11 SURVIVAL RATES FOLLOWING TRANSPLANTATION

This chapter shows graft survival rates over time for kidney, pancreas and cornea transplants, and patient survival estimates for kidney, pancreas, cardiothoracic, liver and intestinal transplants, performed in the UK. Separate estimates are presented for adult and paediatric patients (using organ specific age definitions) and for transplants from donors after brain death and donors after circulatory death.

In all cases, the Kaplan-Meier estimate of the survivor function was used to provide the survival rate and groups (years) were compared using the log-rank test. The analyses do not take account of risk factors which may change over time. Graft survival is defined as time from transplant to graft failure, censoring for death with a functioning graft and grafts still functioning at time of analysis. Patient survival is defined as time from transplant to patient death, censoring for patients still alive at time of analysis.

11.1 Kidney graft and patient survival

11.1.1 Adult kidney recipients - donor after brain death (DBD)

Figure 11.1 shows long-term graft survival in adult (≥18 years) recipients for first kidney only transplant from donors after brain death. **Table 11.1** shows the graft survival estimates and confidence intervals for one, two, five and ten years post-transplant. There have been significant improvements in one, two and five year survival over the time periods shown, p<0.01 in each case. **Table 11.2** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There have been significant improvements in one, two and five year survival over the time periods shown, p<0.02 in each case.

Figure 11.1 Long-term graft survival after first adult kidney only transplant from donors after brain death, 1 January 1997 – 31 December 2009

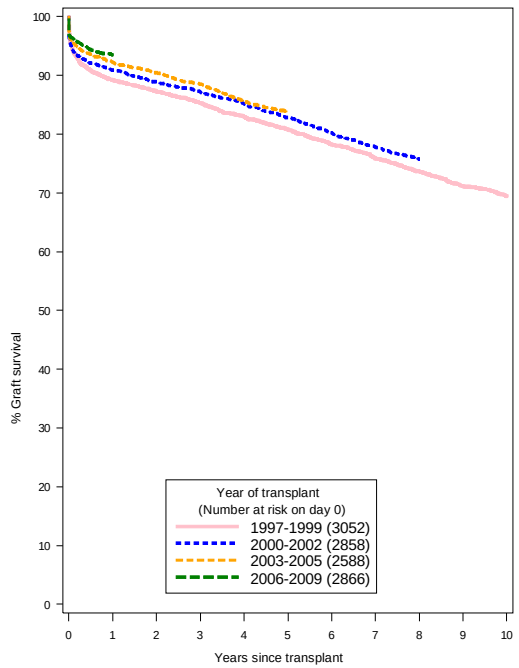

Table 11.1 Graft survival after first adult kidney only transplant from a DBD

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	3052	89	(88-90)	87	(86-88)	81	(79-82)	69	(68-71)
2000-2002	2858	91	(90-92)	89	(88-90)	83	(81-84)		
2003-2005	2588	92	(91-93)	90	(89-92)	84	(82-85)		
2006-2009	2866	94	(93-94)						

Table 11.2 Patient survival after first adult kidney only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	3058	95	(94-95)	93	(92-94)	86	(84-87)	74	(72-75)
2000-2002	2860	95	(94-96)	93	(92-94)	87	(86-88)		
2003-2005	2588	96	(96-97)	95	(94-95)	89	(88-90)		
2006-2009	2868	96	(95-97)						

11.1.2 Adult kidney recipients - donor after circulatory death (DCD)

Long-term graft survival in adult recipients for kidney transplants from donors after circulatory death is shown in **Figure 11.2**. **Table 11.3** shows the graft survival estimates and confidence intervals for one, two, five and ten years post-transplant. There has been a significant improvement in one, two and five year survival over the time periods shown, p<0.01. One year graft and patient survival are comparable for DBD and DCD donor transplants in the most recent time periods. **Table 11.4** shows the patient survival estimates and confidence intervals for each time period analysed. There was a significant improvement in patient survival at one, two and five years following transplant (p<0.05).

Figure 11.2 Long-term graft survival after first adult kidney only transplant from donors after circulatory death, 1 January 1997 – 31 December 2009

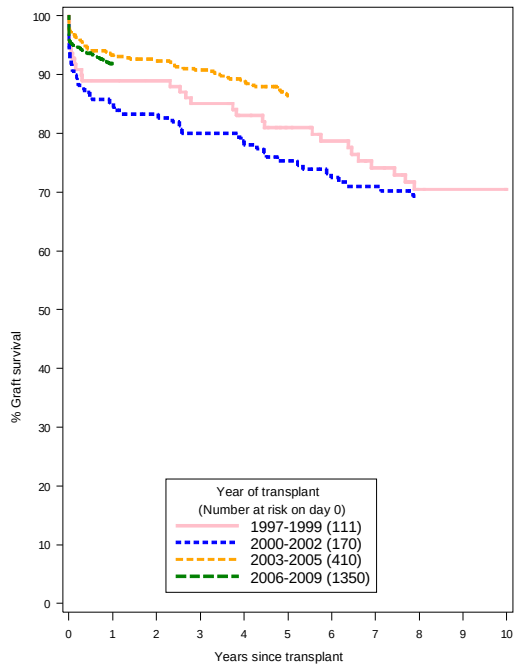

Table 11.3 Graft survival after first adult kidney only transplant from a DCD

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	111	89	(81-94)	89	(81-94)	81	(72-87)	70	(60-79)
2000-2002	170	85	(79-90)	83	(77-88)	75	(68-81)		
2003-2005	410	93	(90-95)	92	(89-95)	86	(83-89)		
2006-2009	1350	92	(90-93)						

Table 11.4 Patient survival after first adult kidney only transplant from a DCD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	111	92	(85-96)	90	(83-94)	80	(72-87)	66	(56-74)
2000-2002	170	92	(87-95)	90	(84-93)	81	(74-86)		
2003-2005	411	97	(94-98)	95	(92-97)	88	(85-91)		
2006-2009	1351	95	(94-96)						

11.1.3 Adult kidney recipients - living donor

Long-term graft survival in adult recipients for living donor kidney transplants in the UK is shown in **Figure 11.3**. **Table 11.5** shows graft survival estimates and confidence intervals for each time period analysed. There has been a significant improvement in one and five year survival over the time periods shown, p<0.02. **Table 11.6** shows the patient survival estimates and confidence intervals for one, two, five and ten years post transplant. There were no statistically significant change in patient survival over time (p>0.1).

Figure 11.3 Long-term graft survival after first adult living donor kidney only transplant in the UK, 1 January 1997 – 31 December 2009

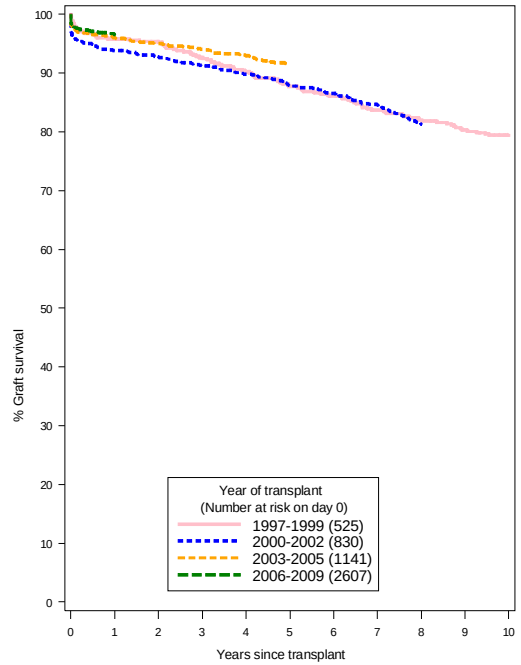

Table 11.5 Graft survival after first adult living donor kidney transplant

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	525	96	(94-97)	95	(93-97)	88	(85-90)	79	(76-83)
2000-2002	830	94	(92-95)	93	(91-94)	88	(85-90)		
2003-2005	1141	96	(95-97)	95	(94-96)	92	(90-93)		
2006-2009	2607	97	(96-97)						

Table 11.6 Patient survival after first adult living donor kidney transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	523	98	(97-99)	98	(96-99)	95	(93-97)	90	(86-92)
2000-2002	832	98	(97-99)	97	(96-98)	95	(93-96)		
2003-2005	1141	99	(98-99)	98	(97-99)	96	(95-97)		
2006-2009	2607	99	(98-99)						

11.1.4 Paediatric kidney recipients - donor after brain death (DBD)

Figure 11.4 shows long-term graft survival in paediatric (<18 years) recipients for first kidney only transplants from donors after brain death. Graft survival estimates and confidence intervals are shown for each time period analysed in **Table 11.7**. There were no statistically significant change in graft survival over time (p>0.1). **Table 11.8** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There have been improvements in one, two and five year survival over the period analysed (p<0.02).

Figure 11.4 Long-term graft survival after first paediatric kidney only transplant from donors after brain death, 1 January 1997 – 31 December 2009

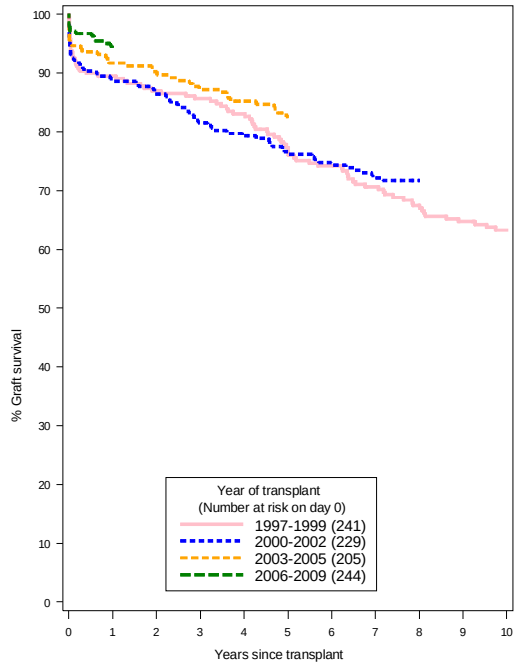

Table 11.7 Graft survival after first paediatric kidney only transplant from a DBD

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	241	90	(85-93)	87	(82-91)	77	(71-82)	63	(57-69)
2000-2002	229	89	(84-92)	86	(81-90)	77	(71-82)		
2003-2005	205	92	(87-95)	90	(85-94)	83	(77-87)		
2006-2009	244	94	(90-97)						

Table 11.8 Patient survival after first paediatric kidney only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	241	97	(94-99)	97	(93-98)	94	(91-97)	91	(86-94)
2000-2002	230	100	(97-100)	100	(97-100)	99	(96-100)		
2003-2005	205	100	(97-100)	100	(97-100)	98	(95-100)		
2006-2009	244	100	(97-100)						

11.1.5 Paediatric kidney recipients - living donor

Long-term graft survival in paediatric recipients for living donor kidney transplants in the UK is shown in **Figure 11.5**. **Table 11.9** shows graft survival estimates and confidence intervals for each time period analysed. **Table 11.10** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There were no statistically significant differences in graft or patient survival over time (p>0.05). There were insufficient paediatric recipients of first kidney only transplants from donors after circulatory death to permit reliable analysis.

Figure 11.5 Long-term graft survival after first paediatric living donor kidney only transplant in the UK, 1 January 1997 – 31 December 2009

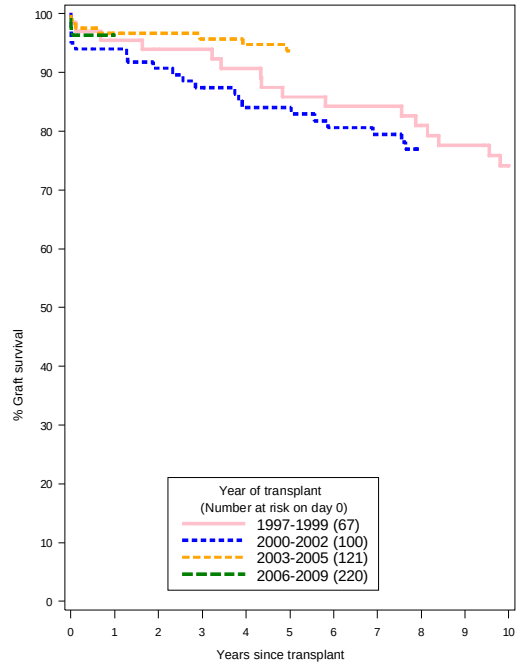

Table 11.9 Graft survival after first paediatric living donor kidney transplant

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	67	95	(87-99)	94	(85-98)	86	(75-92)	74	(61-83)
2000-2002	100	94	(87-97)	91	(83-95)	84	(75-90)		
2003-2005	121	97	(91-99)	97	(91-99)	94	(87-97)		
2006-2009	220	96	(93-98)						

Table 11.10 Patient survival after first paediatric living donor kidney transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	67	100	(-)	98	(90-100)	97	(88-99)	95	(86-98)
2000-2002	101	97	(91-99)	97	(91-99)	96	(89-98)		
2003-2005	121	98	(93-100)	98	(93-100)	98	(93-100)		
2006-2009	220	99	(96-100)						

11.2 Pancreas graft and patient survival

11.2.1 Simultaneous kidney/pancreas transplants

National pancreas follow-up data are only available for transplants performed since 1 January 2001. There are insufficient data available to analyse long-term survival. **Figure 11.6** shows pancreas graft survival in recipients receiving their first simultaneous kidney/pancreas (SPK) transplant performed from donors after brain death, 2003 - 2005 and 2006 - 2009. Graft and patient survival estimates and confidence intervals are shown at one year, two years and three years in **Table 11.11** and **Table 11.12** respectively. Results relate to adults only as there are no paediatric pancreas transplant recipients.

Figure 11.6 Pancreas graft survival after first SPK transplant from donors after brain death, 1 January 2003 – 31 December 2009

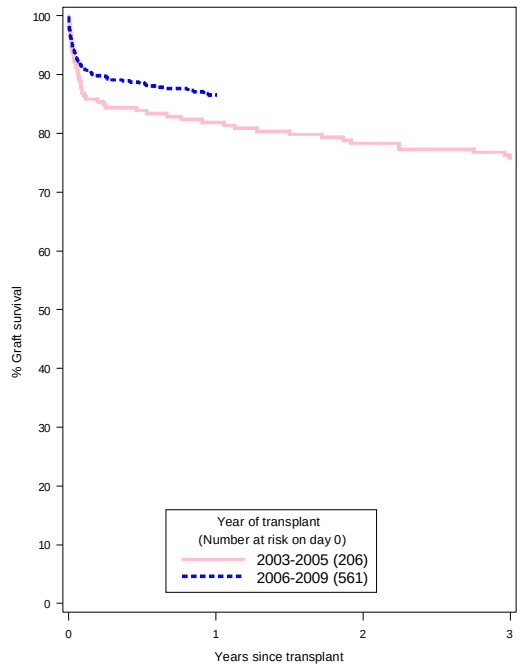

Table 11.11 Graft survival after first SPK transplant from a DBD

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Three year	
2003-2005	206	82	(76-87)	78	(72-83)	76	(69-81)
2006-2009	561	87	(83-89)				

Table 11.12 Patient survival after SPK transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Three year	
2003-2005	207	94	(89-96)	92	(88-95)	90	(85-94)
2006-2009	565	95	(93-97)				

11.2.2 Pancreas only transplants

Figure 11.7 shows pancreas graft survival in recipients receiving their first pancreas only transplant performed from donors after brain death, 2003 - 2005 and 2006 - 2009. Graft and patient survival estimates and confidence intervals are shown at one year, two years and three years in **Table 11.13** and **Table 11.14** respectively. Results are for adult patients only.

Figure 11.7 Pancreas graft survival after pancreas only transplant from donors after brain death, 1 January 2003 – 31 December 2009

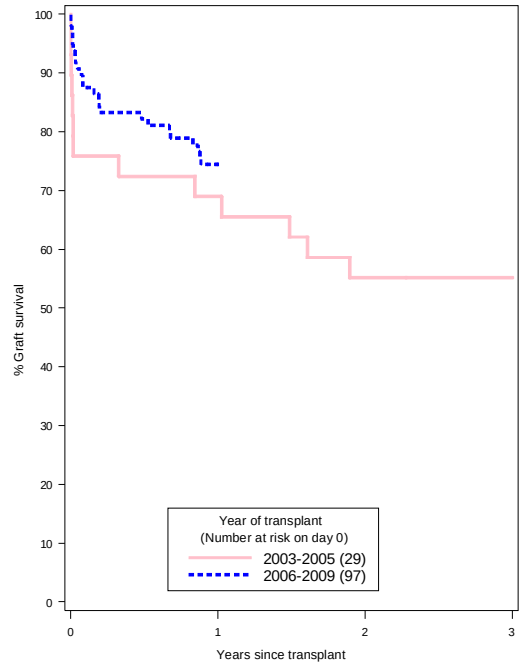

Table 11.13 Graft survival after first pancreas only transplant from DBD

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Three year	
2003-2005	29	69	(49-82)	55	(36-71)	55	(36-71)
2006-2009	97	74	(64-82)				

Table 11.14 Patient survival after first pancreas only transplant from DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Three year	
2003-2005	31	100	(-)	100	(-)	96	(73-99)
2006-2009	100	94	(86-97)				

11.3 Cardiothoracic patient survival

11.3.1 Adult recipients - heart transplants

Long-term patient survival for adult (≥16 years) recipients after first heart only transplants is shown in **Figure 11.8**. Domino and deceased donor (DBD only) transplants are included as well as urgent patients. **Table 11.15** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There were no statistically significant changes in survival rates over the time periods analysed (p>0.2).

Figure 11.8 Long-term patient survival after first adult heart only transplant in the UK, 1 January 1997 – 31 December 2009

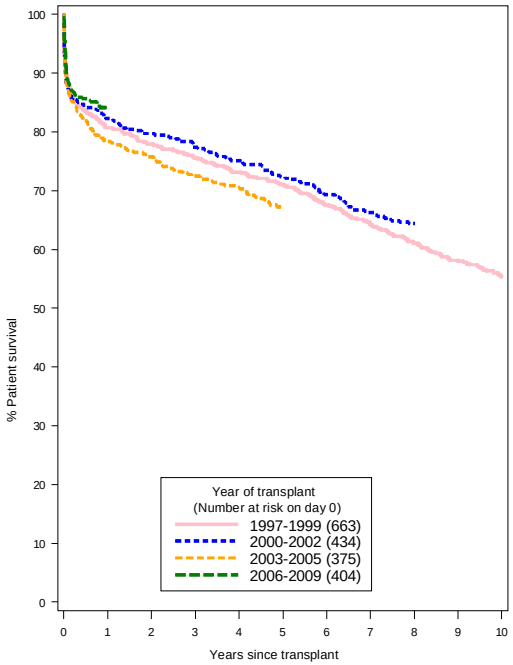

Table 11.15 Patient survival after first adult heart only transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	663	81	(77-83)	78	(75-81)	71	(67-74)	55	(52-59)
2000-2002	434	82	(78-86)	80	(76-83)	72	(68-76)		
2003-2005	375	78	(74-82)	76	(71-80)	67	(62-72)		
2006-2009	404	84	(80-87)						

11.3.2 Adult recipients - heart/lung block transplants

Patient survival for adult recipients after first heart/lung block transplants is shown in **Figure 11.9**. Patient survival estimates and confidence intervals for each time period analysed are shown in **Table 11.16**. There were no statistically significant differences in patient survival over time (p>0.3).

Figure 11.9 Long-term patient survival after first adult heart/lung block transplant in the UK, 1 January 1997 – 31 December 2009

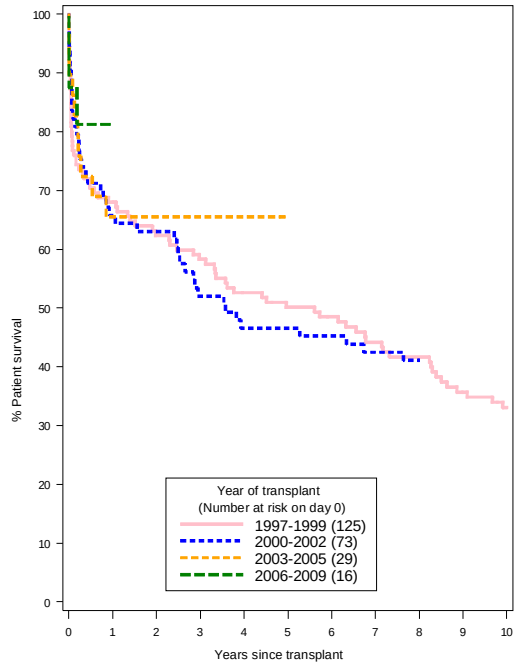

Table 11.16 Patient survival after first adult heart/lung block transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	125	68	(59-75)	62	(53-70)	50	(41-59)	33	(25-42)
2000-2002	73	66	(54-75)	63	(51-73)	47	(35-57)		
2003-2005	29	66	(45-80)	66	(45-80)	66	(45-80)		
2006-2009	16	81	(52-94)						

11.3.3 Adult recipients - lung transplants

Patient survival for adult recipients after first lung only transplant from donors after brain death is shown in **Figure 11.10**, with survival estimates and confidence intervals shown in **Table 11.17**. There is evidence of differences in one year patient survival over the period analysed, p=0.007. There were no statistically significant differences in two or five year patient survival over time (p>0.5).

Figure 11.10 Long-term patient survival after first adult lung only transplant from donors after brain death, 1 January 1997 – 31 December 2009

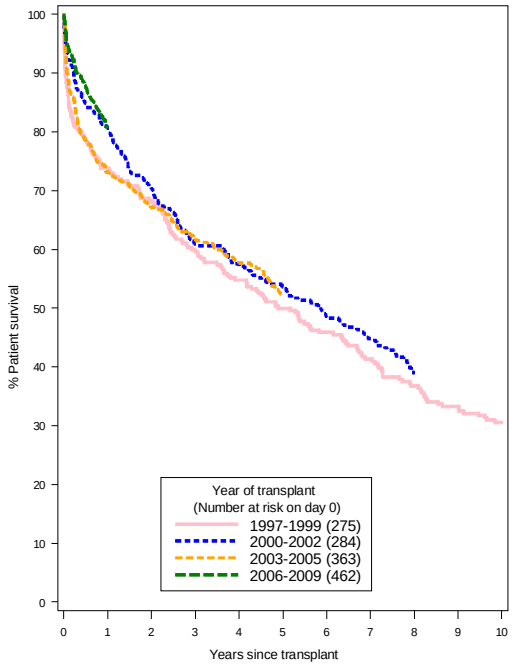

Table 11.17 Patient survival after first adult lung only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	275	74	(68-79)	68	(62-73)	50	(44-56)	31	(25-36)
2000-2002	284	81	(76-85)	70	(65-75)	54	(48-59)		
2003-2005	363	73	(68-77)	67	(62-72)	52	(47-57)		
2006-2009	462	81	(77-84)						

11.3.4 Paediatric recipients - heart transplants

Long-term patient survival for paediatric recipients after first heart only transplant is shown in **Figure 11.11**. Domino and deceased donor transplants (DBD donors only) are included as well as transplants for urgent patients. **Table 11.18** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There is no evidence of an improvement in one, two or five year survival over the time period analysed, p>0.05. The number of paediatric lung and heart/lung transplant recipients was too small for analysis.

Figure 11.11 Long-term patient survival after first paediatric heart only transplant in the UK, 1 January 1997 – 31 December 2009

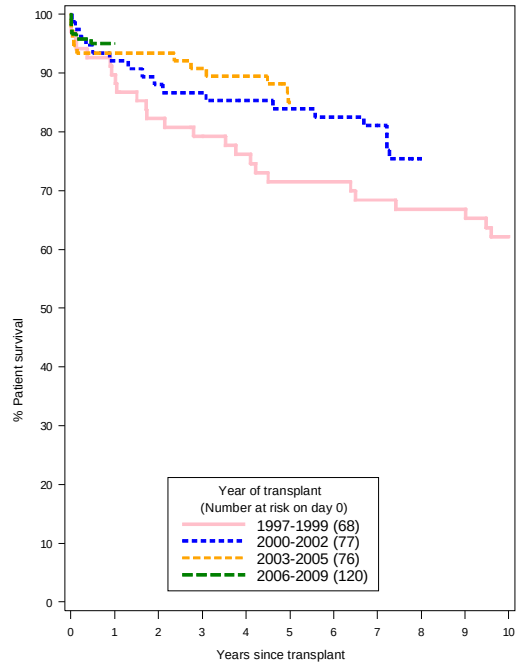

Table 11.18 Patient survival after first paediatric heart only transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	68	90	(80-95)	82	(71-90)	71	(59-81)	62	(49-73)
2000-2002	77	92	(83-96)	88	(78-94)	84	(73-91)		
2003-2005	76	93	(85-97)	93	(85-97)	85	(75-91)		
2006-2009	120	95	(89-98)						

11.4 Liver patient survival

11.4.1 Adult recipients - donor after brain death (DBD)

Long-term patient survival for adult (≥17 years) recipients after first elective liver only transplants from donors after brain death is shown in **Figure 11.12**. **Table 11.19** shows patient survival estimates at one, two, five and ten years post-transplant. There have been significant improvements in one, two and five year patient survival over the time periods analysed, p<0.001, p<0.001 and p<0.004, respectively.

Figure 11.12 Long-term patient survival after first elective adult liver only transplant from donors after brain death, 1 January 1997 – 31 December 2009

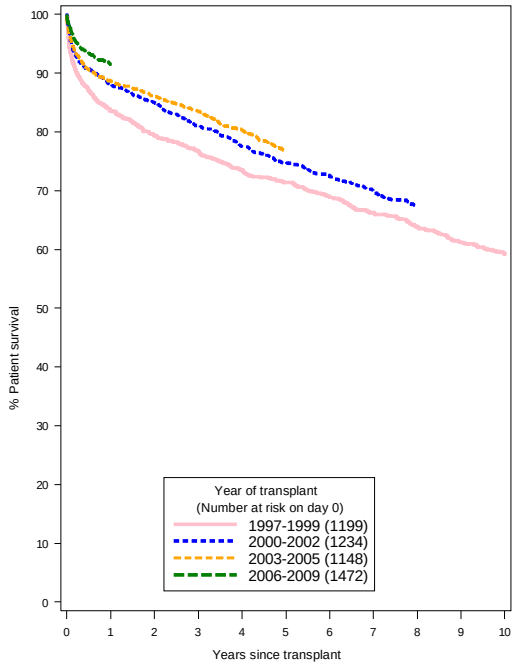

Table 11.19 Patient survival after first elective adult liver only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	1199	84	(81-86)	79	(77-82)	71	(69-74)	59	(56-62)
2000-2002	1234	88	(86-90)	85	(83-87)	75	(72-77)		
2003-2005	1148	89	(87-90)	86	(84-88)	77	(74-79)		
2006-2009	1472	92	(90-93)						

11.4.2 Adult recipients - donor after circulatory death (DCD)

Patient survival for adult (≥17 years) recipients after first elective liver only transplants from donors after circulatory death is shown in **Figure 11.13**. The majority of these liver transplants have been performed since 1 January 2002, so it is not possible to estimate long term patient survival. **Table 11.20** shows patient survival estimates at one, two and three years post transplant.

Figure 11.13 Liver patient survival after first elective adult liver only transplant from donors after circulatory death, 1 January 2003 – 31 December 2009

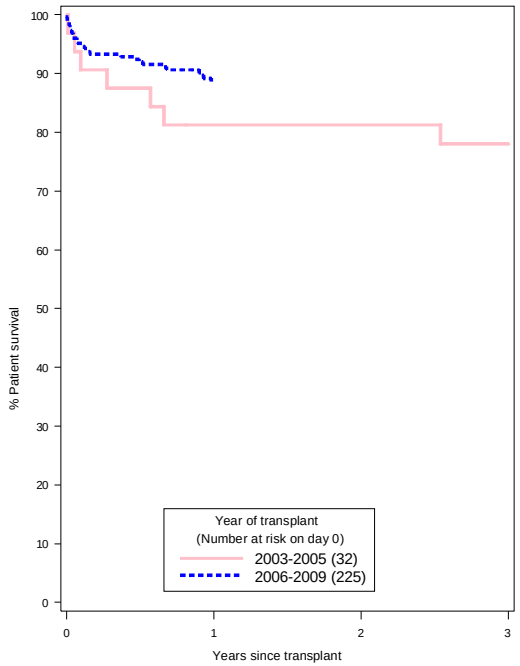

Table 11.20 Patient survival after first elective adult liver only transplant from a DCD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Three year	
2003-2005	32	81	(63-91)	81	(63-91)	78	(59-89)
2006-2009	225	89	(84-92)				

11.4.3 Paediatric recipients - donor after brain death (DBD)

Figure 11.14 and **Table 11.21** show long-term patient survival estimates for first elective liver only transplants from donors after brain death in paediatric (<17 years) recipients. There have been no statistically significant improvements in one, two or five year patient survival over the time period analysed (p>0.2). The number of paediatric transplants from donors after circulatory death was too small to estimate patient survival.

Figure 11.14 Long-term patient survival after first elective paediatric liver only transplant from donors after brain death, 1 January 1997 – 31 December 2009

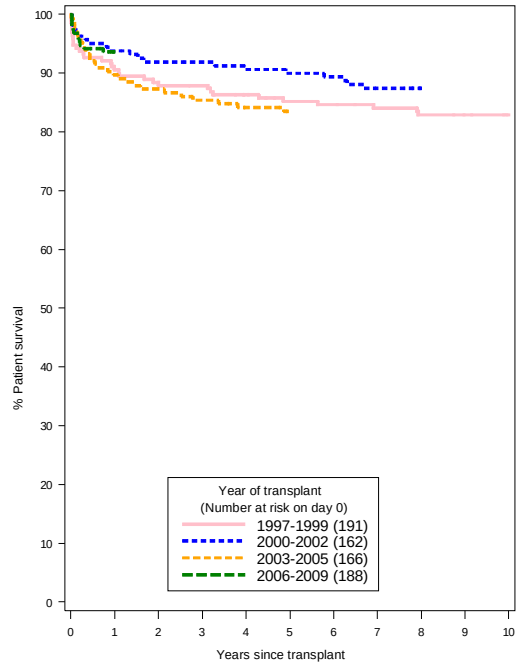

Table 11.21 Patient survival after first elective paediatric liver only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval) One year		Two year		Five year		Ten year	
1997-1999	191	91	(85-94)	88	(82-92)	85	(79-90)	83	(77-88)
2000-2002	162	94	(89-97)	92	(86-95)	90	(84-94)		
2003-2005	166	90	(84-93)	87	(81-91)	83	(77-88)		
2006-2009	188	94	(89-96)						

11.5 Intestinal patient survival

The majority of intestinal transplants have been performed since 1 January 2006, so there are insufficient data available to analyse long-term patient survival. **Figure 11.15** and **Table 11.22** show one-year patient survival estimates for recipients receiving their first intestinal transplant, 2006 – 2009, by recipient age group.

Figure 11.15 Patient survival after first intestinal graft in the UK, 1 January 2006 – 31 December 2009

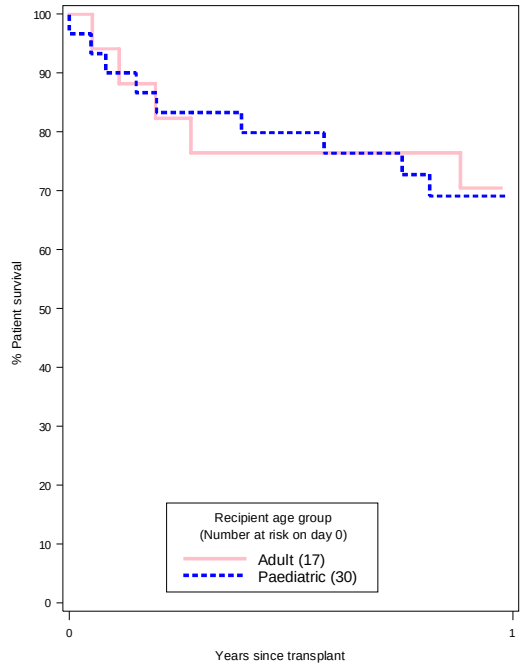

Table 11.22 Patient survival after first intestinal transplant in the UK, 1 January 2006 - 31 December 2009

Recipient age group	No. at risk on day 0	% Patient survival (95% confidence interval) One year	
Adult	17	71	(43-87)
Paediatric	30	69	(49-83)

11.6 Cornea graft survival

Good quality cornea follow-up data were only available for transplants performed since 1 April 1999. There are insufficient data available to analyse long-term survival effects. **Figure 11.16** shows graft survival estimates for first penetrating keratoplasty (PK) for grafts 2000 - 2002, 2003 - 2005 and 2006 - 2009. Graft survival estimates and confidence intervals are shown by transplant year at one, two and five years in **Table 11.23.**

Figure 11.16 Cornea graft survival after first PKP graft in the UK, 1 January 2000 – 31 December 2009

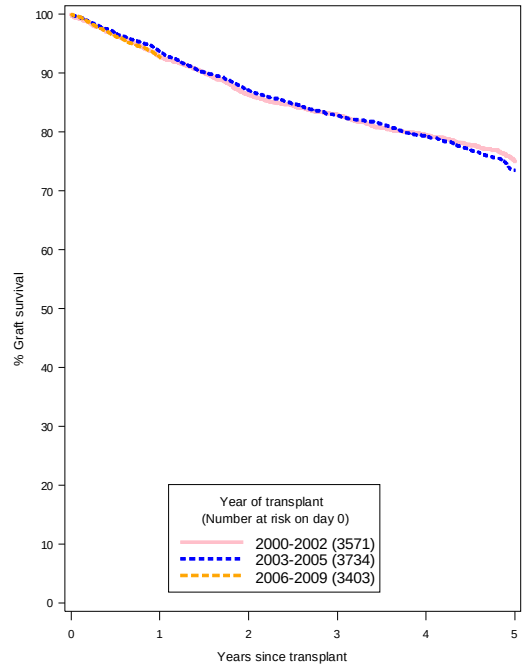

Table 11.23 Cornea graft survival after first PK in the UK

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval) One year		Two year		Five year	
2000-2002	3571	93	(92-94)	86	(85-88)	75	(73-77)
2003-2005	3734	94	(93-94)	87	(86-88)	74	(72-75)
2006-2009	3403	93	(92-94)				