

NHS BLOOD AND TRANSPLANT

BOWEL ADVISORY GROUP

PATIENT SURVIVAL AFTER INTESTINAL TRANSPLANT

SUMMARY

INTRODUCTION

- 1 This paper reports on patient survival following intestinal transplantation, for transplants performed in the UK over a 17 year period. The results should be regarded as guidance only due to the limited amount of data available.

DATA ANALYSIS

- 2 171 elective intestinal transplants were carried out in first time recipients in the UK between 1 January 1998 and 31 December 2014. Follow-up data were recorded on the UK Transplant Registry (UKTR) as at 12 January 2015 in 159 (93%) cases.
- 3 Unadjusted survival analysis on 87 paediatric patients (aged ≤ 17 years) and 72 adult patients suggests the following patient survival estimates at 90 days, one year and five years post-elective intestinal transplant: paediatric: 91%, 79% and 62%, respectively, adult: 83%, 74% and 51%, respectively.
- 4 As the total number of transplants is small it is difficult to make comparisons between transplant eras and transplant types. However, there is some evidence that the one-year outcomes of transplants carried out in the latter part of the 17 year period are better than the outcomes of transplants carried out in the earlier years. However, this difference is not statistically significant either for adults or paediatric patients.
- 5 There have been five super-urgent intestinal transplants performed in the UK to date. Two transplants were performed in the same patient as their first super-urgent transplant resulted in primary non-function. One of the four patients is surviving at nearly two years post-transplant, two at one year and one at 3 months.
- 6 There have been 16 elective transplants including abdominal wall in the time period into 15 different adult patients; 10 bowel only, 1 including the liver and 5 not including the liver. Seven (47%) of the 15 patients are alive as at 12 January 2015, 3 (20%) have missing survival information and 5 (33%) have died.

MEMBERS ARE ASKED TO NOTE

- 7 Follow up data returned and recorded into the UKTR has increased from 82% to 93% since March 2014. Timely provision of three-month and annual follow-up data will aid more accurate estimation of outcomes following intestinal transplantation in the UK.

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INTRODUCTION

- 1 This paper reports on patient survival following intestinal transplantation, for transplants performed in the UK over a 17 year period. The results should be regarded as guidance only due to the limited amount of data available.

DATA AND METHODS

- 2 171 elective intestinal transplants were carried out in first time recipients in the UK between 1 January 1998 and 31 December 2014. Follow-up data were recorded on the UKTR as at 12 January 2015 for 159 (93%) of these transplants. The analysis cohort included 87 paediatric patients (aged ≤ 17 years) and 72 adult patients.
- 3 The Kaplan-Meier estimation method was used to produce survival curves and estimates of 90 day, one year and 5 year patient survival, where the outcome event was patient death. Analyses were broken down by age group, transplant era or transplant type. The number of deaths in each group was often very small so the results should be regarded as guidance only.
- 4 The log-rank test was used to make comparisons between the survival experiences of different groups of patients. The p-values from these tests are presented within the plots, however, they should be treated with caution since the small number of events means that a slight change in this number could affect the p-value considerably.
- 5 The types of intestinal transplant are categorised as:
 - BO Bowel Only (all those not including a liver or pancreas)
 - BP Bowel and Pancreas
 - LBP Liver, Bowel and Pancreas
 - MV Multivisceral (liver, bowel, pancreas and stomach/spleen/kidney/abdominal wall/colon)
 - MMV Modified Multivisceral (bowel, pancreas and stomach/spleen/kidney/abdominal wall/colon)
- 6 Five super-urgent intestinal transplants have been carried out in the UK to date. The outcomes of these transplants are presented in this paper.
- 7 There have been 16 elective transplants including abdominal wall in the time period into 15 different adult patients. The details of these transplants are shown below.

RESULTS

- 8 **Figure 1** shows 90 day and one year survival of paediatric and adult patients who received an elective intestinal transplant over the 17-year time period. Patient survival following intestinal transplantation was 91% and 83% at 90 days and 79% and 74% at one year post-transplant for paediatric and adult patients, respectively, although these differences were not statistically significant.

- 9 **Figure 2** shows long-term patient survival by age group. Five year survival estimates for paediatric and adult elective intestinal transplant recipients are 62% and 51%, respectively. However, these estimates are not statistically significantly different.
- 10 **Figures 3 and 4** show elective paediatric patient survival only. **Figure 3** suggests that paediatric patient survival to 90 days has increased from 83% (for transplants between 1998 and 2002 inclusive), to 96% (for transplants between 2008 and 2014 inclusive), however this result is not statistically significant.
- 11 **Figure 4** compares 90 day and one year paediatric patient survival for bowel only recipients and recipients of a liver and bowel (note that BP and MMV recipients were excluded from this analysis due to small numbers). The results suggest that 90 day survival is more favourable for bowel only recipients but one year survival is marginally better for liver and bowel recipients. Again, this result is just a guide due to the small number of events and none of these differences is statistically significant.
- 12 **Figures 5 and 6** show elective adult patient survival only. **Figure 5** suggests that adult patient survival to 90 days and one year has increased for transplants performed in the latter four years of the time period. For one year, patient survival improved from 65% for transplants between 1998 and 2009 inclusive to 78% for transplants between 2010 and 2014 inclusive. These estimates, however, are not significantly different.
- 13 **Figure 6** suggests that adult recipients of liver and bowel transplants have a poorer, albeit non-statistically significant, survival experience to 90 days compared with recipients of non-liver containing intestinal grafts.
- 14 **Table 1** presents the outcomes of the five super-urgent intestinal transplants that have been carried out in the UK to date. These transplants were all carried out between November 2012 and November 2013. Two transplants were performed in the same patient, as the first transplant resulted in primary non-function.

Table 1 Outcome of super-urgent intestinal transplants, all carried out between November 2012 and November 2013 at Cambridge transplant unit				
Patient number	Graft number	Month of transplant	Transplant type	Outcome
1	2	Nov-12	MV	Previous elective MV transplant failed within one month (acute vascular occlusion). Patient is alive at 23 months after super-urgent MV transplant
2	1	May-13	MV	Patient is alive at 11 months after super-urgent transplant
3	1	Aug-13	MV	Transplant experienced primary non-function so patient was re-registered on the super-urgent list
3	2	Aug-13	MV	Patient is alive at 1 year after second super-urgent MV transplant
4	1	Nov-13	MV	Patient is alive at 3 months after super-urgent MV transplant

- 15 There have been 16 elective transplants including abdominal wall in the time period into 15 different adult patients; 10 bowel only, 1 including the liver and 5 not including the liver¹. Fourteen (87%) of these transplants have been performed at the Oxford

¹ In addition, we are aware of at least two cases of abdominal wall only registrations in the time period. Transplant and outcome data are not available for this type of transplants in the UKTR.

transplant unit and the rest at Cambridge. Two of these patients are re-transplant cases. Of the first-time transplant patients, 5 are alive as at 12 January 2015 (3 approximately one year; 2 approximately 2 months post-transplantation), 5 have died and 3 have missing survival information. The two re-transplant cases (one bowel-only, one multivisceral) are alive approximately 2 years post-transplantation. **Table 2** presents the causes of death of the abdominal wall recipients who died.

Table 2 Cause of death of abdominal wall recipients between 1 January 1998 and 31 December 2014; all deaths of Oxford transplant unit patients				
Patient number	Graft number	Survival time (days)	Transplant type	Cause of death
1	1	593	BO	Multi-system failure
2	1	311	MMV	Pulmonary embolus
3	1	32	BO	Multi-system failure
4	1	24	MMV	Other identified cause of death
5	1	16	MMV	Peritonitis (bacterial, with peritoneal dialysis)

SUMMARY

- 16 Outcome data recorded on the UKTR for paediatric and adult patients who received an elective intestinal transplant over a 17 year period suggest the following patient survival estimates at 90 days, one year and five years post-transplant: paediatric: 91%, 79% and 62%, respectively, adult: 83%, 74% and 51%, respectively. Outcome data were missing for 7% of the transplants.
- 17 The number of intestinal transplants is small, making comparisons between transplant eras and transplant types difficult. There is some evidence that the outcomes of transplants carried out in the latter part of the 17 year period are better than that of transplants carried out in the earlier years, but the difference is not statistically significant.
- 18 There have been five super-urgent intestinal transplants performed in the UK to date into 4 different patients. One of the four patients is surviving at nearly two years post-transplant, two at one year and one at 3 months.
- 19 There have been 16 elective transplants including abdominal wall in the time period into 15 different adult patients. Seven (47%) of the 15 patients are alive as at 12 January 2015, 3 (20%) have missing survival information and 5 (33%) have died.

MEMBERS ARE ASKED TO NOTE

- 20 Follow up data returned and recorded into the UKTR has increased from 82% to 93% since March 2014. Timely provision of three-month and annual follow-up data will aid more accurate estimation of outcomes following intestinal transplantation in the UK.

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Figure 1 90 day and 1 year patient survival following intestinal transplantation, by age group

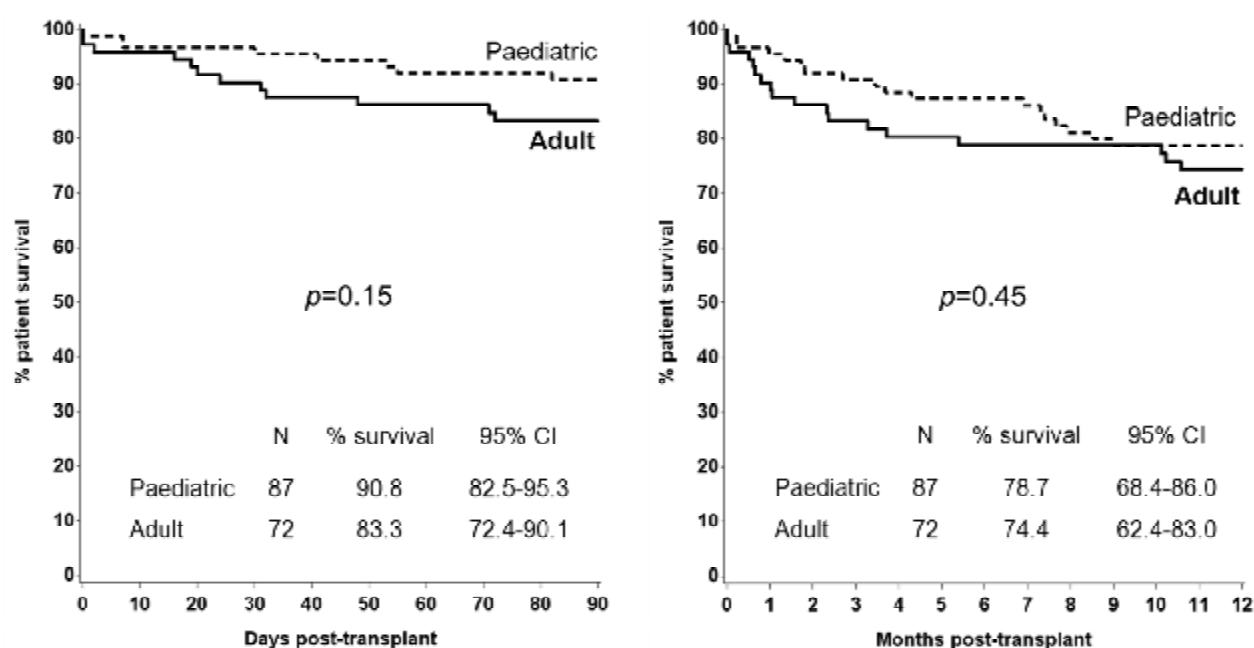
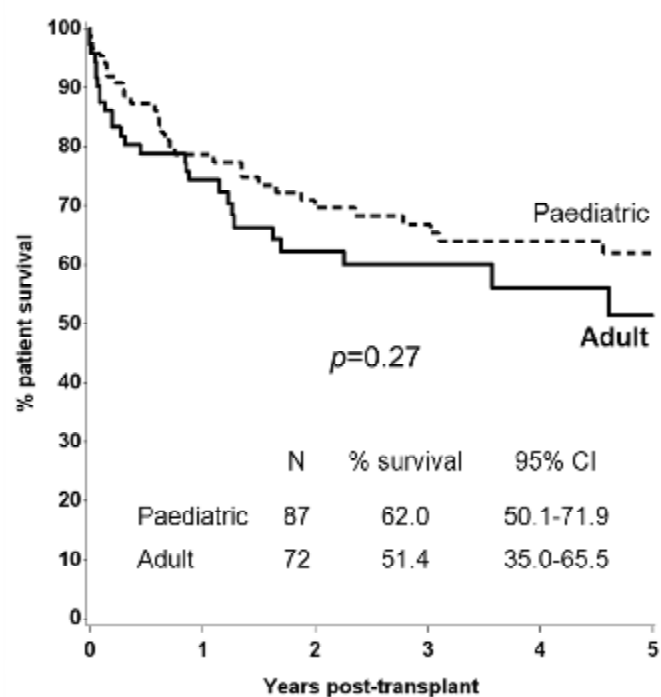


Figure 2 5 year patient survival following intestinal transplantation, by age group



PAEDIATRIC PATIENTS

Figure 3 90 day and 1 year paediatric patient survival following intestinal transplantation, by transplant era

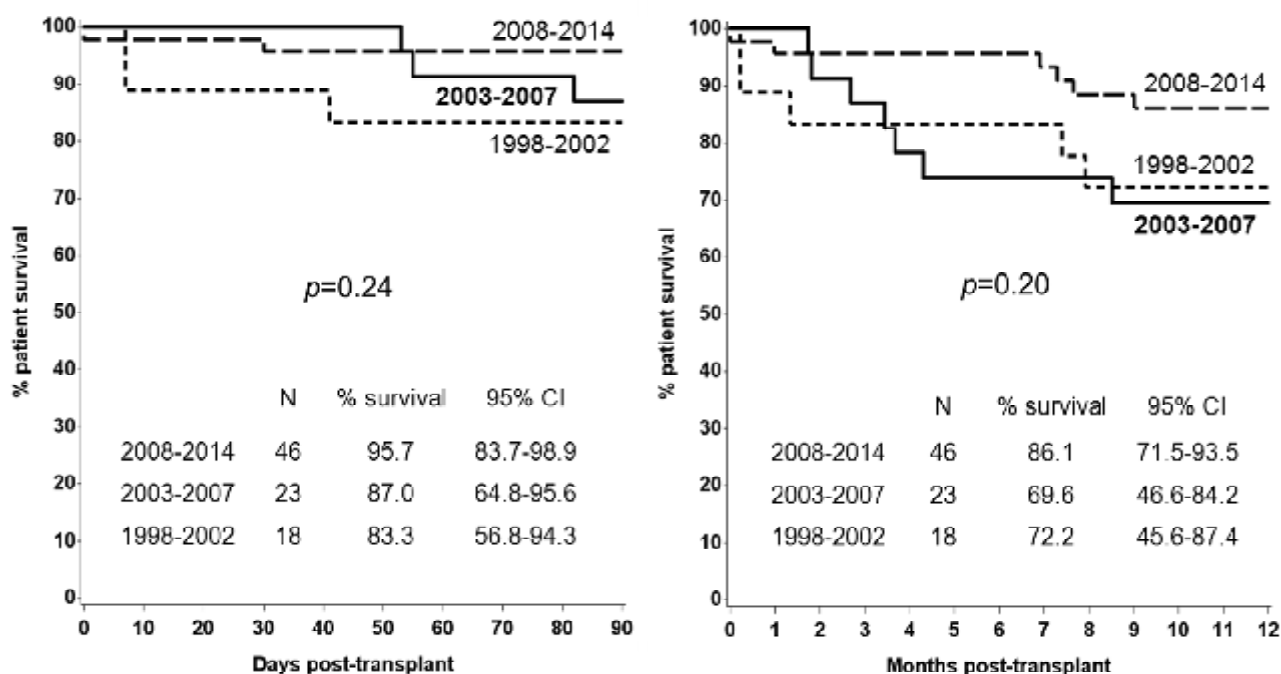
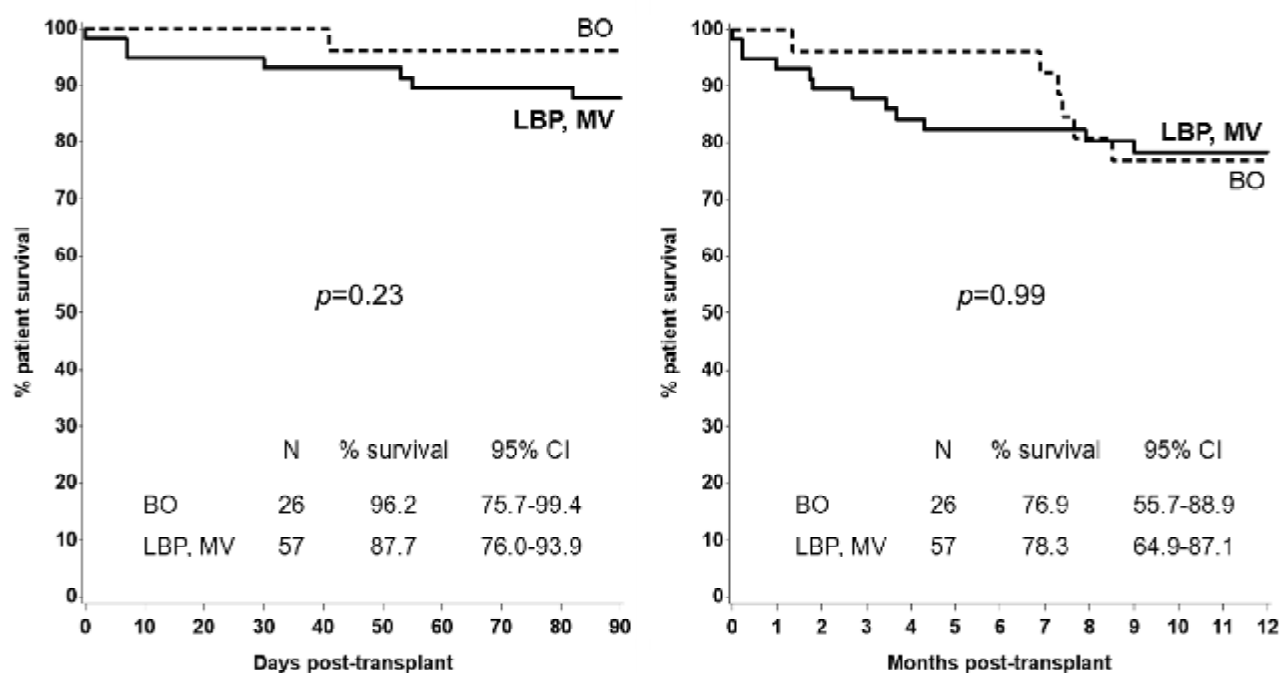


Figure 4 90 day and 1 year paediatric patient survival following intestinal transplantation, by transplant type



ADULT PATIENTS

Figure 5 90 day and 1 year adult patient survival following intestinal transplantation, by transplant era

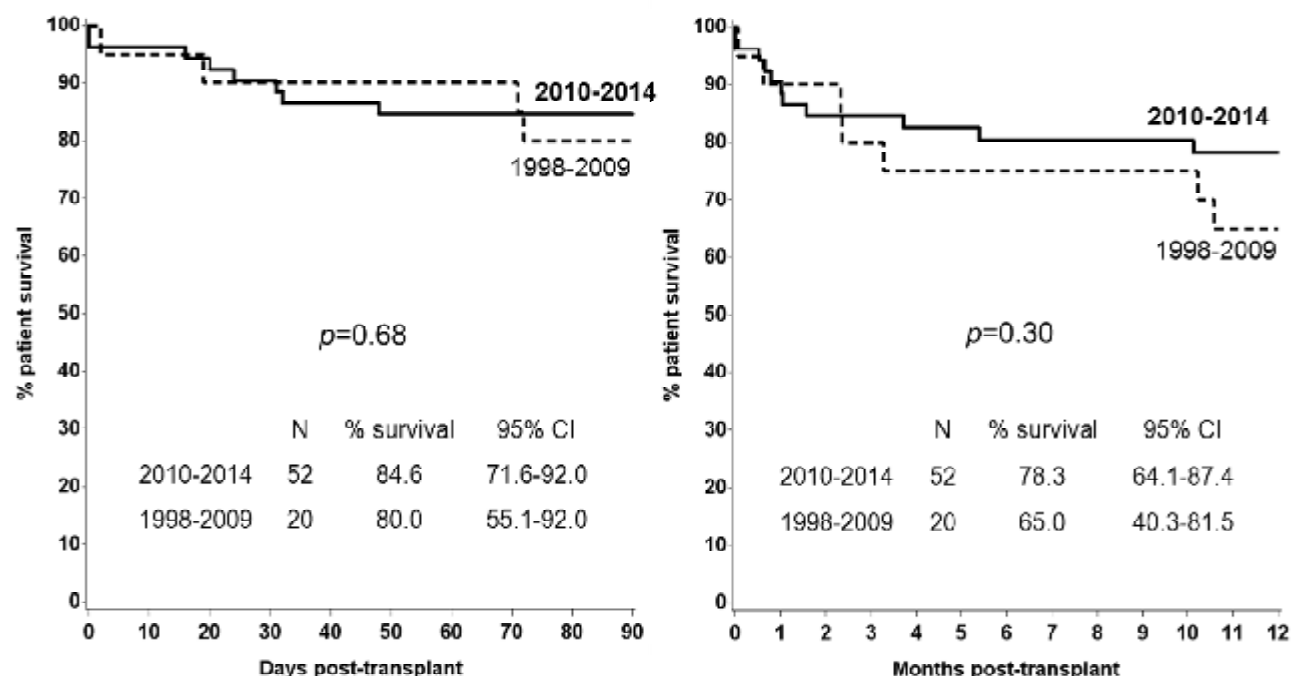
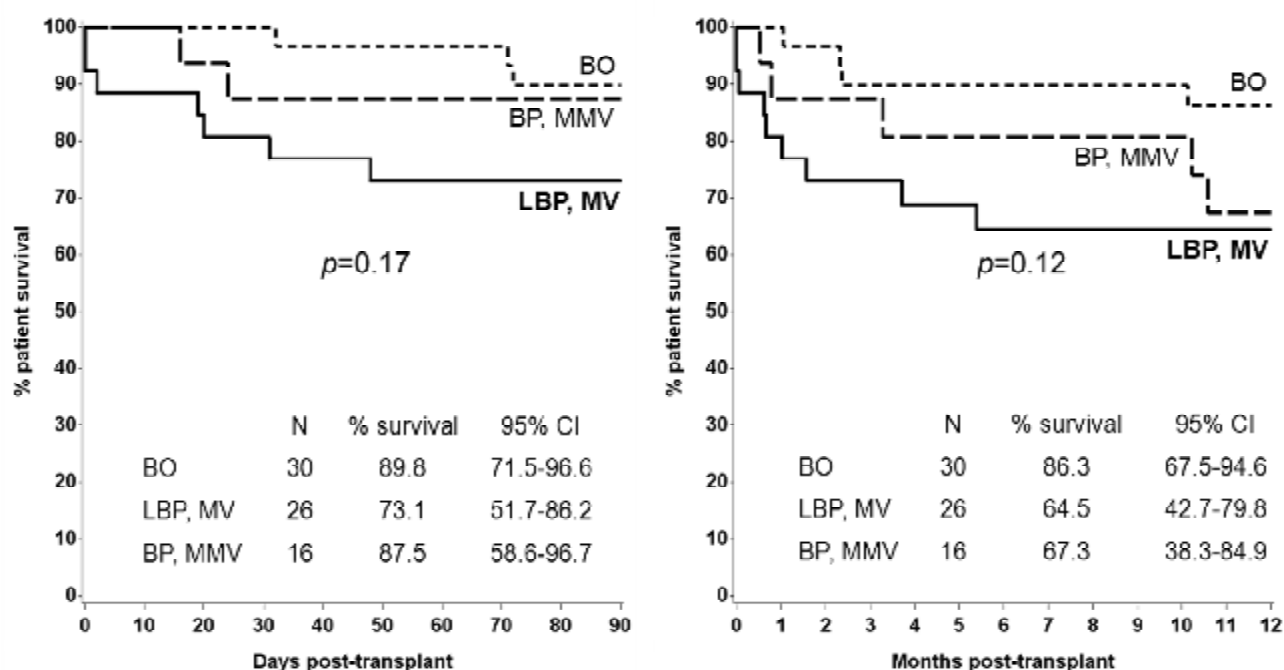


Figure 6 90 day and 1 year adult patient survival following intestinal transplantation, by transplant type



Appendix 1

SUPPLEMENT TO PATIENT SURVIVAL AFTER INTESTINAL TRANSPLANTATION (BAG(15)7)

Causes of patient death after elective intestinal first time transplant in the UK between 1 January 1998 and 31 December 2014				
Causes of patient death post transplantation	Number of deaths within 90 days	Number of deaths between 91 days and 1 year	Number of deaths between 366 days and 5 years	Total
PAEDIATRIC PATIENTS				
ARDS	1	1	0	2
Cardiac arrest after transplant	1	0	0	1
Ischaemic	1	0	0	1
Liver failure – cause unknown	0	1	0	1
Lymphoid malignant disease	0	0	1	1
Multi-system failure	4	2	6	12
Pulmonary infection (bacterial)	0	0	1	1
Pulmonary infection (fungal)	0	0	1	1
Respiratory failure	0	0	1	1
Sepsis	0	0	1	1
Not reported	1	6	1	8
Total	8	10	12	30
ADULT PATIENTS				
Bone marrow depression	1	0	0	1
Disseminated fungal infection, bone marrow failure due to graft versus host disease	0	1	0	1
Generalised viral infection	0	1	1	2
Graft versus host disease	1	0	0	1
Haemorrhage from surgery	1	0	0	1
Hyperkalaemia	1	0	0	1
Lymphoid malignant disease possibly induced by immunosuppressive therapy	0	0	1	1
Multiple cerebral infarcts, fungal sepsis, pulmonary aspiyilosis	0	1	0	1
Multi-system failure	5	0	1	6
Non-lymphoid malignant disease not induced by immunosuppressive therapy	0	1	0	1
Non-lymphoid malignant disease possibly induced by immunosuppressive therapy	0	1	0	1
Other haemorrhage	1	0	1	2
Peritonitis (bacterial)	1	0	0	1
Pulmonary embolus	0	1	0	1
Renal failure	0	0	1	1
Septicaemia	0	0	1	1
Severe bilateral pneumonia and multi-organ failure	0	0	1	1
Not reported	1	0	2	3
Total	12	6	9	27