National Kidney Transplant Service

Annual Report

2021

National Kidney Transplant Service

Contents

Acknowledgements

We are indebted to our colleagues in the renal centers around Ireland for continuing to provide long term follow up data to the Renal Transplant and Living Donor Registries in order to produce this report. In particular, we wish to acknowledge the continued support from our transplant coordinators and the clinical nurse specialists in the regional centers who provide us with timely data, without which this report could not be produced.

Editorial Team

Dilly Little, Colm Magee, Patrick O'Kelly, Anne Cooney.

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Foreword

Successful kidney transplantation is the best treatment for patients with end stage kidney disease, allowing them to regain quality of life, freedom from dialysis and improving their overall health. The National Kidney Transplant Service (NKTS) remains committed to the provision of a high-quality kidney transplant service with more than 5600 kidney transplants performed to date. Currently, 2524 recipients enjoy the benefits of a functioning transplant. Increasingly, potential kidney transplant recipients are identifying a living kidney donor and we have performed 373 living kidney donor transplants in the past 10 years.

Clearly, none of this would be possible without the extraordinary generosity of deceased donor families and friends who consent to organ donation in the midst of their grief. Equally, the courage of the living donor who undergoes major surgery to restore the health of their recipient must be acknowledged. The transplant team at the NKTS wishes to acknowledge in a very special way each and every kidney donor. We see first-hand the extraordinary transformation that each successful transplant brings.

Ms Dilly Little
Surgical Director, NKTS

Dr. Colm Magee
Medical Director, NKTS

Our mission is fair and equitable access to transplantation for all suitable patients, a commitment to quality through continous improvement of our standards, processes, and outcomes, and a lifelong duty of care to both kidney donor and recipient

Highlights 2021

2,610

2610 recipients living with functioning transplants at the end of 2021.

139

139 kidney transplants were performed in the Republic of Ireland despite the COVID-19 pandemic.

25

The median waiting time to first transplant in 2021 was 25 months.

19

19 recipients enjoy allograft function of over 40 years.

20

20 very highly sensitised patients (PGen ≥ 95%) were transplanted in 2021 representing 14% of transplant activity.

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Kidney transplant survival is significantly better in the Republic of Ireland when compared with European outcomes collected by the European Collaborative Transplant Study (CTS).

↗

Transplant survival and patient survival rates have steadily improved among recipients of both living and decreased donor kidney transplants, reflecting the NKTS continued commitment to delivering a quality service.

SECTION 1

Introduction

Kidney Transplantation is the preferred treatment option for patients with end stage kidney disease (ESKD), offering improved survival and better quality of life. The COVID-19 pandemic has posed significant challenges for the safe delivery of kidney transplantation worldwide and the National Kidney Transplant Service in Ireland has experienced similar difficulties. These difficulties include the risk of severe infection and mortality in patients who are immunosuppressed post-transplant; reduced deceased donor activity due to the admission of COVID-19 positive patients to intensive care units; providing a safe Covid free environment for patients undergoing transplant surgery and ensuring the safety of living kidney donors and their recipients. Despite these significant challenges, the National Kidney Transplant Service continued to provide transplant services throughout 2021.

In 2021, we performed **139** kidney transplants, 104 of which were from deceased donors. In January and February 2021, there was a significant surge in the number of COVID-19 positive cases nationally, and due to the high community transmission rates of infection, living donor transplants were deferred pending the availability of COVID-19 vaccines for potential living donors and their recipients. This decision was taken to minimise the risk of overwhelming infection and mortality in potential living kidney donors and their recipients in the post-operative period. At the same time, in line with public health advice, all potential kidney recipients were prioritised for early COVID-19 vaccination. This risk stratification process has allowed **35** living donor transplants to proceed in 2021.

As ESKD is recognised as a risk factor for severe COVID-19 infection, all potential kidney recipients on the transplant waiting list were advised to avail of the COVID-19 vaccines offered under the national vaccination programme. The medical and scientific evidence indicates that any risks associated with the available vaccines are extremely low compared to the consequences and risks of a transplant patient contracting COVID-19. It is clear that a post-transplant patient on immunosuppression who contracts COVID-19 is extremely vulnerable to severe infection with an associated risk of death or long-term illness. In addition, in infected patients, necessary reduction in immunosuppression to allow them to recover adds additional risk of rejection of the kidney transplant. Patients with cardiovascular disease, respiratory disease, diabetes, obesity and age greater than 60 years are especially at risk. The vast majority of patients on the transplant waiting list have been vaccinated. Despite a successful vaccine roll out, a fourth wave of infection was experienced nationally in October through to December 2021. A clinical risk stratification model was adopted following guidance from Organ Donation Transplant Ireland and the HSE to attempt to weigh the risk of proceeding with transplant versus the risk of infection with COVID-19 for each individual patient and also to minimize the transmission risk to other patients in the transplant department.

Thirty five (25%) of our transplants in 2021 were from living donors-a remarkable reflection of the continued commitment of living donors to the process in the current circumstances

To reduce the risk of exposure and cross -infection after discharge from the hospital, the NKTS has adopted the use of virtual clinics and remote monitoring, using a purpose designed system. This system continuously tracks symptoms, blood pressure, weight and laboratory results in the patient's home, reducing the need for hospital attendance by 70%, post-transplantation. Patients can monitor their own data by downloading an app onto their mobile phone. Thanks to the support of the HSE Community intervention team, laboratory tests can be performed on blood drawn in the patient's home, reducing the need for hospital visits. This project was supported by Sláintecare and has been extremely successful. This initiative won an Enterprise Ireland Health Technology Innovation Award for Integrated Health in November 2021.

Because of the requirement for augmented immunosuppression in newly transplanted "highly sensitised" recipients, these patients are especially at risk if they contract COVID-19 or other infection. We prioritise these patients on the transplant waiting list and in 2021 a total of 20 very highly sensitised patients (PGen ≥ 95%) were transplanted, some of whom were on the transplant waiting list for more than 10 years. Stringent analysis of donor specific anti-body status pre-transplant resulted in these patients being transplanted with very limited need for the use of Anti-Thymocyte Globulin (ATG) induction.

There were 16 kidney transplants performed from non-heart beating deceased donors with 2 donor hospitals referring their first such donor.

In July 2021, we conducted a simulated training day in the Royal College of Surgeons in Ireland for non-consultant surgical trainees and newly appointed advanced nurse practioner candidates focusing on the surgical skills and techniques of kidney retrieval surgery. This training was supported by the ODTI and was extremely well received by all attendees. We hope to run this course as an annual event.

The number of patients alive with a functioning kidney transplant remains stable at **2610**. The number of patients listed on the transplant waiting list remained relatively stable with a total of 512 listed at the end of 2021. In 2021, 150 new patients were approved for listing to the pool - similar to 2020. However, the global shortage of organs relative to the number of patients waiting for transplant remains an ongoing challenge for the NKTS reflected by the median time of 25 months from listing to first transplant in 2021, a significant increase from 19 months in 2020.

Irish Kidney transplant outcome data continues to be excellent. The overall median adult allograft and patient survival for first deceased donor kidney transplant is 15.6 and 21.7 years respectively, representing a steady improvement since the 1980s. Based on the most recent data, Irish kidney transplant outcomes are excellent with adult first deceased one year allograft survival of 97% and patient survival 98%.

At 10 years post transplant, adult living donor recipients have a 80% allograft and 91% patient survival, compared to 68% deceased donor allograft and 79% patient survival

We continue to benchmark our data against the European Collaborative Transplant Study (CTS) and our outcome data exceeds the CTS means for all groups. Patients undergoing repeated transplants of 3rd or 4th kidney transplants in Dublin have outcome data that exceeds the CTS data in all time points. Currently, 19 patients have a functioning kidney 40 years or more after their transplant.

We performed 35 living donor transplants in 2021 including 5 living donations to paediatric recipients. While overall survival outcomes for first living donor allografts are comparable to deceased donor allografts at one year post transplant at 95% and 94% respectively, they are noticeably better for patient survival at 99.7% versus 97.6%. The real benefits of living donor transplantation become apparent when we observe longer term outcomes . At 10 years post transplant, adult living donor recipients have an 80% allograft and 91% patient survival compared to 68% deceased donor allograft and 79% patient survival. In addition, patients who received a living donor kidney spent considerably less time waiting for a transplant and less time on dialysis, with a significant number avoiding the need for dialysis entirely. These outcomes highlight the enormous advantages of living kidney donation and illustrate why living donation should be the first choice for the majority of Irish patients. It is for these reasons that our motto is 'Living Donor First'.

In summary, 2021 has again proven to be one of the more challenging years for everyone involved in healthcare provision but especially for patients awaiting a life-changing kidney transplant. We would like to acknowledge the ongoing work and efforts of all the members of the transplant team, the staff of the intensive care units throughout the country and all the staff in Beaumont Hospital who have supported us, since the start of this pandemic. We would especially like to acknowledge the forbearance of the patients that depend on this transplant programme and the bravery of the living kidney donors. We will continue to strive to provide the best and safest care to all our patients.

Finally, we are continuously humbled by the generosity shown by all kidney donors and their families. Every deceased donor kidney transplant comes at a time of utmost tragedy for families, who look beyond their own loss and grief to save the life of another person. Living donors place themselves in harm's way to help a loved one. As such, we have witnessed the best of human nature through working in this programme and wish to thank all donors and their families for their generosity.

1 year adult deceased donor allograft survival has improved from 88.1% for time period 1996-2000 to 96.9% for time period 2016-2020,representing the continuous commitment to quality of care

SECTION 2

Kidney Transplant Activity 2021

- **In 2021, 139 kidney transplants were performed in the Republic of Ireland (ROI). Of these, 35 were from living donors, 104 were from deceased donors.**
- **Despite the ongoing challenges of the COVID-19 pandemic there were 16 more kidney transplants performed in ROI compared to 2020.**
- **The number of recipients living with a functioning allograft remains stable, reaching 2610 (at year end 2021). 2524 (97%) of whom were transplanted in Beaumont Hospital.**
- **There were 35 living donor kidneys transplanted in 2021 representing an increase of 25% on 2020, but reduced compared to previous years where there was an overall 6 year mean of 38 living kidney donor transplants performed. Living donor transplants represent 25% of all kidney transplants performed. This compares to the trend over the previous 6 years where a total of 24% all transplants performed were to living donor recipients. The number of deceased donor kidney transplants was 104 for 2021 which includes 2 simultaneous pancreas/ kidney (SPK) transplants.**
- **There were 11 paediatric (<19yrs) transplants. Five of these were from living donors.**
- **There were two paired kidney exchange transplants performed in collaboration with our colleagues in the UK.**

2.1 Summary of kidney transplant activity 2016-2021

Table 2.1: Summary of transplant activity 2016 – 2021

Category	2016	2017	2018	2019	2020	2021	Average for 6 yrs. (rounded)
Total number of transplanted kidneys*	172	192	167	153	123	139	158
Number of deceased-donor kidney only transplants	122	136	122	126	92	102	117
Number of living donor kidney transplants	50	51	40	25	28	35	38
Number of simultaneous pancreas/kidney (SPK)	0	5	5	2	3	2	3
Number of paired kidney exchange (Living donor UK)	7	3	3	3	1	2	3

*includes SPK and excludes paired kidney exchange (UK)

Table 2.2: Functioning transplants, year-end 2021

Category	0-10 years	>10-20 years	>20-30 years	>30-40 years	>40 years	Total kidneys
Deceased donor kidney only transplants	1,012	703	249	55	8	2,027
Living donor kidney transplants	329	62	4	23	11	429
Simultaneous pancreas/kidney (SPK)	30	32	6	0	0	68
All kidney transplants	1,371	797	259	78	19	2,524

* excludes functioning transplants from recipients of kidneys transplanted abroad who are part of the National Kidney Transplant Service

Figure 2.1: Number of deceased donor kidney transplants per annum 1964 – 2021

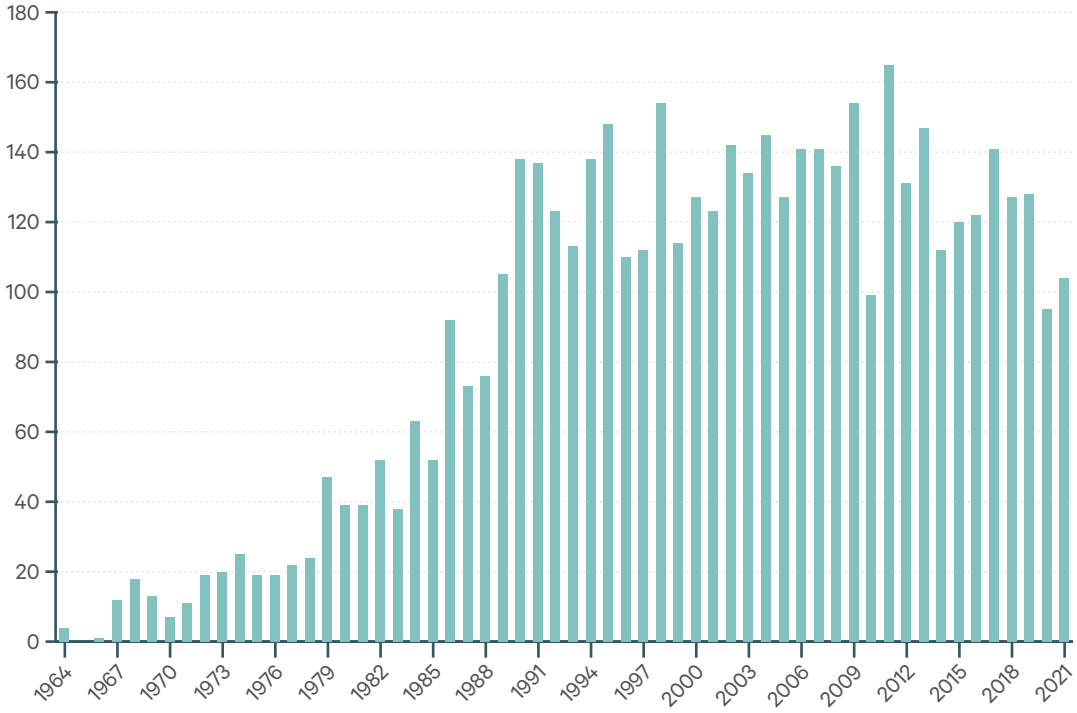


Figure 2.2: Number of living donor kidney transplants per annum 1972 – 2021

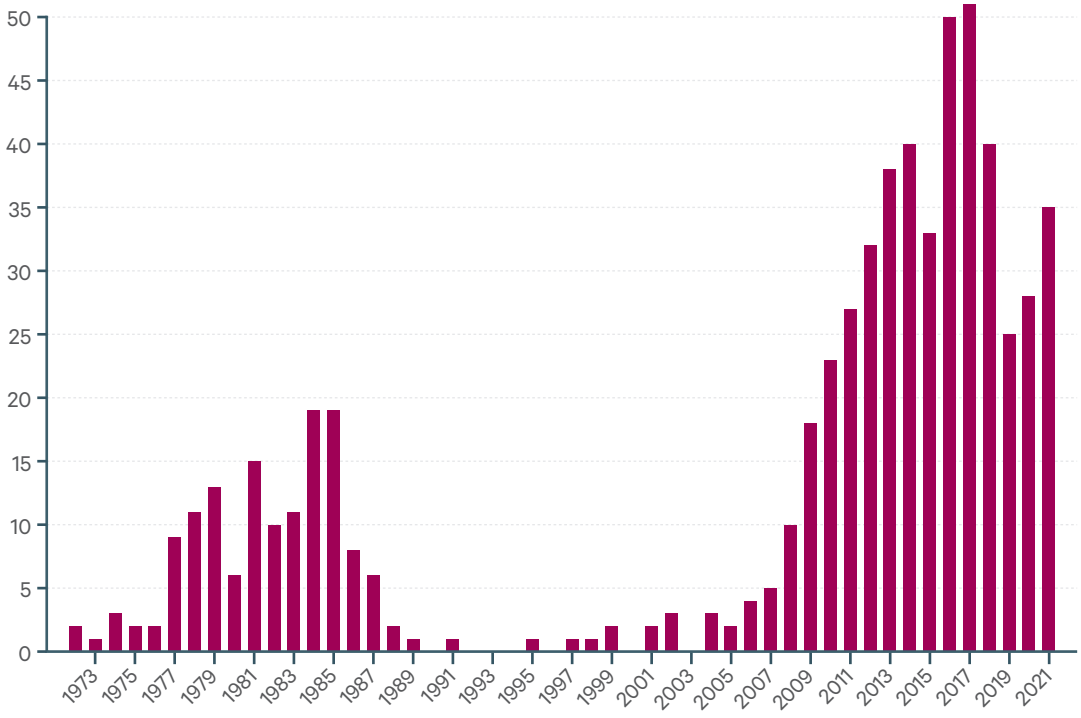


Figure 2.3: Proportion of total - deceased & living donor kidney transplants 2004 – 2021

25%

Living donation represented 25% of transplantation in 2021, similar to overall 24% in last 6 years

2.2 Immunosuppression protocol 1983-2021

Figure 2.4: Immunosuppression protocol for deceased and living donor recipients 1983 – 2021

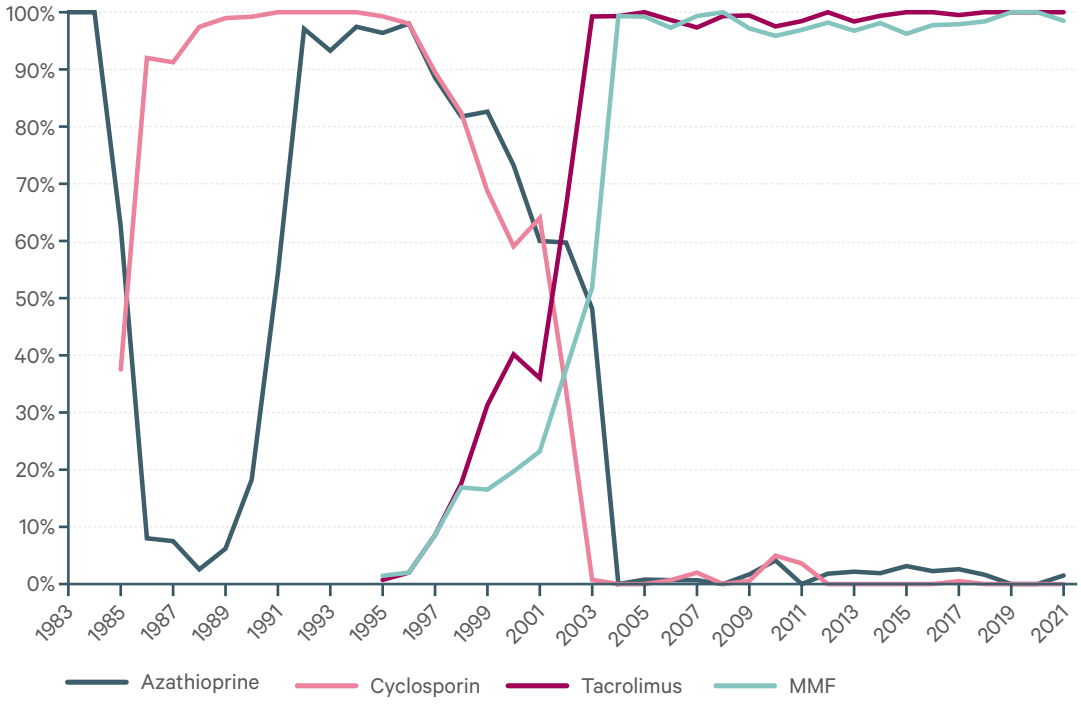
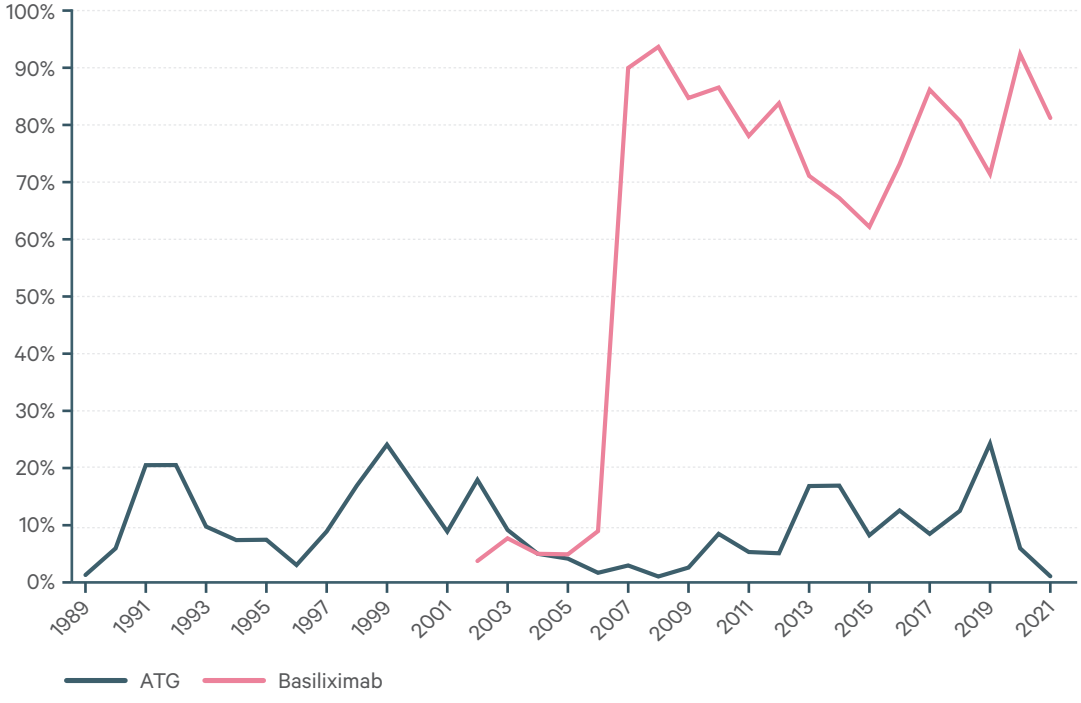


Figure 2.5: Induction therapy for deceased and living donor recipients 1989 – 2021



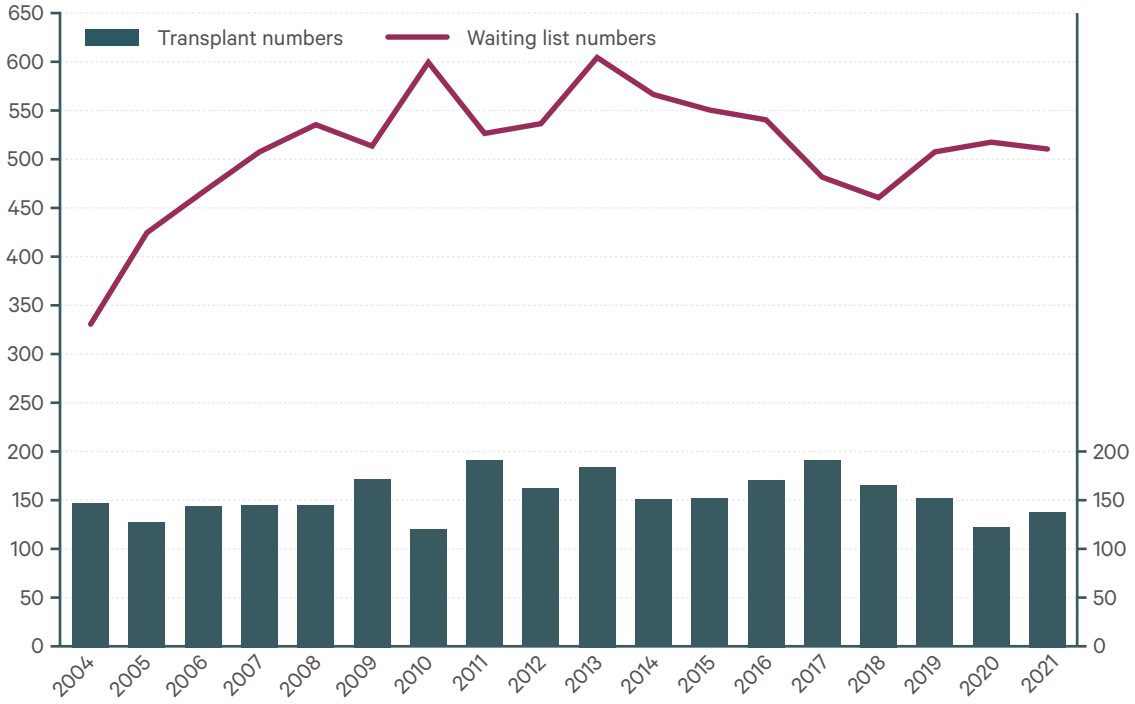
SECTION 3

Kidney Transplant Waiting List

- **At the end of 2021 the kidney transplant waiting list declined slightly to 512 from the previous year end number of 519. This represents a gradual reversal of the trend from recent years where a high of 606 was recorded at the end of 2013 and subsequently decreased to 462 by the end of 2018 (Figure 3.1).**
- **The overall median waiting time to first transplant in 2021 was 25 months, i.e. of the 139 patients transplanted last year 50% received their first kidney within 25 months of being placed on the transplant waiting list - an increase from 19 months in 2020. Waiting times for living donor transplants were considerably shorter than deceased donor transplants, at 15.5 months and 30 months respectively (Figure 3.2). Of note highly sensitised patients (PGen ≥ 95%) had a median waiting time of 64 months.**
- **Median time on dialysis was 27 months overall, 34 months for deceased donor and 17 months for living donor recipients (Figure 3.3).**
- **In 2021 12 (8.6%) of transplants were performed in patients not yet established on dialysis i.e pre-emptively.**

3.1 Number on kidney transplant waiting list compared with total number of kidney transplants

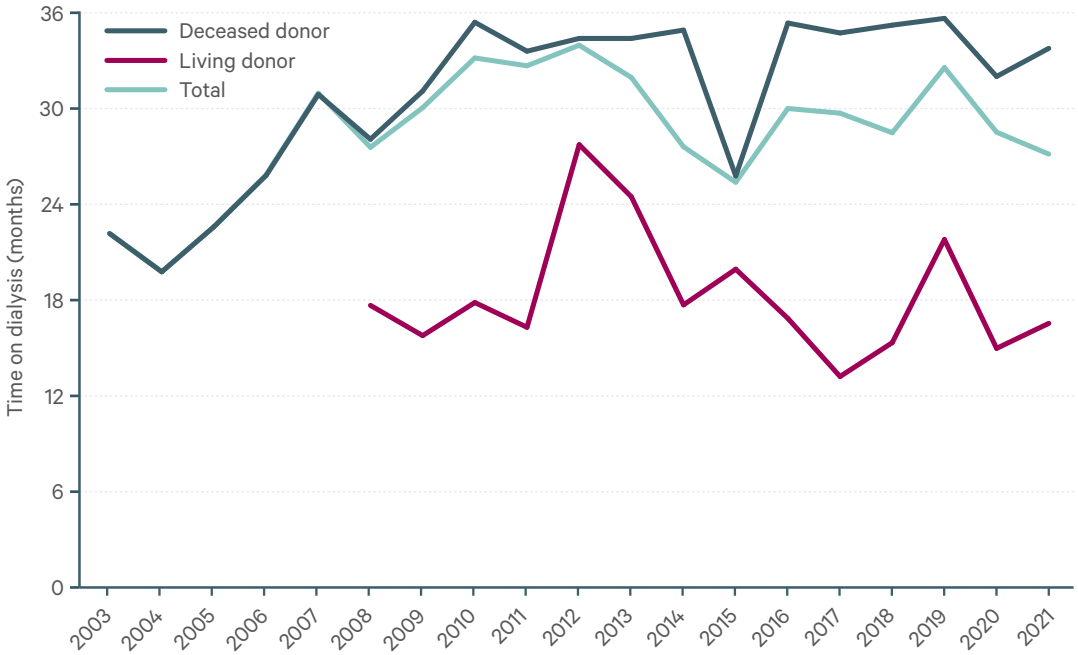
Figure 3.1: Number of potential recipients (active and suspended) on transplant waiting list (at year end) and total number of kidney transplants 2004-2021



3.2 Median time on transplant waiting list and median time on dialysis prior to first transplant

Figure 3.2: Median time on the waiting list prior to first transplant 2004-2021

Figure 3.3: Median time on dialysis prior to first transplant 2004-2021



3.3 Referring centre of transplant recipients

- **Transplant numbers by referring centre expressed as a percentage for 2021 and the last 6 years are presented in Figure3.4. Beaumont Hospital which had the largest proportion of patients transplanted also has the largest number of patients on waiting list at 112 (22%) as illustrated in Figure 3.5. The numbers transplanted per centre broadly reflect the numbers on the waiting list for each centre.**

Figure 3.4: Percentage of total patients transplanted by referring centre for year 2021 separately and overall for years 2016-2021

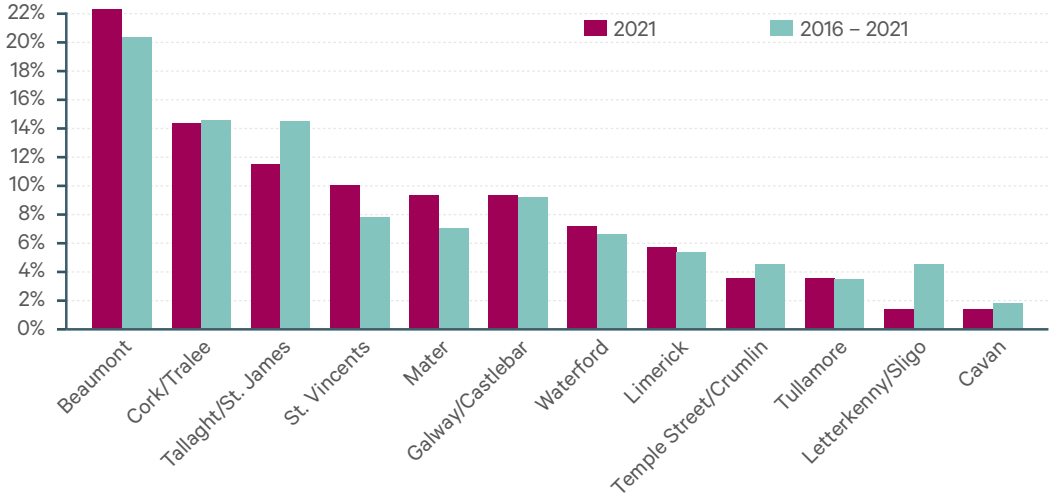
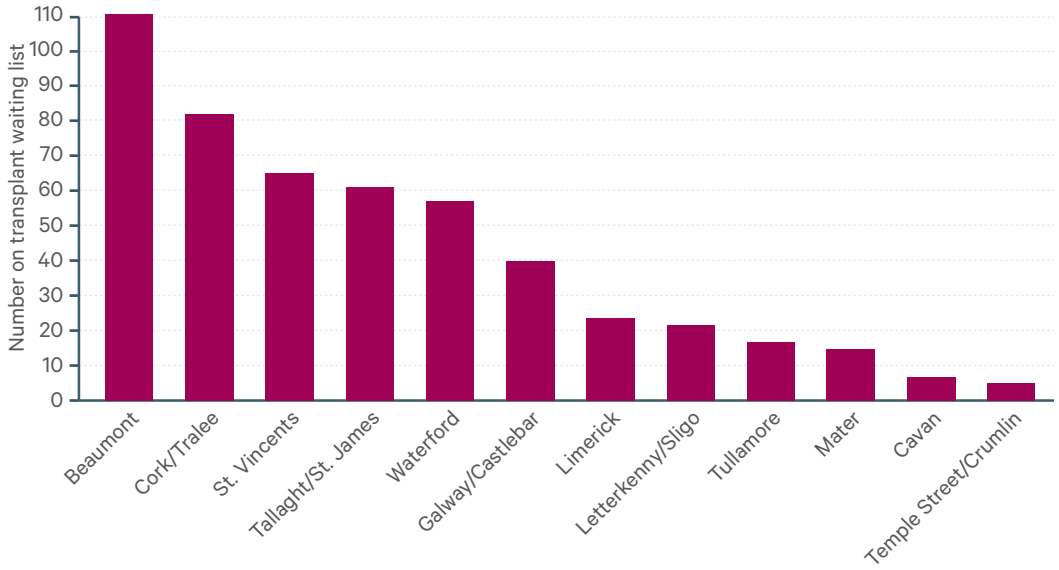


Figure 3.5: Number of patients per referring centre on transplant waiting list at end of 2021



SECTION 4

Recipient and Donor Characteristics at Transplantation

- **There has been a noticeable trend of increasing recipient age at time of transplant for deceased donors. The median age increased from a low of 40 in 2004 to 53.9 years in 2021 (Figure 4.1). This is the highest ever median recipient age for deceased donor kidney recipients in Ireland. The age range for this cohort was 4 to 78 years.**

- **In 2021 just over 20% of deceased donor recipients were ≥ 65 years of age representing an emerging trend of transplanting in higher recipient age groups.**

- **During 2021, the median recipient age of living donor transplants was 39.4 years, range (5 – 64 years), close to the overall median age of 39.6 years for the period 2007 – 2021 (Figure 4.2).**
  For comparison, during a previous period of high living donor transplant activity 1977 – 1985, the median age of recipient at transplant was 28 years.

- **Recipient sex ratios of deceased and living donor kidneys has remained constant over time with approximately two thirds of transplants being male recipients, which reflects the sex distribution of patients on the transplant waiting list. During 2021 the percentage of male versus female recipients was similar to the broader period 2004 - 2021 (Figure 4.3).**

- **Renal replacement modalities prior to transplantation for 2021 varied somewhat from previous years. Whereas regular haemodialysis (RHD) was comparable to the period 2004-2021 the percentage of pre-emptive transplants was reduced to 8.6% and the percentage rates for peritoneal dialysis (PD) and home haemodialysis (HHD) were up slightly (Figure 4.4).**

- **The number of people on the transplant waiting list for whom there is difficulty in finding a compatible donor due to the presence of antibodies poses a major challenge. The majority of these patients have had a previous transplant or other sensitising event including blood transfusion, previous pregnancy or infection. There has been a steady increase in the number of such 'highly sensitised' patients transplanted in recent years with 14% of all patients transplanted in 2021 having a PGen≥ 95% (Figure 4.6). This cohort of patients remains challenging to transplant especially with the risk of exposing them to augmented immunosuppression during the COVID-19 pandemic.**

- **Median donor age for deceased donor recipients was 46 years, range (17 – 68 years) in 2021 (Figure 4.7), similar to the overall period where the highest median donor age was in 2019 at 52 years. Median donor age for living donors has remained relatively constant in recent years and was 45 years (range 27 – 67 years) in 2021 (Figure 4.8).**

- **Donor sex ratios show more male donors donating deceased donor kidneys and more female donors donating living donor kidneys (Figures 4.9 and 4.10).**

4.1 Recipient age

Figure 4.1: Recipient age at transplant for deceased donor kidneys 2004-2021

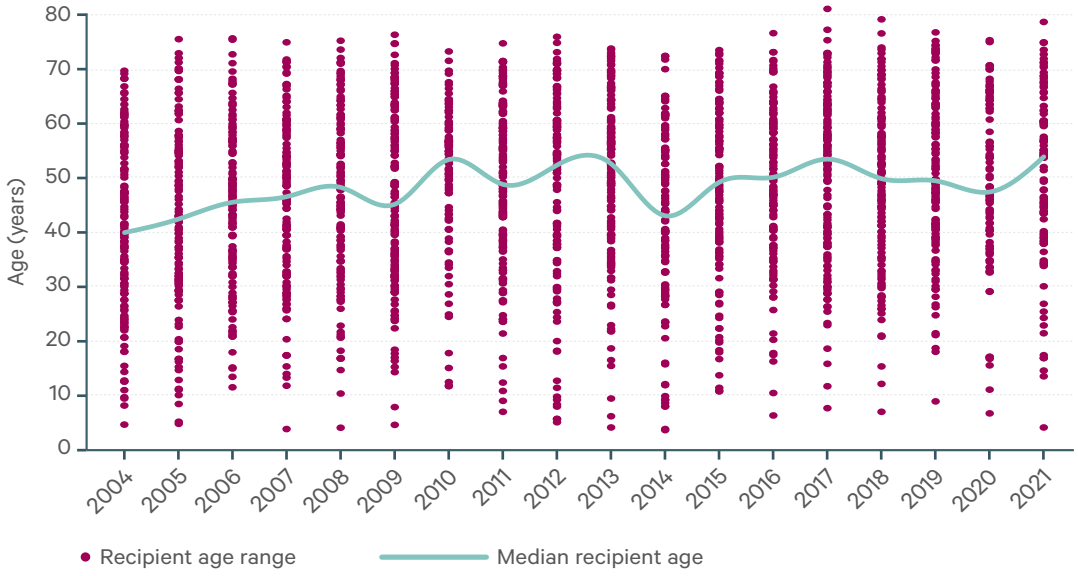
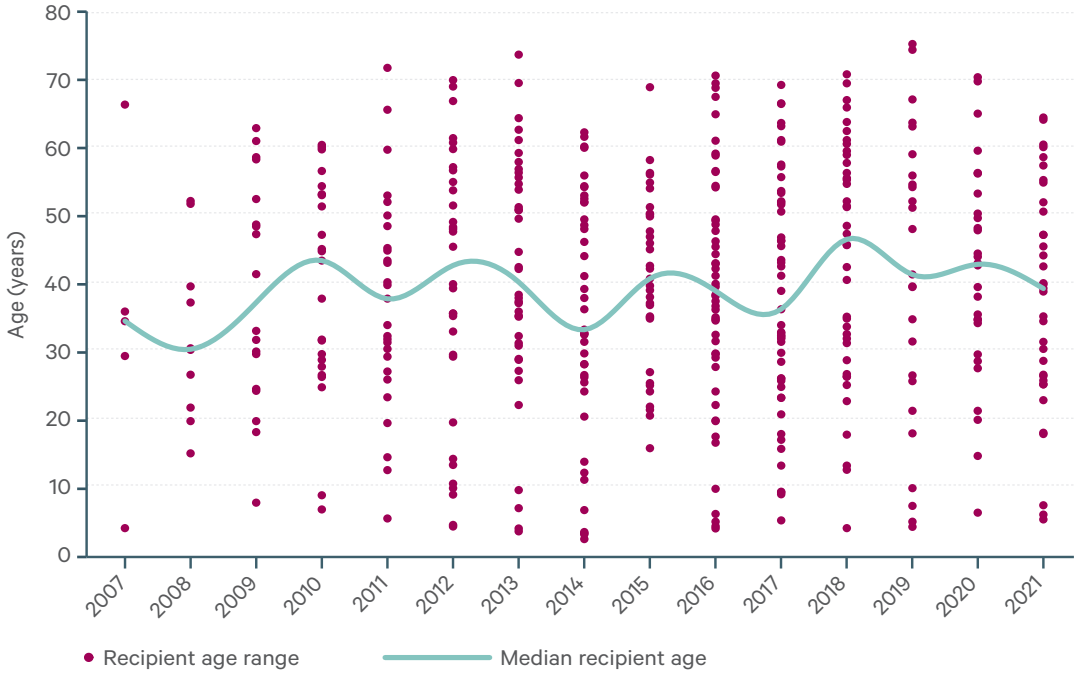
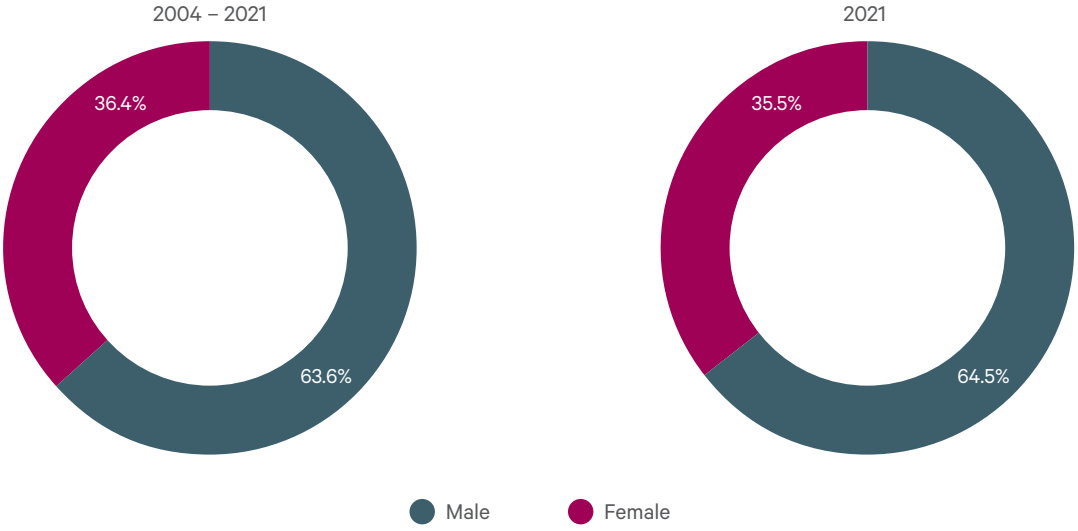


Figure 4.2: Recipient age at transplant for living donor kidneys 2007-2021



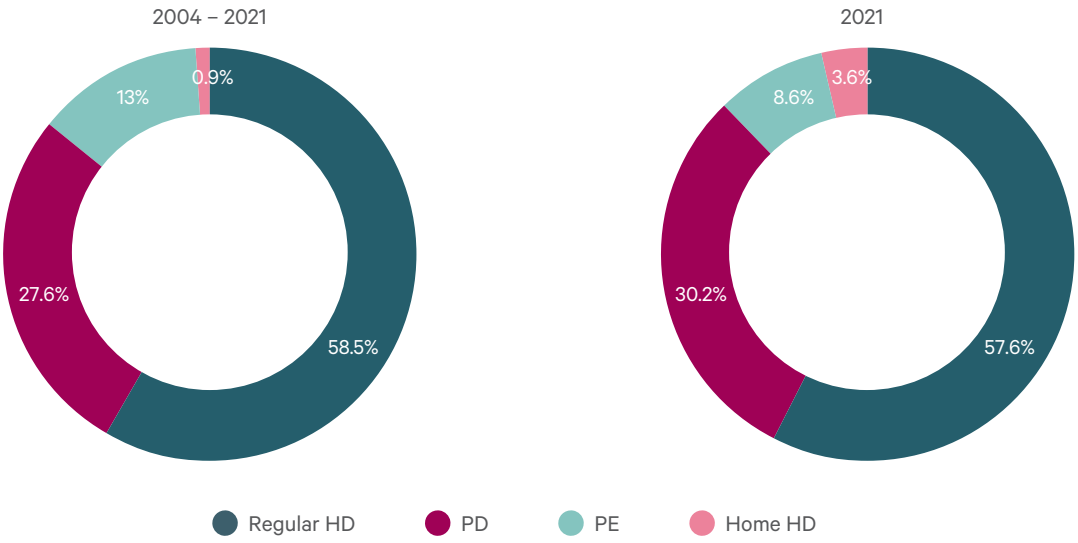
4.2 Recipient sex

Figure 4.3: Sex of recipient for combined deceased and living donor kidney transplants 2004-2021



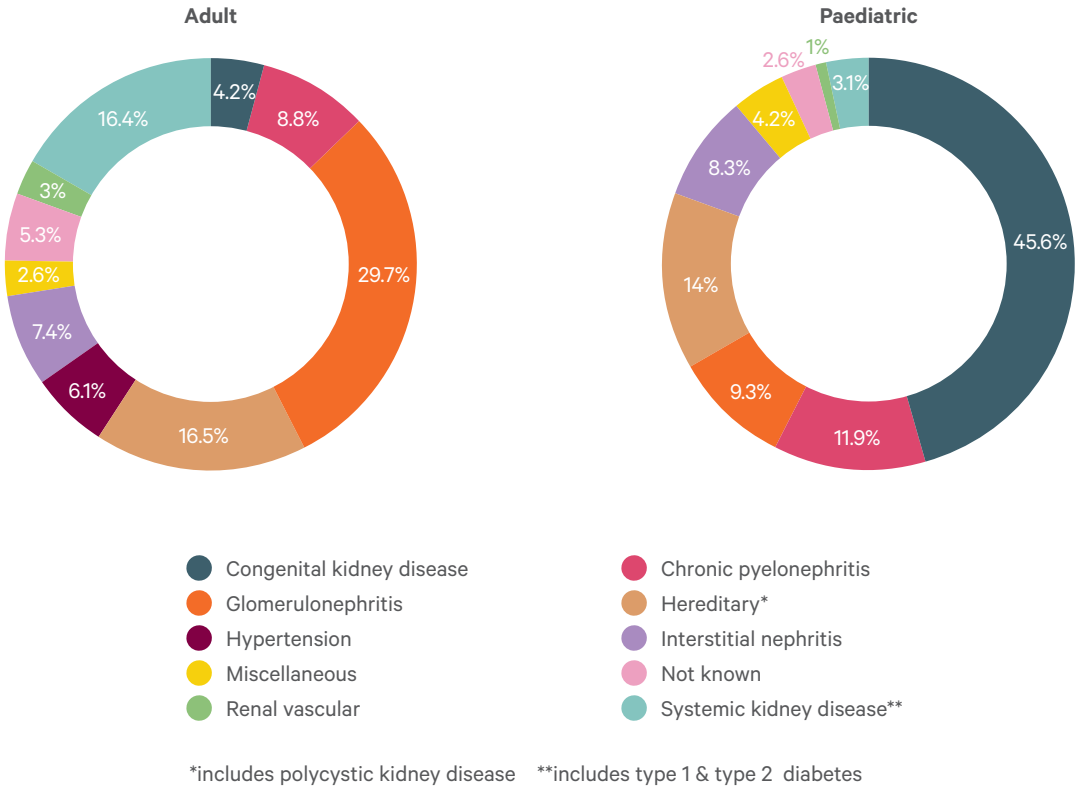
4.3 Mode of renal replacement therapy prior to transplantation

Figure 4.4: Mode of renal replacement therapy prior to first kidney transplant, 2004-2021



4.4 Causes of end stage renal disease for adult and paediatric recipients

Figure 4.5: Causes of end stage renal disease for adult and paediatric transplant recipients 2004-2021



*includes polycystic kidney disease **includes type 1 & type 2 diabetes

The steady increase of highly sensitised patients being transplanted was maintained in 2021 with 14% of all patients transplanted having a PGen ≥ 95%

4.5 Panel reactive antibodies of transplant recipients

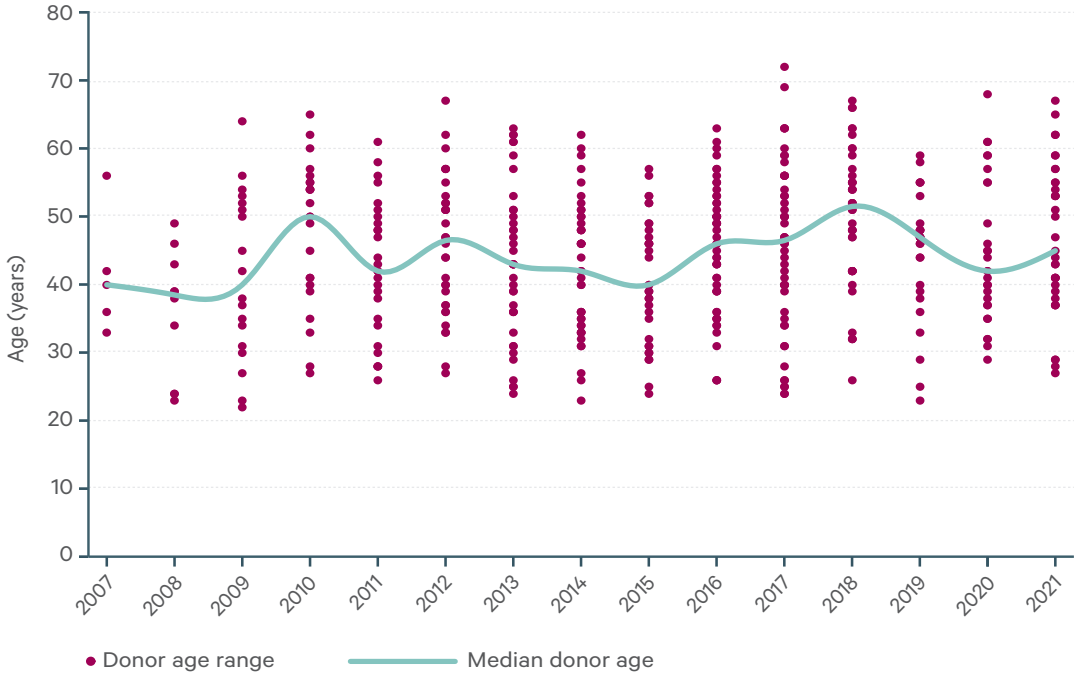
Figure 4.6: Percent PGen in categories for all transplants 2004-2021

Main cause of ESRD in adults is glomerulonephritis (29.7%) while in paediatrics it is congenital disease (49.6%)

4.6 Donor age

Figure 4.7: Donor age for deceased donor kidney transplants 2004-2021

Figure 4.8: Donor age for living donor kidney transplants 2007-2021



4.7 Donor sex

Figure 4.9: Donor sex for deceased donor kidney transplants 2004-2021

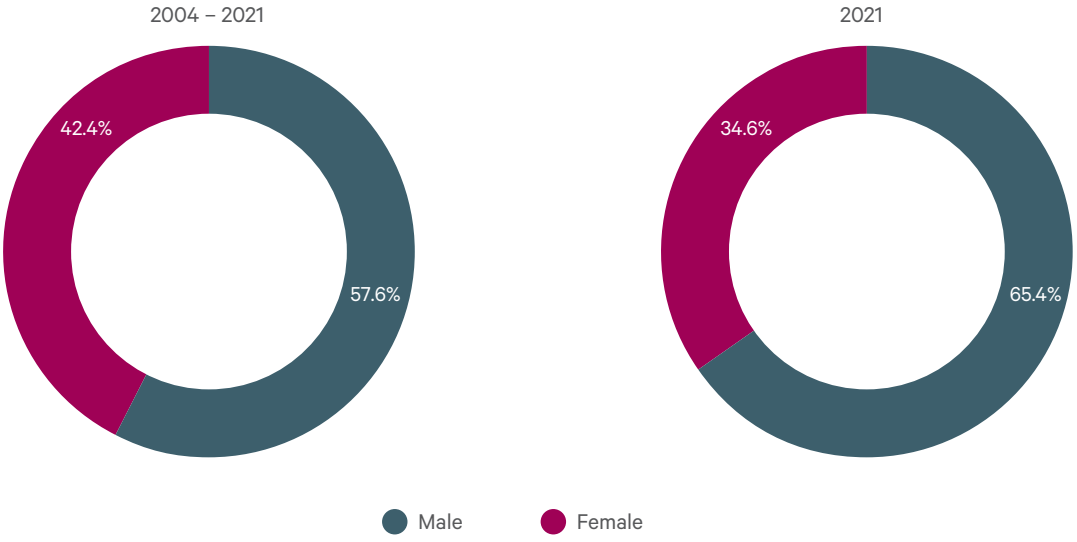
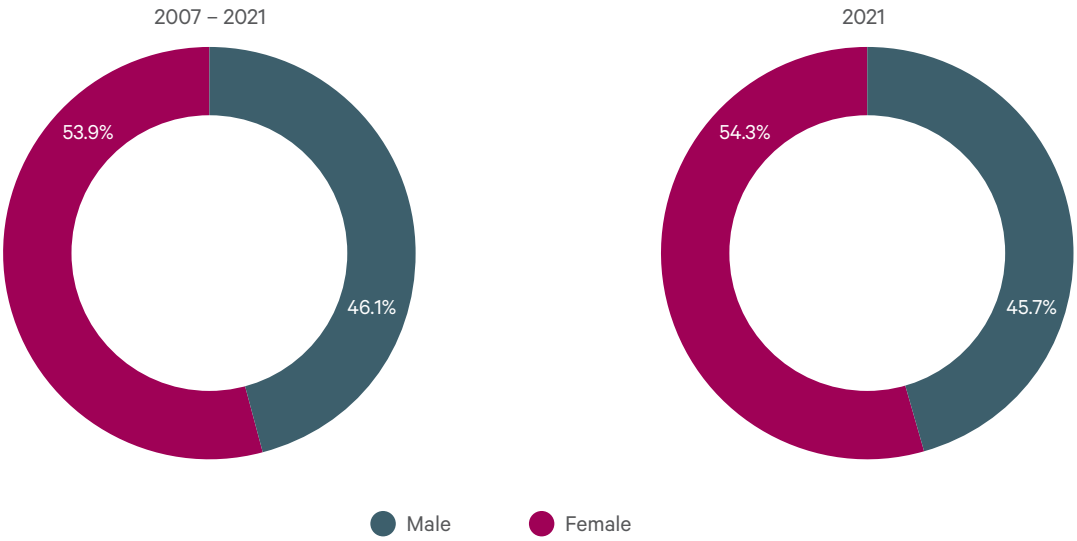


Figure 4.10: Donor sex for living donor kidney transplants 2007 -2021



SECTION 5

Recipient Outcomes

- **The overall median allograft survival for adult first deceased donor transplant in the past 25 years is 15.6 years, with steady improvements in outcomes over time (Table 5.1). The definition of adult recipient is patients age 19 years or older at date of transplant**

- **Outcomes for first and second allografts are almost identical between 1996 and 2020 with median allograft survival for first and second deceased donor adult allografts of 15.6 and 15.5 years respectively. Median survival for third and fourth allografts was 11.3 and 6.1 years respectively (Table 5.3).**

- **One year allograft survival for deceased donor adult kidney recipients for 2016 – 2020 was 96.9%. Five-year allograft survival remains stable at 86.9% for 2011 – 2015 comparable to the previous time period (2006 - 2010) of 87.5%. These results compare very favorably with the earliest period 1996-2000 where 5 year allograft survival was 73.5% (Table 5.5).**

- **Median patient survival for adult deceased donor recipients between 1996 – 2020 was 21.7 years (Table 5.6).**

- **Patient survival at 1 year has remained stable for the eras studied, reaching a high of 98.5% for the period between 2016 – 2020. Five year patient survival rates improved markedly - increasing from 86.7% in the initial period to 92% for 2011 - 2015 (Table 5.8).**

- **One-year allograft survival for adult living donor transplant recipients for the period 2007 - 2020 was 95.2%, and patient survival was 99.7%. Similar one-year allograft results were observed for paediatric recipients. Five-year allograft survival for adult living donor transplant recipients between 2007 and 2020 was 90.3% and patient survival was 96.7%. For paediatric recipients (<19yrs), 5 year allograft and patient survival was 91.4% and 97.5% respectively (Table 5.11).**

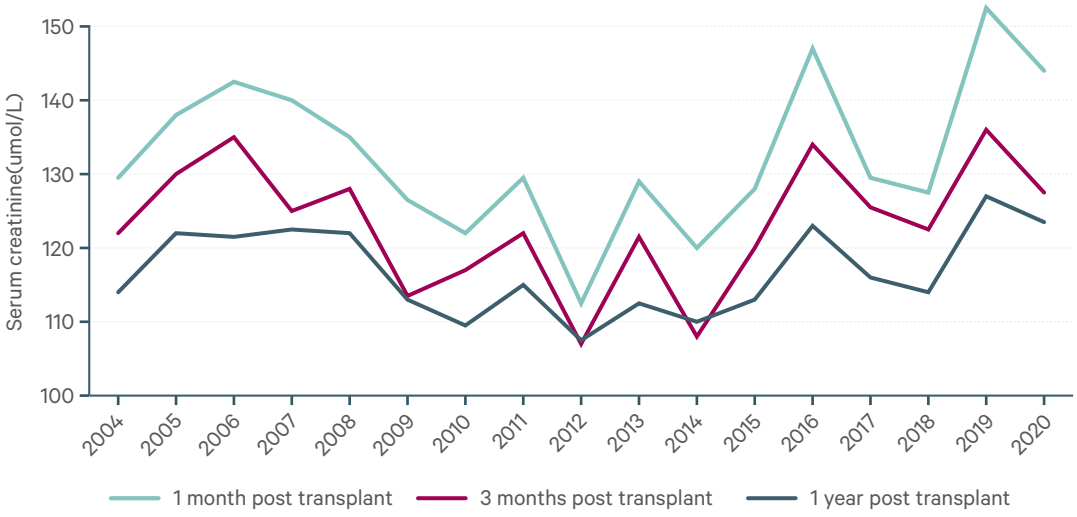
- **The rate of delayed allograft function (defined as the temporary requirement of dialysis within one week of transplant) for deceased donor kidneys has been high for the last 3 years, reaching over 30% in 2019 and 28% in 2021. There are significantly lower rates of delayed graft function for recipients of living donor kidneys and this was reflected in 2021 with a rate of 3% (Figure 5.12).**

- **Instances of acute rejection, defined as either biopsy proven TCMR (T-cell mediated rejection) or ABMR (antibody mediated rejection) within the first year of transplantation have been relatively stable over the last decade with average 10% per year. The rate for 2020 was significantly below average at 3.3% (Figure 5.13).**

5.1 DECEASED DONOR OUTCOMES

5.1.1 Renal function at 1 month, 3 months and 1 year post-transplant of surviving allografts

Figure 5.1: Median plasma creatinine post transplant 2004-2020



5.1.2 Adult deceased donor kidney only allograft long term outcomes

5.1.2.1 Overall adult deceased donor allograft outcomes

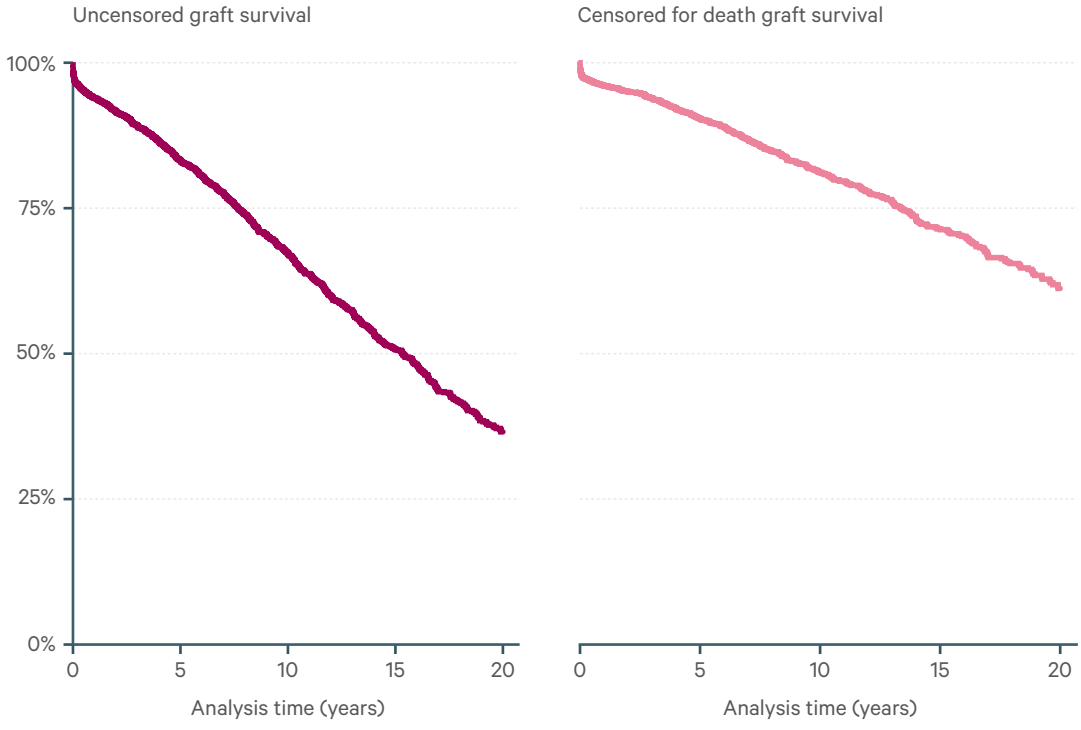
Table 5.1: Overall median adult first deceased donor allograft survival 1996-2020

No of transplants	Median allograft survival in years [95% C.I.] Uncensored for death
2,470	15.6 [14.3 – 16.2]

Table 5.2: Adult first deceased donor allograft survival 1996-2020

Follow up time (years)	Estimated allograft survival [95% C.I.] Uncensored for death	Estimated allograft survival [95% C.I.] Censored for death
1	94.4 [93.4 - 95.2]	96.2 [95.4 - 96.9]
5	83.7 [82.1 - 85.2]	90.9 [89.6 - 92.0]
10	67.7 [65.5 - 69.7]	81.8 [79.9 - 83.5]
15	50.9 [48.3 - 53.5]	72.5 [69.9 - 74.9]
20	37.3 [34.1 - 40.4]	62.4 [58.6 - 66.0]

Figure 5.2: Adult first deceased donor kidney allograft survival 1996-2020



5.1.2.2 Adult uncensored deceased donor allograft outcomes for first and repeat transplants

Table 5.3: Overall median allograft survival for adult deceased donor transplants 1996-2020

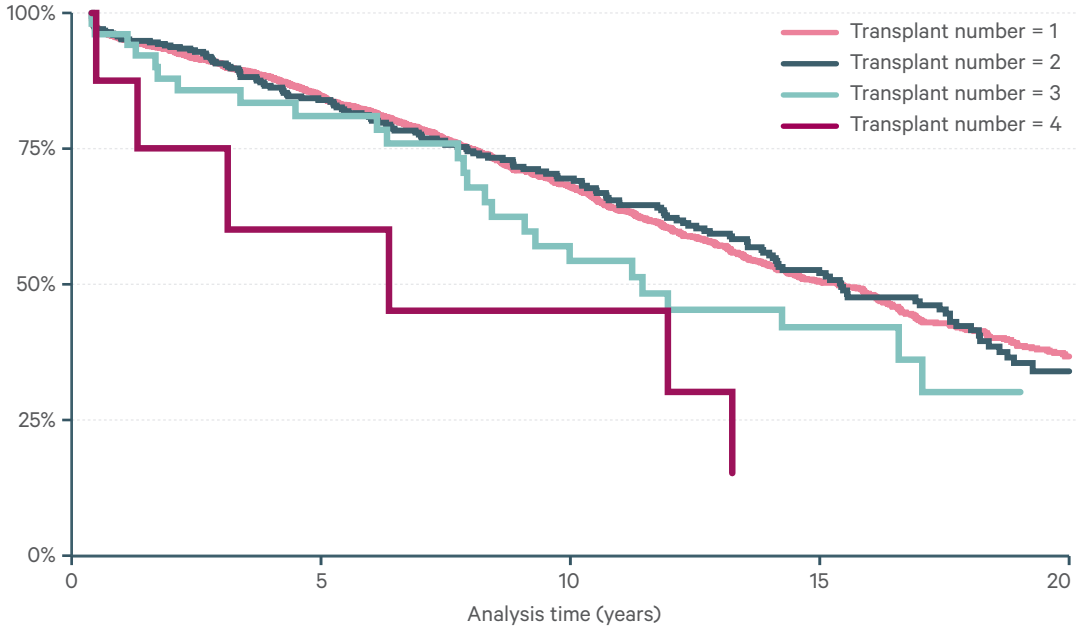
Transplant number	No of patients	Median allograft survival (years) [95% C.I.]	
1	2,470	15.6	[14.3 – 16.2]
2	366	15.5	[13.9 – 18.1]
3	51	11.3	[8.0 – 17.0]
4	8	6.1	[0.1 – 13.1]

Table 5.4: Deceased donor adult allograft survival 1996-2020 by transplant number

Transplant number	Follow up time (years)	Estimated percent allograft survival [95% C.I.]	
1	1	94.3	[93.4 - 95.2]
1	5	83.7	[82.1 - 85.1]
1	10	67.7	[65.5 - 69.7]
1	15	50.9	[48.3 - 53.5]
1	20	37.3	[34.1 - 40.4]
2	1	94.8	[92.0 - 96.7]
2	5	82.4	[78.9 - 87.0]
2	10	69.3	[63.6 - 74.4]
2	15	53.5	[46.9 - 59.6]
2	20	35.4	[27.6 - 43.3]
3	1	92.2	[80.4 - 97.0]
3	5	81.0	[66.5 - 89.6]
3	10	54.2	[37.6 - 68.2]
3	15	41.9	[25.9 - 57.2]
3	20	30.0	[13.7 - 48.2]
4	1	75.0	[31.5 - 93.1]
4	5	60.0	[19.6 - 85.2]
4	10	45.0	[10.8 - 75.1]
4	15	15.0	[0.8 - 47.9]
4	20	15.0	[0.8 - 47.9]

Median adult first deceased allograft survival has increased year on year to 15.6 years

Figure 5.3: Adult deceased donor first and repeat transplants allograft survival estimates 1996-2020

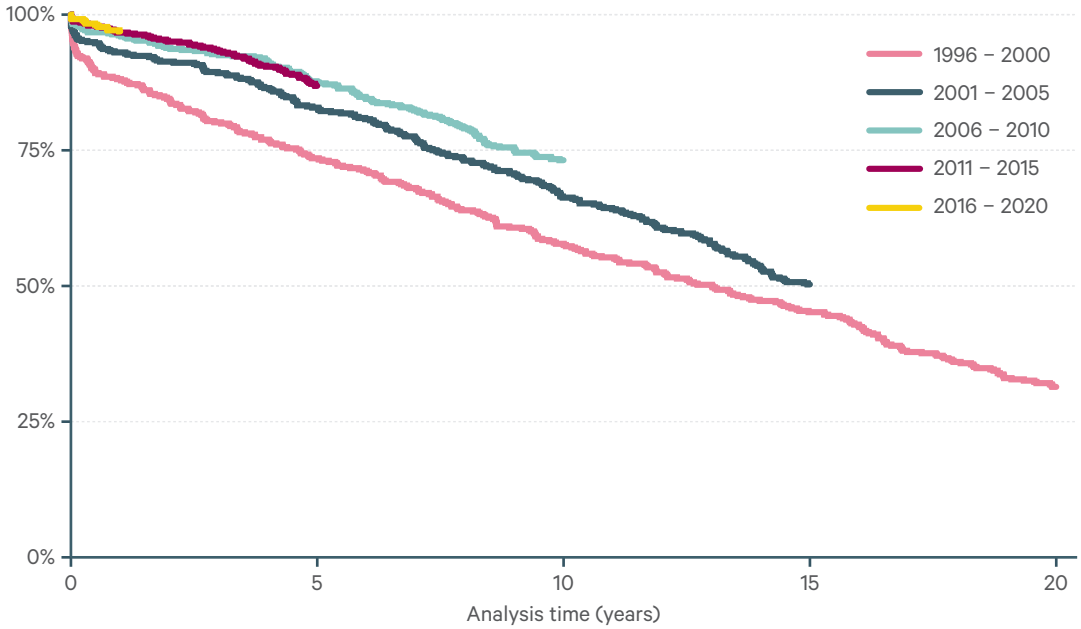


5.1.2.3 Adult uncensored deceased donor first allograft outcomes by era

Table 5.5: Adult first deceased donor allograft survival by era 1996-2020

Period transplanted	Follow up time (years)	Estimated allograft survival [95% C.I.]
1996-2000	1	88.1 [84.7 – 90.8]
1996-2000	5	73.5 [69.2 – 77.4]
1996-2000	10	57.8 [53.0 – 62.2]
1996-2000	15	45.2 [40.5 – 49.8]
1996-2000	20	31.4 [27.1 – 35.8]
2001-2005	1	93.0 [90.3 – 95.0]
2001-2005	5	82.9 [79.1 – 86.0]
2001-2005	10	66.3 [61.8 – 70.4]
2001-2005	15	50.3 [45.7 – 54.7]
2006-2010	1	96.2 [94.1 – 97.5]
2006-2010	5	87.5 [84.4 – 90.1]
2006-2010	10	73.2 [69.1 – 76.8]
2011-2015	1	96.7 [94.8 – 97.9]
2011-2015	5	86.9 [83.7 – 89.5]
2016-2020	1	96.9 [94.9– 98.1]

Figure 5.4: Adult first deceased donor allograft survival by era 1996-2020



5.1.2.4 Overall adult deceased donor patient survival

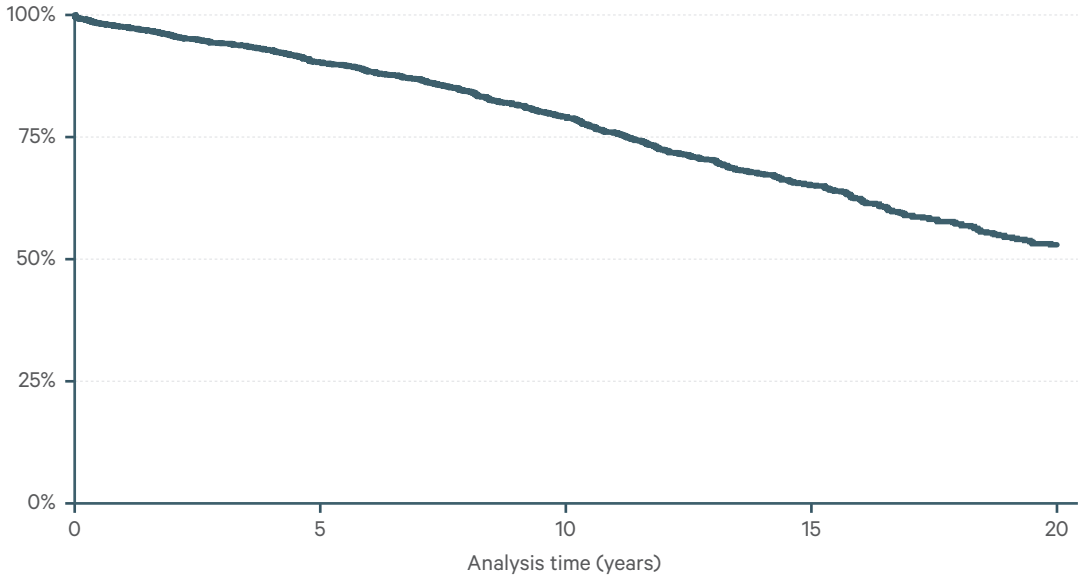
Table 5.6: Overall median adult first deceased donor patient survival 1996-2020

No of transplants	Median patient survival (years) [95% C.I.]	
2470	21.7	[19.5 – 24.2]

Table 5.7: Estimated adult first deceased donor patient survival 1996-2020

Follow up time (years)	Estimated patient survival [95% C.I.]	
1	97.6	[96.9 - 98.1]
5	90.3	[89.0 - 91.4]
10	79.2	[77.2 - 80.9]
15	65.1	[62.6 - 67.5]
20	52.9	[49.7 - 56.1]

Figure 5.5: Kaplan-Meier adult deceased donor patient survival estimates 1996-2020

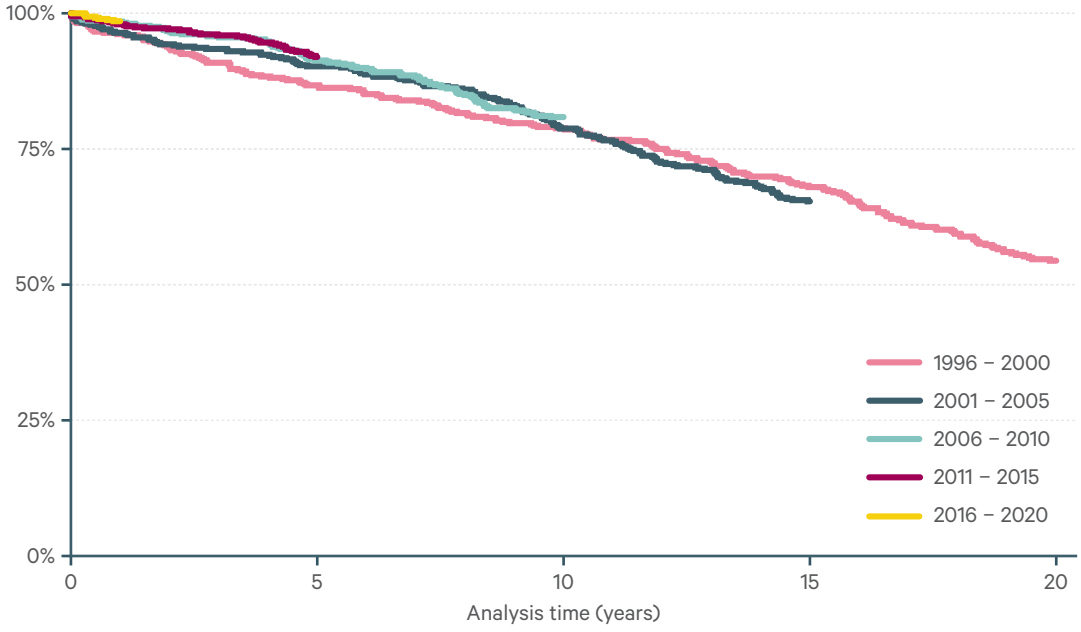


5.1.2.5 Overall adult deceased donor patient survival by era

Table 5.8: Adult first deceased donor patient survival by era transplanted 1996-2020

Period transplanted	Follow up time (years)	Estimated patient survival [95% C.I.]
1996 - 2000	1	96.2 [93.9 – 97.6]
1996 - 2000	5	86.7 [83.2 – 89.6]
1996 - 2000	10	78.8 [74.7 – 82.4]
1996 - 2000	15	68.0 [63.3 – 72.2]
1996 - 2000	20	54.4 [49.5 – 59.1]
2001 - 2005	1	96.4 [94.3 – 97.8]
2001 - 2005	5	90.2 [87.2 – 92.6]
2001 - 2005	10	78.8 [74.8 – 82.1]
2001 - 2005	15	65.3 [60.8 – 69.5]
2006 - 2010	1	98.5 [96.9 – 99.1]
2006 - 2010	5	91.3 [88.5 – 93.4]
2006 - 2010	10	80.9 [77.2 – 84.0]
2011 - 2015	1	98.0 [96.4 – 98.9]
2011 - 2015	5	92.0 [80.3 – 94.0]
2016 - 2020	1	98.5 [97.0 – 99.3]

Figure 5.6: Adult first deceased donor patient survival by era transplanted 1996-2020



5.1.3 Long term outcomes for paediatric deceased donor kidney transplants

5.1.3.1 Paediatric deceased donor allograft and patient survival

Table 5.9: Overall median paediatric first deceased donor allograft survival 1996-2020

No of transplants	Median allograft survival (years) [95% C.I.]
181	17.0 [12.9 – 23.6]

Table 5.10: Paediatric first deceased donor allograft and patient survival 1996-2020

Follow up time (years)	Estimated *allograft* survival [95% C.I.]		Estimated *patient* survival [95% C.I.]	
1	93.4	[88.6 - 96.2]	98.9	[95.6 - 99.7]
5	82.2	[75.6 - 87.1]	98.2	[94.7 - 99.4]
10	72.2	[64.4 - 78.5]	98.2	[94.7 - 99.4]
15	53.2	[43.8 - 61.8]	94.2	[88.0 - 97.3]
20	43.2	[32.4 – 53.4]	83.3	[71.2 - 90.6]

Figure 5.7: Paediatric first deceased donor allograft survival 1996-2020

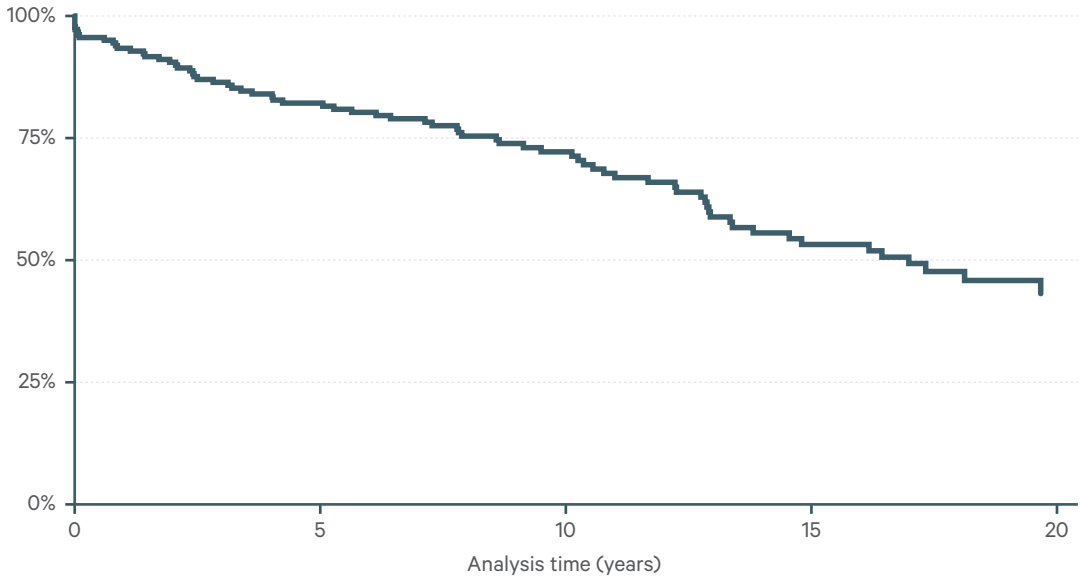
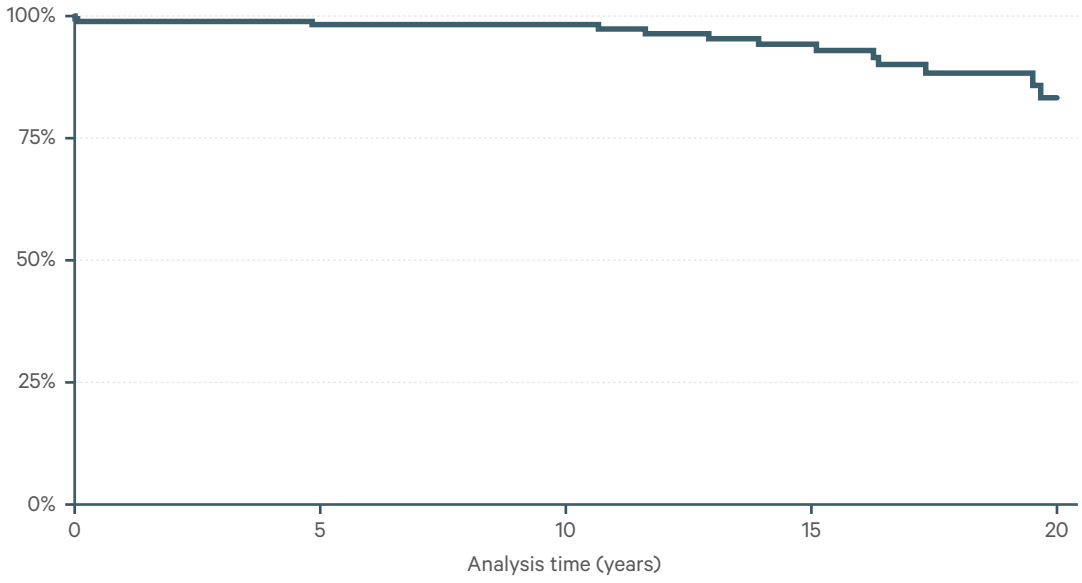


Figure 5.8: Paediatric first deceased donor patient survival 1996-2020

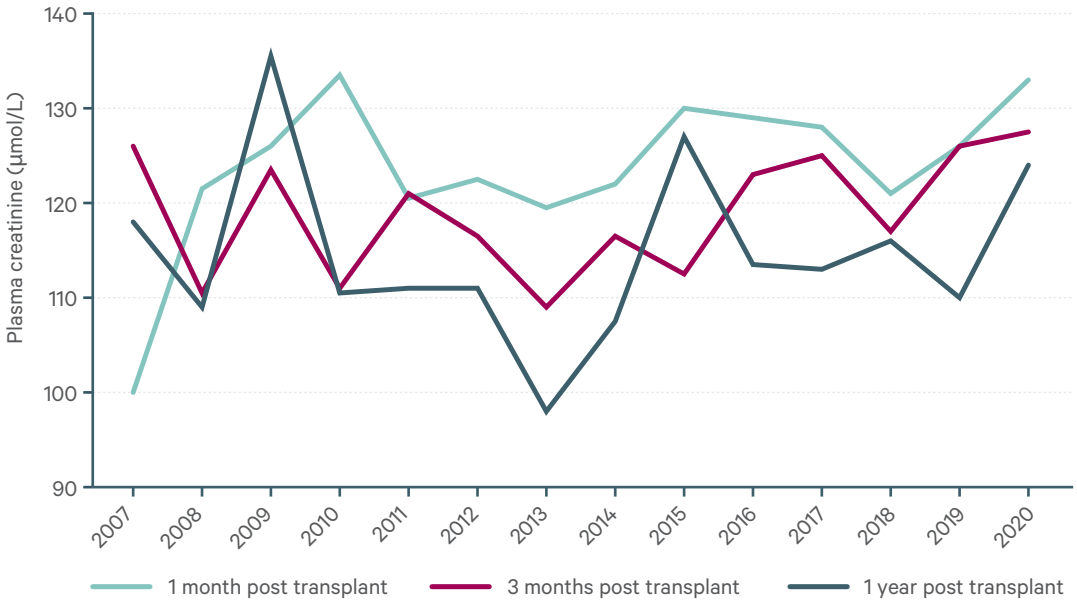


Median paediatric first deceased donor allograft survival is 17 years

5.2 Living Donor Outcomes

5.2.1 Renal function at 1 month, 3 months and 1 year post-transplant of surviving allografts

Figure 5.9: Median plasma creatinine post transplant 2007-2020



Patient and allograft survival has steadily improved for recipients of both living and deceased donation,reflecting the continuous commitment of the NKTS to seek improvements in all aspects of its service.

Adult and paediatric living donor 5 year allograft survival is over 90% and patient survival is over 97%

5.2.2 Long term outcomes for living donor kidney transplants

Table 5.11: Adult and paediatric first living donor allograft and patient survival 2007 – 2020

	Allograft survival				Patient survival			
Follow up time (years)	Adult living donor allograft survival % [95% C.I]		Paediatric Living donor allograft survival % [95% C.I]		Adult living donor patient survival % [95% C.I]		Paediatric Living donor patient survival % [95% C.I]	
1	95.2	[92.1 – 97.1]	93.9	[82.2–98.0]	99.7	[97.6 – 99.9]	100	[-----]
3	93.3	[89.7 – 95.7]	91.4	[78.6–96.7]	98.1	[96.5 – 99.8]	97.5	[83.5 – 99.6]
5	90.3	[85.9 – 93.4]	91.4	[78.6–96.7]	96.7	[93.9 – 98.9]	97.5	[83.5 – 99.6]
10	80.1	[71.4 – 86.5]	69.8	[34.7–88.5]	90.9	[82.0 – 96.5]	97.5	[83.5 – 99.6]

Figure 5.10: Allograft survival for first adult and paediatric living donor kidney transplants 2007–2020

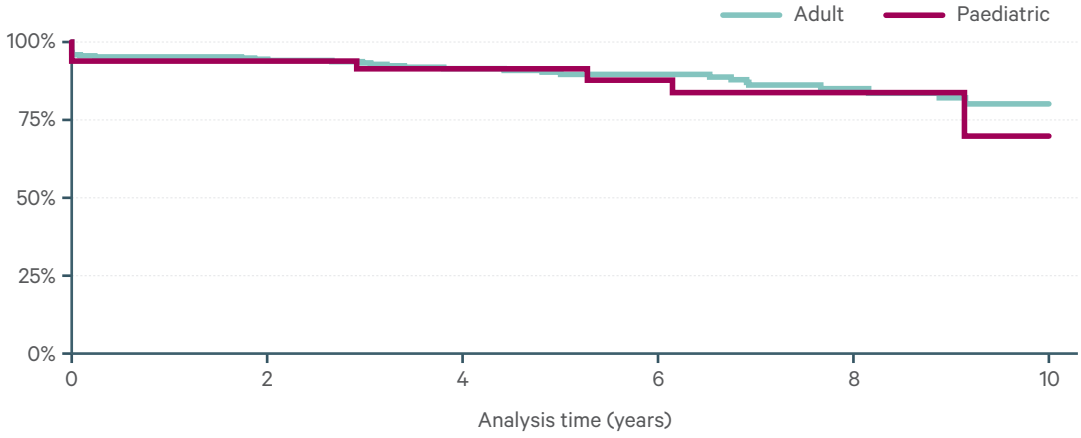
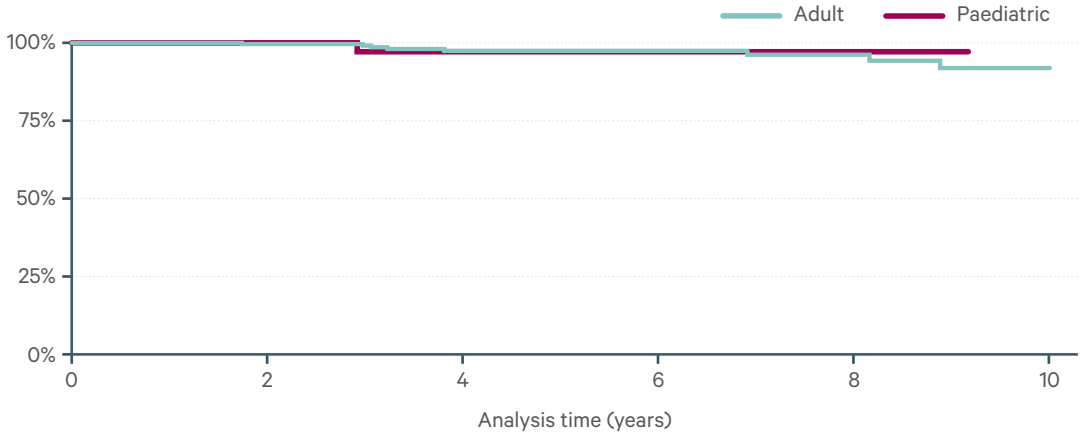


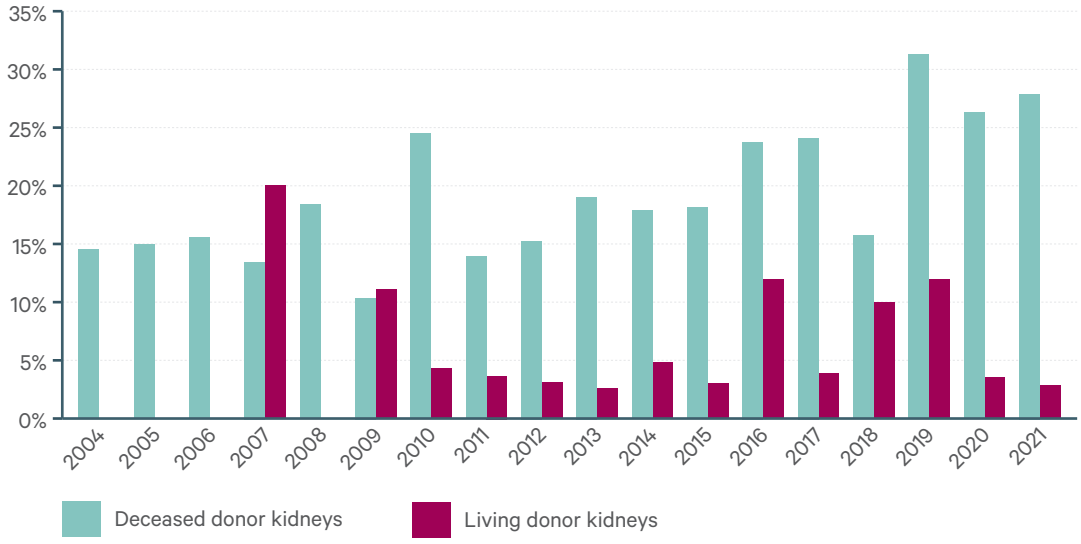
Figure 5.11: Patient survival for first adult and paediatric living donor kidney transplants 2007–2020



5.3 ADVERSE OUTCOMES

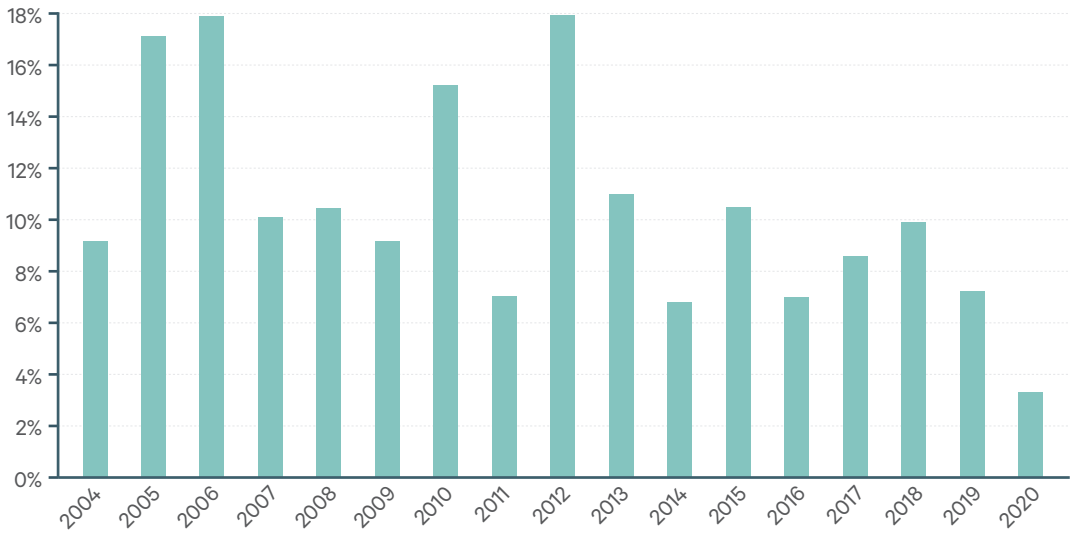
5.3.1 Delayed allograft function

Figure 5.12: Delayed allograft function percentage post-transplant 2004 – 2021



5.3.2 Biopsy proven TCMR (T-cell mediated rejection) or ABMR (antibody mediated rejection) rejection

Figure 5.13: Acute rejection rate post transplant 2004-2020



SECTION 6

International Comparisons

6.1 Comparison of Irish Kidney Transplant Outcomes with European Union (Collaborative Transplant Study)

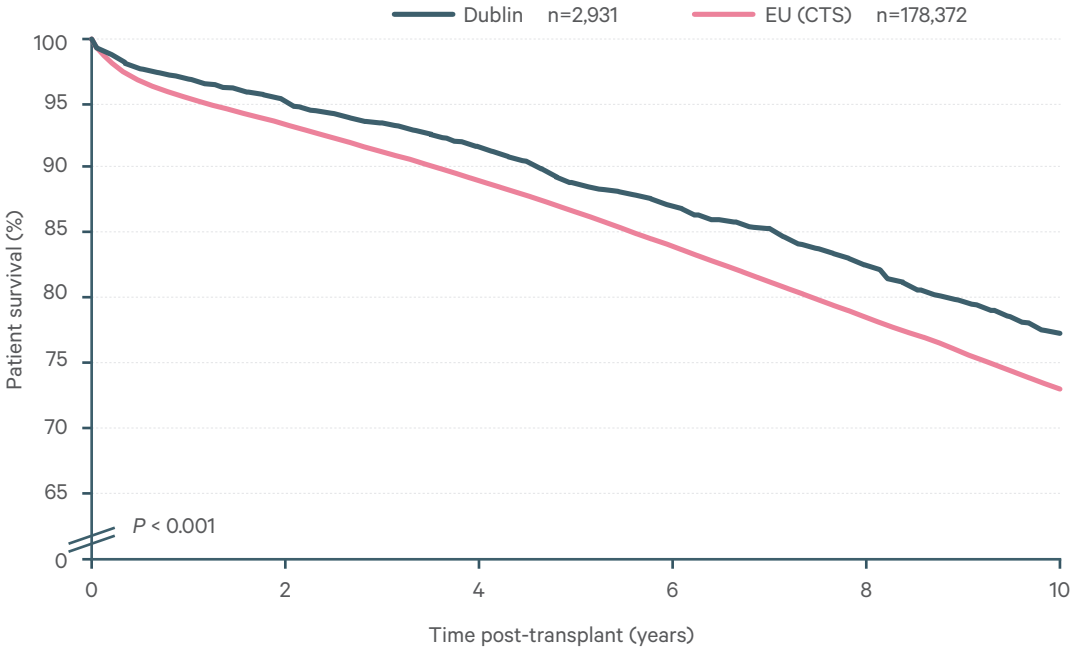
The Collaborative Transplant Study (CTS) is based on the voluntary cooperation of transplant centers from around the world. The CTS has active support of more than 400 transplant centers in 42 countries, with more than 500,000 data sets for kidney, heart, lung, liver, and pancreas transplants collected. The study is coordinated from the Institute of Immunology of the University of Heidelberg, Germany. The Heidelberg CTS team includes physicians, immunologists, computer scientists, statisticians and laboratory staff.

The study's aims are strictly scientific. Aside from maintaining a transplant registry, the CTS conduct various prospective and retrospective studies on particular research topics.

The NKTS Beaumont Hospital provides anonymised data through a secure encrypted portal to the CTS, and they, in return, provide graphical analysis showing the performance of the NKTS compared to other EU centers.

6.1.1 EU (CTS) comparison for kidney transplant survival outcomes

Figure 6.1: EU (CTS) comparison of adult first deceased-donor kidney Patient survival 1990-2019



Long term allograft and patient survival compares favourably with European centers

Figure 6.2: EU (CTS) comparison of adult first deceased-donor kidney Patient survival by era transplanted

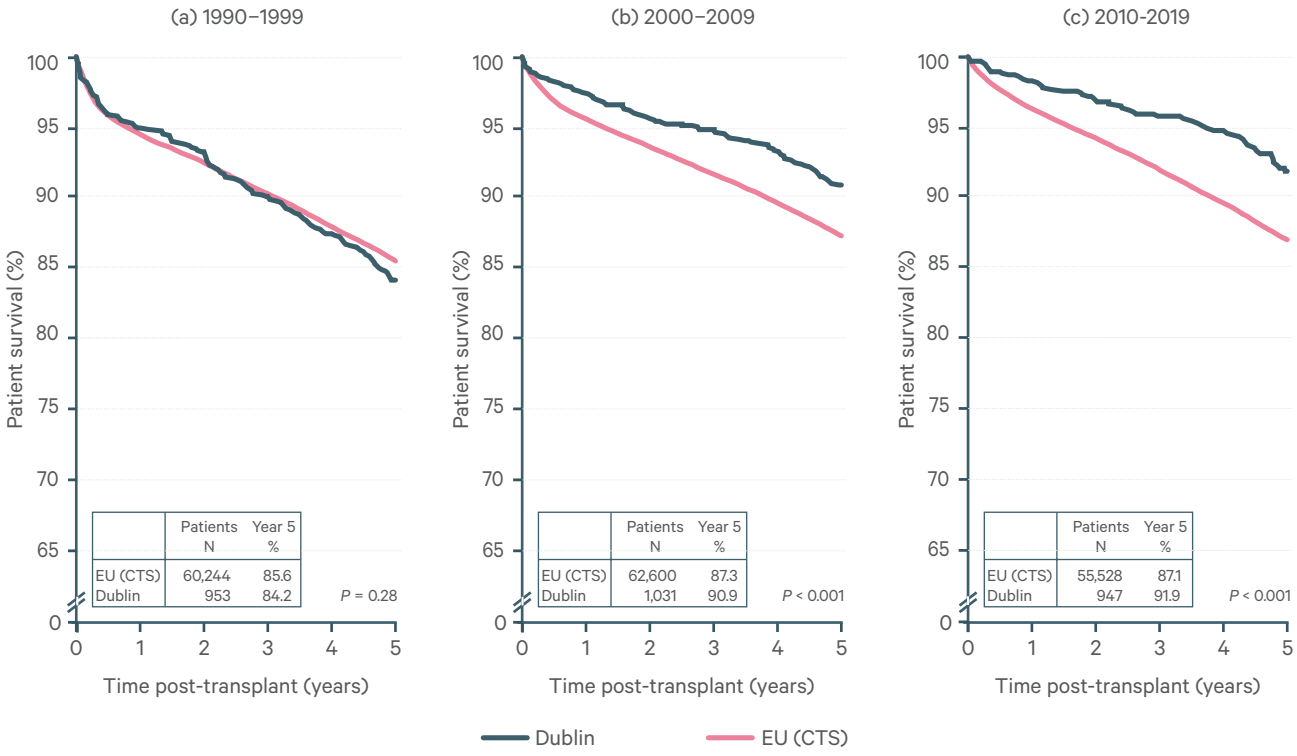


Figure 6.3: EU (CTS) comparison of adult first deceased-donor kidney allograft survival 1990-2019

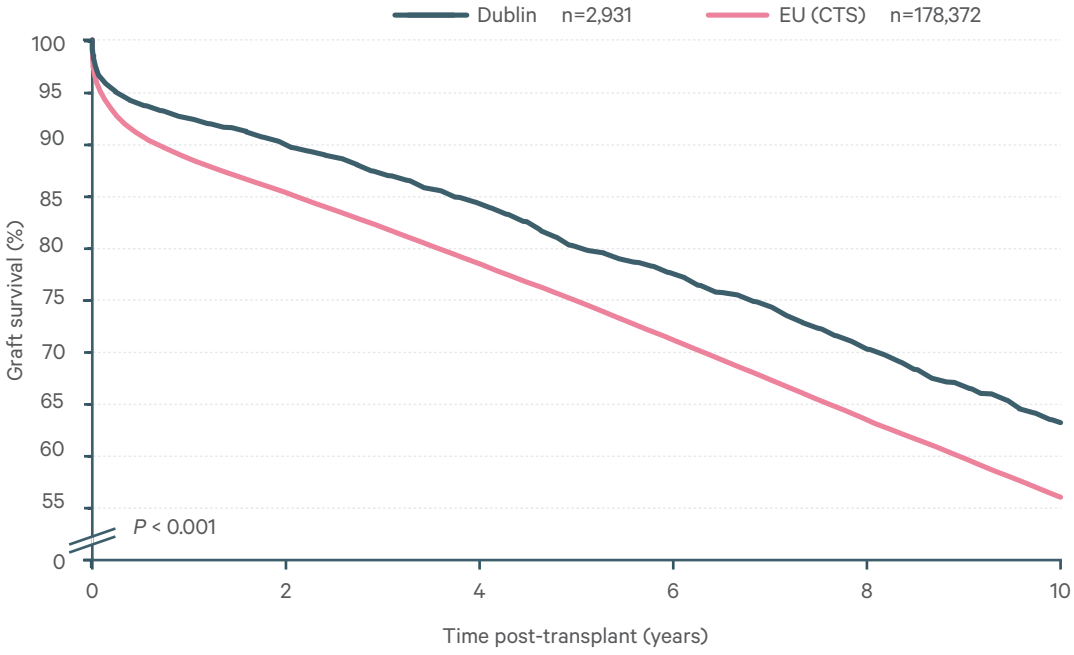


Figure 6.4: EU (CTS) comparison of adult first deceased-donor kidney allograft survival by era transplanted

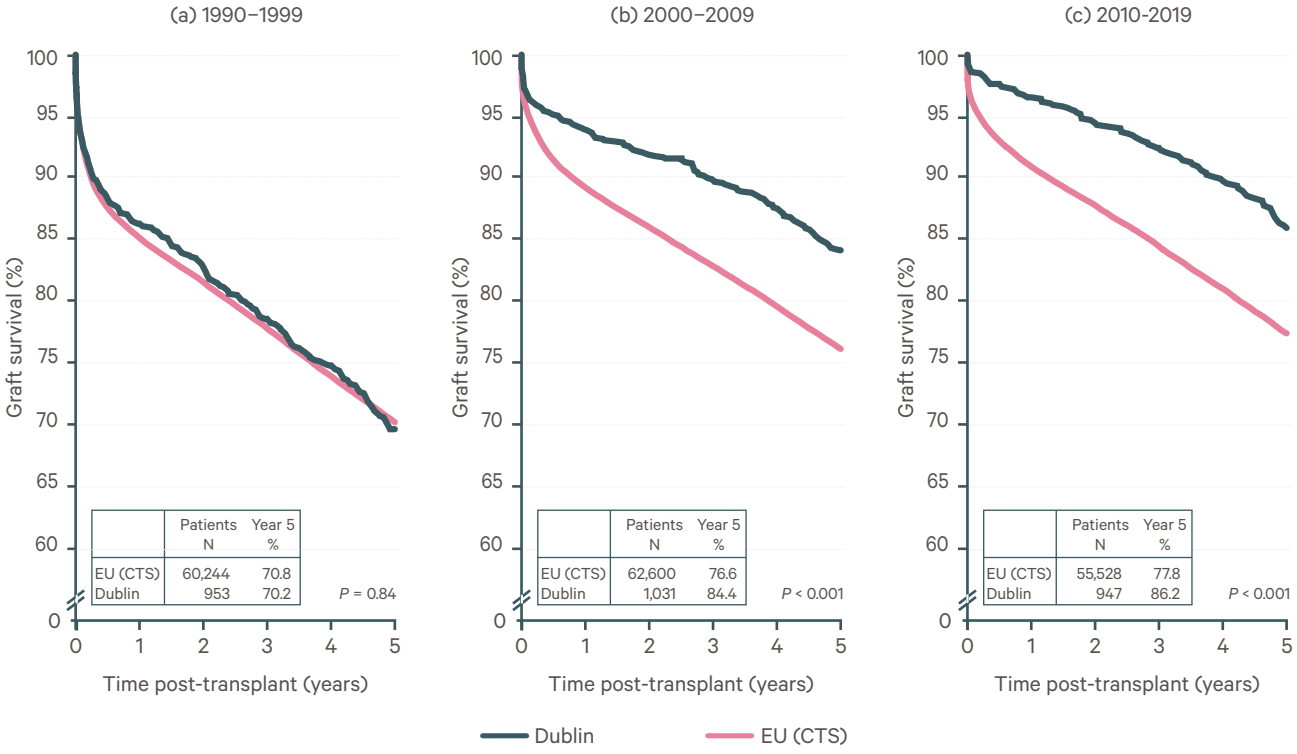


Figure 6.5: EU (CTS) comparison of adult re-transplanted deceased-donor kidney allograft survival by era

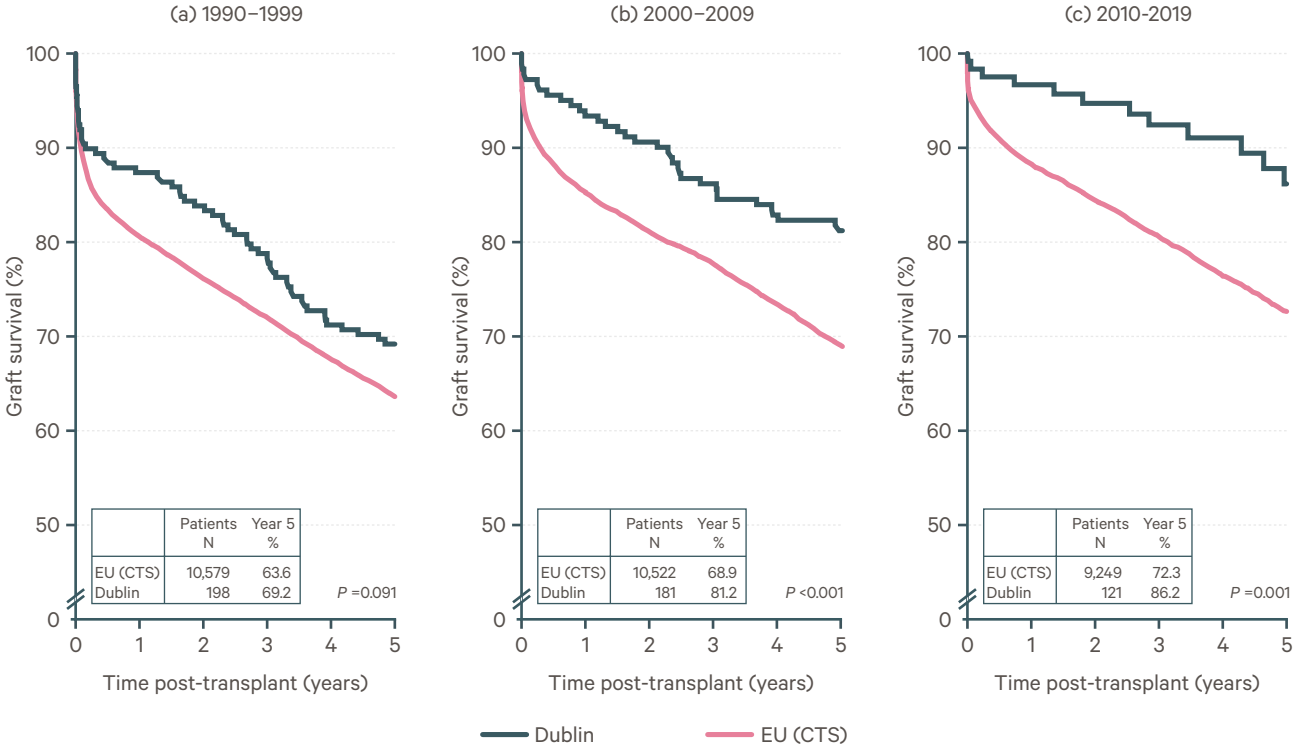


Figure 6.6: EU (CTS) comparison of paediatric first deceased-donor kidney allograft survival 1990-2019

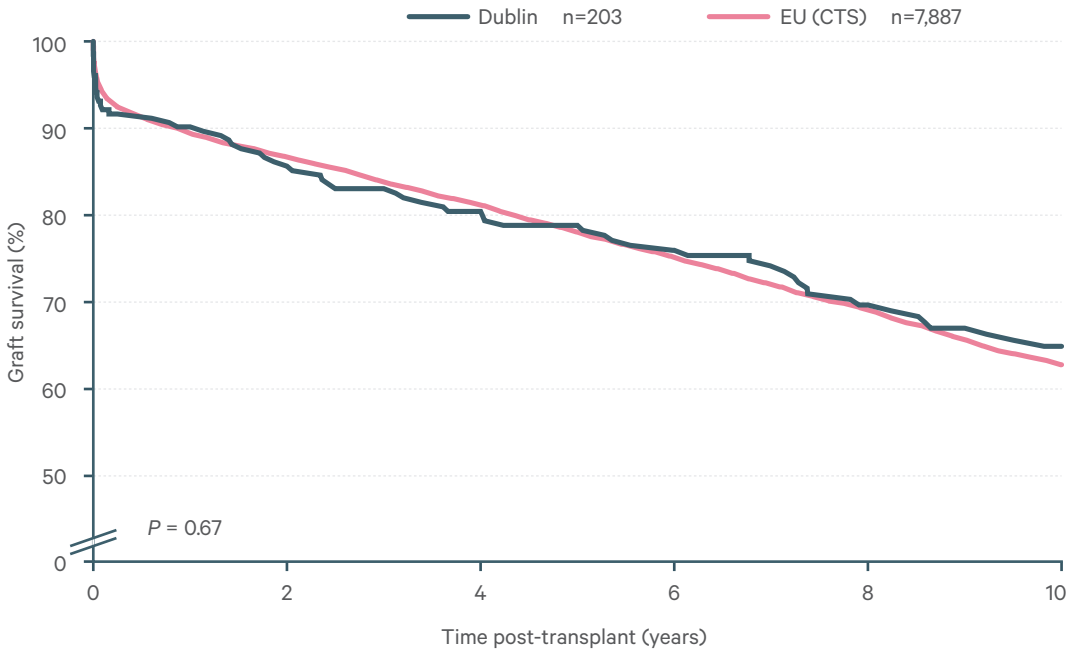


Figure 6.7: EU (CTS) comparison of adult first living-donor kidney patient survival 2009-2019

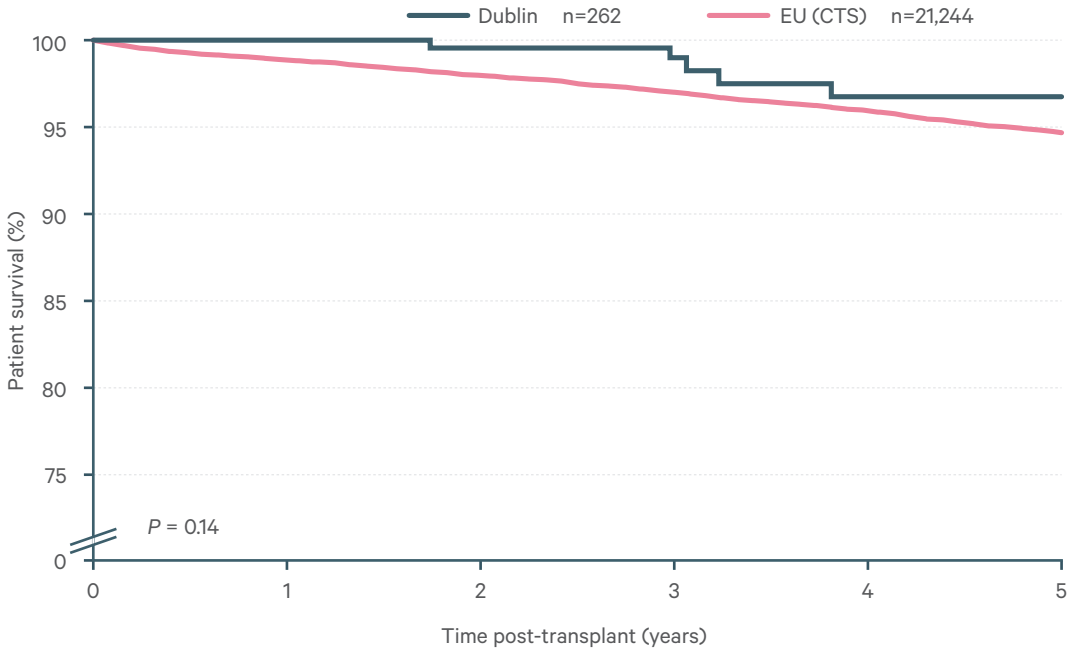


Figure 6.8: EU (CTS) comparison of adult first living-donor kidney allograft survival 2009-2019

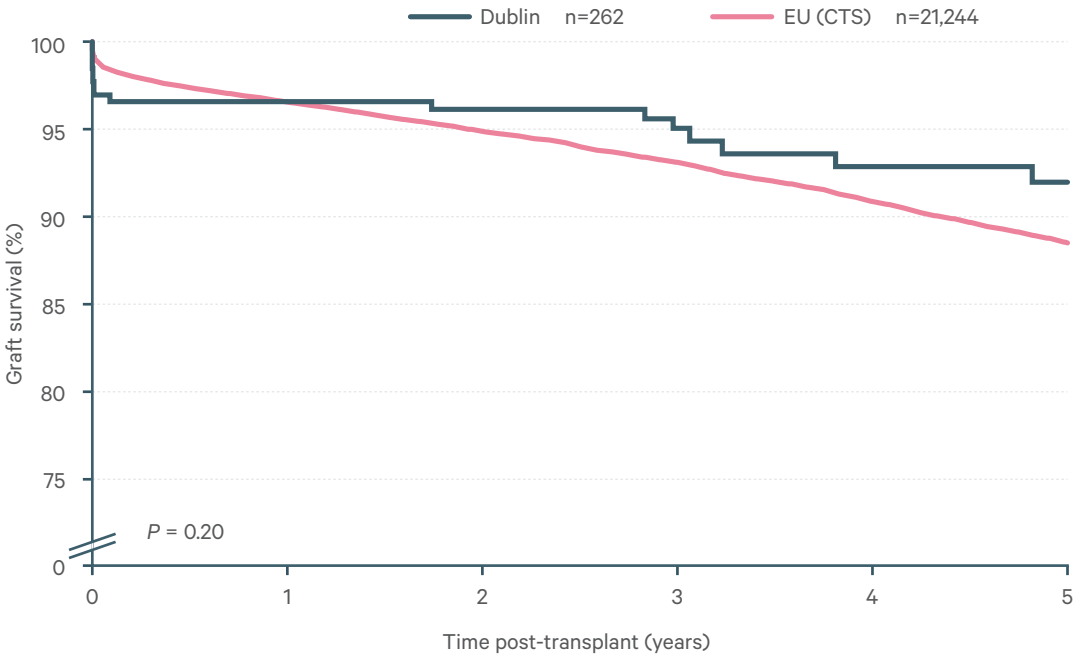
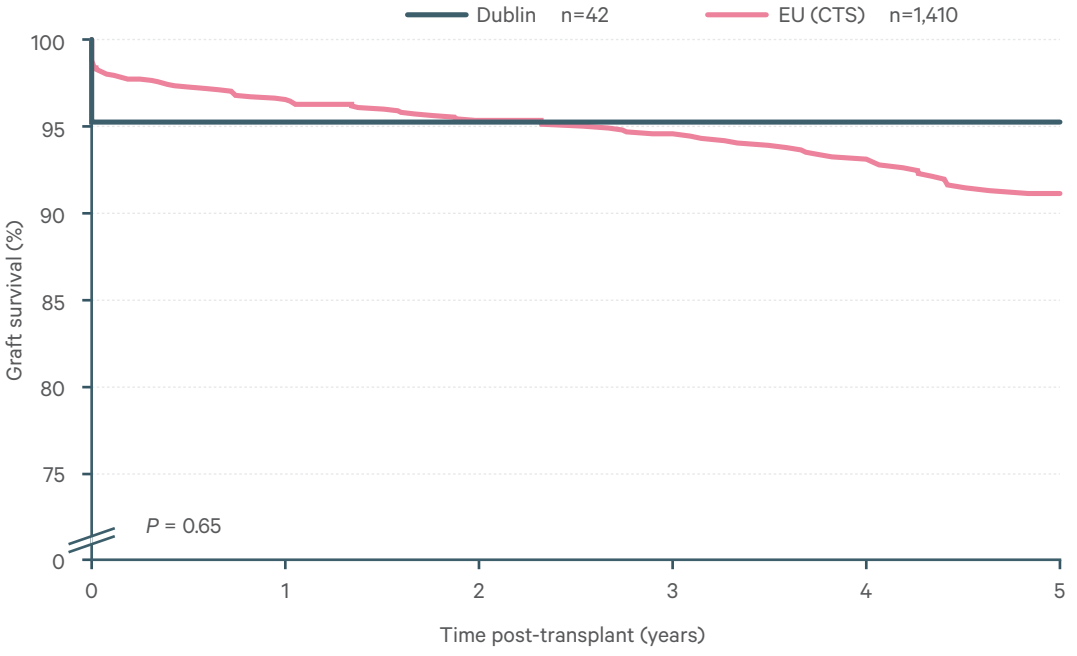


Figure 6.9: EU (CTS) comparison of paediatric first living-donor kidney allograft survival 2009-2019



6.2. Comparison of transplantation rates between European Renal Association (ERA)/ European Dialysis and Transplantation Association (EDTA) countries and Ireland

The ERA/EDTA Registry collects data on renal replacement therapy (RRT) via the national and regional renal registries in Europe. For this section comparisons are made between 40 ERA/EDTA countries/ regions and Ireland which is not affiliated to ERA/EDTA.

Data was gleaned from the 2019(most recent) ERA/EDTA report released in September 2021.

- **The overall kidney transplant rate PMP (per million population)-was 31 for Ireland during 2019. This was lower than the total overall registry rate of 34 PMP. The countries with the highest rates of kidney transplantation are Spain, Northern Ireland, Scotland and France with 73, 59, 56 and 55 PMP respectively. (Figure 6.10)**

- **Deceased donor kidney transplant rate PMP was 26 for Ireland in 2019, higher than the overall registry rate of 24 PMP. The countries with the highest rates of deceased donor kidney transplantation are Spain, Finland, France and the Czech Republic with 66, 48, 47 and 44 PMP respectively(Figure 6.11)**

- **Living donor kidney transplant rate PMP is 5 for Ireland in 2019 compared to a registry overall rate of 10 PMP. Countries with the highest rates of living donor kidney transplantation were Turkey, Northern Ireland, The Netherlands and Israel with 37, 34, 28 and 27 PMP respectively. (Figure 6.12)**

Figure 6.10: Total rates of transplantation PMP for EDTA countries and Ireland for 2019

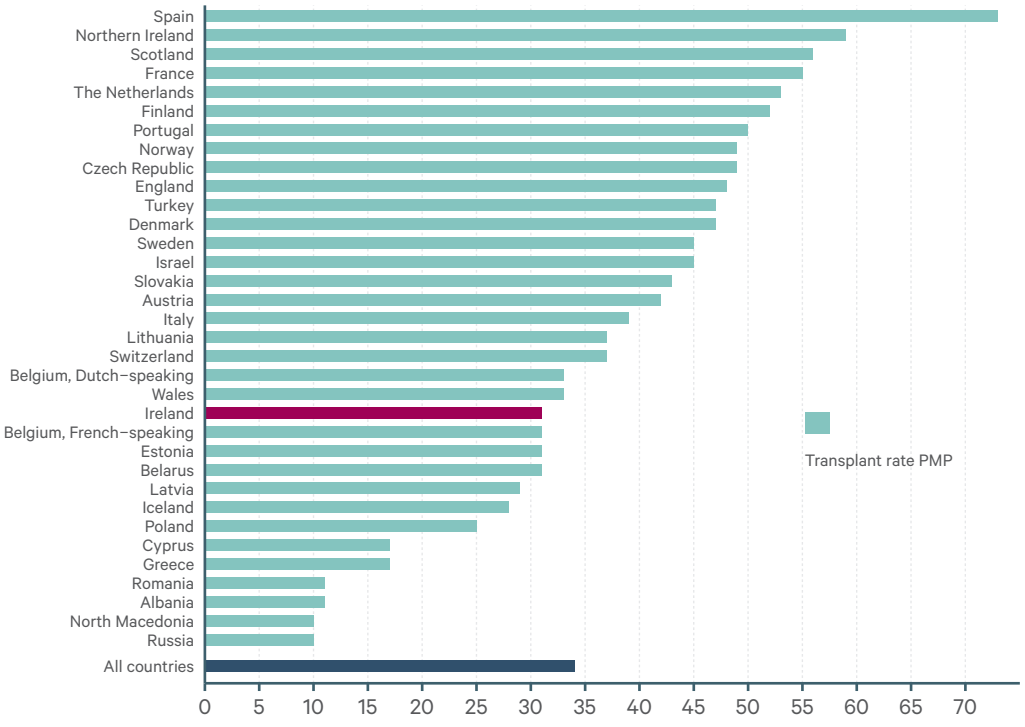


Figure 6.11: Deceased donor rates of transplantation PMP for EDTA countries and Ireland for 2019

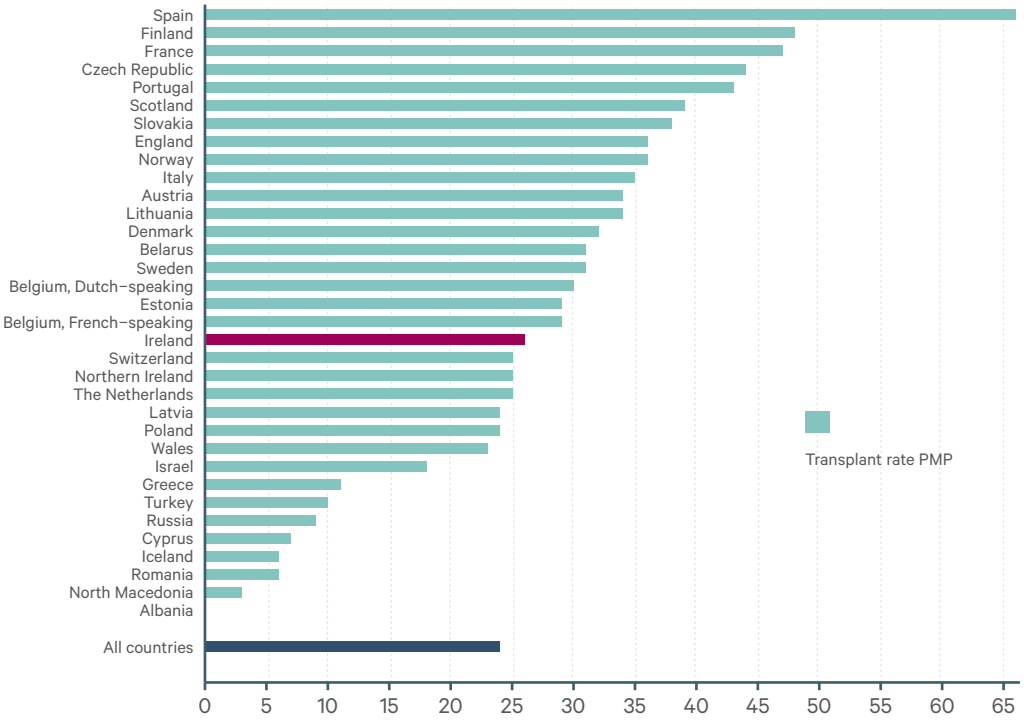
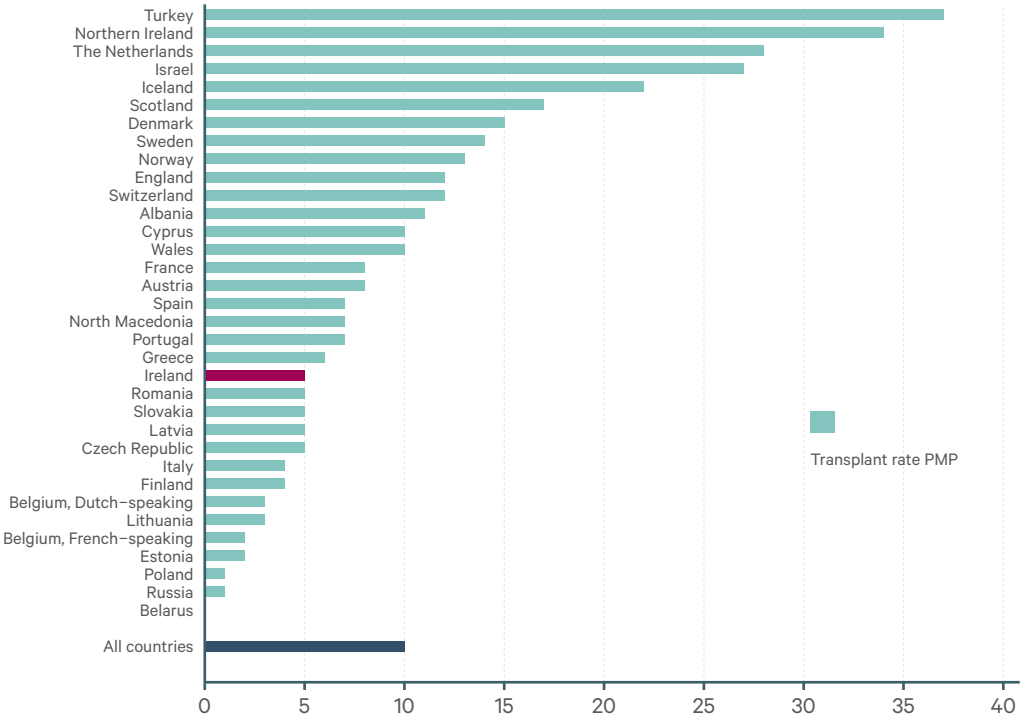


Figure 6.12: Living donor rates of transplantation PMP for EDTA countries and Ireland 2019



Living Donor Programme

7.1 Introduction

Donor organ shortage is a major problem for patients globally resulting in long waiting times for organ transplantation. Receiving a kidney transplant from a living recipient has many advantages over deceased donation including increased allograft and patient survival, evidenced in Tables 5.2, 5.10 and Table 5.11, reduction in rejection rates and waiting times, plus the added benefit that surgery can be scheduled.

The NKTS invites and encourages all living donors to have regular checkups with their nephrologist to ensure they suffer no ill events as a consequence of the nephrectomy. Long term follow up data on kidney donors provides insight and information on the long term safety and possible health risks of living donation for the donor. As stated in Article 15 of the "Directive 2010/53/EU of the European Parliament" countries within the European Union are obliged by law to have a follow up system for living kidney donors - this was legislated into Irish law in August 2012.

COVID-19 posed particular difficulties for the Living Donor Programme in 2021 but was managed very effectively resulting in 122 potential donors being immunologically evaluated for 85 recipients. This reflected an increase of 24% presenting for evaluation compared to 2020 activity. 82 potential donors were medically assessed and underwent investigations to determine suitability to proceed with live donation: 74 for direct donation and 8 for the UK Living Kidney Sharing Scheme (UKLKSS) in collaboration with our colleagues in the UK. Of note these donor recipient pairs can now be seen in Belfast as part of cross –border collaboration which has practical advantages (e.g. travel and access) for all involved. Of the 82, 35 have proceeded to direct donation transplantation in 2021 and 2 have donated into UKLKSS.

- **There were 35 living donor kidneys transplanted in 2021**
- **In the period 2001 - 2021 donation to adults occurred mainly between siblings (51%), spouses (17%), parents (15%) and children (9%). However for paediatric recipients, 84% are parental donors (Figure 7.1)**
- **Overall, females are more likely to donate (54%) amongst all categories of relations, with males marginally more likely to donate to children (51%) or other relation (56%) and females more likely to donate to spouses (75%) and to non relatives (65%) (Figure 7.2).**
- **Median age at donation was 45 years overall with unrelated donors having a median age of 50 years and adult children to parent donation at 33 years. Spousal and unrelated donors are generally of the older age groups while the youngest age groups are identified in adult children donating to parents (33 years). Donor ages ranged from 20 to 72 (Figure 7.3).**
- **During 2021 the median length of in-hospital stay post operatively was 4 days. For the time period 2001-2010 this was 7 days reducing to 5 and 4 days for the latter time periods 2011-2016 and 2017-2021 respectively. (Figure 7.4).**
- **All living donors are followed up by the surgical team and are then offered an annual follow-up with their local nephrologist, 78% of living donors are availing of this service. The median length of time of follow up is 52 months ranging from 1 month to 243 months (20.3 years).**
- **On follow-up, 14 % of donors developed hypertension post donation ranging from 11% in the 35 – 44 age group to 20 % in the age group ≥ 55 years (Figure 7.5).**
- **As expected the renal function (eGFR) falls post donation, but rises in the following years ranging from a median of 99 ml/min/1.73m2 (pre donation) to 66 ml/min/1.73m2 at 5 years post donation (Figure 7.6).**

Figure 7.1: Adult/ Paediatric Recipient by donor type of relation

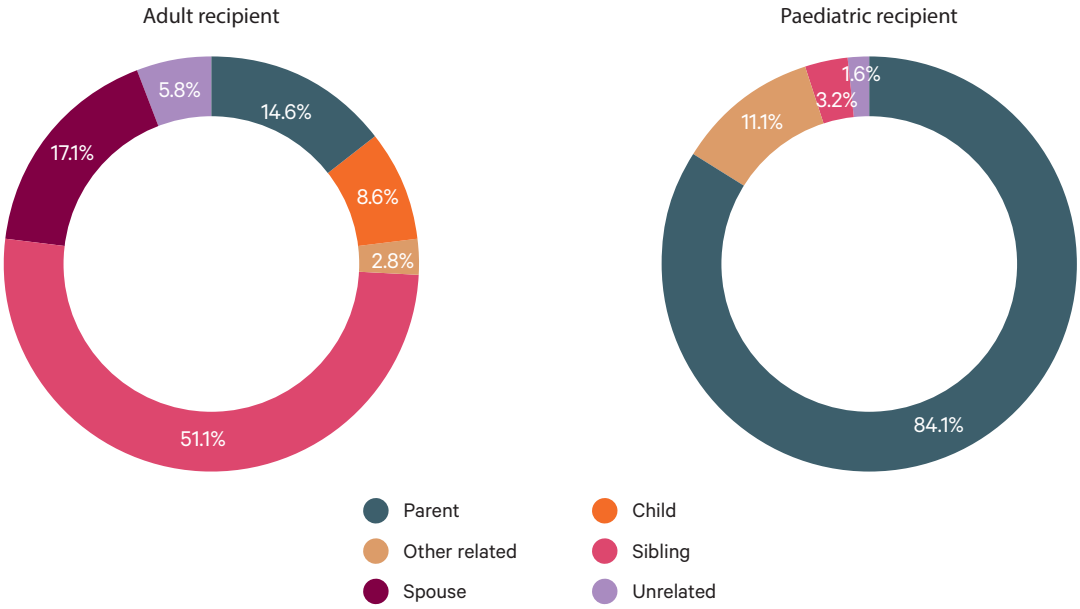


Figure 7.2: Percentage donor sex by donor type of relation

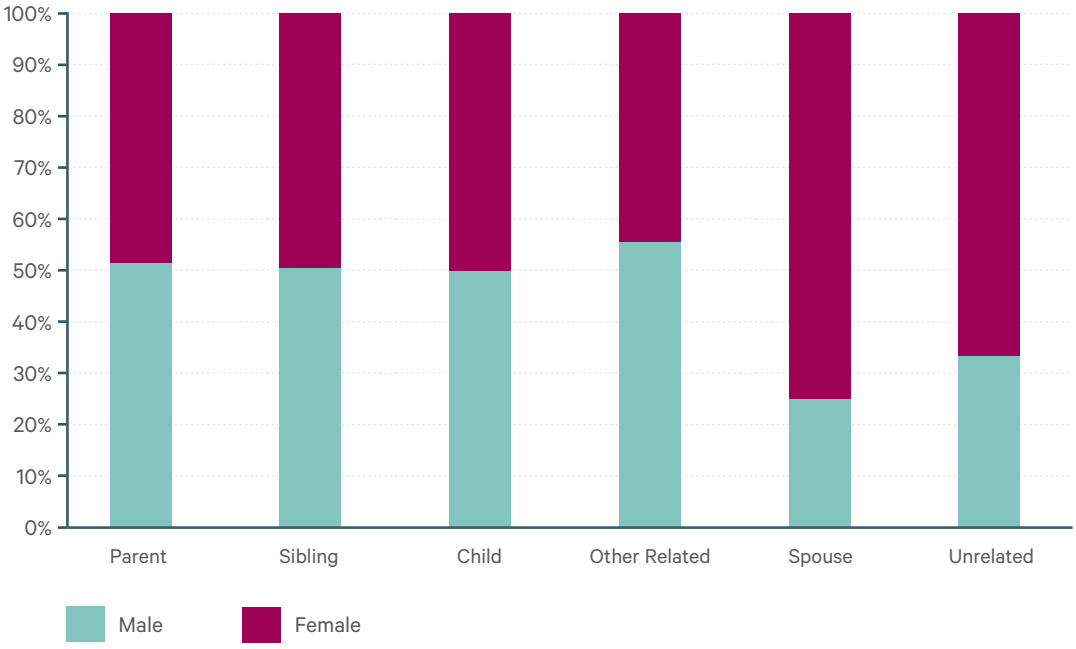


Figure 7.3: Percentage donor age groups by donor type of relation

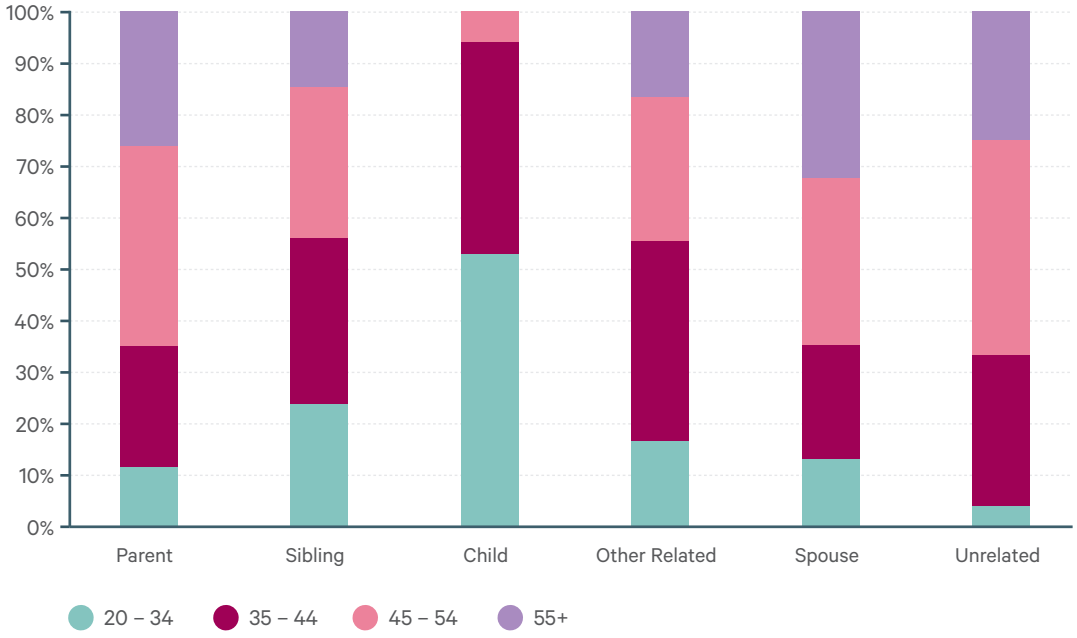


Figure 7.4: Length of stay of living donors by time period of donation

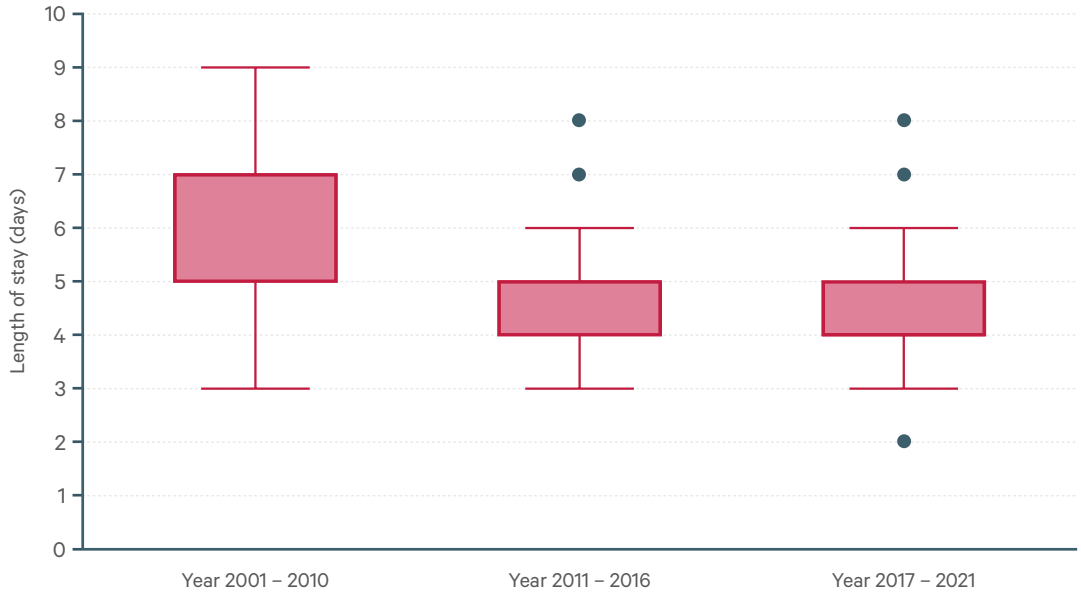


Figure 7.5: Percentage of post donation hypertension by donor age group

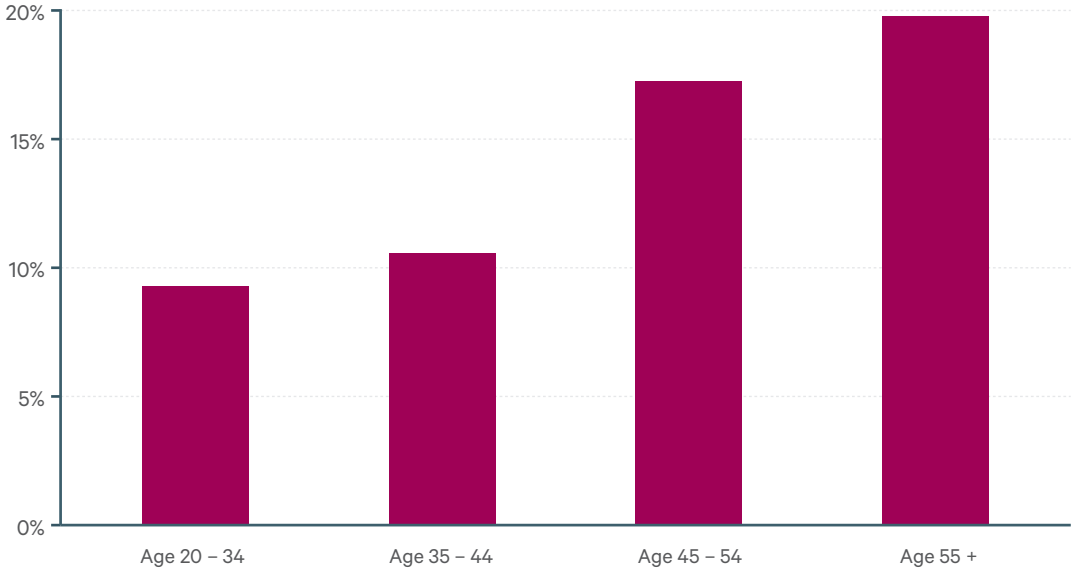
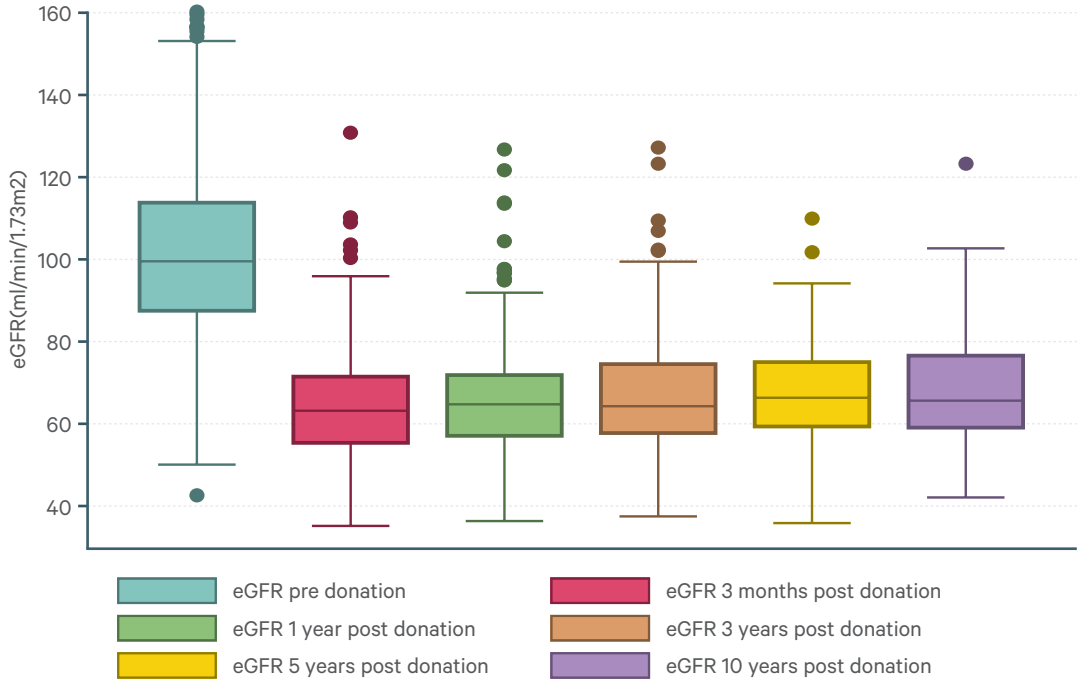


Figure 7.6: Median and interquartile eGFR for living donors pre and post donation



Staff List

Consultants
Ms Dilly Little Consultant Transplant Surgeon
Mr Gordon Smyth Consultant Transplant Surgeon
Mr Ponnusamy Mohan Consultant Transplant Surgeon
Mr Richard Power Consultant Transplant Surgeon
Mr James Forde Consultant Transplant Surgeon
Mr Ian Robertson Consultant Transplant Surgeon
Mr Ati Ferede Consultant Transplant Surgeon
Mr Neal Dugal Consultant Transplant Surgeon
Prof Conall O'Seaghdha Consultant Nephrologist
Prof Peter Conlon Consultant Nephrologist
Dr Colm Magee Consultant Nephrologist
Prof Declan DeFreitas Consultant Nephrologist
Dr Mark Denton Consultant Nephrologist
Dr Carol Traynor Consultant Nephrologist
Dr Ciara Magee Consultant Nephrologist
Dr Amy Hudson Consultant Nephrologist
Mr Denis Murphy Independent Medical Assessor
All Consultant nephrologists nationally
NCHD staff at Beaumont Hospital for Urology and Nephrology Services

Nursing team
Ms Annmarie Mulligan Directorate Nurse Manager
Ms Monica Cunningham CNM2 St Damien's Transplant Unit
Mr Enda Maguire CNM2 St Damien's Transplant Unit
Ms Marisa Pinheiro Transplant CNS
Ms Fiona Downes CNM1 St Damien's Transplant Unit
Ms Emer O'Rourke CNM1 St Damien's Transplant Unit
All transplant nursing, healthcare and household staff

Transplant Co-ordinators
Ms Laura Austin CNM3
Ms Andrea Fitzmaurice CNM2
Ms Laura Lynch CNM2
Ms Marion Stacey CNM2
Ms Laura Motherway CNM2

Renal day care nursing team
Ms Michelle Newe CNM2 Renal day care
Ms Ciara Tolan CNM1 Renal day care
Ms Olive McEnroe CNS Ambulatory care
Ms Caitriona McNamara CNM1 Ambulatory care
Ms Louise McSkeane CNM Ambulatory care
Ms Ruth O'Malley CNM Ambulatory care
Ms Brenda Groarke Patient Care Co-ordinator
Ms Andrea Scully Patient Care Co-ordinator
Ms Sarah McCormac Patient Care Co-ordinator
Ms Jane Ormond Patient Care Co-ordinator
All renal day care nursing staff

St Peters and Acute Dialysis Team
Mr Colm Fox CNM3 Haemodialysis
Ms Lincy Joseph CNM2 AHD
Ms Maeve McBride, CNM1 AHD
Ms Rachel Ipe, CNM1 AHD
All dialysis nursing, healthcare and household staff

TUN Directorate Staff
Mr Tom Moran Directorate Business Manager
Mr Binu Vasu Renal IT Manager
Mr Patrick O'Kelly Statistician
Ms Anne Cooney Renal Transplant Data Manager
Ms Sinead Cronnolly Quality Manager
Ms Caroline Hughes
Ms Mary Sullivan
Ms Claire Kavanagh
Ms Laura Byrne

Clerical Staff
Ms Jennifer Cronin
Ms Anna Farley
Ms Rebecca Moran/Ms Ruth Daly McDonnell
Ms Rita Mather
Ms Amanda Kelly
Ms Joan Long
Ms Rebecca Kavanagh
Ms Gillian O'Rourke
Ms Gillian Curran/Ms Sajida Sattar Sacranie
Ward clerks Marie Fitzpatrick, Clare Ward, Liz Mythen
Theresa Cooling & Denise Redmond/Amanda Walsh/Ann Foy

Critical Care and Anaesthetic Directorate, Beaumont Hospital
Dr Michael Power Clinical Director
Dr Michael Moore Consultant Anaesthetist
Dr Sinead Galvin Consultant Anaesthetist
Dr Tanya O'Neill Consultant Anaesthetist
Dr James O'Rourke Consultant Anaesthetist
Dr Alan Gaffney Consultant Anaesthetist
Ms Sinead Connolly Directorate Nurse Manager
Ms Clare Morris ADON
Ms Eileen Buckley CNM2
And all the Beaumont Theatre Nursing Staff

Department of HistoPathology
Dr T Dorman Consultant Pathologist
Dr B Doyle Consultant Pathologist
HistoPathology Scientists

Department of NHISSOT
Prof Mary Keogan Consultant Immunologist
Dr Khairin Khalib Consultant Immunologist
Ms Geraldine Donnelly Chief Medical Scientist
All Scientists and staff in NHISSOT

Dept of Psychiatry & Psychology
Dr Siobhan MacHale Consultant Psychiatrist
Dr. Ciara Keogh
Ms Tara Power Social Worker

Department of Radiology
Dr Martina Morrin Consultant Radiologist
Dr Ruth Dunne Consultant Radiologist
Dr Aoife McErlean Consultant Radiologist
Dr Douglas Mulholland Consultant Radiologist
Dr Aoife Keeling Consultant Radiologist
Dr Andrew McGrath Consultant Radiologist
Dr Mark Given Clinical Director
Prof Michael Lee Consultant Radiologist
And all Radiologists and Radiographers

Paediatric Services at Temple Street and Crumlin
Dr Atif Awan Consultant Nephrologist Temple Street Children's University Hospital
Dr Mary Waldron Consultant Nephrologist Crumlin Hospital
Dr Niamh Dolan Consultant Nephrologist Temple Street Children's University Hospital
Dr Clodagh Sweeney Consultant Nephrologist Temple Street Children's University Hospital
Dr Maria Stack Consultant Nephrologist Temple Street Children's University Hospital
Dr Michael Riordan Consultant Nephrologist Temple Street Children's University Hospital
Mr Feargal Quinn Consultant Paediatric Urologist Crumlin Hospital
Dept of Anaesthesia in Temple Street Children's University Hospital and all the Theatre and ward nursing staff in Temple Street Children's University Hospital

Proteins Laboratory
Ms Geraldine Collier Principle Biochemist
All Scientists and staff in Laboratory Directorate

Transplant Porters
Noel Flood
Mark Dunne
All Portering Staff in Beaumont Hospital

Academic Publications

1. **Is Bigger Better? Living Donor Kidney Volume as Measured by the Donor CT Angiogram in Predicting Donor and Recipient eGFR after Living Donor Kidney Transplantation**. Ebad CA, Brennan D, Chevarria J, Hussein MB, Sexton D, Mulholland D, Doyle C, O'Kelly P, Williams Y, Dunne R, O'Seaghdha C, Little D, Morrin M, Conlon PJ. J Transplant. 2021 Jul 9;2021:8885354. doi: 10.1155/2021/8885354. PMID: 34336253; PMCID: PMC8286185
2. **A population-based comparison of organ transplant recipients in whom cutaneous squamous cell develops versus those in whom basal cell carcinoma develops**. Menzies S, O'Leary E, Callaghan G, Mansoor N, Deady S, Murad A, Lenane P, O'Neill J, Lally A, Houlihan DD, Murray S, Sexton DJ, McCormick PA, Egan JJ, O'Neill JP, Conlon PJ, Moloney FJ. J Am Acad Dermatol. 2021 Jun 8:S0190-9622(21)01022-7.doi: 10.1016/j.jaad.2021.05.032. Epub ahead of print. PMID: 34116096
3. **Management of a ureteric stricture post ureteroileal anastomosis of a renal transplant**. P Ryan J, Sugrue DD, Davis NF, Mohan P. BMJ Case Rep. 2021 Jun 18; 14(6):e242763. doi: 10.1136/bcr-2021-242763. PMID: 34144952; PMCID: PMC8215234
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8. **Clinical practice recommendations for recurrence of focal and segmental glomerulosclerosis/steroid-resistant nephrotic syndrom**e. Weber LT, Tönshoff B, Grenda R, Bouts A, Topaloglu R, Gülhan B, Printza N, Awan A, Battelino N, Ehren R, Hoyer PF, Novljan G, Marks SD, Oh J, Prytula A, Seeman T, Sweeney C, Dello Strologo L, Pape L. Pediatr Transplant.2021 May;25(3):e13955. doi: 1111/petr.13955. Epub 202 Dec 30.
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Notes:

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Transplant
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