

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 1,181 livers from donors after brain death (DBD) transplanted into Group 1 adult elective patients in the UK between 1 April 2011 and 31 March 2014, 907 (77%) were transplanted on the first offer, 128 (11%) were previously declined once and 146 (12%) were previously declined more than once. Of the 405 livers from donors after circulatory death (DCD) transplanted in the same time period, 281 (69%) were transplanted on the first offer, 46 (11%) were previously declined once and 78 (19%) were previously declined more than once.
- 3 The most common reasons given by liver transplant centres for declining liver offers from DBD donors whose liver was subsequently transplanted were donor related followed by logistical. This was similar for declined liver offers from DCD donors.
- 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 (18% and 15% of offers were declined for DBD donor livers and 27% and 20% for DCD donor livers, respectively). Newcastle declined the highest proportion of their offers (67% and 81%, of DBD and DCD donor liver offers, respectively), while most centres had decline rates of 37-46% and 40-58%, 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 2011 and 30 September 2013. Patient and transplant survival up to one year 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.

ACTION

- 6 Members are asked to note that, to improve clarity, the reason 'no suitable recipients' has been categorised separately from 'recipient' and 'logistical' reasons. Also please note that new results have been added to compare the patient and transplant survival of those receiving a liver on first offer against those who received a liver declined on first offer and subsequently transplanted.
- 7 Members are asked to provide feedback in terms of the contents, relevance and frequency of reporting of this paper (currently produced on a yearly basis).

Sally Rushton and Kate Martin

May 2014

NHS BLOOD AND TRANSPLANT

LIVER ADVISORY GROUP

DECLINED LIVER OFFERS FROM DECEASED DONORS

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 2011 to 31 March 2014. 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 1,586 first Group 1 adult elective whole liver only transplants performed in the UK between 1 April 2011 and 31 March 2014 were included in the analysis, where 1,181 used livers from DBD donors and 405 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 2011 and 30 September 2013. Follow-up data were as recorded on the UK Transplant Registry on 12 May 2014. This analysis is presented separately for transplants using DBD donor livers (N=947) and transplants using DCD donor livers (N=322). 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 1,181 DBD donor livers that were transplanted in the UK between 1 April 2011 and 31 March 2014, 907 (77%) were transplanted on the first offer, 128 (11%) were declined once before being accepted for transplantation and 146 were declined more than once before being accepted for transplantation (12%). The total number of offers associated with the 1,181 DBD donor livers was 1,867. 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 or due to no suitable recipients compared with all other centres. Newcastle and Edinburgh declined more offers on logistical reasons 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 DBD donor liver offers declined by centres ranged from 18% at Birmingham and 15% at King's College to 67% at Newcastle, with the other centres declining between 37% and 46% 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, 25% of DBD donor liver offers were declined on donor reasons before being transplanted, of which 'donor past history' was the most common. 6% 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 2011 to 31 March 2014**

	Liver transplant centre															
	Birmingham		Cambridge		Edinburgh		King's College		Leeds		Newcastle		Royal Free		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
DECLINED	58	18	117	46	120	42	43	15	109	39	161	67	78	37	686	37
Donor reasons	43	14	84	33	63	22	35	13	73	26	104	43	66	31	468	25
ABO type	0	0	4	2	7	2	1	0	2	1	3	1	3	1	20	1
Anatomical	0	0	3	1	0	0	0	0	1	0	1	0	0	0	5	0
Cold ischaemic time too long	1	0	1	0	0	0	0	0	1	0	1	0	1	0	5	0
Donor unsuitable - age	8	3	8	3	5	2	5	2	12	4	6	3	5	2	49	3
Donor unsuitable - cause of death	0	0	3	1	1	0	0	0	2	1	3	1	1	0	10	1
Donor unsuitable - past history	13	4	34	13	23	8	13	5	29	10	47	20	18	8	177	9
Donor unsuitable - size	10	3	2	1	6	2	4	1	8	3	9	4	6	3	45	2
Donor unsuitable - virology	1	0	5	2	4	1	4	1	2	1	5	2	3	1	24	1
Fatty organ	4	1	5	2	3	1	2	1	2	1	3	1	8	4	27	1
Other disease	1	0	1	0	1	0	0	0	2	1	3	1	1	0	9	0
Poor function	5	2	18	7	13	4	5	2	12	4	22	9	18	8	93	5
Tumour	0	0	0	0	0	0	1	0	0	0	1	0	2	1	4	0
Recipient reasons	1	0	2	1	6	2	0	0	4	1	1	0	0	0	14	1
Recipient died	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
Recipient unfit	1	0	2	1	6	2	0	0	4	1	0	0	0	0	13	1
No suitable recipients	3	1	14	6	21	7	5	2	7	3	27	11	7	3	84	4
Logistical reasons	11	4	17	7	30	10	3	1	25	9	29	12	5	2	120	6
Centre already retrieving/transplanting	7	2	8	3	9	3	1	0	7	3	15	6	1	0	48	3
NLA payback	0	0	0	0	9	3	0	0	5	2	2	1	1	0	17	1
No beds/staff/theatre	0	0	2	1	1	0	0	0	5	2	0	0	0	0	8	0
No time	0	0	1	0	0	0	0	0	0	0	1	0	0	0	2	0
Other	4	1	6	2	9	3	2	1	8	3	11	5	3	1	43	2
Distance (Euro)	0	0	0	0	2	1	0	0	0	0	0	0	0	0	2	0
ACCEPTED	256	82	137	54	169	58	235	85	171	61	79	33	134	63	1181	63
TOTAL NUMBER OF OFFERS	314	100	254	100	289	100	278	100	280	100	240	100	212	100	1867	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 1,181 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 2011 to 31 March 2014			
Number of times the liver was declined before being accepted and transplanted	N ¹	CIT (hours)	
		Median	Range
0	837	8.3	0.0 – 18.5
1	118	9.4	4.9 – 17.6
> 1	143	8.9	3.9 – 14.4
Total	1,098	8.5	0.0 – 18.5
¹ CIT was not reported for a total of 83 livers			

Donors after circulatory death

- 13 Of the 405 DCD donor livers that were transplanted in the UK between 1 April 2011 and 31 March 2014, 281 were transplanted on the first offer (69%), 46 were declined once before being accepted for transplantation (11%) and 78 were declined more than once before being accepted for transplantation (19%). The total number of offers associated with the 405 DCD donor livers was 674. 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 20% at King's College and 27% at Birmingham to 81% at Newcastle, with the other centres declining between 40% and 58% 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, 21% 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 2011 to 31 March 2014

	Liver transplant centre															
	Birmingham		Cambridge		Edinburgh		King's College		Leeds		Newcastle		Royal Free		TOTAL	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
DECLINED	47	27	53	50	40	58	25	20	33	40	42	81	29	45	269	40
Donor reasons	22	13	21	17	20	29	9	7	24	29	25	48	20	31	141	21
Centre criteria not achieved	0	0	0	0	1	1	0	0	4	5	1	2	1	2	7	1
Cold ischaemic time too long	0	0	1	1	0	0	0	0	0	0	0	0	1	2	2	0
Donor unsuitable - age	3	2	2	2	7	10	1	1	4	5	5	10	6	9	28	4
Donor unsuitable - other/unknown	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Donor unsuitable - past history	8	5	10	9	11	16	5	4	9	11	15	29	8	12	66	10
Donor unsuitable - size	0	0	3	3	0	0	0	0	0	0	1	2	0	0	4	1
Donor unsuitable - virology	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0
Infection	1	1	1	1	1	1	0	0	1	1	0	0	0	0	4	1
Poor function	7	4	4	4	0	0	2	2	6	7	2	4	4	6	25	4
Warm ischaemic time too long	2	1	0	0	0	0	1	1	0	0	0	0	0	0	3	0
Recipient reasons	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0
Recipient unavailable	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0
No suitable recipients	9	5	6	6	8	12	8	6	3	4	10	19	7	11	51	8
Logistical reasons	16	9	26	25	12	17	8	6	6	7	7	13	1	2	76	11
Centre already retrieving/ transplanting	13	8	13	12	4	6	5	4	1	1	1	2	1	2	38	6
Distance	0	0	3	3	2	3	1	1	0	0	0	0	0	0	6	1
No beds/staff/theatre	1	1	2	2	0	0	0	0	0	0	1	2	0	0	4	1
No time	0	0	2	2	2	3	0	0	0	0	0	0	0	0	4	1
Transport difficulties	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0
Other	2	1	5	5	4	6	2	2	5	6	5	10	0	0	23	3
ACCEPTED	126	73	53	50	29	42	102	80	49	60	10	19	36	55	405	60
TOTAL NUMBER OF OFFERS	173	100	106	100	69	100	127	100	82	100	52	100	65	100	674	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 405 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 2011 to 31 March 2014			
Number of times the liver was declined before being accepted and transplanted	N ¹	CIT (hours)	
		Median	Range
0	260	7.0	1.4 – 18.0
1	44	6.9	5.7 – 10.8
> 1	75	7.4	5.1 – 14.0
Total	379	7.1	1.4 – 18.0
¹ CIT was not reported for a total of 26 livers			

Unadjusted survival analysis

Donors after brain death

- 17 134 (14%) of the 947 first Group 1 adult elective whole DBD donor liver only transplant recipients in the UK between 1 April 2011 and 30 September 2013 received a liver that had previously been declined for a donor related reason ('donor' group). The remaining 813 (86%) 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 one year, by decline reason group. There was no evidence of a difference between the patient survival rates (log rank test p-value=0.4) or the transplant survival rates (p=0.8), up to one year, 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.
- 19 755 (80%) of the 947 first Group 1 adult elective whole DBD donor liver only transplant recipients in the UK between 1 April 2011 and 30 September 2013 received a liver that was accepted on first offer ('accepted' group). The remaining 192 (20%) recipients received a liver that was declined on first offer and subsequently transplanted ('declined' group).
- 20 **Figure 2** shows the Kaplan-Meier survival curves for patient and transplant survival up to one year, 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=0.4), up to one year, of the 'accepted' and 'declined' group. Again, note that there are only a small number of observed events in the 'declined' group and so the results should be viewed with caution.

Donors after circulatory death

- 21 61 (19%) of the 322 first Group 1 adult elective whole DCD donor liver only transplant recipients in the UK between 1 April 2011 and 30 September 2013 received a liver that had previously been declined for a donor related reason ('donor' group). The remaining 261 (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 one year, 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=0.9), up to one year, 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.
- 23 229 (71%) of the 322 first Group 1 adult elective whole DCD donor liver only transplant recipients in the UK between 1 April 2011 and 30 September 2013 received a liver that was accepted on first offer ('accepted' group). The remaining 93 (29%) recipients received a liver that was declined on first offer and subsequently transplanted ('declined' group).
- 24 **Figure 4** shows the Kaplan-Meier survival curves for patient and transplant survival up to one year, by first offer outcome. There was no evidence of a difference between the patient survival rates (log rank test p-value=0.2) or the transplant survival rates (p=0.5), up to one year, of the 'accepted' and 'declined' group. Again, note that there are only a small number of observed events in the 'declined' group and so the results should be viewed with caution.

Figure 1 One 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 2011 to 30 September 2013, by decline reason group

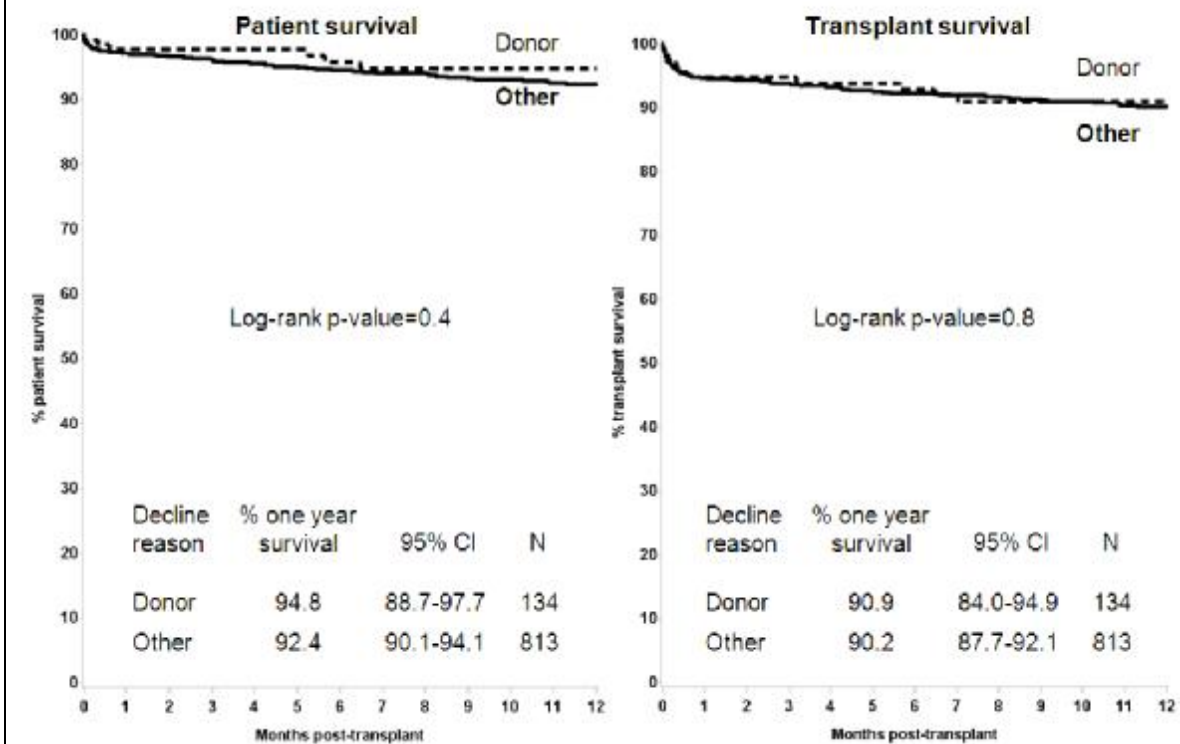


Figure 2 One year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after brain death, 1 April 2011 to 30 September 2013, by first offer outcome

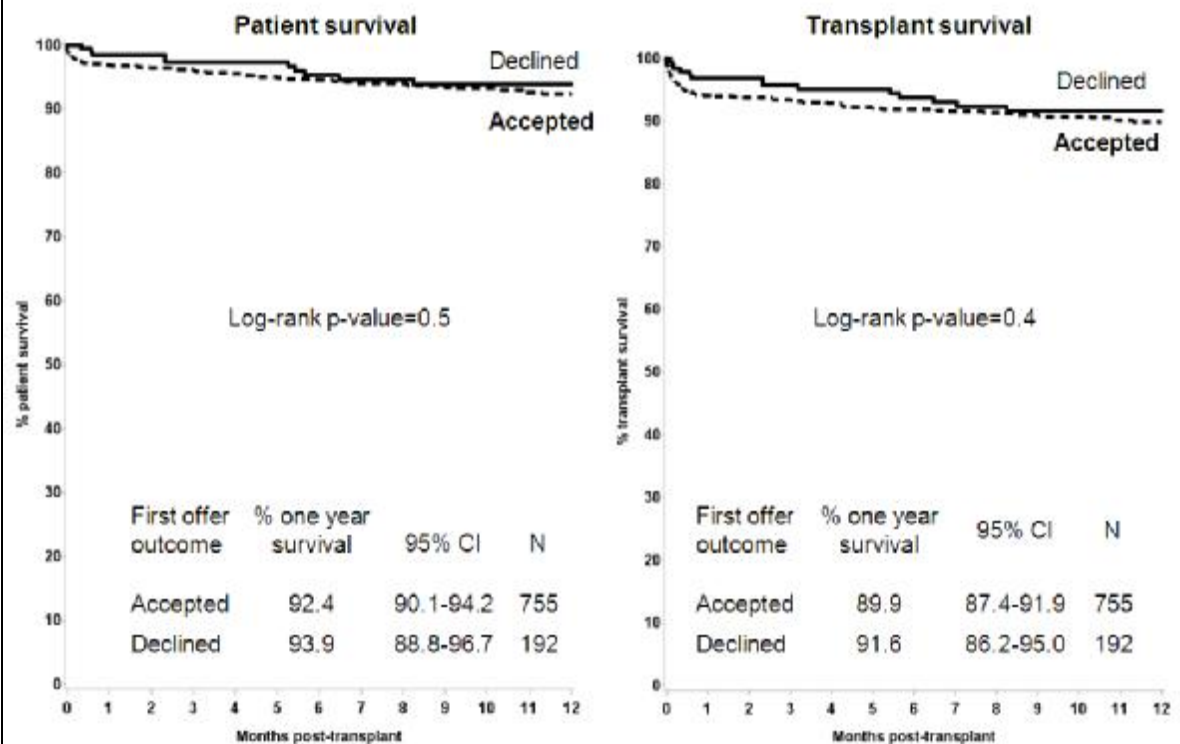


Figure 3 One year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after circulatory death, 1 April 2011 to 30 September 2013, by decline reason group

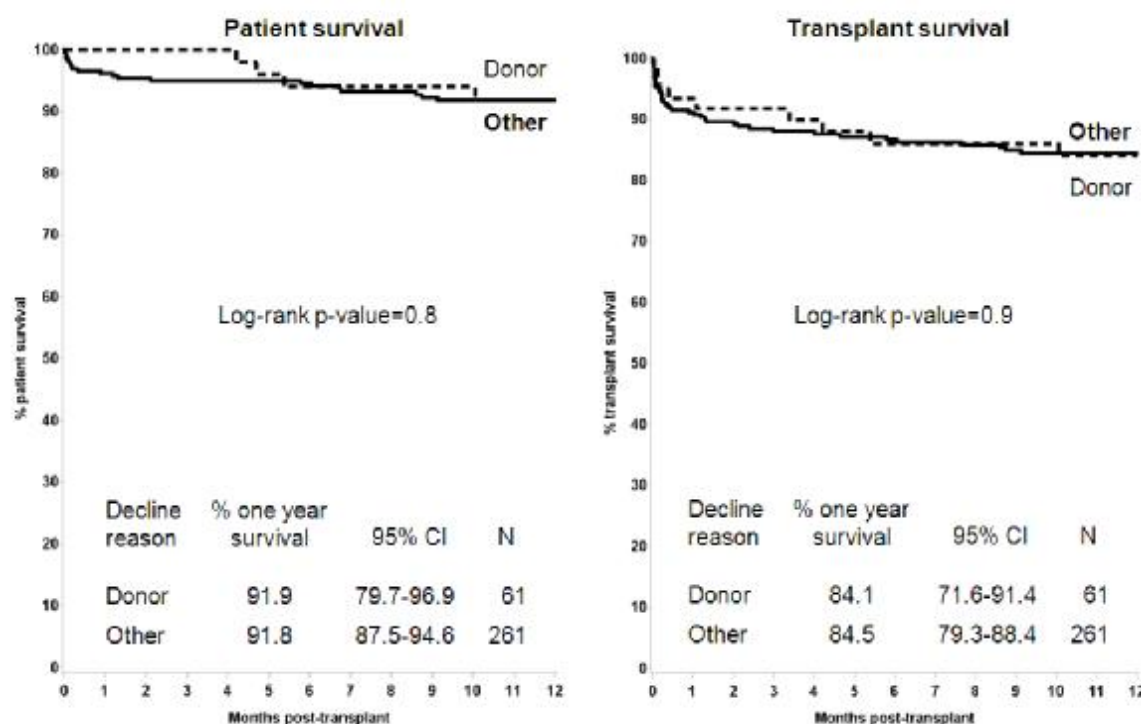
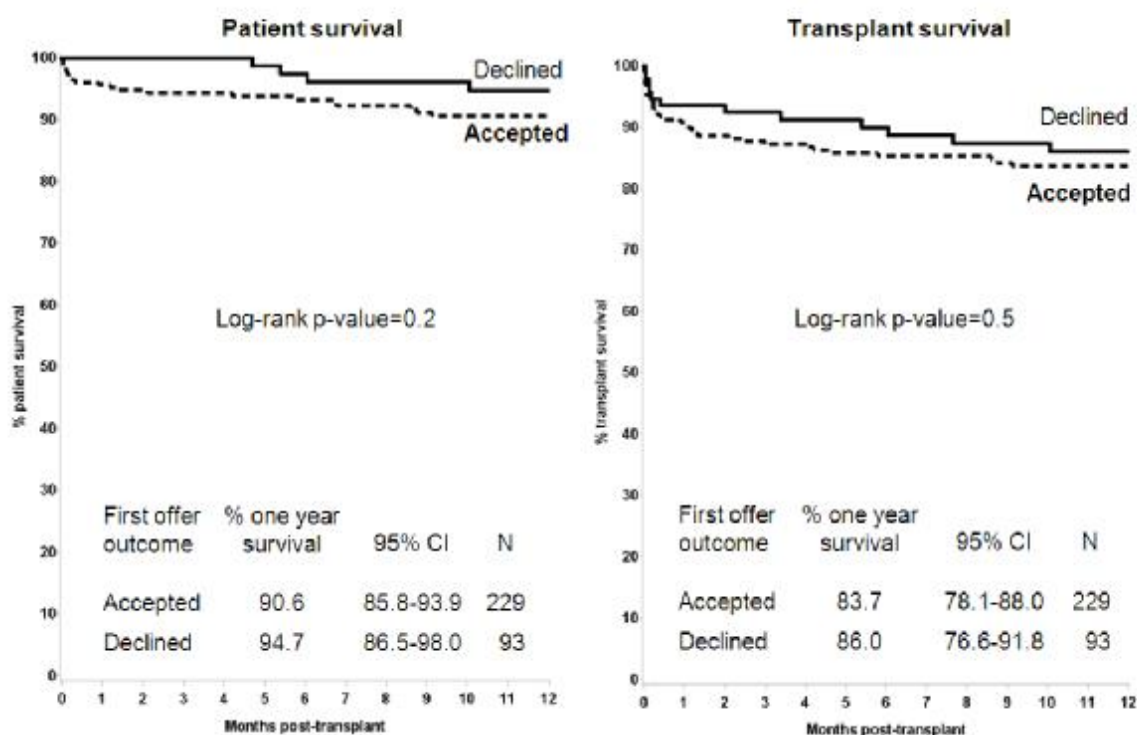


Figure 4 One year patient and transplant survival for first Group 1 adult elective liver only transplants in the UK using livers from donors after circulatory death, 1 April 2011 to 30 September 2013, by first offer outcome



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 logistical. This was similar for declined liver offers from DCD donors.
- 26 Between 1 April 2011 and 31 March 2014, the proportion of declined DBD donor liver offers varied considerably across centres ranging from 18% at Birmingham and 15% at King's College to 67% at Newcastle, while most centres had decline rates between 37% and 46%. The proportion of declined DCD donor liver offers was even more varied, ranging from 20% and 27% at King's College and Birmingham, respectively, to 81% at Newcastle, while most centres declined between 40% and 58% 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 one year 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 also no evidence of a difference in patient or transplant survival up to one year 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 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 initially declined experienced an event. Also, note that these analyses are unadjusted for any differences in patients that may affect their outcomes.

ACTION

- 29 Members are asked to note that, to improve clarity, the reason 'no suitable recipients' has been categorised separately from 'recipient' and 'logistical' reasons.
- 30 Members are asked to provide feedback in terms of the contents, relevance and frequency of reporting of this paper (currently produced on a yearly basis).

Sally Rushton and Kate Martin
Statistics and Clinical Audit

May 2014