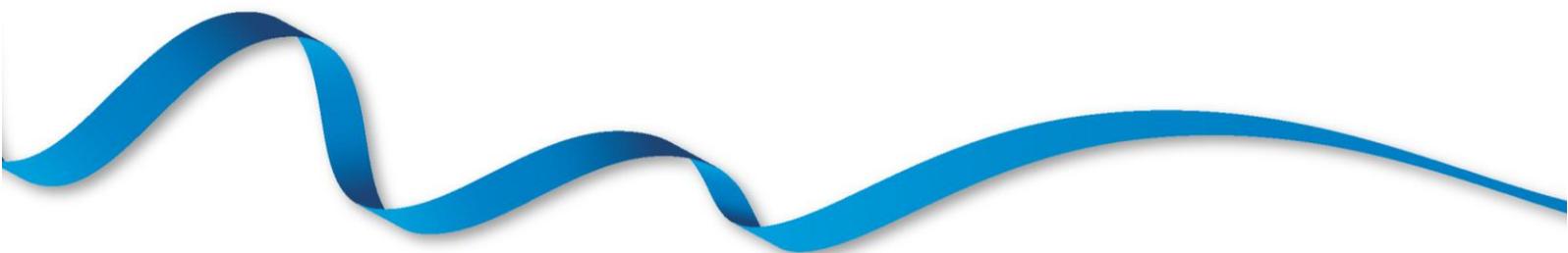


**INTERIM REPORT ON  
LIVER TRANSPLANTATION**

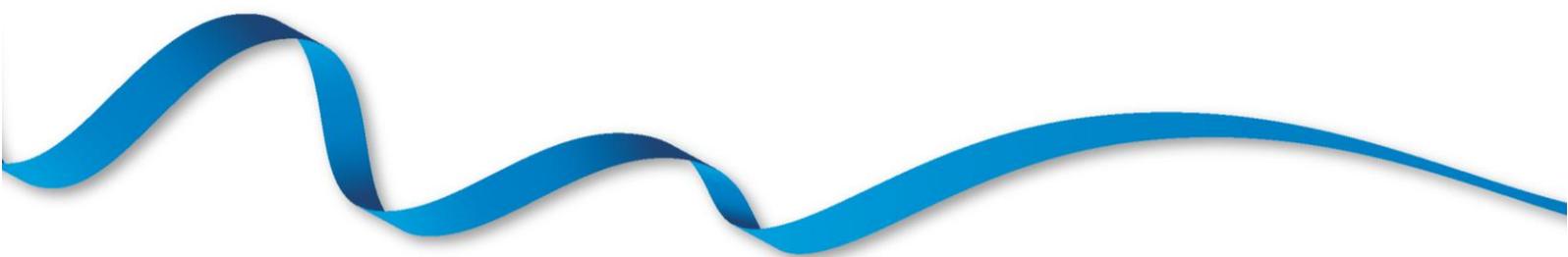
**REPORT FOR 2015/2016  
(1 OCTOBER 2014 – 30 SEPTEMBER 2015)**

**PUBLISHED APRIL 2016**

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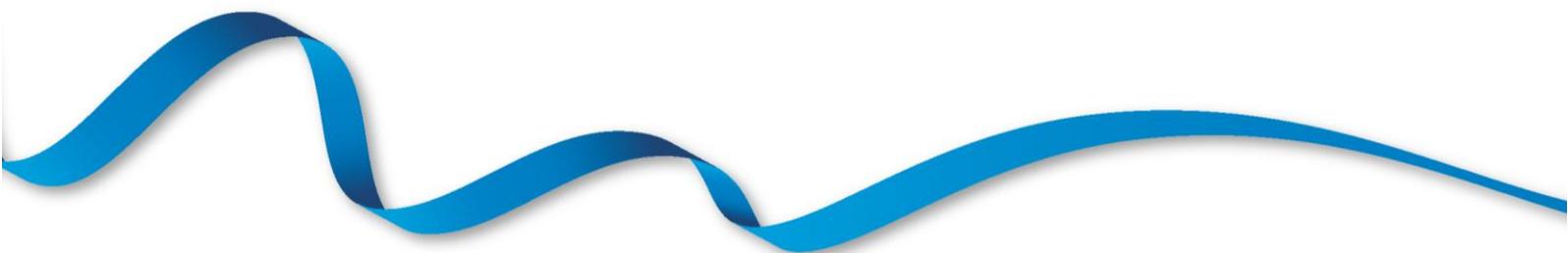
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# **EXECUTIVE SUMMARY**



## EXECUTIVE SUMMARY

This interim report presents key figures about liver transplantation in the UK for the period from 1 October 2014 to 30 September 2015. The report presents information on the number of transplants, [patient survival](#) and [graft function](#) after liver transplantation; both on a national and centre-specific basis. A full report is produced every year and is published in the summer to include the latest full financial year.

### Key points

- There were 867 **liver transplants** performed in the UK between 1 October 2014 and 30 September 2015. Of these, 724 (84%) were deceased donor first liver only transplants (including liver only transplants due to intestinal failure) and 36 (4%) were living donor first liver only transplants (including first liver only domino transplants). The remainder were repeated transplants (85) or multi-organ transplants (22).
- Of the 724 **deceased donor first liver only transplants** in the time period, 668 (92%) were in adult recipients and 56 (8%) were in paediatric patients. The approximate proportion of elective to super-urgent transplants in each of these age groups was 90% to 10% and 80% to 20%, respectively.
- Of the 36 **living donor first liver only (including domino) transplants** in the time period, 17 (47%) were in adult recipients and 19 (53%) were in paediatric patients. All adult recipients were elective. The approximate proportion of elective to super-urgent transplants in paediatric patients was 95% to 5%.
- The unadjusted national **rates of patient survival** 90 days after first liver transplantation from deceased donors were 97% for adult elective and 95% for adult super-urgent registrations. Those for paediatric elective and super-urgent registrations were 100%, respectively, although this should be regarded as guidance only due to the limited amount of data available.
- The unadjusted national **rates of graft function** 90 days after first liver transplantation from deceased donors were 95% for adult elective and 95% for adult super-urgent patient registrations. The rates for paediatric elective and super-urgent patient registrations were 97% and 100%, respectively.

- **Table 1** provides a summary of liver transplant activity in the UK for 1 October 2014 to 30 September 2015. For comparison, transplant activity figures are also provided for 1 October 2013 to 30 September 2014.

<b>Table 1</b> Number of first liver only transplants in the UK, by recipient age group and urgency status and by donor type, for 2013/14 <sup>1</sup> and for 2014/15 <sup>2</sup>						
	2013/14 <sup>1</sup>			2014/15 <sup>2</sup>		
	Elective	Super-urgent	Total	Elective	Super-urgent	Total
<b>Deceased donor</b>	<b>710</b>	<b>75</b>	<b>785</b>	<b>643</b>	<b>81</b>	<b>724</b>
Adult patient	657	67	724	599	69	668
Paediatric patient	53	8	61	44	12	56
<b>Living donor</b>	<b>28</b>	<b>1</b>	<b>29</b>	<b>35</b>	<b>1</b>	<b>36</b>
Adult patient	15	0	15	17	0	17
Paediatric patient	13	1	14	18	1	19
<b>TOTAL</b>	<b>738</b>	<b>76</b>	<b>814</b>	<b>678</b>	<b>82</b>	<b>760</b>

<sup>1</sup> 1 October 2013 – 30 September 2014

<sup>2</sup> 1 October 2014 – 30 September 2015

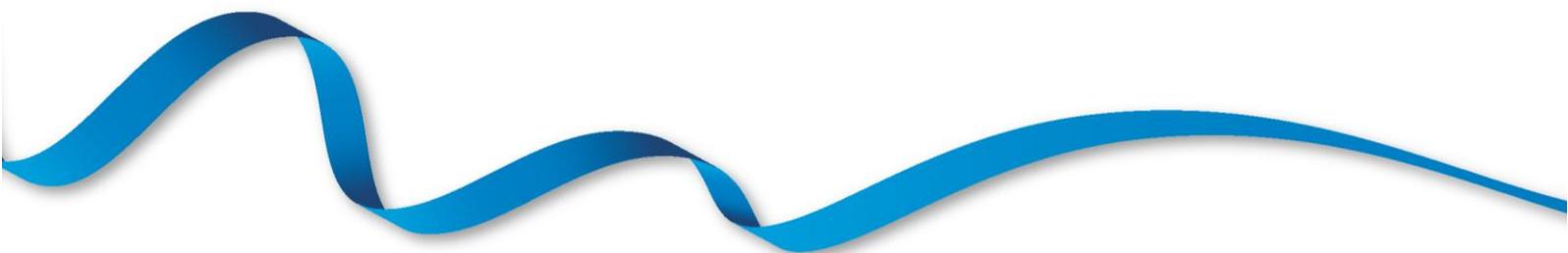
- **Table 2** provides a summary of unadjusted 90 days patient survival (%) and graft function (%) for deceased donor first liver only transplants for 1 October 2014 to 30 September 2015. For comparison, unadjusted 90 days patient survival (%) and graft function (%) are also provided for 1 October 2013 to 30 September 2014.

<b>Table 2</b> Unadjusted 90-day patient survival (%) and graft function (%) for deceased donor first liver only transplants, for 2013/14 <sup>1</sup> and for 2014/15 <sup>2</sup>				
	2013/14 <sup>1</sup>		2014/15 <sup>2</sup>	
	Elective	Super-urgent	Elective	Super-urgent
<b>90 days patient survival</b>				
Adult patient	97%	84%	97%	95%
Paediatric patient	98%	100%	100%	100%
<b>90 days graft function</b>				
Adult patient	93%	82%	95%	95%
Paediatric patient	92%	100%	97%	100%

<sup>1</sup> 1 October 2013 – 30 September 2014

<sup>2</sup> 1 October 2014 – 30 September 2015

# **INTRODUCTION**



## INTRODUCTION

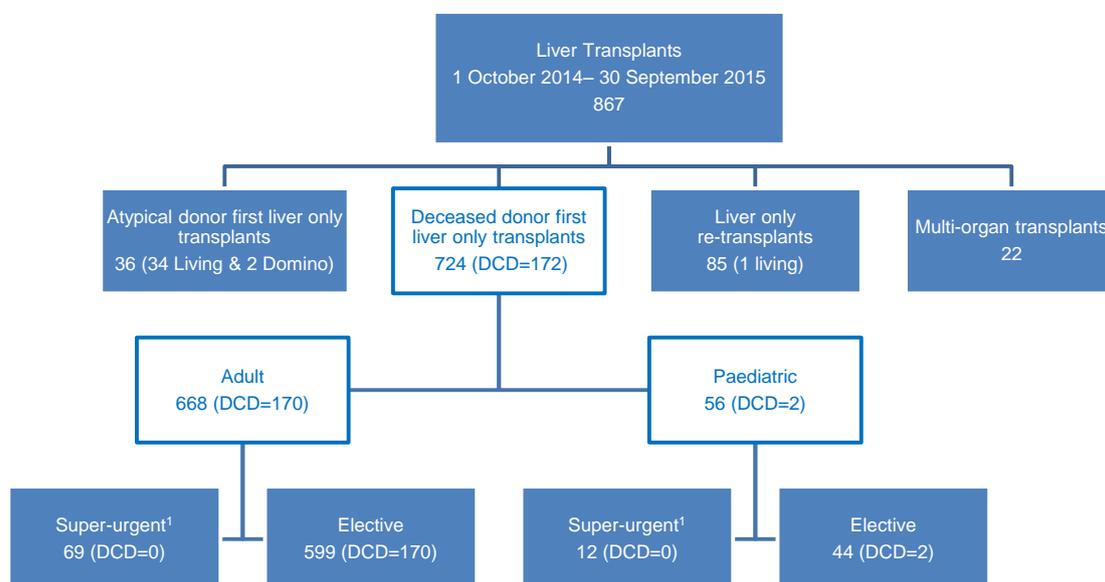
This interim report presents information on liver transplant activity, [patient survival](#) and [graft function](#) after transplantation between 1 October 2014 and 30 September 2015, for all seven centres performing liver transplantation in the UK. Data were obtained from the UK Transplant Registry, at NHS Blood & Transplant, that holds information relating to donors, recipients and outcomes for all liver transplants performed in the UK.

There are three paediatric transplant centres in the UK; Children’s Hospital (Birmingham), St James’s University Hospital (Leeds) and King’s College Hospital (London). Leeds and King’s College are adult transplant centres too, in addition to Queen Elizabeth Hospital (Birmingham), Addenbrooke’s Hospital (Cambridge), Royal Infirmary (Edinburgh), Royal Free Hospital (London) and Freeman Hospital (Newcastle). Results in this report are described separately for adult (aged ≥17 years) and paediatric patients (aged <17 years), and according to the urgency of the transplantation ([elective](#) and [super-urgent](#)).

Data sources and methods are described in full detail in the Appendix.

**Figure 1** details the 867 liver transplants performed in the UK in the reported time period. Of these, 724 (84%) were deceased donor first liver transplants: 668 (92%) in adult and 56 (8%) in paediatric patients. Of the 724 transplants, 81 (11%) were super-urgent and 643 (89%) were elective transplants.

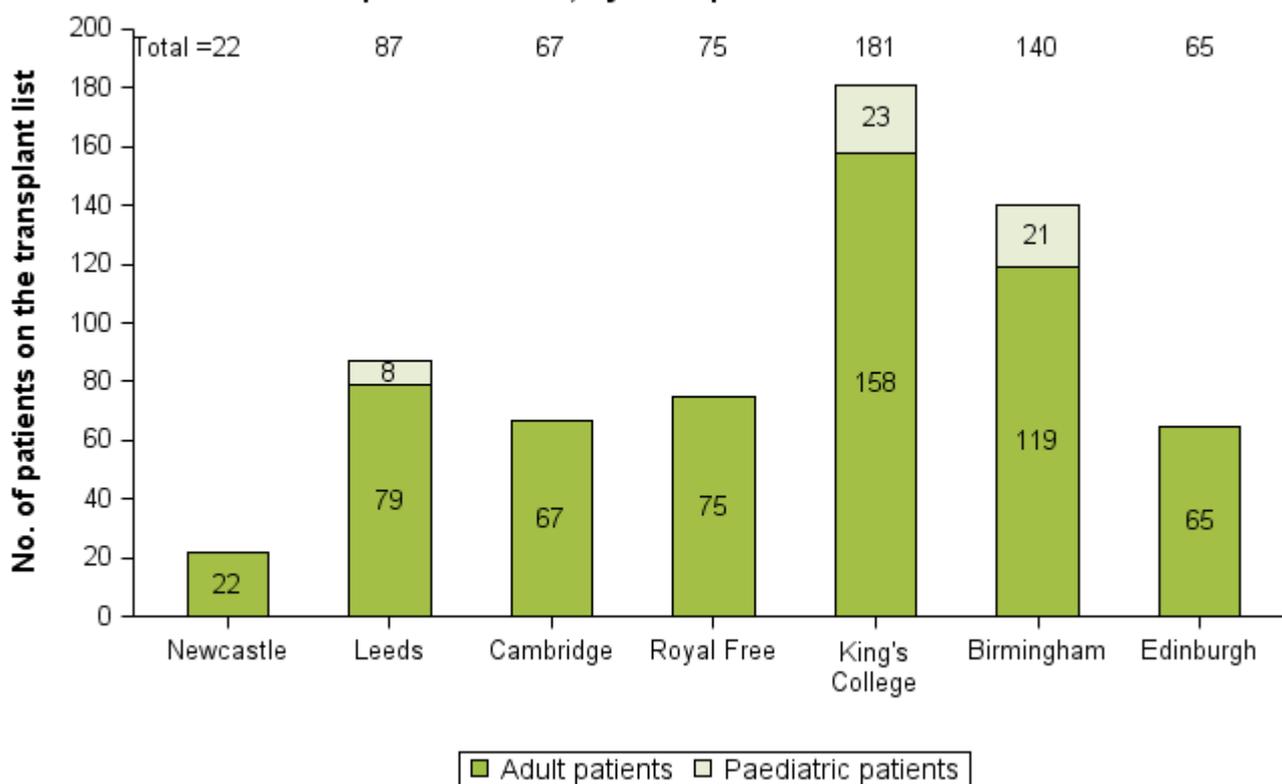
**Figure 1 Liver transplants in the UK, 1 October 2014 – 30 September 2015**



<sup>1</sup> Super-urgent registration categories were changed on 17 June 2015 to account for developments in treatment of patients with acute liver failure

**Figure 2** shows the number of adult and paediatric patients on the active liver transplant list as at 30 September 2015, by transplant centre. In total, there were 637 patients on the transplant list; 585 were adults and 52 were paediatric patients. King's College Hospital had the largest share of the transplant list (28%) and Newcastle the smallest (3%). This figure includes [elective](#) and [super-urgent](#) registrations. Since 30 September 2014, there has been a 12% increase on the active liver transplant list.

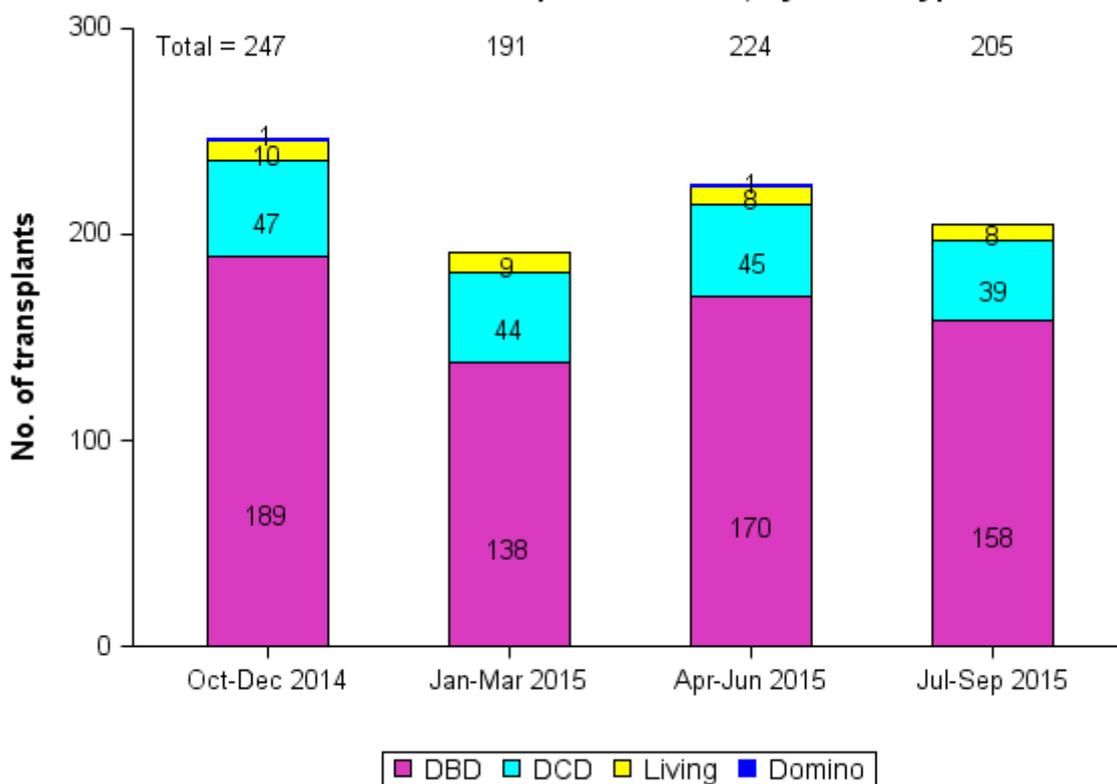
**Figure 2 Adult and paediatric patients on the active liver transplant list, as at 30 September 2015, by transplant centre**



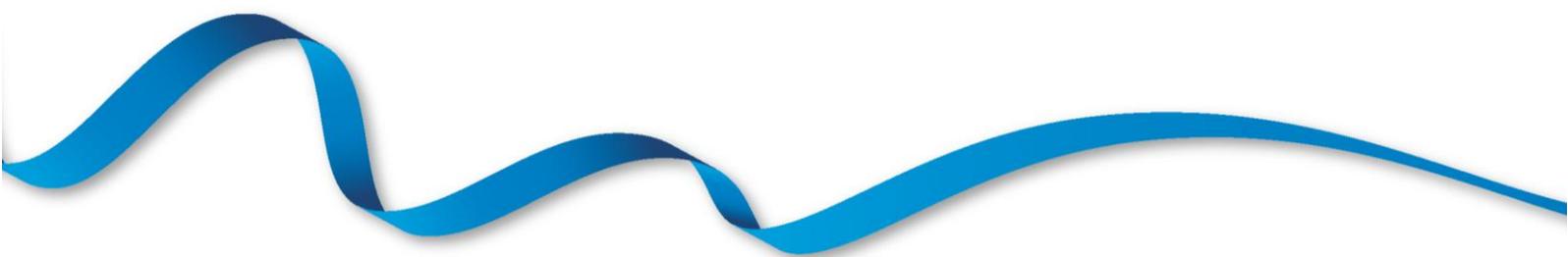
## TRANSPLANT ACTIVITY

During the one-year study period, 867 liver transplants were reported. Activity by quarter is shown in **Figure 3**, by [type of donor](#).

**Figure 3** Liver transplants in the UK, 1 October 2014 - 30 September 2015, by donor type



# **ADULT LIVER TRANSPLANTATION**

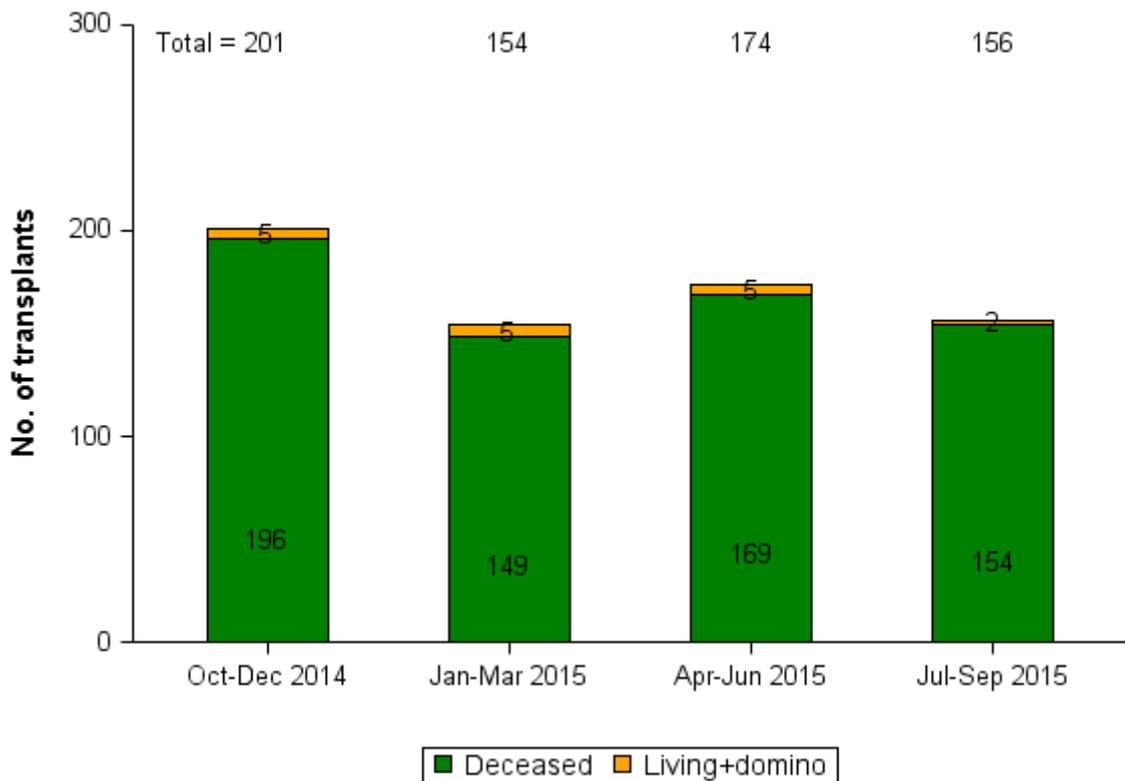


# ADULT LIVER TRANSPLANTATION

## OVERVIEW

The number of all adult first liver only transplants in the study period is shown in **Figure 4**, by quarter. Of the 685 transplants of this type, 668 were deceased donor transplants and, of these, 599 were [elective](#) and 69 were [super-urgent](#) transplants. Of the remaining 17 transplants, 15 were elective living donor transplants and 2 were elective domino donor transplants.

**Figure 4** Adult first liver only transplants in the UK, 1 October 2014 - 30 September 2015, by donor type



**Table 3** shows the total number of adult transplants in the reported time period, including atypical donor, [multi-organ](#) and re-transplants. It also shows the number of adult deceased and living (including domino) donor first liver only transplants, by transplant centre.

**Table 3** Number of adult liver transplants between, 1 October 2014 and 30 September 2015, by transplant centre and urgency status

Centre	Total number of transplants		Deceased donor first liver only transplants		Living donor first liver only transplants	
	Elective	Super-urgent	Elective	Super-urgent	Elective	Super-urgent
Newcastle	32	3	27	3	0	0
Leeds	92	11	76	6	4	0
Cambridge	68	13	64	4	0	0
Royal Free	72	13	63	10	2	0
King's College	159	23	130	20	9	0
Birmingham	178	27	163	21	2	0
Edinburgh	79	9	76	5	0	0
<b>TOTAL</b>	<b>680</b>	<b>99</b>	<b>599</b>	<b>69</b>	<b>17</b>	<b>0</b>

Figure 5 shows adult elective deceased donor first liver only transplants, by quarter and transplant centre.

**Figure 5** Adult elective deceased donor first liver only transplants, 1 October 2014 - 30 September 2015, by quarter and transplant centre

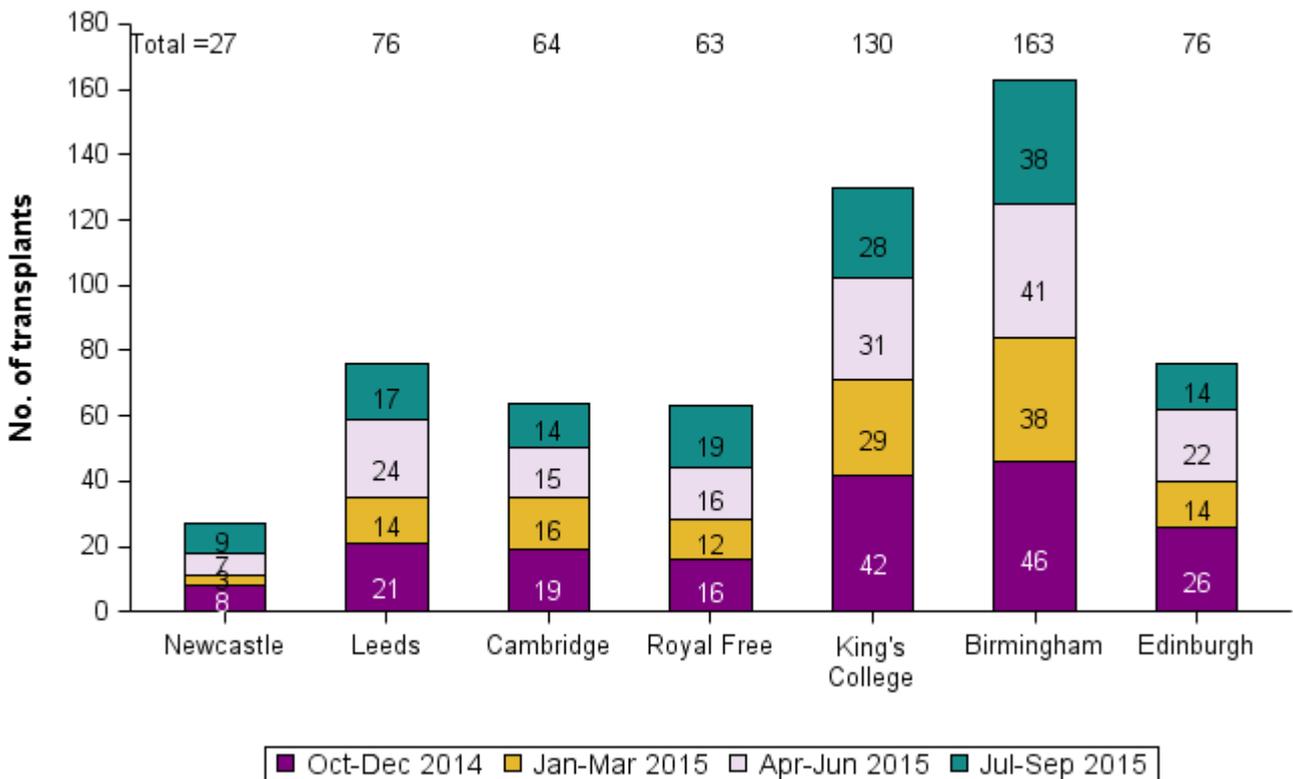
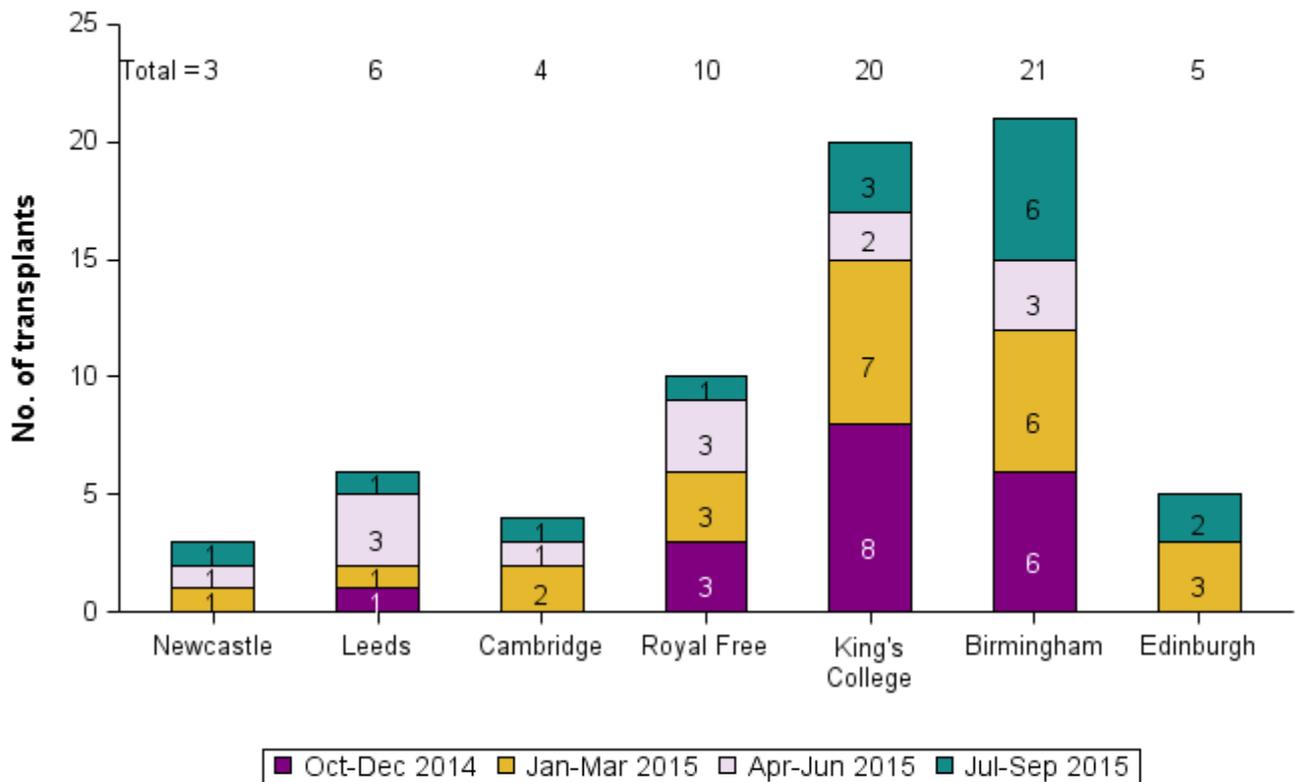


Figure 6 shows adult super-urgent deceased donor first liver only transplants, by quarter and transplant centre.

**Figure 6** Adult super-urgent deceased donor first liver only transplants, 1 October 2014 - 30 September 2015, by quarter and transplant centre



### SURVIVAL AND GRAFT FUNCTION – ADULT ELECTIVE TRANSPLANTS

Table 4 shows the 90-day unadjusted [patient survival](#) and [graft function](#) for adult elective deceased donor first liver transplants in the reported time period, overall and by centre. Of the 599 transplants in this time period, survival information was known for 587 transplants and none of these transplants were auxiliary. Of these, 97% of patients were alive 90 days post-transplant and the graft function rate at 90 days was 95%.

<b>Table 4 Unadjusted 90-day patient survival (%) and graft function (%) for adult elective deceased donor liver only transplants after first graft between, 1 October 2014 and 30 September 2015, by transplant centre</b>					
<b>Centre</b>	<b>Number of transplants</b>	<b>90-day survival (95% CI)</b>		<b>90-day graft function (95% CI)</b>	
Newcastle	25	100	-	100	-
Leeds	71	96	(88-99)	91	(82-97)
Cambridge	64	98	(90-100)	89	(78-95)
Royal Free	63	97	(88-99)	95	(86-99)
King's College	129	97	(92-99)	97	(92-99)
Birmingham	163	97	(94-99)	95	(90-97)
Edinburgh	72	99	(90-100)	96	(88-99)
<b>TOTAL</b>	<b>587</b>	<b>97</b>	<b>(97-99)</b>	<b>95</b>	<b>(92-97)</b>

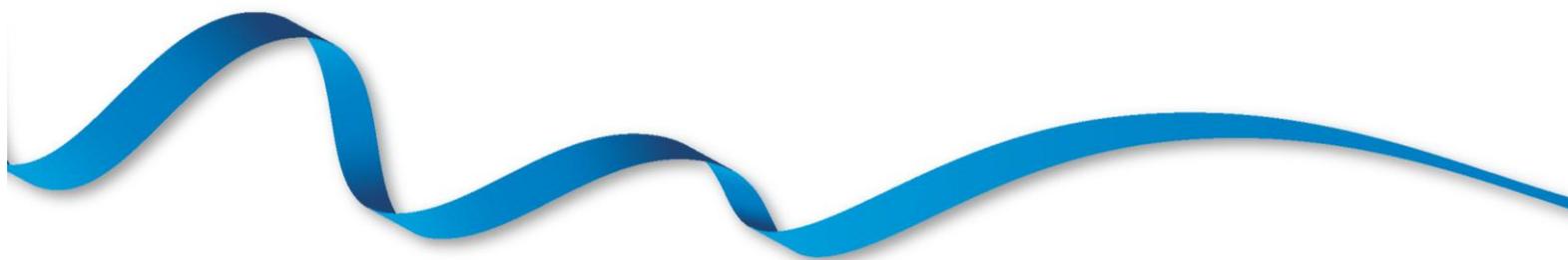
## SURVIVAL AND GRAFT FUNCTION – ADULT SUPER-URGENT TRANSPLANTS

**Table 5** shows the 90-day unadjusted [patient survival](#) and [graft function](#) for adult super-urgent deceased donor first liver only transplants in the reported time period, overall and by transplant centre. Of the 69 transplants in this time period, survival information was known for 68 transplants. One of these transplants was an auxiliary transplant and was excluded from survival analyses. Of the remaining 67 transplants, 95% of patients were alive 90 days post-transplant and the graft function rate at 90 days was 95%. These rates have wide [confidence intervals](#) due to the small number of transplants performed and the rates shown should, therefore, be interpreted with caution.

<b>Table 5 Unadjusted 90-day patient survival (%) and graft function (%) for adult super-urgent<sup>1</sup> deceased donor liver only transplants after first graft between, 1 October 2014 and 30 September 2015, by transplant centre</b>					
<b>Centre</b>	<b>Number of transplants</b>	<b>90-day survival (95% CI)</b>		<b>90-day graft function (95% CI)</b>	
Newcastle	2	100	-	100	-
Leeds	6	83	(27-97)	83	(27-97)
Cambridge	4	100	-	100	-
Royal Free	10	90	(48-99)	90	(48-99)
King's College	20	100	-	100	-
Birmingham	20	95	(69-99)	95	(69-99)
Edinburgh	5	100	-	100	-
<b>TOTAL</b>	<b>67</b>	<b>95</b>	<b>(86-99)</b>	<b>95</b>	<b>(86-99)</b>

<sup>1</sup>Super-urgent registration categories were changed on 17 June 2015 to account for development in treatment of patients with acute liver failure

# **PAEDIATRIC LIVER TRANSPLANTATION**

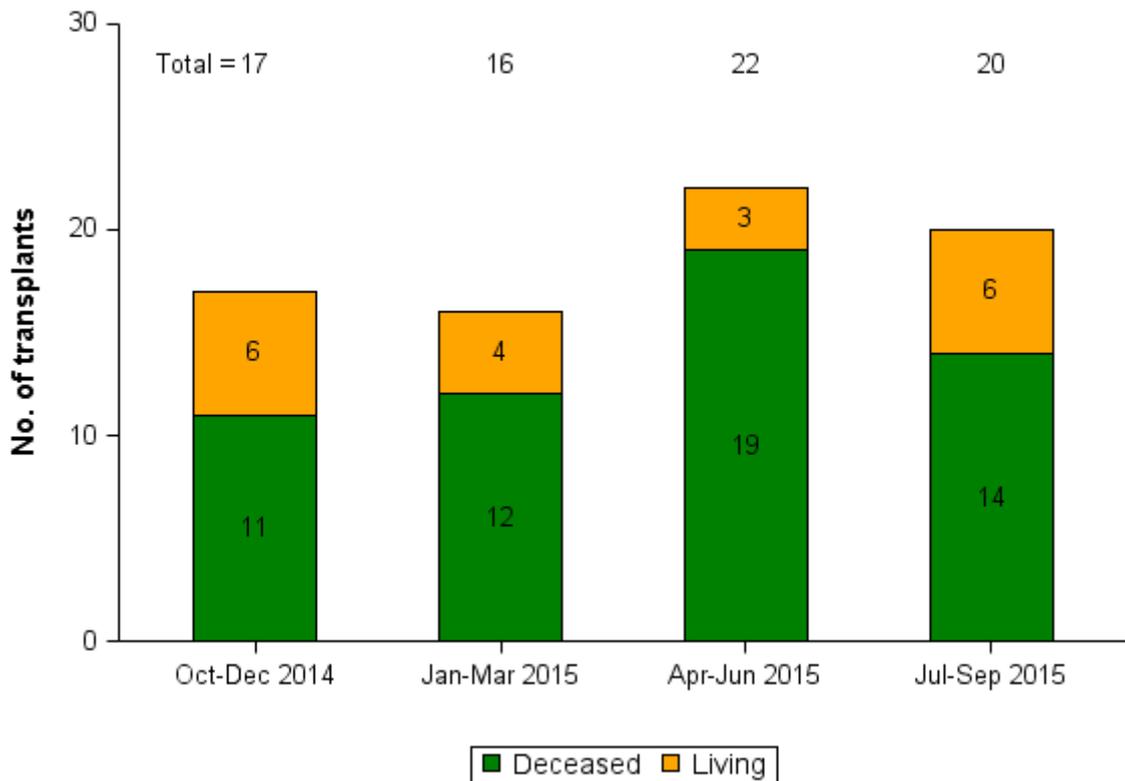


# PAEDIATRIC LIVER TRANSPLANTATION

## OVERVIEW

The number of all paediatric first liver only transplants in the reported period is shown in **Figure 7**, by quarter. Of the 75 transplants in total for paediatric patients, 62 were [elective](#) and 13 were [super-urgent](#) transplants. There were 56 deceased donor transplants and 19 living donor transplants.

**Figure 7** Paediatric first liver only transplants in the UK, 1 October 2014 - 30 September 2015, by donor type



**Table 6** shows the total number of paediatric transplants in the reported time period, including atypical donor, [multi-organ](#) and re-transplants. It also shows the number of paediatric deceased and living (including domino) donor first liver only transplants, by transplant centre.

<b>Table 6</b> Number of paediatric transplants between, 1 October 2014 and 30 September 2015, by transplant centre and urgency status						
<b>Centre</b>	<b>Total number of transplants</b>		<b>Deceased donor first liver only transplants</b>		<b>Living donor first liver only transplants</b>	
	<b>Elective</b>	<b>Super-urgent</b>	<b>Elective</b>	<b>Super-urgent</b>	<b>Elective</b>	<b>Super-urgent</b>
Newcastle	0	0	0	0	0	0
Leeds	15	4	8	1	7	0
Cambridge	0	0	0	0	0	0
Royal Free	0	0	0	0	0	0
King's College	27	9	17	7	9	1
Birmingham	28	5	19	4	2	0
Edinburgh	0	0	0	0	0	0
<b>TOTAL</b>	<b>70</b>	<b>18</b>	<b>44</b>	<b>12</b>	<b>18</b>	<b>1</b>

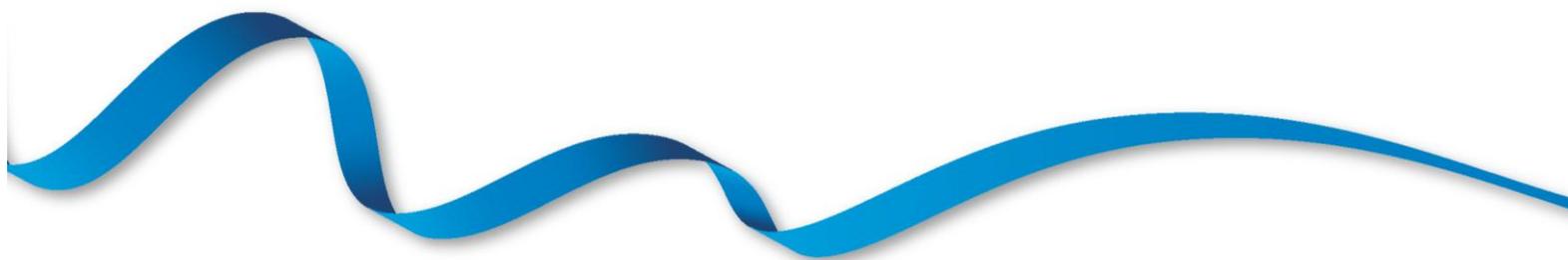
## SURVIVAL AND GRAFT FUNCTION – PAEDIATRIC TRANSPLANTS

**Table 7** shows the 90-day unadjusted [patient survival](#) and [graft function](#) for paediatric elective deceased donor first liver only transplants in the reported period, nationally and by centre. Of the 44 transplants in this time period, survival information was known for 39 transplants and none of these transplants were auxiliary. Of these, 100% of patients were alive 90 days post-transplant and the graft function rate at 90 days was 97%.

<b>Table 7</b> Unadjusted 90-day patient survival (%) and graft function (%) for paediatric elective deceased donor liver only transplants after first graft between, 1 October 2014 and 30 September 2015, by transplant centre					
<b>Centre</b>	<b>Number of transplants</b>	<b>90-day survival (95% CI)</b>		<b>90-day graft function (95% CI)</b>	
Leeds	6	100	-	83	(27-97)
King's College	17	100	-	100	-
Birmingham	16	100	-	100	-
<b>TOTAL</b>	<b>39</b>	<b>100</b>	<b>-</b>	<b>97</b>	<b>(84-99)</b>

There were twelve paediatric [super-urgent](#) deceased donor first liver transplantations in the period of study; one at Leeds, four at Birmingham and seven at King's College. There were no patient deaths or graft failures and so the resulting national 90-day [patient survival](#) and [graft function](#) rates for paediatric super-urgent transplants were both 100%. These rates should be regarded as guidance only due to the small number of transplants.

# APPENDIX



## APPENDIX

### DATA

Data were obtained from the UK Transplant Registry for the time period 1 October 2014 to 30 September 2015 and include all transplants performed in the UK, NHS Group 2 transplants, auxiliary transplants, liver only transplants for intestinal failure patients and exclude all other transplants involving the liver for intestinal failure patients. The Adult and Paediatric sections are limited to first liver only transplants, and unadjusted survival is only estimated for deceased donor transplants, excluding auxiliary transplants.

### METHODS

#### **Unadjusted patient survival and graft function rates**

Unadjusted patient survival and graft function rates were estimated using [Kaplan-Meier](#) methods. Patient survival rates are based on the number of patients transplanted and the number and timing of those that die within the post-transplant period of interest. Patients can be included in this method of analysis irrespective of the length of follow-up recorded. If a patient is alive at the end of the follow-up then information about the survival of the patient is censored at time of analysis, 1 March 2015. Death, irrespective of whether the graft is still functioning or not, is classed as an event. Estimates of graft function follow similar principles but the event of interest is graft failure in living post-transplant patients instead of patient death.

For the purposes of this report, no adjustment was made for risk factors that might make a patient more or less likely to die or a graft to fail. Comparison of unadjusted patient survival or graft function rates across centres and to the national rate should therefore be made with caution.

### GLOSSARY OF TERMS

#### **Confidence interval (CI)**

When an estimate of a quantity such as a survival rate is obtained from data, the value of the estimate depends on the set of patients whose data were used. If, by chance, data from a different set of patients had been used, the value of the estimate may have been different. There is therefore some uncertainty linked with any estimate. A confidence interval is a range of values whose width gives an indication of the uncertainty or precision of an estimate. The number of transplants or patients analysed influences the width of a confidence interval. Smaller data sets tend to lead to wider confidence intervals compared to larger data sets. Estimates from larger data sets are therefore more precise than those from smaller data sets. Confidence intervals are calculated with a stated probability, usually 95%. We then say that there is a 95% chance that the confidence interval includes the true value of the quantity we wish to estimate.

#### **Donor type**

Liver donors can be of different types.

*Donor after brain death (DBD)*. A donor whose heart is still beating when their entire brain has stopped working so that they cannot survive without the use of a ventilator. Organs for

transplant are removed from the donor while their heart is still beating, but only after extensive tests determine that the brain cannot recover and they have been certified dead.

*Donor after circulatory death (DCD).* A donor whose heart stops beating before their brain stops working and who is then certified dead. The organs are then removed.

*Living donor.* A donor who is a living person and who is usually, but not always, a relative of the transplant patient. For example, a parent may donate part of their liver to their child.

*Domino donor.* A donor with a certain type of rare degenerative liver disease who receives a liver transplant to treat their condition. This donor gives their liver to another recipient in a domino liver transplant, because the liver still functions well for other recipients.

### **Elective and super-urgent patients**

Separate selection criteria to join the liver transplant list have been devised for those patients requiring emergency transplantation (super-urgent) compared to those who require a routine procedure (elective transplantation). The two groups have a different range of aetiologies with markedly different short-term prognoses; different criteria are required to define that prognosis. Similarly, processes to allocate a donor liver are different for super-urgent and elective transplantation, reflecting those patient groups with a different risk of death without transplantation.

### **Graft function**

The percentage of patients who are alive with a functioning graft. This is usually specified for a given time period after transplant. For example, a 90 day graft function rate is the percentage of patients alive with a functioning graft 90 days after transplant.

### **Kaplan-Meier method**

A method that allows patients with incomplete follow-up information to be included in estimating survival rates. For example, in a cohort for estimating one year patient survival rates, a patient was followed up for only nine months before they relocated. If we calculated a crude survival estimate using the number of patients who survived for at least a year, this patient would have to be excluded as it is not known whether or not the patient was still alive at one year after transplant. The Kaplan-Meier method allows information about such patients to be used for the length of time that they are followed-up, when this information would otherwise be discarded. Such instances of incomplete follow-up are not uncommon in clinical settings and the Kaplan-Meier method allows the computation of estimates that are more meaningful in these cases.

### **Multi-organ transplant**

A transplant in which the patient receives more than one organ. For example, a patient may undergo a transplant of a liver and kidney.

### **Patient survival rate**

The percentage of patients who are still alive (whether the graft is still functioning or not). This is usually specified for a given time period after first transplant. For example, a five year patient survival rate is the percentage of patients who are still alive five years after their first transplant.

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