

## *Chapter 4*

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# **Adults with a kidney transplant (Tx) in the UK at the end of 2020**

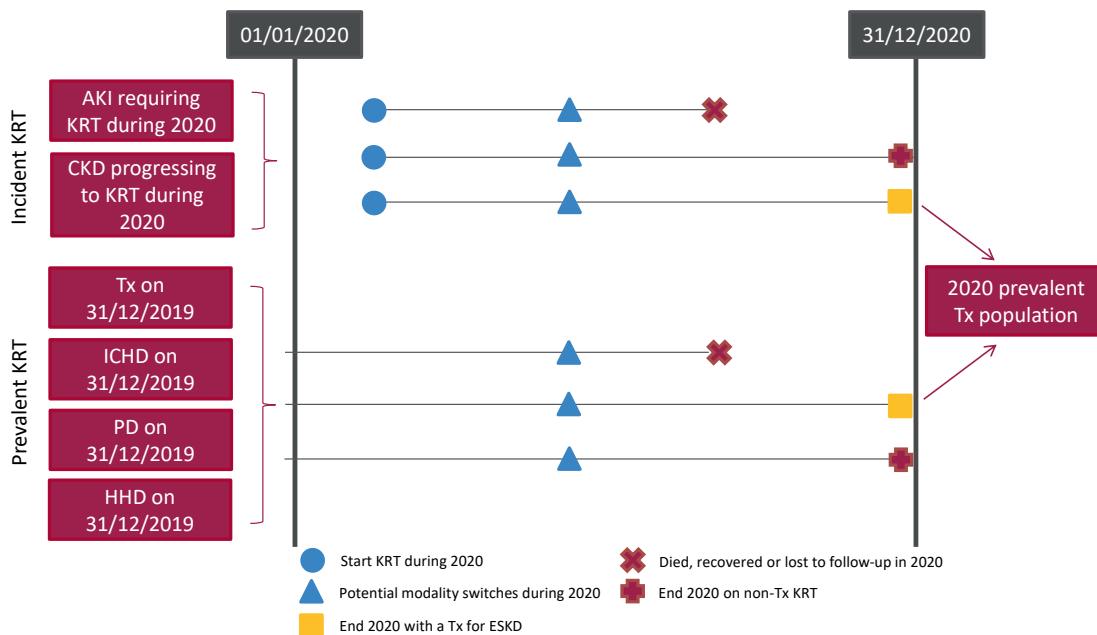
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# Introduction

This chapter describes the population of patients with end-stage kidney disease (ESKD) who had a functioning kidney transplant (Tx) in the UK at the end of 2020 (figure 4.1). Patients can receive their first Tx either pre-emptively, i.e. without spending any time on dialysis, or while on dialysis. Donors in both pathways may be either a living kidney donor (LKD) or a deceased kidney donor – receiving a kidney from a donor after brain death (DBD) or a donor after circulatory death (DCD). If a Tx begins to fail a patient may be considered for a second (or subsequent) Tx, which again can come from a living or deceased donor.

Potential Tx recipients who pass rigorous assessments are wait-listed, which can occur before or after they have started dialysis. The majority of kidneys received through wait-listing are from deceased donors. The cohort of patients living with a kidney Tx in a centre not only reflects differences in underlying population case-mix, but also differences in the rates of acceptance onto kidney replacement therapy (KRT). This includes wait-listing rates and live donor programmes, survival of the Tx graft and its recipient, as well as the care and survival of patients on dialysis therapies, as described in other chapters of this report.



**Figure 4.1** Pathways adult patients could follow to be included in the UK 2020 prevalent Tx population

Note that patients receiving dialysis for acute kidney injury (AKI) are only included in this chapter if they had a timeline or KRT modality code for Tx at the end of 2020 or if they had been on KRT for  $\geq 90$  days and were on Tx at the end of 2020.

AKI – acute kidney injury; CKD – chronic kidney disease; HHD – home haemodialysis; ICHD – in-centre haemodialysis; PD – peritoneal dialysis; Tx - Transplantation

Patient survival, graft survival and cause of death analyses were undertaken on historic incident and prevalent cohorts to allow sufficient follow-up time.

The analyses were undertaken using UK Renal Registry (UKRR) data combined with NHS Blood and Transplant (NHSBT) data through a data sharing agreement.

This chapter addresses the following key aspects of the care of patients with a functioning kidney Tx for which there are UK Kidney Association guidelines (table 4.1):

- **Complications associated with CKD and kidney transplantation:** these include anaemia, mineral bone disorders and dyslipidaemia
- **Blood pressure:** attainment of blood pressure targets are reported, although data completeness does not allow differentiation based on levels of proteinuria.

## Rationale for analyses

The analyses begin with a brief summary of the number and type of kidney Tx undertaken in recent years in the UK as well as early graft and patient survival. More detailed results are available at [organdonation.nhs.uk/helping-you-to-decide/about-organ-donation/statistics-about-organ-donation](https://organdonation.nhs.uk/helping-you-to-decide/about-organ-donation/statistics-about-organ-donation). The 2020 prevalent adult Tx population is described, including the number transplanted per million population (pmp).

The UK Kidney Association guidelines ([ukkidney.org/health-professionals/guidelines/guidelines-commentaries](https://ukkidney.org/health-professionals/guidelines/guidelines-commentaries)) provide audit measures relevant to the care of patients with a Tx, and where data permit, their attainment by UK kidney centres in 2020 is reported in this chapter (table 4.1). Audit measures in guidelines that have been archived are not included.

Some audit measures in current guidelines cannot be reported because the completeness of the required data items is too low. Further detail about the completeness of data returned to the UKRR is available through the UKRR data portal ([ukkidney.org/audit-research/data-portals](https://ukkidney.org/audit-research/data-portals)). Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted. The chapter includes analyses carried out by Getting It Right First Time (GIRFT), a national programme designed to reduce unwarranted variation in medical care provided by the NHS by sharing best practice. The GIRFT metrics for kidney services, analysed in collaboration with the UKRR, were based on data derived from multiple sources and included equity of access to services, outcomes and pathways in nephrology, dialysis and transplantation.

**Table 4.1** The UK Kidney Association audit measures relevant to Tx that are reported in this chapter

The UK Kidney Association guideline	Audit criteria	Related analysis/analyses
Post-operative care in the kidney Tx recipient (2017)	Proportion of patients receiving a target blood pressure of 140/90 mmHg or 130/80 mmHg in the presence of proteinuria – protein:creatinine ratio >100 mg/mmol or albumin:creatinine ratio >70 mg/mmol	Table 4.8, figures 4.13–4.14 (proteinuria was not adequately collected)
	Proportion of patients achieving dyslipidaemia targets	Table 4.8
	Incidence of hyperparathyroidism	Table 4.8
	Prevalence of anaemia	Table 4.8, figures 4.11–4.12
Anaemia (2020)	Treatment guidelines for anaemia in kidney Tx patients should be similar to those for CKD patients not on dialysis	Table 4.8, figures 4.11–4.12

In 2020, 23 of the 68 adult kidney centres in the UK were Tx centres – 19 in England, two in Scotland and one in each of Northern Ireland and Wales.

For definitions and methods relating to this chapter see appendix A. Centres were excluded from caterpillar plots and cells were blanked in tables where data completeness for a biochemical variable was <70% and/or the number of patients reported was <10. The number preceding the centre name in each caterpillar plot indicates the percentage of missing data for that centre.

As Colchester kidney centre did not have any Tx patients they were excluded from some of the analyses, although their dialysis patients were included in the relevant dialysis population denominators.

## Key findings

- 38,895 adult patients had a kidney Tx for ESKD in the UK on 31/12/2020, which represented 57.0% of the KRT population.
- The median age of kidney Tx patients was 56.0 years and 60.8% were male.
- There was a 29% reduction in overall kidney Tx performed in 2020 compared to 2019, with a decrease in kidney Tx from LKDs by 44%, DCDs by 33% and 14% DBDs. This is likely due to COVID disruption of transplant pathways.
- The median eGFR for kidney Tx patients 1 year after transplantation was 56.8 mL/min/1.73m<sup>2</sup> from LKD, 51.8 mL/min/1.73m<sup>2</sup> from DBD and 47.7 mL/min/1.73m<sup>2</sup> from DCD.
- 15.9% of kidney Tx patients had eGFR <30 mL/min/1.73m<sup>2</sup>.
- The median decline in eGFR slope beyond the first year after transplantation was 0.8 mL/min/1.73m<sup>2</sup>/year.
- There was no cause of death data available for 38.4% of deaths on Tx. For those Tx patients with data, the leading cause of death was infection (32%) compared to (18.7%) the previous year and the increase is most likely due to an increase in COVID related deaths.

# Analyses

## Kidney Tx activity

NHSBT provided the UKRR with summary data on kidney Tx activity (table 4.2). More detailed results are available at [organdonation.nhs.uk/helping-you-to-decide/about-organ-donation/statistics-about-organ-donation](http://organdonation.nhs.uk/helping-you-to-decide/about-organ-donation/statistics-about-organ-donation). The number of patients receiving a pre-emptive Tx is reported by centre in chapter 2.

**Table 4.2** Number of kidney and kidney plus other organ Tx (adult and paediatric) in the UK, 2018–2020 calendar years

Organ	2018	2019	2020	% change 2019-2020
Kidney DBD <sup>1</sup>	1,466	1,417	1,220	-14
Kidney DCD <sup>2</sup>	940	1024	683	-33
Kidney LKD	1,036	1,042	586	-44
Kidney and liver <sup>3</sup>	18	18	5	
Kidney and heart	0	1	0	
Kidney and pancreas <sup>4</sup>	174	157	97	-38
Kidney and pancreas islets <sup>5</sup>	7	7	4	
Small bowel (inc kidney)	3	4	0	
<b>Total kidney Tx</b>	<b>3,644</b>	<b>3,670</b>	<b>2,595</b>	<b>-29</b>

<sup>1</sup>Includes en bloc transplants (6 in 2018, 5 in 2019, and 2 in 2020) and double kidney transplants (14 in 2018, 18 in 2019, 10 in 2020)

<sup>2</sup>Includes en bloc transplants (8 in 2018, 3 in 2019, and 2 in 2020) and double kidney transplants (15 in 2018, 24 in 2019, and 9 in 2020)

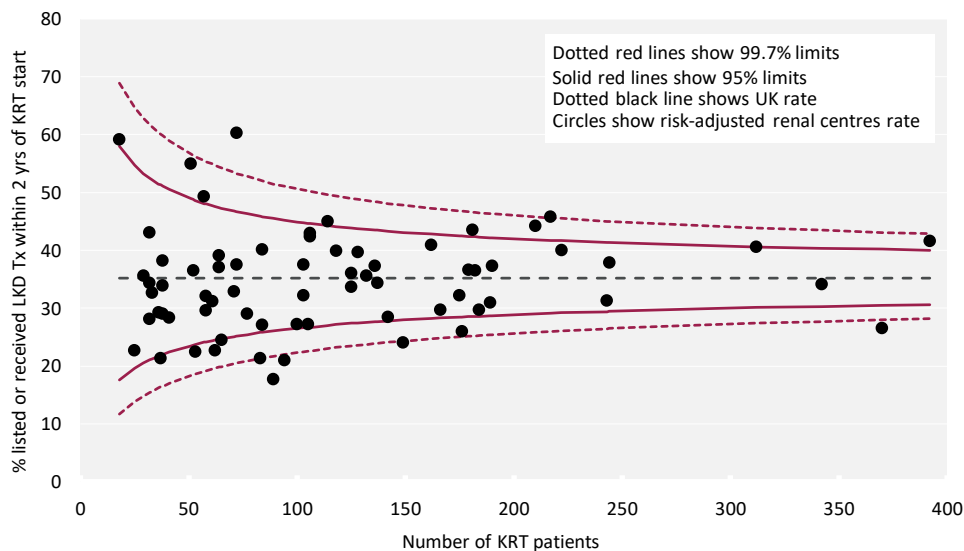
<sup>3</sup>Includes DCD transplants (1 in 2020)

<sup>4</sup>Includes DCD transplants (48 in 2018, 45 in 2019, and 23 in 2020)

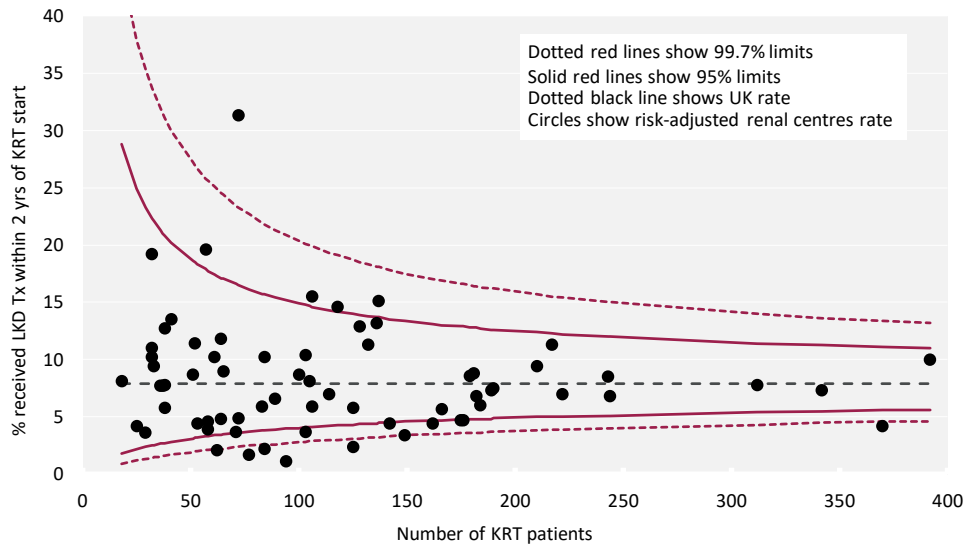
<sup>5</sup>Includes DCD transplants (3 in 2018 and 2 in 2020)

DBD – donor after brain death; DCD – donor after circulatory death; LKD – living kidney donor

Variation in the proportion of patients who received an LKD Tx or were on the Tx waiting list within two years of KRT start, is shown for patients incident to KRT in 2018, adjusted by sex, age and primary renal disease (PRD) (figure 4.2). The analysis for LKD transplantation only is shown separately (figure 4.3).



**Figure 4.2** Percentage of adult patients incident to KRT in 2018 who were waitlisted or received a living kidney donor (LKD) Tx within 2 years of KRT start adjusted by age, sex and primary renal disease by centre



**Figure 4.3** Percentage of adult patients incident to KRT in 2018 who received a living kidney donor (LKD) Tx within 2 years of KRT start adjusted by age, sex and primary renal disease by centre



## Early kidney Tx outcomes

Kidney Tx recipient outcome data from NHSBT were reported against the Tx centre rather than the referring centre (table 4.3). Note that the survival rates were risk-adjusted and used financial year cohorts as per NHSBT methodology (see table footnote).

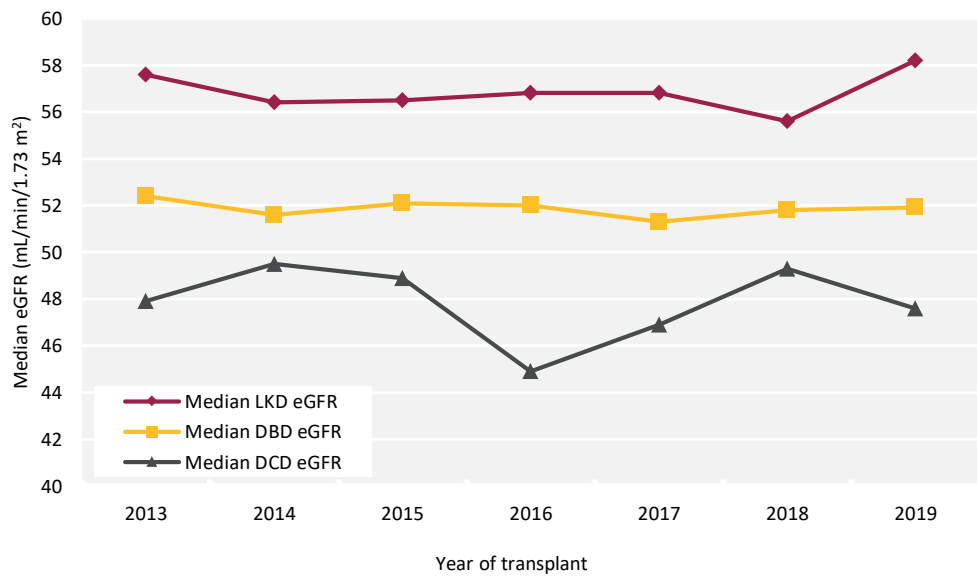
**Table 4.3** Risk-adjusted first adult kidney-only Tx, graft and patient survival by Tx type and Tx centre<sup>1</sup> (cohorts detailed in footnote)

Centre	Deceased donor				Living donor			
	Adj 1 yr survival (%)		Adj 5 yr survival (%)		Adj 1 yr survival (%)		Adj 5 yr survival (%)	
	Graft	Patient	Graft	Patient	Graft	Patient	Graft	Patient
Bham	91	98	86	87	98	100	92	92
Belfast	92	98	90	90	99	99	94	98
Bristol	94	93	92	85	97	100	91	93
Camb	95	99	91	88	99	100	96	96
Cardff	96	96	87	85	95	100	85	87
Covnt	93	97	90	87	99	100	93	98
Edin	100	100	100	100				
Glasgw	96	97	82	84	98	99	92	95
L Barts	93	94	80	85	99	100	90	94
L Guy's	96	97	100	100	99	100	93	96
L Rfree	95	96	82	92	100	100	93	98
L St.G	95	96	87	94	100	100	95	97
L West	95	97	88	85	97	98	91	94
Leeds	95	96	85	91	98	99	91	94
Leic	97	96	84	92	98	99	93	94
Liv Roy	94	96	84	85	98	99	91	97
M RI	95	95	89	85	98	98	92	94
Newc	95	96	84	82	100	100	90	92
Nottm	96	95	90	92	98	100	96	91
Oxford	97	97	88	90	98	100	92	95
Plymth	93	93	100	100	97	98		
Ports			82	86				
Sheff	93	97	92	90	98	100	96	96
<b>UK total</b>	<b>95</b>	<b>96</b>	<b>86</b>	<b>88</b>	<b>98</b>	<b>99</b>	<b>92</b>	<b>95</b>

Cohorts for survival rate estimation: 1 year survival: 1/4/2016–31/03/2020; 5 year survival: 1/4/2012–31/3/2016; first grafts only – re-grafts excluded for patient survival estimation. Since the cohorts to estimate 1 and 5 year survival are different, some centres may appear to have 5 year survival better than 1 year survival.

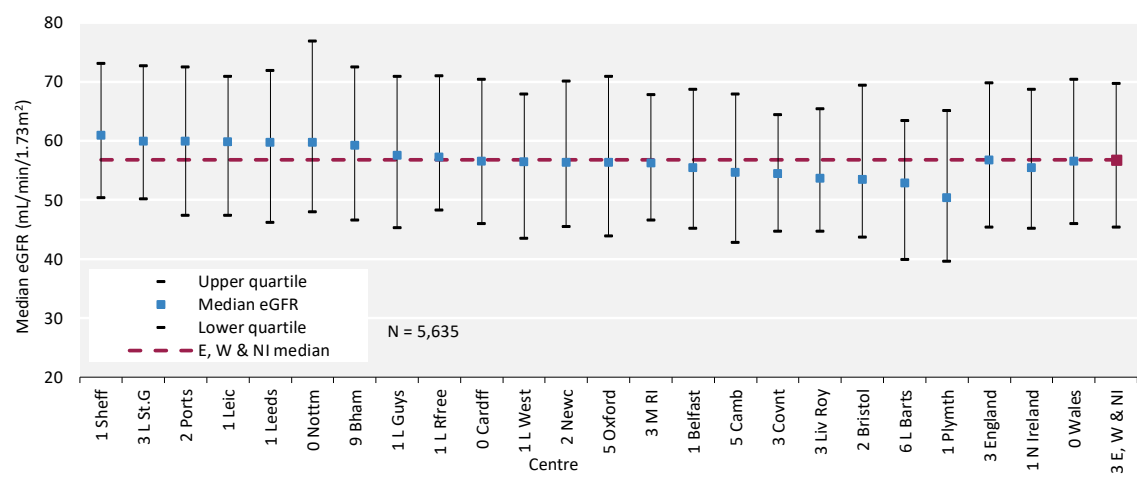
<sup>1</sup>Information courtesy of NHSBT: number of Tx, patients and 95% confidence intervals (CI) for each estimate; statistical methodology for computing risk-adjusted estimates can be obtained from NHSBT (<https://nhsbt.dbe.blob.core.windows.net/umbraco-assets-corp/20032/kidney-annual-report-2019-20-final.pdf>).

Kidney graft function at one year post-Tx was assessed using median eGFR by donor type and by centre using a seven year cohort (patients with graft failure including death with a functioning graft were excluded). The data completeness at one year after Tx (for Tx occurring 2013–2019) was 97.3%.

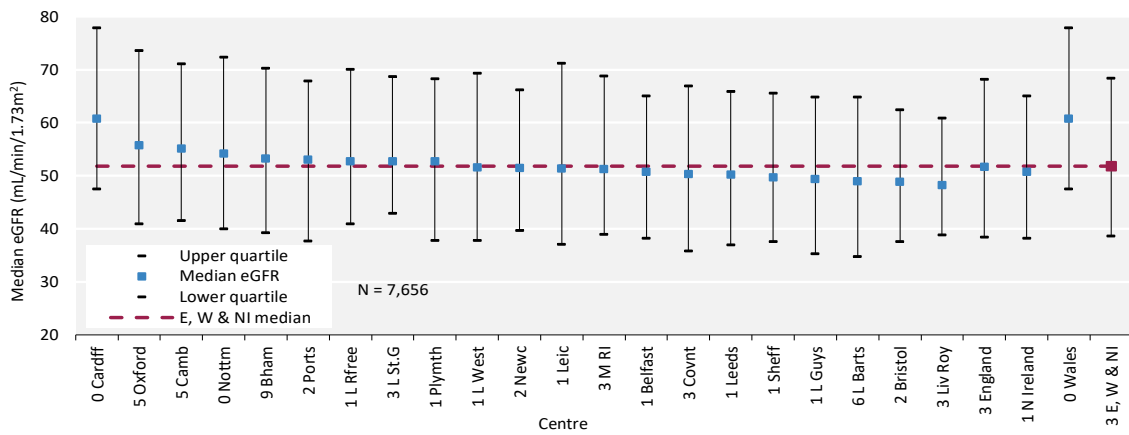


**Figure 4.4** Median estimated glomerular filtration rate (eGFR) for kidney Tx at 1 year by donor type and year of transplantation between 2013 and 2019

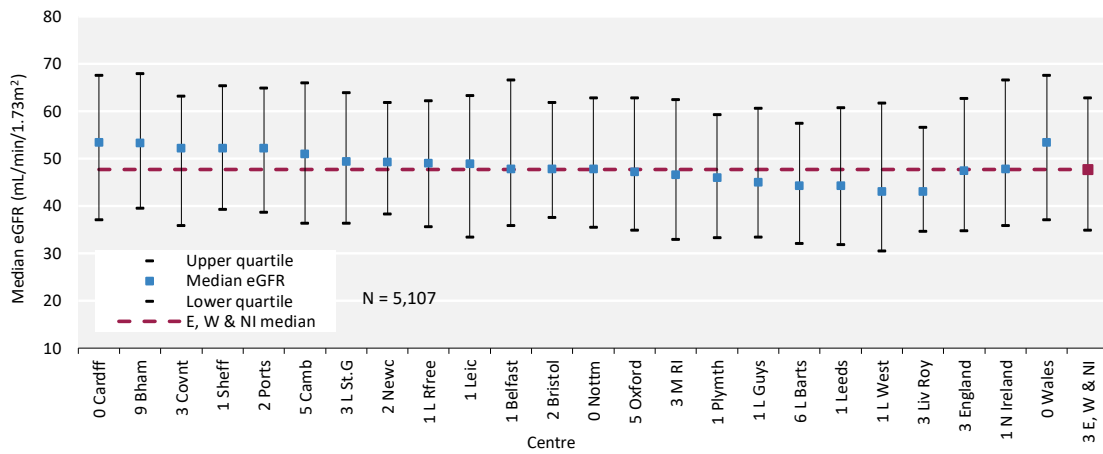
DBD – donor after brain death; DCD – donor after circulatory death; LKD – living kidney donor



**Figure 4.5** Median estimated glomerular filtration rate (eGFR) at 1 year post-living kidney donor (LKD) Tx by transplanting centre for transplantation that occurred between 2013 and 2019



**Figure 4.6** Median estimated glomerular filtration rate (eGFR) at 1 year post-donor after brain death (DBD) Tx by transplanting centre for transplantation that occurred between 2013 and 2019



**Figure 4.7** Median estimated glomerular filtration rate (eGFR) at 1 year post-donor after circulatory death (DCD) Tx by transplanting centre for transplantation that occurred between 2013 and 2019

## Changes to the prevalent adult kidney Tx population

Tx recipients are under the care of a Tx centre around the time of transplantation, but the policy of when to repatriate to the referring centre varies. When data entries for patients were received from more than one centre they were attributed to the referring centre.

**Table 4.4** Percentage completeness of estimated glomerular filtration rate (eGFR), blood pressure, haemoglobin, total cholesterol, adjusted calcium, phosphate and parathyroid hormone (PTH) by centre for adult patients prevalent to Tx on 31/12/2020

Centre	N with Tx	Data completeness (%)						
		eGFR	Blood pressure	Haemoglobin	Total cholesterol	Adjusted calcium	Phosphate	PTH
<b>TX CENTRES</b>								
Bham	1,569	87.6	69.0	86.9	76.1	86.9	83.6	1.4
Belfast	716	95.8	89.9	97.1	97.2	93.6	94.7	27.9
Bristol	911	98.9	84.1	98.9	91.2	97.9	97.5	96.9
Camb	1,150	92.9	0.0	92.7	72.7	86.7	84.3	76.4
Cardff	1,044	98.4	91.7	98.5	39.5	97.8	97.7	14.1
Covnt	620	95.5	40.2	95.5	63.1	94.8	29.2	33.7
Edinb	548			0.0				
Glasgw	1,204			0.0				
L Barts	1,306	86.9	0.2	86.8	93.7	86.2	86.2	87.7
L Guys	1,482	76.5	0.0	73.1	29.0	71.8	71.8	21.6
L Rfree	1,387	87.9	69.1	87.5	57.7	85.8	85.7	54.5
L St.G	474	89.5	61.6	89.2	84.4	89.2	89.2	81.2
L West	1,987	93.1	0.0	93.2	49.4	92.3	93.0	42.6
Leeds	1,096	98.3	73.7	97.3	91.8	93.7	86.1	38.3
Leic	1,461	95.6	3.2	95.2	94.3	93.8	93.1	33.1
Liv Roy	741	93.4	0.5	93.4	60.9	92.0	91.9	0.7
M RI	1,267	90.8	4.0	90.7	60.2	90.5	90.5	54.2
Newc	761	87.1	26.5	86.9	19.3	86.3	86.3	56.4
Nottm	720	98.6	88.1	97.8	62.1	96.0	95.0	79.9
Oxford	1,407	84.9	0.0	83.8	46.7	82.0	81.5	44.9
Plymth	341	98.5	74.8	97.7	58.9	95.3	90.3	43.7
Ports	1,096	90.7	23.1	89.8	42.2	88.5	83.2	33.0
Sheff	790	95.2	64.3	94.9	33.7	93.8	93.5	15.8
<b>DIALYSIS CENTRES</b>								
Abrdn	344			0.0				
Airdrie	291			0.0				
Antrim	157	98.1	37.6	95.5	100.0	94.9	96.2	56.7
Bangor	105	99.1	46.7	97.1	100.0	97.1	97.1	23.8
Bradfd	408	98.0	6.6	97.8	83.3	90.7	90.2	65.2
Brightn	549	99.3	23.0	98.4	68.1	96.4	96.5	49.2
Carlis	149	85.2	0.0	83.2	59.7	82.6	81.2	42.3
Carsh	825	84.9	3.2	84.2	32.4	82.2	81.7	24.0
Clwyd	105	97.1	1.9	96.2	95.2	95.2	95.2	66.7
D&Gall	88			0.0				
Derby	295	98.3	79.0	97.6	88.5	97.0	97.0	1.4
Donc	138	100.0	29.0	100.0	43.5	99.3	99.3	10.9
Dorset	437	87.0	23.1	85.1	65.2	86.0	70.7	44.4
Dudley	115	96.5	0.9	96.5	79.1	89.6	95.7	0.9
Dundee	251			0.0				
EssexMS	344	92.7	9.3	92.2	68.6	91.3	86.6	10.8
Exeter	526	87.1	0.0	85.9	75.3	83.1	81.0	56.1
Glouc	260	96.2	26.9	95.4	48.1	92.3	89.2	20.8
Hull	491	98.6	2.2	98.8	32.4	96.7	96.5	16.3

**Table 4.4** Continued

Centre	N with Tx	Data completeness (%)						
		eGFR	Blood pressure	Haemoglobin	Total cholesterol	Adjusted calcium	Phosphate	PTH
Inverns	170			0.0				
Ipswi	245	90.6	0.4	90.2	49.8	88.6	88.6	45.7
Kent	628	98.6	93.8	98.4	36.8	97.3	97.5	8.4
Klmarnk	178			0.0				
Krkcldy	136			0.0				
L Kings	501	94.0	0.0	93.8	63.5	93.8	93.8	67.7
Liv Ain	35	88.6	2.9	85.7	40.0	88.6	88.6	0.0
Middlbr	565	78.4	0.2	77.4	37.4	75.4	69.7	9.9
Newry	172	99.4	55.8	96.5	99.4	95.4	98.8	95.9
Norwch	451	96.7	1.1	94.7	98.0	90.2	89.1	18.2
Prestn	763	95.3	0.0	94.5	60.9	92.9	90.6	33.6
Redng	487	98.6	71.3	98.8	60.6	98.2	97.1	41.3
Salford	686	96.9	0.0	96.8	92.3	96.7	96.7	0.2
Shrew	153	66.7	0.7	65.4	58.8	64.1	64.1	15.7
Stevng	361	67.6	27.4	65.4	26.6	65.1	63.2	32.7
Stoke	421	96.9	0.0	96.4	99.5	95.7	95.7	48.7
Sund	289	95.9	0.0	95.9	85.5	95.9	95.9	87.2
Swanse	348	98.9	92.5	98.9	56.6	98.3	98.3	62.4
Truro	252	98.8	0.0	97.6	65.9	96.0	95.2	56.0
Ulster	97	99.0	95.9	97.9	93.8	97.9	99.0	12.4
West NI	220	68.2	58.6	94.6	98.2	57.3	95.5	87.3
Wirral	181	91.2	1.7	88.4	65.2	84.0	82.3	9.9
Wolve	229	93.9	67.3	88.7	71.2	93.0	24.0	24.5
Wrexm	177	96.6	81.4	96.6	99.4	96.6	96.6	99.4
York	333	98.8	57.7	97.9	66.7	97.3	96.1	14.7
<b>TOTALS</b>								
England	31,683	91.4	25.8	90.7	62.5	89.2	86.1	40.3
N Ireland	1,362	92.3	75.0	96.5	97.7	88.4	95.8	48.3
Scotland	3,210			0.0				
Wales	1,779	98.3	82.9	98.2	55.7	97.6	97.5	35.7
<b>UK</b>	<b>38,034</b>	<b>91.8</b>	<b>31.4</b>	<b>83.6</b>	<b>63.5</b>	<b>89.6</b>	<b>87.0</b>	<b>40.3</b>

Blank cells – no data returned by the centre.

Patients who had been on Tx for <3 months were excluded from this analysis, including N with Tx.

Scottish centres were excluded from blood pressure, cholesterol and PTH analyses because the Scottish Renal Registry does not share these data items with the UKRR. UK completeness excludes Scotland for these analyses.

Patients with missing ethnicity were classed as White for the eGFR calculation.

For the 68 adult kidney centres, the number of prevalent patients with a Tx was calculated as both a proportion of the prevalent patients on KRT and as a proportion of the estimated centre catchment population (calculated as detailed in appendix A).

**Table 4.5** Number of prevalent adult Tx patients and proportion of adult KRT patients with a Tx by year and by centre; number of Tx patients as a proportion of the catchment population

Centre	N with Tx					% with Tx					Estimated catchment population (millions)	2020 crude rate (pmp)
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020		
<b>TX CENTRES</b>												
Belfast	603	639	671	692	722	73.4	75.9	76.6	78.6	81.1	0.53	1,366
Bham	1,411	1,516	1,576	1,630	1,614	46.3	47.8	48.5	49.2	49.3	2.04	792
Bristol	909	907	925	939	928	61.8	61.6	62.9	63.2	62.8	1.21	765
Camb	953	977	1,020	1,110	1,199	71.9	73.2	73.5	76.2	78.6	0.93	1,290
Cardff	1,038	1,043	1,072	1,082	1,065	63.7	62.0	62.4	62.6	63.5	1.19	895
Covnt	531	566	578	619	632	54.4	58.7	60.3	57.6	57.7	0.79	800
Edinb	453	482	522	546	565	58.3	58.5	60.6	61.7	63.6	0.84	674
Glasgw	1,104	1,136	1,156	1,216	1,239	63.0	64.1	63.8	65.6	67.2	1.37	905
L Barts	1,141	1,200	1,266	1,380	1,330	48.1	48.0	48.7	51.9	52.0	1.58	843
L Guys	1,365	1,415	1,458	1,550	1,515	65.0	65.4	65.4	66.8	65.3	1.00	1,517
L Rfree	1,288	1,346	1,374	1,424	1,426	59.2	61.4	61.5	60.7	61.0	1.32	1,082
L St.G	476	487	495	502	485	55.8	58.1	59.3	58.9	56.6	0.66	735
L West	1,826	1,894	1,975	2,046	2,031	53.8	54.5	55.5	56.7	57.4	1.95	1,041
Leeds	976	999	1,054	1,082	1,116	63.1	61.7	62.6	62.7	63.7	1.36	819
Leic	1,245	1,290	1,363	1,441	1,488	54.3	54.8	55.6	55.9	57.1	2.07	718
Liv Roy	782	791	814	804	755	64.2	63.2	64.1	65.7	66.1	0.81	937
M RI	1,398	1,407	1,422	1,397	1,326	70.3	68.6	68.8	68.3	66.8	1.32	1,001
Newc	680	710	732	765	790	64.7	63.6	63.5	65.3	65.5	0.95	835
Nottm	678	727	743	751	736	58.9	61.4	62.1	61.7	60.7	0.92	798
Oxford	1,225	1,346	1,405	1,430	1,457	69.3	71.6	72.4	72.6	72.1	1.44	1,015
Plymth	330	341	362	359	358	64.2	63.0	67.0	67.2	65.8	0.40	899
Ports	981	1,053	1,069	1,133	1,112	58.0	60.3	60.7	60.3	58.5	1.74	640
Sheff	754	787	821	835	805	53.0	54.6	55.4	56.1	54.0	1.13	715
<b>DIALYSIS CENTRES</b>												
Abrdn	303	311	328	343	349	54.6	55.2	57.3	61.5	61.8	0.50	700
Airdrie	230	257	274	296	292	52.4	55.2	56.2	56.5	56.8	0.46	638
Antrim	112	120	131	145	161	44.4	47.1	47.8	50.7	55.7	0.24	662
Bangor	89	94	100	106	107	49.7	48.2	49.3	52.7	49.5	0.17	634
Bradfd	359	376	392	413	417	56.6	55.8	57.0	56.3	57.4	0.49	855
Brightn	473	487	510	545	556	47.6	48.1	48.3	51.2	51.6	1.07	520
Carlis	148	156	162	155	152	53.1	55.5	55.3	51.5	51.2	0.25	600
Carsh	685	724	766	834	843	41.3	42.7	43.7	46.8	45.5	1.62	521
Clwyd	89	94	98	104	108	50.3	52.5	51.6	50.7	52.2	0.19	579
D&Gall	71	76	83	87	89	54.2	56.3	57.2	58.4	57.1	0.12	729
Derby	224	234	258	296	300	41.3	42.1	44.0	45.3	44.3	0.56	538
Donc	110	117	119	132	140	33.2	35.1	36.1	38.6	41.1	0.37	376
Dorset	368	394	422	436	450	53.7	54.0	55.2	56.4	56.4	0.72	621
Dudley	94	95	106	111	120	27.3	26.0	29.4	30.3	32.4	0.34	352
Dundee	219	232	254	259	252	52.4	53.3	57.1	57.7	58.6	0.37	687
EssexMS	282	312	331	328	349	36.0	37.6	39.2	38.5	39.5	0.99	354
Exeter	477	514	537	541	541	47.1	48.6	49.6	49.7	48.9	0.95	572
Glouc	187	216	243	267	265	39.5	42.3	46.6	50.5	50.9	0.51	523
Hull	455	461	480	498	498	53.3	52.9	54.6	55.1	54.5	0.79	627
Inverns	154	164	169	171	170	59.7	62.6	60.6	60.6	62.7	0.22	763
Ipswi	233	236	232	240	255	55.9	54.1	54.2	56.1	60.0	0.31	822
Kent	584	595	633	649	639	54.4	54.5	56.9	57.0	55.9	1.06	602
Klmarnk	143	159	167	182	181	45.1	47.2	49.1	50.7	49.1	0.29	622
Krkldy	132	149	153	143	136	44.9	49.0	51.3	48.5	46.7	0.27	499
L Kings	436	461	480	525	514	39.2	40.0	40.6	42.1	41.0	0.93	554
Liv Ain	15	15	20	29	41	6.6	7.1	9.2	13.9	19.0	0.43	96
Middlbr	534	537	539	558	572	59.9	59.4	58.0	58.6	60.7	0.80	714

**Table 4.5** Continued

Centre	N with Tx					% with Tx					Estimated catchment population (millions)	2020 crude rate (pmp)
	2016	2017	2018	2019	2020	2016	2017	2018	2019	2020		
Newry	128	138	152	162	173	54.2	57.3	60.3	64.0	65.5	0.23	743
Norwch	395	422	445	454	459	51.0	54.0	56.5	56.1	57.0	0.68	670
Prestn	605	672	721	746	773	50.1	52.8	54.5	55.6	56.4	1.23	631
Redng	433	448	468	483	501	54.7	56.4	57.5	56.0	57.5	0.69	723
Salford	513	572	621	686	687	50.2	51.2	52.9	55.3	54.4	1.14	601
Shrew	134	138	144	146	153	35.5	35.8	33.6	33.8	37.0	0.41	376
Stevng	340	366	378	382	365	38.3	41.4	40.3	39.7	37.9	1.10	331
Stoke	404	409	419	439	428	48.7	50.4	52.0	54.5	52.9	0.73	589
Sund	240	264	278	280	295	47.2	48.5	49.6	49.1	53.0	0.54	543
Swanse	328	334	346	358	353	43.4	42.3	41.9	41.2	41.5	0.78	452
Truro	239	243	249	261	259	56.1	57.2	57.0	58.0	58.2	0.36	729
Ulster	58	67	75	80	101	34.9	36.6	39.3	43.5	50.5	0.20	502
West NI	168	188	202	207	222	54.9	60.1	61.8	63.1	63.4	0.25	893
Wirral	118	158	167	180	189	34.9	40.6	42.0	43.7	46.6	0.47	405
Wolve	189	195	204	228	231	33.1	33.5	33.6	37.2	35.9	0.54	424
Wrexm	156	171	171	175	177	49.8	52.9	54.5	56.3	54.8	0.21	827
York	306	325	340	349	338	57.1	58.4	59.8	60.0	59.1	0.48	701
<b>TOTALS</b>												
<b>England</b>	<b>28,529</b>	<b>29,901</b>	<b>31,116</b>	<b>32,388</b>	<b>32,433</b>	<b>53.8</b>	<b>54.7</b>	<b>55.5</b>	<b>56.3</b>	<b>56.3</b>	<b>44.46</b>	<b>730</b>
<b>N Ireland</b>	<b>1,069</b>	<b>1,152</b>	<b>1,231</b>	<b>1,286</b>	<b>1,379</b>	<b>60.0</b>	<b>62.8</b>	<b>64.1</b>	<b>66.6</b>	<b>69.2</b>	<b>1.45</b>	<b>948</b>
<b>Scotland</b>	<b>2,809</b>	<b>2,966</b>	<b>3,106</b>	<b>3,243</b>	<b>3,273</b>	<b>56.9</b>	<b>58.2</b>	<b>59.3</b>	<b>60.6</b>	<b>61.4</b>	<b>4.44</b>	<b>737</b>
<b>Wales</b>	<b>1,700</b>	<b>1,736</b>	<b>1,787</b>	<b>1,825</b>	<b>1,810</b>	<b>55.7</b>	<b>54.8</b>	<b>55.0</b>	<b>55.1</b>	<b>55.3</b>	<b>2.54</b>	<b>713</b>
<b>UK</b>	<b>34,107</b>	<b>35,755</b>	<b>37,240</b>	<b>38,742</b>	<b>38,895</b>	<b>54.3</b>	<b>55.2</b>	<b>56.0</b>	<b>56.9</b>	<b>57.0</b>	<b>52.89</b>	<b>735</b>

Country Tx populations were calculated by summing the Tx patients from centres in each country. Estimated country populations were derived from Office for National Statistics figures. See appendix A for details on estimated catchment population by kidney centre. pmp – per million population

## Demographics of prevalent adult kidney Tx patients

The proportion of Tx patients from each ethnic group is shown for patients with ethnicity data – the proportion of centre patients with no ethnicity data is shown separately.

**Table 4.6** Demographics of adult patients prevalent to Tx on 31/12/2020 by centre

Centre	N on KRT	N with Tx	% with Tx	Median		Ethnicity				
				age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing
<b>TX CENTRES</b>										
Belfast	890	722	81.1	56.3	59.7	97.5	2.0	0.4	0.1	1.7
Bham	3,272	1,614	49.3	53.2	58.2	61.6	28.5	7.4	2.5	0.6
Bristol	1,477	928	62.8	56.3	59.9	90.0	4.1	4.1	1.8	0.2
Camb	1,526	1,199	78.6	55.3	63.0	89.4	6.6	2.6	1.4	0.4
Cardff	1,678	1,065	63.5	55.8	62.4	92.5	4.8	0.6	2.1	0.7
Covnt	1,096	632	57.7	55.0	61.9	79.4	16.8	3.8	0.0	0.2
Edinb	888	565	63.6	56.2	63.5					74.3
Glasgw	1,844	1,239	67.2	55.7	59.3					42.1
L Barts	2,557	1,330	52.0	54.1	60.0	39.5	33.9	19.3	7.3	0.2
L Guys	2,320	1,515	65.3	53.6	59.5	66.1	10.2	19.4	4.3	0.7
L Rfree	2,337	1,426	61.0	55.7	59.4	47.9	21.6	18.7	11.8	3.7
L St.G	857	485	56.6	57.2	56.7	48.3	25.2	18.0	8.6	3.5
L West	3,537	2,031	57.4	57.9	63.0	43.6	33.4	15.2	7.8	0.1
Leeds	1,751	1,116	63.7	55.5	60.8	79.6	15.1	4.1	1.3	0.0
Leic	2,604	1,488	57.1	57.0	58.7	72.5	21.5	4.4	1.6	1.4
Liv Roy	1,142	755	66.1	56.0	61.7	92.6	3.2	2.4	1.9	0.4
M RI	1,985	1,326	66.8	55.4	60.5	76.2	15.2	6.3	2.4	1.1
Newc	1,207	790	65.5	56.9	59.2	93.9	4.9	0.8	0.4	0.1
Nottm	1,212	736	60.7	55.1	60.3	84.7	7.1	5.0	3.3	0.0
Oxford	2,021	1,457	72.1	56.0	62.8	81.0	11.7	3.2	4.1	8.8
Plymth	544	358	65.8	58.6	68.2	96.4	1.1	0.3	2.2	0.0
Ports	1,902	1,112	58.5	56.6	58.3	93.8	3.8	0.7	1.7	1.7
Sheff	1,491	805	54.0	55.6	62.6	90.2	5.8	1.8	2.3	1.1
<b>DIALYSIS CENTRES</b>										
Abrdn	565	349	61.8	52.9	56.5					56.5
Airdrie	514	292	56.8	55.0	58.9	96.0	2.2	0.4	1.4	4.8
Antrim	289	161	55.7	56.7	61.5	99.4	0.0	0.6	0.0	0.6
Bangor	216	107	49.5	57.0	65.4	98.1	0.0	1.0	1.0	1.9
Bradfd	727	417	57.4	52.0	60.0	54.7	43.4	1.7	0.2	0.0
Brightn	1,078	556	51.6	56.5	62.2	90.3	6.1	1.6	2.0	0.4
Carlis	297	152	51.2	56.9	67.1	98.0	2.0	0.0	0.0	0.0
Carsh	1,854	843	45.5	57.5	62.6	71.2	16.8	8.1	3.8	0.6
Colchr	151	0								
Clwyd	207	108	52.2	58.0	61.1	97.2	1.9	0.0	0.9	1.9
D&Gall	156	89	57.1	57.8	62.9	97.2	1.4	0.0	1.4	19.1
Derby	677	300	44.3	57.5	61.7	83.0	12.0	2.7	2.3	0.0
Donc	341	140	41.1	58.1	65.0	95.7	2.1	1.4	0.7	0.0
Dorset	798	450	56.4	60.2	58.7	97.1	0.9	0.4	1.6	0.0
Dudley	370	120	32.4	57.5	68.3	79.2	14.2	4.2	2.5	0.0
Dundee	430	252	58.6	56.8	59.5					56.8
EssexMS	884	349	39.5	56.5	63.3	87.9	4.9	3.7	3.5	0.3
Exeter	1,106	541	48.9	56.8	58.0	98.7	0.7	0.4	0.2	0.0
Glouc	521	265	50.9	58.3	59.6	92.4	5.3	1.1	1.1	0.4
Hull	914	498	54.5	55.3	63.9	96.8	1.4	0.6	1.2	0.2
Inverns	271	170	62.7	55.1	55.9					32.9
Ipswi	425	255	60.0	58.2	61.6	85.0	3.5	3.5	7.9	0.4
Kent	1,143	639	55.9	56.8	59.5	91.7	3.9	1.3	3.1	0.0

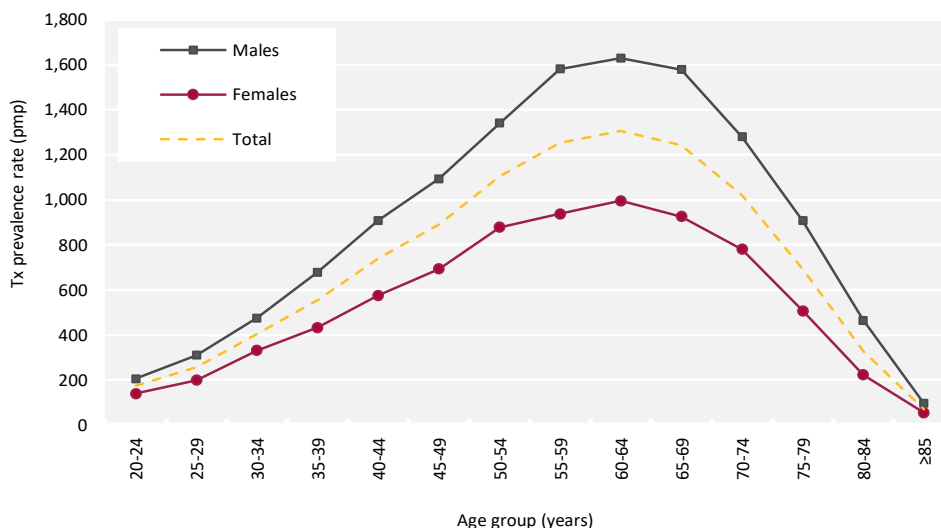


**Table 4.6** Continued

Centre	N on KRT	N with Tx	% with Tx	Median		Ethnicity					
				age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing	
Klmarnk	369	181	49.1	58.0	59.7						45.3
Krkldy	291	136	46.7	57.5	60.3						72.1
L Kings	1,253	514	41.0	57.4	61.7	48.8	16.2	30.1	4.9		0.4
Liv Ain	216	41	19.0	52.4	58.5	92.7	0.0	0.0	7.3		0.0
Middlbr	942	572	60.7	57.3	62.9	95.3	3.9	0.4	0.5		0.0
Newry	264	173	65.5	57.2	56.7	98.8	0.0	0.6	0.6		0.0
Norwch	805	459	57.0	57.9	59.0	97.2	1.7	0.7	0.4		0.0
Prestn	1,370	773	56.4	55.9	61.2	85.3	13.6	0.8	0.4		0.0
Redng	871	501	57.5	58.0	62.5	66.1	23.0	5.0	5.9		4.6
Salford	1,264	687	54.4	56.5	59.7	83.0	14.1	2.0	0.9		0.0
Shrew	414	153	37.0	56.5	64.1	94.8	2.6	1.3	1.3		0.0
Stevng	963	365	37.9	55.9	61.1	68.8	19.1	9.1	3.0		0.8
Stoke	809	428	52.9	54.5	63.6	90.7	5.7	1.9	1.7		1.6
Sund	557	295	53.0	57.0	61.0	95.6	3.1	0.7	0.7		0.0
Swanse	850	353	41.5	57.0	61.8	96.9	2.0	0.0	1.1		0.6
Truro	445	259	58.2	57.5	58.3	97.3	0.8	0.0	1.9		0.0
Ulster	200	101	50.5	56.1	56.4	93.1	3.0	3.0	1.0		0.0
West NI	350	222	63.4	54.6	61.7	98.7	0.9	0.5	0.0		0.0
Wirral	406	189	46.6	58.1	64.0	94.7	3.7	1.1	0.5		0.0
Wolve	643	231	35.9	55.4	58.4	70.6	23.4	5.2	0.9		0.0
Wrexm	323	177	54.8	53.7	67.2	96.1	1.7	0.0	2.3		0.0
York	572	338	59.1	57.4	59.5	97.3	1.5	0.3	0.9		0.6
<b>TOTALS</b>											
England	57,654	32,433	56.3	56.1	60.8	76.1	14.1	6.6	3.2		1.1
N Ireland	1,993	1,379	69.2	56.3	59.6	97.7	1.4	0.7	0.2		0.9
Scotland	5,328	3,273	61.4	55.7	59.7						47.3
Wales	3,274	1,810	55.3	56.0	62.8	94.3	3.5	0.4	1.8		0.7
<b>UK</b>	<b>68,249</b>	<b>38,895</b>	<b>57.0</b>	<b>56.0</b>	<b>60.8</b>	<b>78.3</b>	<b>12.8</b>	<b>6.0</b>	<b>2.9</b>		<b>4.9</b>

Blank cells – no data returned by the centre or data completeness <70%.

Breakdown by ethnicity is not shown for centres with <70% data completeness, but these centres were included in national averages.



**Figure 4.8** Adult Tx prevalence rate on 31/12/2020 by age group and sex  
pmp – per million population

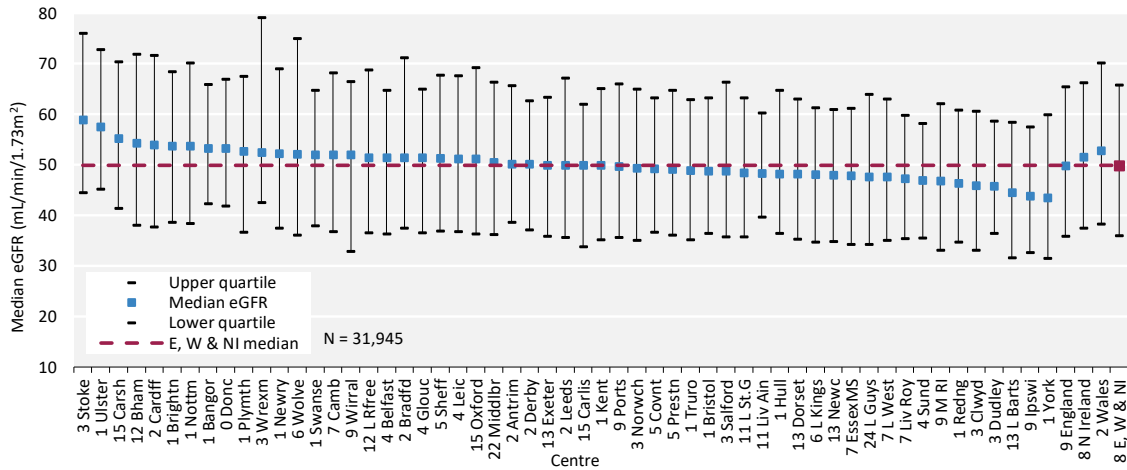
The distribution of primary renal diseases (PRDs) as a cause of ESKD in the incident Tx population is compared to the prevalent Tx population (table 4.7). Comparison to dialysis populations is shown in chapter 3. PRDs were grouped into categories, with the mapping of disease codes into groups explained in more detail in appendix A. The proportion of Tx patients with each PRD is shown for patients with PRD data and these total 100% of patients with data. The proportion of patients with no PRD data is shown on a separate line.

**Table 4.7** Primary renal diseases (PRDs) of adult patients incident to Tx in 2020 and adult patients prevalent to Tx on 31/12/2020

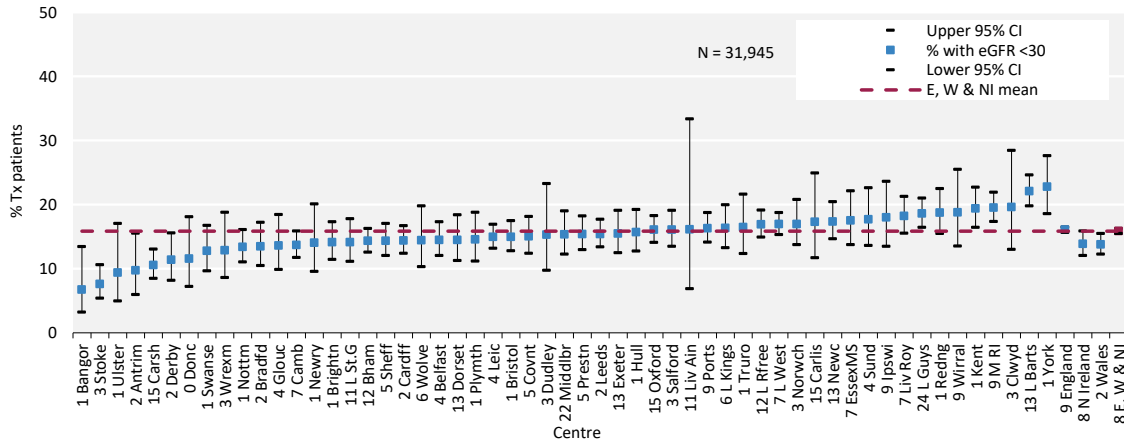
PRD	Incident Tx		Prevalent Tx	
	N	%	N	%
Diabetes	403	17.0	4,599	12.0
Glomerulonephritis	569	24.0	8,957	23.3
Hypertension	168	7.1	2,072	5.4
Polycystic kidney disease	262	11.0	5,276	13.7
Pyelonephritis	143	6.0	4,314	11.2
Renal vascular disease	43	1.8	462	1.2
Other	454	19.1	7,323	19.1
Uncertain aetiology	331	13.9	5,386	14.0
<b>Total (with data)</b>	<b>2,373</b>	<b>100.0</b>	<b>38,389</b>	<b>100.0</b>
Missing	96	3.9	506	1.3

## Graft function and anaemia in prevalent adult kidney Tx patients

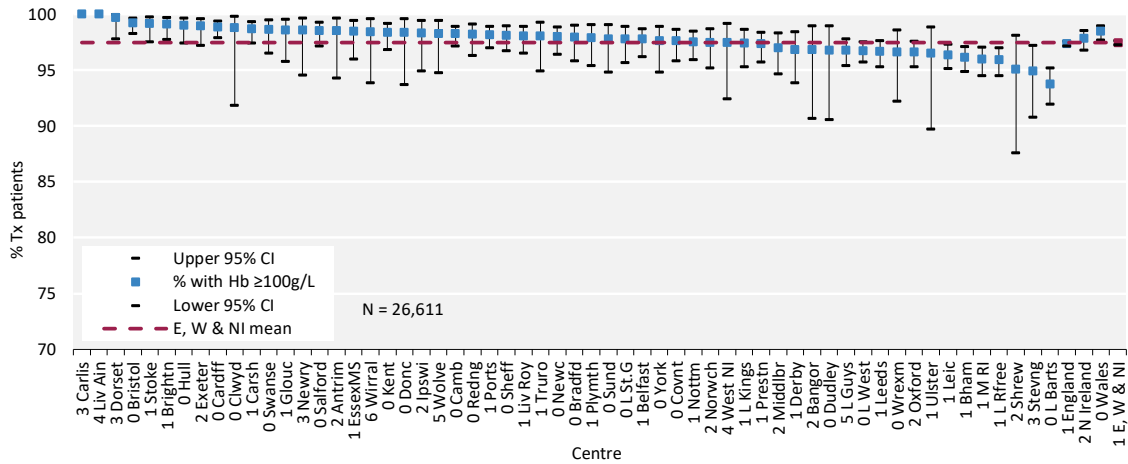
Accepting the limitations of interpreting eGFR in the post-Tx population, analyses by centres were divided into the proportion of patients with eGFR greater or less than 30 mL/min/1.73m<sup>2</sup> and the proportion of patients achieving an adequate haemoglobin level (defined as a haemoglobin ≥100 g/L).



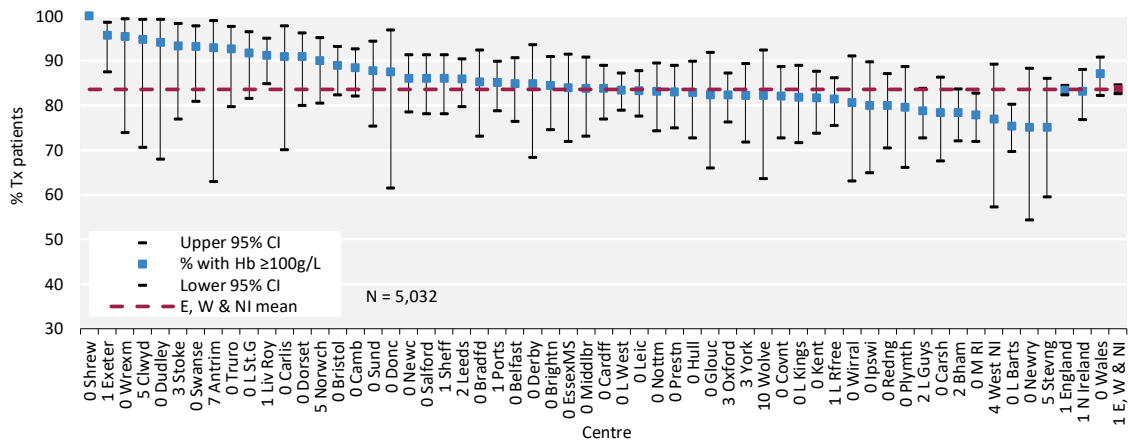
**Figure 4.9** Median estimated glomerular filtration rate (eGFR) in adult patients prevalent to Tx on 31/12/2020 by centre



**Figure 4.10** Percentage of adult patients prevalent to Tx on 31/12/2020 with an estimated glomerular filtration rate (eGFR) <30mL/min/1.73m<sup>2</sup> by centre  
CI – confidence interval



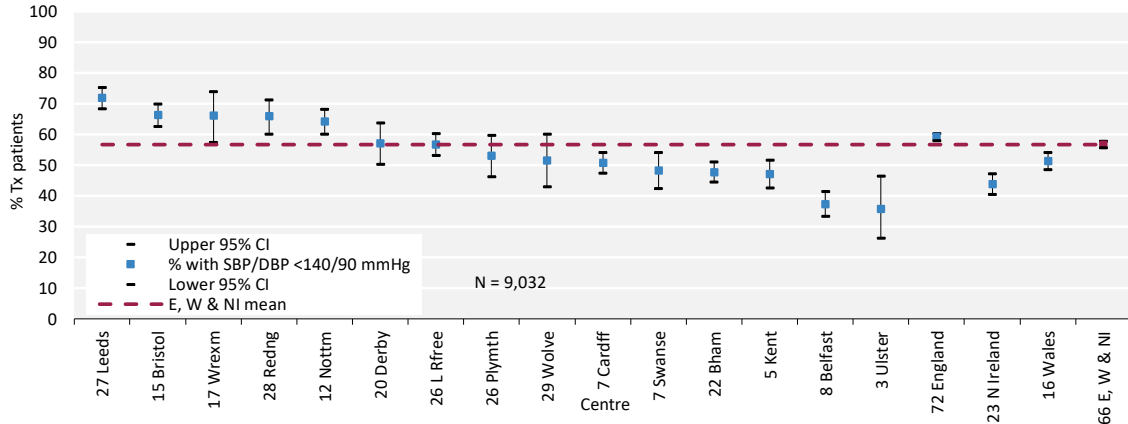
**Figure 4.11** Percentage of adult patients prevalent to Tx on 31/12/2020 with an estimated glomerular filtration rate (eGFR)  $\geq 30\text{mL}/\text{min}/1.73\text{m}^2$  achieving haemoglobin (Hb)  $\geq 100\text{g}/\text{L}$  by centre  
CI – confidence interval



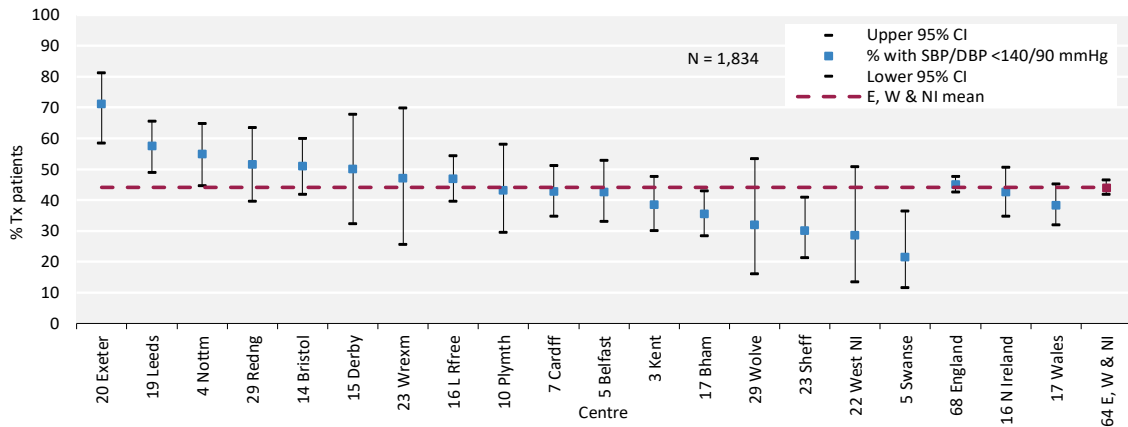
**Figure 4.12** Percentage of adult patients prevalent to Tx on 31/12/2020 with an estimated glomerular filtration rate (eGFR)  $< 30\text{mL}/\text{min}/1.73\text{m}^2$  achieving haemoglobin (Hb)  $\geq 100\text{g}/\text{L}$  by centre  
CI – confidence interval

## Blood pressure in prevalent adult kidney Tx patients

Blood pressure data completeness was variable (table 4.4) and only centres with  $\geq 70\%$  data completeness were included in the analysis. It is possible that bias may be introduced if blood pressure readings in particular ranges were more frequently reported. A lack of data on proteinuria did not allow differentiation for the purposes of reporting against the audit measure.



**Figure 4.13** Percentage of adult patients prevalent to Tx on 31/12/2020 with estimated glomerular filtration rate (eGFR)  $\geq 30$  mL/min/1.73m<sup>2</sup> achieving blood pressure of <140/90 mmHg by centre  
CI – confidence interval; DBP – diastolic blood pressure; SBP – systolic blood pressure



**Figure 4.14** Percentage of adult patients prevalent to Tx on 31/12/2020 with estimated glomerular filtration rate (eGFR) <30 mL/min/1.73m<sup>2</sup> achieving blood pressure of <140/90 mmHg by centre  
CI – confidence interval; DBP – diastolic blood pressure; SBP – systolic blood pressure

## Biochemistry parameters in prevalent adult kidney Tx patients

The attainment of audit standards is shown by stage of Tx kidney function in the prevalent Tx population and by comparing to the prevalent dialysis population.

**Table 4.8** Estimated glomerular filtration rate (eGFR), blood pressure and biochemical parameters in adult patients prevalent to Tx on 31/12/2020 compared with adult patients prevalent to dialysis on 31/12/2020 by CKD stage

Characteristic	Tx CKD stage (eGFR)				Prevalent dialysis Stage 5D
	Stage 1-2T ( $\geq 60$ mL/min/1.73 m <sup>2</sup> )	Stage 3T (30-59 mL/min/1.73 m <sup>2</sup> )	Stage 4T (15-29 mL/min/1.73 m <sup>2</sup> )	Stage 5T (<15 mL/min/1.73 m <sup>2</sup> )	
N	10,516	16,361	4,277	790	22,714
%	32.9	51.2	13.4	2.5	
<b>eGFR (mL/min/1.73m<sup>2</sup>)</b>					
mean $\pm$ SD	76.6 $\pm$ 13.3	45.1 $\pm$ 8.4	23.6 $\pm$ 4.2	11.6 $\pm$ 2.5	
median	73.3	45.2	24.1	12.0	
<b>SBP (mmHg)</b>					
mean $\pm$ SD	135 $\pm$ 17	138 $\pm$ 18	141 $\pm$ 19	146 $\pm$ 21	137 $\pm$ 26
% $\geq 140$ mmHg	33.3	41.4	50.0	60.7	43.4
<b>DBP (mmHg)</b>					
mean $\pm$ SD	81 $\pm$ 10	80 $\pm$ 11	80 $\pm$ 11	82 $\pm$ 12	71 $\pm$ 16
% $\geq 90$ mmHg	18.9	18.5	19.5	23.9	11.0
<b>Total cholesterol (mmol/L)</b>					
mean $\pm$ SD	4.3 $\pm$ 1.0	4.4 $\pm$ 1.1	4.4 $\pm$ 1.2	4.4 $\pm$ 1.2	3.8 $\pm$ 1.1
% $\geq 4.0$ mmol/L	62.2	64.3	62.3	61.7	39.4
<b>Haemoglobin (g/L)</b>					
mean $\pm$ SD	138 $\pm$ 16	130 $\pm$ 17	116 $\pm$ 16	106 $\pm$ 16	111 $\pm$ 14
% <100 g/L	1.4	3.3	13.5	32.1	19.2
<b>Phosphate (mmol/L)</b>					
mean $\pm$ SD	1.0 $\pm$ 0.2	1.0 $\pm$ 0.2	1.1 $\pm$ 0.2	1.5 $\pm$ 0.4	1.7 $\pm$ 0.4
% >1.7 mmol/L	0.2	0.3	1.8	21.7	40.6
<b>Adjusted Ca (mmol/L)</b>					
mean $\pm$ SD	2.4 $\pm$ 0.1	2.4 $\pm$ 0.1	2.4 $\pm$ 0.1	2.3 $\pm$ 0.2	2.3 $\pm$ 0.2
% >2.5 mmol/L	20.5	21.8	17.5	11.9	15.0
% <2.2 mmol/L	3.4	4.0	7.4	18.0	17.6
<b>PTH (pmol/L)</b>					
median	8.7	9.8	16.1	27.9	32.7
% >72 pmol/L	0.3	0.8	3.9	12.6	17.7

Scottish centres are excluded from all analyses as they have not submitted any biochemistry or blood pressure data for 2020.

Ca – adjusted calcium; DBP – diastolic blood pressure; PTH – parathyroid hormone; SBP – systolic blood pressure; SD – standard deviation

Differences in the median eGFR slope in Tx patients is reported by patient and Tx graft characteristics. All UK patients aged at least 18 years receiving their first kidney Tx between 01/01/2010 and 31/12/2018 were considered for inclusion. A minimum duration of 18 months graft function was required and three or more creatinine measurements from the second year of graft function onwards were used to plot eGFR slope. If a Tx failed, but there were at least three creatinine measurements between one year post-Tx and graft failure, the patient was included, but no creatinine measurements after the quarter preceding the recorded date of Tx failure were analysed.

**Table 4.9** Differences in median estimated glomerular filtration rate (eGFR) slope between demographic subgroups of adult patients who received their first kidney Tx between 01/01/2010 and 31/12/2018

Characteristic	N	Median slope	Lower quartile	Upper quartile
<b>Age at Tx (yrs)</b>				
<40	4,854	-1.48	-4.74	0.81
40-55	8,087	-0.62	-3.02	1.20
>55	7,247	-0.65	-3.08	1.14
<b>Ethnicity</b>				
White	14,372	-0.67	-3.09	1.12
Asian	2,704	-1.25	-4.16	1.03
Black	1,434	-1.77	-5.19	0.72
Other	591	-0.85	-3.63	0.80
<b>Sex</b>				
Male	12,460	-0.55	-3.03	1.29
Female	7,728	-1.26	-4.05	0.77
<b>Diabetes</b>				
No Diabetes	16,631	-0.71	-3.21	1.11
Diabetes	3,305	-1.38	-4.31	0.98
<b>Tx donor</b>				
Deceased	13,564	-0.82	-3.55	1.14
Living	6,624	-0.75	-3.18	1.04
<b>Year of Tx</b>				
2010	1,947	-0.94	-2.70	0.36
2011	1,938	-0.82	-2.99	0.56
2012	2,135	-1.00	-3.09	0.46
2013	2,339	-1.04	-3.24	0.64
2014	2,292	-0.78	-3.08	0.93
2015	2,279	-0.58	-3.04	1.26
2016	2,353	-0.65	-3.55	1.72
2017	2,512	-0.54	-4.41	2.38
2018	2,393	-0.54	-5.87	4.22
<b>Status of Tx patients at end of follow-up</b>				
Died	1,863	-1.28	-4.39	1.11
Graft failed	1,729	-6.45	-12.90	-3.24
Re-transplanted	77	-3.02	-6.66	-1.53
Graft functioning	16,596	-0.46	-2.58	1.29
<b>Total</b>	<b>20,188</b>	<b>-0.80</b>	<b>-3.42</b>	<b>1.11</b>

## Survival of adult kidney Tx patients

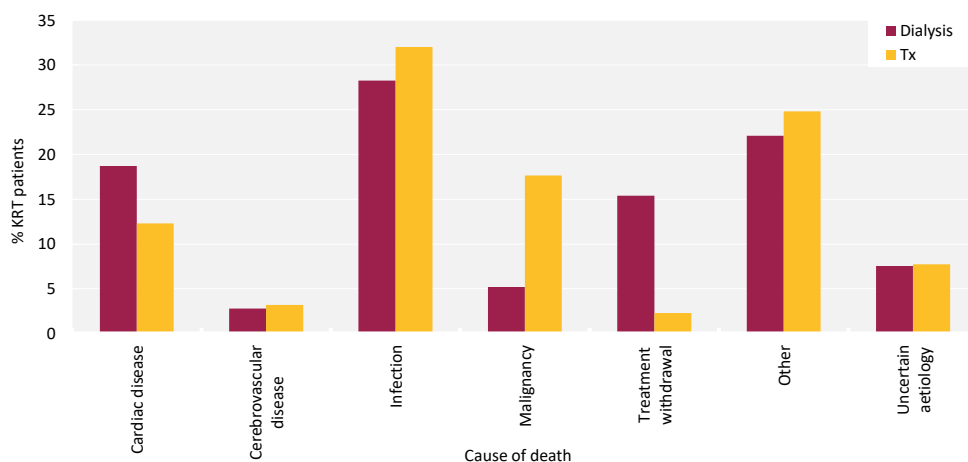
Survival of incident and prevalent KRT patients is described in detail in chapters 2 and 3, respectively. Survival of incident Tx patients is reported in table 4.3. NHSBT reports the survival of Tx recipients.

### Cause of death in adult kidney Tx patients

Cause of death was analysed in patients prevalent to KRT on 31/12/2019 and followed-up for one year in 2020, with comparisons between Tx and dialysis presented in table 4.10. Work is being undertaken to better understand and code the cause of death in Tx recipients. The proportion of KRT patients with each cause of death is shown for patients with cause of death data and these total 100% of patients with data. The proportion of patients with no cause of death data is shown on a separate line.

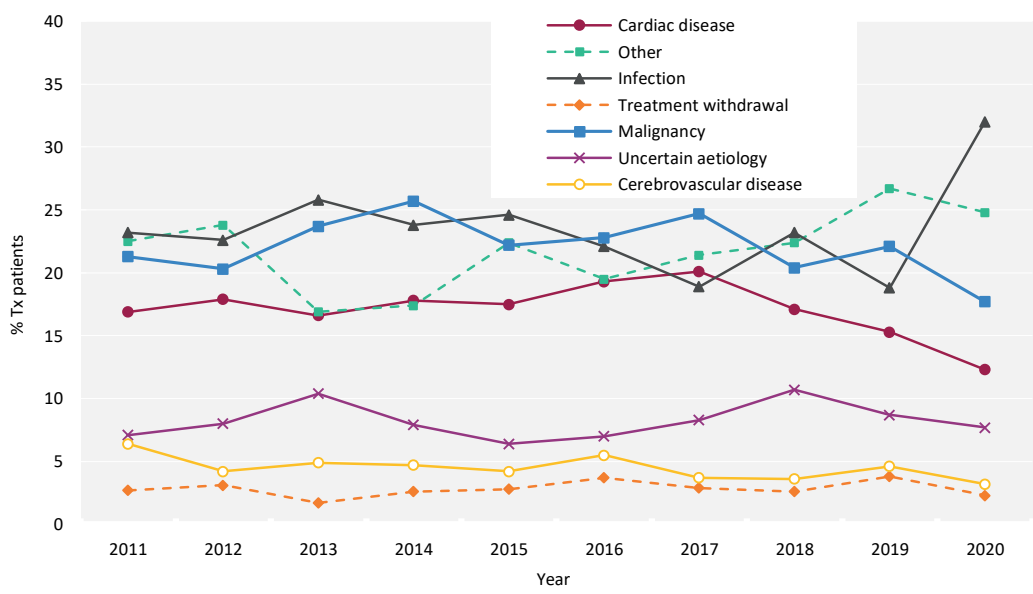
**Table 4.10** Cause of death in adult patients prevalent to KRT on 31/12/2019 followed-up in 2020 by modality

Cause of death	All modalities		Dialysis		Tx	
	N	%	N	%	N	%
Cardiac disease	755	17.4	647	18.7	108	12.3
Cerebrovascular disease	124	2.9	96	2.8	28	3.2
Infection	1,258	29.0	977	28.3	281	32.0
Malignancy	335	7.7	180	5.2	155	17.7
Treatment withdrawal	552	12.7	532	15.4	20	2.3
Other	982	22.7	764	22.1	218	24.8
Uncertain aetiology	329	7.6	261	7.5	68	7.7
<b>Total (with data)</b>	<b>4,335</b>	<b>100.0</b>	<b>3,457</b>	<b>100.0</b>	<b>878</b>	<b>100.0</b>
Missing	2,330	35.0	1,782	34.0	548	38.4



**Figure 4.15** Cause of death for adult patients prevalent to KRT on 31/12/2019 followed-up in 2020 by modality





**Figure 4.16** Cause of death between for adult patients prevalent to transplant by year.