NHS BLOOD AND TRANSPLANT

MULTI-VISCERAL AND COMPOSITE TISSUE ADVISORY GROUP

PATIENT SURVIVAL AFTER INTESTINAL TRANSPLANT

INTRODUCTION

1. This regular paper reports on patient survival following first UK deceased donor intestinal transplantation.

DATA AND METHODS

2. Data on 291 first elective intestinal transplants involving a deceased donor after brain death (DBD) performed in the UK between 1 January 2009 to 31 December 2024 were extracted from the UK Transplant Registry (UKTR) on 10 June 2025. Follow-up data were available on the UKTR for all patients. Please note this report includes six NHS group 2 patients and seven patients where NHS group was not reported.

3. Kaplan-Meier patient survival curves were produced for first elective intestinal transplants and analysed by age group, transplant type and era. Patient survival is defined as the time from first transplant to death or last known survival reported to NHSBT irrespective of whether the patient received a retransplant after their first transplant. It should be noted that the results are based on small numbers and are not risk-adjusted so should be treated as guidance only.

4. Graft status is reported for patients, where available, where a failed graft is defined as either bowel reported to have failed on follow-up form or patient received a bowel re-transplant.

5. Data on 8 super-urgent transplants involving a deceased donor after brain death (DBD) performed in the UK between 1 January 2009 to 31 December 2024 were extracted from the UK Transplant Registry (UKTR) on 10 June 2025. 6 transplants were first grafts and 2 were second grafts.

RESULTS

Overall

6. Ten year survival rate estimates for paediatric and adult elective intestinal transplant recipients are 50.7% and 34.3%, respectively (**Figure 1**). There were no statistically significant differences in the survival rates by age group (log-rank p-value ≥ 0.08) both overall and conditional on both 90 days and 1 year. (**Table 1)**.

7. There were no statistically significant difference at a 5% significance level in the survival rates by era at any time point (log-rank p-value≥ 0.07) (**data not included**).

8. 222 (76%) of the 291 first elective intestinal transplants were ABO identical. There were no statistically significant differences in the survival rates by ABO compatibility in adult or paediatric patients (**Tables 3,7**).

Paediatric elective patients

9. For paediatric patients, there was no significant difference in survival by transplant type at 90 days and 1 year post-transplant. At five years post-transplant, bowel only (BO) transplants appear to have superior outcomes compared with multivisceral (MV) or liver, bowel and pancreas (LBP) transplants (**Table 2**). Please note that there were too few paediatric BP or MMV transplants to be included in **Table 2** and **Figure 2**.

10. Causes of paediatric patient death, as at 10 June 2025, are reported in **Table 4 (removed as patient identifiable)**. 32 deaths following first paediatric elective intestinal transplant in the UK between 1 January 2009 and 31 December 2024 have been reported, where multi-system failure was the most common cause of death (34%). 3 (9%) deaths occurred within 90 days of transplant. There were no deaths reported after ten years post-transplant.

11. Of the 82 paediatric transplants considered, intestinal graft function status is available for 79 (96%). Of these, 26 (33%) have graft failure reported, with 8 alive at last report (3 without re-transplant). **Table 5 (removed as patient identifiable)** shows the reasons reported for graft failure for the 26 paediatric patient cases.

Adult elective patients

12. For adults, there were no significant differences in outcome at 90 days and 1 year by transplant type (**Table 6, Figure 4**). At five years post-transplant, modified multivisceral (MMV) or bowel and pancreas (BP) transplants appear to have superior five-year outcomes overall and conditional on 1 year survival, compared with bowel only (BO), multivisceral (MV) or liver, bowel and pancreas (LBP) transplants.

13. **Table 8** shows adult patient survival rates by registration due to malignancy. There were significant differences in outcomes at 90 days, 1 and 5 years post-transplant by registration due to malignancy, with better outcomes in registrations with non-malignant indications.

14. 96 deaths following first adult elective intestinal transplant in the UK between 1 January 2009 and 31 December 2024 have been reported (**Table 9 (removed as patient identifiable)**). 16 (17%) deaths occurred within 90 days of transplant.

15. Of the 209 adult transplants considered, intestinal graft function status is available for 197 (94%). Of these, 25 (13%) have graft failure reported, with 12 alive at last report (9 without re-transplant). **Table 10 (removed as patient identifiable)** shows the reasons reported for graft failure for the 25 cases. Hepatic artery thrombosis (8) was the most common cause of graft failure in adult intestinal patients.

16. There have been 30 transplants including abdominal wall in the time period into 29 different adult patients: 17 bowel only and 13 MMV. Oxford performed 29 (97%) of these transplants with the remaining one at Cambridge. One year patient survival following first elective intestinal transplant containing abdominal wall is 68.4% compared to 82.5% for all adult first elective intestinal transplants (**Table 11, Figure 7**). **Table 12 (removed as patient identifiable)** presents the causes of death of the abdominal wall recipients who died, since 1 January 2009. These are also included in **Table 9 (removed as patient identifiable)**. Transplant and outcome data are not available for abdominal wall only transplants.

Super-urgent patients

17. There have been eight super-urgent intestinal transplants performed in the UK to date in seven different patients, with the last occurring in November 2022. One further death for these patients have been recorded since the last report; details can be found in **Table 13 (removed as patient identifiable)**.

ACTION

18. Members are asked to note the contents of this paper. Timely provision of three-month and annual follow-up data to NHSBT will aid more accurate estimation of outcomes following intestinal transplantation.

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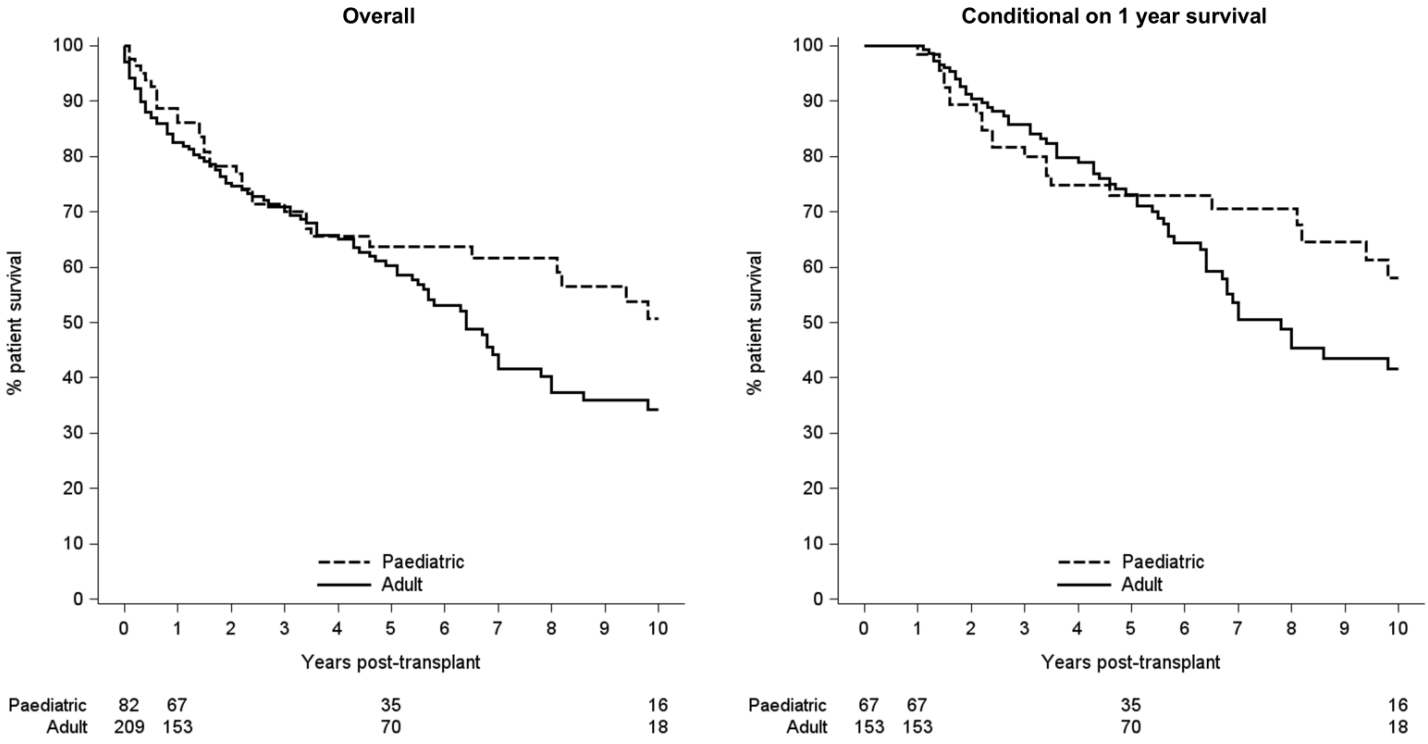
1. ALL PATIENTS

Table 1 **Patient survival for first intestinal transplants between 1 January 2009 and 31 December 2024, by age group**

Age group	No. at risk on day 0	% patient survival (95% confidence interval)							
		90 day		1 year		5 year		10 year	
A. Overall									
Paediatric	82	96.3	89.1 – 98.8	87.5	77.9 – 93.1	63.8	51.6 – 73.7	50.7	36.5 – 63.3
Adult	209	92.3	87.8 – 95.2	82.5	76.6 – 87.0	60.3	52.3 – 67.4	34.3	25.0 – 43.7
Log-rank p-value		0.21		0.27		0.61		0.09	
Overall	**291**	**93.5**	**90.0 - 95.8**	**83.9**	**79.1 – 87.7**	**61.3**	**54.7 – 67.2**	**39.8**	**32.0 – 47.5**
B. Conditional on 90 day survival									
Paediatric	79	100	-	90.8	81.6 – 95.5	66.2	53.8 – 76.0	52.6	37.9 – 65.4
Adult	192	100	-	89.3	83.9 – 93.0	65.3	56.9 – 72.4	37.1	27.1 – 47.1
Log-rank p-value		-		0.70		0.97		0.19	
Overall	**271**	**100**	**-**	**89.7**	**85.4 – 92.8**	**65.6**	**58.8 – 71.5**	**42.6**	**34.2 – 50.6**
C. Conditional on 1 year survival									
Paediatric	67	100	-	100	-	72.9	60.0 – 82.3	58.0	41.9 – 71.1
Adult	153	100	-	100	-	73.1	64.3 – 80.1	41.6	30.4 – 52.4
Log-rank p-value		-		-		0.75		0.20	
Overall	**220**	**100**	**-**	**100**	**-**	**73.1**	**66.0 – 78.9**	**47.4**	**38.2 – 56.1**

Figure 1 **Unadjusted 10 year patient survival after first intestinal transplantation from deceased donor after brain death (DBD) , by age group, 1 January 2009 to 31 December 2024**



2. PAEDIATRIC ELECTIVE PATIENTS

Table 2 **Paediatric patient survival for first intestinal transplants between 1 January 2009 and 31 December 2024, by transplant type**

Transplant type	No. at risk on day 0	% patient survival (95% confidence interval) 90 day		1 year		5 year		10 year	
A. Overall									
BO	31	100	-	90.3	72.9 – 96.8	73.0	53.1 – 85.6	58.4	36.7 – 75.0
LBP, MV	43	93.0	79.9 – 97.7	83.0	67.5 – 91.5	52.6	35.5 – 67.1	45.1	25.5 – 62.9
Log-rank p-value		0.13		0.33		**0.05**		0.11	
Overall	74	95.9	88.0 – 98.7	86.1	75.6 – 92.3	61.7	48.9 – 72.1	50.6	36.1 – 63.3
B. Conditional on 90 day survival									
BO	31	100	-	90.3	72.9 – 96.8	73.0	53.1 – 85.6	58.4	36.7 – 75.0
LBP, MV	40	100	-	89.2	73.7 – 95.8	56.5	38.4 – 71.2	48.5	27.3 – 66.8
Log-rank p-value		-		0.85		0.13		0.23	
Overall	71	100	-	89.7	79.6 – 95.0	64.3	51.1 – 74.7	52.7	37.7 – 65.7
C. Conditional on 1 year survival									
BO	28	100	-	100	-	80.9	59.8 – 91.6	64.7	40.7 – 81.0
LBP, MV	31	100	-	100	-	63.4	43.6 – 77.9	54.3	30.4 – 73.2
Log-rank p-value		-		-		0.09		0.20	
Overall	59	100	-	100	-	71.6	57.8 – 81.6	58.7	42.2 – 72.0

Survival rates at 10 years should be interpreted with caution due to the low number of patients entering the interval alive, which may produce unstable estimates.
BO = bowel only (may require stomach/colon/abdominal wall/spleen/kidney),
LBP = liver, bowel, pancreas only,
MV=multivisceral (liver, bowel, pancreas plus stomach/colon/abdominal wall/spleen/kidney)

Figure 2 **Unadjusted 10 year paediatric patient survival after first intestinal transplantation from deceased donor after brain death (DBD) , by transplant type, 1 January 2009 to 31 December 2024**

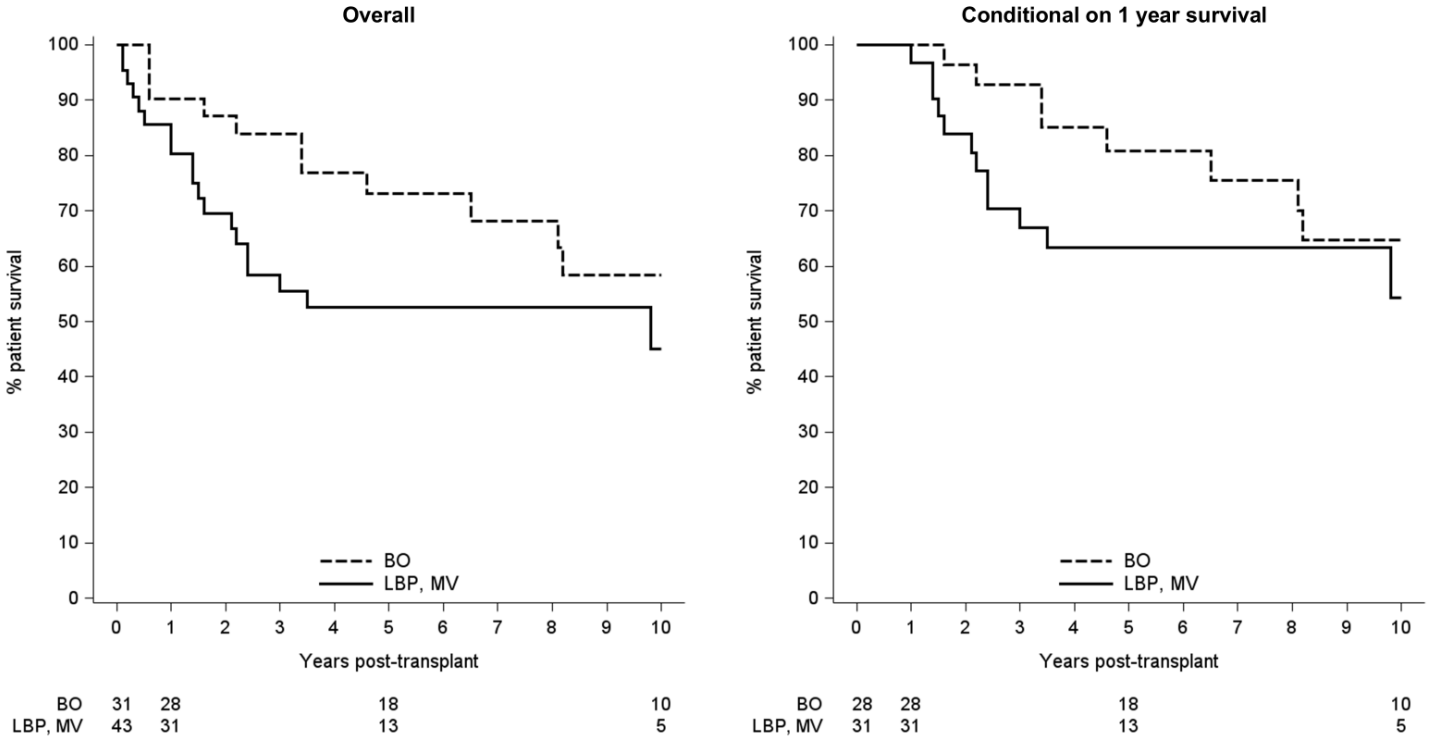
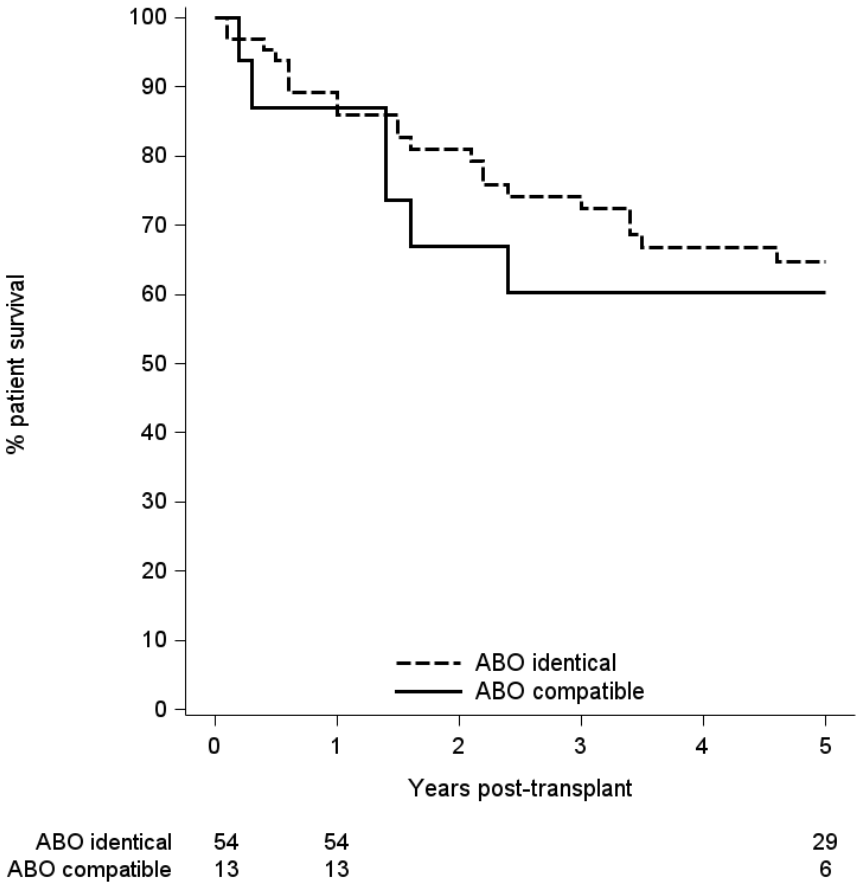


Table 3 **Paediatric patient survival for first intestinal transplants between 1 January 2009 and 31 December 2024, by ABO compatibility**

ABO compatibility	No. of patients	% patient survival (95% confidence interval) 90 day		1 year		5 year	
A. Overall							
ABO identical	66	97.0	88.4 – 99.2	87.6	76.6 – 93.6	64.7	50.9 – 75.5
ABO compatible	16	93.8	63.2 – 99.1	87.1	57.3 – 96.6	60.3	32.0 – 79.8
Log-rank p-value		0.55		0.91		0.59	
Overall	82	96.3	89.1 – 98.8	87.5	77.9 – 93.1	63.8	51.6 - 73.7
B. Conditional on 90 day survival							
ABO identical	64	100	-	90.3	79.7 – 95.5	66.7	52.6 – 77.4
ABO compatible	15	100	-	92.9	59.1 – 99.0	64.3	34.3 – 83.3
Log-rank p-value		-		0.80		0.72	
Overall	79	100	-	90.8	81.6 – 95.5	66.2	53.8 – 76.0
C. Conditional on 1 year survival							
ABO identical	54	100	-	100	-	73.8	59.1 – 84.0
ABO compatible	13	100	-	100	-	69.2	37.3 – 87.2
Log-rank p-value		-		-		0.55	
Overall	67	100	-	100	-	72.9	60.0 – 82.3

Survival rates at 5 years should be interpreted with caution due to the low number of patients entering the interval alive, which may produce unstable estimates.

Figure 3 **5 year paediatric patient survival following intestinal transplantation, by ABO compatibility**



3. ADULT ELECTIVE PATIENTS

Table 6 **Adult patient survival for first intestinal transplants between 1 January 2009 and 31 December 2024, by transplant type**

Transplant type	No. of patients	% patient survival (95% confidence interval) 90 day		1 year		5 year		10 year	
A. Overall									
BO	63	95.2	86.0 – 98.4	88.8	77.8 – 94.5	66.4	51.7 – 77.6	43.7	27.2 – 59.0
LBP, MV	71	87.3	77.1 – 93.2	78.7	67.2 – 86.6	44.4	31.1 – 56.9	23.6	11.6 – 38.1
BP, MMV	75	94.7	86.4 – 98.0	80.7	69.6 – 88.1	72.0	58.6 – 81.7	37.4	19.5 – 55.4
Log-rank p-value		0.13		0.25		**0.008**		**0.01**	
Overall	209	92.3	87.8 – 95.2	82.5	76.6 – 87.0	60.3	52.3 – 67.4	34.3	25.0 – 43.7
B. Conditional on 90 day survival									
BO	59	100	-	93.2	82.9 – 97.4	69.7	54.5 – 80.7	45.9	28.6 – 61.6
LBP, MV	62	100	-	90.1	79.3 – 95.4	50.8	35.8 – 64.1	27.1	13.2 – 43.1
BP, MMV	71	100	-	85.3	74.3 – 91.8	76.0	62.2 – 85.3	39.5	20.5 – 58.1
Log-rank p-value		-		0.34		**0.05**		0.06	
Overall	192	100	-	89.3	83.9 – 93.0	65.3	56.9 – 72.4	37.1	27.1 – 47.1
C. Conditional on 1 year survival									
BO	51	100	-	100	-	74.8	58.9 – 85.3	49.2	30.6 – 65.4
LBP, MV	50	100	-	100	-	56.4	40.0 – 70.0	30.0	14.6 – 47.2
BP, MMV	52	100	-	100	-	89.2	73.5 – 95.8	46.4	23.5 – 66.5
Log-rank p-value		-		-		**0.002**		**0.01**	
Overall	153	100	-	100	-	73.1	64.3 – 80.1	41.6	30.4 – 52.4

Survival rates at 10 years should be interpreted with caution due to the low number of patients entering the interval alive, which may produce unstable estimates.
BO = bowel only (may require stomach/colon/abdominal wall/spleen/kidney), BP= bowel, pancreas only, LBP = liver, bowel, pancreas only, MV=multivisceral (liver, bowel, pancreas plus stomach/colon/abdominal wall/spleen/kidney),
MMV = modified multivisceral (bowel, pancreas plus stomach/colon/abdominal wall/spleen/kidney)

Figure 4 **Unadjusted 10 year adult patient survival after first intestinal transplantation from deceased donor after brain death (DBD) , by transplant type, 1 January 2009 to 31 December 2024**

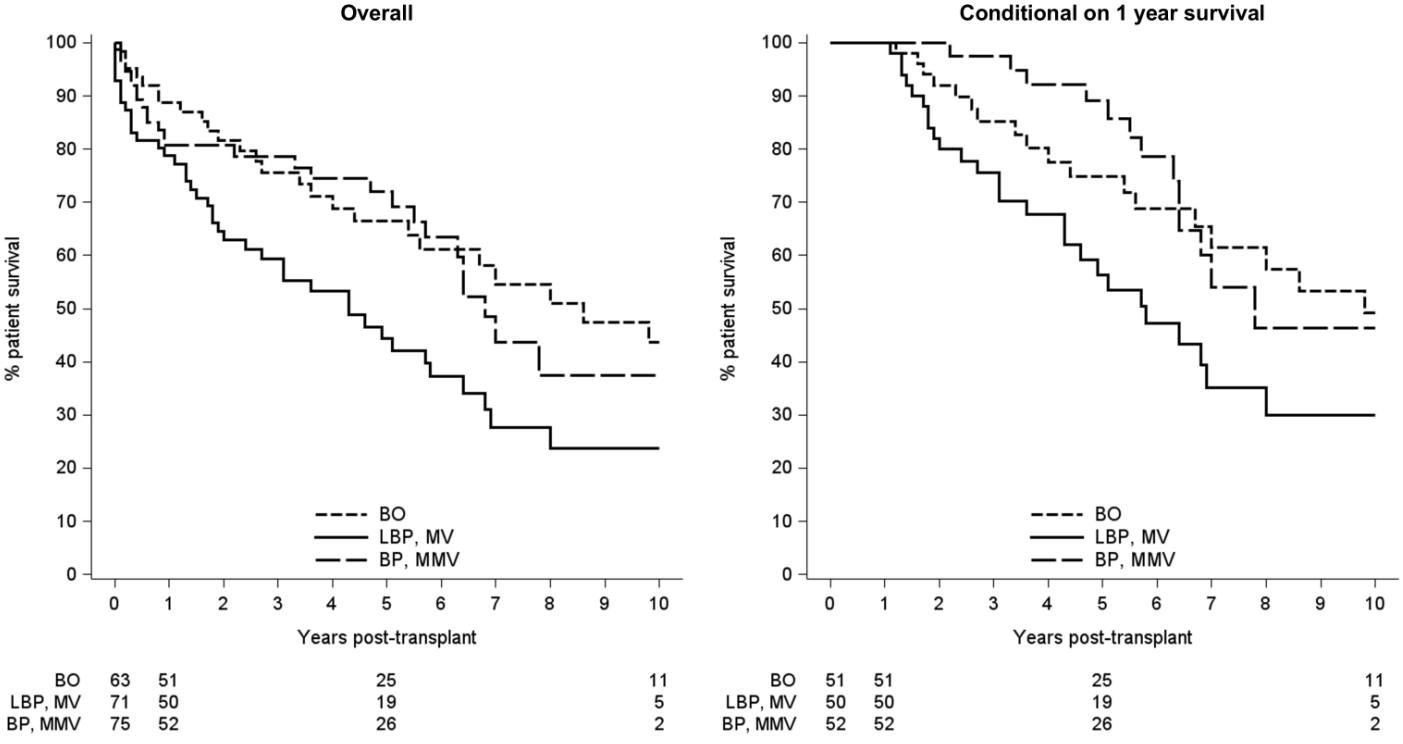


Table 7 **Adult patient survival for first intestinal transplants between 1 January 2009 and 31 December 2024, by ABO compatibility**

ABO compatibility	No. of patients	% patient survival (95% confidence interval) 90 day		1 year		5 year	
A. Overall							
ABO identical	156	92.9	87.6 – 96.0	83.8	76.9 – 88.7	61.7	52.6 – 69.7
ABO compatible	53	90.6	78.8 – 96.0	78.7	64.8 – 87.6	56.4	39.6 – 70.1
Log-rank p-value		0.54		0.35		0.47	
Overall	209	92.3	87.8 – 95.2	82.5	76.6 – 87.0	60.3	52.3 – 67.4
B. Conditional on 90 day survival							
ABO identical	144	100	-	90.1	83.9 – 94.0	66.4	56.8 – 74.4
ABO compatible	48	100	-	86.9	73.1 – 94.0	62.2	43.9 – 76.1
Log-rank p-value		-		0.48		0.63	
Overall	178	100	-	89.3	83.9 – 93.0	65.3	56.9 – 72.4
C. Conditional on 1 year survival							
ABO identical	117	100	-	100	-	73.7	63.6 – 81.4
ABO compatible	36	100	-	100	-	71.6	50.8 – 84.8
Log-rank p-value		-		-		0.94	
Overall	153	100	-	100	-	73.1	64.3 – 80.1

Survival rates at 10 years are not provided due to insufficient follow-up

Figure 5 **Unadjusted 10 year adult patient survival after first intestinal transplantation from deceased donor after brain death (DBD) , by ABO compatibility, 1 January 2009 to 31 December 2024**

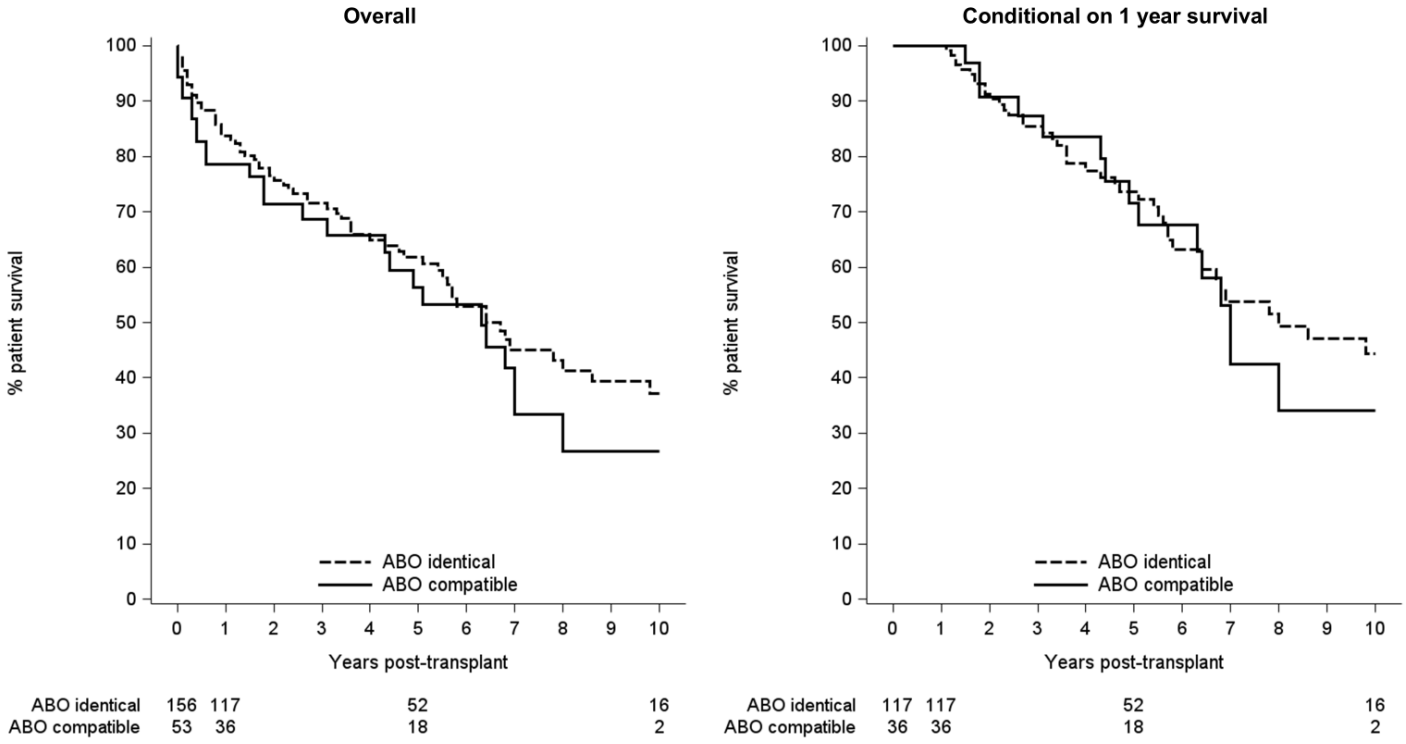
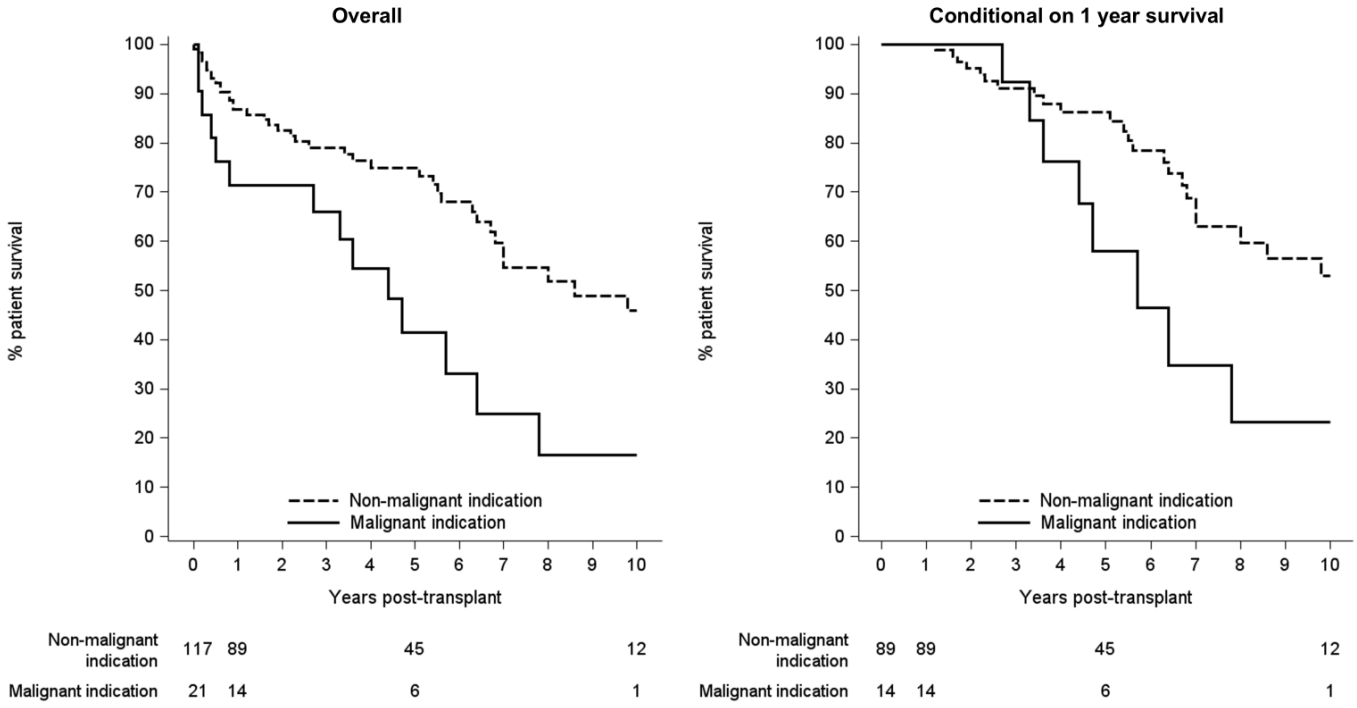


Table 8 **Adult patient survival for first intestinal non-liver transplants between 1 January 2009 and 31 December 2024, by registration due to malignancy**

Registration type	No. of patients	% patient survival (95% confidence interval) 90 day		1 year		5 year		10 year	
A. Overall									
Non-malignant indication	117	96.6	91.1 – 98.7	86.8	79.0 – 91.8	74.9	64.8 – 82.5	45.9	31.6 – 59.1
Malignant indication	21	85.7	62.0 – 95.2	74.1	47.2 – 86.0	41.4	18.9 – 62.7	16.6	2.9 – 40.0
Log-rank p-value		**0.03**		**0.05**		**0.006**		**0.004**	
Overall	138	94.9	89.7 – 97.5	84.4	77.1 – 89.6	68.9	59.3 – 76.8	40.3	27.9 – 52.3
B. Conditional on 90 day survival									
Non-malignant indication	112	100	-	89.8	82.4 – 94.2	77.5	67.3 – 84.9	47.5	32.7 – 61.0
Malignant indication	18	100	-	83.3	56.8 – 94.3	48.4	22.0 – 70.5	19.3	3.3 – 45.3
Log-rank p-value		-		0.40		**0.04**		**0.02**	
Overall	130	100	-	88.9	82.0 – 93.3	72.6	62.7 – 80.3	42.4	29.4 – 54.8
C. Conditional on 1 year survival									
Non-malignant indication	89	100	-	100	-	86.3	75.8 – 92.4	52.9	36.2 – 67.1
Malignant indication	14	100	-	100	-	58.0	26.1 – 80.2	23.2	3.8 – 52.2
Log-rank p-value		-		-		**0.05**		**0.03**	
Overall	103	100	-	100	-	81.7	71.3 – 88.6	47.7	33.0 – 61.0

Survival rates at 10 years should be interpreted with caution due to the low number of patients entering the interval alive, which may produce unstable estimates.

Figure 6 **Unadjusted 10 year adult patient survival after first non-liver intestinal transplantation from deceased donor after brain death (DBD), by registration due to malignancy, 1 January 2009 to 31 December 2024**



3B. ABDOMINAL WALL PATIENTS

Table 11 Patient survival for first intestinal transplants containing abdominal wall, between 1 January 2009 and 31 December 2024

No. of patients	% 90 day survival (95% CI)		% 1 year survival (95% CI)		% 5 year survival (95% CI)	
29	82.8	63.4 – 92.4	68.4	48.0 – 82.1	48.9	29.2 – 66.0

The survival rate at 5 years should be interpreted with caution due to the low number of patients entering the interval alive, which may produce unstable estimates.

Figure 7 5 year adult patient survival following abdominal wall transplantation