



# **Survival Rates Following Transplantation**

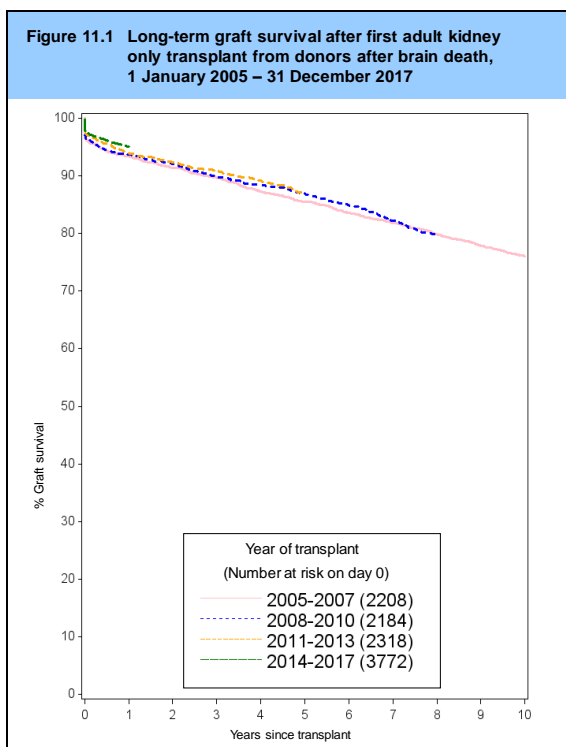
This chapter shows graft survival rates over time for kidney and pancreas transplants, and patient survival estimates for kidney, pancreas, cardiothoracic, liver and intestinal transplants, performed in the UK. Separate estimates are presented for adult and paediatric patients (using organ specific age 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. Both analyses consider only first transplants.

## 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 ( $\geq 18$  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 year survival over the time periods shown,  $p=0.03$ . **Table 11.2** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There were no statistically significant changes in patient survival over time ( $p>0.2$ ).



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

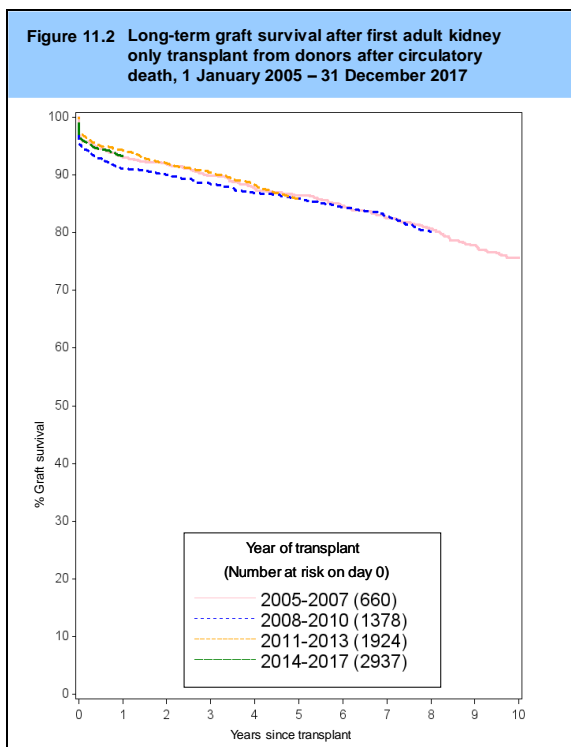
Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)				
		One year	Two year	Five year	Ten year	
2005-2007	2208	93 (92-94)	91 (90-93)	85 (84-87)	76 (74-78)	
2008-2010	2184	94 (93-95)	92 (91-93)	87 (85-88)		
2011-2013	2318	94 (93-95)	92 (91-93)	87 (85-88)		
2014-2017	3772	95 (94-96)				

**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	
2005-2007	2210	97 (96-98)	95 (94-96)	89 (88-91)	77 (75-79)	
2008-2010	2185	96 (95-97)	95 (94-95)	90 (88-91)		
2011-2013	2319	96 (95-97)	94 (93-95)	88 (87-89)		
2014-2017	3773	97 (96-98)				

### 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 significant variation in one year survival over the time periods shown,  $p=0.004$ . 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 statistically significant increase in patient survival over time at one year post-transplant ( $p=0.02$ ).

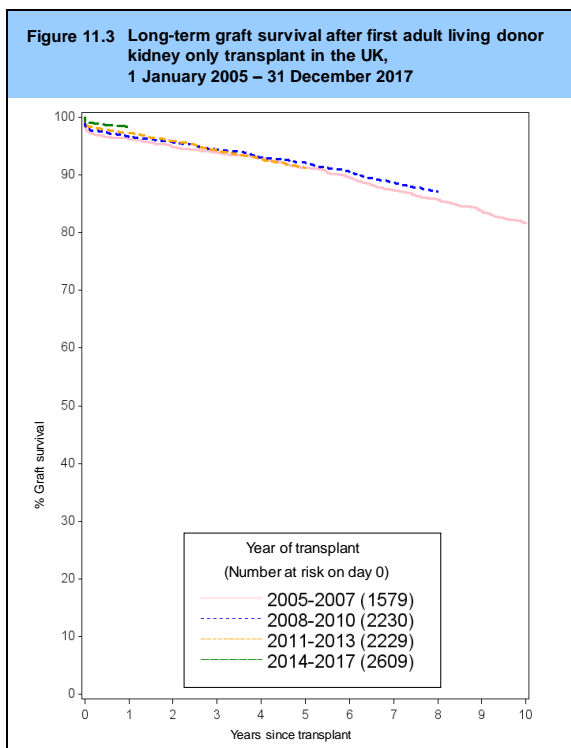


Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)				
		One year	Two year	Five year	Ten year	
2005-2007	660	93 (91-95)	92 (89-94)	86 (84-89)	76 (72-79)	
2008-2010	1378	91 (89-92)	90 (88-92)	86 (84-88)		
2011-2013	1924	94 (93-95)	92 (91-93)	86 (84-87)		
2014-2017	2937	93 (92-94)				

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)				
		One year	Two year	Five year	Ten year	
2005-2007	661	95 (93-97)	93 (91-95)	87 (84-89)	74 (70-77)	
2008-2010	1378	95 (94-96)	94 (92-95)	87 (85-89)		
2011-2013	1924	96 (95-96)	94 (92-95)	86 (84-87)		
2014-2017	2939	97 (96-98)				

### 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 year survival over the time periods shown,  $p < 0.0001$ . **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 changes in patient survival over time ( $p > 0.1$ ).

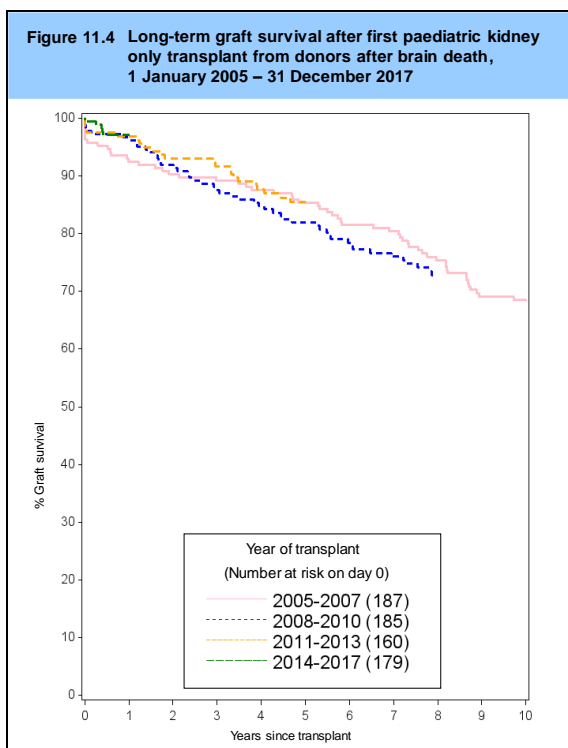


<b>Table 11.5</b> Graft survival after first adult living donor kidney transplant									
Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)							
		One year		Two year		Five year		Ten year	
2005-2007	1579	96	(95-97)	95	(94-96)	91	(90-93)	82	(80-84)
2008-2010	2230	97	(96-97)	96	(95-96)	92	(91-93)		
2011-2013	2229	97	(96-98)	96	(95-97)	91	(90-92)		
2014-2017	2609	98	(98-99)						

<b>Table 11.6</b> 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	
2005-2007	1579	99	(98-99)	98	(97-99)	96	(95-97)	90	(88-91)
2008-2010	2230	99	(98-99)	98	(97-98)	94	(93-95)		
2011-2013	2228	99	(99-99)	98	(97-99)	95	(94-96)		
2014-2017	2609	99	(99-99)						

### 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 has been a borderline significant improvement in one year survival over the time periods shown,  $p=0.08$ . **Table 11.8** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There were no statistically significant changes in patient survival over time ( $p>0.1$ ). There were insufficient paediatric recipients of first kidney only transplants from donors after circulatory death to permit reliable analysis.



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

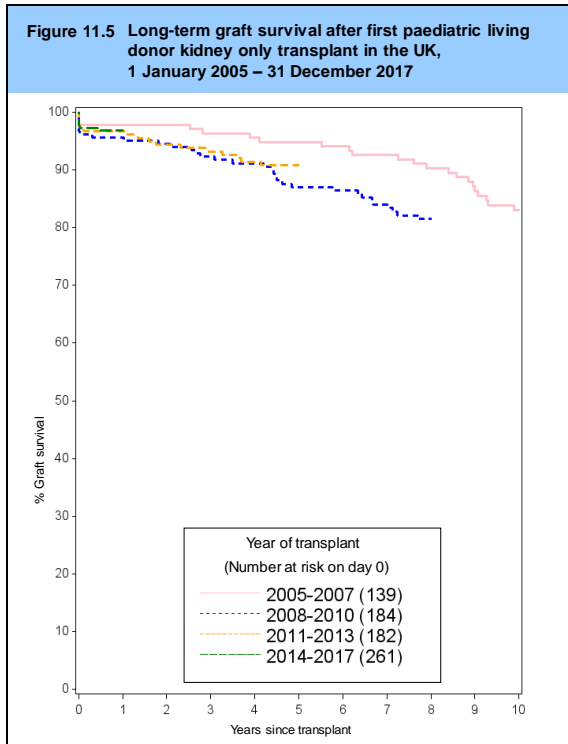
Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)					
		One year	Two year	Five year	Ten year		
2005-2007	187	92 (88-95)	90 (85-94)	85 (79-90)	68 (61-75)		
2008-2010	185	97 (93-99)	92 (87-95)	82 (76-87)			
2011-2013	160	97 (93-99)	93 (88-96)	85 (79-90)			
2014-2017	179	97 (93-99)					

**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		
2005-2007	188	99 (96-100)	99 (96-100)	99 (96-100)	97 (93-99)		
2008-2010	185	99 (96-100)	99 (96-100)	98 (94-99)			
2011-2013	160	99 (96-100)	99 (95-100)	97 (92-99)			
2014-2017	179	99 (96-100)					

### 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. There has been a borderline significant change in five year survival over the time periods shown,  $p=0.07$ . **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 changes in patient survival over time ( $p>0.1$ ).



**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	
2005-2007	139	98 (93-99)	98 (93-99)	95 (89-98)	83 (75-89)	
2008-2010	184	96 (91-98)	95 (90-97)	87 (81-91)		
2011-2013	182	97 (93-99)	94 (90-97)	91 (85-94)		
2014-2017	261	97 (94-98)				

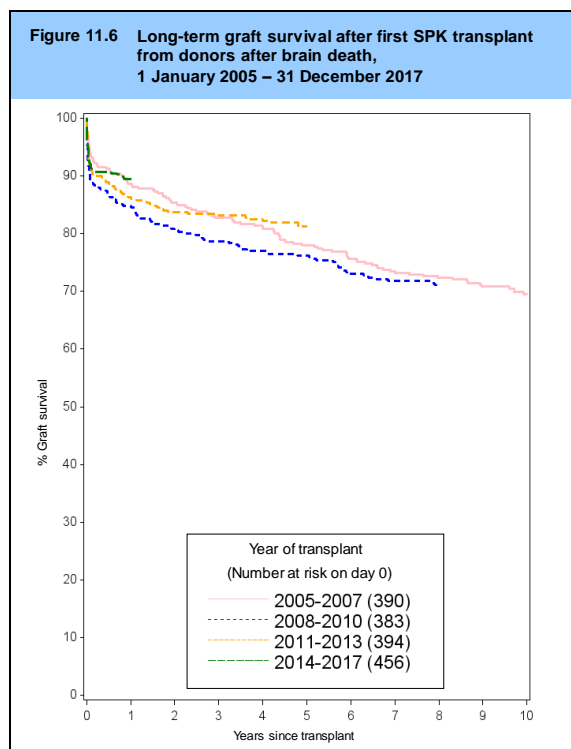
**Table 11.10** Patient survival after first paediatric living donor kidney transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)				
		One year	Two year	Five year	Ten year	
2005-2007	139	100 (-)	100 (-)	100 (-)	99 (95-100)	
2008-2010	185	99 (96-100)	99 (96-100)	97 (93-99)		
2011-2013	182	99 (96-100)	99 (96-100)	99 (96-100)		
2014-2017	261	99 (97-100)				

## 11.2 Pancreas graft and patient survival

### 11.2.1 Simultaneous kidney/pancreas transplants - donor after brain death (DBD)

**Figure 11.6** shows long-term graft survival in recipients receiving their first simultaneous kidney/pancreas (SPK) transplant performed from donors after brain death. Graft and patient survival estimates and confidence intervals are shown at one, two, five and ten years post-transplant in **Table 11.11** and **Table 11.12** respectively. Results relate to adults only as there are no paediatric pancreas transplant recipients. There has been no significant variation in graft survival over time ( $p>0.1$ ). Differences in patient survival are also not significant over time ( $p>0.3$ ).



**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	Five year	Ten year
2005-2007	390	89 (85-91)	85 (81-89)	78 (73-82)	70 (65-74)
2008-2010	383	85 (81-88)	81 (76-84)	76 (72-80)	
2011-2013	394	86 (82-89)	84 (80-87)	81 (77-85)	
2014-2017	456	89 (86-92)			

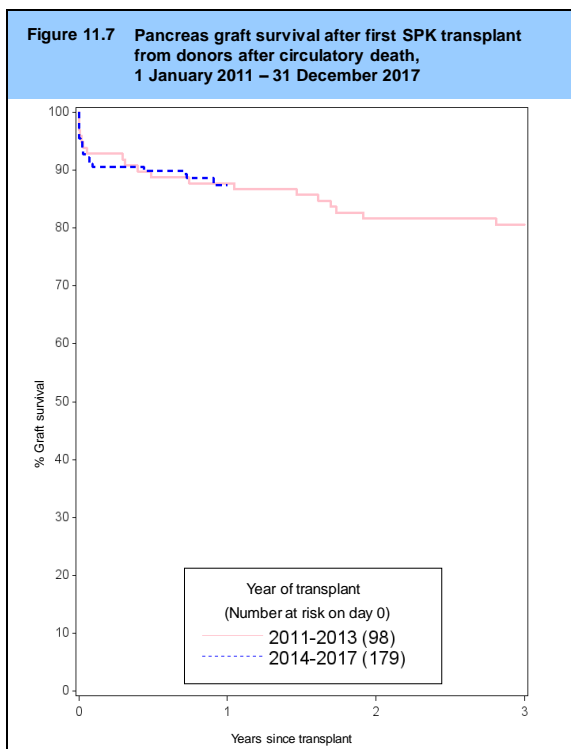
**Table 11.12** Patient survival after first SPK transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Five year	Ten year
2005-2007	392	95 (93-97)	94 (91-96)	90 (86-92)	75 (70-79)
2008-2010	383	97 (95-99)	95 (92-97)	90 (86-92)	
2011-2013	396	96 (93-97)	94 (91-96)	87 (83-90)	
2014-2017	456	97 (95-98)			



### 11.2.2 Simultaneous kidney/pancreas transplants - donor after circulatory death (DCD)

The majority of simultaneous kidney/pancreas (SPK) transplants from a DCD have been performed since 1 January 2007, so there are insufficient data available to analyse long-term survival. **Figure 11.7** shows pancreas graft survival in recipients receiving their first SPK transplant performed from donors after circulatory death. Graft and patient survival estimates and confidence intervals are shown at one, two and three years in **Table 11.13** and **Table 11.14** respectively. Results are for adult patients only.



**Table 11.13** Graft survival after first SPK transplant from a DCD

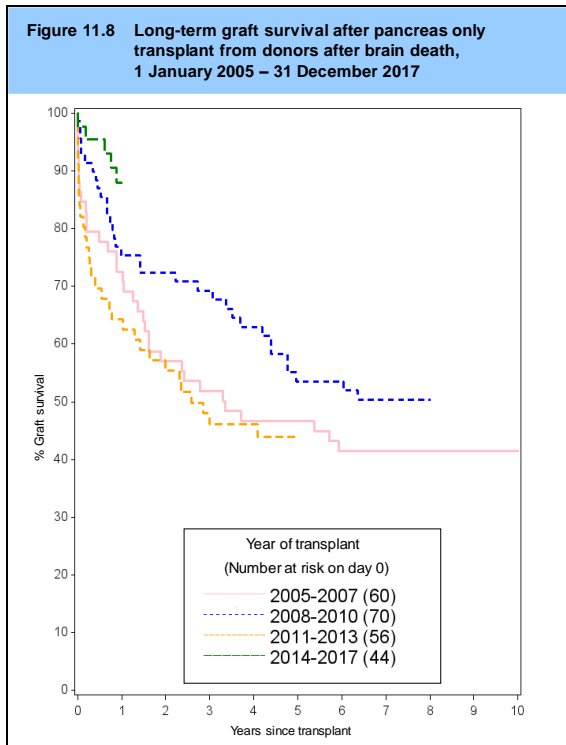
Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)			
		One year	Two year	Three year	
2011-2013	98	88 (79-93)	82 (72-88)	81 (71-87)	
2014-2017	179	87 (82-92)			

**Table 11.14** Patient survival after first SPK transplant from a DCD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)		
		One year	Two year	Three year
2011-2013	98	99 (93-100)	99 (93-100)	97 (90-99)
2014-2017	179	99 (95-100)		

### 11.2.3 Pancreas only transplants - donor after brain death (DBD)

**Figure 11.8** shows long-term graft survival in recipients receiving their first pancreas only transplant performed from donors after brain death. Graft and patient survival estimates and confidence intervals are shown at one, two, five and ten years in **Table 11.15** and **Table 11.16** respectively. Results are for adult patients only. There has been a significant change in one year survival over the time periods shown,  $p=0.04$ . There were no statistically significant changes in patient survival over time ( $p>0.1$ ).



**Table 11.15** Graft survival after first pancreas only transplant from a DBD

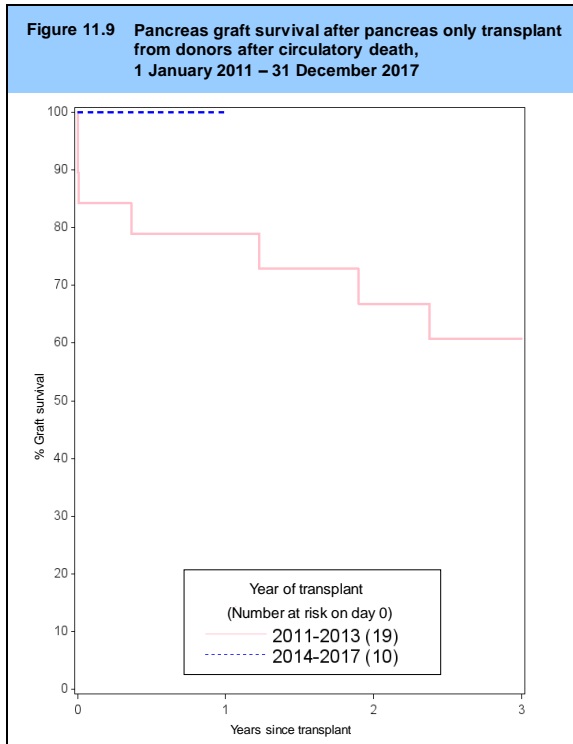
Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)			
		One year	Two year	Five year	Ten year
2005-2007	60	73 (59-82)	57 (43-69)	47 (33-59)	41 (29-54)
2008-2010	70	75 (63-84)	72 (60-81)	54 (41-65)	41 (29-54)
2011-2013	56	64 (50-75)	55 (41-67)	44 (31-56)	41 (29-54)
2014-2017	44	88 (73-95)	73 (60-81)	50 (41-65)	41 (29-54)

**Table 11.16** Patient survival after first pancreas 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
2005-2007	61	97 (87-99)	95 (85-98)	9 (82-97)	68 (52-80)
2008-2010	71	94 (85-98)	91 (81-96)	8 (72-91)	68 (52-80)
2011-2013	56	98 (86-100)	98 (86-100)	7 (55-85)	68 (52-80)
2014-2017	44	98 (84-100)	98 (86-100)	7 (55-85)	68 (52-80)

### 11.2.4 Pancreas only transplants - donor after circulatory death (DCD)

**Figure 11.9** shows pancreas graft survival in recipients receiving their first pancreas only transplant performed from donors after circulatory death. Graft and patient survival estimates and confidence intervals are shown at one, two and three years in **Table 11.17** and **Table 11.18** respectively. Results are for adult patients only.



**Table 11.17** Graft survival after first pancreas only transplant from a DCD

Year of transplant	No. at risk on day 0	% Graft survival (95% confidence interval)			
		One year	Two year	Three year	
2011-2013	19	79 (53-92)	67 (40-84)	61 (35-79)	
2014-2017	10	100 (-)			

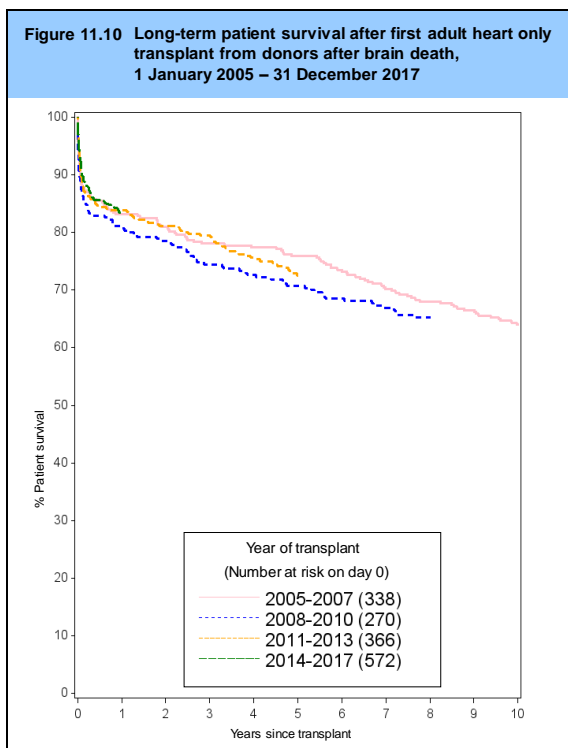
**Table 11.18** Patient survival after first pancreas only transplant from a DCD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Three year	
2011-2013	19	94 (67-99)	94 (67-99)	94 (67-99)	
2014-2017	10	100 (-)			

## 11.3 Cardiothoracic patient survival

### 11.3.1 Adult heart recipients – donors after brain death (DBD)

Long-term patient survival for adult ( $\geq 16$  years) recipients after first heart only transplant performed from donors after brain death is shown in **Figure 11.10**. Super-urgent, urgent, and non-urgent patients are included. **Table 11.19** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant for each transplant era. There were no statistically significant differences in patient survival over time ( $p > 0.3$ ).



**Table 11.19** Patient survival after first adult heart 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	
2005-2007	338	83 (79-87)	81 (76-85)	76 (71-80)	64 (59-69)	
2008-2010	270	81 (76-85)	79 (73-83)	71 (65-76)		
2011-2013	366	84 (80-87)	81 (77-85)	72 (68-77)		
2014-2017	572	83 (80-86)				

### 11.3.2 Adult heart-lung block recipients – donors after brain death (DBD)

Patient survival for adult recipients after first heart-lung block transplant from donors after brain death is shown in **Figure 11.11**. Patient survival estimates and confidence intervals for each time period analysed are shown in **Table 11.20**. There is some variation between survival rates across transplant eras, with shorter term outcomes generally seeing an improvement, however these statistics are based on small numbers and are not statistically significantly different ( $p>0.1$ ).

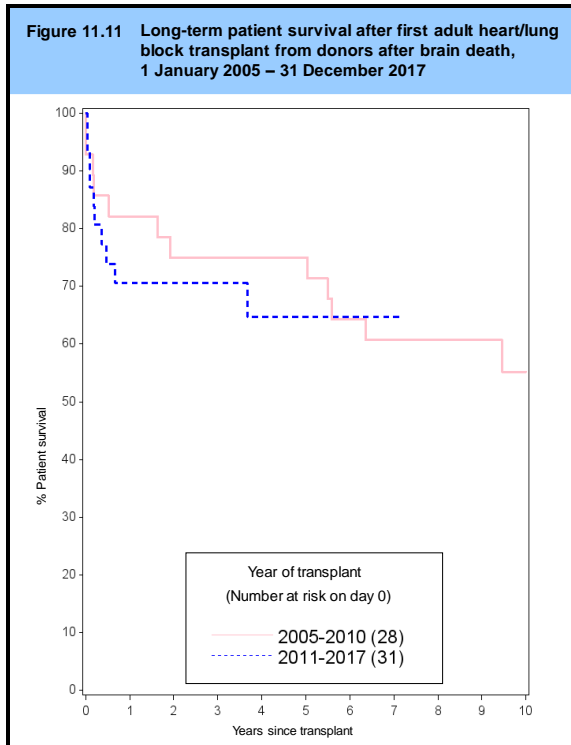
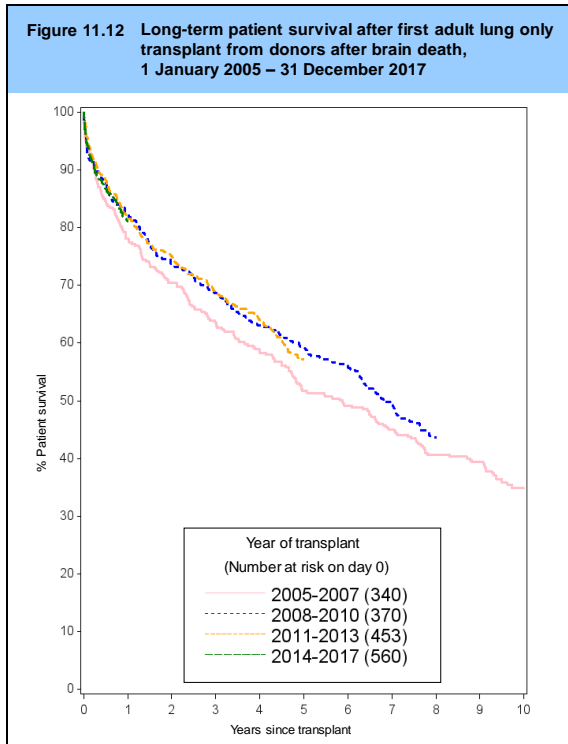


Table 11.20 Patient survival after first adult heart-lung block transplant from a DBD									
Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)							
		One year	Two year	Five year	Ten year				
2005-2010	28	82 (62-92)	75 (55-87)	75 (55-87)	55 (34-72)				
2011-2017	31	71 (51-83)	71 (51-83)	65 (43-80)					

### 11.3.3 Adult lung recipients - donors after brain death (DBD)

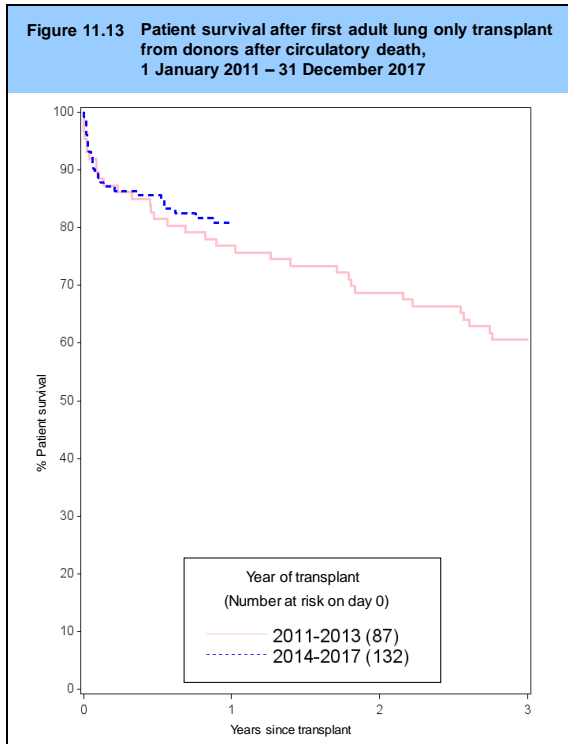
Patient survival for adult recipients after first lung only transplant from donors after brain death is shown in **Figure 11.12**, with survival estimates and confidence intervals shown in **Table 11.21**. Super-urgent, urgent, and non-urgent patients are included. There were no statistically significant differences in patient survival over time ( $p>0.1$ ).



Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)				
		One year	Two year	Five year	Ten year	
2005-2007	340	78 (73-82)	70 (65-75)	52 (46-57)	35 (30-40)	
2008-2010	370	82 (78-86)	74 (69-78)	59 (54-64)	35 (30-40)	
2011-2013	453	82 (78-85)	75 (71-79)	57 (52-62)	35 (30-40)	
2014-2017	560	81 (78-84)	75 (71-79)	57 (52-62)	35 (30-40)	

### 11.3.4 Adult lung recipients - donors after circulatory death (DCD)

The majority of lung transplants from a DCD have been performed since 1 January 2007, so there are insufficient data available to analyse long-term patient survival. Patient survival for adult recipients after first lung only transplant from donors after circulatory death is shown in **Figure 11.13**, with survival estimates and confidence intervals shown in **Table 11.22**. Super-urgent, urgent, and non-urgent patients are included.

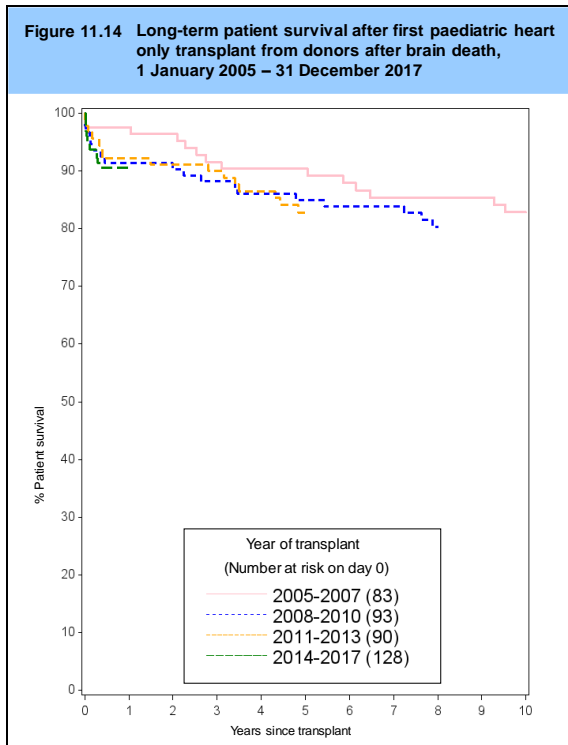


**Table 11.22 Patient survival after first adult lung only transplant from a DCD**

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Three year	
2011-2013	87	77 (66-84)	69 (58-77)	61 (49-70)	
2014-2017	132	81 (73-87)			

### 11.3.5 Paediatric heart recipients – donors after brain death (DBD)

Long-term patient survival for paediatric recipients after first heart only transplant from donors after brain death is shown in **Figure 11.14**. Both urgent and non-urgent patients are included. **Table 11.23** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There was no statistically significant variation in survival over the time period analysed,  $p>0.2$ . The number of heart-lung transplant recipients was too small for analysis.



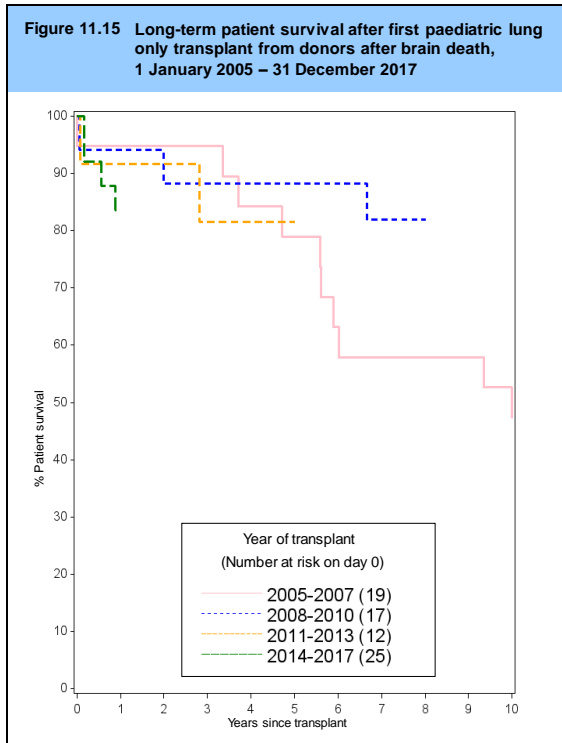
**Table 11.23** Patient survival after first paediatric heart only transplant

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)				
		One year	Two year	Five year	Ten year	
2005-2007	83	98 (91-99)	96 (89-99)	90 (82-95)	83 (73-89)	
2008-2010	93	91 (84-96)	90 (82-95)	85 (76-91)	83 (73-89)	
2011-2013	90	92 (84-96)	91 (83-95)	83 (73-89)		
2014-2017	128	91 (84-95)				



### 11.3.6 Paediatric lung recipients - donors after brain death (DBD)

Long-term patient survival for paediatric recipients after first lung only transplant from donors after brain death is shown in **Figure 11.15**. Urgent and non-urgent patients are included. **Table 11.24** shows the patient survival estimates and confidence intervals for one, two, five and ten years post-transplant. There were no statistically significant differences in patient survival over time ( $p>0.3$ ).



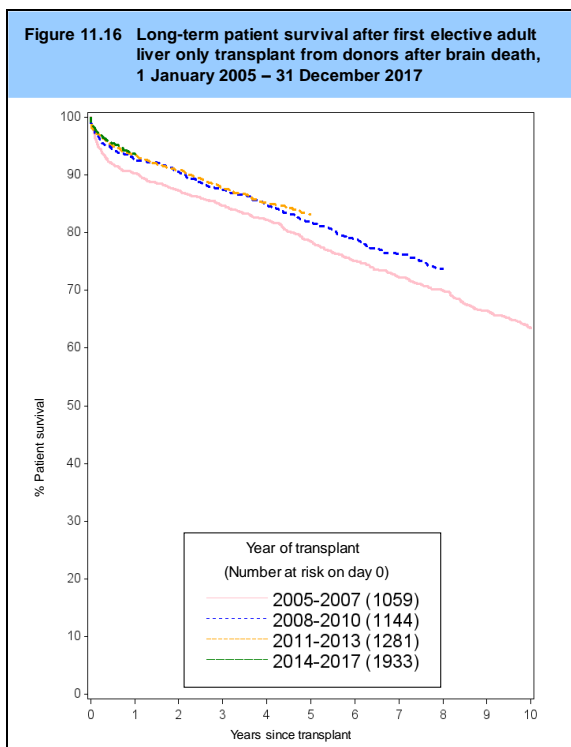
**Table 11.24** Patient survival after first paediatric lung only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Five year	Ten year
2005-2007	19	95 (68-99)	95 (68-99)	79 (53-92)	47 (24-67)
2008-2010	17	94 (65-99)	88 (61-97)	88 (61-97)	-
2011-2013	12	92 (54-99)	92 (54-99)	81 (44-95)	-
2014-2017	25	84 (62-94)	-	-	-

## 11.4 Liver patient survival

### 11.4.1 Adult liver recipients - donor after brain death (DBD)

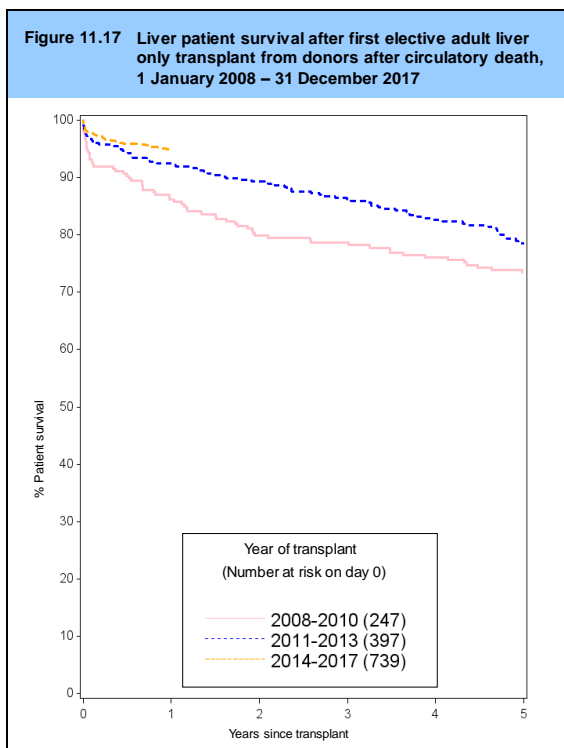
Long-term patient survival for adult ( $\geq 17$  years) recipients after first elective NHS Group 1 liver only transplants from donors after brain death is shown in **Figure 11.16**. **Table 11.25** shows patient survival estimates at one, two, five and ten years post-transplant. There have been significant improvements in one, two and five year patient survival,  $p < 0.02$  in each case, over the time periods analysed.



<b>Table 11.25 Patient survival after first elective adult NHS Group 1 liver only transplant from a DBD</b>									
Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)							
		One year		Two year		Five year		Ten year	
2005-2007	1059	90	(88-92)	87	(85-89)	78	(76-81)	64	(60-66)
2008-2010	1144	93	(91-94)	91	(89-92)	82	(79-84)		
2011-2013	1281	93	(92-95)	91	(89-92)	83	(81-85)		
2014-2017	1933	94	(92-95)						

### 11.4.2 Adult liver recipients - donor after circulatory death (DCD)

Patient survival for adult ( $\geq 17$  years) recipients after first elective NHS Group 1 liver only transplants from donors after circulatory death is shown in **Figure 11.17**. Due to small numbers prior to 2006 it is not possible to estimate long term patient survival. **Table 11.26** shows patient survival estimates at one, two and five years post-transplant.

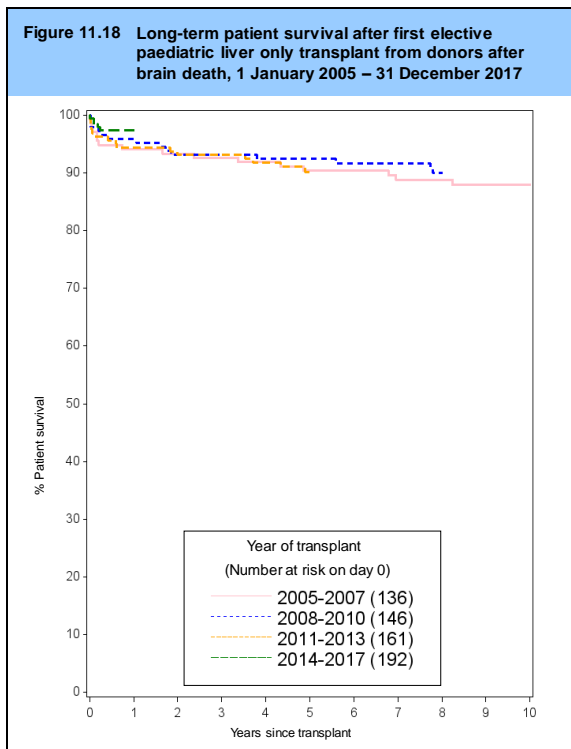


**Table 11.26** Patient survival after first elective adult NHS Group 1 liver only transplant from a DCD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Five year	
2008-2010	247	86 (81-90)	80 (74-84)	73 (67-79)	
2011-2013	397	92 (89-95)	89 (86-92)	79 (74-82)	
2014-2017	739	95 (93-96)			

### 11.4.3 Paediatric liver recipients - donor after brain death (DBD)

**Figure 11.18** and **Table 11.27** 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 ( $p>0.4$ ). The number of paediatric transplants from donors after circulatory death was too small to estimate meaningful patient survival.

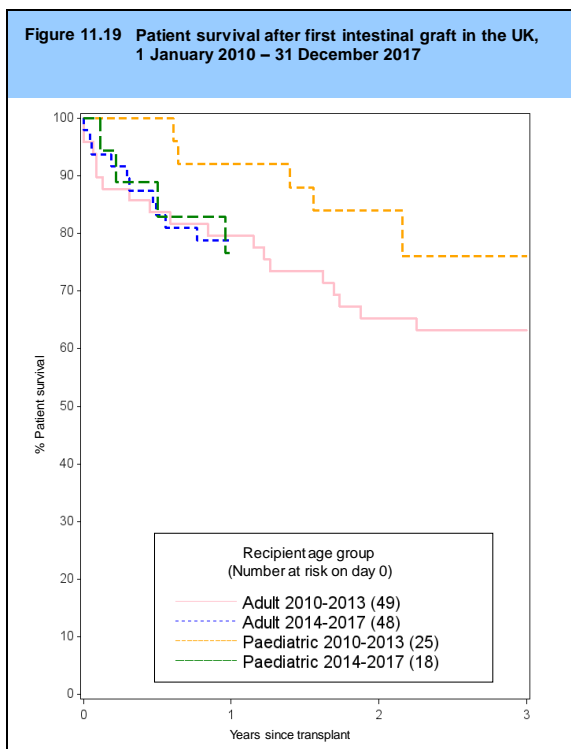


**Table 11.27** Patient survival after first elective paediatric liver only transplant from a DBD

Year of transplant	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Five year	Ten year
2005-2007	136	94 (89-97)	93 (88-96)	90 (84-94)	88 (81-92)
2008-2010	146	96 (91-98)	93 (88-96)	92 (87-96)	88 (81-92)
2011-2013	161	94 (90-97)	93 (88-96)	90 (84-94)	
2014-2017	192	97 (94-99)			

## 11.5 Intestinal patient survival

**Figure 11.19** and **Table 11.28** show one-year patient survival estimates for recipients receiving their first intestinal transplant, by recipient age group (adults aged  $\geq 18$  years).



**Table 11.28 Patient survival after first intestinal transplant in the UK, 1 January 2010 - 31 December 2017**

Recipient age group	No. at risk on day 0	% Patient survival (95% confidence interval)			
		One year	Two year	Three year	
<b>Adult</b>					
2010-2013	49	80 (65-88)	65 (50-77)	63 (48-75)	
2014-2017	48	79 (64-88)			
<b>Paediatric</b>					
2010-2013	25	92 (72-98)	84 (63-94)	76 (54-88)	
2014-2017	18	77 (49-91)			