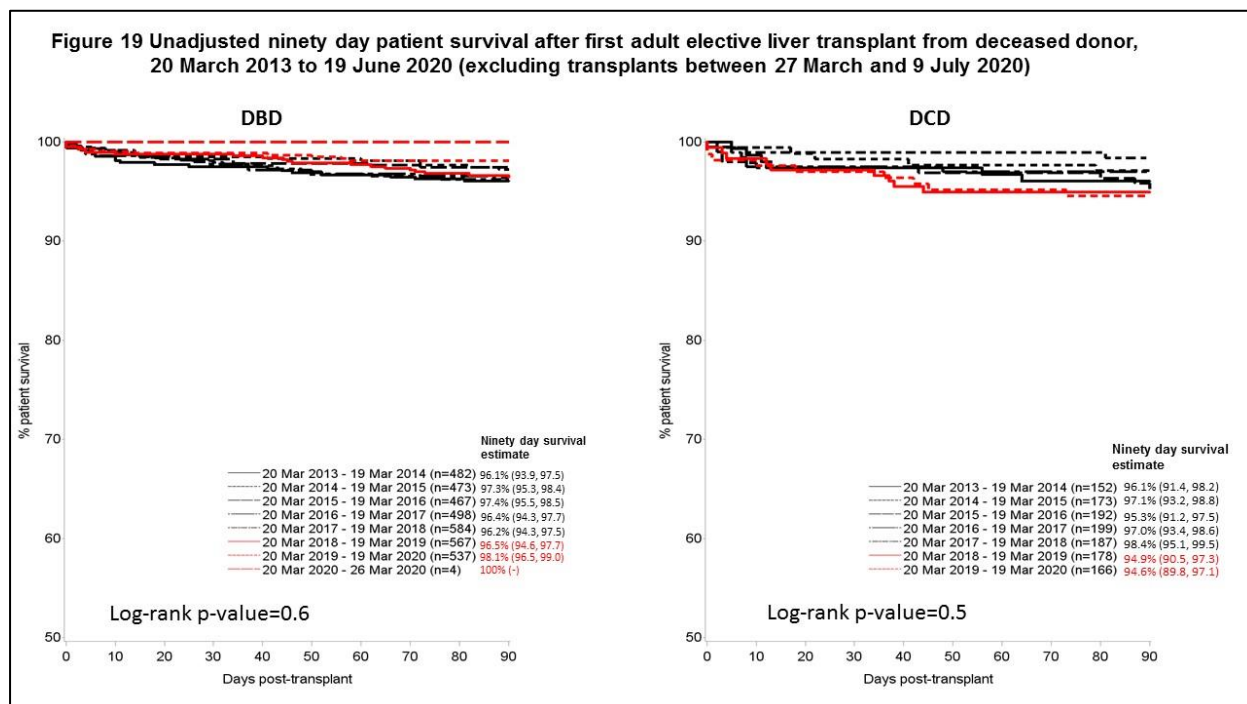
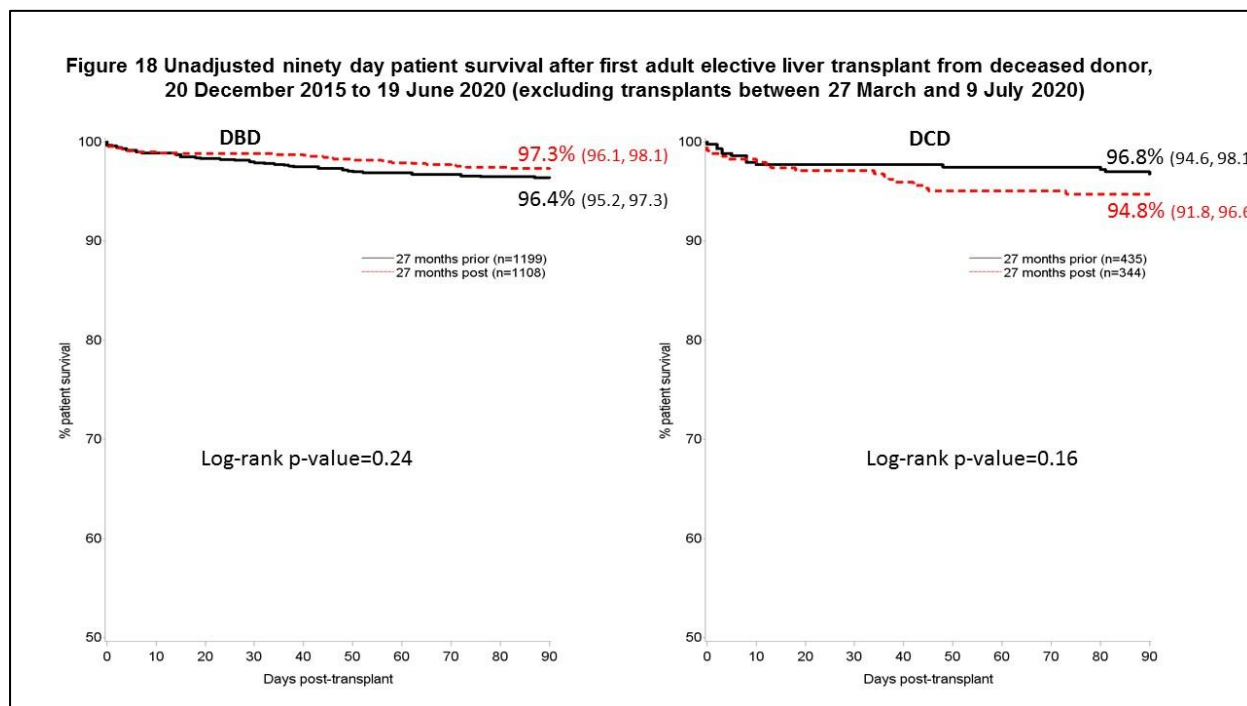


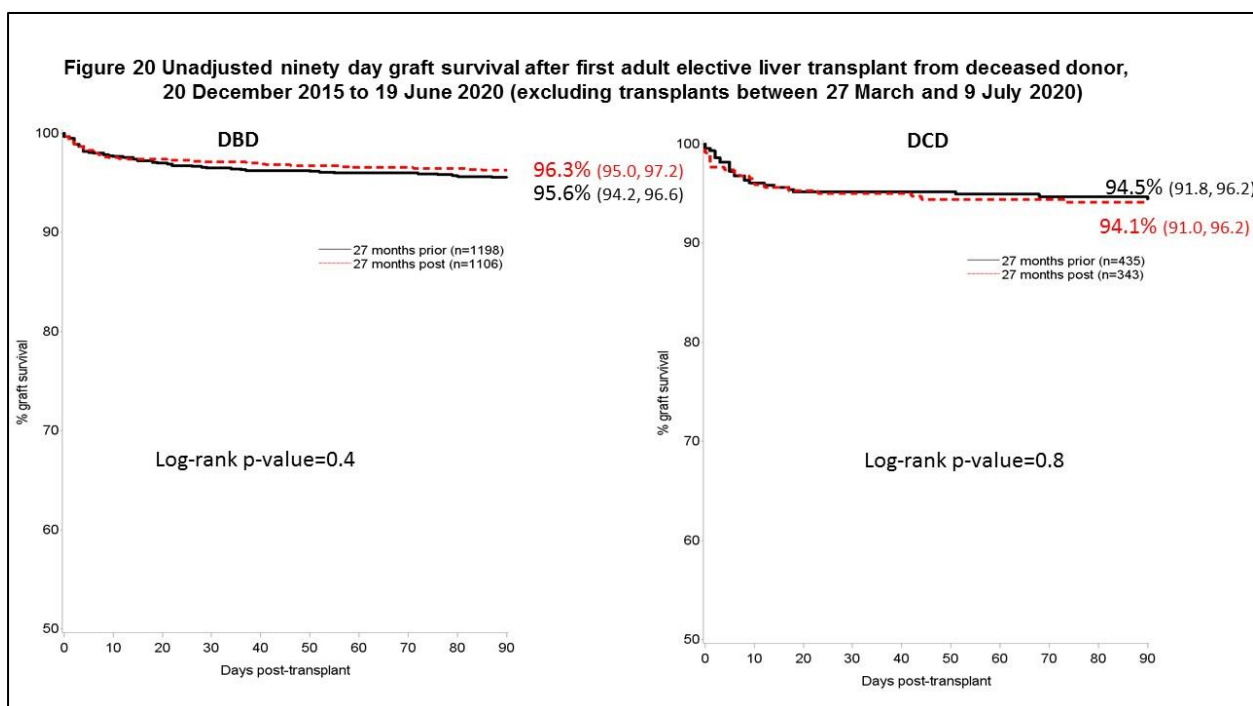
Table 23 90 day patient survival (95% confidence interval) for first adult elective liver and liver/kidney transplants performed in the UK using livers from deceased donors, 20 December 2015 to 19 June 2020 (excluding 27 March to 9 July 2020)

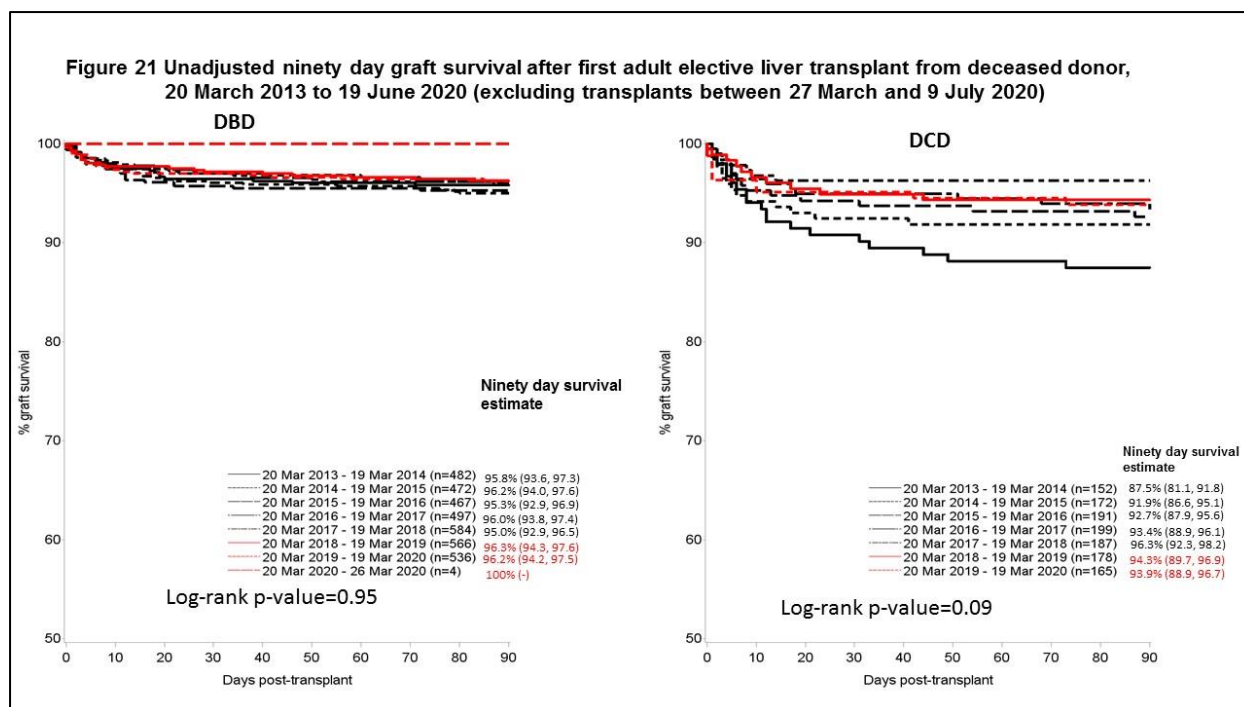
	Twenty-seven months prior ¹		DBD Twenty-seven months post ²		Log-rank p-value	Twenty-seven months prior ¹		DCD Twenty-seven months post ²		Log-rank p-value
	No, at risk on day 0	% (95% CI)	No, at risk on day 0	% (95% CI)		No, at risk on day 0	% (95% CI)	No, at risk on day 0	% (95% CI)	
Overall	1199	96.4 (95.2,97.3)	1108	97.3 (96.1,98.1)	0.2	435	96.8 (94.6,98.1)	344	94.8 (91.8,96.7)	0.16
Type of patient										
CLD	869	96.2 (94.7,97.3)	852	96.9 (95.5,97.9)	0.4	279	96.8 (93.9,98.3)	188	96.3 (92.3,98.2)	0.8
HCC	226	98.2 (95.3,99.3)	146	97.9 (93.7,99.3)	0.8	139	96.4 (91.5,98.5)	140	92.8 (87.1,96.1)	0.19
VS	96	93.8 (86.6,97.1)	100	99.0 (93.1,99.9)	0.05	14	100 (-)	5	100 (-)	-
HCC downstaging	8	100 (-)	10	100 (-)	-	3	100 (-)	11	90.9 (50.8,98.7)	0.6
Recipient blood group										
O	515	94.8 (92.4,96.4)	500	98.0 (96.2,98.9)	0.007	220	96.8 (93.4,98.5)	146	93.8 (88.5,96.7)	0.15
A	515	97.7 (95.9,98.7)	427	96.9 (94.8,98.2)	0.5	169	96.4 (92.3,98.4)	150	96.6 (92.1,98.6)	0.9
B	126	99.2 (94.5,99.9)	109	95.4 (89.3,98.1)	0.07	39	97.4 (83.2,99.6)	38	92.1 (77.5,97.4)	0.3
AB	43	93.0 (79.7,97.7)	72	97.2 (89.3,99.3)	0.3	7	100 (-)	10	90.0 (47.3,98.5)	0.4
Centre										
Newcastle	61	91.8 (81.4,96.5)	46	95.7 (83.7,98.9)	0.4	12	100 (-)	7	100 (-)	-
Leeds	193	93.3 (88.7,96.0)	114	94.7 (88.6,97.6)	0.6	50	96.0 (84.9,99.0)	38	92.1 (77.5,97.4)	0.4
Cambridge	135	97.8 (93.3,99.3)	120	97.5 (92.4,99.2)	0.9	75	96.0 (88.1,98.7)	68	95.6 (86.9,98.6)	0.9
Royal Free	167	95.8 (91.4,98.0)	166	96.9 (92.7,98.7)	0.6	29	96.6 (77.9,99.5)	64	93.8 (84.2,97.6)	0.6
Kings College	232	98.7 (96.0,99.6)	264	98.9 (96.5,99.6)	0.9	115	99.1 (94.0,99.9)	79	96.1 (88.3,98.7)	0.16
Birmingham	257	95.7 (92.4,97.6)	271	97.8 (95.1,99.0)	0.2	119	94.1 (88.1,97.2)	71	94.4 (85.7,97.8)	0.9
Edinburgh	154	99.4 (95.5,99.9)	127	95.9 (90.3,98.3)	0.05	35	100 (-)	17	94.1 (65.0,99.1)	0.15

¹ 20 December 2015 to 19 March 2018

² 20 March 2018 to 26 March 2020

- 3.8.5. **Figure 20** shows the unadjusted ninety-day graft survival by time period and donor type for transplants performed in either the twenty-seven months prior to NLOS or in the first twenty-seven months of NLOS while **Figure 21** shows the unadjusted graft survival for transplants performed in the last seven years. Transplants performed on or after 27 March 2020 were excluded either due to offering during COVID-19 or so that all transplants had a minimum of 90 days post-transplant. Graft survival was defined as the time from first transplant to retransplant or last known survival reported to NHSBT. Patients who received a second transplant were treated as events while patients who were alive with a functioning first transplant were censored at 90 days.
- 3.8.6. There were no statistically significant differences in the unadjusted ninety day graft survival between the two time periods for DBD and DCD transplants (log-rank p-value=0.4 and 0.8) and for DBD transplants performed over the last seven years (log-rank p-value=0.95). Although there were statistically significant differences at a 10% significance level between the seven year time periods for DCD transplants (log-rank p-value=0.09), the survival curves post NLOS were not the lowest survival curve.





3.8.7. **Figure 22** shows the unadjusted ninety-day transplant survival by time period and donor type for transplants performed in either the twenty-seven months prior to NLOS or in the first twenty-seven months of NLOS while **Figure 23** shows the unadjusted transplant survival for transplants performed in the last seven years. Transplants performed on or after 27 March 2020 were excluded either due to offering during COVID-19 or so that all transplants had a minimum of 90 days post-transplant. Transplant survival was defined as the time from first transplant to retransplant, death or last known survival reported to NHSBT. Patients who received a second transplant or who died post-transplant were treated as events while patients who were alive with a functioning first transplant were censored at 90 days.

3.8.8. There were no statistically significant differences in the unadjusted ninety day transplant survival between the two time periods for DBD and DCD transplants (log-rank p-value=0.6 and 0.5) and for DBD and DCD transplants performed over the last seven years (log-rank p-value=0.8 and 0.13).

Figure 22 Unadjusted ninety day transplant survival after first adult elective liver transplant from deceased donor, 20 December 2015 to 19 June 2020 (excluding transplants between 27 March and 9 July 2020)

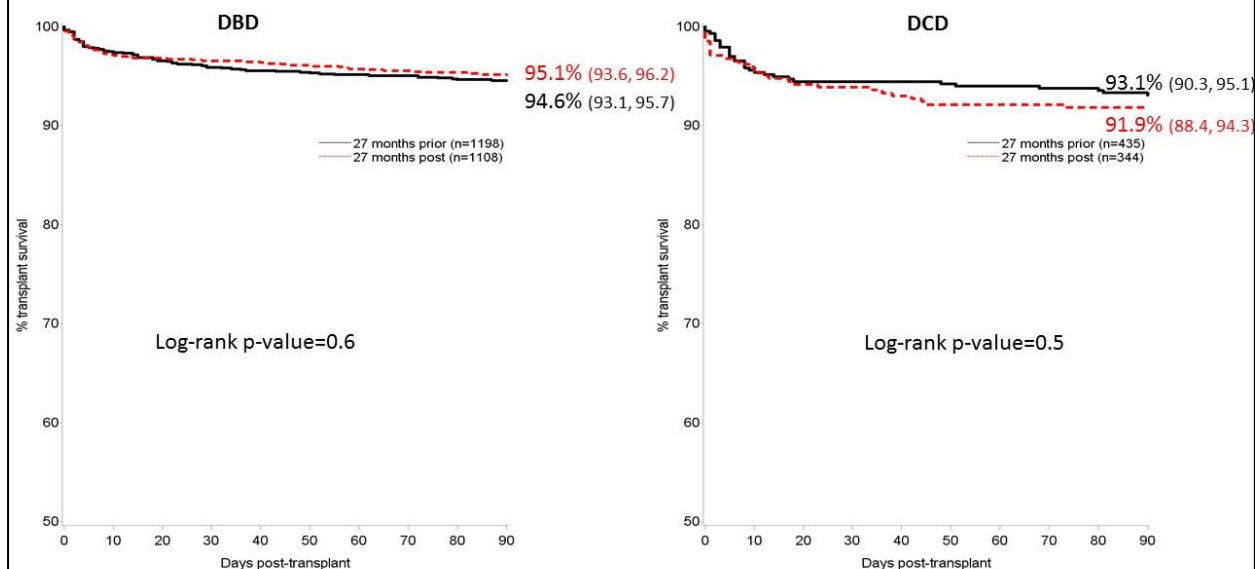
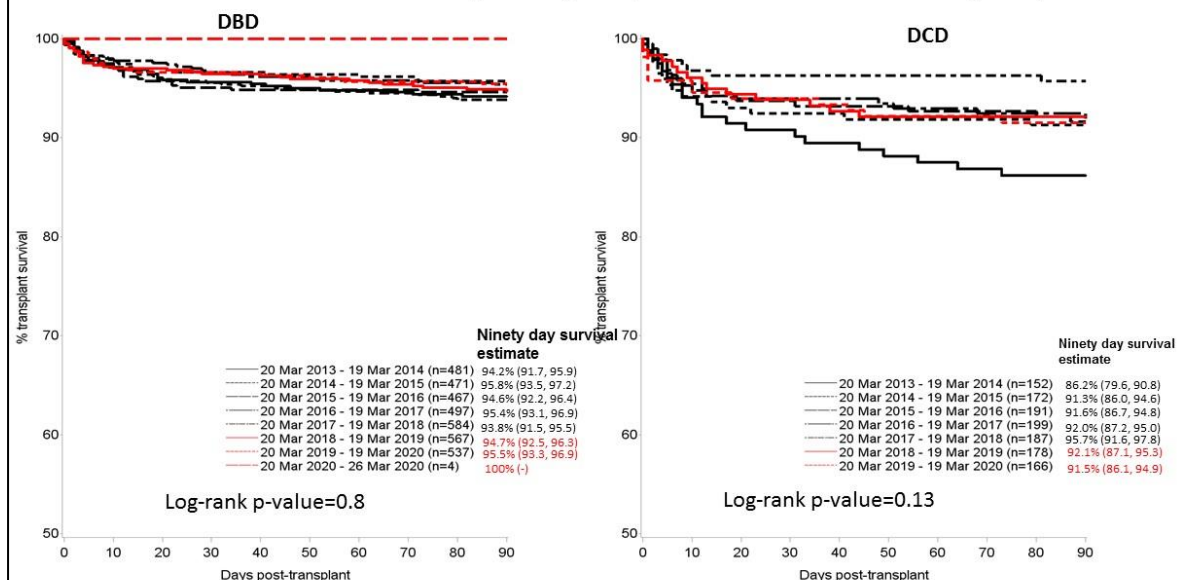


Figure 23 Unadjusted ninety day transplant survival after first adult elective liver transplant from deceased donor, 20 March 2013 to 19 June 2020 (excluding transplants between 27 March and 9 July 2020)



4. CONCLUSIONS

4.1.1. The new National Liver Offering Scheme was implemented on the 20th March 2018. During the first thirty months of the scheme, ODT Hub Operations have offered 2398 livers from DBD donors and 2284 livers from DCD donors to UK transplant centres. Of the 2398 DBD liver donors, 2076 were retrieved for the purposes of transplantation and 1803 were transplanted.

Rhiannon Taylor
Statistics and Clinical Studies

October 2020

APPENDIX A: SUPER-URGENT CATEGORIES

INDICATION FOR REGISTRATION

- 1 - Category 1: Aetiology: Paracetamol poisoning: pH <7.25 more than 24 hours after overdose and after fluid resuscitation
- 2 - Category 2: Aetiology: Paracetamol poisoning: Co-existing prothrombin time >100 seconds or INR >6.5, and serum creatinine >300 µmol/l or anuria, and grade 3-4 encephalopathy
- 3 - Category 3: Aetiology: Paracetamol poisoning: Significant liver injury and coagulopathy following exclusion of other causes of hyperlactatemia (e.g. pancreatitis, intestinal ischemia) after adequate fluid resuscitation: arterial lactate >5 mmol/l on admission and >4 mmol/l 24 hours later in the presence of clinical hepatic encephalopathy
- 4 - Category 4: Aetiology: Paracetamol poisoning: Two of the three criteria from category 2 with clinical evidence of deterioration (eg increased ICP, FiO₂ >50%, increasing inotrope requirements) in the absence of clinical sepsis
- 5 - Category 5: Aetiology: Favourable non-paracetamol aetiologies such as acute viral hepatitis or ecstasy/cocaine induced ALF: the presence of clinical hepatic encephalopathy is mandatory and: prothrombin time >100 seconds, or INR >6.5, or any three from the following: age >40 or <10 years; prothrombin time >50 seconds or INR >3.5; any grade of hepatic encephalopathy with jaundice to encephalopathy time >7 days; serum bilirubin >300 µmol/l
- 6 - Category 6: Aetiology: Unfavourable non-paracetamol aetiologies such as seronegative or idiosyncratic drug reactions: a) prothrombin time >100 seconds, or INR >6.5, or b) in the absence of clinical hepatic encephalopathy then INR >2 after vitamin K repletion is mandatory and any two from the following: age >40 or <10 years; prothrombin time >50 seconds or INR >3.5; if hepatic encephalopathy is present then jaundice to encephalopathy time >7 days; serum bilirubin >300 µmol/l
- 7 - Category 7: Aetiology: Acute presentation of Wilson's disease or Budd-Chiari syndrome. A combination of coagulopathy and any grade of encephalopathy
- 8 - Category 8: Hepatic artery thrombosis on days 0 to 21 after liver transplantation
- 9 - Category 9: Early graft dysfunction on days 0 to 7 after liver transplantation with at least two of the following: AST >10,000; INR >3.0; arterial lactate >3 mmol/l; absence of bile production
- 10 - Category 10: The total absence of liver function (eg after total hepatectomy)
- 11 - Category 11: Any patient who has been a live liver donor (NHS entitled) who develops severe liver failure within 4 weeks of the donor operation
- 20 - Category 20: Acute liver failure in children under two years of age: INR >4 or grade 3-4 encephalopathy. Definition: Multisystem disorder in which severe acute impairment of liver function with or without encephalopathy occurs in association with hepatocellular necrosis in a child with no recognised underlying chronic liver disease. Children with leukaemia/lymphoma, haemophagocytosis and disseminated intra-vascular coagulopathy are excluded

APPENDIX B: SIX MONTH REGISTRATION OUTCOME

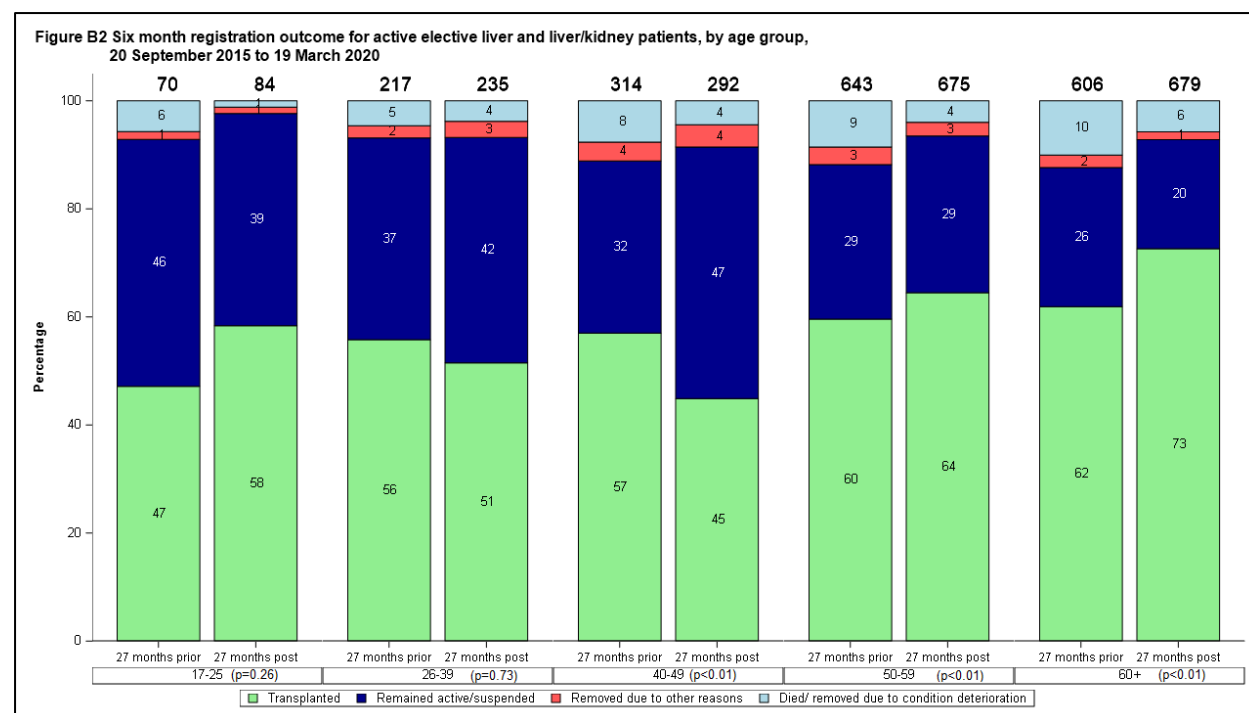
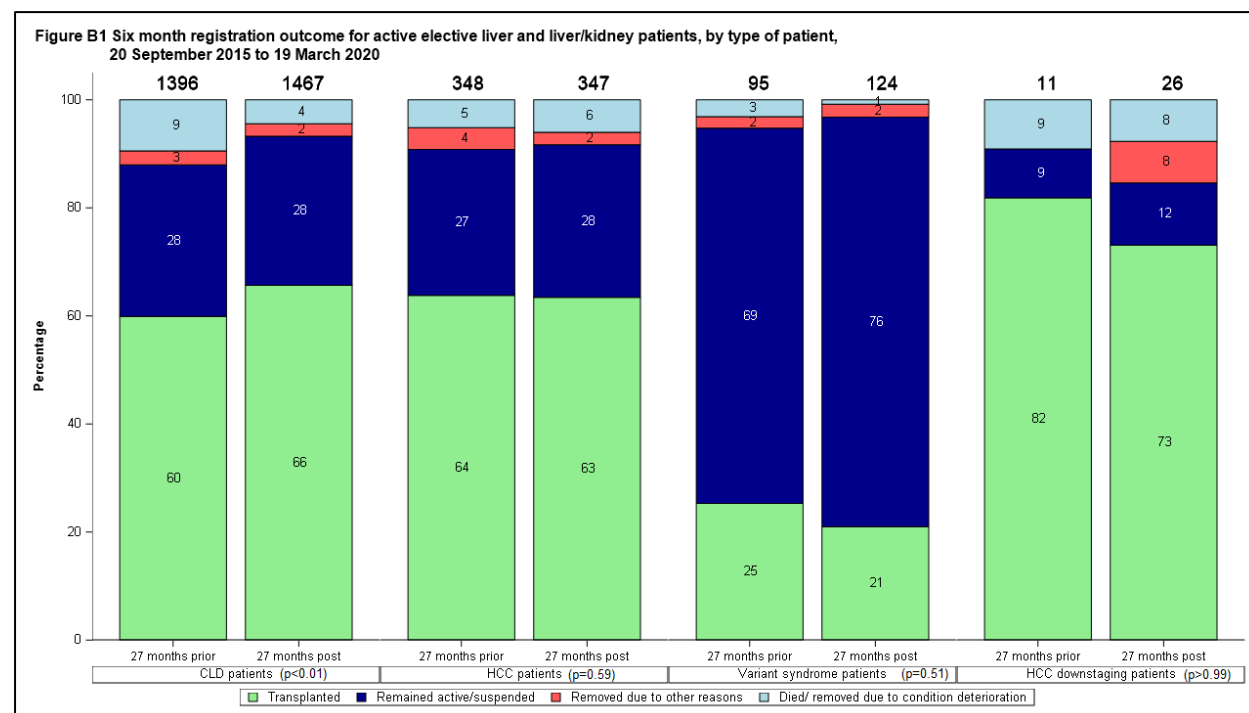


Figure B3 Six month registration outcome for active elective liver and liver/kidney patients, by first transplant or re-graft, 20 September 2015 to 19 March 2020

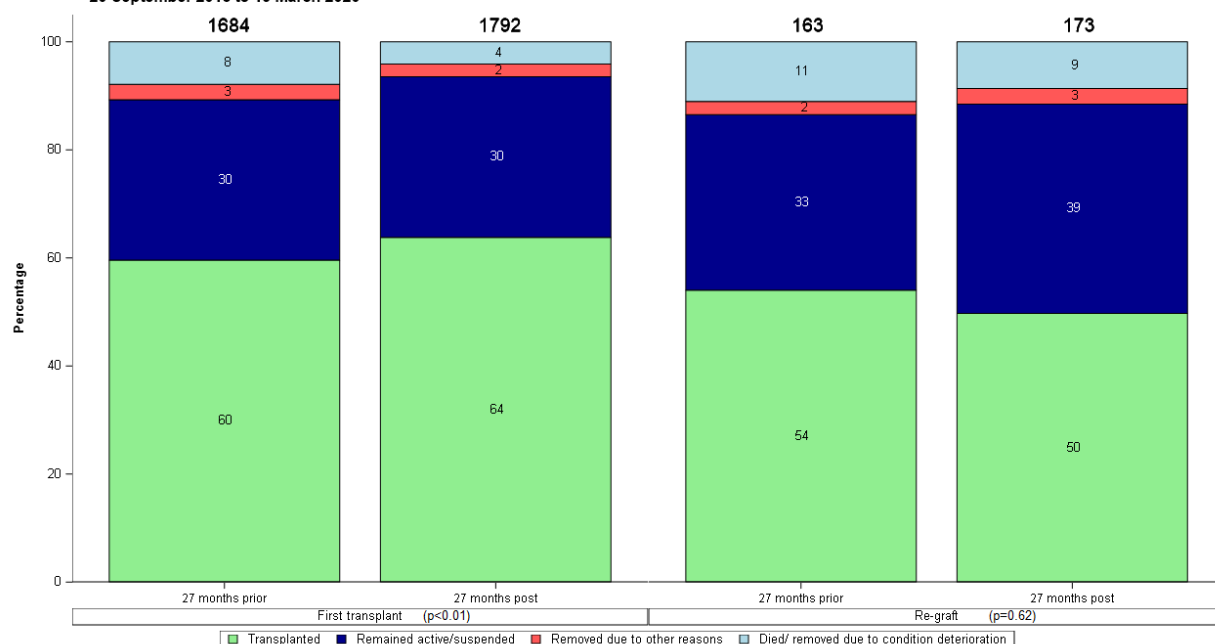


Figure B4 Six month registration outcome for active elective liver and liver/kidney patients, by quarter, 20 September 2015 to 19 March 2020

