

NHS BLOOD AND TRANSPLANT

LIVER ADVISORY GROUP

DECLINED LIVER OFFERS FROM DECEASED DONORS

SUMMARY

BACKGROUND

- 1 In the offering sequence, transplanted livers from deceased donors are either accepted by a liver transplant centre on the first offer and transplanted, or declined at least once by one or more centres before being accepted for transplantation.

DATA ANALYSIS

- 2 Of the 1,233 livers from donors after brain death (DBD) transplanted into Group 1 adult elective patients in the UK between 1 April 2012 and 31 March 2015, 920 (75%) were transplanted on the first offer, 141 (11%) were previously declined once and 172 (14%) were previously declined more than once. Of the 447 livers from donors after circulatory death (DCD) transplanted in the same time period, 308 (69%) were transplanted on the first offer, 51 (11%) were previously declined once and 88 (20%) were previously declined more than once.
- 3 The most common reasons for declining liver offers from either DBD or DCD donors whose liver was subsequently transplanted were donor related followed by no suitable recipients.
- 4 The proportion of declined DBD and DCD donor liver offers varied considerably across centres. Birmingham and King's College accepted the majority of livers that were offered to them (19% and 18% of offers were declined for DBD donor livers and 24% and 21% for DCD donor livers, respectively). Newcastle declined the highest proportion of their offers (69% and 79%, of DBD and DCD donor liver offers, respectively), while most centres had decline rates of 37-50% and 36-56%, for DBD and DCD donor liver offers, respectively. Note that these results are somewhat reflective of the size of the centre and the size of their transplant list.
- 5 A comparison of the unadjusted survival of patients who received a donor liver that had previously been declined by another centre for donor related reasons before being transplanted, with all other patients who received a liver transplant, was also undertaken for transplants between 1 April 2012 and 30 September 2014. Patient and transplant survival up to two years after transplantation was not significantly different depending on whether the liver had previously been declined for a donor related reason. This was the case in the separate analyses of DBD and DCD donor liver transplants. Similarly a comparison was undertaken for patient and transplant survival where the liver was accepted on first offer and where the liver was declined at least once and subsequently transplanted. There was no significant difference in the separate analyses for DBD or DCD donor transplants.

ACTIONS

- 6 Note that 'NLA payback' is no longer considered as a reason for decline in Tables 1 and 2 but as an independent category.
- 7 Note that two year survival is now provided, instead of one year, as in previous reports.
- 8 There are two types of NHSBT reports that present offer decline data; centre-specific reports on organ offers (agenda item 4.3) and the annual report on liver transplantation. Are all three reports needed? If so, should the current paper continued to be produced once a year?

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INTRODUCTION

- 1 This paper reports on declined liver offers from donors after brain death (DBD) and donors after circulatory death (DCD) during the three year period from 1 April 2012 to 31 March 2015. It also reports on a comparison of post-transplant survival of patients who received a donor liver that had previously been declined by another centre for donor related reasons before being transplanted, with all other patients who received a liver transplant, separately for DBD and DCD donor livers. Survival of patients is also compared for those who received a liver accepted on first offer and livers that were declined at least once then subsequently transplanted.

DATA

- 2 Data on 1,680 first Group 1 adult elective whole liver only transplants performed in the UK between 1 April 2012 and 31 March 2015 were included in the analysis, where 1,233 used livers from DBD donors and 447 used livers from DCD donors. The offering data for these transplanted livers were analysed, where fast track liver offers and offers made to super-urgent, Group 2, paediatric, multi-organ or intestinal transplant patients were excluded.

METHODS

- 3 The donor livers analysed in this paper were either accepted by a liver transplant centre on the first offer and transplanted, or declined at least once by one or more centres before being accepted for transplantation. A liver offer can be accepted and then declined after retrieval and for the purposes of this paper these cases are treated the same as liver offers that are declined at time of offer.
- 4 Reasons for decline are recorded from information provided by the centres for each declined offer. These reasons have been summarised by centre, for DBD donor livers in **Table 1** and DCD donor livers in **Table 3**.
- 5 Summary statistics on the cold ischaemia time (CIT) of the DBD and DCD donor livers are presented in **Table 2** and **Table 4** respectively, by the number of times the liver was declined before being accepted and transplanted.
- 6 For donor livers that were declined at least once, the category most commonly stated for decline has been taken (based on groupings in **Table 1** and **Table 3**), in order to classify a donor liver as having been declined for a donor related reason or another reason. Unadjusted post-transplant survival rates were then compared for patients who received a liver previously declined for 'donor' reasons and all other patients who received a liver that was either transplanted on the first offer or previously declined by centres for reasons other than donor related.
- 7 Unadjusted post-transplant survival rates were also compared for patients who received a liver that was accepted on the first offer and all patients who received a liver that was declined at least once then subsequently transplanted.

- 8 The survival rates were obtained using the Kaplan-Meier estimation method performed on a reduced cohort of transplants carried out between 1 April 2012 and 30 September 2014. Follow-up data were as recorded on the UK Transplant Registry on 6 April 2015. This analysis is presented separately for transplants using DBD donor livers (N=1,024) and transplants using DCD donor livers (N=359). Patient survival and transplant survival (where outcome event is graft failure or patient death) rates by decline reason groups, for DBD and DCD donors, are presented in **Figure 1** and **Figure 3**, respectively. Patient survival and transplant survival rates by outcome of first offer, for DBD and DCD donors, are presented in **Figure 2** and **Figure 4**, respectively.

RESULTS

Offering data

Donors after brain death

- 9 Of the 1,233 DBD donor livers that were transplanted in the UK between 1 April 2012 and 31 March 2015, 920 (75%) were transplanted on the first offer, 141 (11%) were declined once before being accepted for transplantation and 172 were declined more than once before being accepted for transplantation (14%). The total number of offers associated with the 1,233 DBD donor livers was 2,028. These offers are summarised by the centre the offer was made to and the reason for decline in **Table 1**.
- 10 Newcastle declined a higher proportion of DBD donor liver offers on donor reasons, logistical reasons or due to no suitable recipients compared with all other centres. King's College accepted the majority of livers that were offered to them, followed by Birmingham who had the next highest acceptance rate. Overall, the proportion of DBD donor liver offers declined by centres ranged from 19% at Birmingham and 18% at King's College to 69% at Newcastle, with the other centres declining between 37% and 50% of their offers.
- 11 **Table 1** shows the detailed reasons for decline. Note that percentages have been rounded to the nearest whole number and some are based on particularly small numbers of offered organs. Overall, 26% of DBD donor liver offers were declined on donor reasons before being transplanted, of which 'donor past history' was the most common. 5% of liver offers were declined on logistical reasons, of which 'centre already retrieving/transplanting' was the most common.

Table 1 **Number of liver offers declined from donors after brain death in the UK, where livers were subsequently transplanted, by reason of decline and transplant centre, 1 April 2012 to 31 March 2015**

	Liver transplant centre															
	Birmingham		Cambridge		Edinburgh		King's College		Leeds		Newcastle		Royal Free		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
DECLINED	66	19	129	50	113	37	58	18	121	39	181	69	87	37	755	37
Donor reasons	52	15	89	34	66	21	45	14	83	27	124	48	73	31	532	26
ABO type	0	0	5	2	7	2	2	1	1	0	5	2	6	3	26	1
Anatomical	0	0	3	1	0	0	1	0	0	0	2	1	0	0	6	0
Ischaemic time too long	1	0	2	1	1	0	0	0	1	0	2	1	1	0	8	0
Donor unsuitable - age	14	4	9	3	4	1	6	2	10	3	7	3	5	2	55	3
Donor unsuitable - cause of death	0	0	2	1	1	0	0	0	2	1	3	1	1	0	9	0
Donor unsuitable - past history	15	4	37	14	25	8	19	6	35	11	56	21	22	9	209	10
Donor unsuitable - size	12	4	1	0	3	1	4	1	10	3	9	3	9	4	48	2
Donor unsuitable - virology	2	1	3	1	3	1	2	1	2	1	6	2	0	0	18	1
Donor unsuitable - other	2	1	3	1	2	1	0	0	4	1	4	2	4	2	19	1
Fatty organ	2	1	4	2	3	1	2	1	4	1	2	1	5	2	22	1
Other disease	1	0	0	0	1	0	0	0	1	0	1	0	1	0	5	0
Poor function	3	1	20	8	16	5	8	2	13	4	26	10	18	8	104	5
Tumour	0	0	0	0	0	0	1	0	0	0	1	0	1	0	3	0
Recipient reasons	1	0	2	1	2	1	0	0	7	2	0	0	0	0	12	1
Recipient refused/did not need transplant	0	0	0	0	0	0	0	0	4	1	0	0	0	0	4	0
Recipient unfit	1	0	2	1	2	1	0	0	3	1	0	0	0	0	8	0
No suitable recipients	3	1	21	8	26	8	8	2	14	5	33	13	12	5	117	6
Logistical reasons	10	3	17	7	19	6	5	2	17	6	24	9	2	1	94	5
Centre already retrieving/transplanting	5	1	10	4	13	4	1	0	3	1	15	6	1	0	48	2
No beds/staff/theatre	1	0	1	0	0	0	0	0	9	3	0	0	0	0	11	1
Other	4	1	5	2	4	1	4	1	5	2	9	3	1	0	32	2
Distance (Euro)	0	0	1	0	2	1	0	0	0	0	0	0	0	0	3	0
NLA PAYBACK	0	0	0	0	21	7	0	0	11	4	8	3	0	0	40	2
ACCEPTED	274	81	129	50	173	56	263	82	175	57	72	28	147	63	1233	61
TOTAL NUMBER OF OFFERS	340	100	258	100	307	100	321	100	307	100	261	100	234	100	2028	100

Note: Percentages have been rounded to the nearest whole number

- 12 **Table 2** shows the median and range of cold ischaemic times (CIT), in hours, of the 1,233 DBD donor livers by the number of times the liver was declined before being accepted and transplanted. The median CIT was reasonably similar regardless of the number of times the liver was declined.

Table 2 Cold ischaemic times (CIT) of livers from donors after brain death that were subsequently transplanted, by the number of times the liver was declined, 1 April 2012 to 31 March 2015			
Number of times the liver was declined before being accepted and transplanted	N ¹	CIT (hours)	
		Median	Range
0	807	8.2	0.0 – 18.5
1	125	9.3	4.8 – 15.8
> 1	164	8.9	4.4 – 15.7
Total	1,096	8.5	0.0 – 18.5
¹ CIT was not reported for a total of 137 livers			

Donors after circulatory death

- 13 Of the 447 DCD donor livers that were transplanted in the UK between 1 April 2012 and 31 March 2015, 308 were transplanted on the first offer (69%), 51 were declined once before being accepted for transplantation (11%) and 88 were declined more than once before being accepted for transplantation (20%). The total number of offers associated with the 447 DCD donor livers was 725. These offers are summarised by the centre the offer was made to and the reason for decline in **Table 3**.
- 14 Newcastle declined a higher proportion of DCD donor liver offers on donor reasons or due to no suitable recipients compared with all other centres. Cambridge declined more offers on logistics than other centres. King's College accepted the majority of livers that were offered to them, followed by Birmingham who had the next highest acceptance rate. Overall, the proportion of DCD donor liver offers declined by centres ranged from 21% at King's College and 24% at Birmingham to 79% at Newcastle, with the other centres declining between 36% and 56% of their offers
- 15 **Table 3** shows the detailed reasons for decline. Note that percentages have been rounded to the nearest whole number and some are based on particularly small numbers of offered organs. Overall, 19% of these DCD donor liver offers were declined on donor reasons before being transplanted, of which donor past history was the most common. 11% of liver offers were declined on logistical reasons, of which 'centre already retrieving/transplanting' was the most common reason.

Table 3 Number of liver offers declined from donors after circulatory death in the UK, where livers were subsequently transplanted, by reason of decline and transplant centre, 1 April 2012 to 31 March 2015

	Liver transplant centre															
	Birmingham		Cambridge		Edinburgh		King's College		Leeds		Newcastle		Royal Free		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
DECLINED	45	24	50	46	44	56	25	21	36	36	46	79	32	44	278	38
Donor reasons	19	10	21	19	25	32	9	7	18	18	24	41	25	35	141	19
Centre criteria not achieved	0	0	0	0	2	3	0	0	1	1	1	2	0	0	4	1
Cold ischaemic time too long	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0
Donor unsuitable - age	3	2	5	5	10	13	1	1	7	7	2	3	9	13	37	5
Donor unsuitable - past history	8	4	8	7	10	13	5	4	4	4	15	26	10	14	60	8
Donor unsuitable - size	1	1	4	4	0	0	0	0	0	0	2	3	0	0	7	1
Donor unsuitable - virology	0	0	0	0	0	0	0	0	0	0	1	2	1	1	2	0
Infection	1	1	1	1	1	1	0	0	1	1	0	0	0	0	4	1
Poor function	6	3	3	3	2	3	2	2	5	5	3	5	4	6	25	3
Warm ischaemic time too long	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0
Recipient reasons	1	1	0	0	0	0	1	1	0	0	0	0	1	1	3	1
Recipient refused	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0
Recipient unfit	1	1	0	0	0	0	0	0	0	0	0	0	1	1	2	0
No suitable recipients	8	4	5	5	9	12	7	6	9	9	12	21	4	6	54	7
Logistical reasons	17	9	24	22	10	13	8	7	9	9	10	17	2	3	80	11
Centre already retrieving/ transplanting	12	6	14	13	3	4	6	5	1	1	4	7	1	1	41	6
Distance	0	0	1	1	1	1	0	0	0	0	0	0	0	0	2	0
No beds/staff/theatre	0	0	3	3	0	0	0	0	1	1	2	3	0	0	6	1
No time	1	1	1	1	2	3	0	0	0	0	0	0	0	0	4	1
Transport difficulties	0	0	0	0	0	0	0	0	1	1	0	0	0	0	1	0
Other	4	2	5	5	4	5	2	2	6	6	4	7	1	1	26	4
ACCEPTED	142	76	58	54	34	44	96	79	65	64	12	21	40	56	447	62
TOTAL NUMBER OF OFFERS	187	100	108	100	78	100	121	100	101	100	58	100	72	100	725	100

Note: Percentages have been rounded to the nearest whole number

- 16 **Table 4** shows the median and range of cold ischaemic times (CIT), in hours, of the 447 DCD donor livers by the number of times the liver was declined before being accepted and transplanted. Again, the median CIT was reasonably similar regardless of the number of times the liver was declined.

Table 4 Cold ischaemic times (CIT) of livers from donors after circulatory death that were subsequently transplanted, by the number of times the liver was declined, 1 April 2012 to 31 March 2015			
Number of times the liver was declined before being accepted and transplanted	N ¹	CIT (hours)	
		Median	Range
0	279	7.2	2.6 – 18.0
1	46	7.3	5.7 – 10.5
> 1	83	7.6	5.1 – 13.2
Total	408	7.3	2.6 – 18.0
¹ CIT was not reported for a total of 39 livers			

Unadjusted survival analysis

Donors after brain death

- 17 171 (17%) of the 1,024 first Group 1 adult elective whole DBD donor liver only transplant recipients in the UK between 1 April 2012 and 30 September 2014 received a liver that had previously been declined for a donor related reason ('donor' group). The remaining 853 (83%) recipients received a liver that was either not previously declined or was previously declined for a reason other than donor related ('other' group).
- 18 **Figure 1** shows the Kaplan-Meier survival curves for patient and transplant survival up to two years, by decline reason group. There was no evidence of a difference between the patient survival rates (log rank test p-value=0.3) or the transplant survival rates (p=0.2), up to two years, of the 'donor' and 'other' group. Note that there are only a small number of observed events in the 'donor' group, particularly in the patient survival curve, and hence a small change in the number of events could affect the p-value considerably so the results should be viewed with caution.
- 19 778 (76%) of the 1,024 first Group 1 adult elective whole DBD donor liver only transplant recipients in the UK between 1 April 2012 and 30 September 2014 received a liver that was accepted on first offer ('accepted on first offer' group). The remaining 246 (24%) recipients received a liver that was declined on first offer and subsequently transplanted ('not accepted on first offer' group).
- 20 **Figure 2** shows the Kaplan-Meier survival curves for patient and transplant survival up to two years, by first offer outcome. There was some evidence of a difference between the patient survival rates (log rank test p-value=0.07) but no difference between the transplant survival rates (p=0.2), up to two years, of the 'accepted on first offer' and 'not accepted on first offer' group. Again, note that there are only a small number of observed events in the 'not accepted on first offer' group and so the results should be viewed with caution.

Donors after circulatory death

- 21 67 (19%) of the 359 first Group 1 adult elective whole DCD donor liver only transplant recipients in the UK between 1 April 2012 and 30 September 2014 received a liver that had previously been declined for a donor related reason ('donor' group). The remaining 292 (81%) received a liver that was either not previously declined or was previously declined for a reason other than donor related ('other' group).
- 22 **Figure 3** shows the Kaplan-Meier survival curves for patient and transplant survival up to two years, by decline reason group. There was no evidence of a difference between the patient survival rates (log rank test p-value=0.8) or the transplant survival rates (p=0.4), up to two years, of the 'donor' and 'other' group. Note that there are only a small number of observed events in the 'donor' group and hence the results should be treated with caution.
- 23 250 (70%) of the 359 first Group 1 adult elective whole DCD donor liver only transplant recipients in the UK between 1 April 2012 and 30 September 2014 received a liver that was accepted on first offer ('accepted on first offer' group). The remaining 109 (30%) recipients received a liver that was declined on first offer and subsequently transplanted ('not accepted on first offer' group).
- 24 **Figure 4** shows the Kaplan-Meier survival curves for patient and transplant survival up to two years, by first offer outcome. There was no evidence of a difference between the patient survival rates (log rank test p-value=0.5) or the transplant survival rates (p=0.5), up to two years, of the 'accepted on first offer' and 'not accepted on first offer' group. Again, note that there are only a small number of observed events in the 'not accepted on first offer' group and so the results should be viewed with caution.

Figure 1 Two year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after brain death, 1 April 2012 to 30 September 2014, by decline reason group

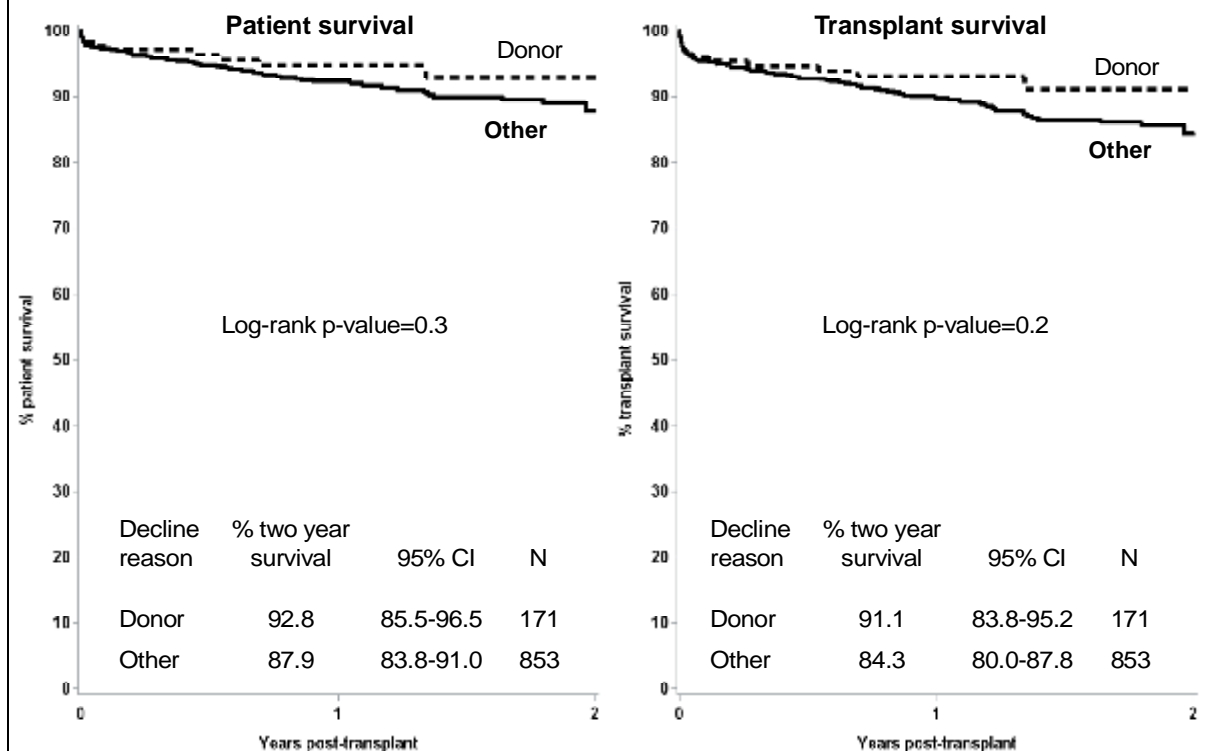


Figure 2 Two year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after brain death, 1 April 2012 to 30 September 2014, by first offer outcome

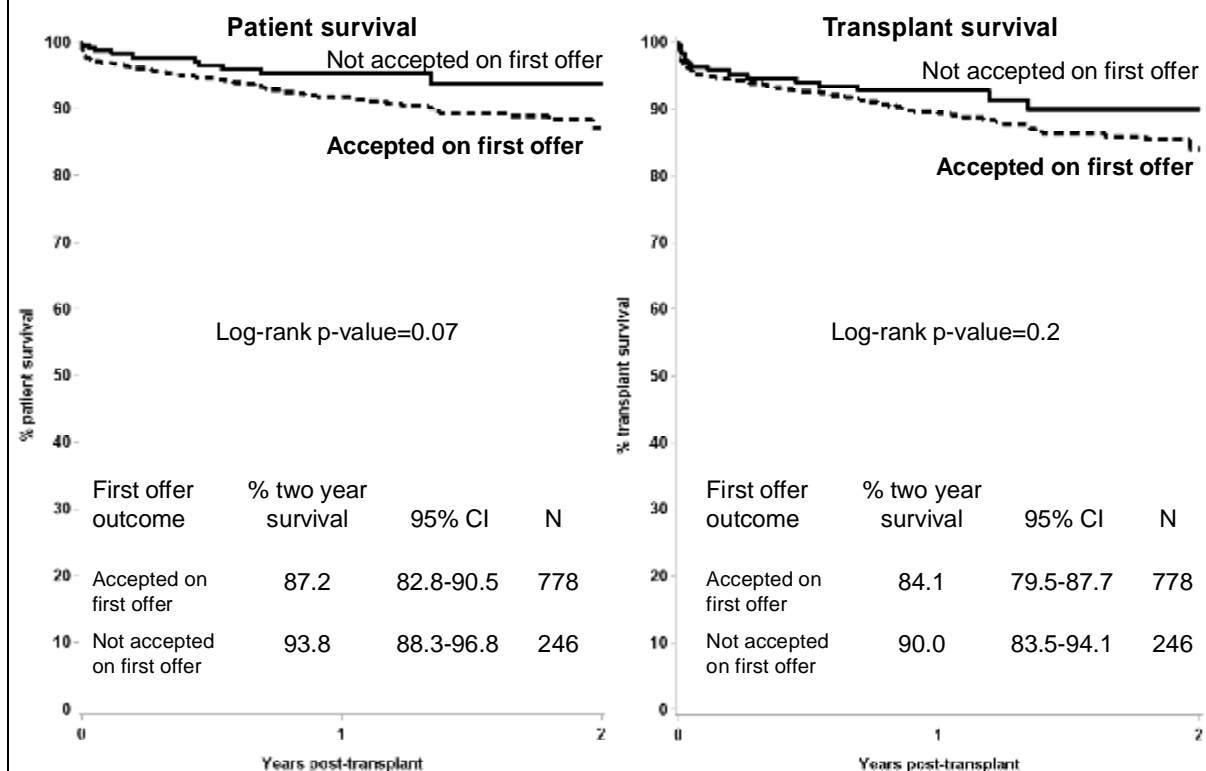


Figure 3 Two year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after circulatory death, 1 April 2012 to 30 September 2014, by decline reason group

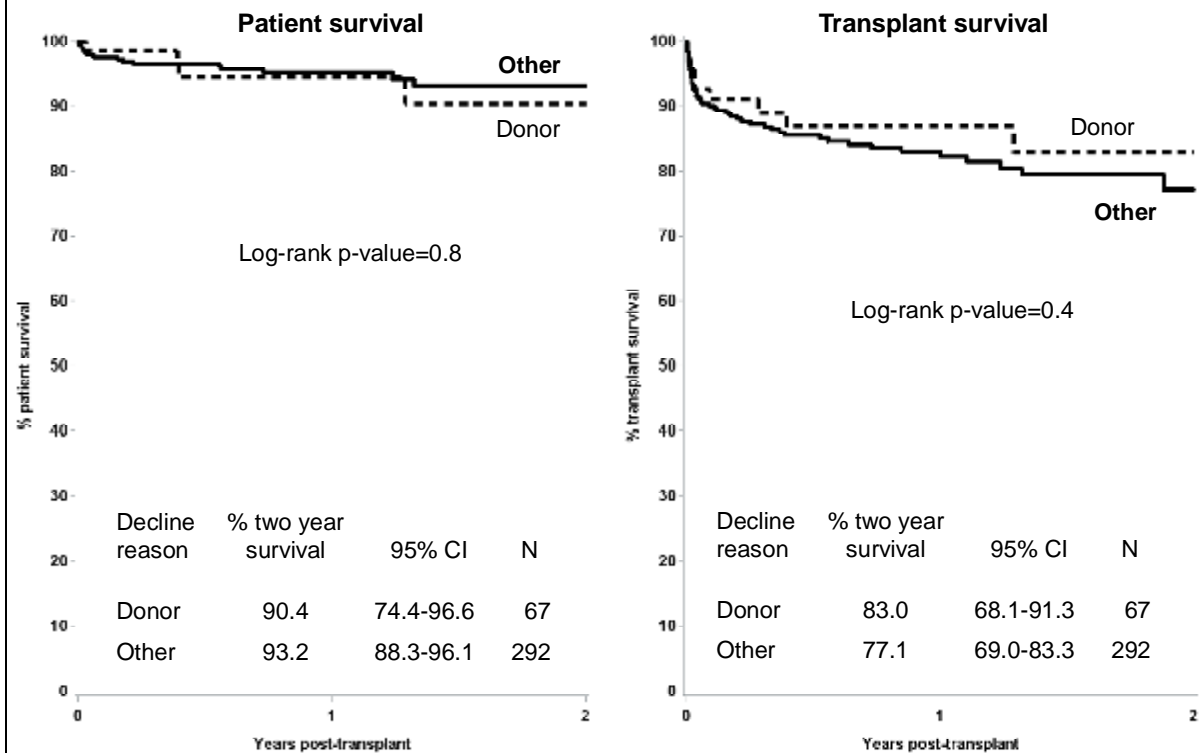
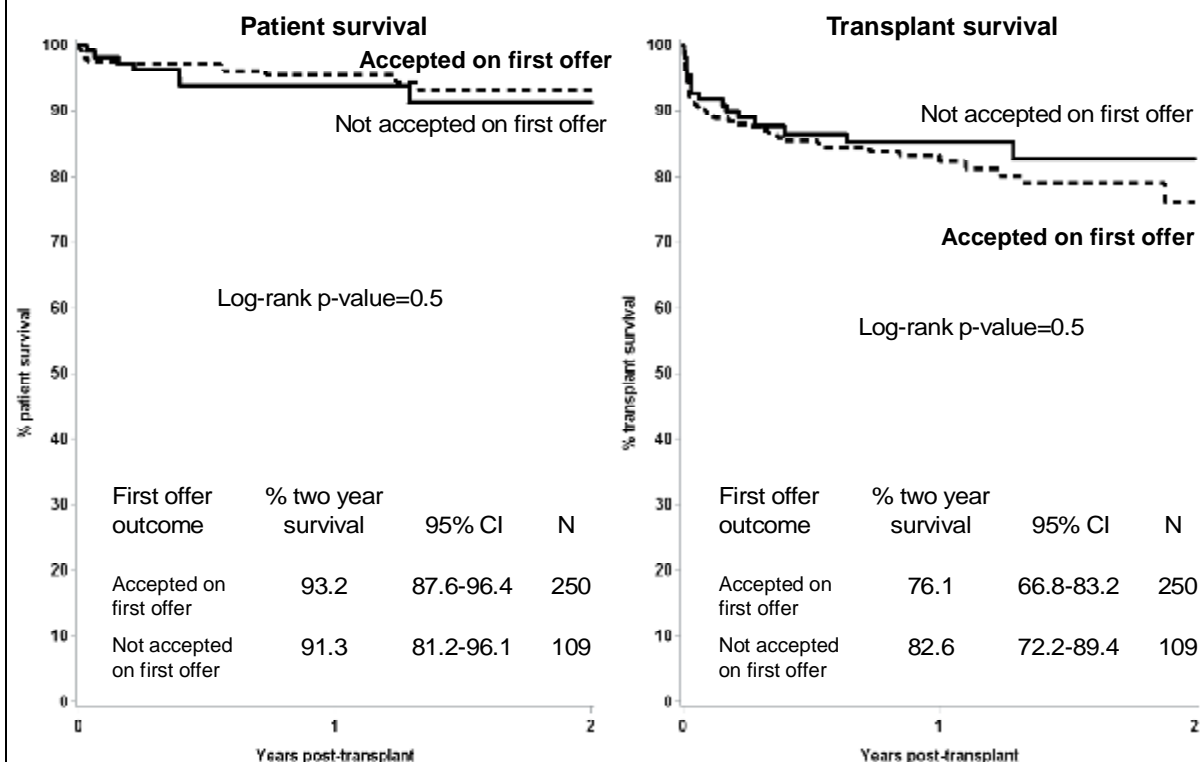


Figure 4 Two year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after circulatory death, 1 April 2012 to 30 September 2014, by first offer outcome



SUMMARY

- 25 Of the reasons given by centres for the decline of liver offers from DBD donors whose liver was subsequently transplanted, the most common were donor related followed by no suitable recipients. This was similar for declined liver offers from DCD donors.
- 26 Between 1 April 2012 and 31 March 2015, the proportion of declined DBD donor liver offers varied considerably across centres ranging from 19% at Birmingham and 18% at King's College to 69% at Newcastle, while most centres had decline rates between 37% and 50%. The proportion of declined DCD donor liver offers was even more varied, ranging from 24% and 21% at Birmingham and King's College, respectively, to 79% at Newcastle, while most centres declined between 36% and 56% of DCD donor liver offers. Note that these analyses did not take into account the size of a centre or their respective transplant list size.
- 27 There was no evidence of a difference in patient or transplant survival up to two years for patients receiving DBD donor livers that were previously declined for donor reasons and patients receiving DBD donor livers that were transplanted on the first offer or previously declined for reasons other than donor related. The results based on DCD donor livers also provided no evidence of a difference. However, these results should be viewed with some caution as only a small number of patients that received livers that were previously declined for donor reasons experienced an event. Also, note that these analyses are unadjusted for any differences in patients that may affect their outcomes.
- 28 There was borderline evidence of a difference in patient survival up to two years for patients receiving DBD donor livers that were accepted on first offer and patients receiving DBD donor livers that were declined at least once then subsequently transplanted. The results based on DCD donor livers provided no evidence of a difference. However, these results should be viewed with some caution as only a small number of patients that received livers that were initially declined experienced an event. Also, note that these analyses are unadjusted for any differences in patients that may affect their outcomes.

ACTIONS

- 29 Members are asked to note that 'NLA payback' is no longer considered as a reason for decline in Tables 1 and 2 but as an independent category.
- 30 Members are asked to note that two year survival is now provided, instead of one year, as in previous reports.
- 31 Statistics and Clinical Studies is now regularly producing two types of reports that present offer decline data; centre-specific reports on organ offers (agenda item 4.3) and the annual report on liver transplantation. The current paper could be regarded as a summary of the centre-specific reports with the added section on survival analysis. Are all three reports needed? If so, should the current paper continued to be produced once a year, or less frequently?