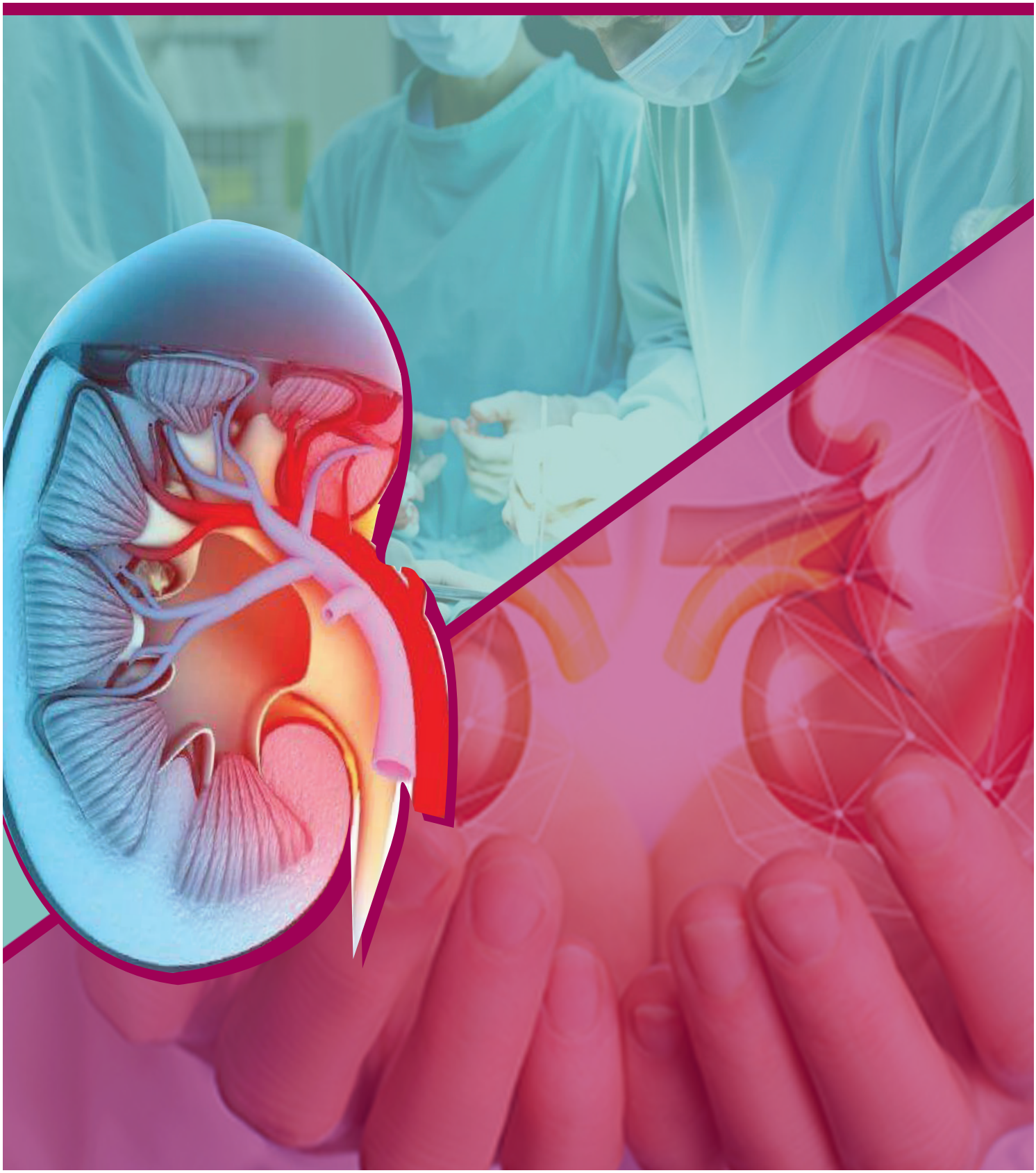
Annual Report 2023

National Kidney Transplant Service

Beaumont Hospital



Forward

Kidney transplantation is the optimal treatment for people with end-stage kidney disease. By liberating them from the constraints of dialysis it restores their quality of life. But more importantly, it dramatically improves their health, well-being and long-term survival. The National Kidney Transplant Service (NKTS) remains steadfast in its commitment to delivering a world-class kidney transplant service to the citizens of Ireland. Testament to this, a remarkable 2,730 people are currently living and benefiting from a functioning kidney transplant. The NKTS recently passed the significant milestone of our 6000th kidney transplant completed to date in the context of one of our highest years of transplant activity to date.

This extraordinary progress could not occur without the remarkable generosity shown by deceased donor families, who selflessly consent to organ donation during a time of unimaginable grief. Similarly, we are humbled by the courage exhibited by living donors who undergo major surgery to restore the health of their friends and family. The transplant team at NKTS wishes to extend ourdeepest gratitude to all kidney donors for the profound transformation we see with each successful transplant.

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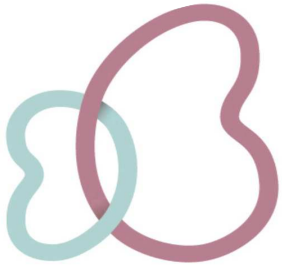


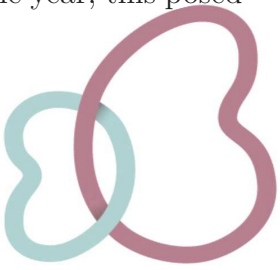
1. Introduction

This year we saw kidney transplant activity at the National Kidney Transplant Service (NKTS) at Beaumont Hospital finally recover to pre-pandemic levels. As we adapted our treatment protocols and management strategies to COVID and its evolving manifestations, we were able to successfully mitigate risks to patients while expanding opportunities for successful kidney transplantation. Challenges in organ procurement in Intensive Care Units also gradually decreased as transmission rates eased over 2023, especially in the latter half of the year, resulting in a restoration of activity to pre-pandemic levels.

Such was the restoration in transplant activity, that by the end of 2023 the NKTS had performed **189** kidney transplants, just shy of the highest number recorded in a single year. It is important to appreciate that kidney transplantation has changed considerably in the intervening years since that high-water mark of **192** transplant was achieved in 2011. In general, kidney organ offers are now from older patients of higher complexity and with more co-morbid illness. This is most clearly seen in the markedly increased use of organs from donors after cardiac death, which has risen as a proportion from none in 2010 to almost 30% of our activity in 2023. A similar pattern has emerged for 'extended criteria' donors (older donors with medical co-morbidity). While the transplant outcomes for patients receiving such transplants remains excellent, this necessary evolution in organ utilization patterns is not without cost. Compared to previous years, kidney transplantation in 2023 was of significantly increased medical complexity due to co-morbidity and frailty requiring longer hospital stays, increased use of intensive care beds, high rates of delayed graft function, higher rates of readmission, increased utilization of supporting services such as H+I and interventional radiology and more intensive follow-up after hospital discharge. It is clear that continued investment in transplant infrastructure will be required, as these trends in organ utilization are set to continue.

The number of patients alive with a functioning kidney transplant at year end 2023 is **2,730**, a 4% increase on 2022. Despite the high-water mark for transplant activity in 2023, the number of patients on the transplant waiting list has continued to rise by over 4.5%. In 2023, **198** new patients were listed for kidney transplant representing a 6% increase on the previous year. The global shortage of organs relative to the number of patients waiting for a kidney transplant remains an on-going challenge. Increased awareness of living donor transplantation, increased resourcing as highlighted above to permit utilization of more marginal organs and active transplant waiting list management to ensure fitness for transplant at the time of organ offer will all be required to meaningfully address the organ shortage.

We are seeing an increasing number of potential kidney transplant recipients actively seeking living kidney donors, resulting in the remarkable performance of **519** living kidney donor transplants over the past 17 years. Despite the COVID pandemic, the living donor program remained active during 2023 due to the availability of COVID vaccines for potential living donors and their recipients. Despite this, due to COVID infections and other unpredictable clinical situations we faced a number of short notice cancellations of living donor transplants. As potential donors and recipients were shielding from COVID earlier in the year, this posed



logistical difficulties in substituting pairs for surgery at short notice. Despite this, the living donor rate was sustained, and we performed **30** transplants with approximately **22** donor recipient pairs having completed evaluations and scheduled for surgery early in 2024.

'Highly sensitized' patients, with high levels of pre-formed antibodies, require intensified immunosuppression to prevent transplant rejection and often struggle to find a matched kidney, resulting in very long waiting list times. The COVID pandemic posed unique challenges for such patients, when the risks of intensive immunosuppression were increased. Through a process of risk mitigation from immunosuppression individualization and intensified monitoring, the NKTS continued to transplant this complex patient group throughout the pandemic. This activity continued through 2023, with **23** very highly sensitised patients (PGen $\geqslant$ 95%)) transplanted, similar to pre-pandemic levels. Progress in transplanting this group has resulted in a reduction in the average wait time on the list despite increasing patient numbers accessing the transplant waiting list.

We begin 2024 by crossing a significant milestone in Irish kidney transplantation: the **6,000th** kidney transplant performed by the NKTS. This extraordinary achievement could not have been realised without the on-going work and efforts of all the members of the transplant team, the staff of the Intensive Care Units throughout the country under the auspices of the ODTI, and all the staff in Beaumont Hospital who continue to support us. We would especially like to acknowledge the forbearance of the patients that depend on this transplant program and the bravery of the living kidney donors. Finally, we wish to recognize the extraordinary generosity of all kidney donors and their families, to whom so many owe their lives and without whom the NKTS could not exist.

Highlights for 2023

- **189** kidney transplants were performed by the National Kidney Transplant Service at Beaumont Hospital
- The median waiting time to transplant for all recipients in 2023 was **25** months.
- **2,730** recipients (transplanted in Beaumont Hospital and abroad) are living with functioning kidney transplants at the end of 2023.
- **25** recipients enjoy allograft function of over 40 years.
- **23** very highly sensitised patients (PGen $\geqslant$ 95%) were transplanted in 2023 representing 12% of transplant activity.
- **45** transplants were performed with kidneys from non-heart beating donors (DCD).

2. Kidney Transplant Activity 2023

Summary of transplant activity

• In 2023, **189** kidney transplants were performed by the NKTS at Beaumont an increase from 2022 of **26**. Of these, **30** were from living donors, **159** from deceased donors. The deceased donor transplant rate returned to pre-pandemic levels.

• Of the 159 deceased donor transplants, **45** (28%) were from non heart beating donor kidneys (DCD), the highest level recorded to date.

• The number of recipients living with a functioning allograft increased by 4% during 2023, reaching **2,730** (at year end 2023), **2,601** (95%) of whom were transplanted in Beaumont Hospital.

• There were **30** living donor kidneys transplanted in 2023, lower than the average for the past 6 years (32). Living donor transplants represented 16% of all kidney transplants performed in 2023, compared to the overall percent for the last 6 years of 21%.

• There were **5** simultaneous pancreas/kidney (SPK) transplants performed in collaboration with our colleagues in St. Vincents University Hospital.

• There were **4** paediatric (age <19 years) transplants performed, all of which were recipients of kidneys from deceased donors.

• There were **2** paired kidney exchange transplants performed in collaboration with our colleagues in the United Kingdom Living Kidney Shared Scheme (UKLKSS).

Table 2.1: Summary of transplant activity 2018 - 2023

Category	2018	2019	2020	2021	2022	2023	Average (6yrs)
Total number of transplanted kidneys*	167	153	123	139	163	189	156
Number of deceased donor kidney only transplants	122	126	92	102	122	154	120
Number of Living donor kidney transplants	40	25	28	35	33	30	32
Number of Simultaneous Pancreas/Kidney (SPK)	5	2	3	2	8	5	4
Number of Paired Kidney Exchange (Living donor UK)	3	3	1	2	8	2	3

Note: *includes SPK, and excludes paired kidney exchange (UKLKSS)

Table 2.2: Recipient allograft survival at the end of 2023

Category	0-10 yrs	>10-20 yrs	>20-30 yrs	>30-40 yrs	>40 yrs	Total
Deceased donor kidney only transplants	1016	703	281	58	12	2070
Living donor kidney transplants	314	107	7	17	13	458
Simultaneous pancreas/kidney (SPK)	33	33	7	0	0	73
All kidney transplants	1363	843	295	75	25	2601

Note: includes patients transplanted in Beaumont Hospital and excludes those transplanted abroad

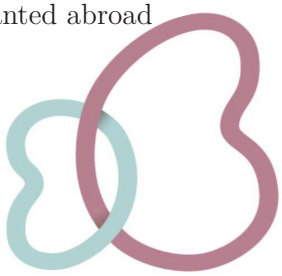


Figure 2.1: Number of deceased donor kidney transplants performed per annum 1964 - 2023

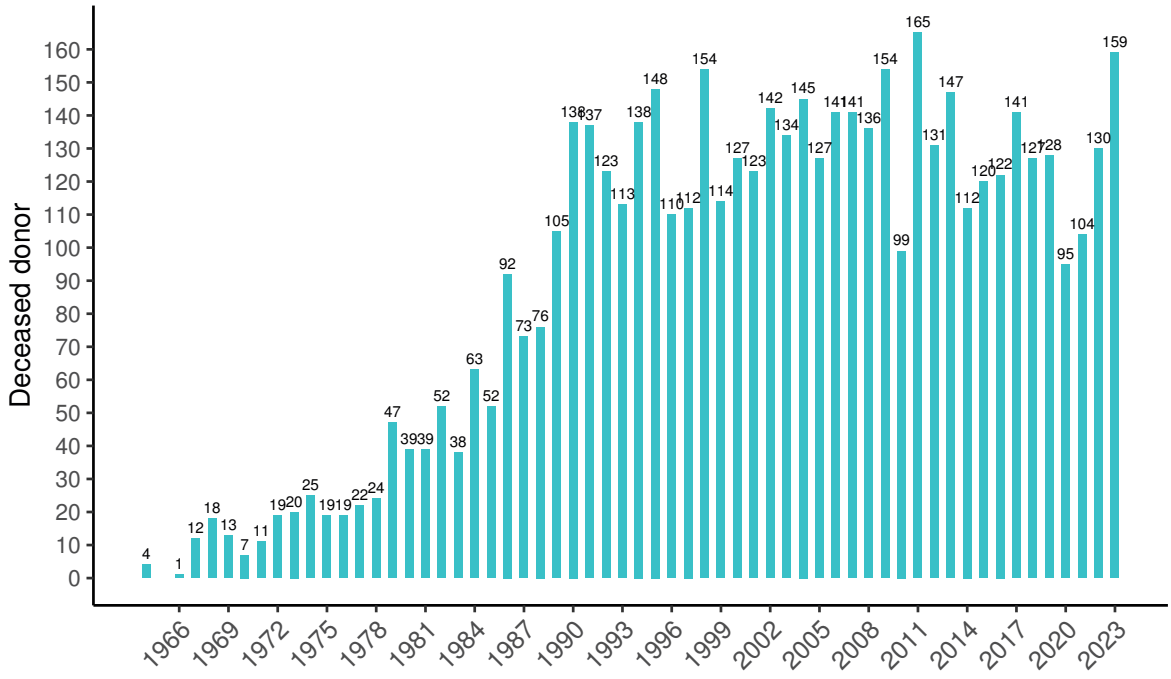


Figure 2.2: Number of DCD and DBD donor kidney transplants performed 2010 - 2023

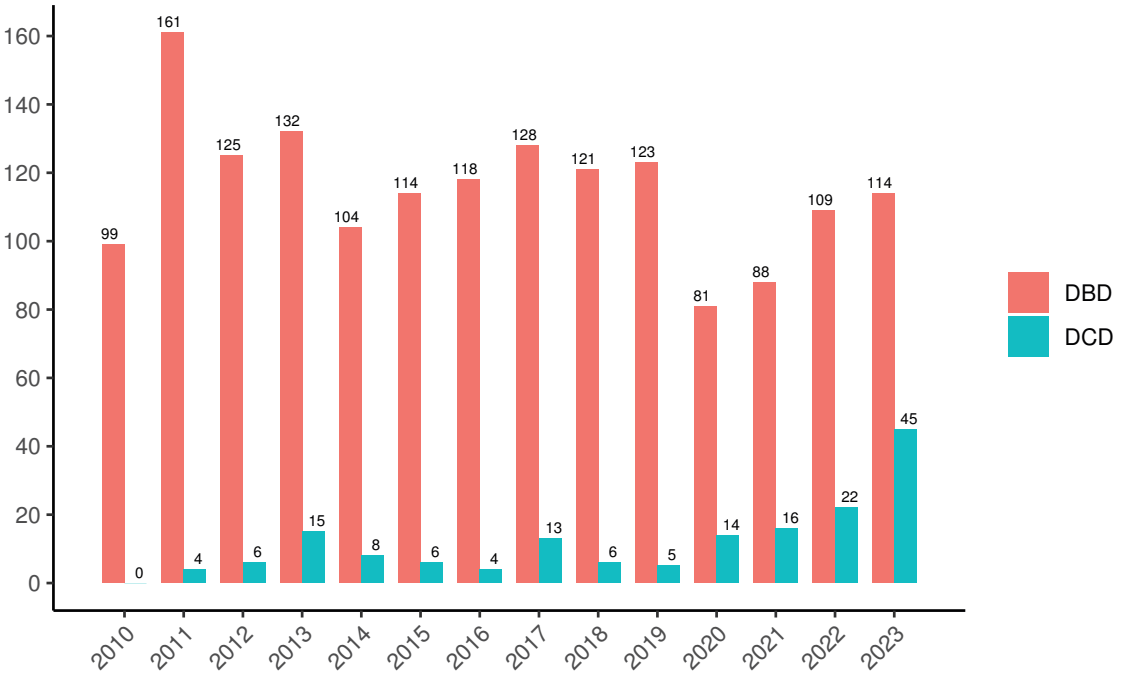


Figure 2.3: Number of living donor kidney transplants performed per annum 1972 - 2023

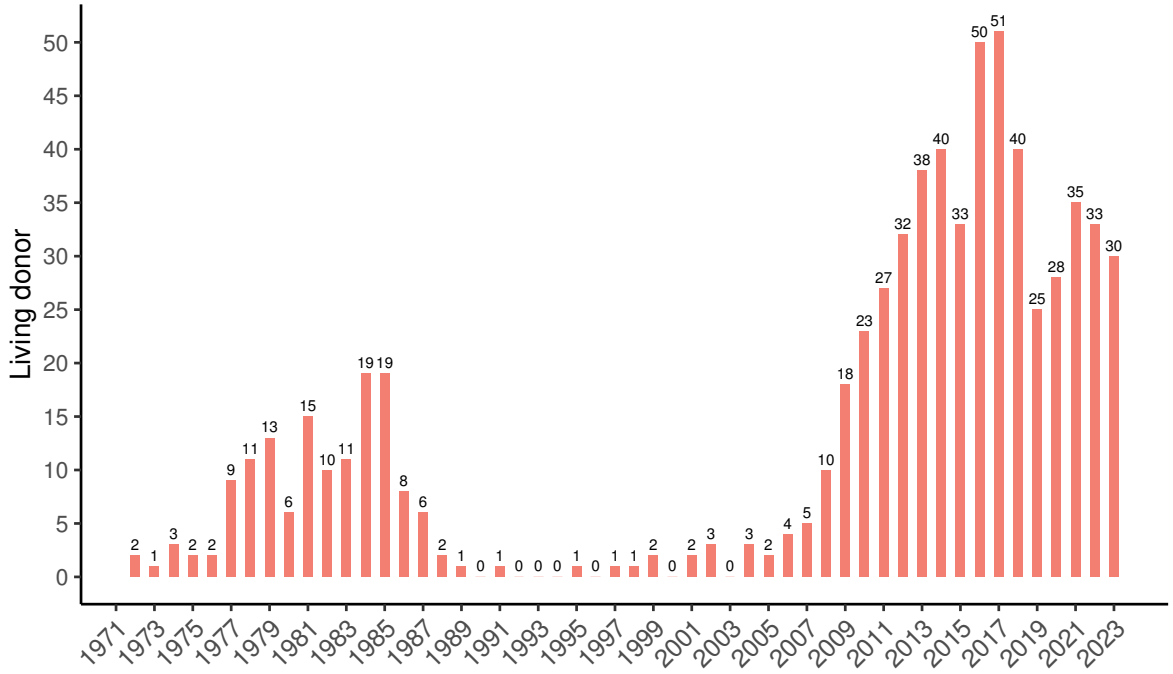
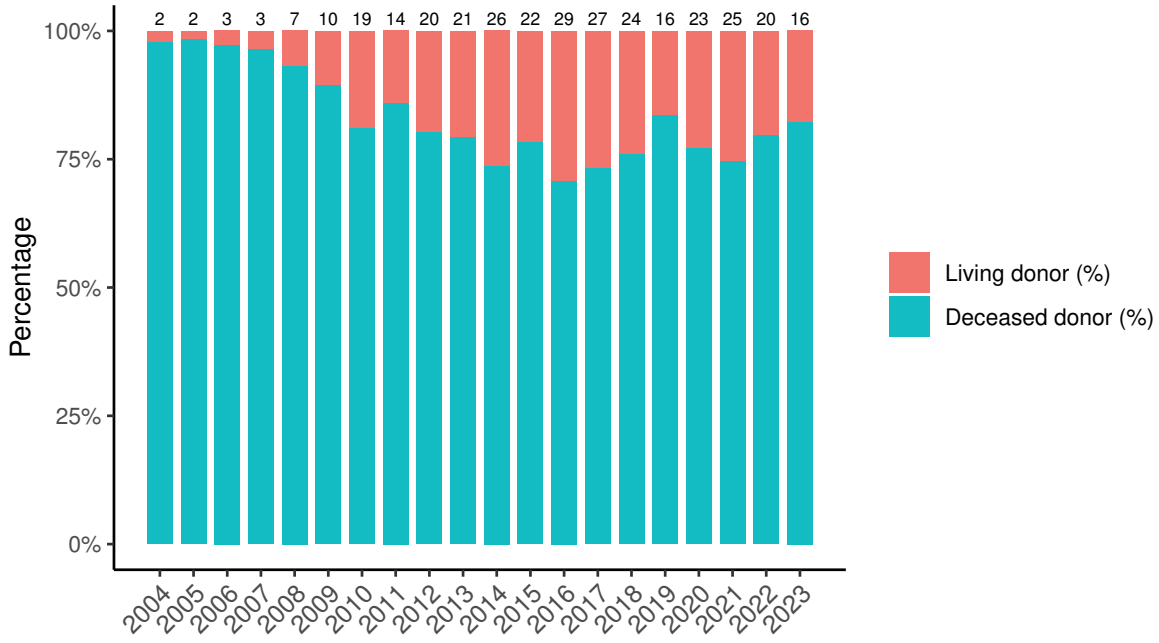


Figure 2.4:Proportion of total living and deceased donor kidney transplants performed 2004 - 2023



*Note: % of living donor kidney recipients quoted on top of bars

3. Kidney Transplant Waiting List 2023

• At the end of 2023, the number of patients on the kidney transplant waiting list has increased by **4.5%** from 2022 to **535**. This represents the 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) before increasing again slightly during theyears affected by Covid-19.

• Median time on dialysis prior to first transplant was **30** months overall, **34** months for deceased donor and **13** months for living donor recipients (Figure 3.2)

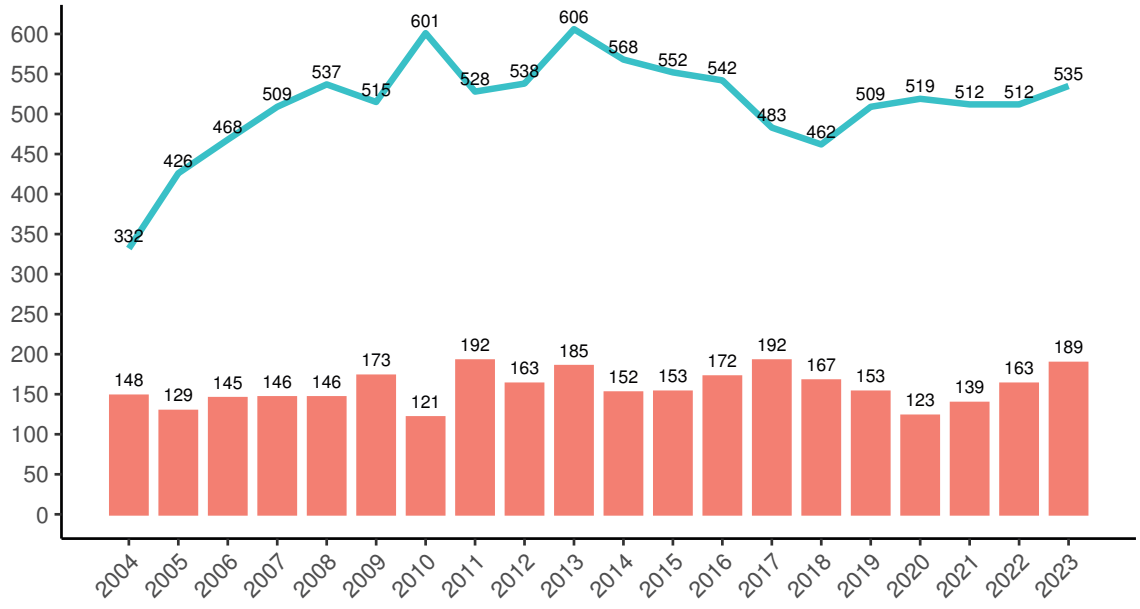
• In 2023, **11, (6%)** of transplants were performed in patients not yet established on dialysis (i.e. pre-emptively), **5** of whom received a deceased donor kidney and **6** received a living donor kidney (Figure 3.3).

• The overall median waiting time to first kidney transplant in 2023 was **25** months, i.e. of the 189 transplants performed in 2023, 50% of recipients received a kidney within 25 months of being placed on the transplant waiting list (Figure 3.4). Of note highly sensitized patients (PGen $\geqslant$ 95%) had median waiting time of **30** months.

• Waiting times for living donor transplants was considerably shorter at **11** months compared to **27** months for deceased donors (Figure 3.4).

Number of patients on the kidney transplant waiting list and total number of kidney transplants performed per year

Figure 3.1: Number of patients on the kidney transplant waiting list(active and suspended) and number of transplants per annum 2004 - 2023*



*Note: number of transplants per annum = bar graph, waiting list = line graph

Median time on renal replacement therapy and kidney transplant waiting list prior to transplant

Figure 3.2: Median time on dialysis prior to first transplant 2004 - 2023

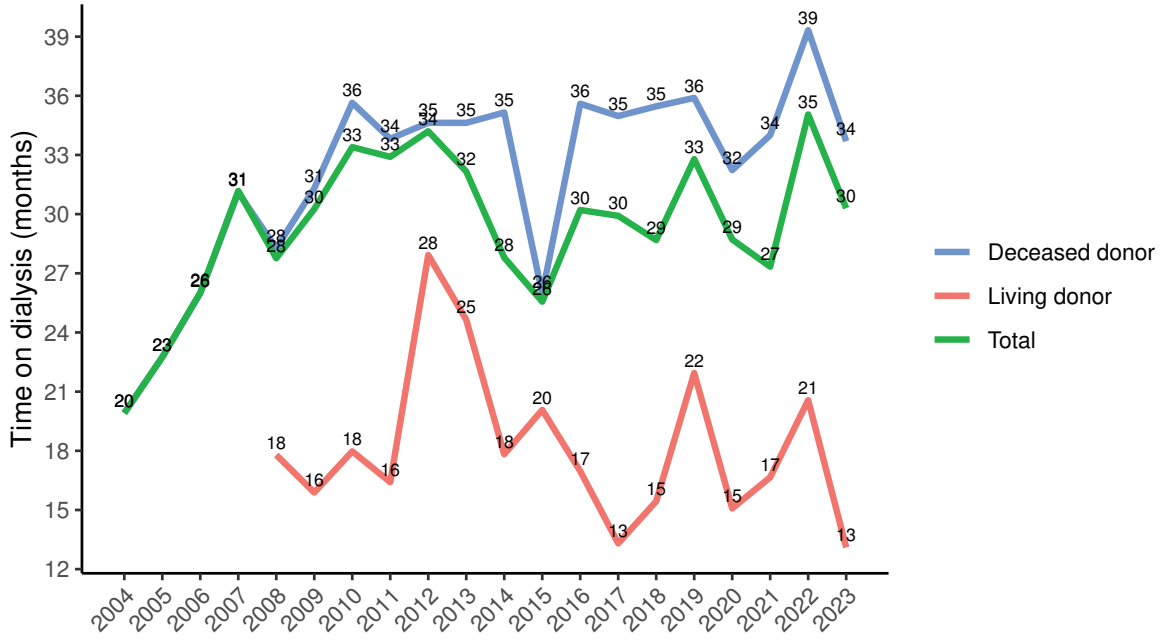


Figure 3.3: Percentage of transplants per year performed pre-emptively for deceased and living donor recipients 2008 - 2023

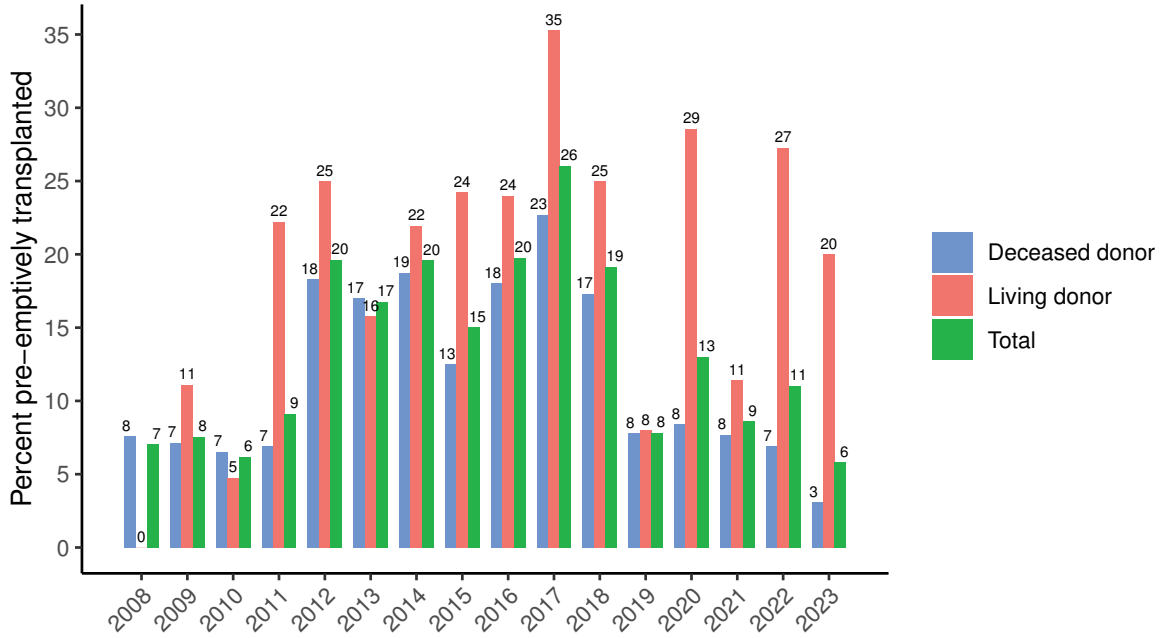
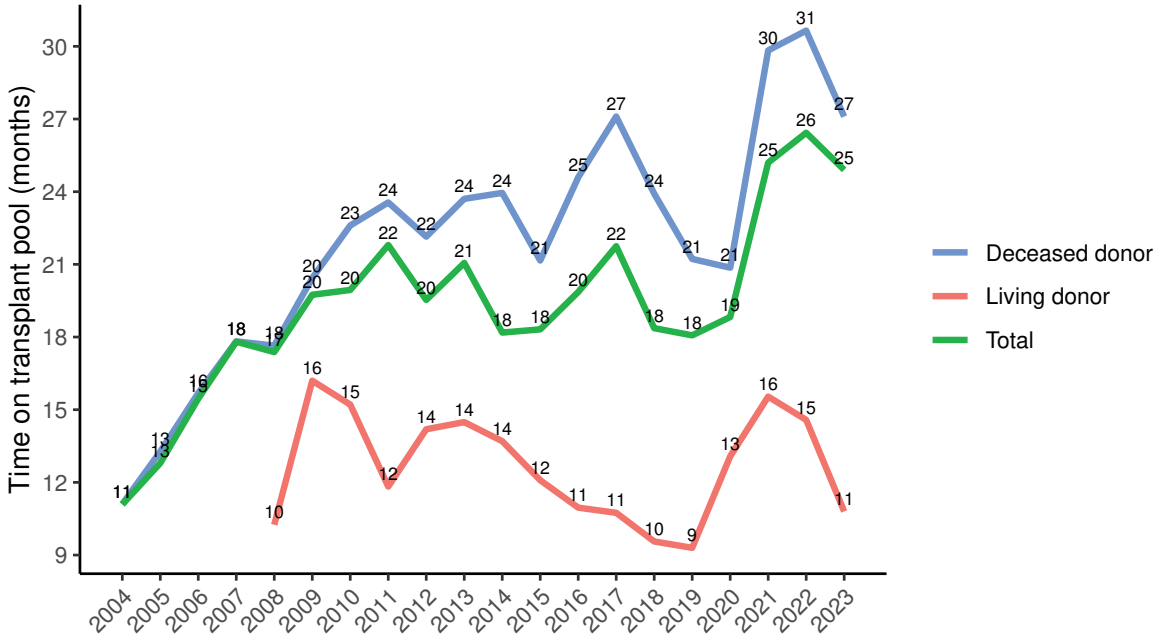


Figure 3.4: Median time on kidney transplant waiting list prior to first transplant 2004 - 2023



60% "Recipients with an identified **living donor** spend approximately **60% less time** on **dialysis** and the **waiting list** prior to transplant."

Referring center for kidney transplant recipients

The number of patients transplanted per referring center broadly reflects the number on the waiting list per center. Figure 3.5 details the number on the waiting list per center for 2023 which correlates with the percentage of transplants for each center for the period 2018 - 2023 (Figure 3.5).

Figure 3.5: Number of patients per referring center on the kidney transplant waiting list at the end of 2023

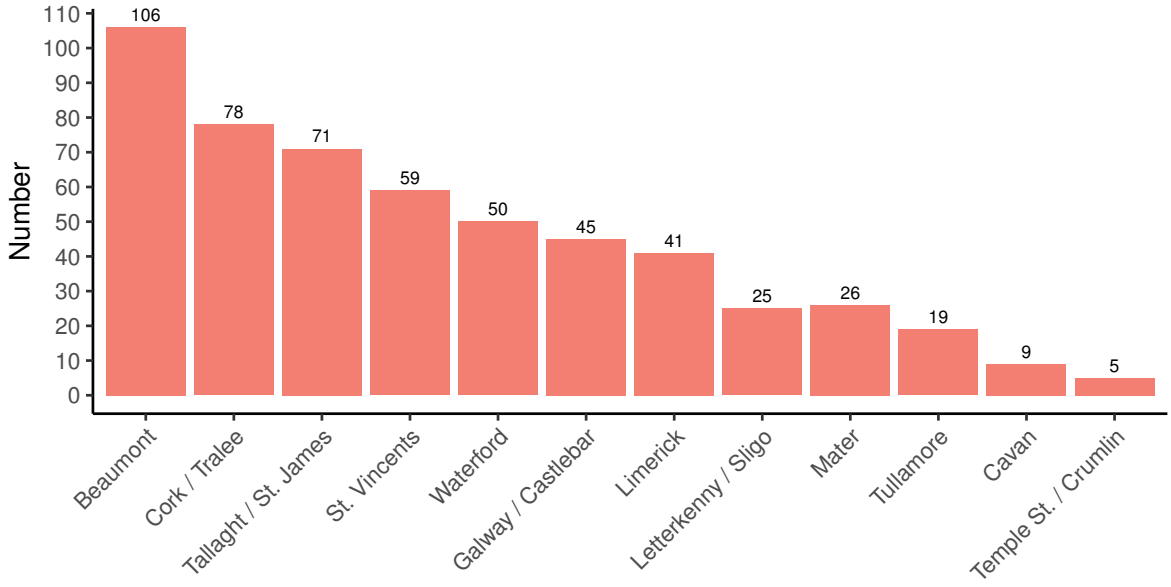
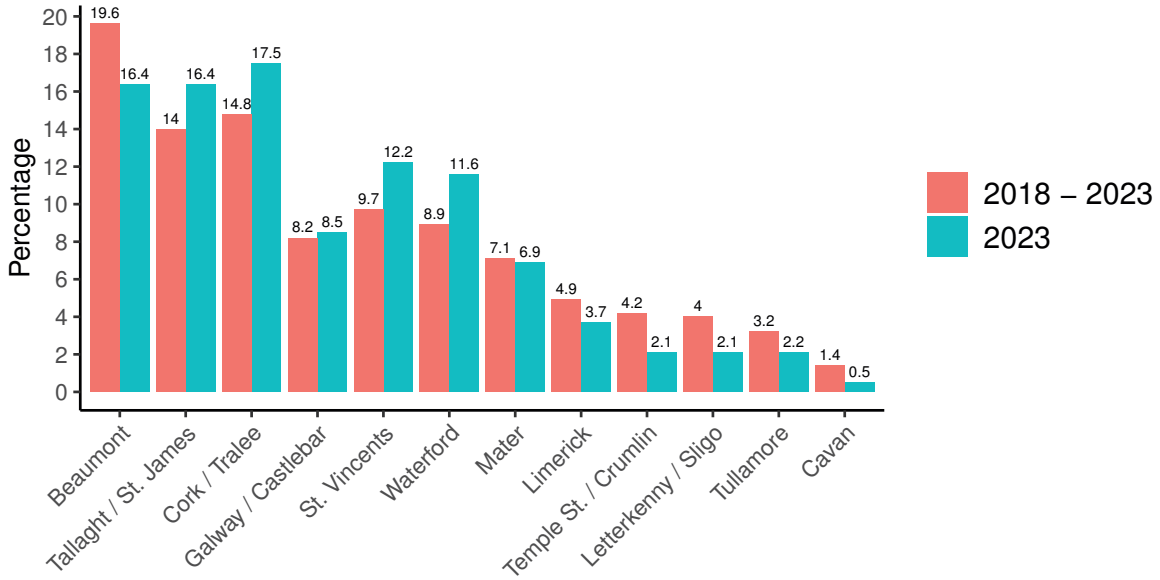


Figure 3.6: Percentage of total kidneys transplanted by referring center for 2023 and 2018-2023



4. Donor and Recipient Characteristics at Transplant

• 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** years in 2004 to **54** years in 2021. In 2023, the median age at the time of transplant was **52** years (Figure 4.1). The age range for this cohort is 4 to 78 years.

• In 2023, **29** (15%) of recipients were $\geqslant$ 65 years of age representing an emerging trend of transplanting older recipients.

• During 2023, the median recipient age for living donor transplants was **45** years, range of 20 – 70 years (Figure 4.2), reflecting older age of donation in recent years.
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. In 2023 the percentage of male recipients was **(65%)**, similar to the overall **(63%)** for 2004 - 2023 (Figure 4.3).

• Renal replacement modalities prior to transplant in 2023 varied somewhat from previous years with regular haemodialysis (RHD) increased compared to the overall for the period 2004-2023 and the percentage for peritoneal dialysis (PD) reduced slightly (Figure 4.4).

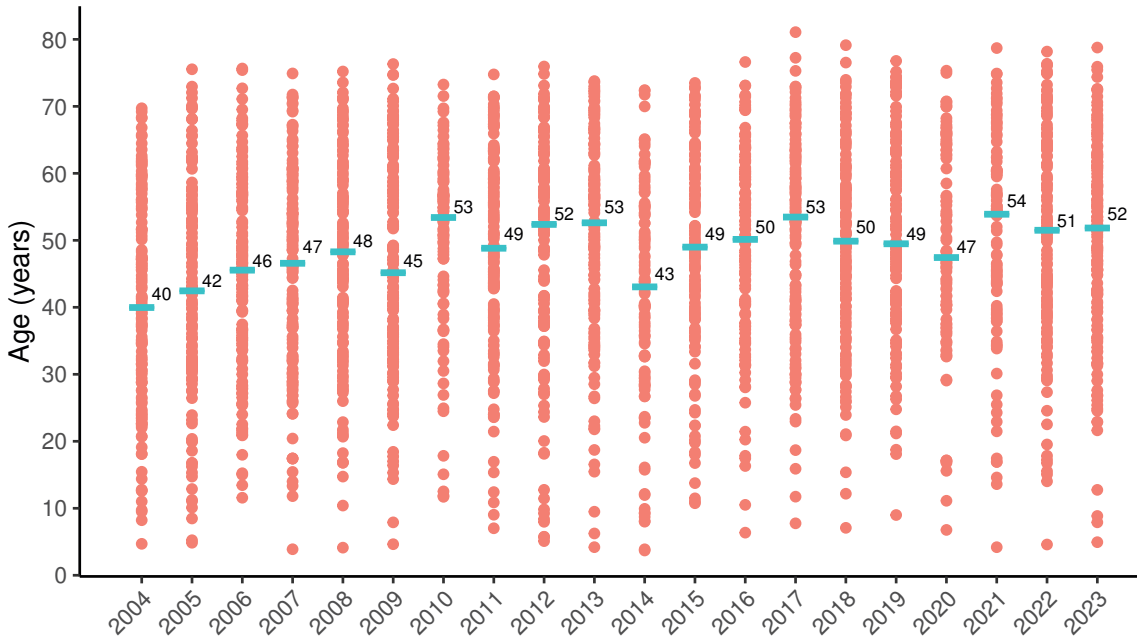
• The number of people on the transplant waiting list for whom there is difficulty in finding a compatible donor due to the presence of antibodies poses a major challenge. The majority of these highly sesitised (PGen $\geqslant$ 95%) patients have had a previous kidney transplant or other sensitising events including previous blood transfusion, pregnancy or infection. There has been a steady increase in the number of such 'highly sensitised' patients transplanted in recent years with **12%** of all recipients in 2023 having a PGen $\geqslant$ 95% at time of transplant (Figure 4.6). There were **80** highly sensitised patients on the waiting list at the end of 2023.

• Median donor age for deceased donor recipients was **45** years, (range 14 – 73 years) in 2023 (Figure 4.7), where the highest median donor age was 52 years in 2019. Median donor age for living donors has remained relatively constant in recent years and was **48** years (range 31 – 65 years) in 2023 (Figure 4.8).

• Donor sex ratios during 2023 reflect overall for both deceased and living donors compared to overall rates over the time periods studied (Figures 4.9 and 4.10).

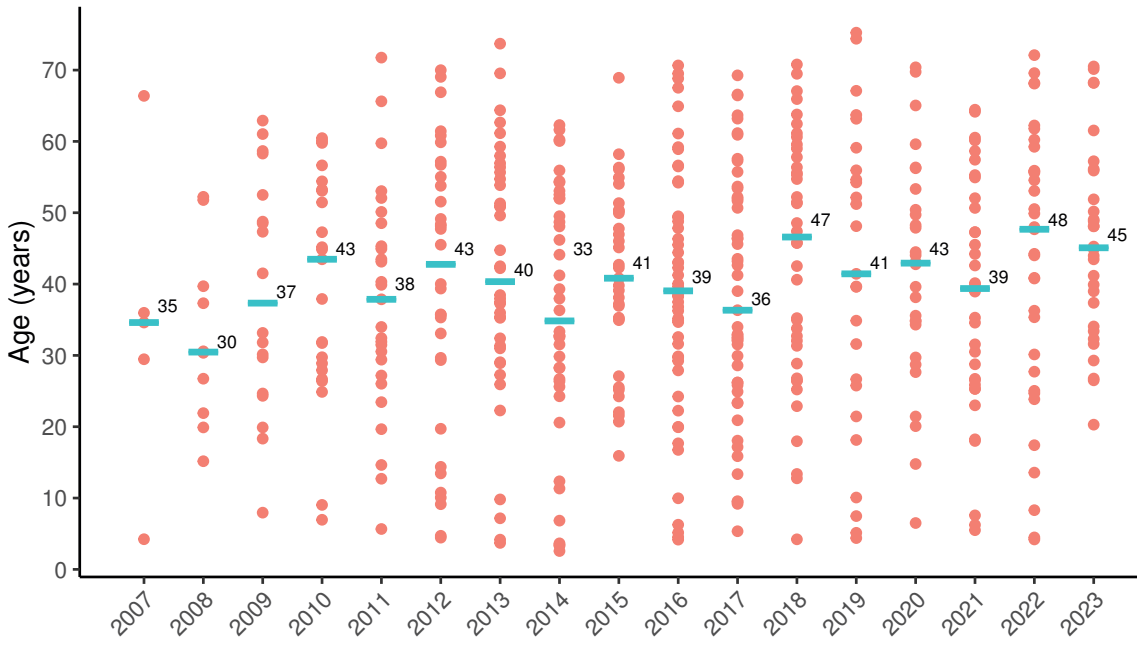
Recipient age

Figure 4.1: Recipient age at transplant for deceased donor kidneys 2004 – 2023*



*Note: median age quoted in graph

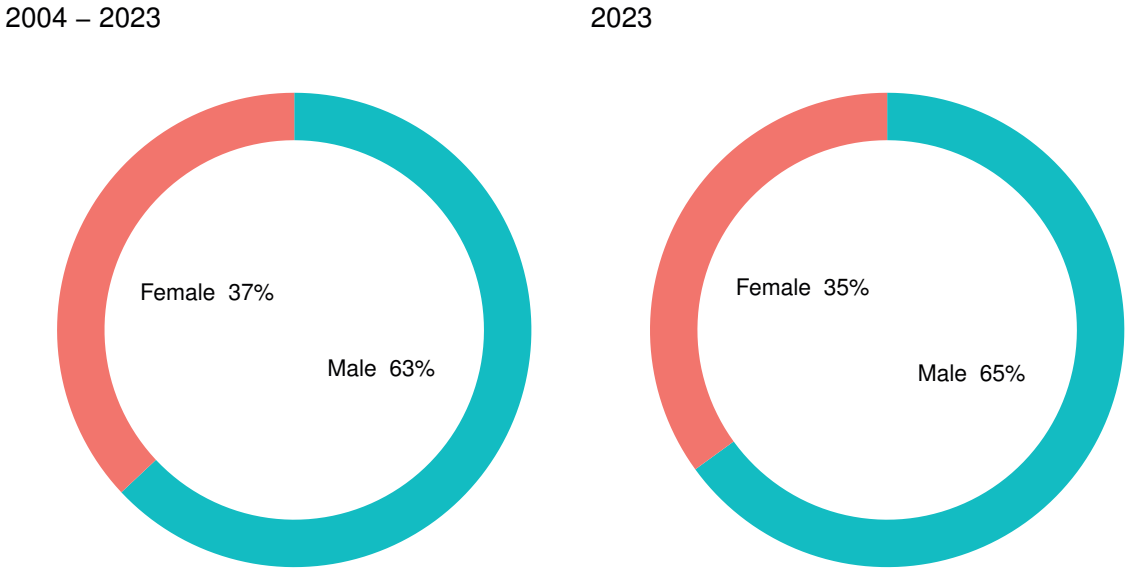
Figure 4.2: Recipient age at transplant for living donor kidneys 2004 – 2023*



*Note: median age quoted in graph

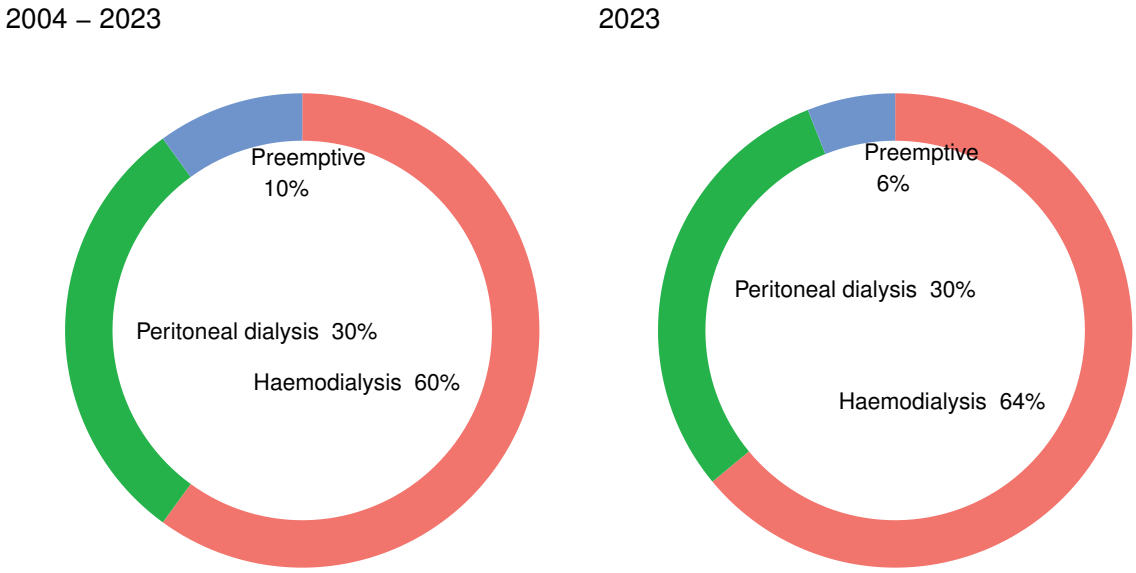
Recipient sex

Figure 4.3: Sex of recipient for combined deceased and living donor kidneys 2004-2023



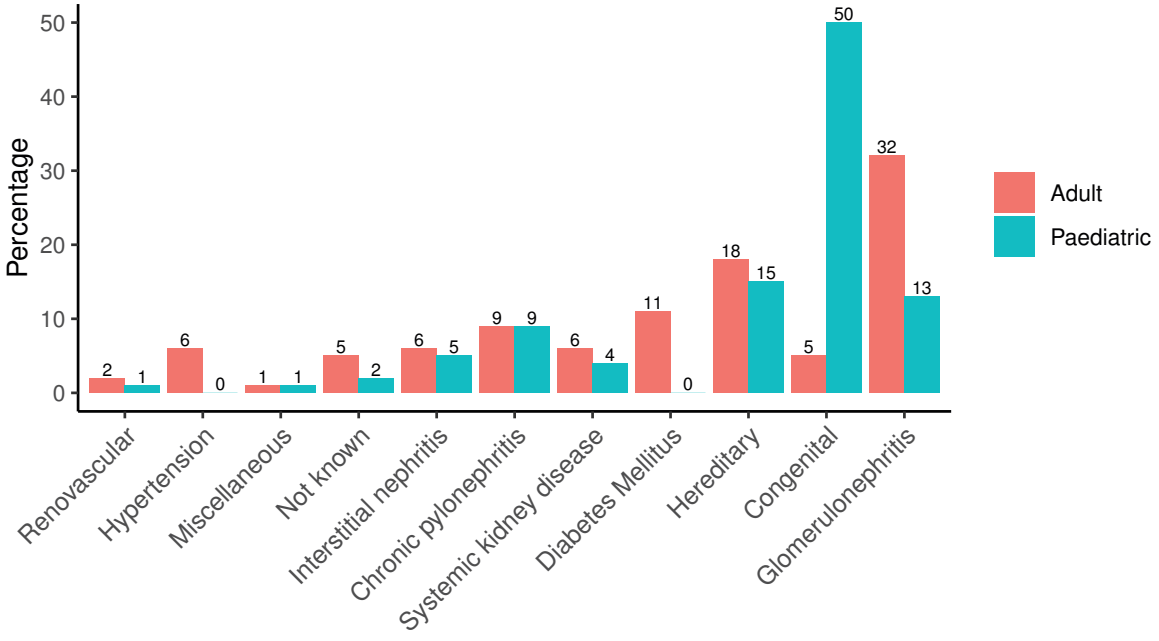
Mode of renal replacement therapy prior to transplantation

Figure 4.4: Mode of renal replacement prior to first kidney transplant 2004 - 2023



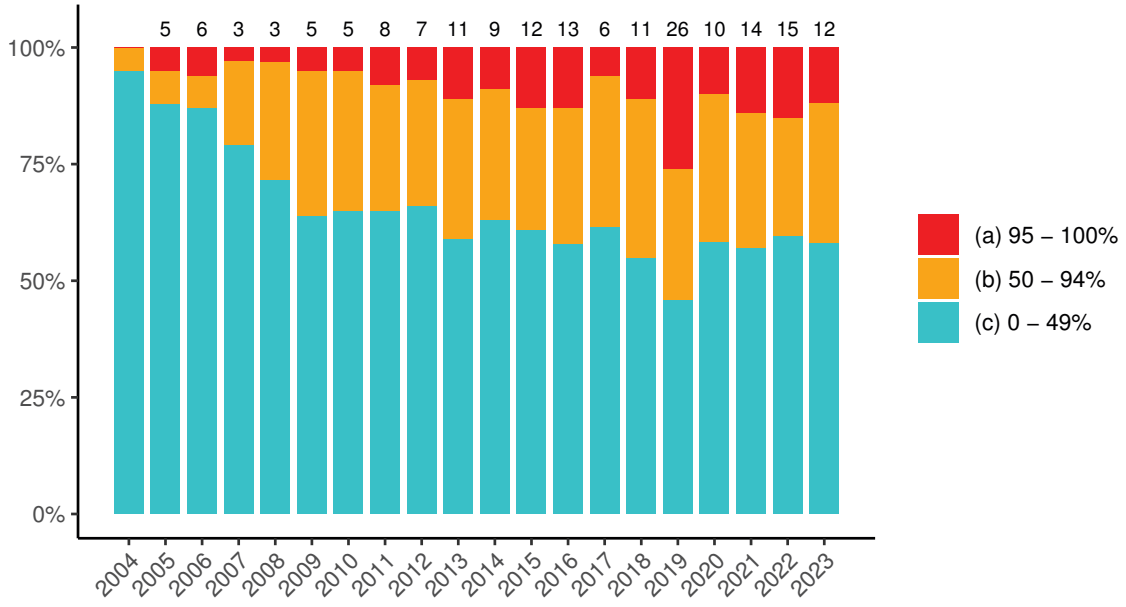
Cause of end stage renal disease for adult and paediatric recipients

Figure 4.5: Cause of ESRD for adult and paediatric transplant recipients 2004-2023



Panel reactive antibodies (PGen) of renal transplant recipients

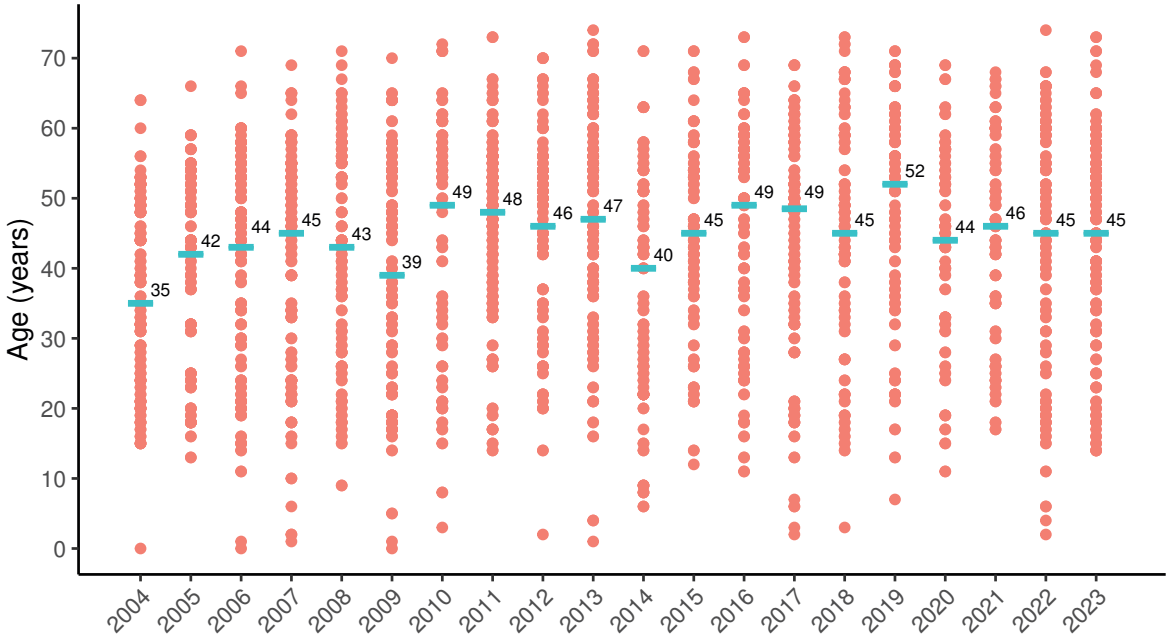
Figure 4.6: Recipient PGen in categories for all kidney transplants 2004 - 2023*



Note: % of highly sensitised patients quoted on top of bars

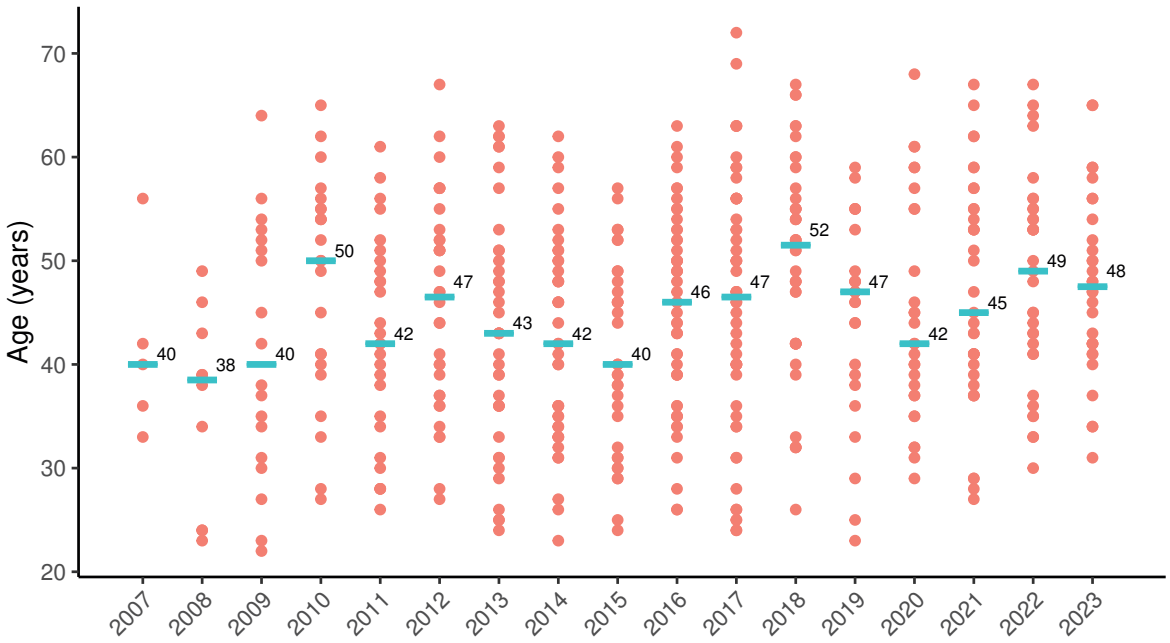
Donor age

Figure 4.7: Donor age at transplant for deceased donor kidneys 2004 – 2023*



*Note: median age quoted in graph

Figure 4.8: Donor age at transplant for living donor kidneys 2004 – 2023*



*Note: median age quoted in graph

Donor sex

Figure 4.9: Donor sex for deceased donor kidney transplants 2004 - 2023

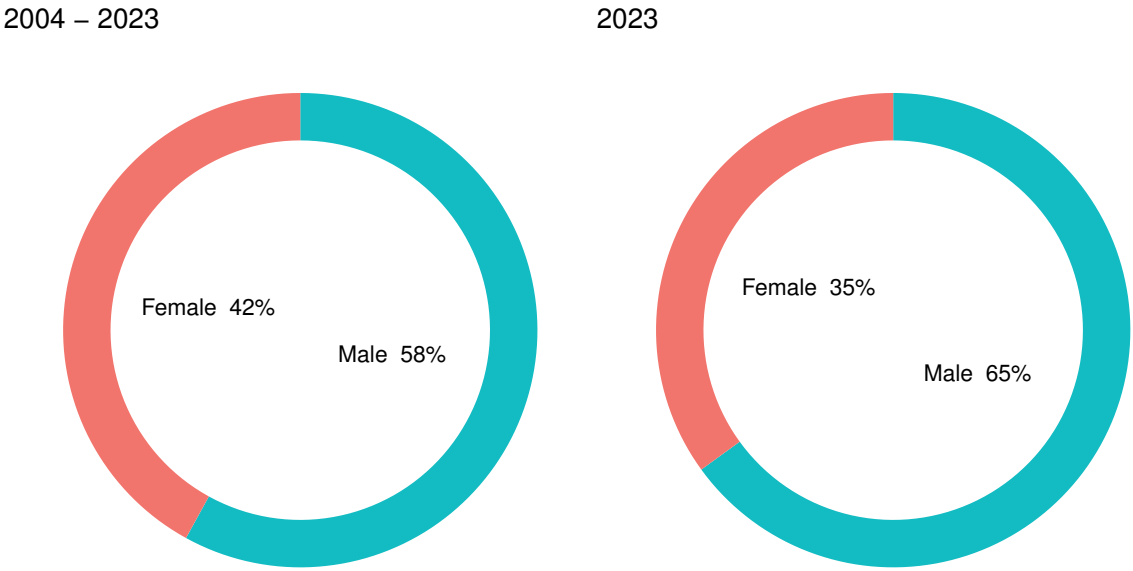
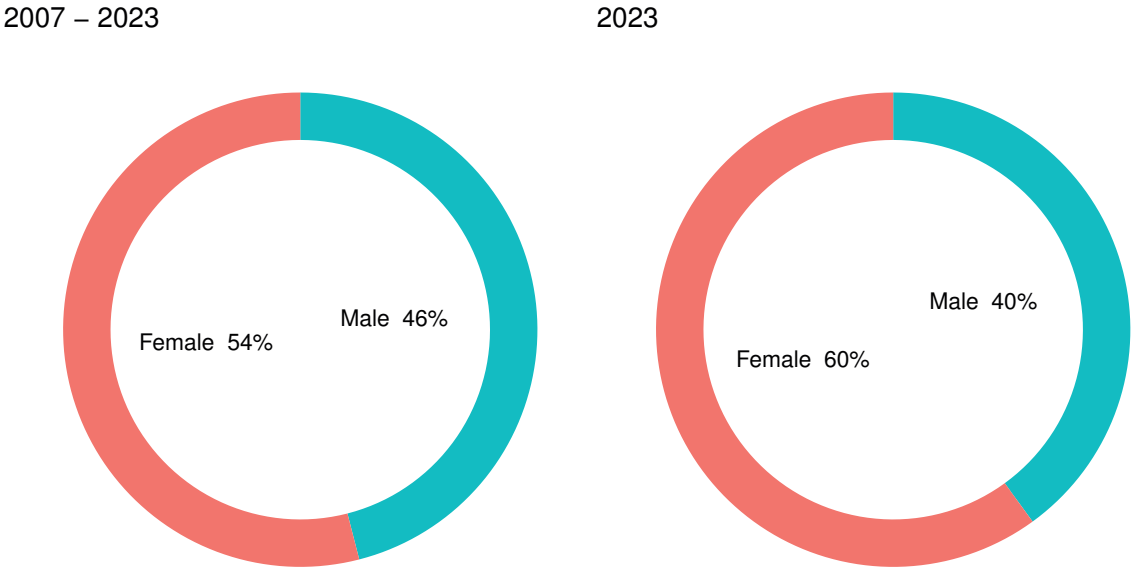


Figure 4.10: Donor sex for living donor kidney transplants 2007 - 2023



5. Deceased and Living Donor Recipient Outcomes

Adult deceased donor kidney allograft outcomes

This section focuses on adult deceased donor allograft and patient survival for the 30 year period 1993 - 2022. A total of **2,953** adult kidney only first transplants were performed in this period. The definition of an adult recipient is age 19 years or older at date of transplant.

- The overall median allograft survival for adult first deceased donor transplants in the past 30 years is **14.2** years (Table 5.1).
- Overall 5-year uncensored allograft survival for adult first deceased donor transplants in the past 30 years is **81.5%** and **89.5%** when censored for death with a functioning graft (Table 5.2).
- Outcomes for first and second allografts for this period are quite similar with median times of survival for first and second adult deceased allografts of **14.2** and **15.4** years respectively. Median survival for third and fourth allografts was **9.1** and **5.1** years respectively (Table 5.3).
- One year allograft survival for deceased donor adult kidney recipients for 2018 – 2022 was **96%** in comparison to one year survival of **88%** for period 1993 - 1997 (Table 5.4).
- Five-year allograft survival remains stable at **89%** for 2013 – 2017 comparable to the previous time period (2008 - 2012) of **85%**. The latest 5 year allograft outcomes compare very favorably with the earliest period 1993 – 1997 where 5 year allograft survival was **69%** (Table 5.4).

77%

"Long term allograft survival rates for adult and paediatric living donor kidney recipients exceeds those for deceased. 10 year adult living allograft survival rate is **77%** compared to deceased rate 65%. For paediatrics this is **77%** and **69%** respectively"

Adult first deceased donor allograft survival

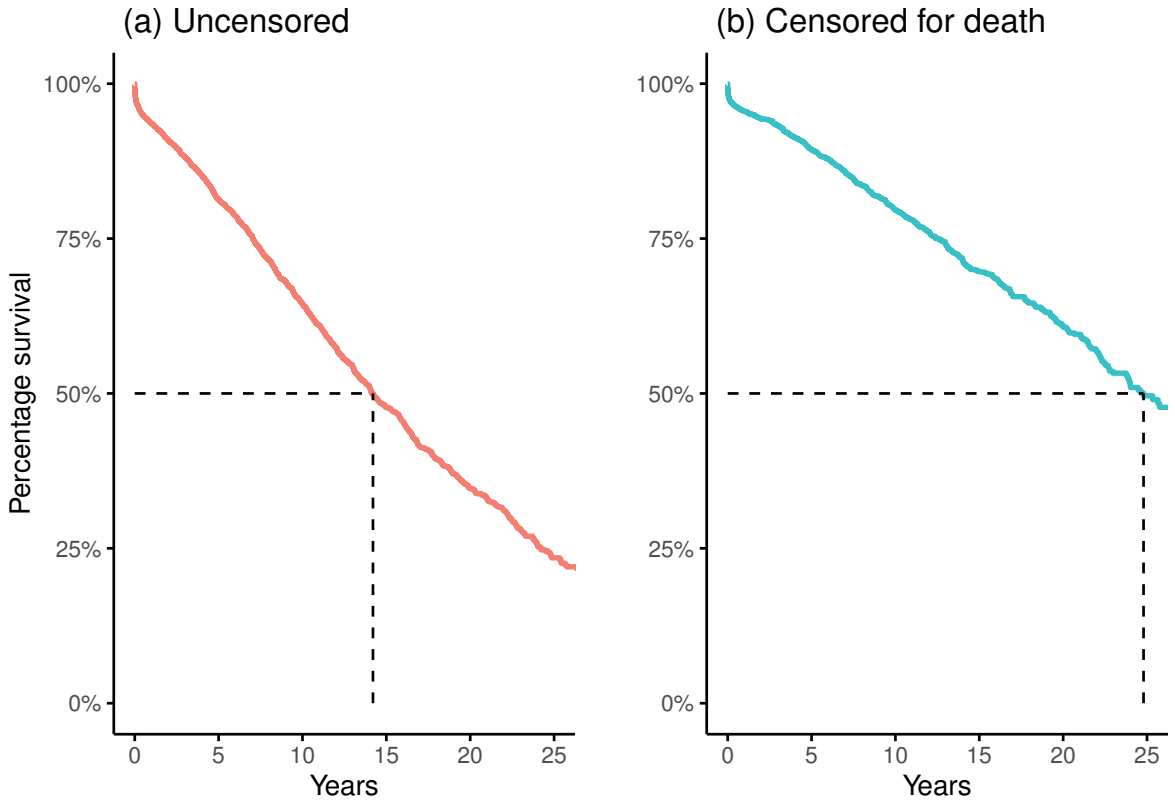
Table 5.1: Adult first deceased donor median allograft survival 1993 - 2022

Transplant number	Median allograft survival in years [95% C.I.] Uncensored for death
2,953	14.2 [13.7 - 15.2]

Table 5.2: Adult first deceased donor allograft survival 1993 - 2022

Follow up time (Years)	Estimated allograft survival [95% C.I.] (Uncensored)	Estimated allograft survival [95% C.I.] (Censored for death)
1	93.7 [92.7 - 94.5]	95.6 [94.8 - 96.3]
5	81.5 [80.0 - 82.9]	89.5 [88.3 - 90.6]
10	64.8 [62.8 - 66.6]	79.8 [78.0 - 81.4]
15	48.0 [45.8 - 50.2]	69.9 [67.6 - 72.0]
20	34.9 [32.4 - 37.3]	61.0 [58.1 - 63.8]

Figure 5.1: Adult first deceased donor kidney allograft survival 1993-2022

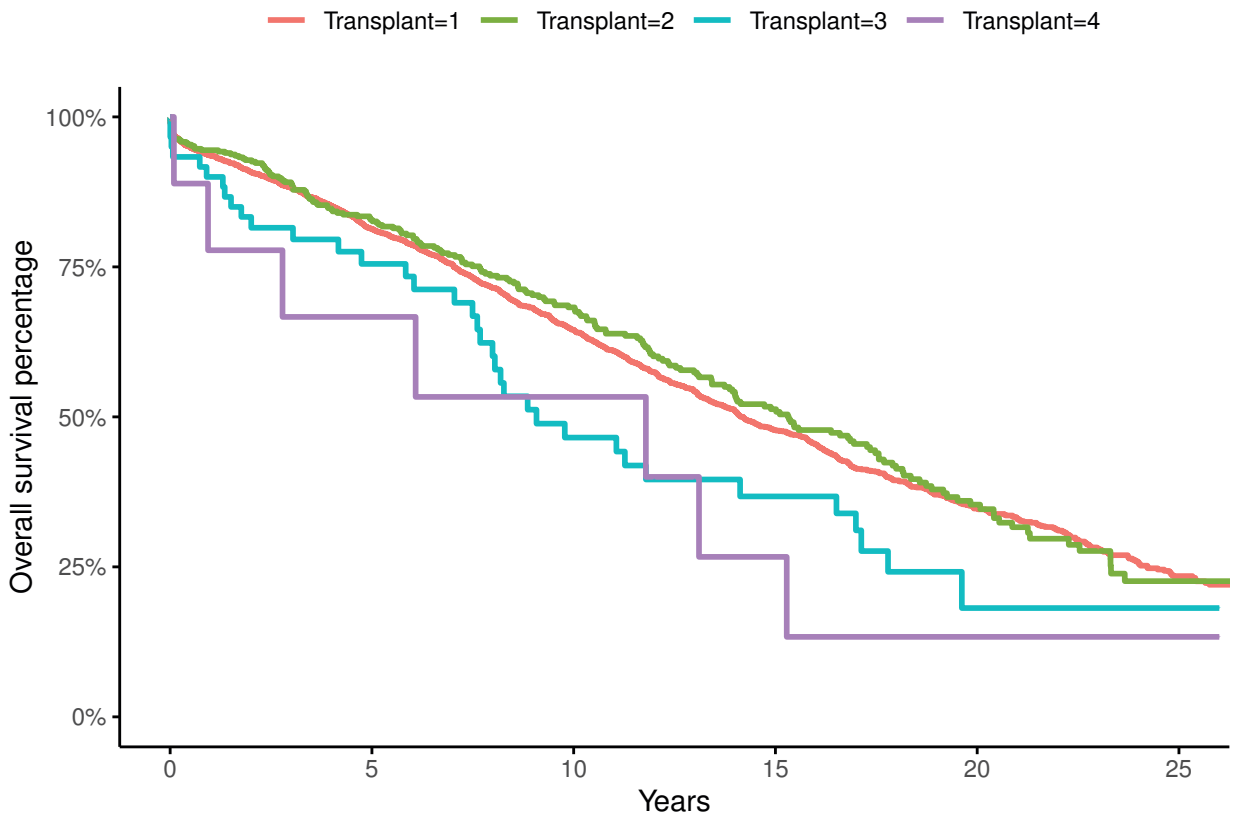


Adult first and repeat deceased donor allograft survival

Table 5.3: Adult first and repeat median allograft survival for deceased donor transplants 1993 - 2022 by transplant number

Transplant number	No of allografts	Median allograft survival (years) [95% C.I.]
1	2953	14.2 [13.7 - 15.2]
2	438	15.4 [13.7 - 17.6]
3	61	9.1 [7.7 - 16.5]
4	9	5.1 [0.1 - 15.3]

Figure 5.2: Adult deceased donor first & repeat allograft survival estimates 1993 – 2022

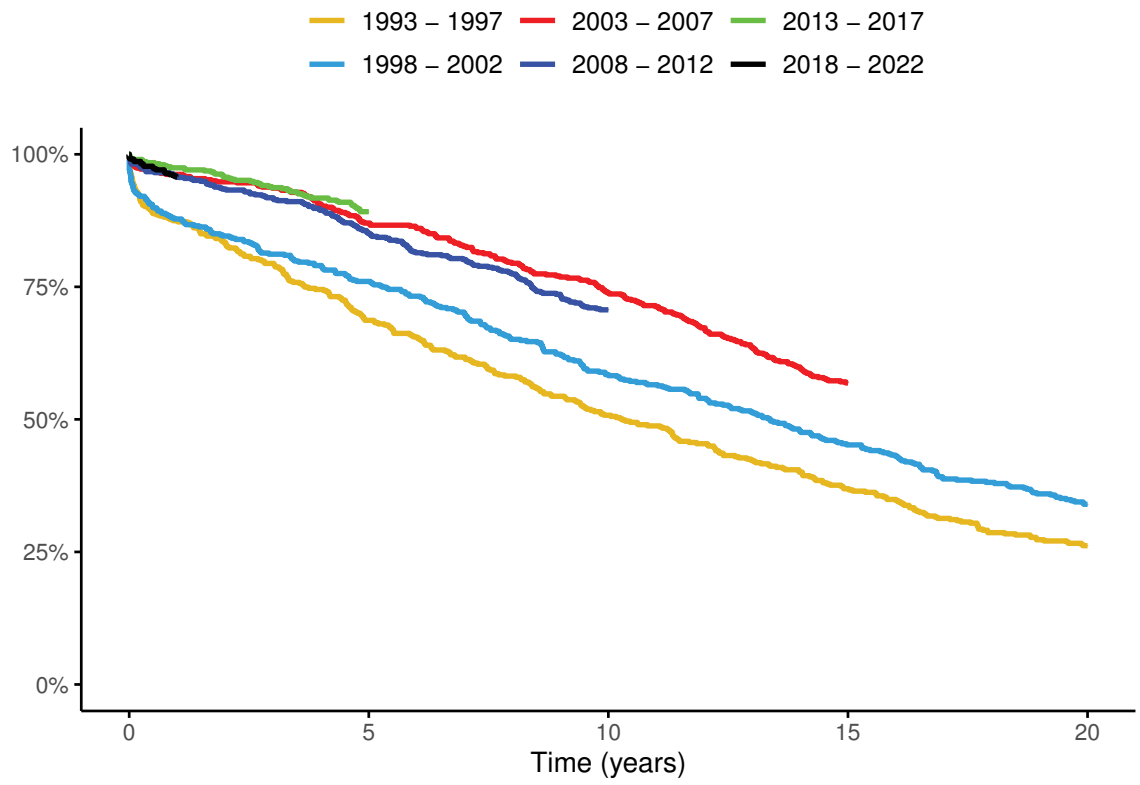


Adult first deceased donor allograft survival by era

Table 5.4: Adult first deceased donor allograft survival by era 1993 - 2022

Period transplanted	Follow up time (years)	Estimated allograft survival [95% C.I.]
1993 - 1997	1	87.6 [84.2 - 90.3]
1993 - 1997	5	68.9 [64.4 - 72.9]
1993 - 1997	10	50.9 [46.2 - 55.5]
1993 - 1997	15	37.0 [32.6 - 41.5]
1993 - 1997	20	26.3 [22.3 - 30.4]
1998 - 2002	1	88.0 [84.7 - 90.6]
1998 - 2002	5	75.2 [72.1 - 79.8]
1998 - 2002	10	58.7 [54.1 - 63.0]
1998 - 2002	15	45.3 [40.7 - 49.7]
1998 - 2002	20	34.0 [29.7 - 38.3]
2003 - 2007	1	96.3 [94.2 - 97.6]
2003 - 2007	5	87.2 [83.9 - 89.8]
2003 - 2007	10	74.1 [70.0 - 77.7]
2003 - 2007	15	57.0 [52.6 - 61.2]
2008 - 2012	1	95.9 [93.8 - 97.2]
2008 - 2012	5	85.2 [82.0 - 87.9]
2008 - 2012	10	70.9 [66.9 - 74.5]
2013 - 2017	1	97.5 [95.7 - 98.5]
2013 - 2017	5	89.2 [86.2 - 91.6]
2018 - 2022	1	95.7 [93.4 - 97.2]

Figure 5.3: Kaplan-Meier adult first deceased donor allograft survival estimates by era 1993–2022



14.2 & 20.5 years

" Median adult deceased allograft and patient survival for the last 30 years is **14.2** and **20.5 years** respectively."

Adult deceased donor patient survival

• The overall median patient survival for adult deceased donor recipients between 1993 – 2022 was **20.5** years (Table 5.5).

• Patient survival at 1 year has remained stable for the eras studied, reaching a high of **98%** for the period 2018 – 2022. Five year survival rates have improved markedly from **83%** in the initial period to **93%** for 2013 - 2017 (Table 5.7).

Adult first deceased donor patient survival

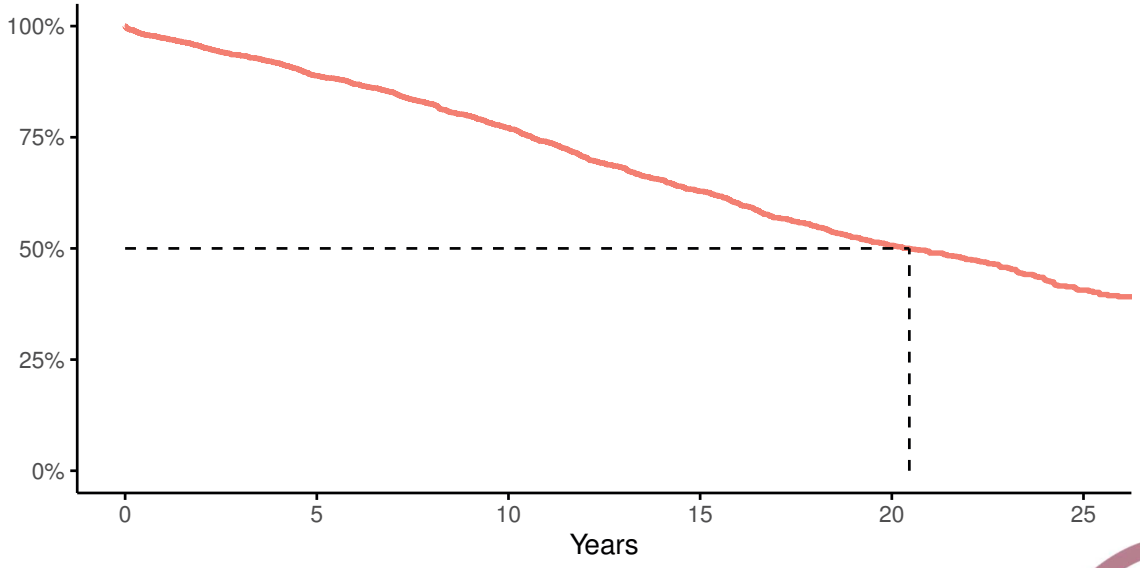
Table 5.5: Adult first deceased donor median patient survival 1993 - 2022

No. of transplants	Median patient survival (years) [95% C.I.]
2,953	20.5 [19.1 - 22.1]

Table 5.6: Estimated adult first deceased donor patient survival 1993 - 2022

Follow up time (years)	Estimated patient survival [95% C.I.]
1	97.3 [96.7 - 97.8]
5	88.9 [87.6 - 90.0]
10	77.2 [75.4 - 78.8]
15	62.8 [60.7 - 64.9]
20	50.7 [48.2 - 53.1]

Figure 5.4: Kaplan-Meier adult deceased donor patient survival estimates 1993-2022

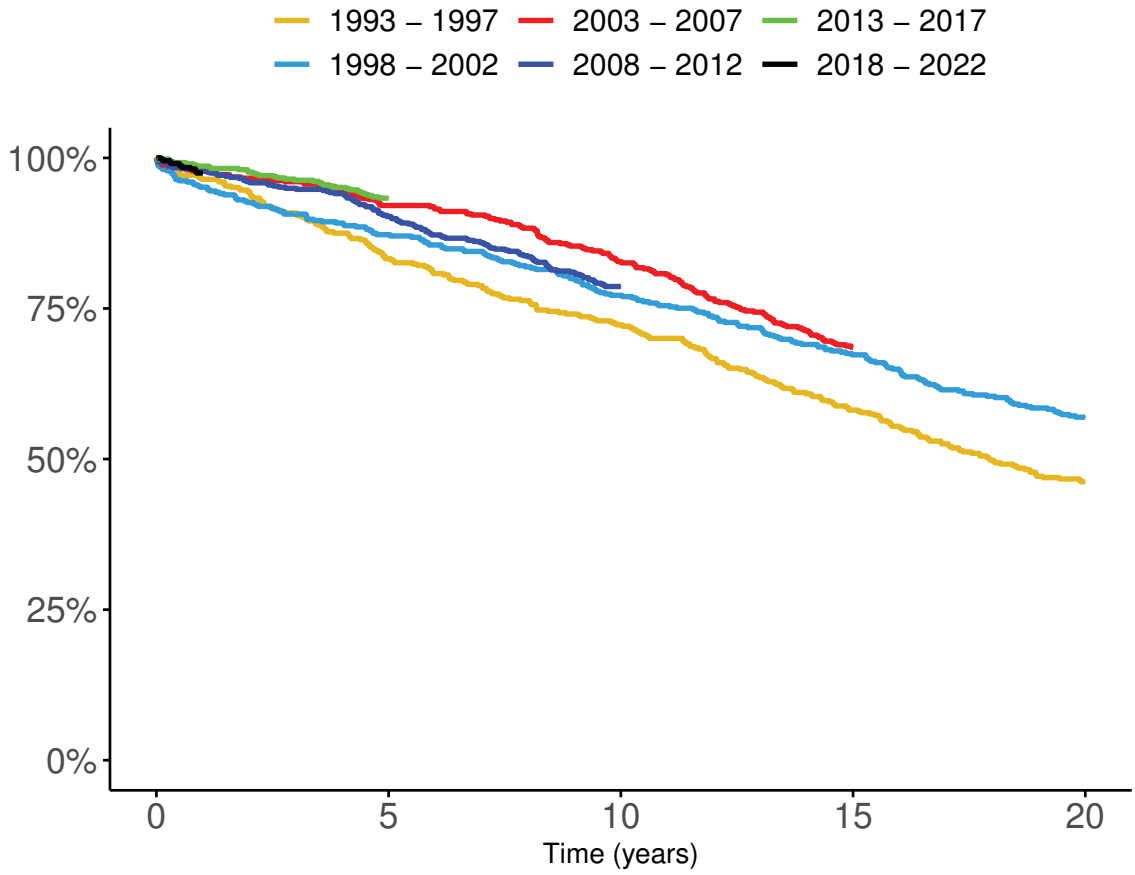


Adult first deceased donor patient survival

Table 5.7: Adult first deceased donor patient survival by era transplanted 1993 - 2022

Period transplanted	Follow up time (years)	Estimated patient survival [95% C.I.]
1993 - 1997	1	96.4 [94.3 - 97.8]
1993 - 1997	5	83.3 [79.5 - 86.4]
1993 - 1997	10	72.3 [67.9 - 76.2]
1993 - 1997	15	58.1 [53.4 - 62.6]
1993 - 1997	20	46.2 [41.6 - 50.8]
1998 - 2002	1	95.1 [92.8 - 96.7]
1998 - 2002	5	87.3 [83.9 - 90.0]
1998 - 2002	10	77.2 [73.1 - 80.7]
1998 - 2002	15	67.3 [62.8 - 71.4]
1998 - 2002	20	57.0 [52.3 - 61.3]
2003 - 2007	1	97.8 [96.1 - 98.8]
2003 - 2007	5	92.1 [89.4 - 94.1]
2003 - 2007	10	82.8 [79.2 - 85.8]
2003 - 2007	15	68.6 [64.3 - 72.4]
2008 - 2012	1	98.0 [96.5 - 98.9]
2008 - 2012	5	90.3 [87.5 - 92.5]
2008 - 2012	10	78.7 [75.0 - 81.8]
2013 - 2017	1	98.6 [97.2 - 99.4]
2013 - 2017	5	93.3 [90.8 - 95.2]
2018 - 2022	1	97.5 [95.5 - 98.6]

Figure 5.5: Kaplan-Meier adult first deceased donor patient survival estimates by era 1993–2022



Adult recipient living donor allograft and patient outcomes 2007 - 2022

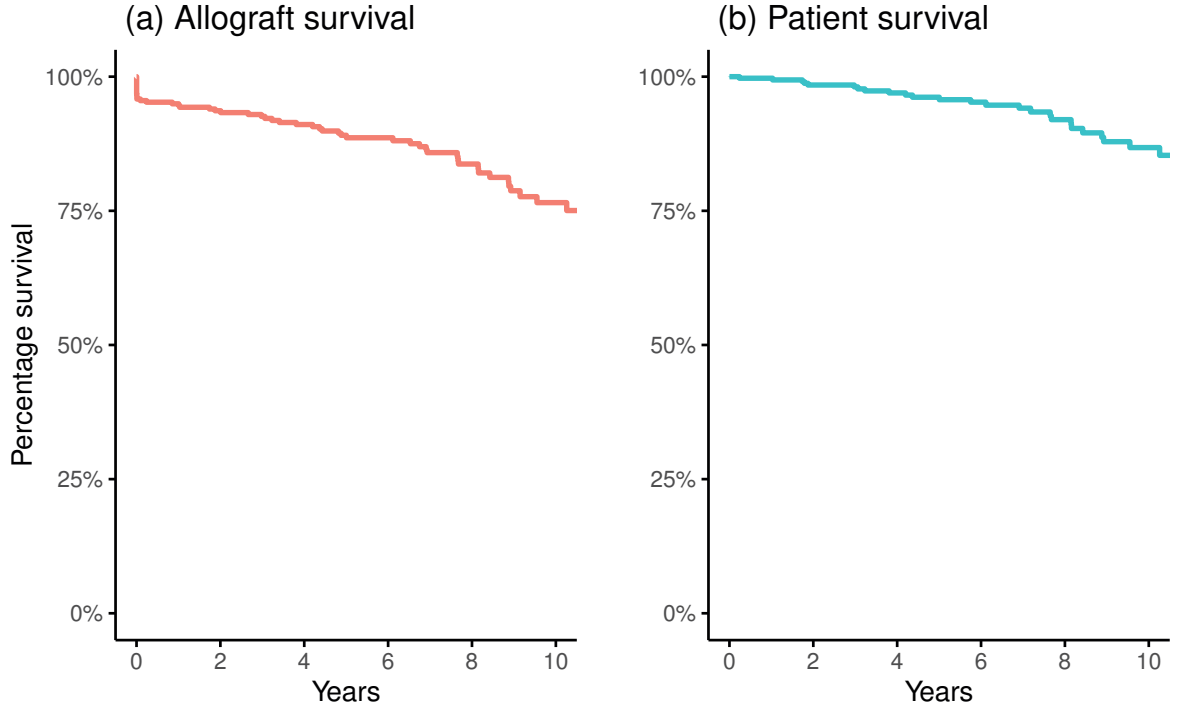
This section focuses on outcomes for adult recipients of living donor kidney from 2007-2022. During this period **424** living donor transplants were performed, **346** were for first transplant recipients **65** for second and **13** were for subsequent transplants.

- One-year allograft survival for adult living donor transplant recipients for the period 2007 - 2022 was **95%**, and patient survival was **99%**. Five-year allograft survival for adult living donor transplant recipients between 2007 and 2022 was **89%** and patient survival was **96%** (Table 5.8).

Table 5.8: Adult first living donor allograft and patient survival 2007 - 2022

Follow up time (years)	Adult living donor allograft survival[95% C.I]	Adult living donor patient survival[95% C.I]
1	95.1 [92.2 - 96.9]	99.7 [98.0 - 99.9]
3	92.8 [89.4 - 95.1]	98.1 [95.8 - 99.1]
5	89.3 [85.3 - 92.3]	96.2 [93.2 - 97.9]
10	76.9 [69.6 - 82.6]	86.8 [80.3 - 91.3]

Figure 5.6: Adult first living donor first kidney allograft and patient survival 2007 - 2022



Paediatric deceased donor allograft and patient outcomes 1993 - 2022

This section focuses on paediatric deceased donor allograft and patient survival for the 30 year period 1993 - 2022. During this period there were **248** deceased donor paediatric transplants, of which **221** were first transplants.

- There were **4** paediatric transplants during 2023, all of which were from deceased donors. The age range was 4-12 years and all recipients received a first transplant.
- The overall median allograft survival for recipients of first deceased donors was **16.1** years (Table 5.9).
- One year paediatric deceased donor allograft survival was **91%** with one year patient survival of **99%**, reducing only to **98%** at 5 and 10 years (Table 5.10).

Paediatric first deceased donor median allograft survival

Table 5.9: Paediatric first deceased donor median allograft survival 1993 - 2022

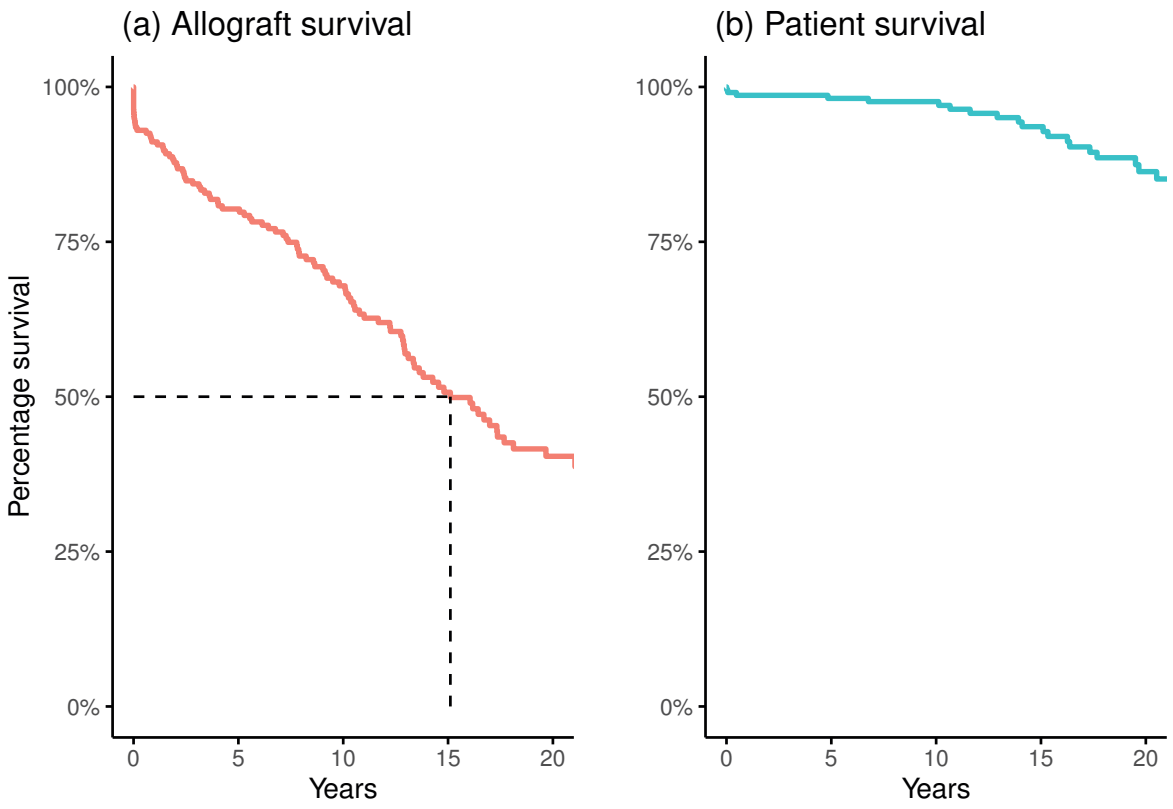
Transplant number	Median allograft survival in years [95% C.I.]
221	16.1 [13.1 - 19.7]

Paediatric first deceased donor allograft and patient survival

Table 5.10: Paediatric first deceased donor allograft and patient survival 1993 - 2022

Follow up time (Years)	Estimated allograft survival [95% C.I.]	Estimated patient survival [95% C.I.]
1	91.4 [88.7 - 94.4]	98.6 [95.9 - 99.6]
5	80.9 [75.0 - 85.6]	98.1 [95.1 - 99.3]
10	68.9 [61.9 - 74.8]	97.6 [94.4 - 99.0]
15	51.7 [43.7 - 59.1]	93.6 [88.6 - 96.4]
20	41.3 [33.0 - 49.5]	86.3 [79.0 - 91.2]

Figure 5.7: Paediatric first deceased donor kidney allograft and patient survival 1993-2022



Paediatric recipient living donor allograft and patient survival 2007 - 2022

This section details survival outcomes for the period 2007 - 2022. There were **64** paediatric living donor transplants during this period, 57 were first and **7** were repeat transplants.

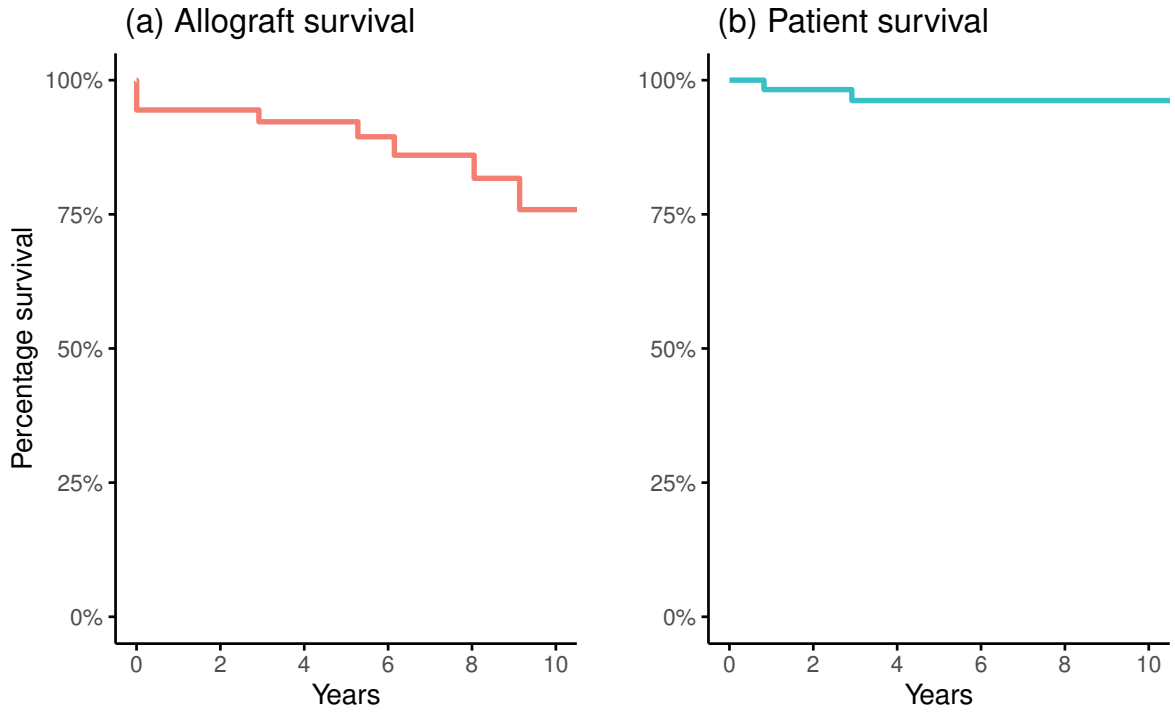
- One-year allograft survival for paediatric living donor transplant recipients for the period 2007 - 2022 was **95%**, and patient survival was **98%**. Ten year allograft and patient survival was **77%** and **96%** respectively (Table 5.11).

Paediatric first living donor recipient allograft and patient survival

Table 5.11: Paediatric first living donor allograft and patient survival 2007 - 2022

Follow up time (Years)	Estimated allograft survival [95% C.I.]	Estimated patient survival [95% C.I.]
1	94.7 [84.6 - 98.3]	98.3 [88.2 - 99.8]
3	92.6 [81.5 - 97.2]	96.2 [85.6 - 99.0]
5	92.6 [81.5 - 97.2]	96.2 [85.6 - 99.0]
10	77.0 [56.5 - 88.8]	96.2 [85.6 - 99.0]

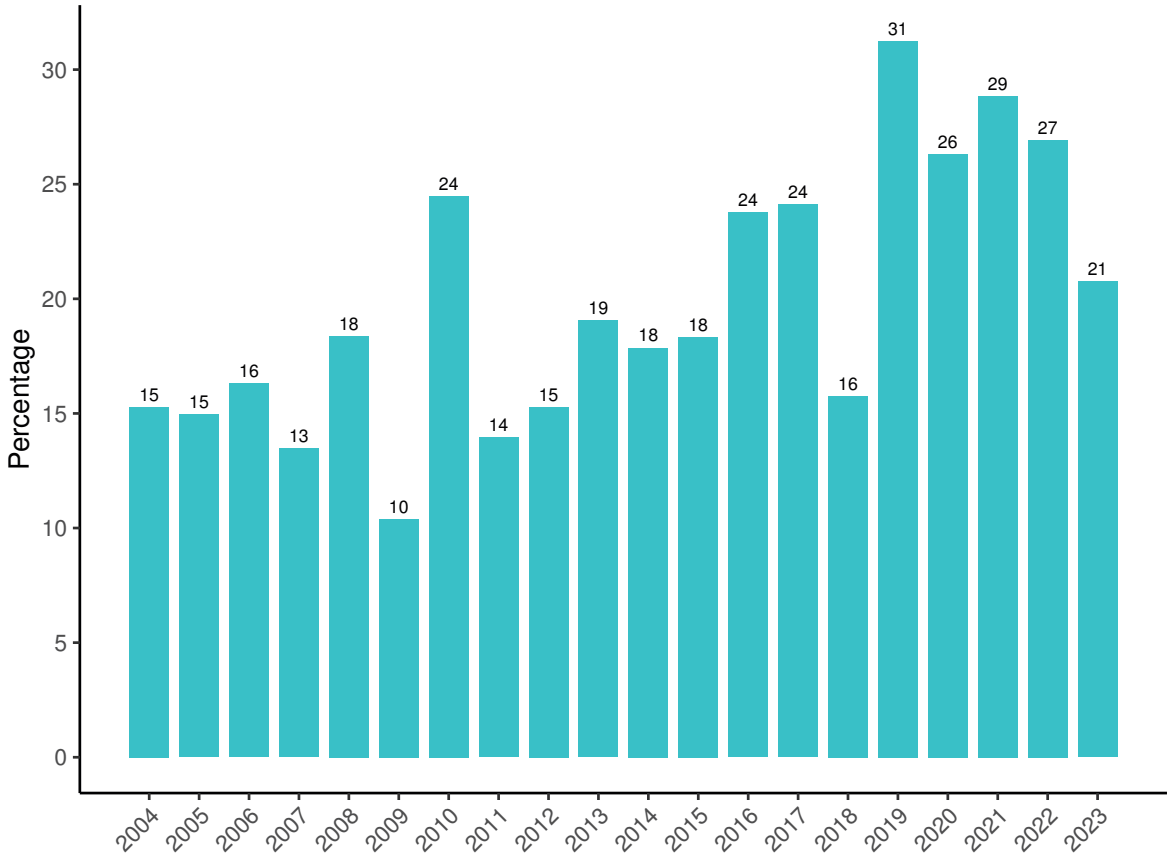
Figure 5.8: Paediatric first living donor kidney allograft and patient survival 2007 - 2022



Delayed graft function

The rate of delayed allograft function (defined as the temporary requirement of dialysis within one week of transplant) for recipients of deceased donor kidneys has been high for the last 4 years, reaching over 31% in 2019 and was 21% in 2023 (Figure 5.9) reflecting the use of kidneys from non-heart beating (DCD) and extended criteria donors. There are significantly lower rates of delayed graft function for recipients of living donor kidneys and in 2023 the rate was 3%.

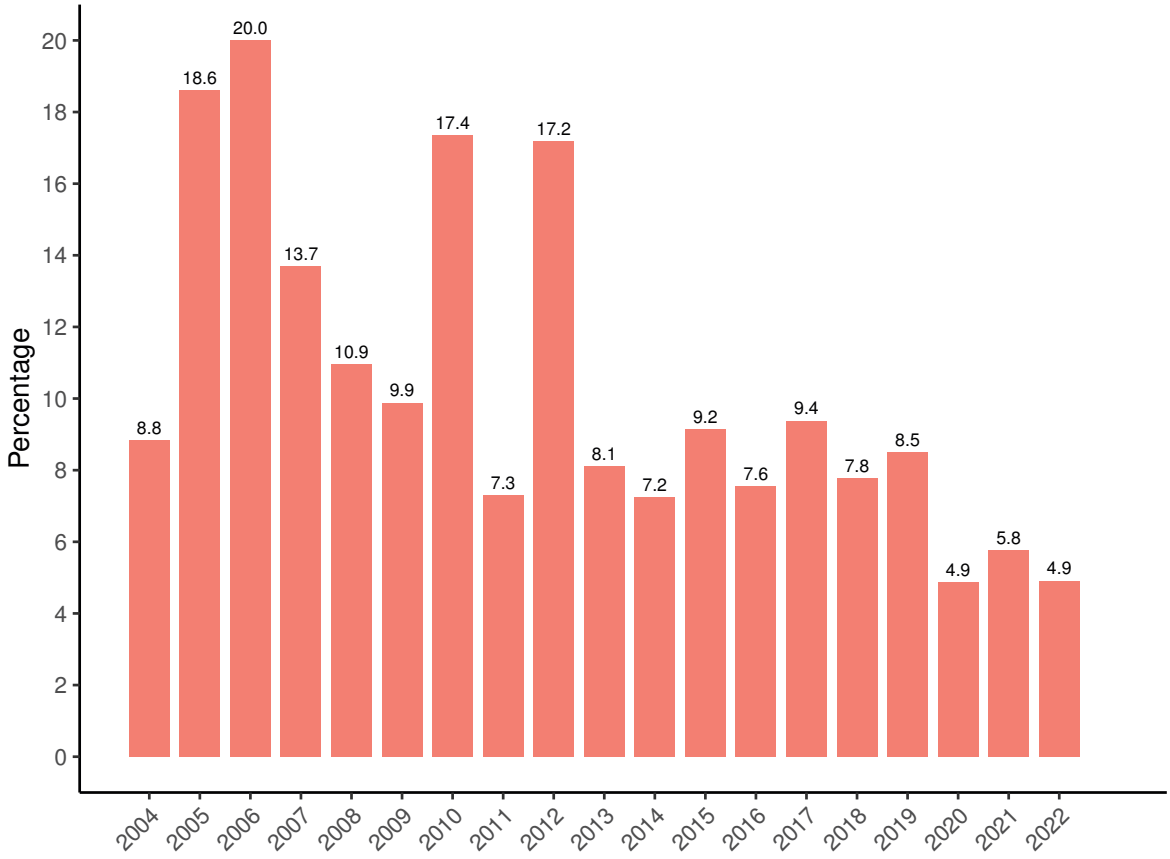
Figure 5.9: Delayed allograft function for deceased donor recipients post-transplant 2004-2023



Biopsy proven acute rejection

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 an average of 10% per year. As we assess acute rejection within the first year of transplantation the latest figure was for 2022 which was 4.9% for both deceased and living donor kidneys (Figure 5.10).

Figure 5.10: Acute rejection rate for living and deceased recipients post-transplant 2004-2022



6. International Comparisons

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 800,000 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 conducts various prospective and retrospective studies on particular research topics.

The NKTS at Beaumont Hospital provides anonymised data through a secure encrypted portal to the CTS, and they, in return, have produced graphs showing the performance of the NKTS compared to other European centers. 2022 is the most recent year that data is available for survival analysis published by the CTS. Results are presented for adult and paediatric recipients for both deceased and living donor kidneys. The time frames presented below were requested to best reflect NKTS activity and enhance comparisons with other centers.

Figure 6.1: EU (CTS) adult **first** deceased-donor kidney **patient** survival 1993-2022

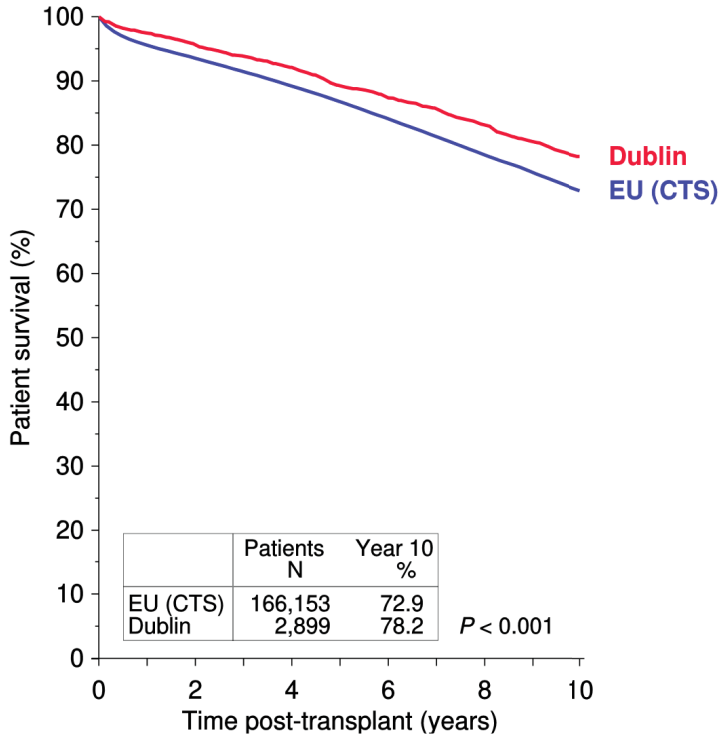


Figure 6.2: EU (CTS) adult **first** deceased-donor kidney **allograft** survival 1993-2022

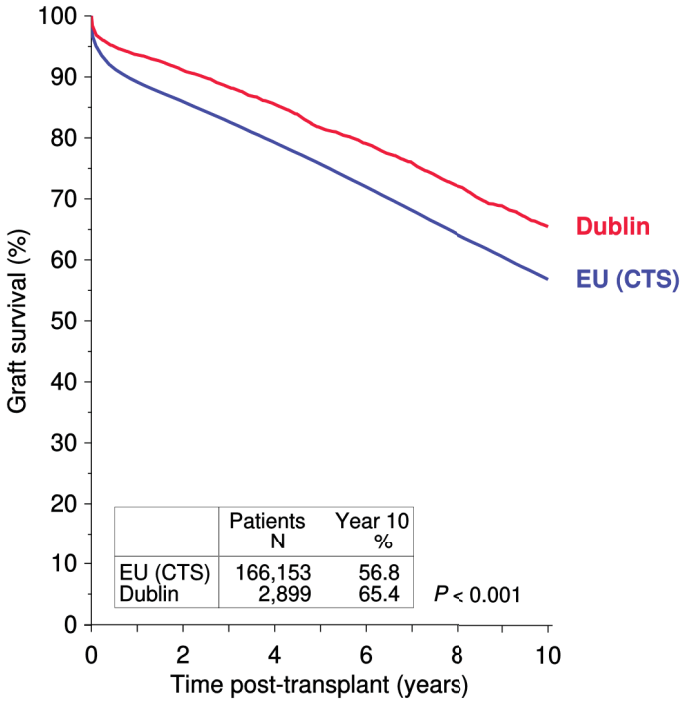


Figure 6.3: EU (CTS) adult **retransplant** deceased-donor kidney **allograft** survival 1993-2022

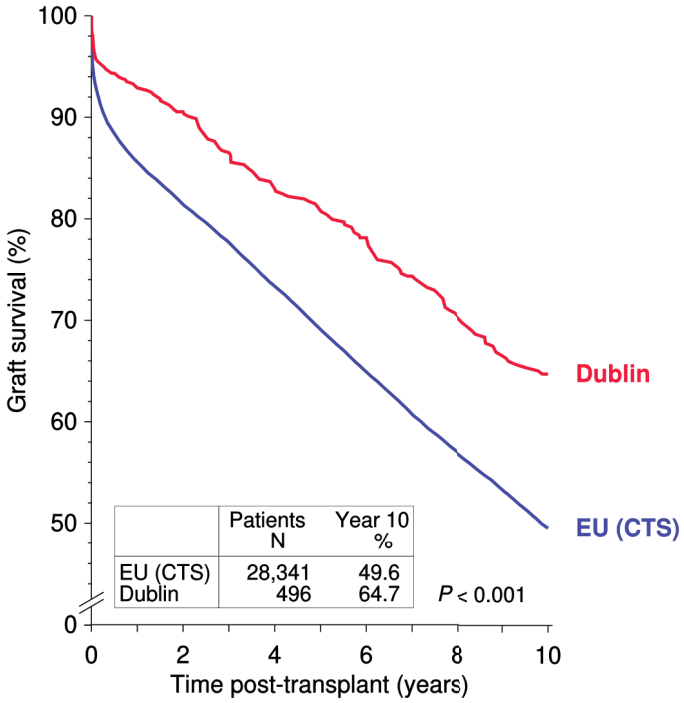


Figure 6.4: EU (CTS) adult **first** living-donor kidney **patient** survival 2006-2022

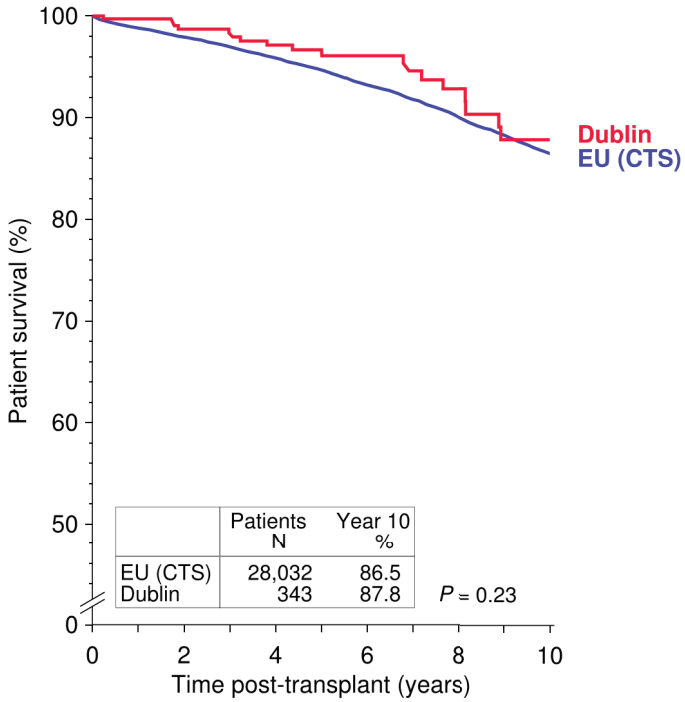


Figure 6.5: EU (CTS) adult **first** living-donor kidney **allograft** survival 2006-2022

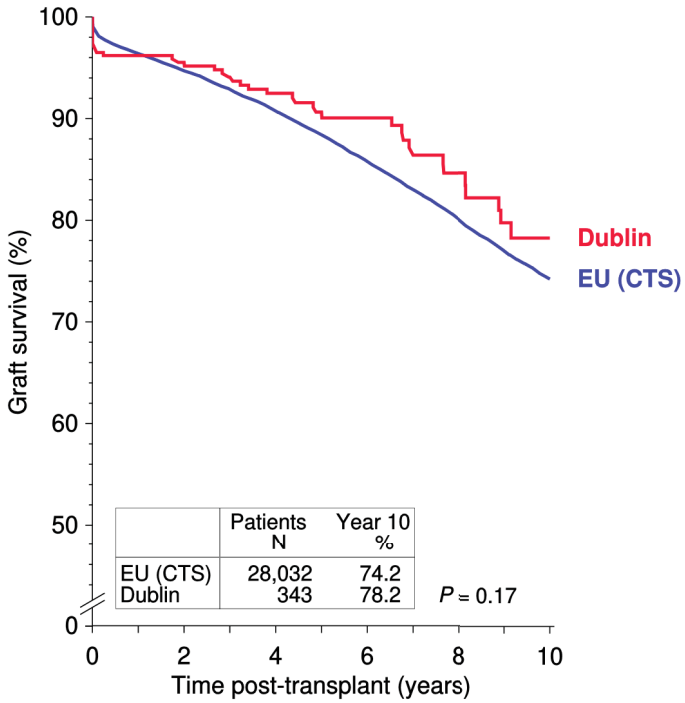


Figure 6.6: EU (CTS) paediatric **first** deceased-donor kidney **allograft** survival 2006-2022

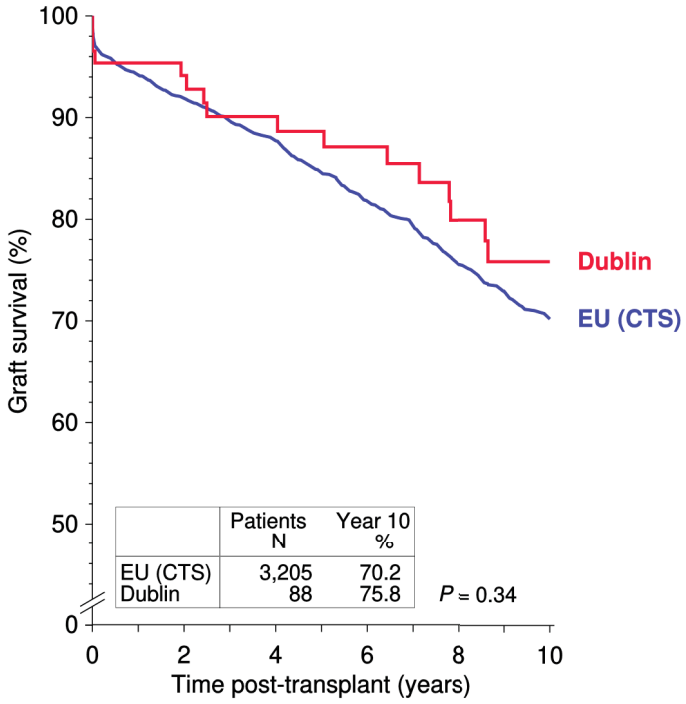
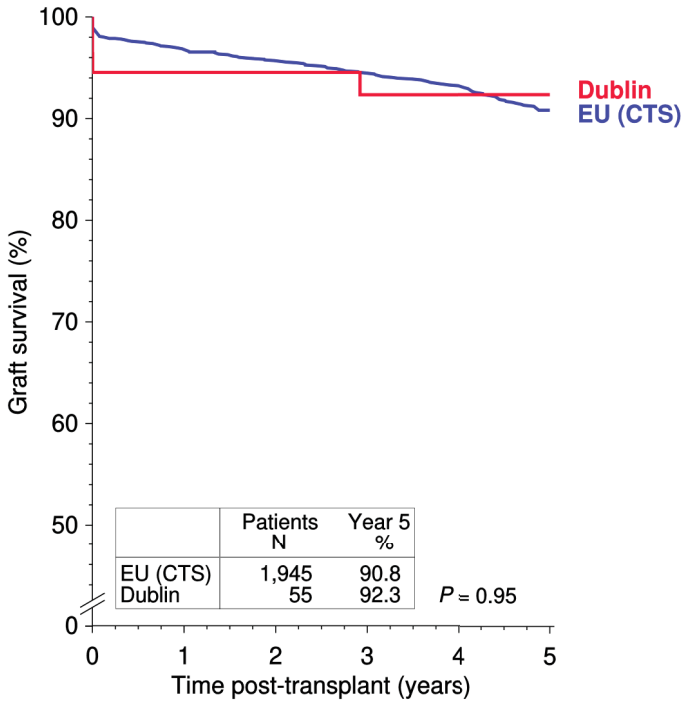


Figure 6.7: EU (CTS) paediatric **first** living-donor kidney **allograft** survival 2006-2022



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), rates and outcomes of kidney transplantation and donation via the national and regional renal registries in Europe. For this section comparisons are made between 20 ERA/EDTA countries for transplant rates.

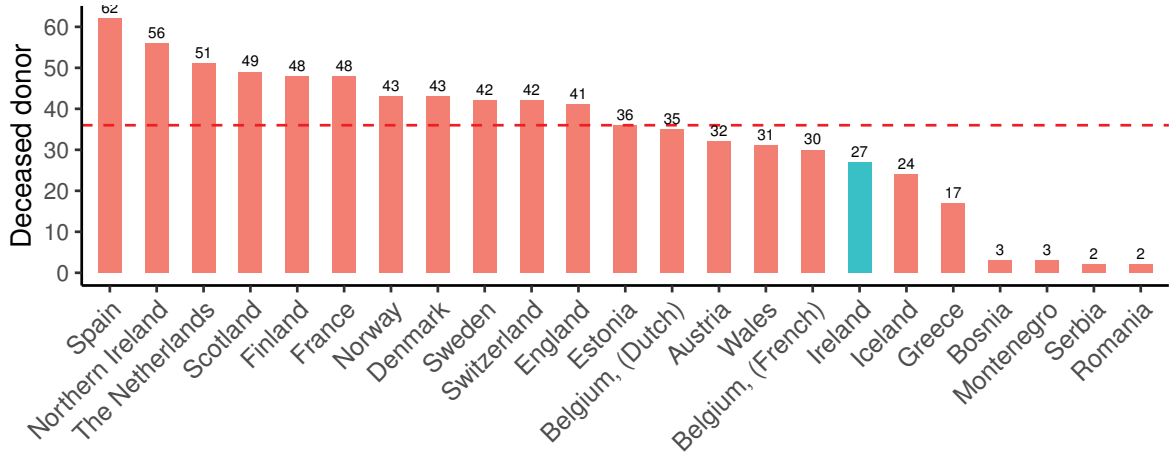
Data was retrieved from the 2021 (most recent) ERA/EDTA report released in November 2023. Rates for all centres improved somewhat from the previous year with Covid-19 having less impact on total numbers transplanted for both deceased and living donor kidneys.

- The overall kidney transplant rate PMP (per million population) was **27** for Ireland during 2021 compared to the EDTA overall registry rate of **36** PMP. The countries with the highest rates of kidney transplantation were Spain, Northern Ireland, The Netherlands and Scotland with **62, 56, 51 and 49** PMP respectively.(Figure 6.10)

- Deceased donor kidney transplant rate PMP was **20** for Ireland in 2021, compared to the overall registry rate of **24** PMP. The countries with the highest rates of deceased donor kidney transplantation were Spain, France, Estonia and Scotland with **55, 41, 33 and 33** PMP respectively(Figure 6.11)

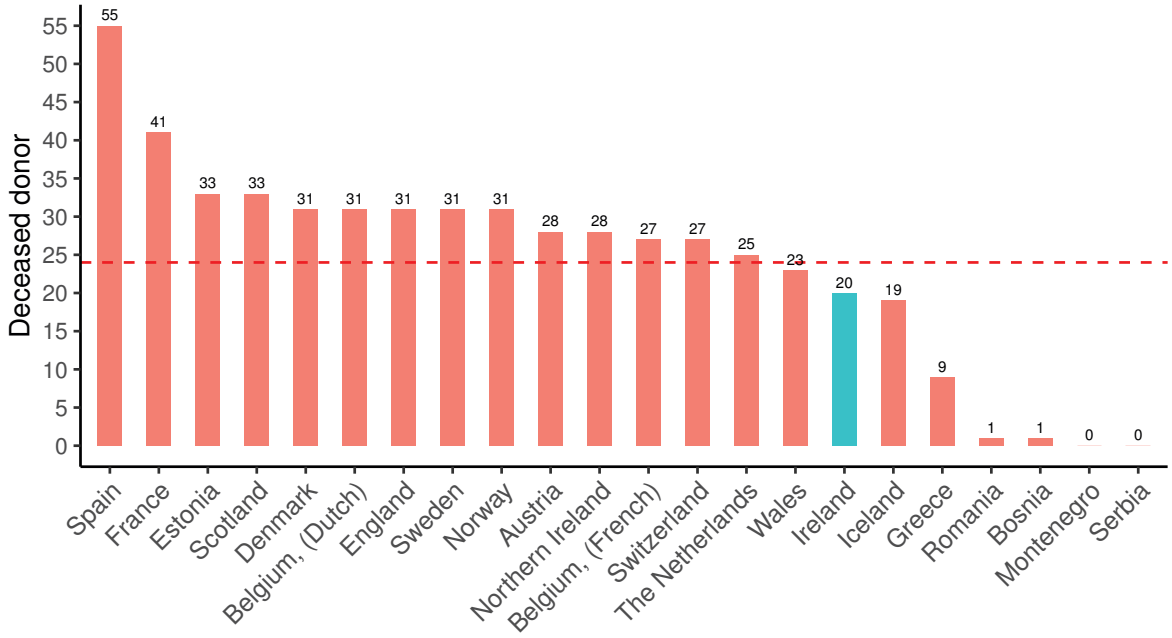
- Living donor kidney transplant rate PMP was **7** for Ireland in 2021 compared to a registry overall rate of 12 PMP. Countries with the highest rates of living donor kidney transplantation were Northeren Ireland, The Netherlands, Scotland and Switzerland with **28, 25, 16 and 14** PMP respectively.(Figure6.12)

Figure 6.10: Total rates of transplantation PMP for EDTA countries and Ireland for 2021



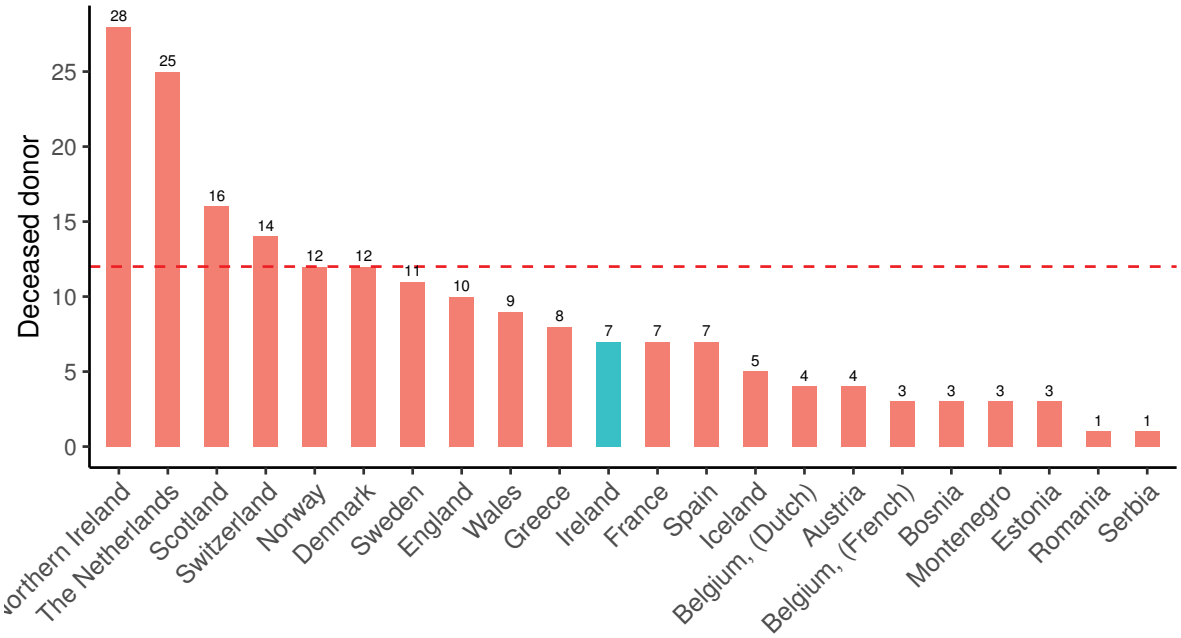
Note: dashed line = Average PMP for EDTA countries

Figure 6.11: Deceased donor rates of transplantation PMP for EDTA countries and Ireland for 2021



Note: dashed line = Average PMP for EDTA countries

Figure 6.12: Living donor rates of transplantation PMP for EDTA countries and Ireland 2021



Note: dashed line = Average PMP for EDTA countries

7. Living Donor Programme

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. This is evidenced by comparing Table 5.2 and 5.5 (deceased donor adult allograft and patient outcomes) with Table 5.8 (living donor adult allograft and patient outcomes). There are also reductions 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 check ups with their nephrologist to ensure they suffer no ill events post nephrectomy. Long term follow up data on kidney donors provides insight and information on the long term safety and possible health risks of 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 to which the NKTS complies with this legislation.

COVID-19 continued to pose particular difficulties for the Living Donor Programme in 2023 but was managed very effectively resulting in **120** potential donors being immunologically evaluated. This reflected a decrease of 7% presenting for evaluation compared to 2022 activity. Of this number **85** were medically assessed and underwent investigations to determine suitability to proceed with live donation. 70 were assessed for direct donation and 15 for the UK Living Donor Kidney Sharing Scheme (UKLKSS). Of note, these donor recipient pairs are now assessed in Belfast as part of cross border collaboration which has practical advantages for all involved (e.g. travel and access). Of the 15 donors in the UKLKSS, 2 proceeded to donation in 2023.

Summary of Living Donor profiles and outcomes

- There were **30** living donor kidneys transplanted in 2023
- In the period 2001 - 2023 donation to adults occurred mainly between siblings **(49%)**, spouses **(17%)**, parents **(15%)** and children **(10%)**. However for paediatric recipients, as expected, **83%** are parental donors (Figure 7.1)
- Median age at donation was **48** overall. 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 **31 to 65**. The percentage of donor type by age groups are presented in Figure 7.2.
- During 2023 the median length of in-hospital stay post-operatively was **4 days**, the same as for the period 2018 - 2023 as a whole. For the time period 2001-2011 this was **6 days** reducing to 5 days for 2012-2017 (Figure 7.3). The overall reduction in inpatient length of stay in

recent years is due to the fact that virtually all donor nephrectomies are performed using minimally invasive laparoscopic techniques allowing for accelerated post-operative recovery.

• Post-operatively all living donors are reviewed by the surgical team and are then offered an annual follow-up with their local nephrologist. **77%** of living donors are availing of this service with a median follow up time of **6.9** years.

• At follow-up, **14%** of living donors developed hypertension post donation ranging from **9%** in the 20 – 34 age group to **23%** in the age group > 55 years (Figure 7.4).

• 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 7.5).

Donor characteristics at donation date

Figure 7.1: Adult/ Paediatric Recipient by donor type of relation 2001 - 2023

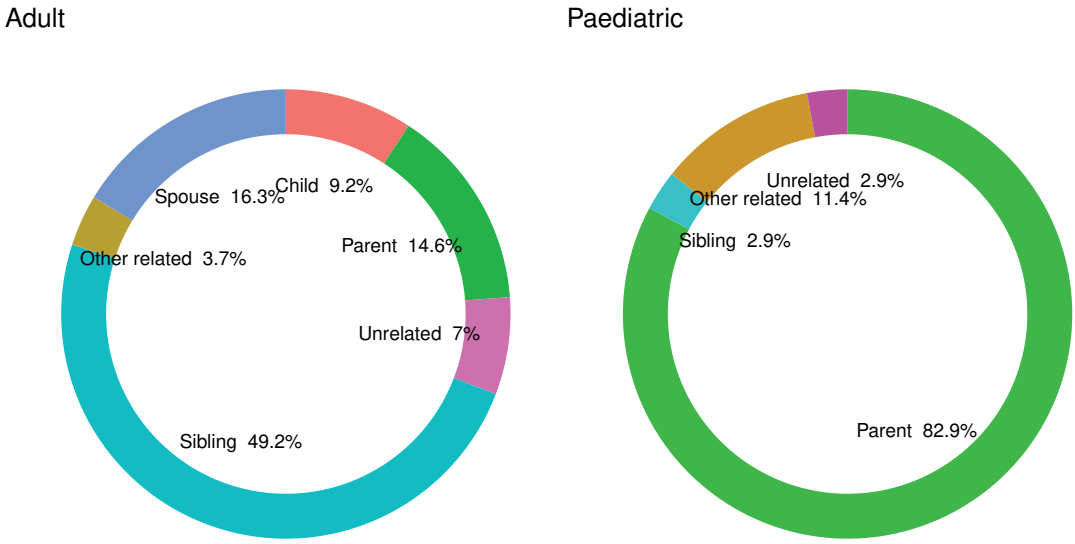
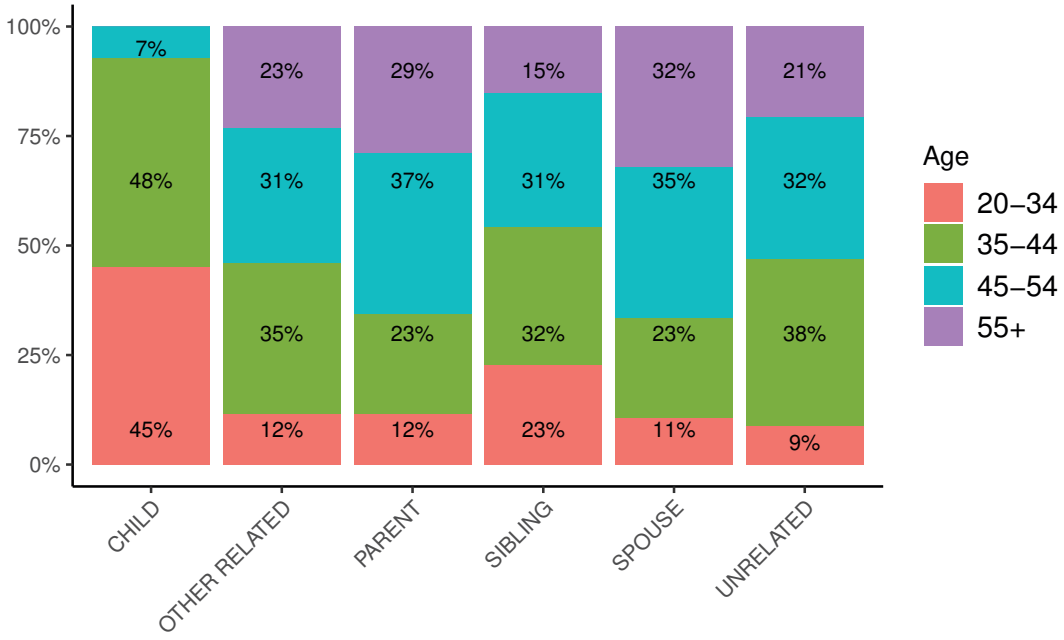


Figure 7.2: Percentage of age group by donor type at donation 2001 - 2023



Donor outcomes post donation

Figure 7.3: Length of stay of living donors by time period of donation 2001 - 2023

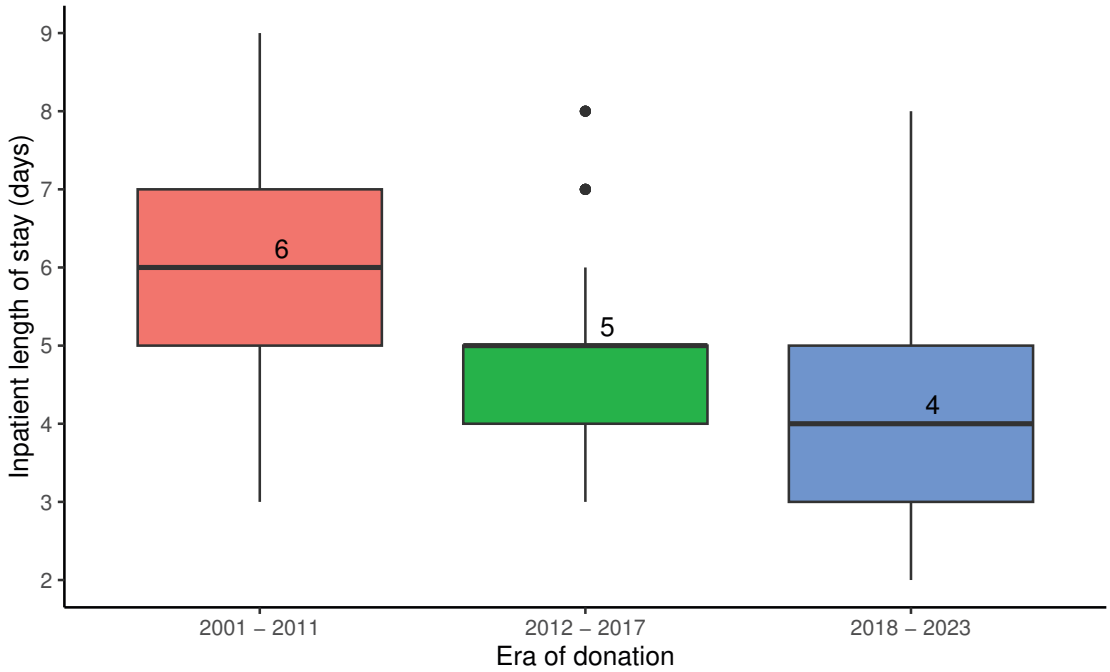


Figure 7.4: Percentage of post donation hypertension by donor age group 2001 - 2023

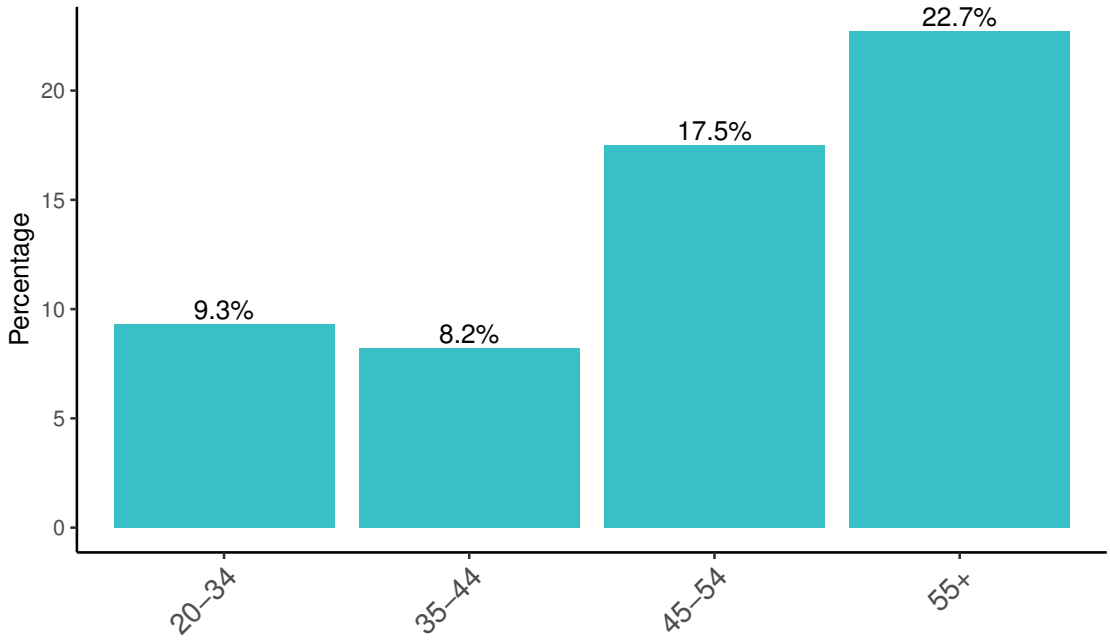
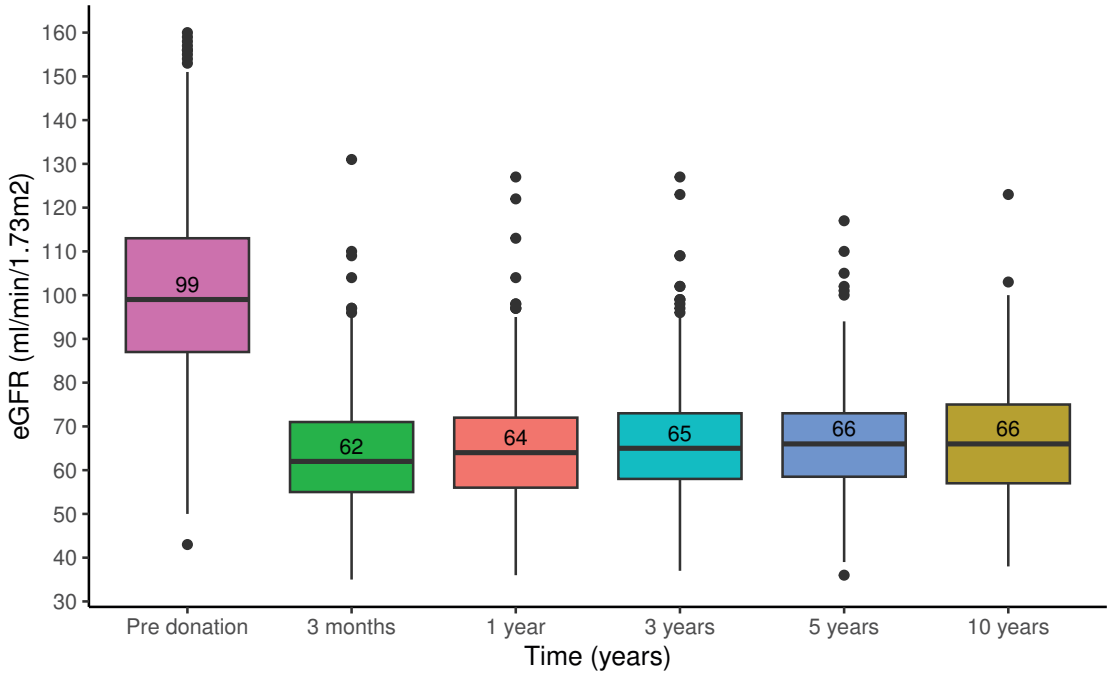


Figure 7.5: Median and interquartile eGFR for living donors pre and post donation 2001 - 2023

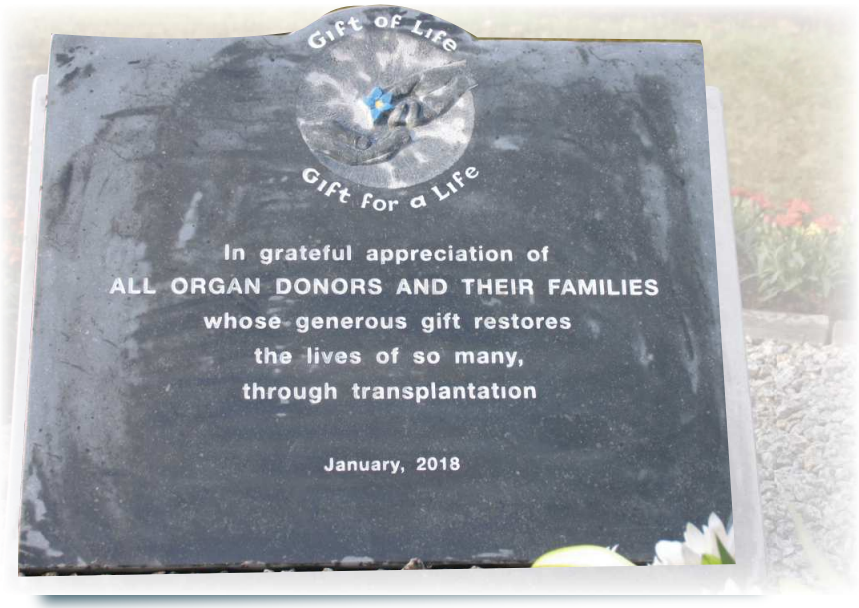


Acknowledgements

In preparing for this annual report, the Directorate Team would like to acknowledge the generosity of all the kidney donors and their families whose "Gift of Life "makes each transplant a reality. We also recognise and acknowledge the extremely hard work and dedication of the entire Transplant Team and indeed all the staff in Beaumont Hospital who commit on a daily basis to delivering the highest quality of care to our recipients and donors.

"Individuals make a difference, but a team make miracles."

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 Transplant Coordinators and the Clinical Nurse Specialists in the regional centers in providing us with timely data, without which this report could not be produced.



National Kidney Transplant Service

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E: transplantcoordinators@beaumont.ie
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