



Blood and Transplant

**INTERIM REPORT ON
LIVER TRANSPLANTATION**

**REPORT FOR 2018/2019
(1 OCTOBER 2017 – 30 SEPTEMBER 2018)**

PUBLISHED FEBRUARY 2019

PRODUCED IN COLLABORATION WITH NHS ENGLAND

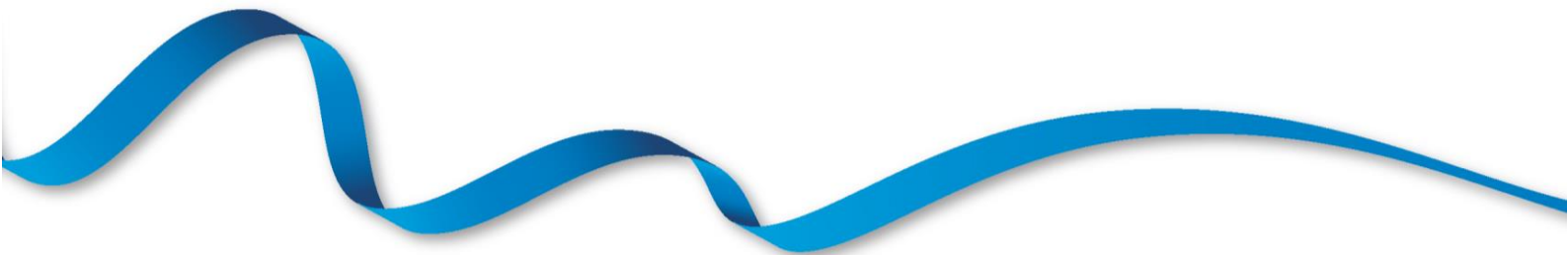


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Executive Summary



This interim report presents key figures about liver transplantation in the UK for the period from 1 October 2017 to 30 September 2018. 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.

The new national liver offering scheme was introduced on 20th March 2018 initially for offering livers for donors after brain death (DBD).

Key points

- There were 1069 **liver transplants** performed in the UK between 1 October 2017 and 30 September 2018. Of these, 943 (88%) were deceased donor first liver only transplants (including liver only transplants due to intestinal failure) and 23 (2%) were living donor first liver only transplants (including 1 first liver only domino transplant). The remainder were repeated transplants (86) or multi-organ transplants (17).
- Of the 943 **deceased donor first liver only transplants** in the time period, 869 (92%) were in adult recipients and 74 (8%) were in paediatric recipients. The approximate proportion of elective to super-urgent transplants in each of these age groups was 90% to 10% and 84% to 16%, respectively.
- Of the 23 **living donor first liver only (including domino) transplants** in the time period, 9 (39%) were in adult recipients and 14 (61%) were in paediatric recipients. All adult recipients were elective. Of paediatric recipients, 13 (93%) were elective and 1 (7%) was super-urgent.
- The unadjusted national **rates of patient survival** 90 days after first liver transplantation from deceased donors were 96% for adult elective and 87% for adult super-urgent registrations. Those for paediatric elective and super-urgent registrations were 98% and 83%, respectively, although this should be regarded as guidance only due to the relatively small number of data points.
- The unadjusted national **rates of graft function** 90 days after first liver transplantation from deceased donors were 94% for adult elective and 82% for adult super-urgent patient registrations. The rates for paediatric elective and super-urgent patient registrations were 93% and 83%, respectively, but note the caveat above.

- **Table 1.1** provides a summary of liver transplant activity in the UK for 1 October 2017 to 30 September 2018. For comparison, transplant activity figures are also provided for 1 October 2016 to 30 September 2017.

Table 1.1 Number of first liver only transplants in the UK, by recipient age group and urgency status and by donor type, for 2016/17¹ and for 2017/18²						
	2016/17¹			2017/18²		
	Elective	Super-urgent	Total	Elective	Super-urgent	Total
Deceased donor	787	70	857	847	96	943
Adult patient	724	62	786	785	84	869
Paediatric patient	63	8	71	62	12	74
Living donor	30	2	32	22	1	23
Adult patient	10	0	10	9	0	9
Paediatric patient	20	2	22	13	1	14
TOTAL	817	72	889	869	97	966

¹ 1 October 2016 – 30 September 2017
² 1 October 2017 – 30 September 2018

- **Table 1.2** provides a summary of unadjusted 90 days patient survival (%) and graft function (%) for deceased donor first liver only transplants for 1 October 2017 to 30 September 2018. For comparison, unadjusted 90 days patient survival (%) and graft function (%) are also provided for 1 October 2016 to 30 September 2017.

Table 1.2 Unadjusted 90-day patient survival (%) and graft function (%) for deceased donor first liver only transplants, for 2016/17¹ and for 2017/18²				
	2016/17¹		2017/18²	
	Elective	Super-urgent	Elective	Super-urgent
90 days patient survival				
Adult patient	96%	92%	96%	87%
Paediatric patient ³	93%	-	98%	-
90 days graft function				
Adult patient	92%	90%	94%	82%
Paediatric patient ³	90%	-	93%	-

¹ 1 October 2016 – 30 September 2017
² 1 October 2017 – 30 September 2018
³ Survival rates for cohorts with less than 10 patients are not presented due to small numbers

How to cite this report:
Interim Report on Liver Transplantation 2018/2019. NHS Blood and Transplant.

Introduction



This interim report presents information on liver transplant activity, [patient survival](#) and [graft function](#) after transplantation between 1 October 2017 and 30 September 2018, 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.

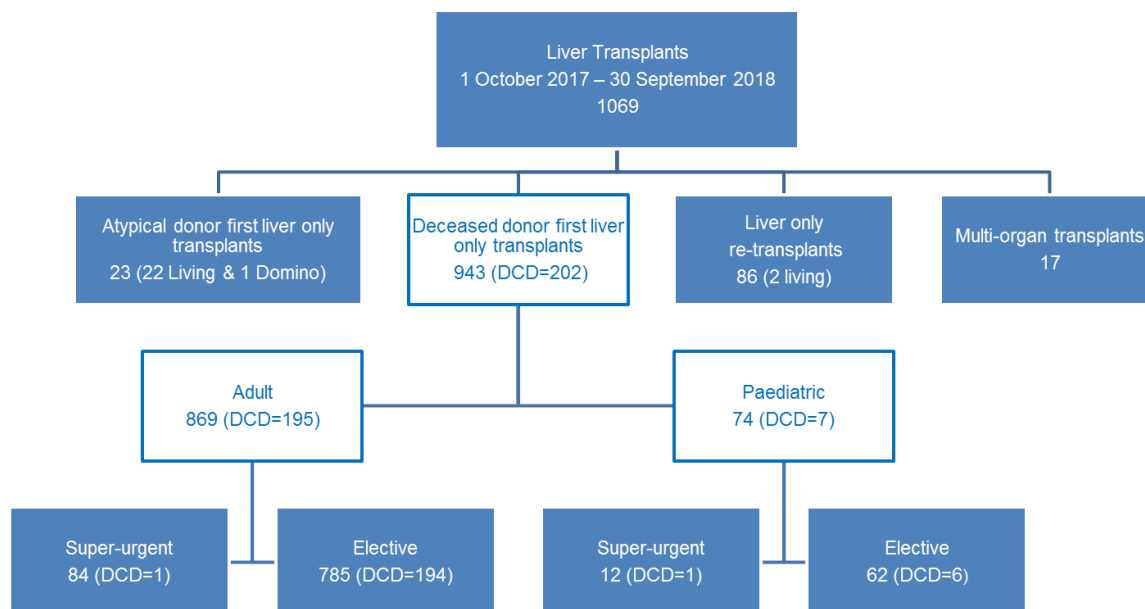
There are three paediatric transplant centres in the UK; Children’s Hospital (Birmingham), St James’s University Hospital (Leeds) and King’s College Hospital (London). Leeds and King’s College are adult transplant centres too, in addition to Queen Elizabeth Hospital (Birmingham), Addenbrooke’s Hospital (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 recipients (aged<17 years), and according to the urgency of the transplantation ([elective](#) and [super-urgent](#)). *Note:* Super-urgent registration categories were changed on 17 June 2015 to account for development in treatment of patients with acute liver failure.

[Data](#) sources and [methods](#) are described in full detail in the **Appendix**.

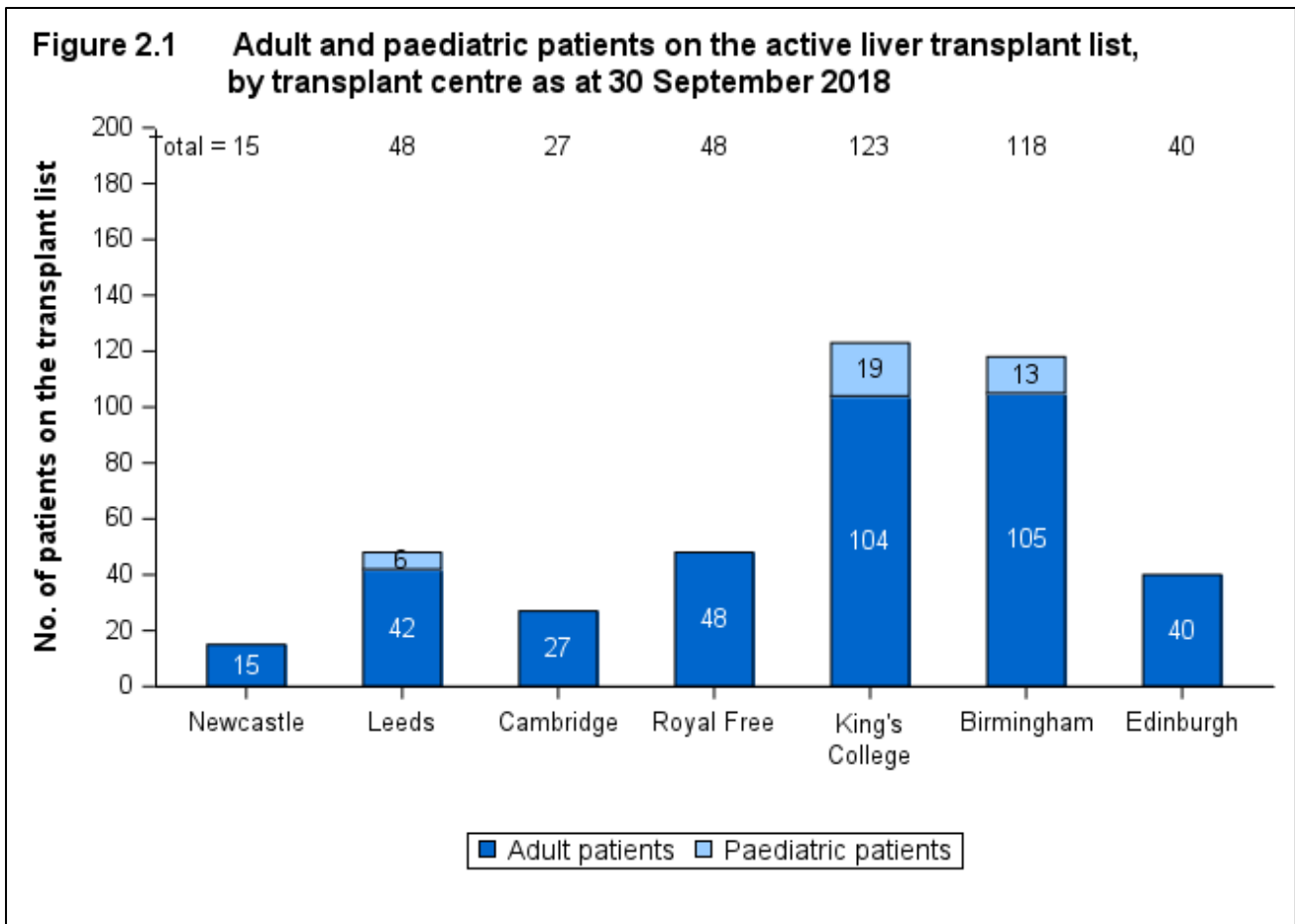
Figure 1.1 details the 1069 liver transplants performed in the UK in the reported time period. Of these, 943 (88%) were deceased donor first liver only transplants: 869 (92%) in adult and 74 (8%) in paediatric patients. Of the 943 transplants, 96 (10%) were super-urgent and 847 (90%) were elective transplants.

Figure 1.1 Liver transplants in the UK, 1 October 2017 – 30 September 2018



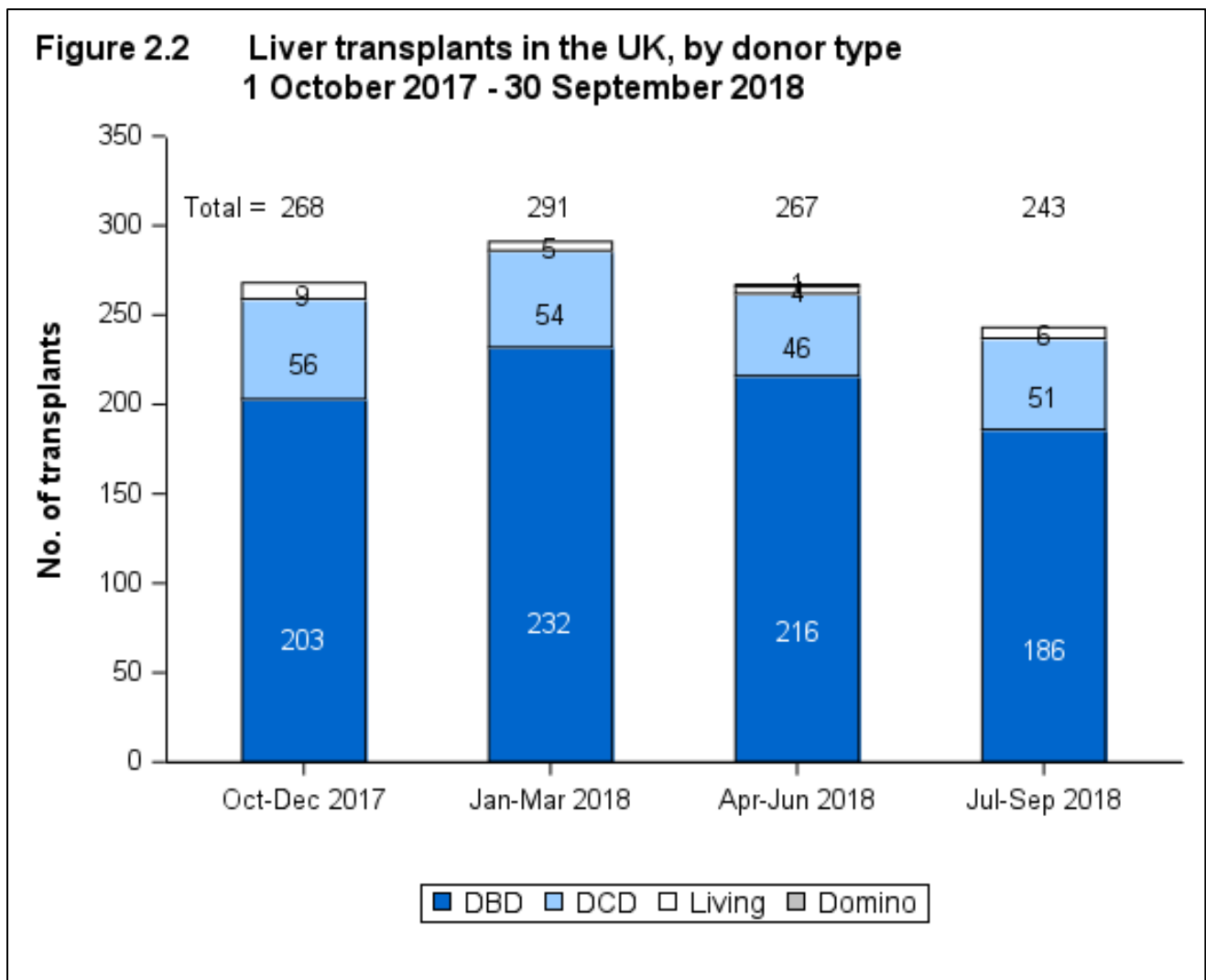
2.1 Transplant list

Figure 2.1 shows the number of adult and paediatric patients on the active liver transplant list as at 30 September 2018, by transplant centre. In total, there were 419 patients on the transplant list; 381 were adults and 38 were paediatric patients. King's College Hospital had the largest share of the transplant list (32%) and Newcastle the smallest (4%). This figure includes [elective](#) and [super-urgent](#) registrations. Compared with numbers as at 30 September 2017, there has been a 18% decrease (from 514 registrations to 419 registrations) on the active liver transplant list.



2.2 Transplant activity

During the one-year study period, 1069 liver transplants were reported. Activity by quarter is shown in **Figure 2.2**, by [type of donor](#).



Adult Liver Transplantation

3.1 Transplant activity

The number of all adult first liver only transplants in the study period is shown in **Figure 3.1**, by quarter. Of the 878 transplants of this type, 869 were deceased donor transplants and, of these, 785 were [elective](#) and 84 were [super-urgent](#) transplants. Of the remaining 9 transplants, all were elective living donor transplants.

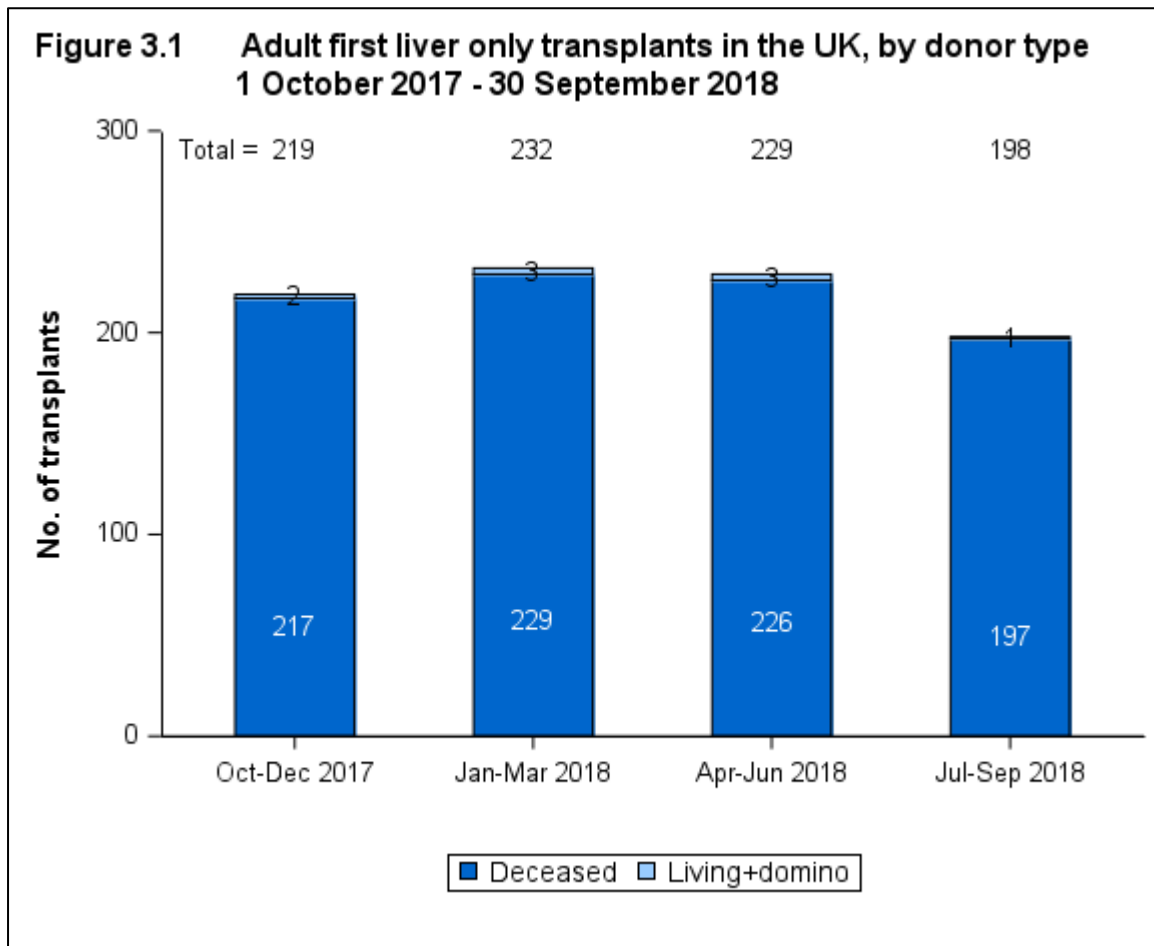


Table 3.1 shows the total number of adult transplants in the reported time period, including atypical donor, [multi-organ](#) and re-transplants. It also shows the number of adult deceased and living (including domino) donor first liver only transplants, by transplant centre.

Table 3.1 Number of adult liver transplants between, 1 October 2017 and 30 September 2018, 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	30	5	28	5	0	0
Leeds	116	16	101	13	1	0
Cambridge	125	12	115	9	0	0
Royal Free	105	19	103	15	0	0
King's College	189	16	167	14	2	0
Birmingham	197	30	179	24	0	0
Edinburgh	96	8	92	4	0	0
TOTAL	864¹	106	785	84	9¹	0

¹Includes 6 living donor transplants at London Bridge

Figure 3.2 shows adult elective deceased donor first liver only transplants, by quarter and transplant centre.

Figure 3.2 Adult elective deceased donor first liver only transplants, by quarter and transplant centre, 1 October 2017 - 30 September 2018

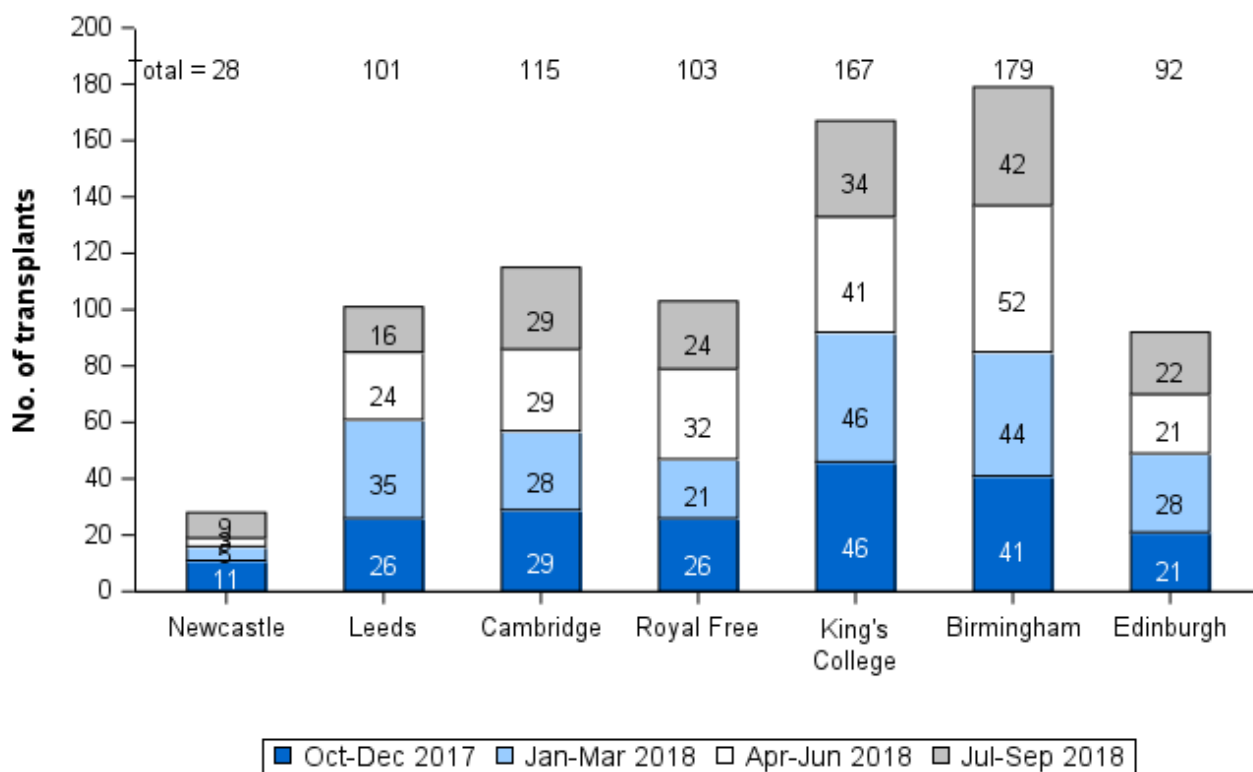
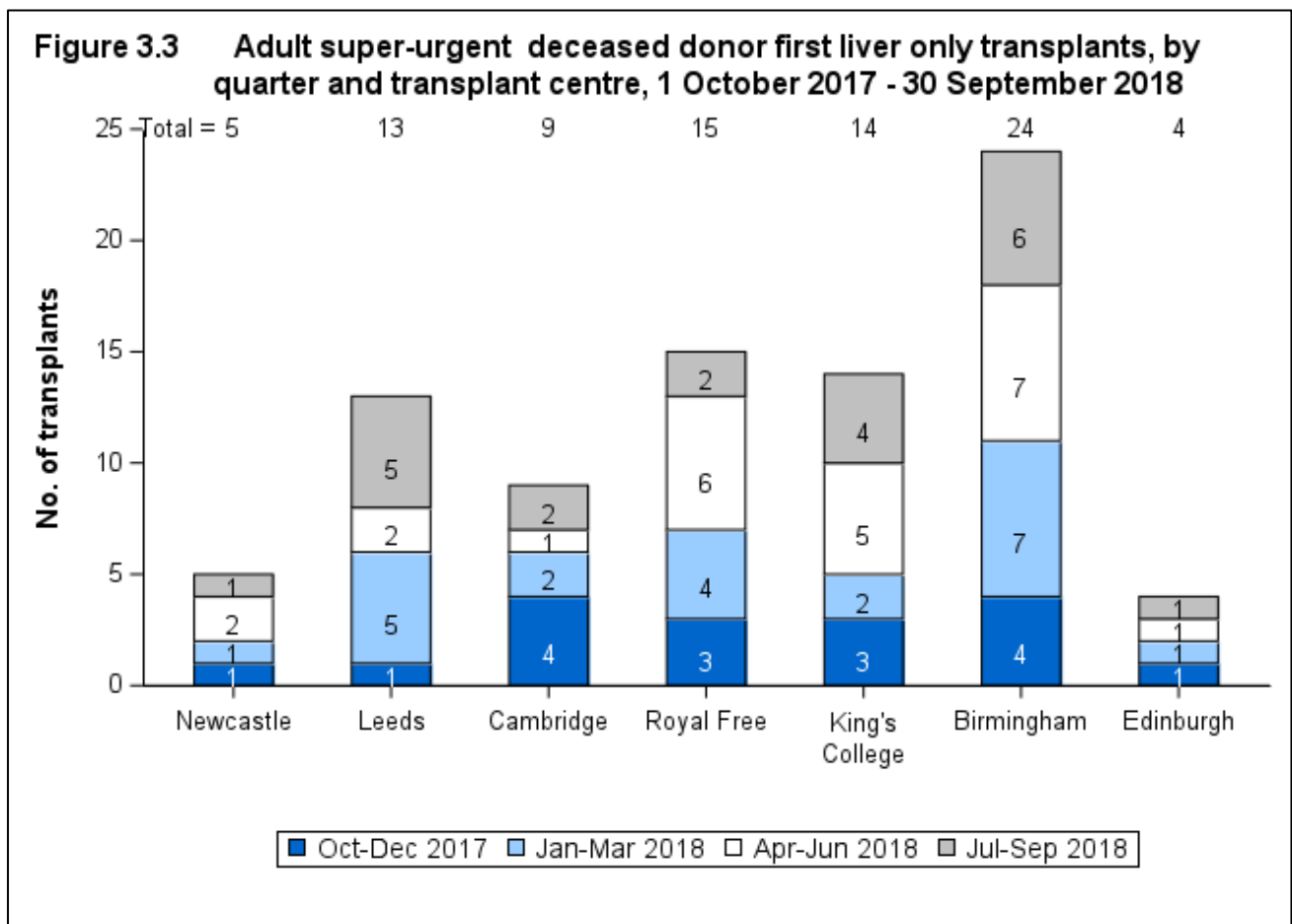


Figure 3.3 shows adult super-urgent deceased donor first liver only transplants, by quarter and transplant centre.



The demographic characteristics of 785 adult [elective](#) first-time transplant recipients of a deceased donor liver in the time period are shown, by centre and overall, in **Table 3.2**. Two thirds of these recipients were male and the mean age was 57 years. The most common indication for transplantation was alcoholic liver disease (26% of cases) followed by cancer (20% of cases). The mean recipient BMI was 27 kg/m². For some characteristics, due to rounding, percentages may not add up to 100.

Table 3.2 Demographic characteristics of adult elective deceased donor liver transplant recipients, 1 October 2017 and 30 September 2018

		Birmingham N (%)	Cambridge N (%)	Edinburgh N (%)	King's College N (%)	Leeds N (%)	Newcastle N (%)	Royal Free N (%)	TOTAL N (%)
Number		179	115	92	167	101	28	103	785 (100)
Recipient sex	Male	120 (67)	77 (67)	60 (65)	100 (60)	66 (65)	22 (79)	69 (67)	513 (65)
	Female	59 (33)	38 (33)	32 (35)	67 (40)	35 (35)	6 (21)	34 (33)	272 (35)
Recipient ethnicity	White	164 (92)	106 (92)	89 (97)	135 (81)	90 (89)	26 (93)	90 (87)	700 (89)
	Non-white	12 (7)	9 (8)	3 (3)	32 (19)	11 (11)	2 (7)	13 (13)	82 (10)
	Not reported	3 (2)	0	0	0	0	0	0	3 (1)
Indication ¹	Cancer	24 (13)	32 (28)	18 (20)	40 (24)	12 (12)	4 (14)	28 (27)	158 (20)
	Hepatitis C	5 (3)	4 (4)	2 (2)	2 (1)	4 (4)	0	5 (5)	22 (3)
	Alcoholic liver disease	48 (27)	30 (26)	29 (32)	33 (20)	30 (30)	11 (39)	23 (22)	204 (26)
	Hepatitis B	3 (2)	0	0	4 (2)	2 (2)	1 (4)	5 (5)	15 (2)
	Primary sclerosing cholangitis	27 (15)	13 (11)	4 (4)	24 (14)	23 (23)	4 (14)	16 (16)	111 (14)
	Primary biliary cirrhosis	19 (11)	5 (4)	13 (14)	11 (7)	3 (3)	1 (4)	3 (3)	55 (7)
	Autoimmune and cryptogenic disease	17 (9)	2 (2)	8 (9)	15 (9)	8 (8)	4 (14)	7 (7)	61 (8)
	Metabolic	22 (12)	20 (18)	15 (16)	20 (12)	13 (13)	3 (11)	11 (11)	104 (13)
	Other	14 (8)	9 (8)	3 (3)	18 (11)	6 (6)	0	5 (5)	55 (7)
	Recipient HCV status ²	Negative	165 (92)	98 (84)	84 (91)	145 (87)	92 (91)	28 (100)	86 (83)
Positive		10 (6)	17 (16)	5 (5)	20 (12)	6 (6)	0	17 (17)	75 (10)
Not reported		4 (2)	0	3 (3)	2 (1)	3 (3)	0	0	12 (2)
Pre-transplant in-patient status	Out-patient	168 (94)	97 (84)	80 (87)	150 (90)	93 (92)	27 (96)	100 (97)	715 (91)
	In-patient	11 (6)	18 (16)	12 (13)	17 (10)	8 (8)	1 (4)	2 (2)	69 (9)
	Not reported	0	0	0	0	0	0	1 (1)	1 (0)

Table 3.2 Demographic characteristics of adult elective deceased donor liver transplant recipients, 1 October 2017 and 30 September 2018

		Birmingham N (%)	Cambridge N (%)	Edinburgh N (%)	King's College N (%)	Leeds N (%)	Newcastle N (%)	Royal Free N (%)	TOTAL N (%)
Recip age (years)	Median (IQR)	55 (46,63)	57 (51,64)	59 (51,64)	55 (47,61)	56 (46,61)	62 (54,65)	57 (49,61)	57 (48,62)
	Not reported	0	0	0	0	0	0	0	0
BMI kg/m ²	Median (IQR)	27 (24,31)	28 (25,32)	29 (24,33)	28 (24,31)	26 (23,31)	27 (24,33)	27 (24,31)	27 (24,31)
	Not reported	0	0	0	0	0	0	0	0
Cold Ischaemia Time (hrs)	Median (IQR)	7 (6,9)	8 (7,11)	9 (8,11)	9 (7,11)	7 (6,9)	11 (9,12)	8 (7,10)	8 (7,10)
	Not reported	0	0	1	1	0	0	0	2

¹ Based on the Robert's hierarchy of indications that considers three reported diseases (Roberts et al. 2004, Liver Transplantation, 10(7), pp. 886-897).

² Based on the Anti HCV variable in the "Recipient investigations immediately prior to transplant" section of the NHSBT First Week Transplant Record Form.

3.2 Elective patient survival and graft function

Table 3.3 shows the 90-day unadjusted [patient survival](#) and [graft function](#) for adult elective deceased donor first liver only transplants in the reported time period, overall and by centre. Of the 785 transplants in this time period, survival information was known for 94% (740) of transplants and none of these transplants was [auxiliary](#). Of these, 96% of patients were alive 90 days post-transplant and the graft function rate at 90 days was 94%.

Table 3.3 Unadjusted 90-day patient survival (%) and graft function (%) for adult elective deceased donor first liver only transplants between, 1 October 2017 and 30 September 2018, by transplant centre					
Centre	Number of transplants	90-day survival (95% CI)		90-day graft function (95% CI)	
Newcastle	26	89.5	(65.1-96.6)	89.5	(65.1-96.6)
Leeds	99	94.7	(88.2-98.7)	94.7	(88.2-98.7)
Cambridge	113	97.0	(90.3-98.7)	94.1	(88.2-96.6)
Royal Free	100	96.7	(90.3-98.7)	94.6	(88.2-98.7)
King's College	165	97.4	(92.4-98.7)	96.6	(92.4-98.7)
Birmingham	177	94.1	(90.3-96.6)	93.5	(88.2-96.6)
Edinburgh	60	95.2	(81.9-98.7)	91.9	(79.8-96.6)
TOTAL	740	95.7	(94.5-96.6)	94.4	(92.4-96.6)

3.3 Super-urgent patient survival and graft function

Table 3.4 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 84 transplants in this time period, survival information was known for 74 transplants. Two of these transplants were [auxiliary](#) transplants and were excluded from the survival analysis. Of the 72 transplants, 87% of patients were alive 90 days post-transplant and the graft function rate at 90 days was 82%. These rates have wide [confidence intervals](#) due to the small number of transplants performed and the rates shown should, therefore, be interpreted with caution.

Table 3.4 Unadjusted 90-day patient survival (%) and graft function (%) for adult super-urgent deceased donor first liver only transplants between, 1 October 2017 and 30 September 2018, by transplant centre					
Centre	Number of transplants	90-day survival (95% CI)		90-day graft function (95% CI)	
Newcastle	5	80.0	(21.0-96.6)	80.0	(21.0-96.6)
Leeds	10	80.0	(39.9-94.5)	80.0	(39.9-94.5)
Cambridge	8	87.5	(37.8-98.7)	87.5	(37.8-98.7)
Royal Free	15	86.7	(56.7-96.6)	80.0	(50.4-92.4)
King's College	11	81.8	(44.1-94.5)	81.8	(44.1-94.5)
Birmingham	20	95.0	(69.3-98.7)	80.0	(54.6-92.4)
Edinburgh	3	100		100	
TOTAL	72	87.4	(77.7-92.4)	81.9	(71.4-88.2)

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



4.1 Transplant activity

The number of all paediatric first liver only transplants in the reported period is shown in **Figure 4.1**, by quarter. Of the 88 transplants in total for paediatric patients, 75 were [elective](#) and 13 were [super-urgent](#) transplants. There were 74 deceased donor transplants and 14 living donor transplants.

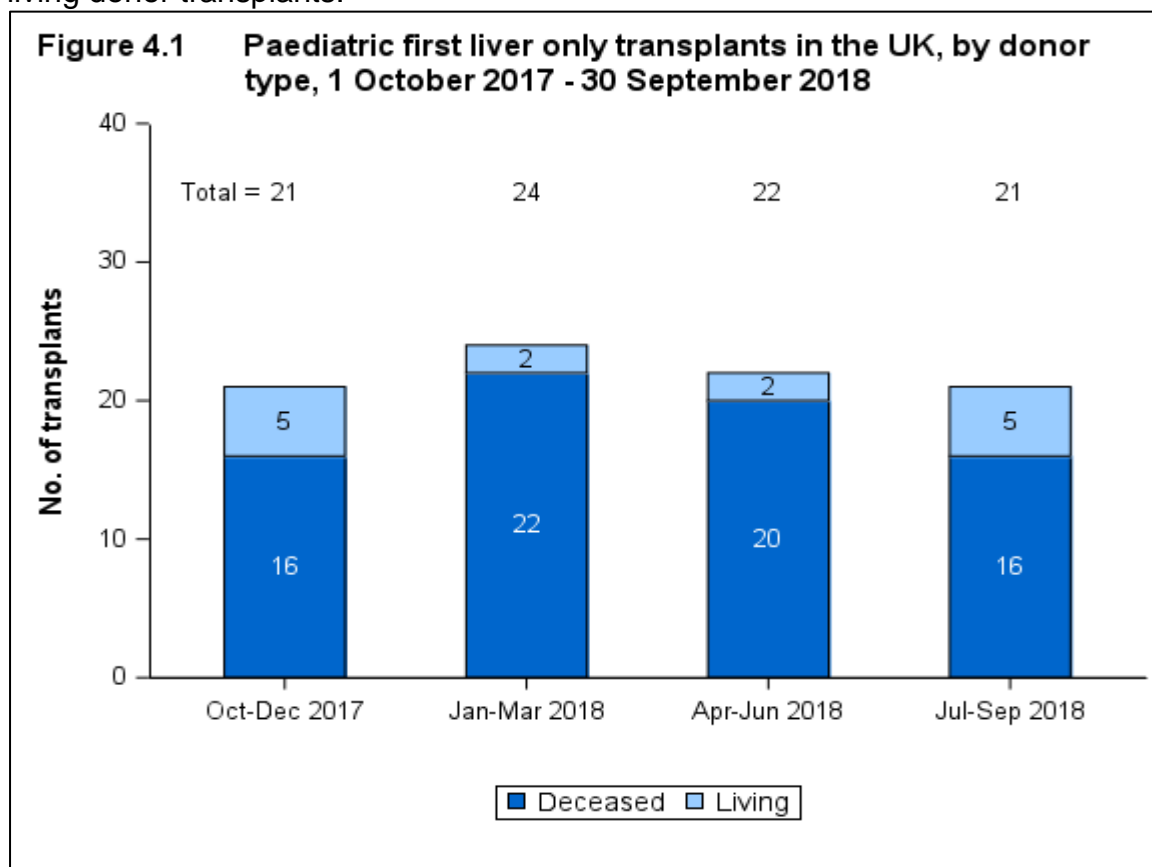


Table 4.1 shows the total number of paediatric transplants in the reported time period, including atypical donor, [multi-organ](#) and re-transplants. It also shows the number of paediatric deceased and living (including domino) donor first liver only transplants, by transplant centre.

Table 4.1 Number of paediatric transplants between 1 October 2017 and 30 September 2018, 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	0	0	0	0	0	0
Leeds	19	5	16	1	3	1
Cambridge	0	0	0	0	0	0
Royal Free	0	0	0	0	0	0
King's College	42	9	31	8	8	0
Birmingham	18	6	15	3	2	0
Edinburgh	0	0	0	0	0	0
TOTAL	79	20	62	12	13	1

4.2 Patient survival and graft function

Table 4.2 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 62 transplants in this time period, survival information was known for 55 transplants, and none of these transplants was [auxiliary](#). Of the 55 transplants for analysis, 98% of patients were alive 90 days post-transplant and the graft function rate at 90 days was 93%.

Table 4.2 Unadjusted 90-day patient survival (%) and graft function (%) for paediatric elective deceased donor first liver only transplants between, 1 October 2017 and 30 September 2018, by transplant centre					
Centre	Number of transplants	90-day survival (95% CI)		90-day graft function (95% CI)	
Leeds	16	100	-	93.8	(63.0-98.7)
King's College	28	100	-	96.4	(77.7-98.7)
Birmingham	11	90.9	(50.4-98.7)	81.8	(44.1-94.5)
TOTAL	55	98.2	(88.2-98.7)	92.7	(81.9-96.6)

There were twelve paediatric super-urgent deceased donor first liver transplants in the period of study; one at Leeds, eight at King's College and three at Birmingham; four of the 12 transplants were auxiliary. Ninety-day survival was not known for two of the remaining eight non-auxiliary transplants. All but one patient survived the first ninety days and the resulting unadjusted national 90-day patient survival and graft function rates (95% confidence interval) for paediatric super-urgent transplants were both at 83.3% (27.3, 96.6). These rates should be regarded as guidance only due to the small number of transplants.

Appendix

A1 Data

Data were obtained from the UK Transplant Registry for the time period 1 October 2017 to 30 September 2018 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](#).

A2 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, 10th January 2019. 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.

A3 Glossary of terms

Auxiliary transplant

Auxiliary transplantation uses a partial left or right lobe from the donor which acts as temporary support for the recipient's injured liver, which remains in place.

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. *Note:* Super-urgent registration categories were changed on 17 June 2015 to account for development in treatment of patients with acute liver failure.

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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