

Kidney Transplant Report

Beaumont Hospital

National Renal Transplant Programme

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Preface

I would like to start by thanking Yvonne Williams, Patrick O'Kelly and Peter Conlon for the great work they have done in producing this report on the activity within the National Kidney and Pancreas Transplant Programme. It is gratifying to see that our results stand up well to International comparison. I would like to also note that we did perform our 4,000th transplant this year which is a significant milestone and places us in the Premier League of transplant programmes worldwide.

These results are the product of very hard work done by many people throughout Ireland. I would like to thank all the donating hospitals and their staff in the ICU's throughout the country, without whose co-operation, we obviously would have no transplant programme.

Next, I would like to acknowledge the fantastic work done by all our Nephrologists who have participated in the long term management of these patients and we are giving 15 year survivals as elaborated in the report.

Our Immunology Department have many achievements, but one of our great advances in the past ten years has been prospective typing, which has now reduced the cold ischaemia time to significantly less than 20 hours for the second of a pair of kidneys. This has had huge implications in terms of delayed graft function, particularly as our donor pool is now getting older. Also our very low rejection rates are to their credit.

I would like to thank the Anaesthetic Department which has contributed greatly to our endeavours here, and in particular, James O'Rourke, who singlehandedly has championed the non beating donation programme which is now up and running and will make some significant contributions in the future.

I would like to thank the theatre staff in Beaumont Hospital, for facilitating us, particularly Sr. Patricia Connolly and Staff Nurse Bowas Jayaprakasam.

The nerve centre of transplantation over the past 30 years has been the Organ Procurement Office run by Phyllis Cunnigham and her four colleagues. Their hard work and voluntarism is reflected in our organ procurement rate which is still in the upper echelons of the European League Table.

To my colleagues in the Surgical Department, both medical and nursing, the spirit of voluntarism and love of the job that emanates from the Senior Sisters Monica Cunningham, Somi Alex and Sinead Haugh, has generated a great team work ethic and a high nurse retention rate within our stressed unit. It is one of the happiest places I have ever worked in. This atmosphere is greatly enhanced by our excellent household staff.

A final word of thanks to my surgical colleagues – Mr. Mohan Ponnusamy, Miss Dilly Little, Mr. Richard Power, Mr. Gordon Smyth, Miss Molly Eng, Mr. Tom Creagh, have been exemplary in the execution of their responsibilities, far beyond the letter of the law. They have tirelessly worked and have always pitched up when the going got rough. I have to mention Antonio Zimmerman and William Sheilds who for the past six years have almost singlehandedly run the surgical side of Organ Procurement. We owe these guys a great debt of gratitude as the transplant programme essentially hinges on their continued availability.

Finally, and most importantly, this work and the achievements which have been carried out over the past 50 years in the National Kidney Transplant Centre could not have been achieved without the donor families. Their courageous, spiritual, generous and thoughtful consideration of others hardships, at a time of immense grief, is an example to everybody in an increasing materialistic and unspiritual world.

David Hickey, Consultant Transplant Surgeon, Director Kidney Transplantation Beaumont Hospital

1. Introduction

This document summarises the outcomes of Kidney and Kidney Pancreas Transplantation in Ireland as it stands at the end of 2012.

Highlights of this report include;

- Continued high number of renal transplants performed with a total of 163 for 2012.
- Number of living donor transplants continues to rise to a high of 32 performed in 2012 (6.9 per million population). This number is still low by European standards.
- Waiting times for transplants has stabilised but remains high at a median of 20 months.
- Progressive decline in cold ischaemic time for deceased donor recipients from a mean of 20 hours in 2001 to 15 hours in 2012.
- Improved renal function at one year from median serum creatinine of 126 $\mu\text{mol/L}$ in 2001 to 110 $\mu\text{mol/L}$ in 2012.
- The progressive improvement in 1-year adult deceased donor graft survival from 86% in period 1991-1994 to 96% in 2003-2006. A similar high 1-year graft survival rate has been maintained in the period 2007-2011. Medium term improvement in graft survival defined by 5-year adult deceased donor graft survival from 69% in 1991-1994 to 85% in 2003-2006.
- Improvements are also noted in patient survival despite the increasing age of transplant recipients. One-year patient survival has increased from 93.9% in the period 1991-1994 to 98.5% in the most recent period. Five-year graft survival has also improved with rates in 1991-1994 of 83.4% increasing to 92.0% for 2002-2006.
- Results compare favourably to European Renal Association (ERA) countries. In nearly every category of patient studied, short and medium term patient and graft survival surpasses combined European countries outcomes. This is particularly so during the period of comparison 2002-2006. It is less obvious in the period 2005-2009 indicating an improvement in overall outcomes in Europe and a levelling off of improvements in the Republic of Ireland.
- Biopsy proven acute rejection rates post transplantation are low by international standards and have tended to fluctuate from between 5 and 15% in the last decade

This report describes the considerable improvements in outcomes of kidney transplantation over the last two decades and to some extent a levelling off of these improvements in the last 10 years. There is however an urgent need for additional investment in transplantation if the full benefits of kidney transplantation are to be offered to Irish people and further expansion in patients on dialysis ameliorated or reduced. Although we have seen a significant increase in live donor transplant activity this does not come anywhere near meeting the current demands.

The production of this analysis is dependent on centres continuing to provide long term follow up data to the Renal Transplant Registry. There have been significant improvements in the quality of patient follow up data in the last few years. This is of great benefit to the Registry and in fact improves the graft and patient outcome results. This is because many patients who previously had serum creatinine results that were not up to date and had been described as 'lost to follow up' and censored from the analysis at an earlier date are now contributing to longer term survivors and thence reducing the effect of failures on estimated survivor functions.

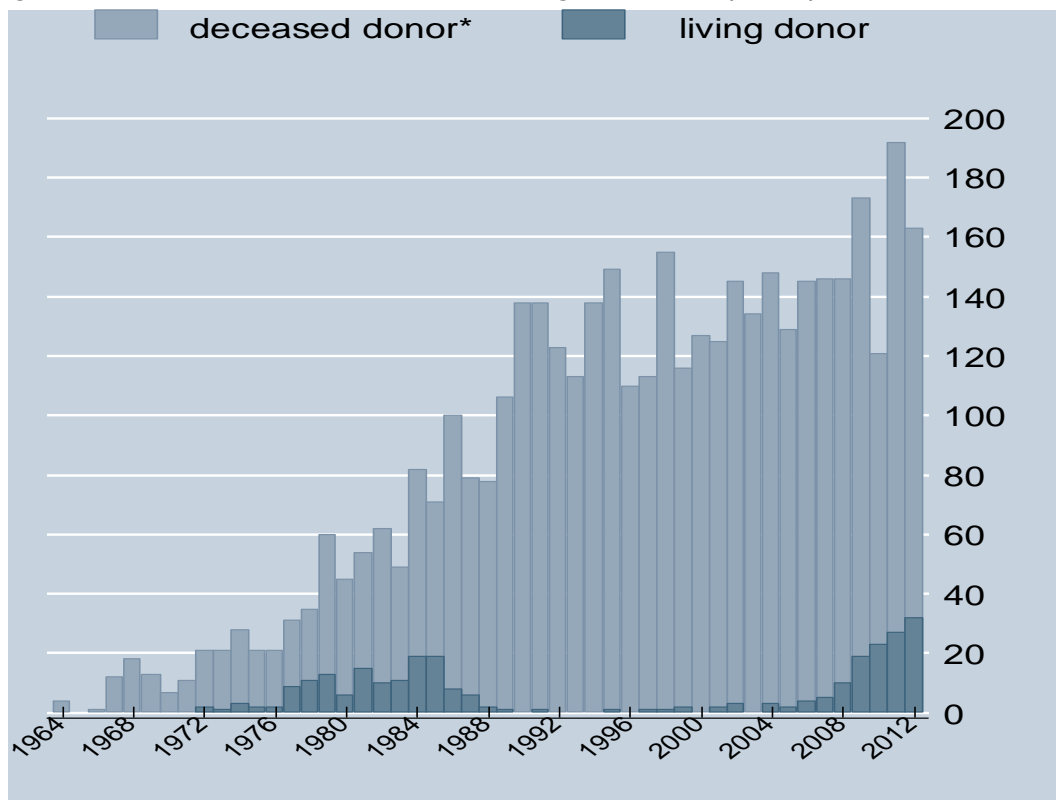
2.1 Summary of transplant activity 2010-2012

Table 2.1: Summary of transplant numbers 2010 – 2012

| Category | Transplanted 2010 | Transplanted 2011 | Transplanted 2012 | Difference +/- in 2012* |
|--|-------------------|-------------------|-------------------|-------------------------|
| Total number of transplanted kidneys | 122 | 192 | 163 | -29 |
| Number of deceased donor kidney only | 90 | 158 | 130 | -28 |
| Number of Living donor kidneys | 23 | 27 | 32 | +5 |
| Number of Simultaneous Pancreas/Kidney (SPK) | 8 | 7 | 1 | -6 |
| Number of Combined Kidney/Liver or Heart | 1 | 0 | 0 | 0 |

*compared to previous year

Figure 2.1: Number of deceased donor and living related transplants per annum 1964 – 2012



*Includes kidney only, SPK and kidney/liver or kidney/ heart combined

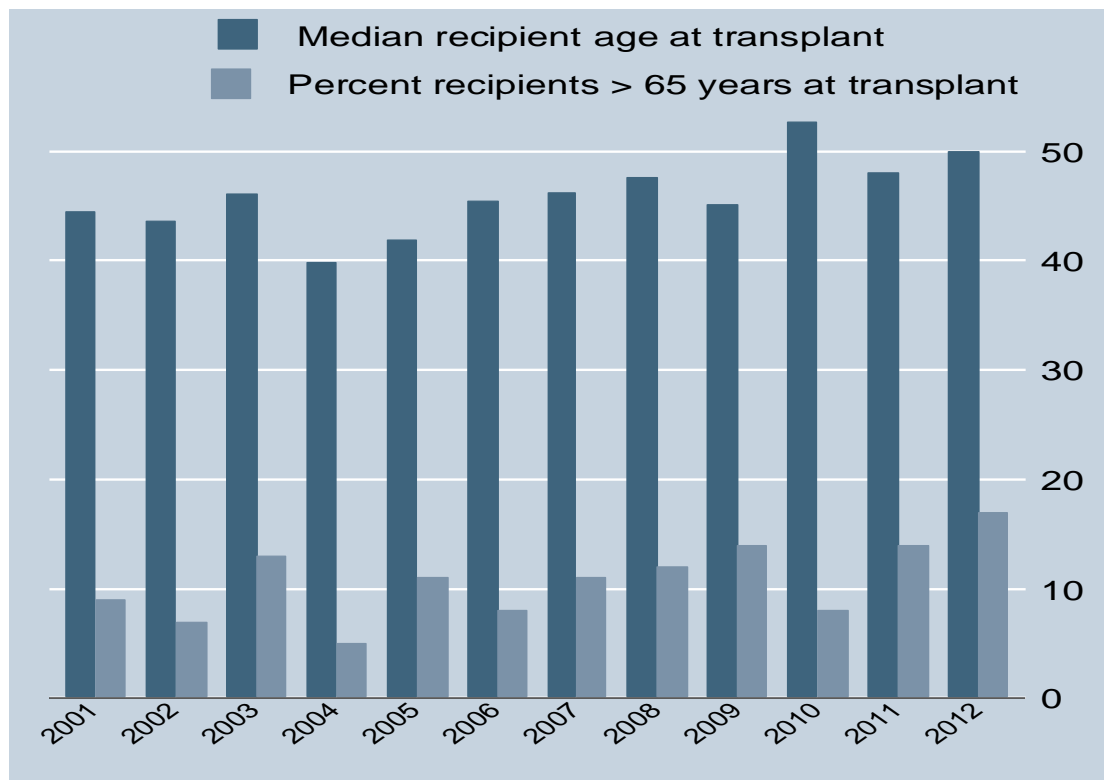
- Record number of living donor transplants in 2012
- 17% decrease in kidney only deceased donor transplants in 2012 compared to 2011

2.2 Recipient age and sex

Table 2.2: Recipient age and sex at transplant years 2001-2012

| Year | Median age | Age range | Number (%) greater than 65 years at transplant | % Male/Female |
|------|------------|------------|--|---------------|
| 2001 | 44.5 | 5.6 – 75.4 | 11 (9) | 61/39 |
| 2002 | 43.6 | 1.4 – 72.7 | 10 (7) | 64/36 |
| 2003 | 46.1 | 4.7 – 74.8 | 18 (13) | 66/34 |
| 2004 | 39.8 | 3.9 – 69.7 | 7 (5) | 56/44 |
| 2005 | 41.9 | 2.2 – 75.5 | 14 (11) | 62/38 |
| 2006 | 45.4 | 2.8 – 75.6 | 12 (8) | 66/34 |
| 2007 | 46.2 | 3.4 – 74.9 | 16 (11) | 59/41 |
| 2008 | 47.6 | 4.1 – 75.2 | 18 (12) | 58/42 |
| 2009 | 45.1 | 4.6 – 76.3 | 24 (14) | 62/38 |
| 2010 | 52.7 | 7.0 – 73.2 | 10 (8) | 66/34 |
| 2011 | 48.0 | 5.0 – 75.0 | 26 (14) | 71/29 |
| 2012 | 50.0 | 4.0 – 76.0 | 28 (17) | 66/34 |

Figure 2.2: Median recipient age & % > 65 years at transplant for years 2001-2012



- Highest percent > 65 years of age at transplant during 2012
- Recipient ages at time of transplant has fluctuated but has steadily increased to a median age of 50 over the last 12 years
- High percent of male recipients in 2011 compared to previous years. A return to more typical male/female recipient sex ratios in 2012

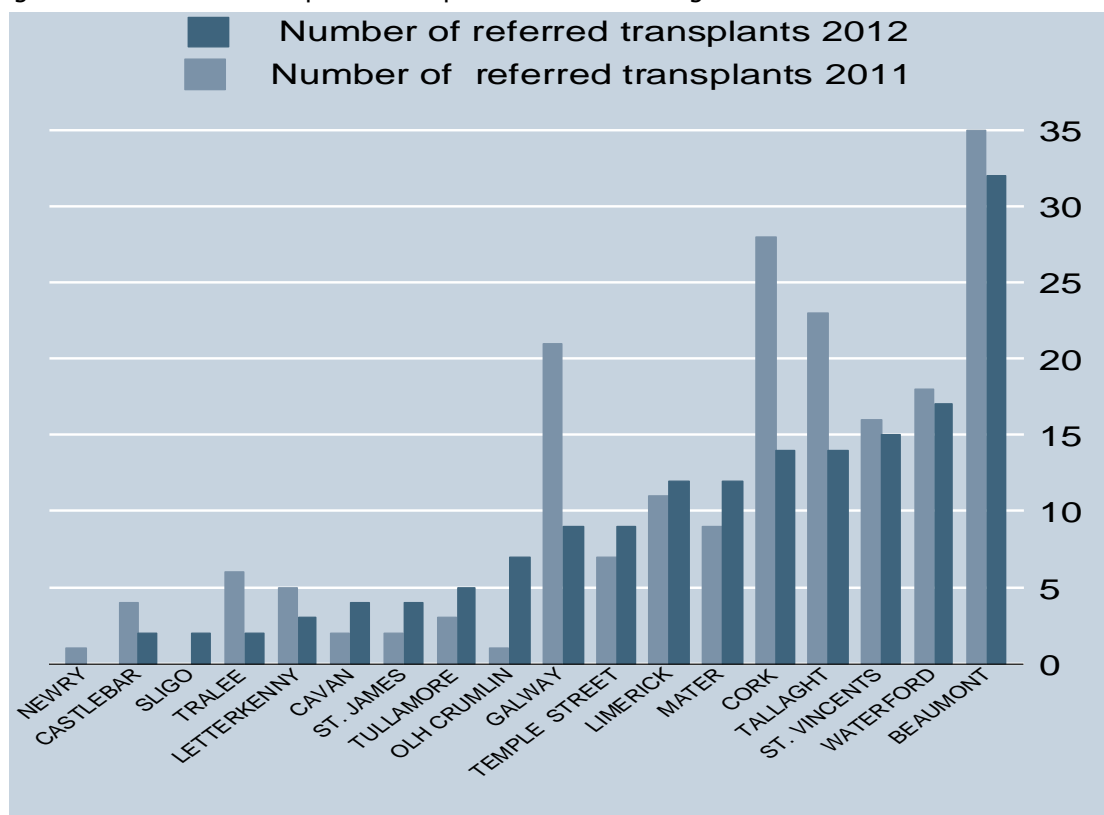
2.3 Referring centre of transplant recipients

Table 2.3: Referring centre of transplant recipients 2010 - 2012

| Centre | Number 2010 (%) | Number 2011 (%) | Number 2012 (%) | Numbers +/- in 2012* |
|---------------|-----------------|-----------------|-----------------|----------------------|
| BELFAST | 4 (3.3) | 0 (0) | 0 (0) | 0 |
| BEAUMONT | 26 (21.3) | 35 (18.2) | 32 (19.6) | - 3 |
| CAVAN | 1 (0.8) | 2 (1.0) | 4 (2.5) | + 2 |
| CASTLEBAR | 6 (4.9) | 4 (2.1) | 2 (1.2) | - 2 |
| CORK | 18 (14.7) | 28 (14.6) | 14 (8.6) | - 14 |
| GALWAY | 9 (7.4) | 21 (10.9) | 9 (5.5) | - 12 |
| LETTERKENNY | 2 (1.6) | 5 (2.6) | 3 (1.8) | - 2 |
| LIMERICK | 7 (5.7) | 11 (5.7) | 12 (7.4) | + 1 |
| MATER | 7 (5.7) | 9 (4.7) | 12 (7.4) | + 3 |
| NEWRY | 0 (0) | 1 (0.5) | 0 (0) | - 1 |
| OLH CRUMLIN | 2 (1.6) | 1 (0.5) | 7 (4.3) | + 6 |
| ST. JAMES | 3 (2.5) | 2 (1.0) | 4 (2.5) | + 2 |
| SLIGO | 3 (2.5) | 0 (0) | 2 (1.2) | + 2 |
| ST. VINCENTS | 6 (4.9) | 16 (8.3) | 15 (9.2) | - 1 |
| TALLAGHT | 12 (9.8) | 23 (12.0) | 14 (8.6) | - 9 |
| TRALEE | 3 (2.5) | 6 (3.1) | 2 (1.2) | - 4 |
| TEMPLE STREET | 4 (3.3) | 7 (3.6) | 9 (5.5) | + 2 |
| TULLAMORE | 3 (2.5) | 3 (1.6) | 5 (3.1) | + 2 |
| WATERFORD | 6 (4.9) | 18 (9.4) | 17 (10.4) | - 1 |

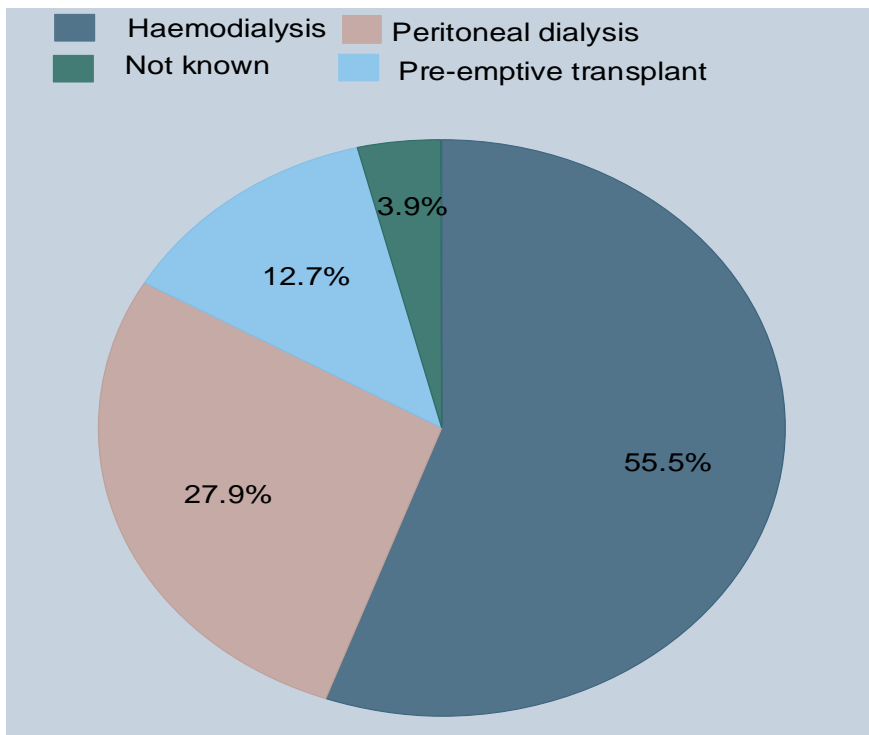
*compared to previous year

Figure 2.3: Number of recipients transplanted from referring centres 2011-2012



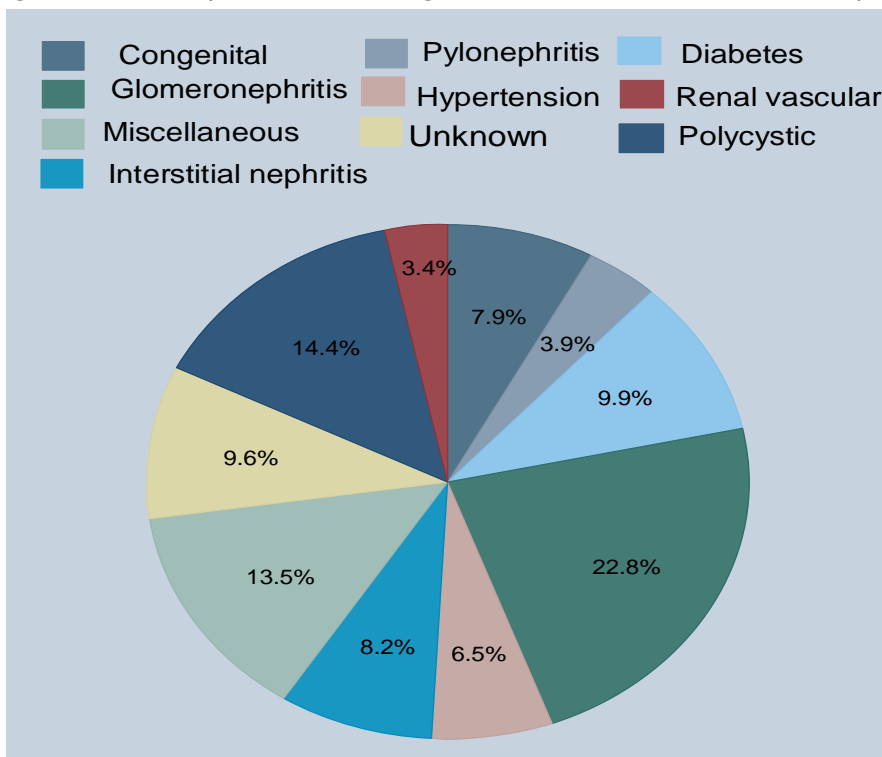
2.4 Mode of renal replacement therapy prior to transplantation

Figure 2.4: Mode renal replacement prior to transplantation 2011 – 2012



2.5 Cause of end stage renal disease

Figure 2.5: Primary cause of end stage renal disease for 2011-2012 transplant recipients

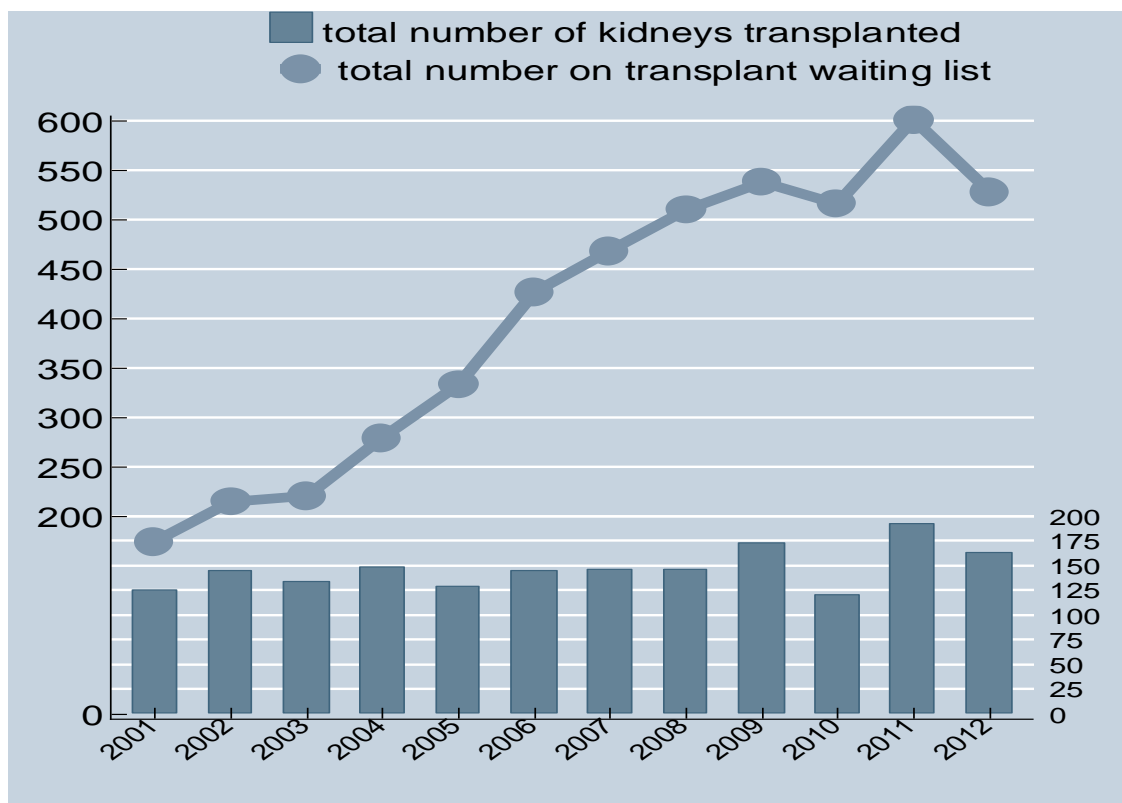


2.6 Number of potential recipients on transplant waiting list at the start of year and total number of kidney transplants

Table 2.6: Number of potential recipients on transplant waiting list 2001-2012 and total number of kidney transplants

| <i>Year</i> | <i>Number on transplant waiting list</i> | <i>Total number of kidney transplants</i> |
|-------------|--|---|
| 2001 | 174 | 125 |
| 2002 | 214 | 145 |
| 2003 | 220 | 134 |
| 2004 | 279 | 148 |
| 2005 | 332 | 129 |
| 2006 | 426 | 145 |
| 2007 | 468 | 146 |
| 2008 | 509 | 146 |
| 2009 | 537 | 173 |
| 2010 | 515 | 121 |
| 2011 | 601 | 192 |
| 2012 | 528 | 163 |

Figure 2.6: Number of potential recipients on transplant waiting list and total kidneys transplanted 2001-2012



- The numbers on the transplant waiting list is provided by the dept. of Histocompatibility and Immunogenetics (H & I) and refer to the number waiting at the start of that year.
- After many years of steady increase, the number on the transplant waiting list appears to have declined in 2012. This may be due to the large number of transplants in 2011 and the removal from the transplant waiting list of long term suspended patients.

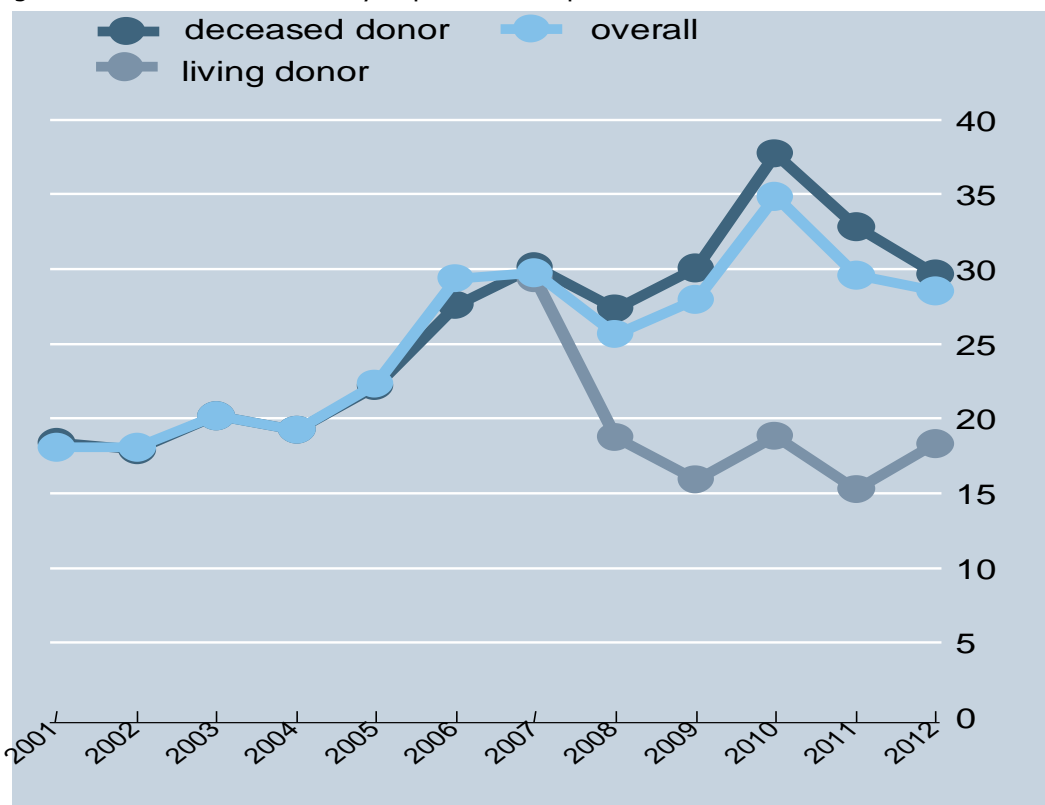
2.7 Time on dialysis prior to transplant

Table 2.7: Time on dialysis in months 2001-2012

| Year | Median time on dialysis deceased donor [IQR]* | Median time on dialysis living donor [IQR] | Median time on dialysis overall [IQR] |
|------|---|--|---------------------------------------|
| 2001 | 18 [10 – 31] | 1 [0 – 2] | 18 [9 – 30] |
| 2002 | 18 [8 – 32] | 19 [0 – 41] | 18 [8 – 32] |
| 2003 | 20 [11 – 36] | | 20 [11 – 36] |
| 2004 | 19 [11 – 32] | 16 [0 – 22] | 19 [11 – 32] |
| 2005 | 22 [12 – 37] | 30 [22 – 37] | 22 [13 – 37] |
| 2006 | 28 [15 – 42] | 33 [29 – 67] | 29 [16 – 42] |
| 2007 | 30 [18 – 39] | 29 [23 – 51] | 30 [18 – 40] |
| 2008 | 27 [13 – 40] | 19 [8 – 31] | 26 [13 – 40] |
| 2009 | 30 [13 – 44] | 16 [10 – 26] | 28 [12 – 43] |
| 2010 | 38 [22 – 51] | 19 [14 – 40] | 35 [19 – 50] |
| 2011 | 33 [19 – 51] | 15 [9 – 23] | 30 [15 – 48] |
| 2012 | 30 [11 – 48] | 18 [0 – 40] | 30 [10 – 47] |

*Interquartile range (IQR) refers to data in the 1st to 3rd quartile or the middle 50% of data

Figure 2.7: Median time on dialysis prior to transplant 2001-2012



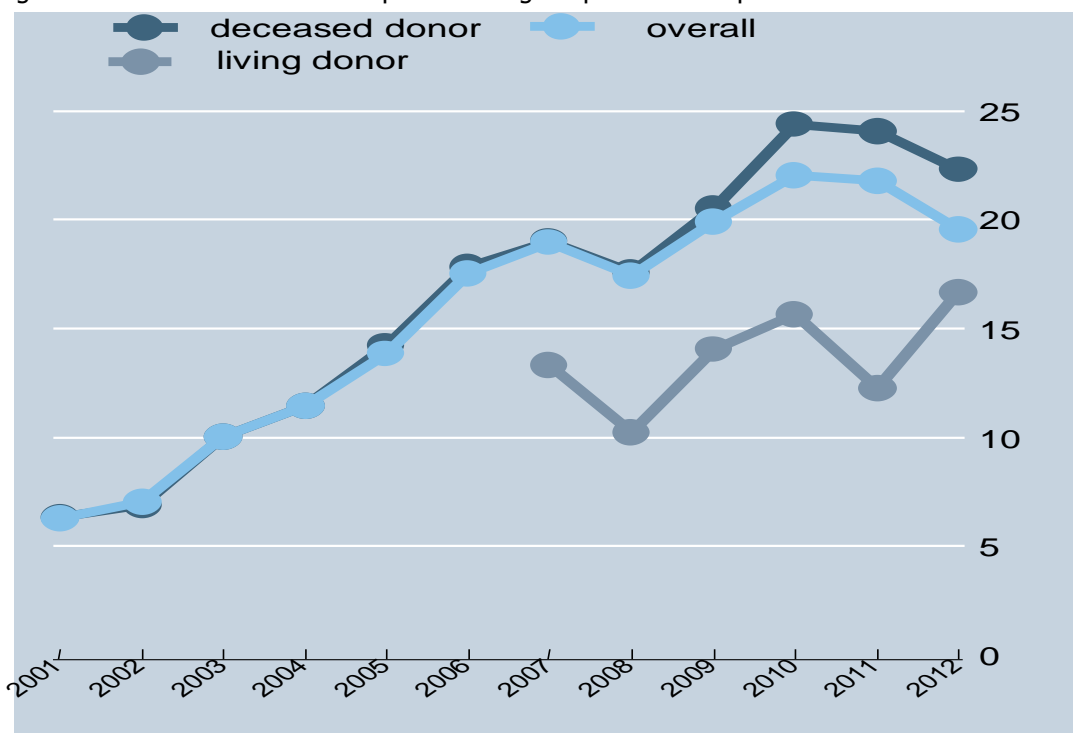
2.8 Time on transplant waiting list

Table 2.8: Time on transplant waiting list 2001-2012

| Year | Median time on transplant waiting list deceased donor [IQR] | Median time on transplant waiting list living donor [IQR] | Median time on transplant waiting list overall [IQR] |
|------|---|---|--|
| 2001 | 6 [3 – 13] | 5 [5 – 5] | 6 [3 – 12] |
| 2002 | 7 [2 – 16] | 27 [14 – 40] | 7 [2 – 16] |
| 2003 | 10 [5 – 18] | | 10 [5 – 18] |
| 2004 | 11 [7 – 17] | 11 [1– 17] | 11 [7 – 17] |
| 2005 | 14 [9 – 21] | 9 [9 – 10] | 14 [9 – 21] |
| 2006 | 18 [9 – 25] | 14 [8 – 29] | 18 [9 – 25] |
| 2007 | 19 [9 – 28] | 13 [12– 25] | 19 [10 – 28] |
| 2008 | 18 [8 – 30] | 10 [9 – 14] | 17 [8 – 30] |
| 2009 | 21 [9 – 30] | 14 [9 – 22] | 20 [9 – 28] |
| 2010 | 24 [12 – 40] | 16 [10 – 22] | 22 [11 – 38] |
| 2011 | 24 [11 – 40] | 12 [10 – 21] | 22 [10 – 36] |
| 2012 | 22 [11 – 41] | 17 [13 – 21] | 20 [12 – 38] |

*Interquartile range (IQR) refers to data in the 1st to 3rd quartile or the middle 50% of data

Figure 2.8: Median time on transplant waiting list prior to transplant 2001-2012



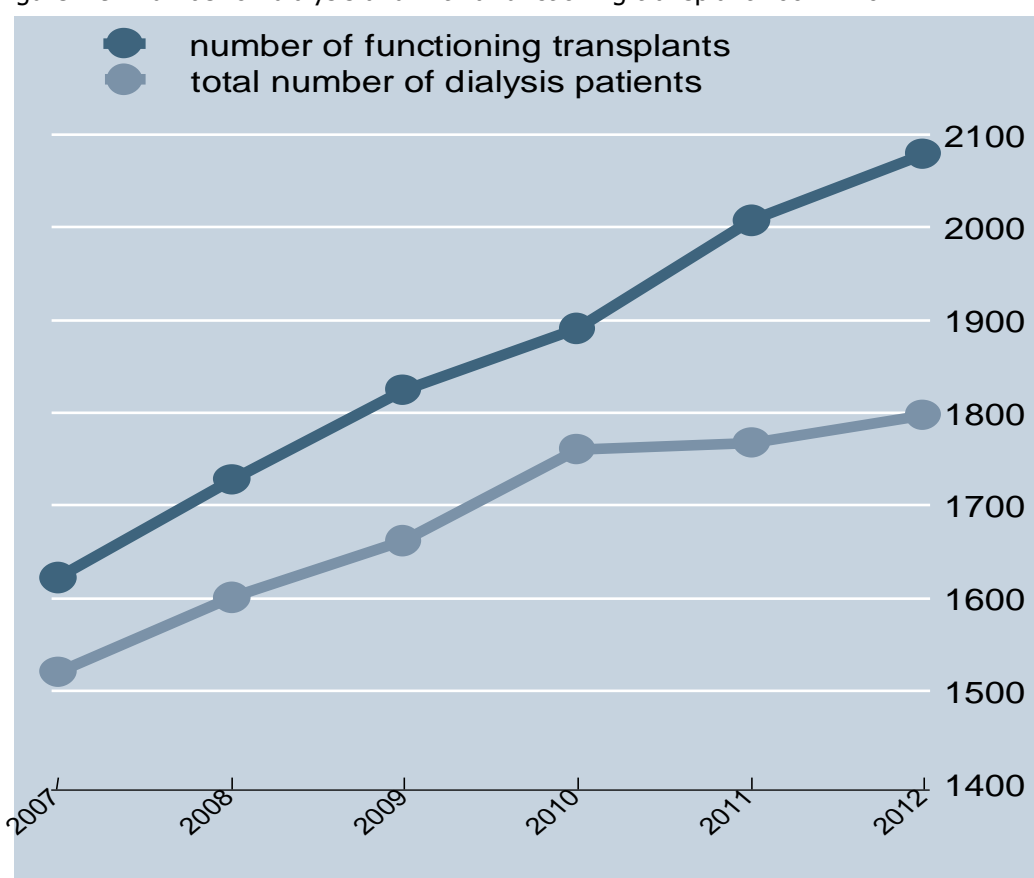
- Overall median time on waiting list for transplant recipients has come down from highs of 22 months for 2010 – 2011 recipients to just under 20 months for 2012.
- Living donor transplant recipients tend to wait less than deceased donors. The discrepancy in 2002 is down to only three patients receiving a living donor transplant. The graph above reflects living donor waiting times for the period where sufficient numbers were transplanted.

2.9 Numbers on renal replacement therapy

Table 2.9: Number of prevalent patients on renal replacement therapy (RRT) 2007 – 2012

| Year | Number on regular haemodialysis | Number on home haemodialysis | Number on peritoneal dialysis | Total number on dialysis | Number of functioning transplants |
|------|---------------------------------|------------------------------|-------------------------------|--------------------------|-----------------------------------|
| 2007 | 1329 | | 191 | 1520 | 1623 |
| 2008 | 1401 | | 200 | 1601 | 1728 |
| 2009 | 1473 | 2 | 188 | 1663 | 1824 |
| 2010 | 1554 | 11 | 195 | 1760 | 1891 |
| 2011 | 1557 | 20 | 191 | 1768 | 2007 |
| 2012 | 1560 | 28 | 209 | 1797 | 2079 |

Figure 2.9: Number on dialysis and with a functioning transplant 2007 – 2012



- Number of recipients with a functioning transplant passes the 2000 mark in 2011
- Percentage of patients on renal replacement therapy with a functioning transplant rises to 54% in 2012
- The results above are end of year numbers and have been obtained from the HSE renal office website and refers to prevalent patients in the various renal replacement modalities at the end of each year

3. Clinical Variables pre and post transplant

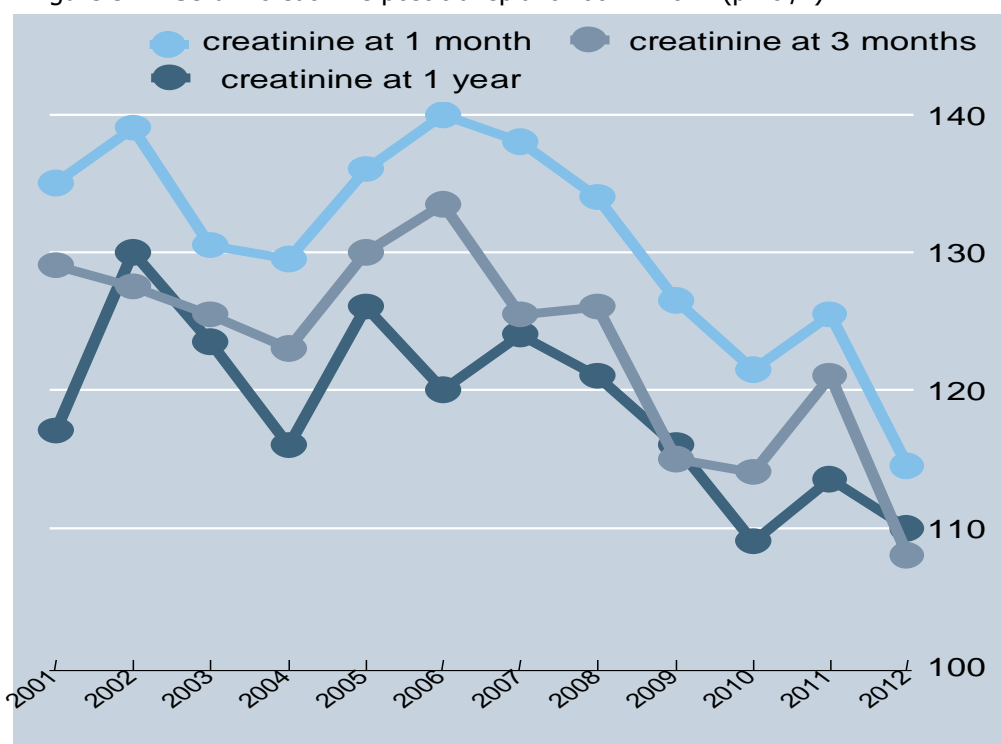
3.1 Serum creatinine at 1 month, 3 months and 1 year post transplant

Table 3.1: Serum creatinine post transplant 2001 – 2012

| Year | Median creatinine 1 month post tx. [IQR] | Median creatinine 3 months post tx. [IQR] | Median creatinine 1 year post tx. [IQR] |
|------|--|---|---|
| 2001 | 135 [110 - 179] | 129 [110 - 151] | 117 [104 - 139] |
| 2002 | 139 [118 - 190] | 127 [110 - 154] | 130 [109 - 155] |
| 2003 | 131 [113 - 150] | 125 [106 - 148] | 124 [103 - 142] |
| 2004 | 130 [110 - 147] | 123 [109 - 145] | 116 [100 - 138] |
| 2005 | 136 [114 - 170] | 130 [110 - 163] | 126 [103 - 147] |
| 2006 | 140 [119 - 162] | 133 [116 - 156] | 120 [104 - 138] |
| 2007 | 138 [118 - 165] | 126 [109 - 145] | 124 [100 - 141] |
| 2008 | 134 [109 - 155] | 126 [101 - 150] | 121 [98 - 141] |
| 2009 | 127 [102 - 159] | 115 [96 - 145] | 116 [95 - 137] |
| 2010 | 122 [100 - 154] | 114 [93 - 134] | 109 [87 - 136] |
| 2011 | 126 [101 - 155] | 121 [102 - 144] | 114 [94 - 137] |
| 2012 | 115 [93 - 145] | 108 [92 - 134] | 110 [91 - 132]* |

*Results of 1-year creatinine post transplant incomplete for 2012 transplants

Figure 3.1: Serum creatinine post transplant 2001 – 2012 ($\mu\text{mol/L}$)



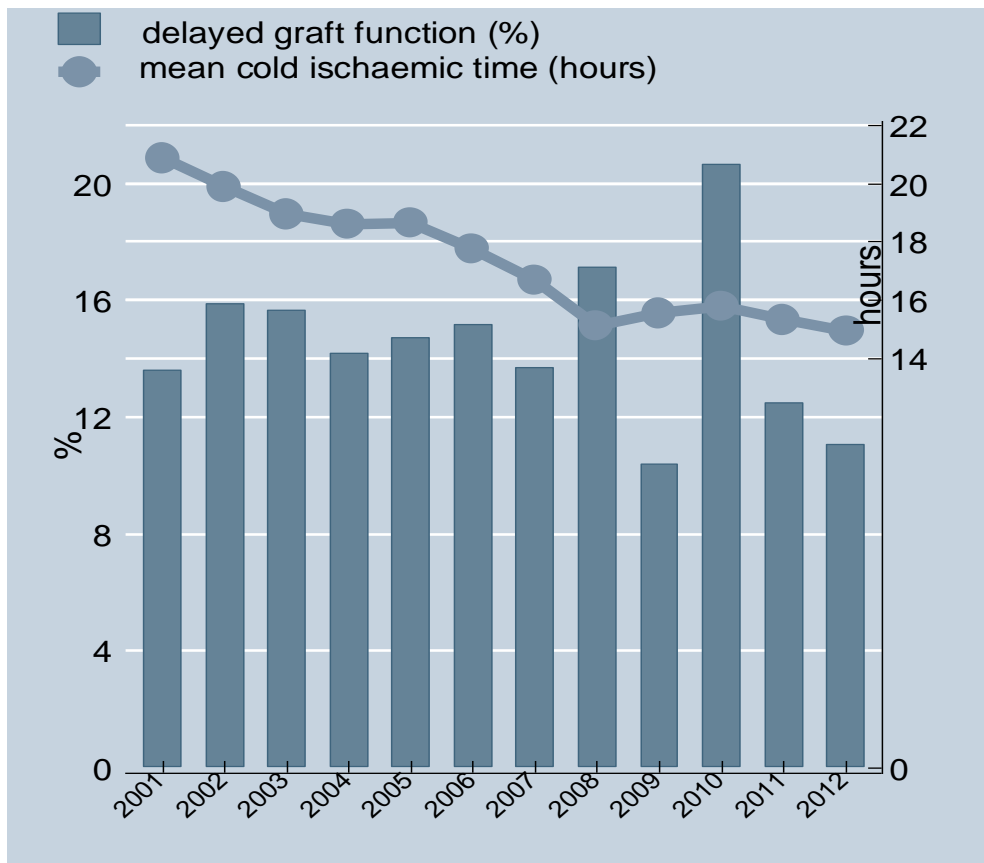
- Excellent renal function post transplant for 2012 recipients with a median serum creatinine at 3 months at a low of 108 $\mu\text{mol/L}$
- Recent low 1-year serum creatinines achieved since 2010 looks set to continue for 2012 recipients subject to end of year creatinines for those transplanted late in 2012

3.2 Delayed graft function (DGF) post transplant (defined as the need for dialysis) and cold ischaemic time (CIT) for deceased donor kidneys

Table 3.2: DGF and CIT post transplant 2001 – 2012

| Year | Number DGF (%) | Mean CIT in hours (SD) |
|------|----------------|------------------------|
| 2001 | 17 (13.6) | 20.9 (5.1) |
| 2002 | 23 (15.9) | 19.9 (5.3) |
| 2003 | 21 (15.7) | 19.0 (5.2) |
| 2004 | 21 (14.2) | 18.6 (4.3) |
| 2005 | 19 (14.7) | 18.6 (4.1) |
| 2006 | 22 (15.2) | 17.8 (4.5) |
| 2007 | 20 (13.7) | 16.7 (3.8) |
| 2008 | 25 (17.1) | 15.1 (3.7) |
| 2009 | 18 (10.4) | 15.6 (3.8) |
| 2010 | 25 (20.7) | 15.8 (3.8) |
| 2011 | 24 (12.5) | 15.3 (3.9) |
| 2012 | 18 (11.0) | 14.9 (3.8) |

Figure 3.2: DGF post transplant and CIT 2001 – 2012



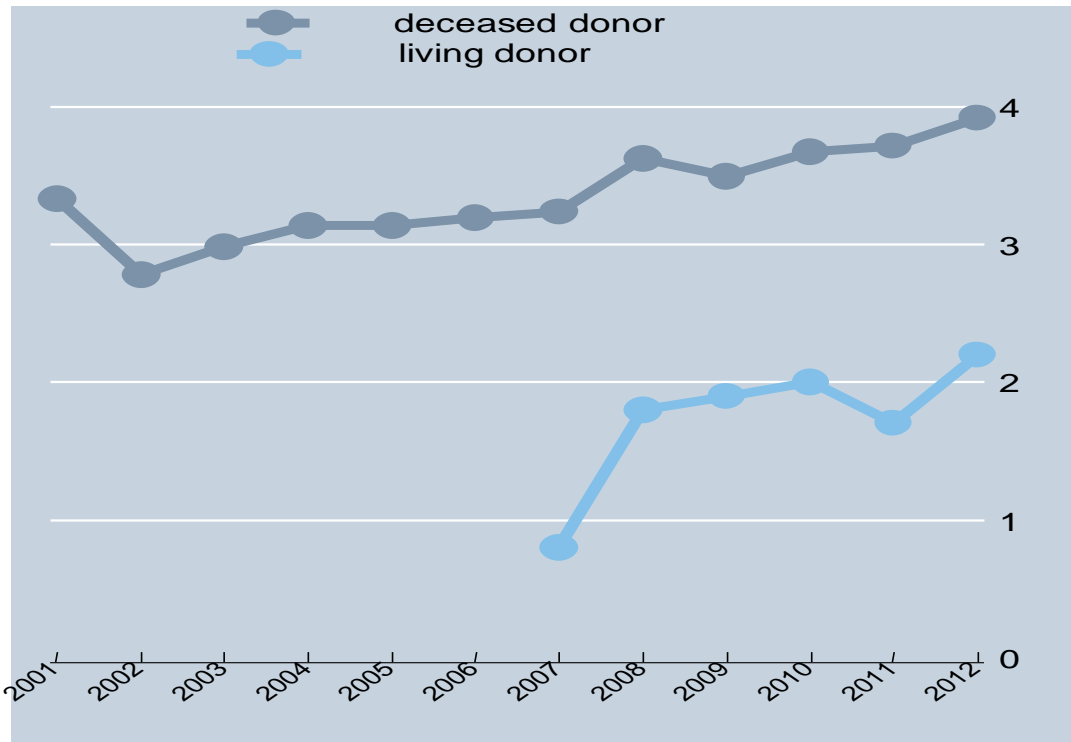
- The need for dialysis post transplant was low at 11% in 2012
- Mean CIT below 15 hours for deceased donor kidney recipients

3.3 HLA mismatches

Table 3.3: Mean HLA mismatches 2001 – 2012

| <i>year</i> | <i>Mean HLA deceased donors (std. dev.)</i> | <i>Mean HLA living donors (std. dev.)</i> | <i>Number 000 miss matches (% of total)</i> | <i>Number 222 miss matches (% of total)</i> |
|-------------|---|---|---|---|
| 2001 | 3.3 (1.3) | | 2 (1.6) | 5 (4.0) |
| 2002 | 2.8 (1.3) | | 10 (6.9) | 1 (0.7) |
| 2003 | 3.0 (1.4) | | 8 (6.0) | 5 (3.7) |
| 2004 | 3.1 (1.4) | | 9 (6.1) | 5 (3.4) |
| 2005 | 3.1 (1.4) | | 5 (3.9) | 6 (4.6) |
| 2006 | 3.2 (1.5) | | 12 (8.3) | 7 (4.8) |
| 2007 | 3.2 (1.6) | 0.8 (1.3) | 12 (8.2) | 6 (4.1) |
| 2008 | 3.6 (1.4) | 1.8 (1.9) | 9 (6.2) | 5 (3.4) |
| 2009 | 3.5 (1.4) | 1.9 (1.7) | 11 (6.4) | 11 (6.4) |
| 2010 | 3.7 (1.2) | 2.0 (1.5) | 4 (3.4) | 3 (2.5) |
| 2011 | 3.7 (1.3) | 1.7 (1.3) | 9 (4.7) | 15 (7.9) |
| 2012 | 3.9 (1.2) | 2.2 (1.9) | 8 (5.0) | 12 (7.5) |

Figure 3.3: Mean HLA mismatches 2001 – 2012

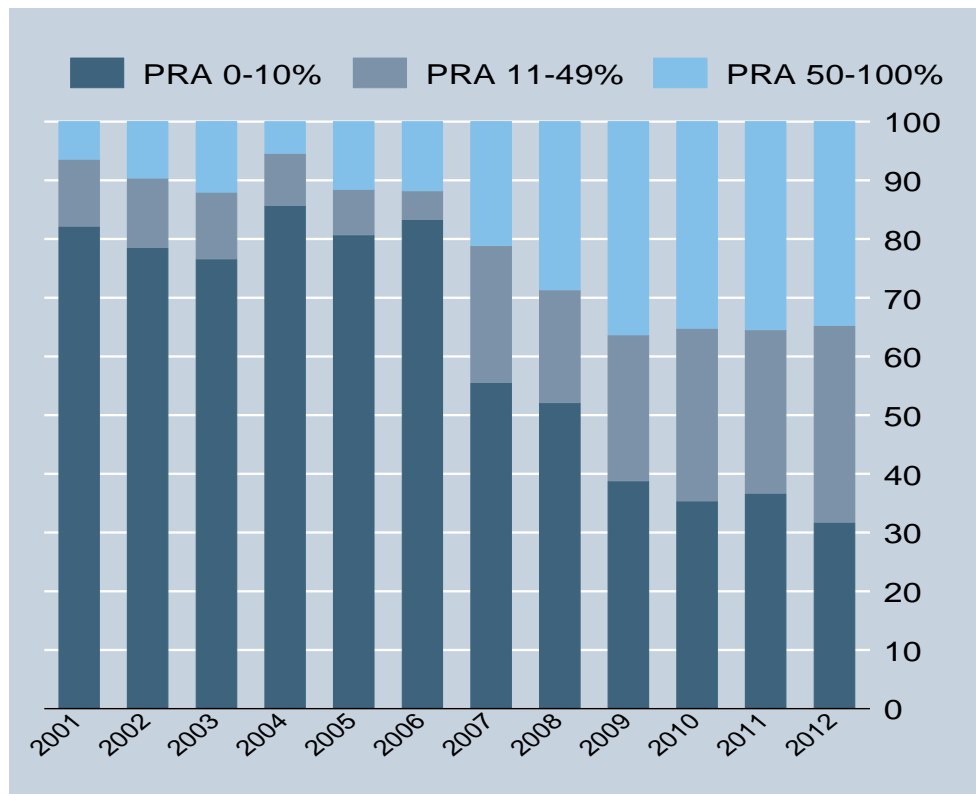


3.4 Panel reactive antibodies

Table 3.4: Panel reactive antibodies (PRA) 2001 – 2012

| <i>year</i> | <i>Percent PRA 0-10%</i> | <i>Percent PRA 11-49%</i> | <i>Percent PRA 50-100%</i> |
|-------------|----------------------------------|-----------------------------------|------------------------------------|
| 2001 | 82 | 11 | 7 |
| 2002 | 78 | 12 | 10 |
| 2003 | 77 | 11 | 12 |
| 2004 | 86 | 9 | 5 |
| 2005 | 80 | 8 | 12 |
| 2006 | 83 | 5 | 12 |
| 2007 | 56 | 23 | 21 |
| 2008 | 52 | 19 | 29 |
| 2009 | 39 | 25 | 36 |
| 2010 | 35 | 30 | 35 |
| 2011 | 37 | 28 | 35 |
| 2012 | 32 | 33 | 35 |

Figure 3.4: Percent PRA in low/ medium and high categories 2001- 2012



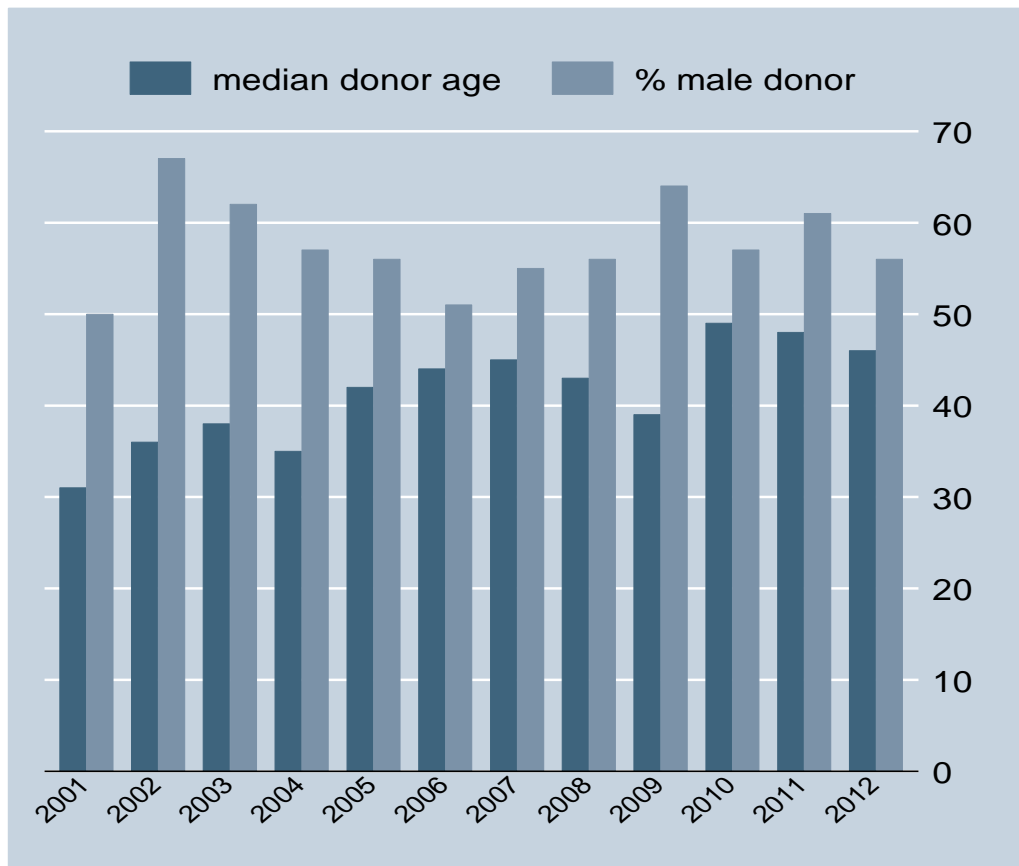
- Calculated or generated PRA (PGen) replaced PRA in 2007. PGen is a more accurate assessment of the difficulty in finding an antibody compatible donor for a given patient. It is based on the cumulative effect of antibodies detected in a patient and the percentage of organ donors expressing the matching antigens in our population. PRA was inaccurately low in how it assessed difficulty in transplanting a patient - hence the change and the apparent increase in the number of highly sensitized patients on the transplant pool.

3.5 Donor age and sex

Table 3.5: Donor age & donor sex 2001 – 2012

| Year | Median donor age [Inter-quartile range] | Number of male donors (%) | Number of female donors (%) |
|------|--|------------------------------|--------------------------------|
| 2001 | 31 [23 - 47] | 61 (50) | 60 (50) |
| 2002 | 36 [21 - 46] | 95 (67) | 46 (33) |
| 2003 | 38 [25 - 47] | 82 (62) | 51 (38) |
| 2004 | 35 [24 - 48] | 82 (57) | 62 (43) |
| 2005 | 42 [25 - 51] | 71 (56) | 56 (44) |
| 2006 | 44 [26 - 53] | 72 (51) | 69 (49) |
| 2007 | 45 [27 - 53] | 77 (55) | 63 (45) |
| 2008 | 43 [28 - 54] | 76 (56) | 60 (44) |
| 2009 | 39 [23 - 53] | 99 (64) | 55 (36) |
| 2010 | 49 [34 - 54] | 56 (57) | 42 (43) |
| 2011 | 48 [38 - 55] | 100 (61) | 65 (39) |
| 2012 | 46 [34 - 54] | 67 (56) | 52 (44) |

Figure 3.5: Donor age & percent male donor 2001 – 2012

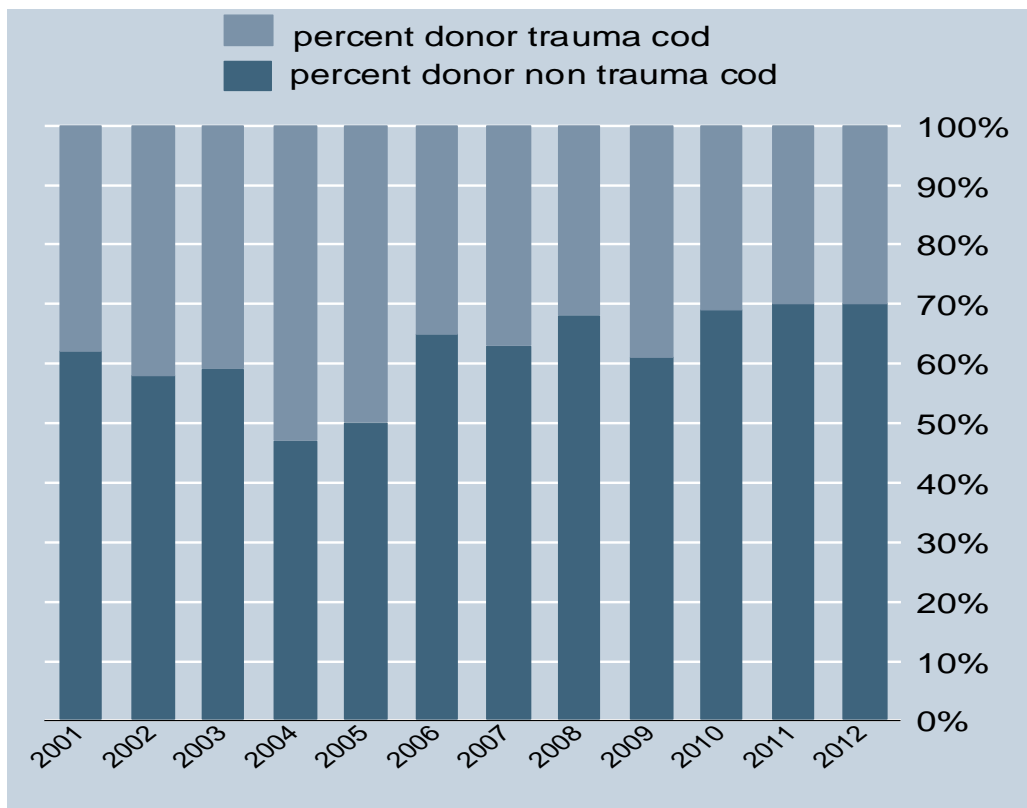


3.6 Donor cause of death

Table 3.7: Donor cause of death 2001 – 2012

| <i>Year</i> | <i>Number trauma (%)</i> | <i>Number non trauma (%)</i> |
|-------------|--------------------------|------------------------------|
| 2001 | 46 (38) | 76 (62) |
| 2002 | 60 (42) | 82 (58) |
| 2003 | 55 (41) | 79 (59) |
| 2004 | 76 (53) | 68 (47) |
| 2005 | 63 (50) | 64 (50) |
| 2006 | 49 (35) | 92 (65) |
| 2007 | 52 (37) | 89 (63) |
| 2008 | 43 (32) | 93 (68) |
| 2009 | 61 (39) | 93 (61) |
| 2010 | 30 (31) | 69 (69) |
| 2011 | 46 (30) | 109 (70) |
| 2012 | 35 (30) | 80 (70) |

Figure 3.6: Donor cause of death due to non trauma 2001 – 2012



- The relatively high percent of non trauma deceased donors is indicative of the increasing use of marginal donors in transplantation in recent years

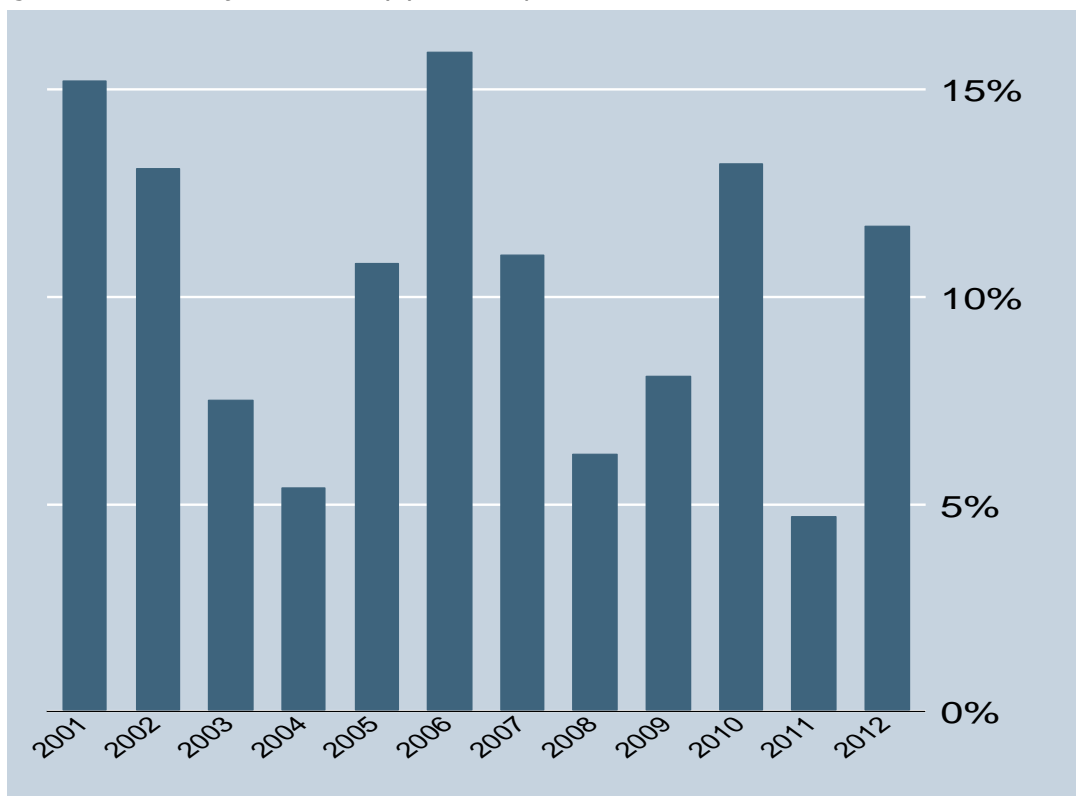
3.7 Biopsy proven acute rejection

Acute rejection is defined as either a biopsy proven Banff category Type 1 or Type 2 acute cellular rejection or vascular rejection within the first year of transplantation.

Table 3.7: Acute rejection rate by year transplanted 2001 – 2012

| <i>Year</i> | <i>Number transplanted</i> | <i>Number of acute rejection patients</i> | <i>% acute rejection</i> |
|-------------|----------------------------|---|--------------------------|
| 2001 | 125 | 19 | 15.2 |
| 2002 | 145 | 19 | 13.1 |
| 2003 | 134 | 10 | 7.5 |
| 2004 | 148 | 8 | 5.4 |
| 2005 | 129 | 14 | 10.8 |
| 2006 | 145 | 23 | 15.9 |
| 2007 | 146 | 16 | 11.0 |
| 2008 | 146 | 9 | 6.2 |
| 2009 | 173 | 14 | 8.1 |
| 2010 | 121 | 16 | 13.2 |
| 2011 | 192 | 9 | 4.7 |
| 2012 | 163 | 19 | 11.7 |
| Total | 1,767 | 176 | 10.0 |

Figure 3.7: Acute rejection rate by year transplanted 2001 – 2012

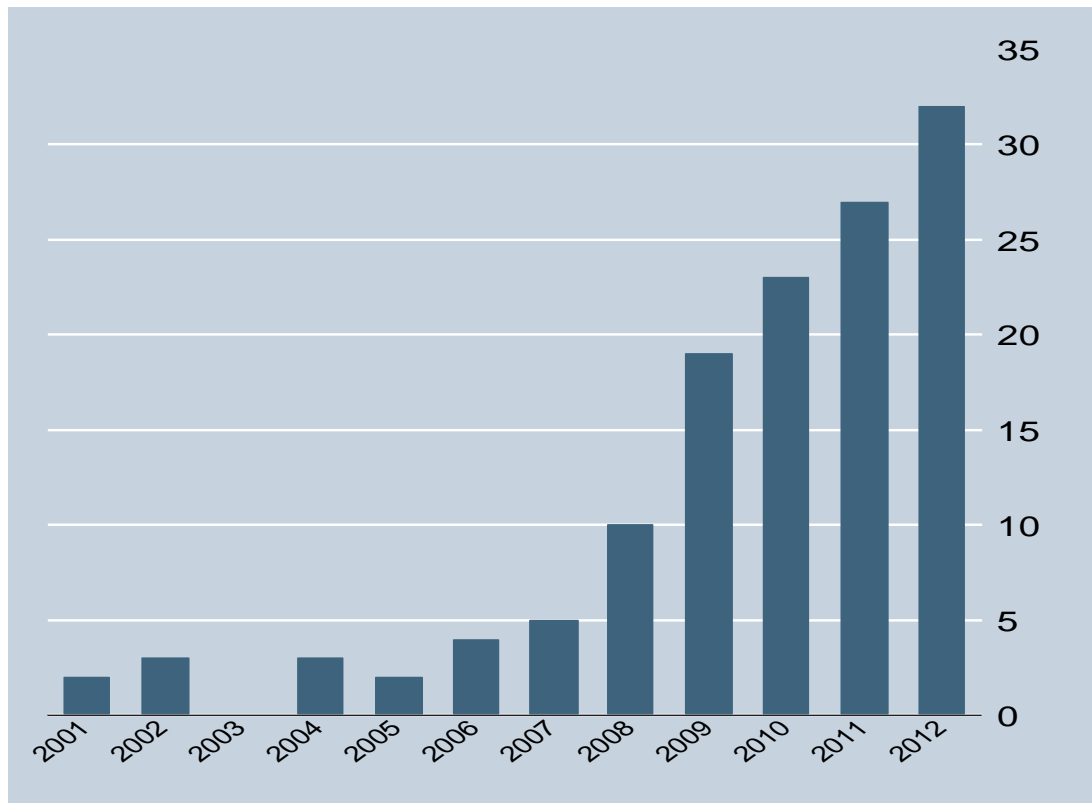


4. Living donor transplants

Table 4.1: Living donor (LD) transplants 2001 – 2012

| <i>Year transplanted</i> | <i>Frequency</i> | <i>Percent of total transplants</i> | <i>Mean age of LD recipient (Std. Dev.)</i> |
|--------------------------|------------------|-------------------------------------|---|
| 2001 | 2 | 1.6 | 11.0 (7.8) |
| 2002 | 3 | 2.1 | 43.5 (14.8) |
| 2003 | 0 | 0.0 | - |
| 2004 | 3 | 2.0 | 20.8 (15.1) |
| 2005 | 2 | 1.6 | 2.7 (0.6) |
| 2006 | 4 | 2.8 | 20.8 (17.1) |
| 2007 | 5 | 3.4 | 34.1 (22.1) |
| 2008 | 10 | 6.8 | 32.6 (12.7) |
| 2009 | 19 | 11.0 | 38.9 (16.6) |
| 2010 | 23 | 18.9 | 39.6 (15.7) |
| 2011 | 27 | 14.1 | 37.5 (16.0) |
| 2012 | 32 | 19.6 | 39.6 (20.0) |

Figure 4.1: Number of living donor transplants 2001 – 2012



- A record high number of living donor transplants performed at our centre in 2012
- Up to the year 2005 most living donors were paediatric recipients. Average age for recipients in recent years show deceased donor and living donor recipients have a more similar demographic profile

Comparison of living donor and deceased donor kidney outcomes 2007 – 2011

4.2 Graft survival

Table 4.2: Adult and paediatric 1,2 & 3 year graft survival for deceased versus living donors 2007 – 2011 (first grafts)

| Follow up time (years) | Adult transplants | | Paediatric transplants | |
|------------------------|---|---|---|---|
| | Deceased donor graft survival % [95% C.I] | Living donor graft survival % [95% C.I] | Deceased donor graft survival % [95% C.I] | Living donor graft survival % [95% C.I] |
| 1 | 96.2 [94.2–97.5] | 98.3 [88.2–99.8] | 96.9 [79.8–99.6] | 100 [-----] |
| 2 | 94.2 [91.7–96.0] | 95.6 [83.0–98.1] | 92.5 [72.6–98.1] | 100 [-----] |
| 3 | 93.2 [90.4–95.2] | 92.7 [78.5–97.7] | 87.6 [65.7–95.9] | 100 [-----] |

Figure 4.2.1: Kaplan-Meier graft survival for adult deceased donor versus living donor transplants 2007 – 2011

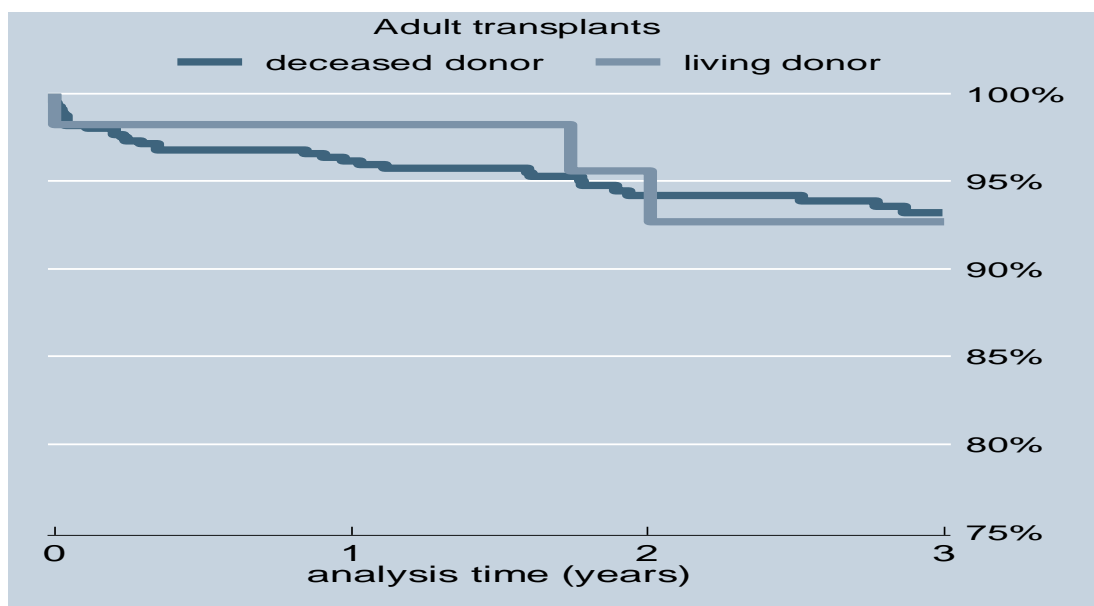
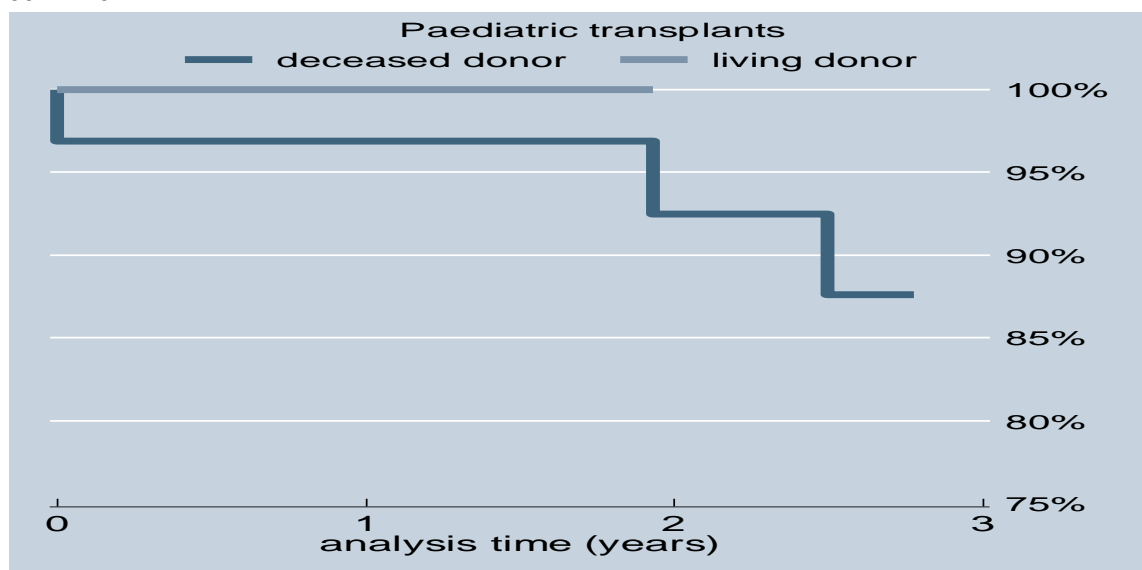


Figure 4.2.1: Kaplan-Meier graft survival for paediatric deceased donor versus living donor transplants 2007 – 2011



4.3 Patient survival

Table 4.3: Adult and paediatric 1,2 & 3 year patient survival deceased donor versus living donor transplants 2007 – 2011 (first grafts)

| Follow up time (years) | Adult transplants | | Paediatric transplants | |
|------------------------|---|---|---|---|
| | Deceased donor patient survival % [95% C.I] | Living donor patient survival % [95% C.I] | Deceased donor patient survival % [95% C.I] | Living donor patient survival % [95% C.I] |
| 1 | 98.6 [97.1–99.3] | 100 [-----] | 100 [-----] | 100 [-----] |
| 2 | 96.4 [94.2–97.7] | 97.4 [82.8–99.6] | 100 [-----] | 100 [-----] |
| 3 | 96.0 [93.7–97.5] | 97.4 [82.8–99.6] | 100 [-----] | 100 [-----] |

Figure 4.3.1: Kaplan-Meier patient survival for adult deceased versus living donor transplants 2007–2011

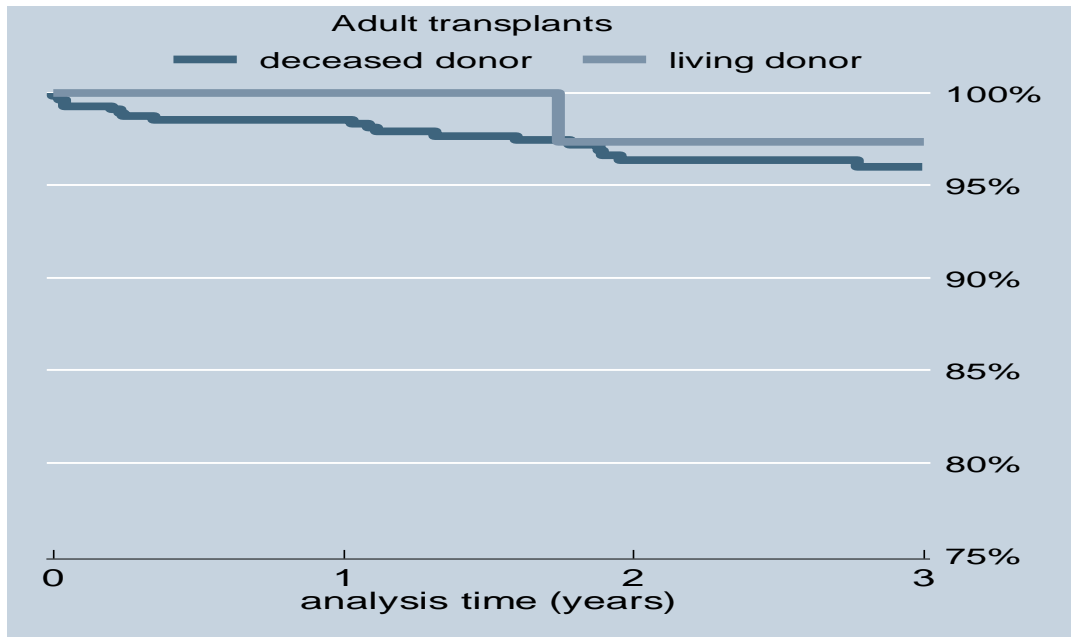
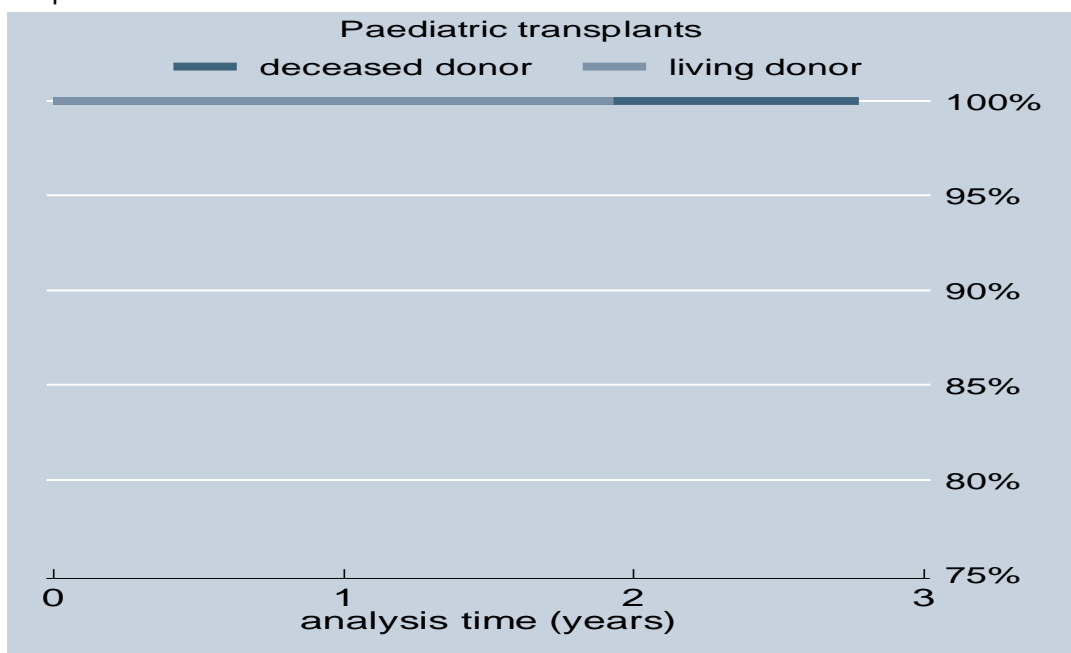


Figure 4.3.1: Kaplan-Meier patient survival for paediatric deceased donor versus living donor transplants 2007 – 2011



5. Adult deceased donor kidney only outcomes 1991 – 2011

Adult deceased donor graft outcome censored and uncensored for death with functioning graft 1991 - 2011

Table 5.1: Overall median adult deceased donor graft survival (graft half-life)

| <i>No of grafts</i> | <i>Median graft survival in years [95% C.I.] Uncensored for death</i> | <i>Median graft survival in years[95% C.I.] Censored for death</i> |
|---------------------|---|--|
| 2429 | 13.0 [12.1 – 13.7] | 20.3 [17.9 – -----] |

Table 5.2: Estimated adult deceased donor graft survival

| <i>Follow up time (years)</i> | <i>Estimated graft survival [95% C.I.] Uncensored for death</i> | <i>Estimated graft survival [95% C.I.] Censored for death</i> |
|-----------------------------------|---|---|
| 1 | 91.37 [90.19 - 92.41] | 93.52 [92.47 - 94.43] |
| 5 | 77.99 [76.19 - 79.67] | 85.60 [84.03 - 87.02] |
| 10 | 59.17 [56.76 - 61.50] | 72.55 [70.22 - 74.73] |
| 15 | 42.73 [39.79 - 45.64] | 60.75 [57.56 - 63.78] |

Figure 5.1: Kaplan-Meier adult deceased donor graft survival estimates 1991-2011

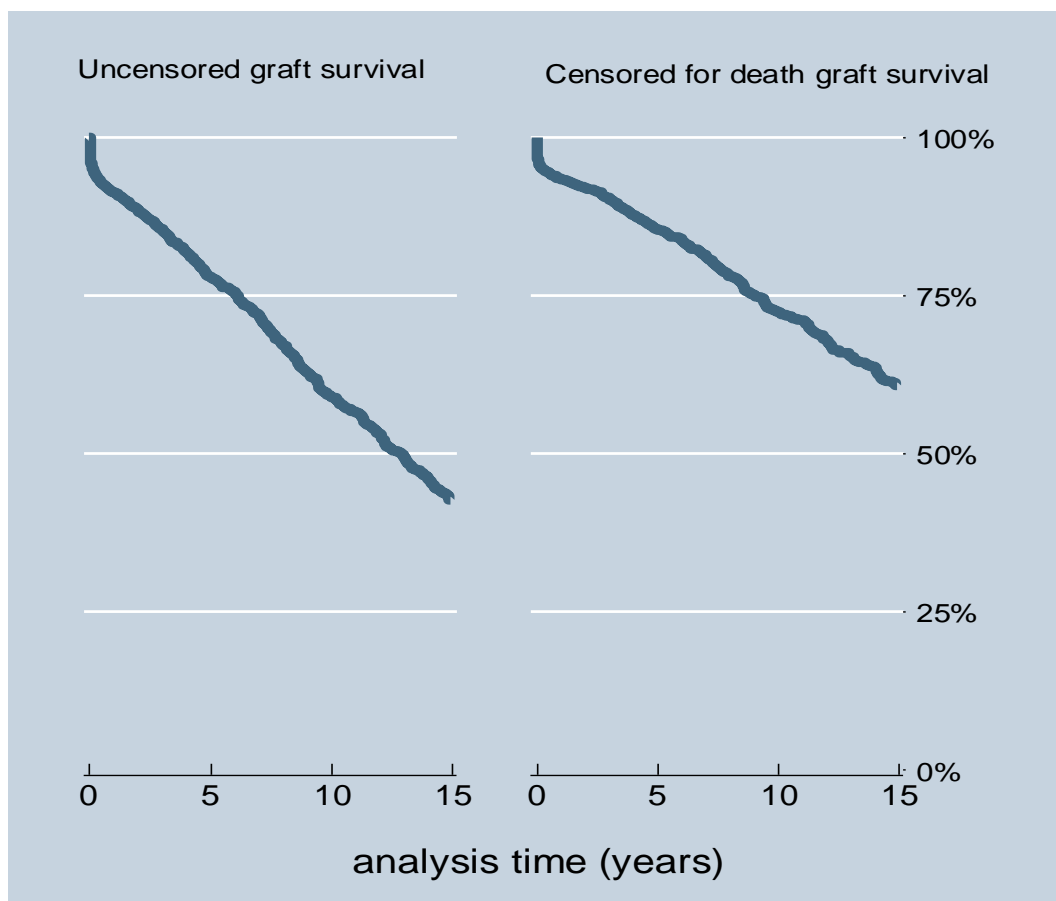


Table 5.3: Cox proportional hazards graft survival model for adult deceased donor kidneys
Uncensored for death with a functioning graft

| <i>Variables</i> | <i>HR [95% conf. int]</i> | <i>P value</i> |
|------------------------|---------------------------|--------------------|
| Recipient age | 1.018 [1.012 - 1.023] | <0.001** |
| Donor age | 1.013 [1.008 - 1.017] | <0.001** |
| Recipient sex | 1.015 [0.885 - 1.165] | 0.825 |
| Donor sex | 0.862 [0.754 - 0.985] | 0.029** |
| Transplant number | 1.190 [1.024 - 1.383] | 0.023** |
| CIT | 1.007 [0.996 - 1.018] | 0.207 |
| HLA miss matches | 0.963 [0.944 - 1.045] | 0.798 |
| Delayed graft function | 1.318 [1.083 - 1.603] | 0.006** |
| Acute rejection | 1.462 [1.357 - 1.884] | <0.001** |
| PRA group* | 1.086 [0.981 - 1.202] | 0.108 |
| Tacrolimus use | 0.489 [0.411 - 0.582] | <0.001** |

*PRA groups 0-10%, 11-49%, 50-100% **Significant variables

Table 5.4: Cox proportional hazards graft survival model for adult deceased donor kidneys
Censored for death with a functioning graft

| <i>Variables</i> | <i>HR [95% conf. int]</i> | <i>P value</i> |
|---------------------------|---------------------------|--------------------|
| Recipient age | 0.983 [0.976 - 0.990] | <0.001** |
| Donor age | 1.016 [1.010 - 1.022] | <0.001** |
| Recipient sex | 0.977 [0.820 - 1.165] | 0.804 |
| Donor sex | 0.833 [0.702 - 0.988] | 0.036** |
| Transplant number | 1.176 [0.982 - 1.410] | 0.078 |
| CIT | 1.012 [0.998 - 1.025] | 0.094 |
| HLA miss matches | 1.005 [0.941 - 1.073] | 0.871 |
| Delayed graft function | 1.329 [1.037 - 1.706] | 0.025** |
| Acute rejection (3 month) | 1.820 [1.498 - 2.213] | <0.001** |
| PRA group* | 1.129 [0.994 - 1.283] | 0.063 |
| Tacrolimus use | 0.513 [0.412 - 0.639] | <0.001** |

*PRA groups 0-10%, 11-49%, 50-100% **Significant variables

- Significant variables that predict graft failure not censored for death include higher recipient age, higher donor age, female donor, transplant number, the need for dialysis immediately post transplant(delayed graft function), biopsy proven acute rejection and Tacrolimus use. The latter predicts reduced risk of graft failure.
- All of the above variables that are associated with uncensored graft failure apply to graft outcome censored for death with a functioning graft apart from transplant number which is marginally non significant. Recipient age is interesting in that the hazard ratio implies that older recipients are at reduced risk of graft failure censored for death unlike the uncensored graft outcome which implies increased risk. The reason is that a high proportion of older recipients die with a functioning graft which might give a false impression of patient outcomes based on age when censoring for death. Care is needed when interpreting the results.

Graft survival (uncensored) – adult deceased donor kidney only 1st, 2nd and 3rd transplants 1991 - 2011

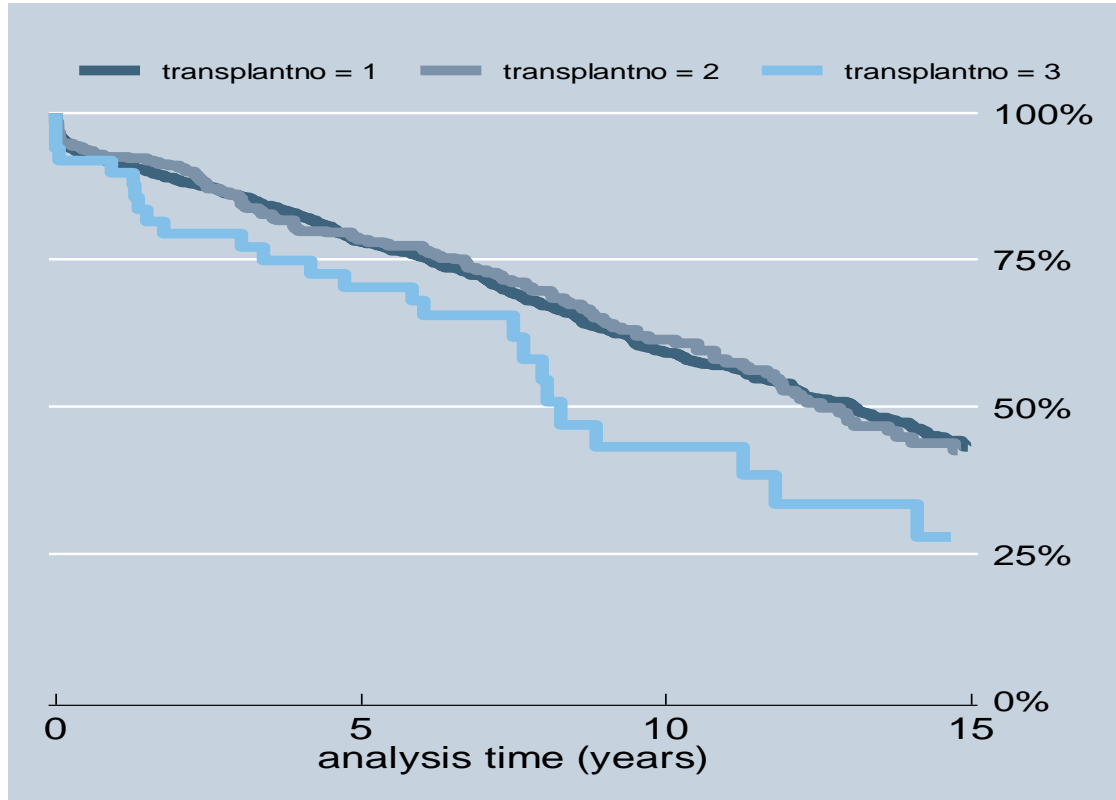
Table 5.5: Overall median graft survival (half-life) for deceased donor adult 1st, 2nd & 3rd grafts

| <i>Transplant number</i> | <i>No of patients</i> | <i>Median graft survival (years) [95% C.I.]</i> |
|--------------------------|-----------------------|---|
| 1 | 2,094 | 13.1 [12.2 – 14.0] |
| 2 | 323 | 12.5 [11.3 – 16.4] |
| 3 | 49 | 8.3 [6.0 – 14.1] |

Table 5.6: Estimated deceased donor adult 1st, 2nd & 3rd graft survival

| <i>Transplant number</i> | <i>Follow up time (years)</i> | <i>Estimated graft survival [95% C.I.]</i> |
|--------------------------|-------------------------------|--|
| 1 | 1 | 91.32 [90.02 - 92.45] |
| 1 | 5 | 78.22 [76.24 - 80.04] |
| 1 | 10 | 59.27 [56.61 - 61.83] |
| 1 | 15 | 43.14 [39.90 - 46.34] |
| 2 | 1 | 92.57 [89.12 - 94.96] |
| 2 | 5 | 78.46 [73.39 - 82.67] |
| 2 | 10 | 61.36 [54.98 - 67.11] |
| 2 | 15 | 42.60 [34.91 - 50.06] |
| 3 | 1 | 89.80 [77.21 - 95.62] |
| 3 | 5 | 70.41 [55.11 - 81.33] |
| 3 | 10 | 43.08 [25.85 - 59.21] |
| 3 | 15 | 27.92 [12.16 - 46.18] |

Figure 5.2: Kaplan-Meier deceased donor adult 1st, 2nd & 3rd transplants graft survival estimates

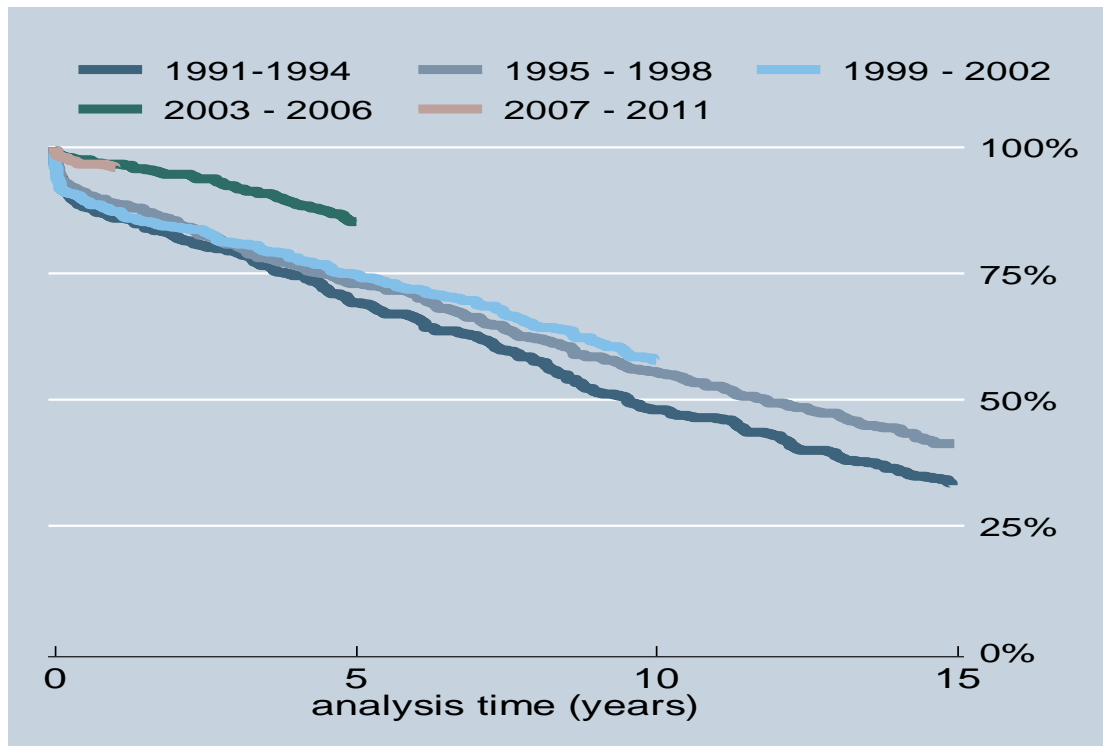


Graft survival (uncensored) – adult deceased donor by four time periods transplanted 1991 - 2011

Table 5.7: Adult deceased donor graft survival by era transplanted at 1,5,10 & 15 years

| <i>Follow up time (years)</i> | <i>Period transplanted</i> | <i>Estimated graft survival [95% C.I.]</i> | |
|-------------------------------|----------------------------|--|-----------------|
| 1 | 1991-1994 | 86.00 | [82.47 – 88.87] |
| 5 | 1991-1994 | 69.08 | [64.62 – 73.10] |
| 10 | 1991-1994 | 48.12 | [43.46 – 52.63] |
| 15 | 1991-1994 | 33.20 | [28.89 – 37.55] |
| 1 | 1995-1998 | 88.75 | [85.51 – 91.31] |
| 5 | 1995-1998 | 73.08 | [68.78 – 76.89] |
| 10 | 1995-1998 | 55.60 | [50.93 – 60.01] |
| 15 | 1995-1998 | 41.36 | [36.70 – 45.95] |
| 1 | 1999-2002 | 87.36 | [83.90 – 90.13] |
| 5 | 1999-2002 | 75.01 | [70.68 – 78.79] |
| 10 | 1999-2002 | 57.83 | [53.02 – 62.34] |
| 15 | 1999-2002 | | |
| 1 | 2003-2006 | 96.70 | [94.67 – 97.96] |
| 5 | 2003-2006 | 85.29 | [81.78 – 88.18] |
| 10 | 2003-2006 | | |
| 15 | 2003-2006 | | |
| 1 | 2007-2011 | 96.05 | [94.17 – 97.34] |
| 5 | 2007-2011 | | |
| 10 | 2007-2011 | | |
| 15 | 2007-2011 | | |

Figure 5.3: Kaplan-Meier adult deceased donor graft survival by era transplanted



Patient survival – adult deceased donor (from time of first graft) 1991 - 2011

Table 5.8: Overall median adult deceased donor patient survival (patient half-life)

| No of grafts | Median patient survival (years) [95% C.I.] |
|--------------|--|
| 2094 | 18.89 [17.53 - ---] |

Table 5.9: Estimated adult deceased donor patient survival at 1,5,10&15 years

| Follow up time (years) | Estimated patient survival [95% C.I.] |
|------------------------|---------------------------------------|
| 1 | 96.61 [95.74 - 97.31] |
| 5 | 87.98 [86.38 - 89.41] |
| 10 | 76.39 [74.04 - 78.56] |
| 15 | 61.44 [58.14 - 64.57] |

Figure 5.4: Kaplan-Meier adult deceased donor patient survival estimates

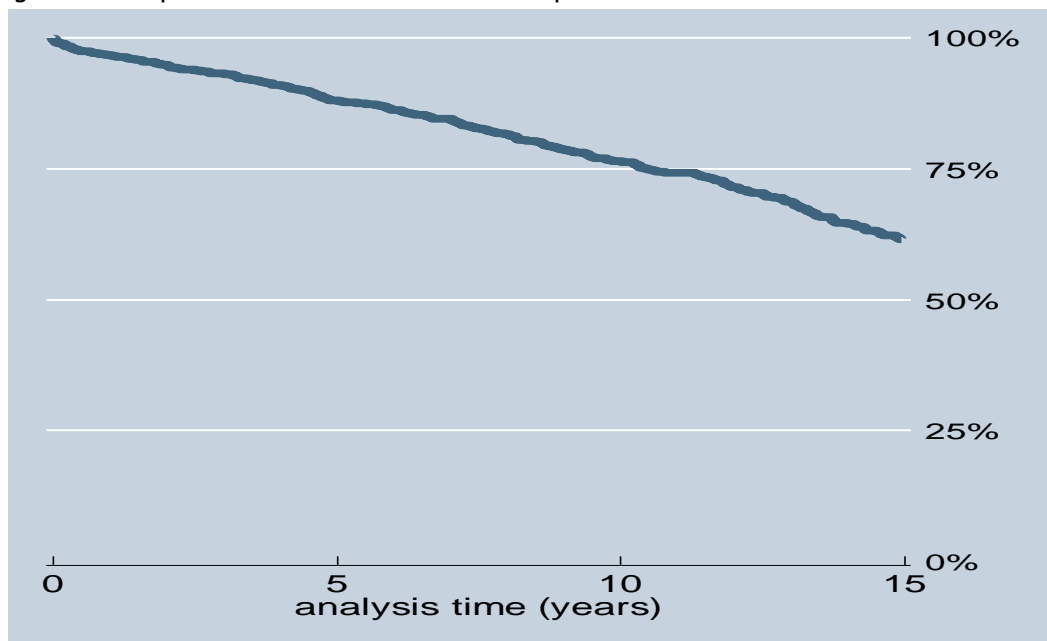


Table 5.10: Cox proportional hazards patient survival for adult deceased donor transplants

| Variables | HR [95% conf. int] | P value |
|---------------------------|-----------------------|--------------------|
| Recipient age | 1.069 [1.060 - 1.077] | <0.001** |
| Donor age | 1.011 [1.005 - 1.018] | <0.001** |
| Recipient sex | 1.087 [0.898 - 1.315] | 0.392 |
| Donor sex | 0.871 [0.723 - 1.048] | 0.143 |
| CIT | 1.005 [0.989 - 1.022] | 0.491 |
| HLA miss matches | 1.040 [0.969 - 1.117] | 0.275 |
| Delayed graft function | 1.336 [1.018 - 1.754] | 0.036** |
| Acute rejection (3 month) | 1.081 [0.847 - 1.377] | 0.530 |
| PRA group | 1.126 [0.971 - 1.306] | 0.114 |
| Tacrolimus | 0.403 [0.308 - 0.529] | <0.001** |

*PRA groups 0-10%, 11-49%, 50-100% **Significant variables

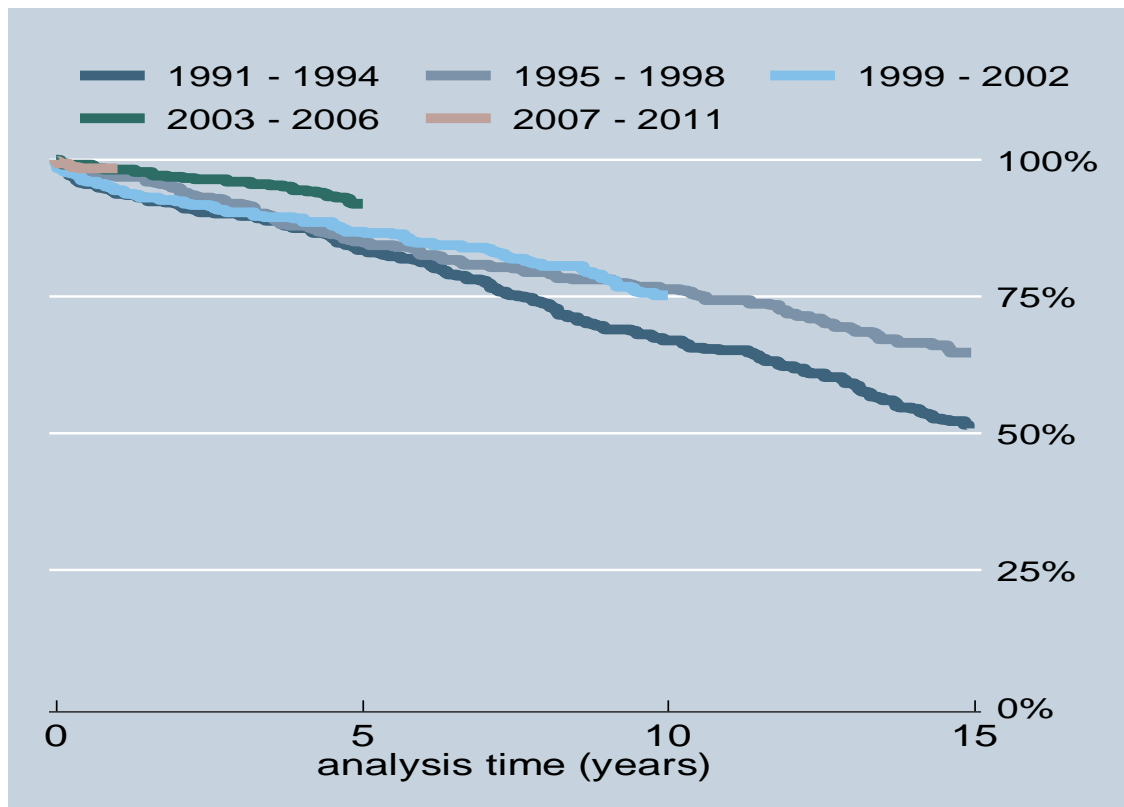
- Significant variables that predict patient survival include higher recipient age, higher donor age, delayed graft function and Tacrolimus use. The latter predicts a reduced risk of patient death

Patient survival – adult deceased donor by four time periods transplanted 1991 – 2011 from first transplant

Table 5.7: Adult deceased donor patient survival by era transplanted at 1,5,10 & 15 years

| <i>Follow up time (years)</i> | <i>Period transplanted</i> | <i>Estimated graft survival [95% C.I.]</i> | |
|-------------------------------|----------------------------|--|-----------------|
| 1 | 1991-1994 | 93.86 | [90.91 – 95.88] |
| 5 | 1991-1994 | 83.41 | [79.23 – 86.81] |
| 10 | 1991-1994 | 67.08 | [62.04 – 71.62] |
| 15 | 1991-1994 | 51.02 | [45.76 – 56.03] |
| 1 | 1995-1998 | 96.85 | [94.53 – 98.20] |
| 5 | 1995-1998 | 85.05 | [81.02 – 88.29] |
| 10 | 1995-1998 | 76.43 | [71.74 – 80.44] |
| 15 | 1995-1998 | 64.79 | [59.40 – 69.64] |
| 1 | 1999-2002 | 94.55 | [91.68 – 96.45] |
| 5 | 1999-2002 | 86.92 | [82.98 – 90.01] |
| 10 | 1999-2002 | 75.27 | [70.32 – 79.51] |
| 15 | 1999-2002 | | |
| 1 | 2003-2006 | 98.21 | [96.28 – 99.14] |
| 5 | 2003-2006 | 92.03 | [88.80 – 94.36] |
| 10 | 2003-2006 | | |
| 15 | 2003-2006 | | |
| 1 | 2007-2011 | 98.55 | [97.12 – 99.27] |
| 5 | 2007-2011 | | |
| 10 | 2007-2011 | | |
| 15 | 2007-2011 | | |

Figure 5.5: Kaplan-Meier adult deceased donor patient survival by era transplanted



6. Paediatric deceased donor outcomes 1991 - 2011

Paediatric deceased donor graft survival (less than 18 years of age at transplant)

- 181 deceased donor grafts transplanted in 162 paediatric recipients 1991-2011
- 100 deceased donor grafts transplanted in male recipients (55%)
- Mean age at transplant 12.52 years (S.D. 4.20) range [1.42 years – 17.98 years]

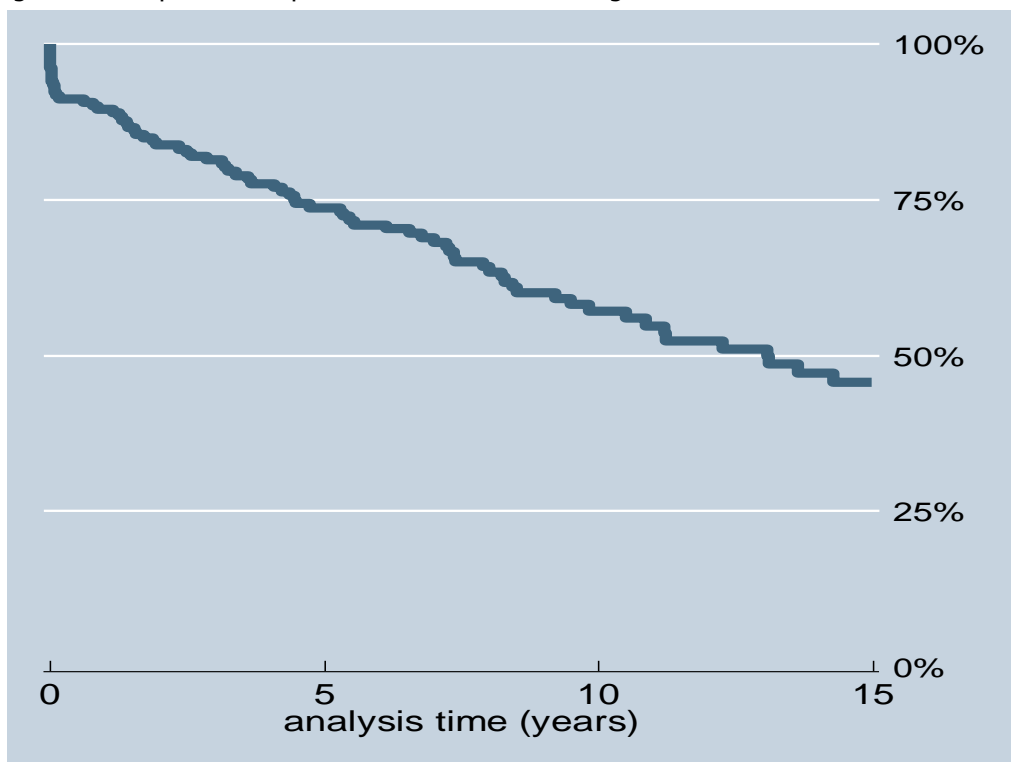
Table 6.1: Overall median paediatric deceased donor graft survival (graft half-life)

| <i>No of patients</i> | <i>Median graft survival (years) [95% C.I.]</i> |
|-----------------------|---|
| 181 | 13.1 [9.5 – 16.2] |

Table 6.2: Estimated paediatric deceased donor graft survival

| <i>Follow up time (years)</i> | <i>Estimated graft survival [95% C.I.]</i> |
|-------------------------------|--|
| 1 | 89.47 [83.98 - 93.15] |
| 5 | 73.71 [66.37 - 76.69] |
| 10 | 57.19 [48.62 - 64.86] |
| 15 | 45.64 [36.05 - 54.72] |

Figure 6.1: Kaplan-Meier paediatric deceased donor graft survival estimates 1991-2011

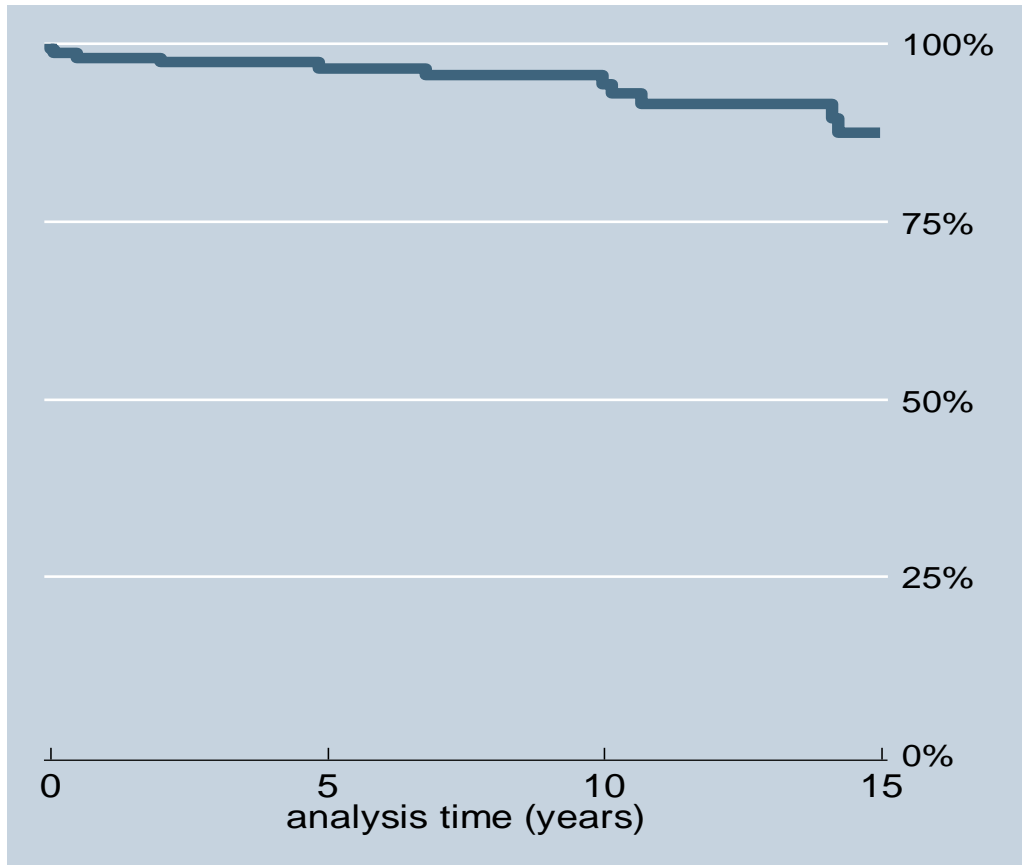


Patient survival – paediatric deceased donor

Table 6.3: Estimated paediatric deceased donor patient survival at 1,5,10&15 years

| <i>Follow up time (years)</i> | <i>Estimated patient survival [95% C.I.]</i> |
|-------------------------------|--|
| 1 | 98.06 [94.09 - 99.37] |
| 5 | 96.49 [91.71 - 98.53] |
| 10 | 94.29 [88.10 - 97.31] |
| 15 | 87.53 [77.43 - 93.30] |

Figure 6.2: Kaplan-Meier paediatric deceased donor patient survival estimates



7. Simultaneous pancreas kidney (SPK) outcome 1991 - 2011

SPK kidney graft outcome

- 118 SPK transplants between 1991-2011
- Almost equal number of male and female recipients (60 male, 58 female)
- Mean age at transplant 40.7 years (S.D. 7.3) range [25.4 years – 59.2 years]

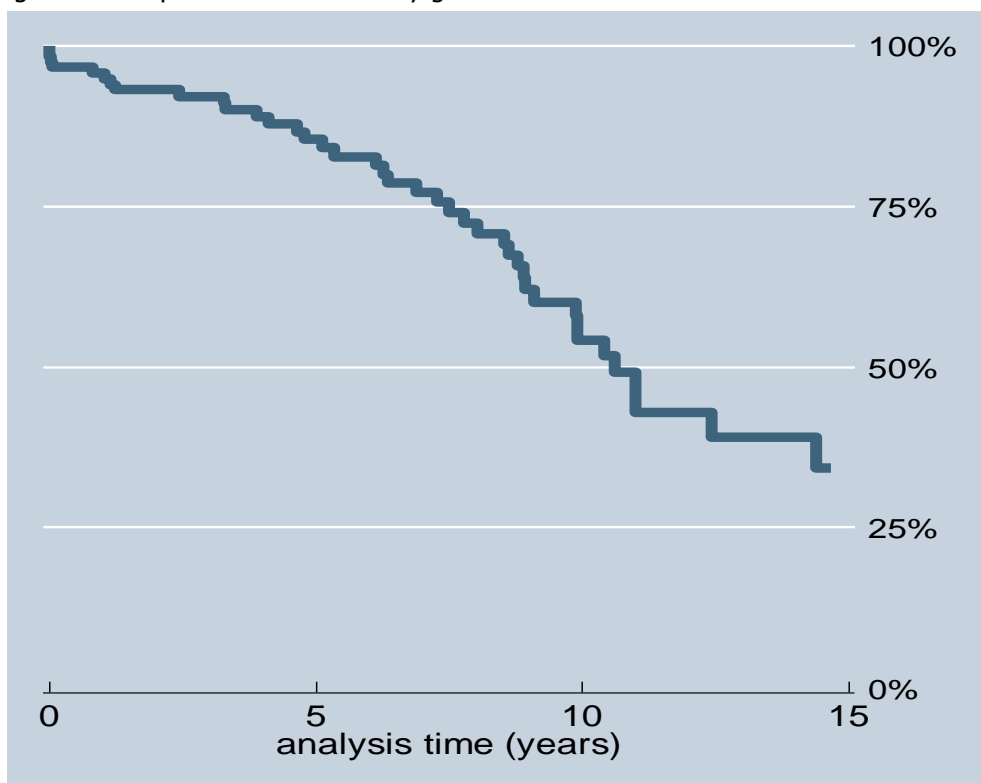
Table 7.1: Overall median SPK kidney graft survival (graft half-life)

| <i>No of patients</i> | <i>Median graft survival (years) [95% C.I.]</i> |
|-----------------------|---|
| 118 | 10.6 [8.9 – 14.4] |

Table 7.2: Estimated SPK kidney graft survival

| <i>Follow up time (years)</i> | <i>Estimated graft survival [95% C.I.]</i> |
|-------------------------------|--|
| 1 | 95.75 [90.08 - 98.21] |
| 5 | 85.39 [76.76 - 90.99] |
| 10 | 54.11 [41.07 - 65.45] |
| 15 | 34.22 [19.41 - 49.60] |

Figure 7.1: Kaplan-Meier SPK kidney graft survival estimates for 1991-2011



SPK pancreas graft outcome

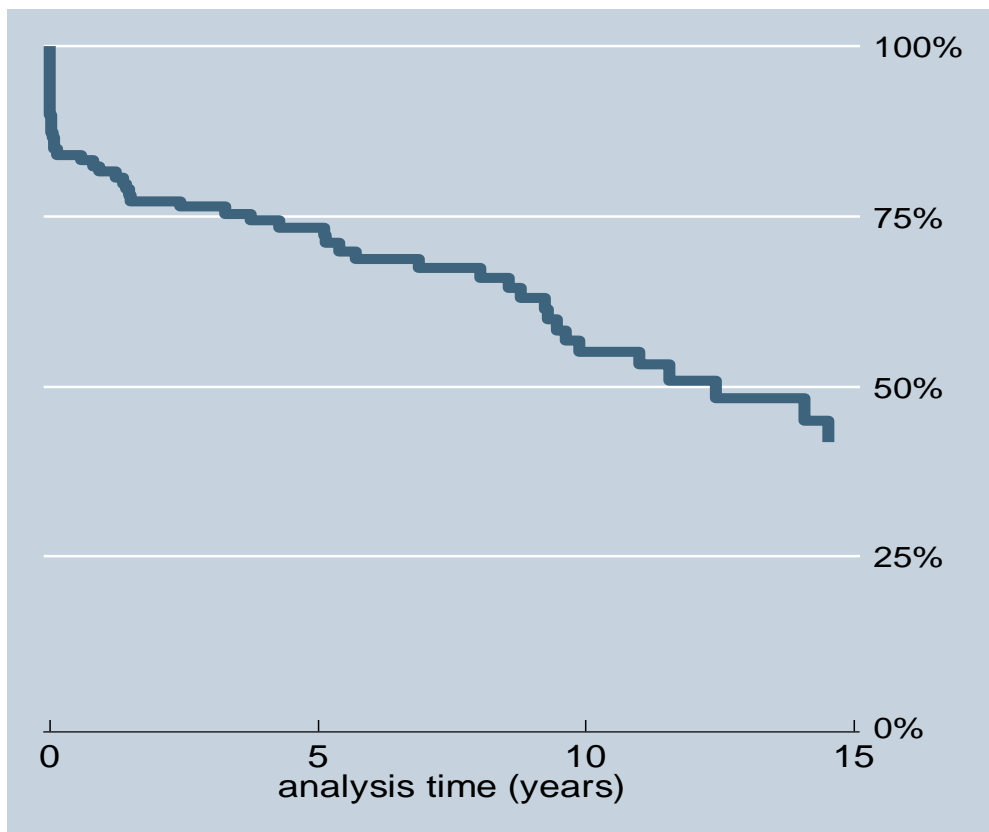
Table 7.3: Overall median SPK pancreas graft survival (graft half-life)

| <i>No of patients</i> | <i>Median graft survival (years) [95% C.I.]</i> |
|-----------------------|---|
| 118 | 12.4 [9.3 - ----] |

Table 7.4: Estimated SPK pancreas graft survival

| <i>Follow up time (years)</i> | <i>Estimated graft survival [95% C.I.]</i> |
|-------------------------------|--|
| 1 | 81.36 [73.08 - 87.31] |
| 5 | 73.14 [64.00 - 80.31] |
| 10 | 54.51 [43.17 - 65.51] |
| 15 | 40.70 [27.26 - 53.71] |

Figure 7.2: Kaplan-Meier SPK pancreas graft survival estimates for 1991-2011



SPK patient survival 1991 – 2011 from time of first transplant (one patient had a kidney only transplant prior to receiving an SPK)

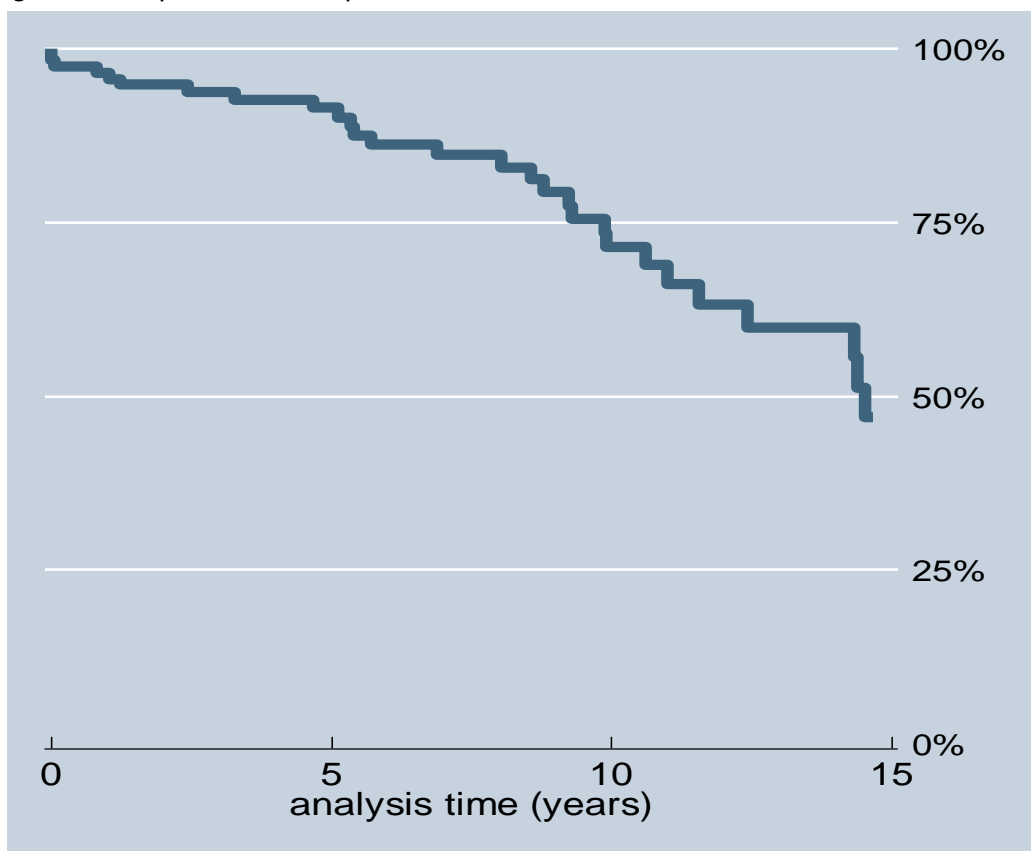
Table 7.5: Overall median SPK patient survival (patient half life)

| <i>No of patients</i> | <i>Median patient survival (years) [95% C.I.]</i> |
|-----------------------|---|
| 117 | 14.5 [11.6 –] |

Table 7.6: Estimated SPK patient survival at 1, 5, 10&15 years

| <i>Follow up time (years)</i> | <i>Estimated patient survival [95% C.I.]</i> |
|-------------------------------|--|
| 1 | 96.57 [91.11 - 98.70] |
| 5 | 91.54 [84.27 - 95.54] |
| 10 | 71.84 [59.19 - 81.17] |
| 15 | 48.54 [31.47 - 63.64] |

Figure 7.3: Kaplan-Meier SPK patient survival estimates for 1991-2011



8. Comparison of graft and patient outcomes between European Renal Association (ERA) countries and the Republic of Ireland (ROI)

Introduction

The ERA Registry collects data on renal replacement therapy (RRT) via the national and regional renal registries in Europe. For this section comparisons are made between 18 ERA countries and the Republic of Ireland which is not affiliated to ERA. Data was gleaned from the 2011 ERA report. There are 9 regions of Spain with separate results. Included in this report are the 2 largest regions by population Catalonia and Valencia. The countries are listed in tables 8.1 and 8.2.

Statistical analysis

Unadjusted survival probabilities were calculated using the Kaplan-Meier method.

In this section, patient survival after the first transplant, and graft survival after the first transplant is presented in tables and graphs by age, gender and cause of renal failure. Survival probabilities are presented as percentages from 0 to 100.

For the analysis of survival data, two five-year periods were used, 2002 to 2006 and 2005 to 2009, the former for one and five-year follow up, the latter for one and two-year follow up.

For patient survival from first graft, event is defined as death of patient. Censoring is at loss to follow-up and end of follow-up time.

For graft survival from first graft, event is defined as death of patient or graft loss. Censoring is at loss to follow-up and end of follow-up time.

Comparisons between the ROI and ERA countries reveal the following;

- In 2011, the ROI recorded a record number of kidney transplants (192). Despite this relatively high number, overall rates per million remain about average by ERA standards at 41.7 per million population (PMP).
- Great strides have been made to increase living donor transplantation in the ROI to the stage where rates are approximately 6 PMP but this is still low for ERA countries. To get to the European average rate of about 15 PMP would require approximately 70 living donor transplants per annum at current population levels in the ROI.
- The percent of renal replacement therapy (RRT) patients with a functioning transplant remains high by European standard at 53.4%. The advances made in Norway to achieve a rate of functioning transplants exceeding 70% of RRT patients shows the potential for a well resourced transplant service.
- In the period 2002-2006, significant improvements in graft and patient survival were recorded in our centre compared to previous years. It is not surprising that results for short and medium term graft and patient survival exceed those for ERA countries. In nearly all categories of age, sex and primary disease, ROI outcomes surpass those for ERA countries.
- The second period studied 2005-2009 also reveals substantial differences though European averages for one and two year survival narrow to some extent with the ROI. Short term patient survival is low for all countries so the differences are naturally not so evident
- Despite the limited number of living donor transplants performed in ROI between 2005-2009 (41) graft survival is high at 97% two year survival versus 94% for ERA countries and patient survival at two years is recorded as 100% for the ROI versus 98% for ERA countries.

8.1 Rates of transplantation PMP for ERA countries and the ROI

Table 8.1: Rates of transplantation PMP for ERA countries and the ROI for 2011

| <i>Country</i> | <i>Deceased donors</i> | <i>Living donors</i> | <i>Unknown source</i> | <i>Total</i> |
|-------------------------|------------------------|----------------------|-----------------------|--------------|
| Austria | 39.2 | 5.5 | 0 | 44.6 |
| Belgium Dutch-speaking | 36.5 | 3.0 | 0.2 | 39.7 |
| Belgium French-speaking | 40.7 | 3.6 | 0.2 | 44.6 |
| Bosnia and Herzegovina | 1.7 | 4.6 | 0 | 6.3 |
| Denmark | 23.1 | 15.8 | 2.5 | 41.4 |
| Finland | 30.3 | 2.4 | 0 | 32.7 |
| France | 40.1 | 3.4 | 0.1 | 43.6 |
| Greece | 13.2 | 4.6 | 0 | 17.8 |
| Iceland | 0 | 34.5 | 0 | 34.5 |
| Norway | 46.2 | 14.7 | 0 | 61.0 |
| Romania | 3.7 | 3.0 | 1.4 | 8.1 |
| Serbia | 9.5 | 6.1 | 0 | 15.6 |
| Spain Catalonia | 58.1 | 18.7 | 0 | 76.8 |
| Spain Valencian region | 36.0 | 1.6 | 0 | 37.5 |
| Sweden | 25.7 | 19.5 | 0 | 45.2 |
| The Netherlands | 24.9 | 26.7 | 1.1 | 51.6 |
| England | 27.0 | 16.7 | 0 | 43.9 |
| Northern Ireland | 37.0 | 26.0 | 0 | 63.0 |
| Scotland | 22.1 | 10.1 | 0 | 32.2 |
| Wales | 36.1 | 12.6 | 0 | 48.6 |
| Republic of Ireland | 35.9 | 5.9 | 0 | 41.7 |

Figure 8.1.1: Total rates of transplantation PMP for ERA countries and the ROI 2011

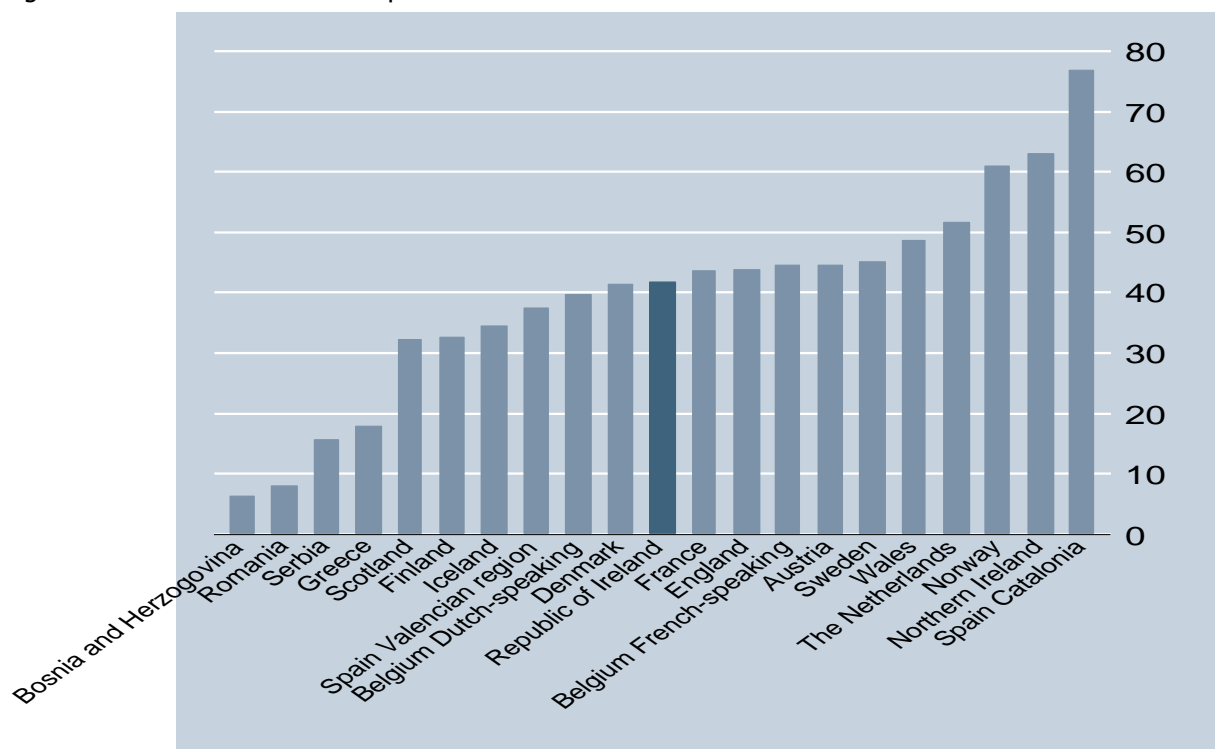


Figure 8.1.2: Deceased donor rates of transplantation PMP for ERA countries and the ROI for 2011

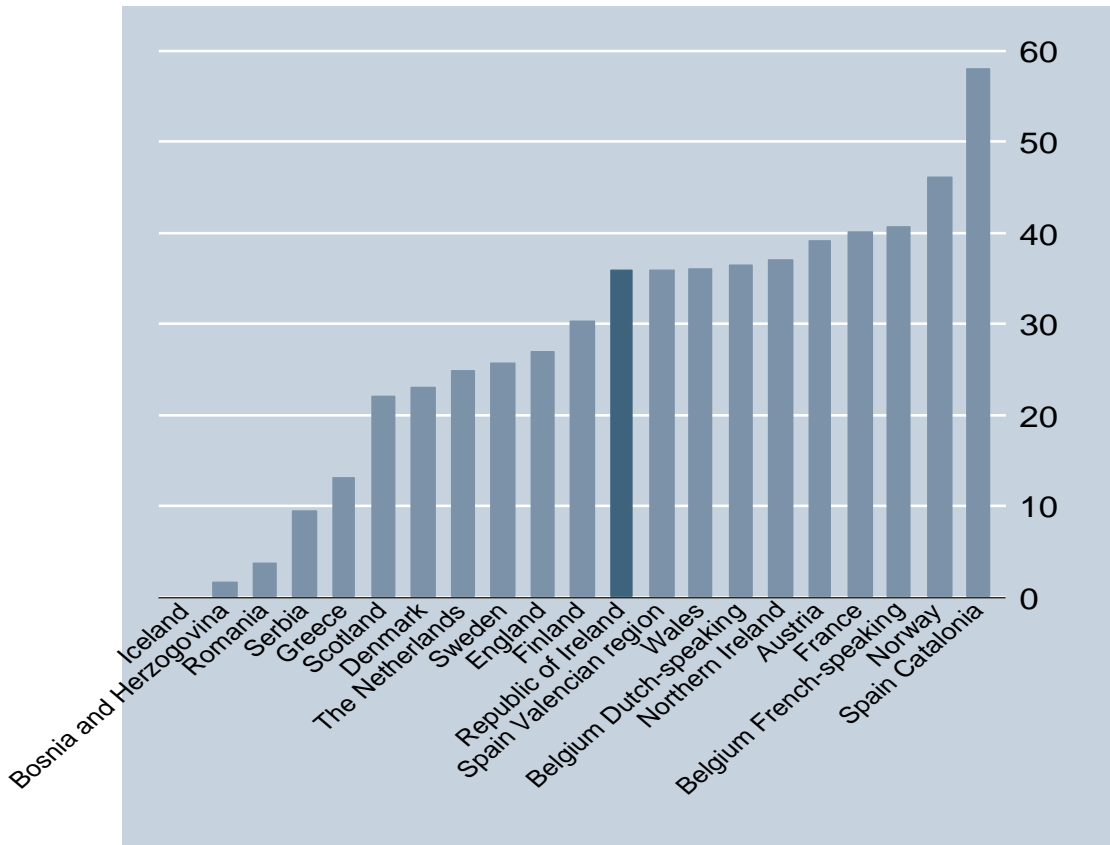
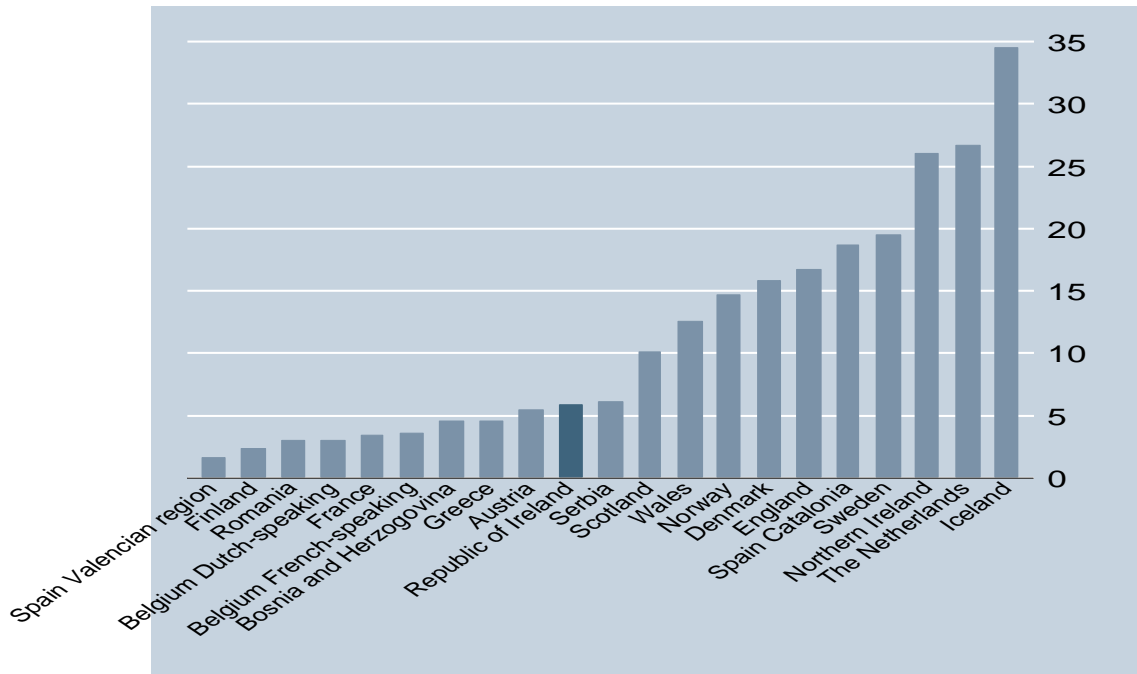


Figure 8.1.3: Living donor rates of transplantation PMP for ERA countries and the ROI 2011

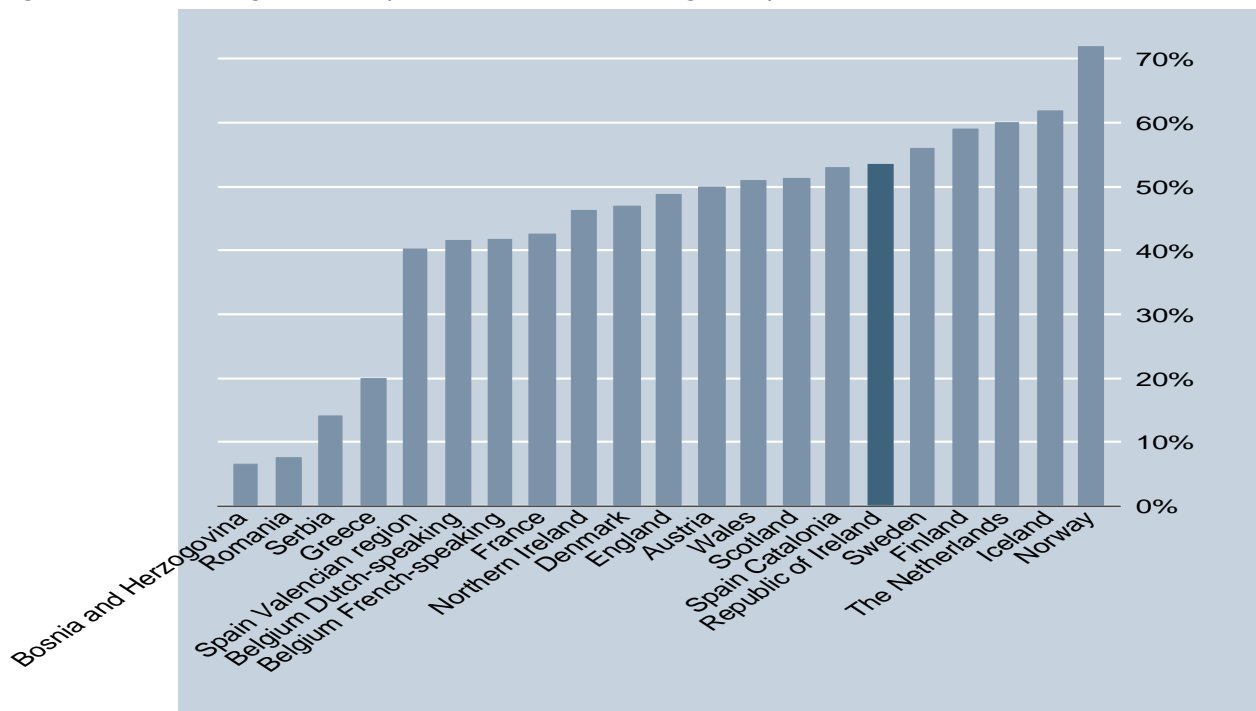


8.2 Percentage of RRT patients with functioning transplant

Table 8.2: Percentage of RRT patients with a functioning transplant for ERA and ROI for 2011

| <i>Country</i> | <i>% Transplant</i> | <i>% HD</i> | <i>% PD</i> | <i>% NK/missing</i> |
|-------------------------|---------------------|-------------|-------------|---------------------|
| Austria | 50.0 | 45.8 | 4.2 | 0 |
| Belgium Dutch-speaking | 41.5 | 53.3 | 5.3 | 0 |
| Belgium French-speaking | 41.8 | 53.1 | 4.8 | 0.3 |
| Bosnia and Herzegovina | 6.6 | 89.6 | 3.7 | 0 |
| Denmark | 46.9 | 42.2 | 10.5 | 0.5 |
| Finland | 59.0 | 33.4 | 7.6 | 0 |
| France | 42.6 | 52.7 | 4.0 | 0.7 |
| Greece | 20.0 | 74.2 | 5.8 | 0 |
| Iceland | 61.8 | 30.7 | 7.5 | 0 |
| Norway | 71.9 | 23.8 | 4.3 | 0 |
| Romania | 7.5 | 81.2 | 11.3 | 0 |
| Serbia | 14.0 | 78.1 | 7.8 | 0.1 |
| Spain Catalonia | 52.9 | 43.2 | 3.9 | 0 |
| Spain Valencian region | 40.3 | 54.7 | 5.0 | 0 |
| Sweden | 55.9 | 34.8 | 9.4 | 0 |
| Netherlands | 60.0 | 33.7 | 6.3 | 0 |
| England | 48.7 | 43.8 | 7.4 | 0 |
| Northern Ireland | 46.2 | 48.5 | 5.3 | 0 |
| Scotland | 51.2 | 42.9 | 6.0 | 0 |
| Wales | 50.9 | 41.1 | 7.9 | 0 |
| Republic Of Ireland | 53.4 | 41.5 | 5.1 | 0 |

Figure 8.2: Percentages of RRT patients with a functioning transplant for ERA and ROI in 2011



8.3 Graft survival

Table 8.3.1: Graft survival from first deceased donor transplant 2002 – 2006

| <i>Group</i> | <i>ROI one-year survival in % (95% CI)</i> | <i>ERA one-year survival in % (95% CI)</i> | <i>ROI five-year survival in % (95% CI)</i> | <i>ERA five-year survival in % (95% CI)</i> |
|--------------------|--|--|---|---|
| Age 0-19 years | 95.7 (84.0-98.9) | 91.5 (89.0-93.5) | 83.0 (68.8-91.1) | 77.6 (74.5-80.3) |
| Age 20-44 years | 98.0 (94.8-99.2) | 92.3 (91.6-93.0) | 92.4 (87.8-95.4) | 82.6 (81.7-83.5) |
| Age 45-64 years | 93.9 (89.9-96.3) | 89.6 (88.9-90.2) | 80.8 (75.1-85.4) | 77.2 (76.4-77.9) |
| Age 65+ years | 89.1 (80.2-97.0) | 81.1 (79.4-82.7) | 66.7 (52.5-77.6) | 61.9 (60.3-63.4) |
| Men | 96.4 (93.8-98.0) | 89.8 (89.2-90.4) | 85.8 (81.6-89.2) | 77.1 (76.4-77.7) |
| Women | 92.8 (88.2-95.7) | 89.7 (89.0-90.4) | 80.8 (74.5-85.7) | 78.6 (77.7-79.4) |
| Diabetes | 83.8 (67.4-92.4) | 88.9 (87.7-90.1) | 75.7 (58.5-86.5) | 73.5 (72.1-74.8) |
| Hypertension | 94.1 (78.5-98.5) | 87.0 (85.4-88.4) | 66.8 (48.1-80.1) | 71.2 (69.5-72.8) |
| Glomerulonephritis | 97.6 (92.6-99.2) | 90.9 (90.0-91.8) | 86.6 (79.1-91.6) | 80.1 (79.0-81.2) |
| Other cause | 95.6 (92.8-97.3) | 90.2 (89.6-90.8) | 85.6 (81.4-88.9) | 79.0 (78.2-79.7) |
| All | 95.1 (92.9-96.7) | 89.8 (89.3-90.2) | 84.0 (80.5-86.9) | 77.6 (77.1-78.2) |

Table 8.3.2: Graft survival from first deceased donor transplant 2005 – 2009

| <i>Group</i> | <i>ROI one-year survival in % (95% CI)</i> | <i>ERA one-year survival in % (95% CI)</i> | <i>ROI two-year survival in % (95% CI)</i> | <i>ERA two-year survival in % (95% CI)</i> |
|--------------------|--|--|--|--|
| Age 0-19 years | 95.1 (81.8-98.8) | 91.4 (88.8-93.4) | 92.6 (78.8-97.6) | 88.6 (85.8-90.9) |
| Age 20-44 years | 98.1 (95.0-99.3) | 92.8 (92.2-93.4) | 97.6 (94.4-99.0) | 90.4 (89.7-91.1) |
| Age 45-64 years | 94.7 (91.0-96.9) | 90.2 (89.6-90.8) | 92.6 (88.5-95.3) | 87.3 (86.7-87.9) |
| Age 65+ years | 93.3 (84.7-97.2) | 84.6 (83.1-86.0) | 89.2 (79.6-94.5) | 80.4 (78.9-81.9) |
| Men | 96.9 (94.4-98.3) | 90.5 (90.0-91.0) | 95.4 (92.6-97.2) | 87.5 (86.9-88.0) |
| Women | 94.1 (90.0-96.5) | 90.6 (90.0-91.3) | 91.8 (87.2-94.7) | 88.0 (87.3-88.7) |
| Diabetes | 95.0 (81.4-98.7) | 89.3 (88.2-90.3) | 92.5 (78.5-97.5) | 85.9 (84.7-87.0) |
| Hypertension | 93.9 (77.9-98.5) | 88.5 (87.1-89.8) | 87.7 (70.4-95.2) | 85.4 (83.9-86.7) |
| Glomerulonephritis | 96.9 (91.9-98.8) | 91.5 (90.6-92.3) | 96.1 (90.9-98.4) | 88.7 (87.7-89.6) |
| Other cause | 95.6 (93.0-97.3) | 91.0 (90.4-91.5) | 94.0 (91.0-96.0) | 88.2 (87.6-88.8) |
| All | 95.8 (93.8-97.1) | 90.6 (90.1-91.0) | 94.0 (91.7-95.7) | 87.7 (87.2-88.1) |

Table 8.3.3: Graft survival from first living donor transplant 2005 – 2009

| <i>Group</i> | <i>ROI one-year survival in % (95% CI)</i> | <i>ERA one-year survival in % (95% CI)</i> | <i>ROI two-year survival in % (95% CI)</i> | <i>ERA two-year survival in % (95% CI)</i> |
|--------------|--|--|--|--|
| Men | 95.6 (72.9-99.4) | 95.5 (94.8-96.1) | 95.6 (72.9-99.4) | 94.0 (93.2-94.7) |
| Women | 100 () | 95.4 (94.5-96.2) | 100 () | 93.4 (92.3-94.3) |
| All | 96.9 (79.8-99.6) | 95.5 (94.9-96.0) | 96.9 (79.8-99.6) | 93.8 (93.1-94.3) |

Figure 8.3.1: One-year graft survival from first deceased donor transplant 2002 – 2006

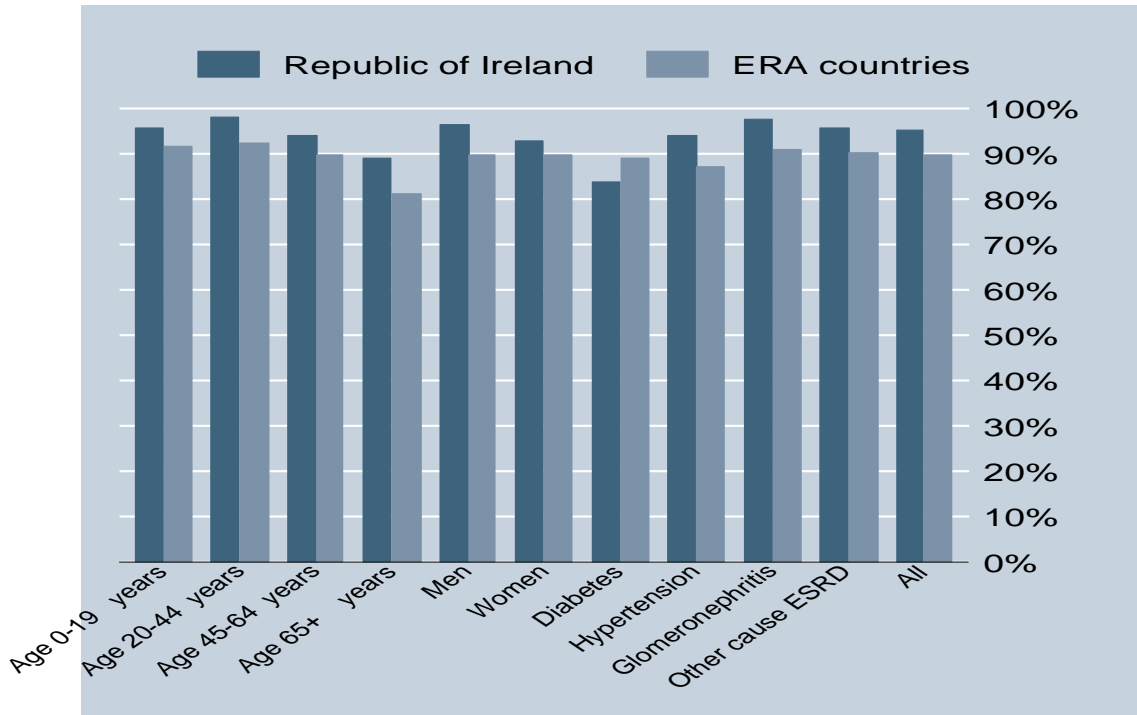


Figure 8.3.2: Five-year graft survival from first deceased donor transplant 2002 – 2006

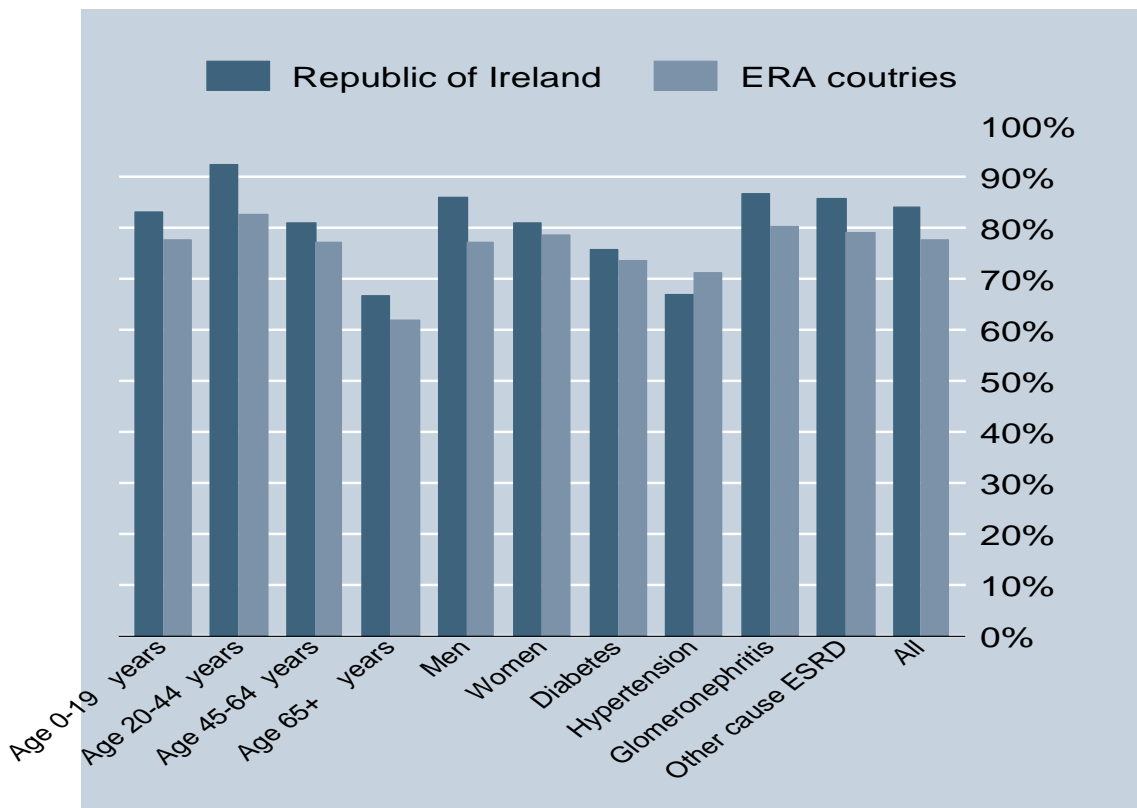


Figure 8.3.3: One-year graft survival from first deceased donor transplant 2005 – 2009

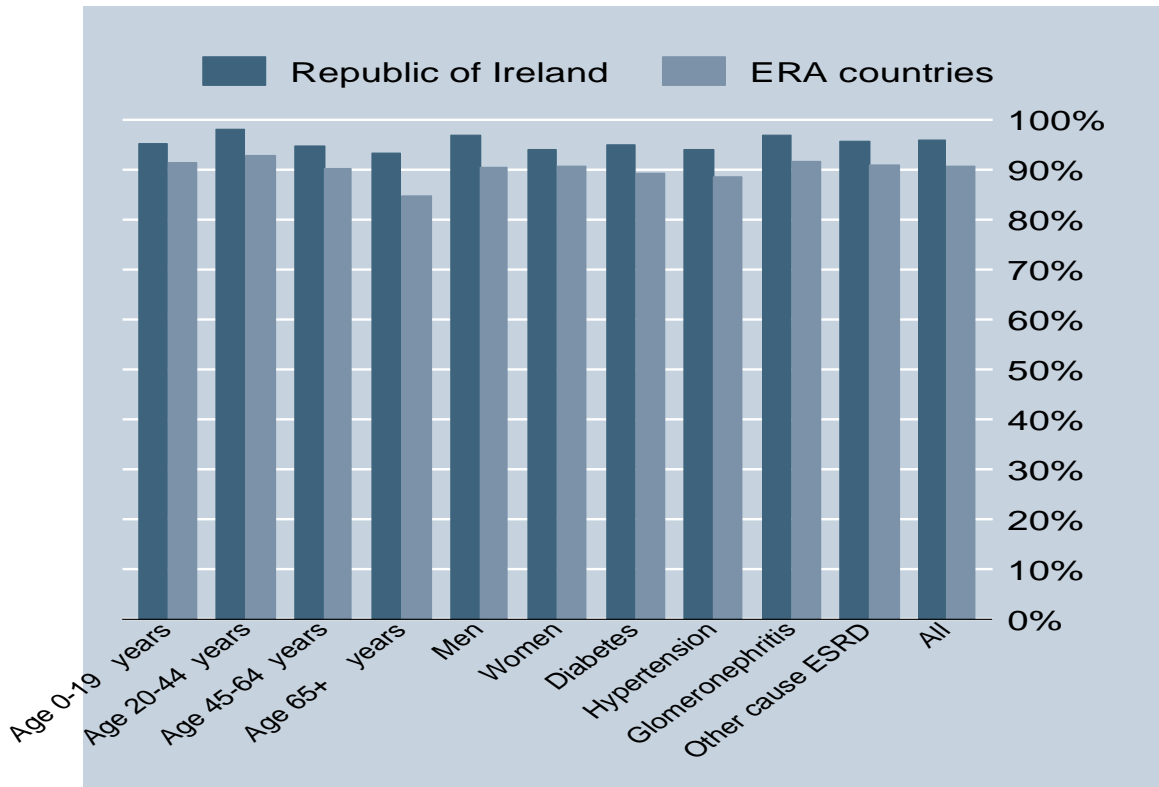
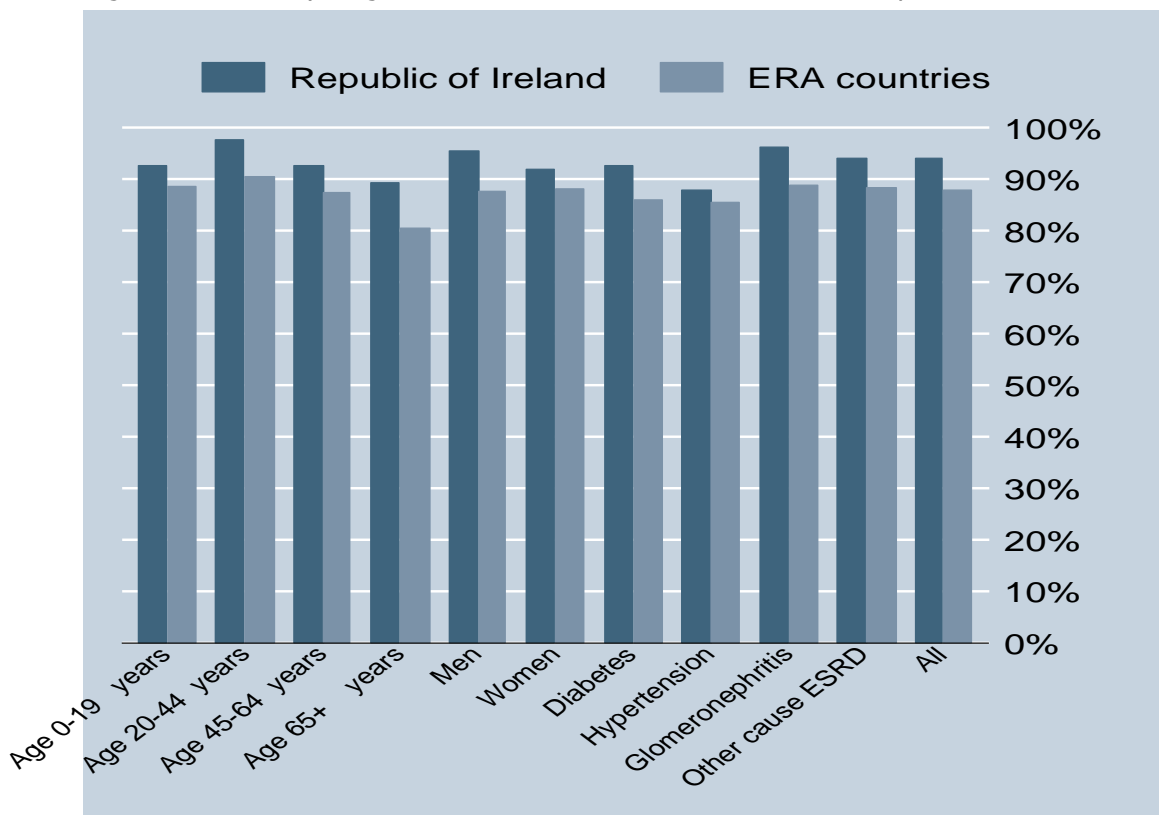


Figure 8.3.4: Two-year graft survival from first deceased donor transplant 2005 – 2009



8.4 Patient survival

Table 8.4.1: Patient survival from first deceased donor transplant 2002 – 2006

| <i>Group</i> | <i>ROI one-year survival in % (95% CI)</i> | <i>ERA one-year survival in % (95% CI)</i> | <i>ROI five-year survival in % (95% CI)</i> | <i>ERA five-year survival in % (95% CI)</i> |
|--------------------|--|--|---|---|
| Age 0-19 | 100 () | 98.4 (96.8-99.2) | 97.5 (83.5-99.6) | 95.4 (93.3-96.9) |
| Age 20-44 | 99.5 (96.5-99.9) | 97.9 (97.5-98.3) | 98.0 (94.7-99.2) | 93.9 (93.3-94.5) |
| Age 45-64 | 97.3 (94.2-98.8) | 95.0 (94.5-95.5) | 87.9 (82.7-91.6) | 85.2 (84.5-85.8) |
| Age 65+ | 90.9 (79.5-96.1) | 88.0 (86.4-89.4) | 75.5 (61.5-85.0) | 69.8 (68.1-71.4) |
| Men | 98.5 (96.4-99.4) | 95.2 (94.7-95.6) | 92.5 (89.1-94.9) | 86.3 (85.7-86.9) |
| Women | 96.4 (92.5-98.3) | 96.0 (95.5-96.5) | 89.3 (83.9-93.0) | 88.5 (87.7-89.2) |
| Diabetes | 89.2 (73.7-95.8) | 93.1 (92.1-94.1) | 75.6 (58.5-86.5) | 80.3 (78.9-81.6) |
| Hypertension | 94.1 (78.5-98.5) | 93.1 (91.8-94.2) | 82.0 (64.2-91.5) | 81.3 (79.6-82.8) |
| Glomerulonephritis | 99.2 (94.4-99.9) | 96.8 (96.2-97.3) | 94.7 (88.6-97.6) | 90.7 (89.8-91.6) |
| Othercause | 98.5 (96.4-99.4) | 96.1 (95.6-96.5) | 92.8 (89.4-95.2) | 88.6 (87.9-89.2) |
| All | 97.7 (96.0-98.7) | 95.5 (95.1-95.8) | 91.3 (88.5-93.5) | 87.1 (86.6-87.6) |

Table 8.4.2: Patient survival from first deceased donor transplant 2005 – 2009

| <i>Group</i> | <i>ROI one-year survival in % (95% CI)</i> | <i>ERA one-year survival in % (95% CI)</i> | <i>ROI two-year survival in % (95% CI)</i> | <i>ERA two-year survival in % (95% CI)</i> |
|--------------------|--|--|--|--|
| Age 0-19 | 100 () | 97.7 (95.9-98.7) | 100 () | 97.3 (95.4-98.4) |
| Age 20-44 | 98.6 (95.6-99.5) | 97.9 (97.6-98.3) | 98.6 (95.6-99.5) | 97.0 (96.5-97.4) |
| Age 45-64 | 98.3 (95.6-99.4) | 95.7 (95.3-96.1) | 97.1 (93.9-98.6) | 93.6 (93.1-94.1) |
| Age 65+ | 96.0 (88.0-98.7) | 90.9 (89.6-92.0) | 90.4 (81.0-95.3) | 86.7 (85.2-88.0) |
| Men | 99.1 (97.3-99.7) | 95.7 (95.3-96.1) | 98.6 (96.5-99.4) | 93.7 (93.2-94.1) |
| Women | 96.8 (93.3-98.4) | 96.6 (96.2-97.0) | 94.4 (90.3-96.8) | 95.0 (94.4-95.5) |
| Diabetes | 95.0 (81.5-98.7) | 94.1 (93.2-94.9) | 92.5 (78.5-97.5) | 91.6 (90.5-92.5) |
| Hypertension | 97.0 (80.4-99.6) | 94.3 (93.2-95.3) | 90.6 (73.6-96.9) | 91.7 (90.4-92.9) |
| Glomerulonephritis | 100 () | 97.4 (96.8-97.9) | 98.4 (93.7-99.6) | 96.0 (95.3-96.6) |
| Othercause | 98.1 (96.0-99.1) | 96.4 (96.0-96.8) | 97.5 (95.3-98.7) | 94.7 (94.2-95.1) |
| All | 98.2 (96.7-99.0) | 96.0 (95.7-96.3) | 97.0 (95.2-98.1) | 94.2 (93.8-94.5) |

Table 8.4.3: Patient survival from first living donor transplant 2005 – 2009

| <i>Group</i> | <i>ROI one-year survival in % (95% CI)</i> | <i>ERA one-year survival in % (95% CI)</i> | <i>ROI two-year survival in % (95% CI)</i> | <i>ERA two-year survival in % (95% CI)</i> |
|--------------|--|--|--|--|
| Men | 100 () | 98.3 (97.8-98.7) | 100 () | 97.5 (96.9-97.9) |
| Women | 100 () | 98.4 (97.8-98.9) | 100 () | 97.7 (97.0-98.3) |
| All | 100 () | 98.3 (98.0-98.6) | 100 () | 97.6 (97.1-97.9) |

Figure 8.4.1: One-year patient survival from first deceased donor transplant 2002 – 2006

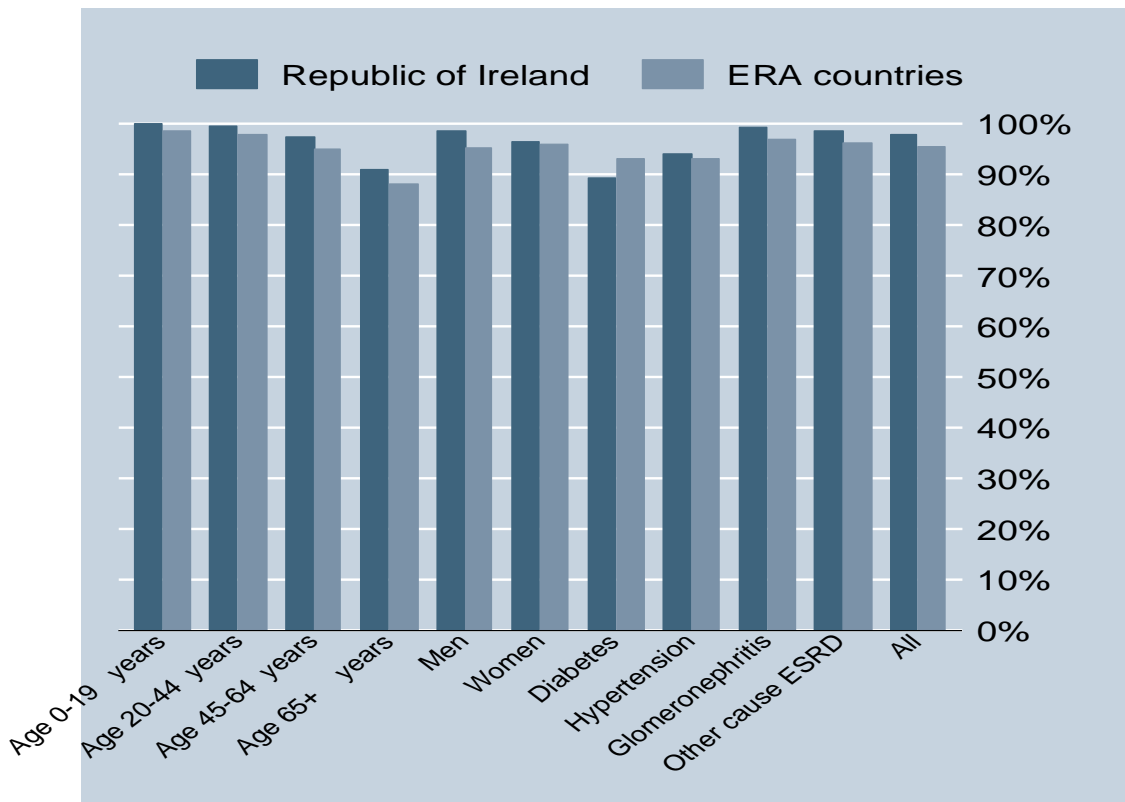


Figure 8.4.2: Five-year patient survival from first deceased donor transplant 2002 – 2006

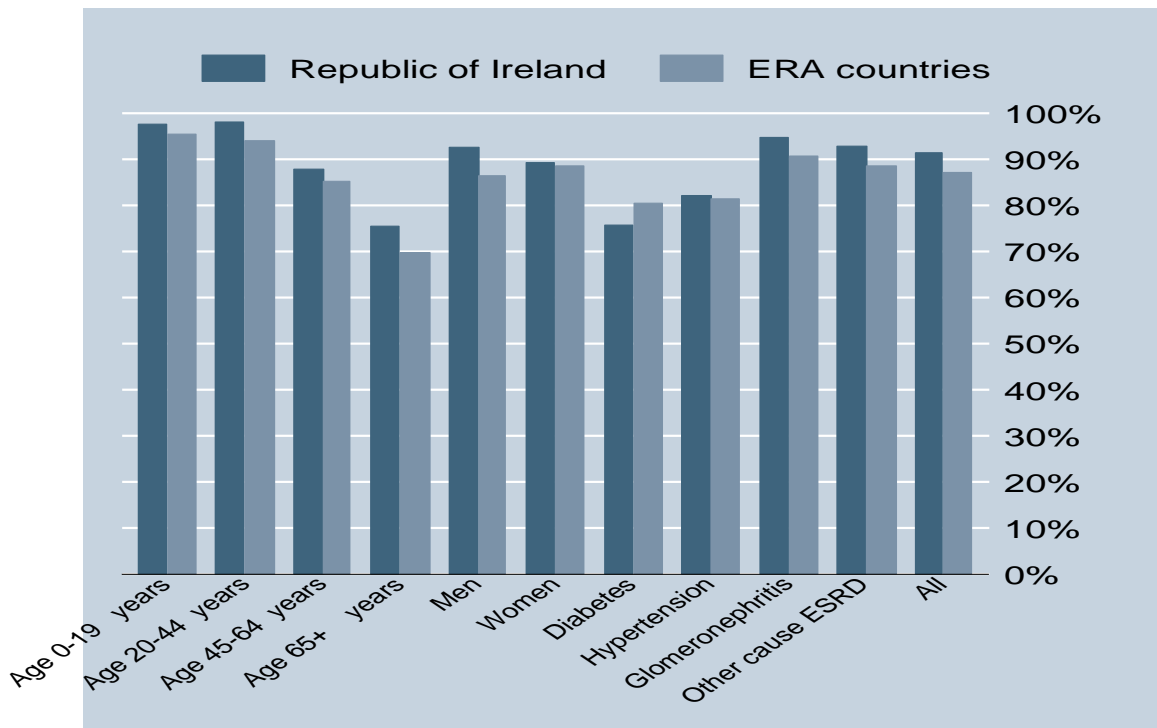


Figure 8.4.3: One-year patient survival from first deceased donor transplant 2005 – 2009

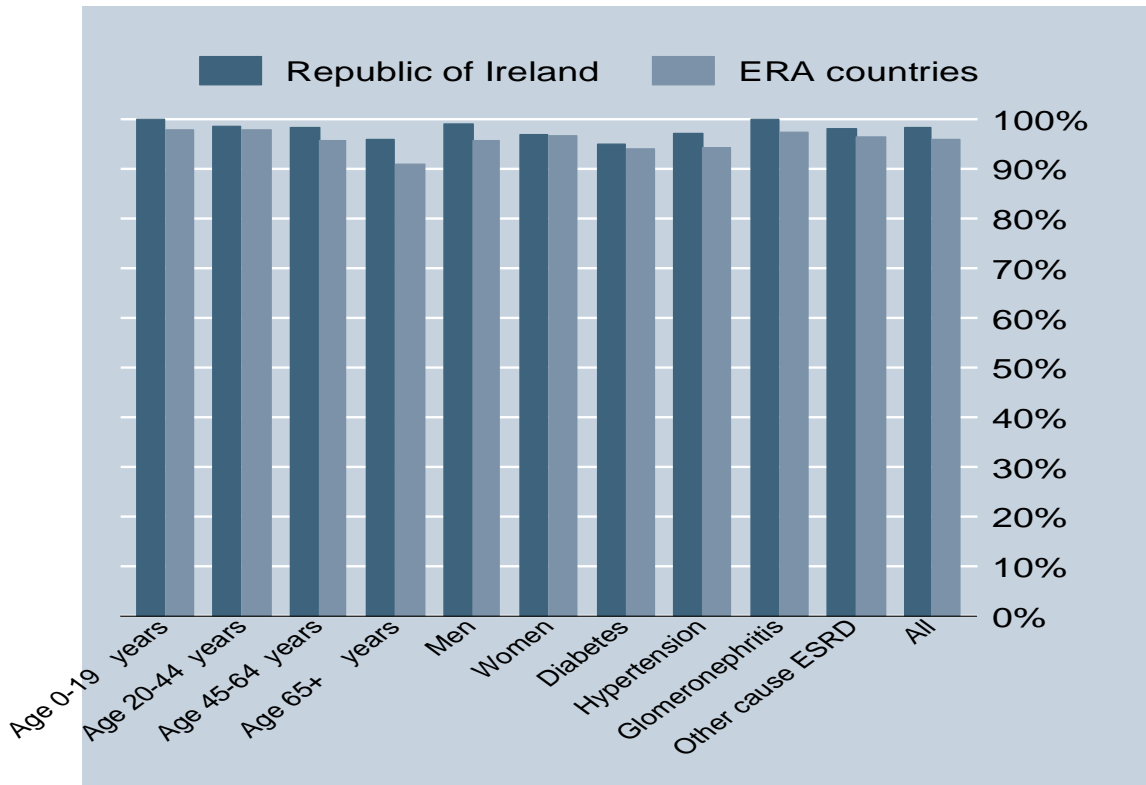


Figure 8.4.4: Two-year patient survival from first deceased donor transplant 2005 – 2009

