ISSN 1471-3349 (Print)
ISSN 2632-4326 (Online)

UK Renal Registry 21st Annual Report

Data to 31/12/2017

UK Renal Registry 21st Annual Report

Data to 31/12/2017

Suggested citation

UK Renal Registry (2019) UK Renal Registry 21st Annual Report – data to 31/12/2017, Bristol, UK.
Available from https://www.renalreg.org/publications-reports/

Publications based on UK Renal Registry (UKRR) data presented in this report must include the citation detailed above and the following disclaimer:

The data reported here have been supplied by the UKRR of The Renal Association. The interpretation and reporting of these data are the responsibility of the authors and in no way should be seen as an official policy or interpretation of the UKRR or The Renal Association.

Summary of the UKRR 21st Annual Report for patients

UK Renal Registry (2019) UK Renal Registry 21st Annual Report summary for patients – analyses of adult data to the end of 2017, Bristol, UK.
Available from https://www.renalreg.org/patient-info/

Contact information

For more information about this report or the UKRR, please contact us:


renal@renal.org


www.renalreg.org


@RenalAssoc

Foreword



Ron Cullen, chief executive officer, The Renal Association

I am delighted to present the 21st UK Renal Registry (UKRR) Annual Report – data to 31/12/2017. The analyses are based on 8,001 incident and 64,887 prevalent patients with end-stage kidney disease in the UK who were on a renal replacement therapy, during or at the end of 2017, respectively.

As ever, I am very grateful to patients for the inclusion of their data, the renal centres that submit the data and the staff at the UKRR who clean, validate, process and analyse the data.

Changes to the UKRR Annual Report

This year's report marks a significant departure from the format of previous years. In consultation with the wider renal community, we have devised a simpler, greener, predominantly online report, where the audit measures presented are directly linked to The Renal Association's guidelines. The chapters have been re-designed to reflect treatment types (haemodialysis, peritoneal dialysis and transplantation) or stage (incidence and prevalence), rather than the biomedical parameters.

Most significantly, we decided to reduce substantially the amount of clinical commentary on the data to bring us more in line with other registries' reports and to allow us to focus our energy on speeding up the reporting of the data. This will also free up UKRR resources, enabling us to conduct a wider range of audit and research analyses. Any novel analyses will in future be published outside the report to increase their impact – forthcoming publications include diabetes and ethnicity. We also plan survival analyses for patients in England and Wales that are adjusted for comorbidity, using the linkage between the UKRR database and the Hospital Episode Statistics database.

To increase accessibility and impact of the UKRR's audit work to patients and carers, we have developed in partnership with The Renal Association Patient Council, a summary of the annual report for patients, in plain English and with infographics.

Two clinical summaries of the report – one for adult data and one for paediatric data – will be published in *Nephron*, enabling citation of the annual report findings.

New work and developments at the UKRR

Work is underway to develop a data portal which will enable more timely access to UKRR data. The Renal Association's websites, including the UKRR's, are being redeveloped to simplify their structure and improve their functionality, making it easier both to find information about the work undertaken by the UKRR and to understand how data are being used. Audit/research ready datasets for both adult and paediatric data are being assembled to help clinicians and researchers to understand data completeness for key data items held in the wider UKRR dataset.

The UK Research Data Collaboration (UKRDC) continues to progress, with King's College Hospital expected to be the first renal centre to submit their 2018 data through the UKRDC.

The acute kidney injury (AKI) master patient index currently receives files from 93% of hospital laboratories in England and these data will form the basis of an AKI specific annual report later this year. This report will begin to enable the medical community to better understand the frequency and variation in AKI episodes between hospitals. Data on patients with chronic kidney disease (CKD) are beginning to be returned by some renal centres. The AKI and CKD datasets will eventually provide a much more complete picture of the development and progression of kidney disease in the UK.

As always, we very much welcome feedback from the renal community to make our annual report, data and other outputs as usable and useful as possible.



Ron Cullen
Chief executive officer, The Renal Association, May 2019

Contents

Introduction	Welcome to the UK Renal Registry's 21st Annual Report	v
Chapter 1	Adults starting renal replacement therapy (RRT) for end-stage kidney disease (ESKD) in the UK in 2017	1
Chapter 2	Adults on renal replacement therapy (RRT) in the UK at the end of 2017	45
Chapter 3	Adults on in-centre haemodialysis (ICHD) in the UK at the end of 2017	67
Chapter 4	Adults on peritoneal dialysis (PD) in the UK at the end of 2017	101
Chapter 5	Adults with a kidney transplant (Tx) in the UK at the end of 2017	125
Chapter 6	Access to kidney transplantation for adults in the UK – data to the end of 2017	147
Chapter 7	Children on renal replacement therapy (RRT) for end-stage kidney disease (ESKD) in the UK in 2017	161
Abbreviations	UK renal centre abbreviations and other shortened forms used in the 21st Annual Report	183

Appendices available from https://www.renalreg.org/publications-reports/

Appendix A	Definitions and methodologies used in the 21st Annual Report – data to the end of 2017
Appendix B	Clinical commissioning group (CCG) and health board (HB) adult incidence and prevalence numbers, rates and standardised ratios – data to the end of 2017

Introduction: Welcome to the UK Renal Registry's 21st Annual Report

The UK Renal Registry (UKRR) Annual Report is aimed primarily at health professionals with an interest in the health, care and outcomes of people with kidney disease in the UK. The main purpose of the report is to present information about the care provided to patients at each of the UK's 71 adult and 13 paediatric renal centres against national standards, in particular, The Renal Association's guidelines – https://renal.org/guidelines/.

As highlighted in the foreword, the format of this year's report is significantly different to previous years. In brief, there are fewer chapters, each representing either a stage or modality of end-stage kidney disease (ESKD) and all follow the same structure. Clinical summaries of the report – one for adult data and one for paediatric data – will be published in *Nephron*. Lastly, in partnership with The Renal Association Patient Council, a summary of the annual report for patients has been developed, in plain English and with infographics – https://www.renalreg.org/patient-info/.

The new report is simpler and faster to produce. Combined with the new data portal this will increase the clinical timeliness and relevance of UKRR data. It will also free up UKRR resources to conduct and facilitate a wider variety of audit and research work using UKRR data. The UKRR welcomes your comments on this annual report.

Data items collected by the UKRR

The UKRR was originally established as a registry for people with ESKD on renal replacement therapy (RRT) – recently, data permissions were expanded to include patients with acute kidney injury (AKI) in primary and secondary care (in England only) and all cases of chronic kidney disease (CKD) stages 2–5 in secondary care not on dialysis. For this year's report only patients with ESKD on RRT are reported.

The full list of data items that the UKRR aims to collect (dataset version 4.2) can be found at https://www.renalreg.org/datasets/the-uk-renal-registry-dataset/.

Work is underway to assess and improve the quality and completeness of the advanced CKD dataset, so that these data can be included in future annual reports. The AKI master patient index, established as part of the NHS England safety alert, is progressing well with 93% of laboratories submitting data. The UKRR produces quarterly AKI reports for clinical commissioning groups and laboratories, and will publish a separate AKI annual report later this year.

Mechanisms of data transfer to the UKRR

Most data items about adults are collected from renal centres via secure and automatic quarterly downloads from the renal centre IT system to the UKRR database. English, Welsh and Northern Irish renal centres send their data directly to the UKRR, where the data are cleaned and validated before analyses are conducted. Scottish data are collected, validated and published by the Scottish Renal Registry before they are shared with the UKRR. AKI data, in contrast, are collected from hospital laboratories via secure and automatic monthly downloads from the laboratory IT system to the UKRR database. The majority of patients in the AKI cohort are not under the care of renal centres.

Data items about children are collected from renal centres through a variety of mechanisms – from automated download to Excel spreadsheets – reflecting differences in how local IT systems handle paediatric renal data.

The continuing development of the UK Renal Data Collaboration (UKRDC) is leading to significant changes in both adult and paediatric data collection. Data will flow immediately to the UKRR data warehouse rather than through quarterly downloads, enabling much quicker feedback and analyses of up to date data. Furthermore, the new format will allow data to be extracted in more detail and with more metadata, which will improve interpretation of the data. Trials with King's College Hospital renal centre are proceeding well.

Data completeness of UKRR held data items

The completeness and quality of data items submitted to the UKRR varies by renal centre, but continues to cause significant challenges, as detailed in each chapter. Throughout the report, each analysis includes only those renal centres that had submitted the data item for at least 70% of their patients.

Poor data completeness may result from failure to undertake a test or to accurately capture patient data. Data may also be lost during the transfer and validation processes. The UKRR dataset has evolved and expanded over time in response to audit guidelines, with an understandable variable lag in the ability of renal centre IT systems to respond to those changes. Data completeness is likely to improve with the development of the UKRDC and increasing uptake of version 4.2 of the UKRR dataset. The UKRR will prioritise greater transparency around data completeness to aid the planning of audit and research.

Completeness of comorbidity data from renal centres at the start of RRT remains poor. However, NHS Digital recently permitted the UKRR to link the UKRR dataset to the Hospital Episode Statistics (HES) and Civil Registration datasets, which, for the first time, will allow adjustment for comorbidity in survival analyses as a standalone piece of work to follow the publication of this report.

Information governance at the UKRR – the care of patient data

Issues surrounding information governance, data protection and information security remain a priority at the UKRR to ensure that the UKRR continues to process data fairly, transparently and securely. The UKRR remains clear and open with patients about how their data are used, publishing information describing the nature and scope of processing on the UKRR website and in patient information leaflets and posters, which are distributed to all renal centres.

The UKRR continues to receive support from the Department of Health's Health Research Authority with their approval of the UKRR under section 251 of the NHS Act (2006) to collect data without individual patient consent. This helps to ensure the robustness and validity of analyses, while respecting the rights and freedoms of patients in relation to their data.

The Health Research Authority also continues to support the UKRR's governance framework for assessing applications for others to use the UKRR's data for audit and research purposes. The UKRR accepts applications to use its data all year round – https://www.renalreg.org/about-us/working-with-us/.

Each year the UKRR completes an assessment against the National Data Guardian's information governance standards. NHS Digital has updated the method of assessment this year, replacing the Information Governance Toolkit with the Data Security and Protection Toolkit. The UKRR achieved a positive outcome for the 2018/2019 assessment period.

Further information on information governance at the UKRR is available at https://www.renalreg.org/patient-info/.

How to interpret centre specific analyses and outlying centres

The UKRR continues to advise caution when comparing centre specific attainment of clinical audit measures provided in this report. For many of these analyses no adjustment can be made for the range of factors known to influence the measured variable. The UKRR does not test for significant differences between centres – arbitrary 95% and 99% confidence intervals are created from the data to show compliance with an audit standard. Centre comparisons will become more meaningful when more comorbidity data are included in analyses via the UKRR-HES data linkage and when advanced CKD data are included to understand differences in the transition of patients onto both RRT and conservative non-dialysis pathways.

Despite these shortcomings, for a number of years identifiable centre specific reports on the survival of RRT patients have been published in the annual report.

The UKRR has no statutory powers. However, because the UKRR provides centre specific analyses of important clinical outcomes, including survival, it is important to define how the UKRR responds to apparent under-performance. The UKRR senior management team communicates survival outlier status with the renal centres prior to publication. Centres are asked to report their outlying status internally at trust level and to follow-up with robust mortality and morbidity meetings. They are also asked to provide evidence that the clinical governance department and chief executive of the trust housing the service have been informed. In the event that no such evidence is provided, the chief executive officer or medical director of the UKRR informs the president of The Renal Association, who then takes action to ensure that the findings are properly investigated.

We hope you enjoy the new format of the annual report and as always we welcome your feedback on the outputs of the UKRR – renal@renal.org.



Chapter 1

Adults starting renal replacement therapy (RRT) for end-stage kidney disease (ESKD) in the UK in 2017

Contents

Introduction 3
Rationale for analyses 5
Key findings 7
Analyses 8
- Changes to the incident adult RRT population 8
- Demographics and start modality of incident adult RRT patients 11
- Modality changes of incident adult RRT patients 14
- Late presentation to nephrology services of incident adult RRT patients 17
- Start estimated glomerular filtration rate in incident adult RRT patients 20
- Management of anaemia in incident adult RRT patients 20
- Biochemistry parameters in incident adult RRT patients 23
- Dialysis access in incident adult dialysis patients 25
- Survival in incident adult RRT patients 36
- Cause of death in incident adult RRT patients 43

Introduction

This chapter describes the population of patients who developed end-stage kidney disease (ESKD) and started renal replacement therapy (RRT) in the UK in 2017 (figure 1.1). This includes patients starting dialysis therapies – haemodialysis (HD) and peritoneal dialysis (PD) – and patients who received a pre-emptive kidney transplant (Tx). Patients with a failed Tx who returned to dialysis are not included. Patients who received dialysis for acute kidney injury (AKI), as coded by their reporting renal centre, were only included if their dialysis was subsequently recoded as being for ESKD, when they failed to recover native renal function. Recoding is automatically applied at 90 days for individuals still on RRT, but can be applied earlier by reporting centres that identify ESKD before day 90. Individuals who commenced dialysis for AKI and subsequently recovered renal function, died or withdrew from dialysis within the first 90 days of treatment are being analysed separately to this report and are therefore not included in this chapter (although they are shown in figure 1.1). Patients who died, or withdrew from dialysis after being coded as ESKD are included in this chapter, but patients who recovered renal function are not included if they recovered before 90 days on dialysis.

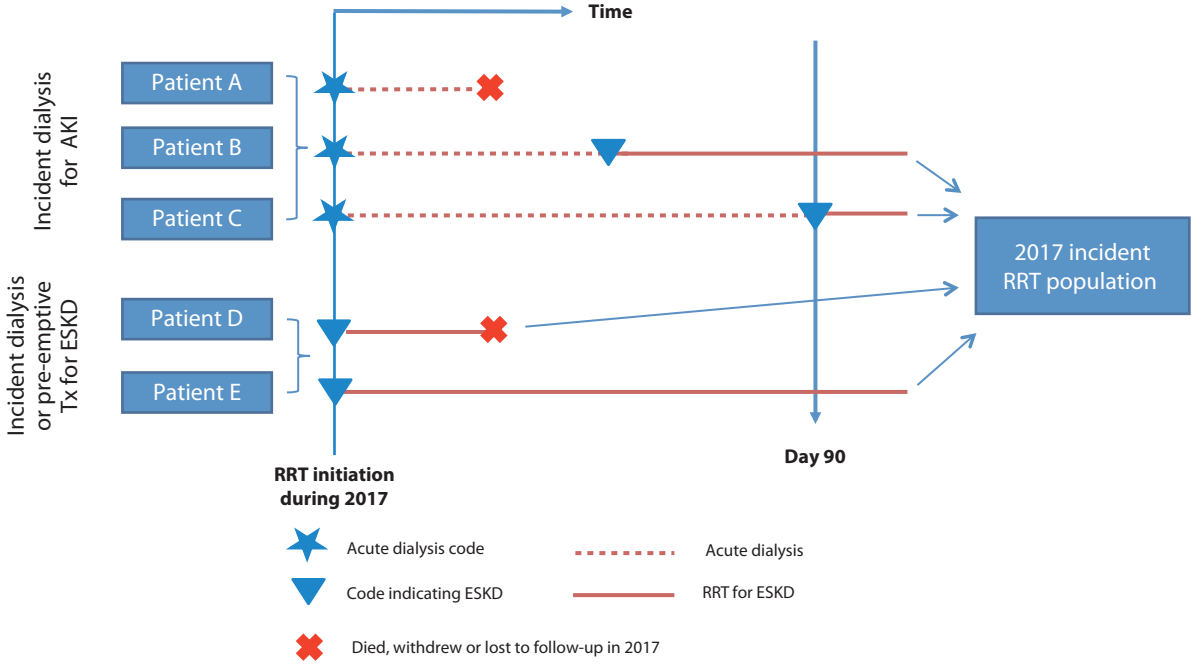


Figure 1.1 Example histories for patients starting RRT, illustrating the use of timeline codes to define dialysis as being 'acute' or for ESKD

Note that patients who recovered renal function before 90 days on dialysis are not included in this chapter, whether they were coded as AKI or ESKD

Note that patients who followed patterns B–E received RRT for ESKD and are counted as 'incident to RRT' throughout this report. Patients who followed pattern A are not counted as 'incident to RRT' and do not feature in this chapter

Survival and cause of death analyses were undertaken on historic incident cohorts to allow sufficient follow-up time and numbers of patients. Dialysis access data were collected separately to the main UKRR quarterly data returns via the 2017 Multisite Dialysis Access Audit and some analyses include two year cohorts to describe outcomes.

This chapter addresses the following key aspects of care of patients incident to RRT for which there are Renal Association guidelines (table 1.1):

- **Modality selection, pre-emptive transplantation and Tx wait-listing** – the number of patients starting on each RRT modality, including a home therapy – home HD (HHD) or PD – or a kidney Tx is reported in this chapter, while Tx wait-listing is reported in chapter 6
- **Late presentation** – a patient first seen by renal services within 90 days of starting RRT for ESKD is defined as a 'late presentation' (in this report 'late presentation' is used interchangeably with 'late referral')
- **Complications associated with ESKD** – these include anaemia and mineral bone disorders
- **Type of dialysis access** – definitive access – either a surgically created arteriovenous fistula (AVF) or arteriovenous graft (AVG), or a PD catheter. Alternatively, more temporary access can be provided through a central venous catheter (CVC) – either a tunnelled line (TL) or a non-tunnelled line (NTL).

Rationale for analyses

The analyses begin with a description of the 2017 incident adult RRT population, including the incident number on RRT per million population (pmp). The inclusion of centre specific reports on the survival of RRT patients reflects the need for transparency following the Francis and Keogh enquiries and the ongoing Care Quality Commission inspections of patient care and outcomes at a number of hospital trusts. Survival analyses were adjusted for age, primary renal disease (PRD) and comorbidity using renal centre data. Linkage to Hospital Episode Statistics (HES) and Patient Episode Database for Wales (PEDW) data for England and Wales, respectively, is being undertaken as a separate piece of work to this report.

The Renal Association guidelines (https://renal.org/guidelines/) provide audit measures relevant to the care of patients incident to RRT and, where data permit, their attainment by UK renal centres in 2017 is reported in this chapter (table 1.1). Audit measures in guidelines that have been archived (for example, 'Haemodialysis', 'Blood borne viruses' and 'Nutrition') are not included.

Some audit measures in current guidelines – for example, the target for glycated haemoglobin in those on hypoglycaemia-inducing treatment – cannot be reported because the completeness of the required data is too low. Detail about the completeness of data returned to the UK Renal Registry (UKRR) is available on the UKRR website. Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted.

Where revised target ranges are published, the measures in place at the time of patient care are reported. However, where new guidelines remove audit measures, those targets are no longer reported – in this chapter this applies to phosphate and parathyroid hormone.

For definitions and methods relating to this chapter see appendix A. The number preceding the centre name in each caterpillar plot indicates the percentage of missing data for that centre, except in the dialysis access data where the number following the centre name indicates the number of patients in the centre with data. Caterpillar plots exclude centres with $<70\%$ data completeness but include centres with small numbers of patients depending on the analysis.

Cambridge renal centre (Addenbrooke's Hospital) was unable to submit patient level data for 2015–2017. While data extraction issues have now been resolved, the UKRR and Cambridge are working to load and validate the backlog of data for these years. Using aggregate numbers of patients starting RRT by treatment modality, it is possible to report treatment rates for Cambridge, but no other quality assurance for the service provided.

Table 1.1 The Renal Association audit measures relevant to RRT incidence that are reported in this chapter

The Renal Association guideline	Audit criteria	Related analysis/analyses
Planning, initiating and withdrawing RRT (2014)	Proportion of patients commencing PD or HHD	Table 1.3
	Proportion of patients remaining on initial treatment modality 3 and 12 months post initiation of RRT	Tables 1.5–1.7, figure 1.5
	Percentage of patients commencing RRT referred <3 months and <12 months before date of starting RRT	Tables 1.8–1.11, figure 1.6
	Proportion of patients on UK Tx waiting list at RRT initiation	Chapter 6
	Proportion of RRT patients transplanted pre-emptively from living and deceased donors	Chapter 6
	Estimated glomerular filtration rate (eGFR) at start of RRT and at time of pre-emptive Tx	Figure 1.7
	Proportion of planned initiations with established access or pre-emptive Tx	Table 1.15, figure 1.15
	Number of patients withdrawing from dialysis as a proportion of all deaths on dialysis	Table 1.22
Anaemia (2017)	Proportion of patients initiating RRT with haemoglobin <100 g/L not on erythropoiesis stimulating agent (ESA)	Table 1.12, figure 1.8 (ESA data completeness poor so not included)
Chronic kidney disease (CKD) mineral bone disorder (2018)	Percentage of RRT patients with serum calcium above the normal reference range of 2.2–2.5 mmol/L	Table 1.13, figure 1.10
Vascular access (2015)	>60% of all patients with established ESKD commencing planned HD should receive dialysis via a functioning AVF or AVG	Table 1.15, figure 1.16
Peritoneal access (2009)	>80% of catheters should be patent at 1 year (censoring for death and elective modality change)	Figures 1.20–1.22
	Complications following PD catheter insertion	Figures 1.20–1.22 (partly addressed)
	Peritonitis within 2 weeks of catheter insertion <5%	Chapter 4

AVF – arteriovenous fistula; AVG – arteriovenous graft; CKD – chronic kidney disease; eGFR – estimated glomerular filtration rate; ESA – erythropoiesis stimulating agent

Key findings

- 8,001 adult patients started RRT for ESKD in the UK in 2017, an increase of 2.6% from 2016
- RRT incidence was 121 pmp compared to 118 pmp in 2016
- The median age of incident RRT patients was 63.7 years, but this was dependent on ethnicity (White 65.8 years, South Asian 61.1 years and Black 56.5 years)
- 64.1% of incident RRT patients were male
- Diabetes remained the most common identifiable PRD for patients starting RRT (29.4%)
- By 90 days, 65.3% of patients were on HD (including HHD), 19.1% on PD, 9.6% had a functioning Tx and 5.9% had died or stopped treatment
- The mean eGFR at the start of RRT was 7.4 mL/min/1.73 m^2 (HD 7.2 mL/min/1.73 m^2, PD 7.5 mL/min/1.73 m^2 and pre-emptive Tx 9.9 mL/min/1.73 m^2)
- Late presentation has fallen from 18.8% in 2011 to 18.1% in 2017 (for centres returning continuous data)
- Of the 5,299 incident dialysis patients with dialysis access data, 50.3% started dialysis with definitive access (21.3% PD and 28.9% HD with an AVF or AVG), 27.4% with a TL and 22.3% with a NTL
- Short-term (90 day) age adjusted survival of incident RRT patients in a combined 2 year cohort (2015–2016) was 96.6% (unchanged from the previous analysis of the 2014–2015 cohort)
- 1 year after 90 day age adjusted survival for incident RRT patients in a combined 2 year cohort (2015–2016) was 90.4% (compared to 90.1% in the previous analysis of the 2014–2015 cohort)
- There were 2 outlying centres in the funnel plot showing 1 year after 90 day age adjusted survival for incident RRT patients in a combined 4 year cohort (2013–2016): 1 centre below the lower 95% limit (Glasgow) and 1 centre above the upper 95% limit (Gloucester). There were fewer outlying centres in this recent survival analysis compared to the previous 4 year cohort (2012–2015) and it would be expected that 3 centres would be outside the limits by chance
- There was no cause of death data available for 41.4% of deaths in the first 90 days of RRT. For those with data, the leading cause of death in the first 90 days was cardiac disease (24.4%) and infection (19.6%).

Analyses

Changes to the incident adult RRT population

For the 71 adult renal centres, the number of incident patients on RRT was calculated as a proportion of the estimated centre catchment population (calculated as detailed in appendix A).

Table 1.2 Number of incident adult RRT patients by year and by centre; number of RRT patients as a proportion of the catchment population

Centre	*N* on RRT					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017		
ENGLAND							
B Heart	100	100	122	135	126	0.77	163
B QEH	200	248	245	243	259	1.78	146
Basldn	34	46	52	44	46	0.43	106
Bradfd	63	83	91	88	81	0.68	119
Brightn	139	148	143	149	154	1.36	113
Bristol	174	149	146	154	159	1.51	105
Camb	136	121	175	120	90	1.21	74
Carlis	42	37	46	35	40	0.34	119
Carsh	228	265	260	246	233	2.00	116
Chelms	46	55	50	53	42	0.53	79
Colchr	29	38	28	30	44	0.31	140
Covnt	90	126	111	128	82	0.93	88
Derby	74	77	63	86	87	0.74	118
Donc	61	54	39	63	55	0.43	128
Dorset	73	78	75	72	100	0.90	111
Dudley	51	42	51	53	60	0.46	130
Exeter	100	143	137	144	134	1.14	117
Glouc	53	74	72	67	81	0.61	132
Hull	90	98	120	93	104	1.07	97
Ipswi	40	34	67	43	52	0.42	124
Kent	143	148	143	142	139	1.28	108
L Barts	283	302	310	294	348	1.92	182
L Guys	134	159	178	169	170	1.13	150
L Kings	166	148	180	154	166	1.23	135
L Rfree	224	230	239	239	237	1.59	149
L St.G	84	92	114	90	92	0.84	110
L West	303	355	334	386	408	2.51	162
Leeds	183	169	147	166	174	1.75	99
Leic	288	251	272	320	287	2.55	113
Liv Ain	65	65	61	51	62	0.51	122
Liv Roy	94	137	142	111	142	1.05	136
M RI	198	164	197	213	230	1.60	143
Middlbr	109	103	134	102	114	1.05	108
Newc	92	109	125	134	150	1.17	128
Norwch	78	76	118	103	80	0.82	97
Nottm	113	111	124	120	133	1.14	117
Oxford	164	188	193	217	218	1.77	123
Plymth	66	54	53	62	95	0.49	193
Ports	193	230	200	195	204	2.12	96
Prestn	154	164	163	140	164	1.56	105
Redng	117	104	87	95	101	0.95	106
Salford	116	162	173	192	172	1.56	110
Sheff	136	164	147	149	160	1.44	111

Table 1.2 Continued

Centre	*N* on RRT					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017		
Shrew	60	65	62	58	64	0.52	122
Stevng	156	150	135	165	141	1.26	112
Sthend	42	30	35	48	50	0.33	151
Stoke	103	117	117	112	88	0.93	94
Sund	51	63	63	94	94	0.65	145
Truro	47	40	70	49	57	0.43	132
Wirral	65	55	64	66	61	0.60	102
Wolve	91	79	86	69	82	0.70	117
York	37	64	60	73	59	0.52	114
N IRELAND							
Antrim	29	35	36	40	48	0.30	158
Belfast	72	65	94	96	75	0.66	114
Newry	23	20	28	28	26	0.27	96
Ulster	30	23	33	31	31	0.27	113
West NI	29	36	39	35	33	0.36	91
SCOTLAND							
Abrdn	58	53	66	52	55	0.61	90
Airdrie	51	50	64	62	67	0.57	119
D&Gall	8	22	12	12	17	0.15	112
Dundee	41	50	46	44	54	0.47	114
Edinb	72	90	96	87	126	0.99	128
Glasgw	174	173	221	199	201	1.66	121
Inverns	21	22	35	20	25	0.28	90
Klmarnk	40	34	39	53	48	0.37	130
Krkcldy	38	36	44	32	42	0.32	130
WALES							
Bangor	24	22	29	23	26	0.23	113
Cardff	171	168	160	165	180	1.50	120
Clwyd	17	32	28	17	21	0.20	105
Swanse	109	120	135	130	131	0.94	140
Wrexm	35	42	45	47	24	0.25	94
TOTALS							
England	**5,978**	**6,364**	**6,619**	**6,624**	**6,771**	**55.62**	**122**
N Ireland	**183**	**179**	**230**	**230**	**213**	**1.87**	**114**
Scotland	**503**	**530**	**623**	**561**	**635**	**5.42**	**117**
Wales	**356**	**384**	**397**	**382**	**382**	**3.13**	**122**
UK	**7,020**	**7,457**	**7,869**	**7,797**	**8,001**	**66.04**	**121**

Country dialysis populations were calculated by summing the dialysis patients from centres in each country. Estimated country populations were derived from Office for National Statistics figures rather than from summing the estimated catchment populations of renal centres, which may cross country borders
pmp – per million population

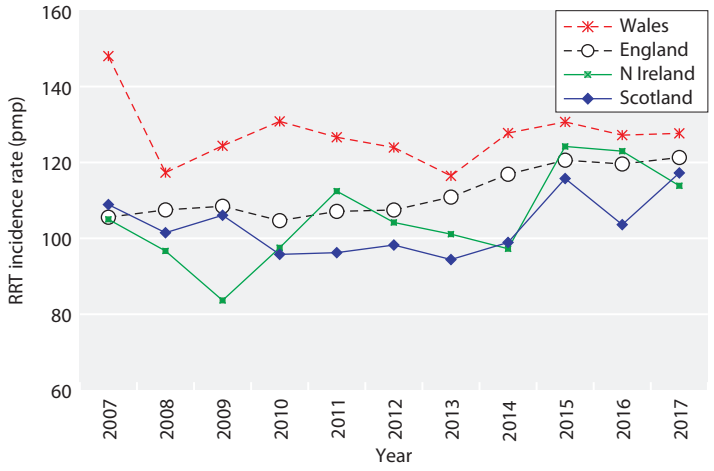


Figure 1.2 Adult RRT incidence rates by country between 2007 and 2017
pmp – per million population

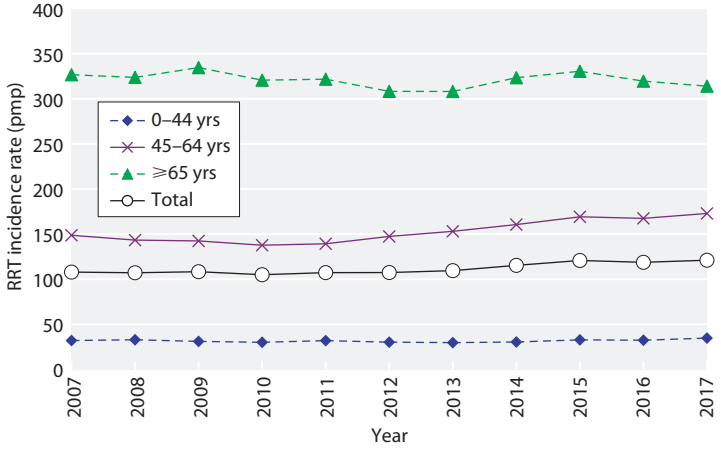


Figure 1.3 Adult RRT incidence rates by age group between 2007 and 2017
pmp – per million population

Demographics and start modality of incident adult RRT patients

The proportion of RRT 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 1.3 Demographics and start modality of adult patients incident to RRT in 2017 by centre

								Ethnicity				
Centre	*N* on RRT	% on ICHD	% on PD	% on HHD	% with Tx	Median age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing
ENGLAND												
B Heart	126	63.5	34.9	0.8	0.8	64.7	70.6	55.6	30.2	13.5	0.8	0.0
B QEH	259	67.6	22.4	0.4	9.7	61.1	66.4	57.5	22.1	12.8	7.5	12.7
Basldn	46	73.9	21.7	0.0	4.4	68.4	63.0	89.5	2.6	0.0	7.9	17.4
Bradfd	81	80.3	9.9	0.0	9.9	60.6	69.1	48.8	45.0	3.8	2.5	1.2
Brightn	154	74.7	17.5	0.7	7.1	69.5	68.2	92.6	6.1	1.4	0.0	3.9
Bristol	159	78.0	15.1	0.0	6.9	64.5	66.0	83.6	4.4	9.4	2.5	0.0
Camb	90											
Carlis	40	82.5	10.0	0.0	7.5	66.1	57.5	100.0	0.0	0.0	0.0	7.5
Carsh	233	83.3	13.3	0.0	3.4	65.0	57.9	70.5	14.3	10.5	4.8	9.9
Chelms	42	78.6	16.7	0.0	4.8	62.5	71.4	82.5	5.0	2.5	10.0	4.8
Colchr	44	100.0	0.0	0.0	0.0	69.5	68.2	100.0	0.0	0.0	0.0	6.8
Covnt	82	62.2	24.4	0.0	13.4	66.3	73.2	81.7	12.2	6.1	0.0	0.0
Derby	87	56.3	37.9	2.3	3.5	59.1	65.5	88.0	4.8	1.2	6.0	4.6
Donc	55	80.0	18.2	0.0	1.8	73.2	58.2	96.4	3.6	0.0	0.0	0.0
Dorset	100	71.0	21.0	0.0	8.0	66.8	69.0	96.9	2.1	0.0	1.0	3.0
Dudley	60	68.3	28.3	0.0	3.3	63.2	71.7	83.3	13.3	3.3	0.0	0.0
Exeter	134	76.1	17.9	0.0	6.0	71.0	65.7	87.3	0.7	0.0	11.9	0.0
Glouc	81	80.3	16.1	0.0	3.7	65.0	61.7	90.1	3.7	2.5	3.7	0.0
Hull	104	67.3	26.0	0.0	6.7	63.9	63.5	98.1	1.0	1.0	0.0	1.0
Ipswi	52	63.5	34.6	0.0	1.9	70.3	65.4	69.0	0.0	2.4	28.6	19.2
Kent	139	76.3	16.6	0.0	7.2	65.8	64.7	92.8	2.2	3.6	1.4	0.0
L Barts	348	59.5	33.9	0.0	6.6	56.1	63.5	30.2	27.0	18.4	24.4	0.0
L Guys	170	77.1	10.0	1.2	11.8	57.1	65.3	57.8	7.8	27.9	6.5	9.4
L Kings	166	70.5	27.1	0.6	1.8	60.1	54.8	50.6	11.0	34.1	4.3	1.2
L Rfree	237	64.6	21.5	0.0	13.9	62.5	63.3	48.1	22.3	17.5	12.1	13.1
L St.G	92	71.7	18.5	0.0	9.8	61.5	66.3	52.3	20.0	16.9	10.8	29.3
L West	408	77.7	13.7	0.0	8.6	64.3	65.4	46.3	37.5	15.0	1.2	0.0
Leeds	174	73.0	17.8	0.0	9.2	56.4	58.6	76.3	17.3	3.5	2.9	0.6
Leic	287	80.5	10.8	1.1	7.7	65.1	60.3	76.6	18.4	2.7	2.3	9.1
Liv Ain	62	79.0	17.7	3.2	0.0	67.6	64.5	98.3	0.0	1.7	0.0	6.5
Liv Roy	142	58.5	19.0	0.7	21.8	63.1	62.0	89.7	1.5	2.9	5.9	4.2
M RI	230	69.6	17.0	0.0	13.5	62.3	60.0	68.5	15.3	13.5	2.7	3.5
Middlbr	114	75.4	18.4	0.0	6.1	65.0	66.7	94.7	4.4	0.9	0.0	0.0
Newc	150	58.7	20.7	0.0	20.7	63.8	68.0	96.0	1.3	2.0	0.7	0.7
Norwch	80	75.0	22.5	0.0	2.5	67.0	67.5	96.2	2.5	0.0	1.3	1.3
Nottm	133	66.9	21.8	0.0	11.3	64.4	67.7	76.7	14.3	6.8	2.3	0.0
Oxford	218	66.1	17.4	0.5	16.1	62.9	60.6	81.5	9.8	5.2	3.5	20.6
Plymth	95	61.1	26.3	0.0	12.6	69.5	56.8	95.7	1.1	0.0	3.2	1.1
Ports	204	65.2	21.1	2.0	11.8	64.8	68.1	94.5	3.3	0.0	2.2	10.3
Prestn	164	62.8	17.1	3.1	17.1	63.8	65.2	84.9	13.2	1.9	0.0	3.0
Redng	101	60.4	25.7	0.0	13.9	64.2	66.3	71.9	21.3	3.4	3.4	11.9
Salford	172	64.0	26.7	0.0	9.3	61.9	61.0	79.8	14.3	3.0	3.0	2.3
Sheff	160	76.9	15.0	0.6	7.5	65.8	67.5	85.7	8.8	2.0	3.4	8.1
Shrew	64	62.5	31.3	0.0	6.3	64.8	67.2	98.4	1.6	0.0	0.0	4.7
Stevng	141	78.0	12.1	0.7	9.2	66.6	66.7	79.3	9.5	3.4	7.8	17.7
Sthend	50	78.0	22.0	0.0	0.0	68.9	62.0	88.0	4.0	4.0	4.0	0.0
Stoke	88	64.8	29.6	0.0	5.7	68.2	70.5	94.1	3.5	0.0	2.4	3.4
Sund	94	79.8	13.8	0.0	6.4	64.4	56.4	93.6	3.2	1.1	2.1	0.0

Table 1.3 Continued

Centre	*N* on RRT	% on ICHD	% on PD	% on HHD	% with Tx	Median age (yrs)	% male	Ethnicity				
								% White	% South Asian	% Black	% Other	% missing
Truro	57	79.0	12.3	0.0	8.8	71.3	66.7	98.2	0.0	1.8	0.0	0.0
Wirral	61	78.7	19.7	0.0	1.6	67.5	57.4	98.4	0.0	0.0	1.6	0.0
Wolve	82	79.3	19.5	1.2	0.0	60.9	64.6	68.3	19.5	7.3	4.9	0.0
York	59	62.7	23.7	0.0	13.6	67.9	67.8	100.0	0.0	0.0	0.0	15.3
N IRELAND												
Antrim	48	75.0	10.4	0.0	14.6	68.8	72.9	100.0	0.0	0.0	0.0	2.1
Belfast	75	58.7	13.3	0.0	28.0	62.3	66.7	96.6	0.0	1.7	1.7	22.7
Newry	26	50.0	38.5	0.0	11.5	58.6	57.7	100.0	0.0	0.0	0.0	0.0
Ulster	31	87.1	6.5	0.0	6.5	70.8	51.6	96.8	0.0	0.0	3.2	0.0
West NI	33	60.6	15.2	0.0	24.2	69.1	63.6	96.9	3.1	0.0	0.0	3.0
SCOTLAND												
Abrdn	55	78.2	21.8	0.0	0.0	60.9	61.8					100.0
Airdrie	67	89.6	10.5	0.0	0.0	61.9	62.7	100.0	0.0	0.0	0.0	14.9
D&Gall	17	76.5	17.7	0.0	5.9	62.1	64.7					100.0
Dundee	54	85.2	14.8	0.0	0.0	64.3	68.5					100.0
Edinb	126	72.2	12.7	0.0	15.1	61.9	52.4					96.8
Glasgw	201	77.1	8.0	0.0	14.9	58.9	62.2					98.0
Inverns	25	64.0	36.0	0.0	0.0	64.6	44.0					96.0
Klmarnk	48	81.3	18.8	0.0	0.0	66.7	58.3					97.9
Krkcldy	42	88.1	11.9	0.0	0.0	64.3	57.1					97.6
WALES												
Bangor	26	73.1	26.9	0.0	0.0	62.6	57.7	96.0	0.0	4.0	0.0	3.8
Cardff	180	73.9	19.4	0.0	6.7	62.9	67.2	90.4	5.4	1.2	3.0	7.8
Clwyd	21	81.0	9.5	0.0	9.5	67.2	81.0	95.2	0.0	4.8	0.0	0.0
Swanse	131	74.1	23.7	0.0	2.3	69.0	71.8	98.3	0.0	0.8	0.8	9.9
Wrexm	24	50.0	37.5	4.2	8.3	61.6	70.8	100.0	0.0	0.0	0.0	0.0
TOTALS												
England	**6,771**	**71.0**	**19.9**	**0.4**	**8.8**	**63.8**	**64.2**	**74.8**	**13.0**	**7.5**	**4.7**	**5.4**
N Ireland	**213**	**65.7**	**15.0**	**0.0**	**19.3**	**67.3**	**64.3**	**97.9**	**0.5**	**0.5**	**1.0**	**8.9**
Scotland	**635**	**78.7**	**13.4**	**0.0**	**7.9**	**61.9**	**59.5**					**89.3**
Wales	**382**	**72.8**	**22.0**	**0.3**	**5.0**	**66.0**	**69.1**	**94.4**	**2.5**	**1.4**	**1.7**	**7.3**
UK	**8,001**	**71.5**	**19.3**	**0.4**	**8.8**	**63.7**	**64.1**	**76.7**	**12.0**	**7.0**	**4.4**	**12.3**

Blank cells – no data returned by the centre or data completeness <70%
Breakdown by ethnicity not shown for centres with <70% data completeness, but these centres are included in national averages
Breakdown of RRT patients by start modality is not available for Cambridge

PRDs were grouped into categories as shown in table 1.4, with the mapping of disease codes into groups explained in more detail in appendix A. The proportion of RRT patients in each ethnic group and with each PRD is shown for patients with ethnicity and PRD data, respectively, and these total 100% of patients with data. The proportions of patients with no ethnicity and no PRD data are shown on separate lines.

Table 1.4 Demographics, primary renal diseases (PRDs), referral time and start modality of adult patients incident to RRT in 2017 by age group

	Age group (yrs)								
	18–34	35–44	45–54	55–64	65–74	75–84	⩾85	Total	Median age (yrs)
Total									
N	556	717	1,237	1,681	1,926	1,542	252	7,911	63.7
%	7.0	9.1	15.6	21.2	24.3	19.5	3.2		
Sex (%)									
Male	57.9	61.1	62.8	64.1	64.2	67.1	72.2	64.1	64.3
Female	42.1	38.9	37.2	35.9	35.8	32.9	27.8	35.9	62.9
Ethnicity (%)									
White	68.3	66.6	70.6	73.0	82.2	83.3	87.1	76.5	65.8
South Asian	15.4	17.5	12.1	14.5	11.1	8.1	6.4	12.1	61.1
Black	8.4	11.6	10.6	8.2	3.4	5.2	4.7	7.0	56.5
Other	7.9	4.3	6.6	4.3	3.3	3.4	1.7	4.4	57.7
Missing	5.9	5.6	5.5	5.8	5.6	5.6	5.3	5.6	63.2
PRD (%)									
Diabetes	14.5	28.4	32.4	37.1	29.9	25.6	14.5	29.4	62.7
Glomerulonephritis	25.7	18.9	17.5	14.6	11.8	8.7	6.5	14.1	58.2
Hypertension	2.8	5.9	5.9	4.7	6.0	8.8	16.0	6.3	69.3
Polycystic kidney	3.2	12.0	12.4	8.4	5.4	1.7	1.5	6.8	55.5
Pyelonephritis	8.9	4.8	5.5	4.1	5.4	6.8	9.5	5.7	65.9
Renal vascular disease	1.1	0.5	1.5	3.4	8.2	12.5	12.0	5.9	74.1
Other	26.4	16.9	14.7	16.1	18.3	15.2	13.5	16.9	63.9
Uncertain aetiology	17.4	12.5	10.2	11.7	15.0	20.7	26.5	14.9	68.5
Missing	15.5	16.6	14.0	14.2	12.8	14.7	20.6	14.4	63.2
Referral time (%)									
<90 days	24.2	15.3	14.8	14.6	15.4	15.4	20.9	15.9	64.0
⩾90 days	75.8	84.7	85.2	85.4	84.6	84.6	79.1	84.1	64.4
Missing	10.8	10.6	9.7	9.6	6.5	5.4	4.5	8.0	59.0
Start modality (%)									
ICHD	55.0	55.9	63.1	72.3	76.0	82.7	86.9	71.5	66.0
HHD	0.2	0.7	0.6	0.4	0.3	0.1	0.0	0.4	58.3
PD	25.9	24.3	22.3	18.0	17.9	16.5	13.1	19.3	60.7
Tx	18.9	19.1	14.1	9.3	5.9	0.7	0.0	8.8	51.5

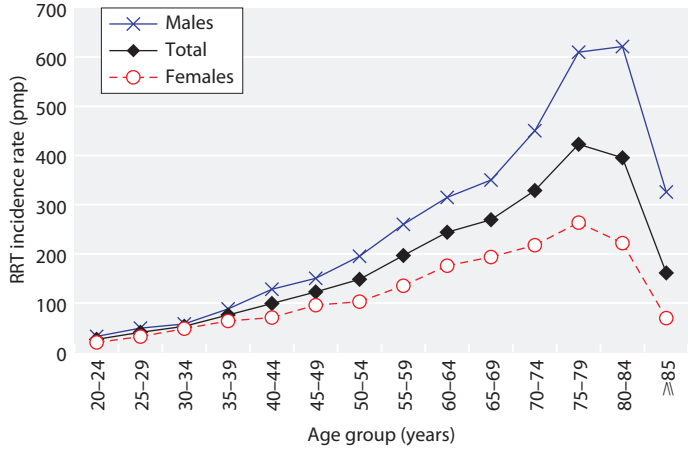


Figure 1.4 Incidence rates for adult patients starting RRT in 2017 by age group and sex

Modality changes of incident adult RRT patients

Many patients undergo a period of HD before switches to other modalities are, or can be, considered. The modality in use at 90 days may be more representative of the first elective modality. The analysis of the proportion of patients by treatment modality at three months post-RRT initiation is shown over time and by UK country. Changes from start modality and deaths during the first five years are shown by start modality. Due to small numbers, the percentage of incident patients on HHD and ICHD at 90 days after start of RRT is shown at a UK level, but all HD patients are combined for other analyses.

Table 1.5 RRT modality at start and 90 days after start of RRT for incident adult RRT patients by year of start

RRT start year	% on ICHD	% on HHD	% on PD	% with Tx
Day 0 modality				
2012	72.8	0.1	19.7	7.4
2013	71.9	0.2	19.5	8.4
2014	71.5	0.4	20.1	8.0
2015	72.7	0.2	19.3	7.8
2016	71.8	0.4	20.3	7.5
2017	71.5	0.4	19.3	8.8
Day 90 modality				
Oct 2011–Sept 2012	70.3	0.6	20.4	8.7
Oct 2012–Sept 2013	69.5	0.5	20.3	9.7
Oct 2013–Sept 2014	68.9	0.9	20.3	10.0
Oct 2014–Sept 2015	70.6	0.6	19.6	9.3
Oct 2015–Sept 2016	68.7	0.9	20.6	9.8
Oct 2016–Sept 2017	68.6	0.8	20.3	10.2

For 90 day analyses, the incident cohort from the 12 months starting 1 October of the previous year was used so that follow up to 90 days was possible for all patients
Cambridge, a Tx centre, is excluded from all years in the analysis

Table 1.6 RRT modality at 90 days for adult patients incident to RRT between 01/10/2016 and 30/09/2017 by country

		Patients who started RRT					Patients still on RRT at 90 days		
Country	*N*	% on HD*	% on PD	% with Tx	% discontinued[a]	% died	% on HD*	% on PD	% with Tx
England	6,699	64.8	19.6	9.6	1.2	4.9	69.0	20.8	10.2
N Ireland	207	60.4	15.0	17.9	3.9	2.9	64.8	16.1	19.2
Scotland	634	70.7	15.3	9.5	0.3	4.3	74.1	16.0	9.9
Wales	367	68.9	19.9	6.0	1.6	3.5	72.7	21.0	6.3
UK	7,907	65.3	19.1	9.6	1.2	4.7	69.4	20.3	10.2

*HD includes ICHD and HHD
[a]Discontinued does not include patients who recovered function within 90 days because by definition they are not included in the incident cohort

Table 1.7 Start and subsequent RRT modalities for adult patients incident to RRT in 2012 by time after start

Start modality	*N*	Later modality	Time after start (%)			
			90 days	1 yr	3 yrs	5 yrs
HD	4,900	HD	89.8	73.0	46.1	28.3
		PD	2.0	3.0	1.4	0.5
		Tx	1.0	4.7	13.1	16.5
		Other*	0.5	1.8	2.2	3.2
		Died	6.7	17.6	37.3	51.4
PD	1,324	HD	6.3	16.1	21.4	16.5
		PD	88.7	62.2	24.2	7.5
		Tx	2.3	14.1	31.3	37.5
		Other	0.5	0.8	1.4	2.9
		Died	2.2	6.7	21.8	35.6
Tx	498	HD	0.2	0.6	2.6	4.0
		PD	0.0	0.2	0.6	1.2
		Tx	96.6	96.2	92.2	80.3
		Other	2.2	1.4	1.4	8.2
		Died	1.0	1.6	3.2	6.2

Light grey shading indicates proportion of individuals maintained on their initial modality
*Other is discontinued, recovered, moved away or currently transferring between centres
Cambridge, a Tx centre, is excluded from all years in the analysis

The modality at one year after RRT initiation is shown by centre using incident patients starting RRT in 2016 to allow one year follow-up time.

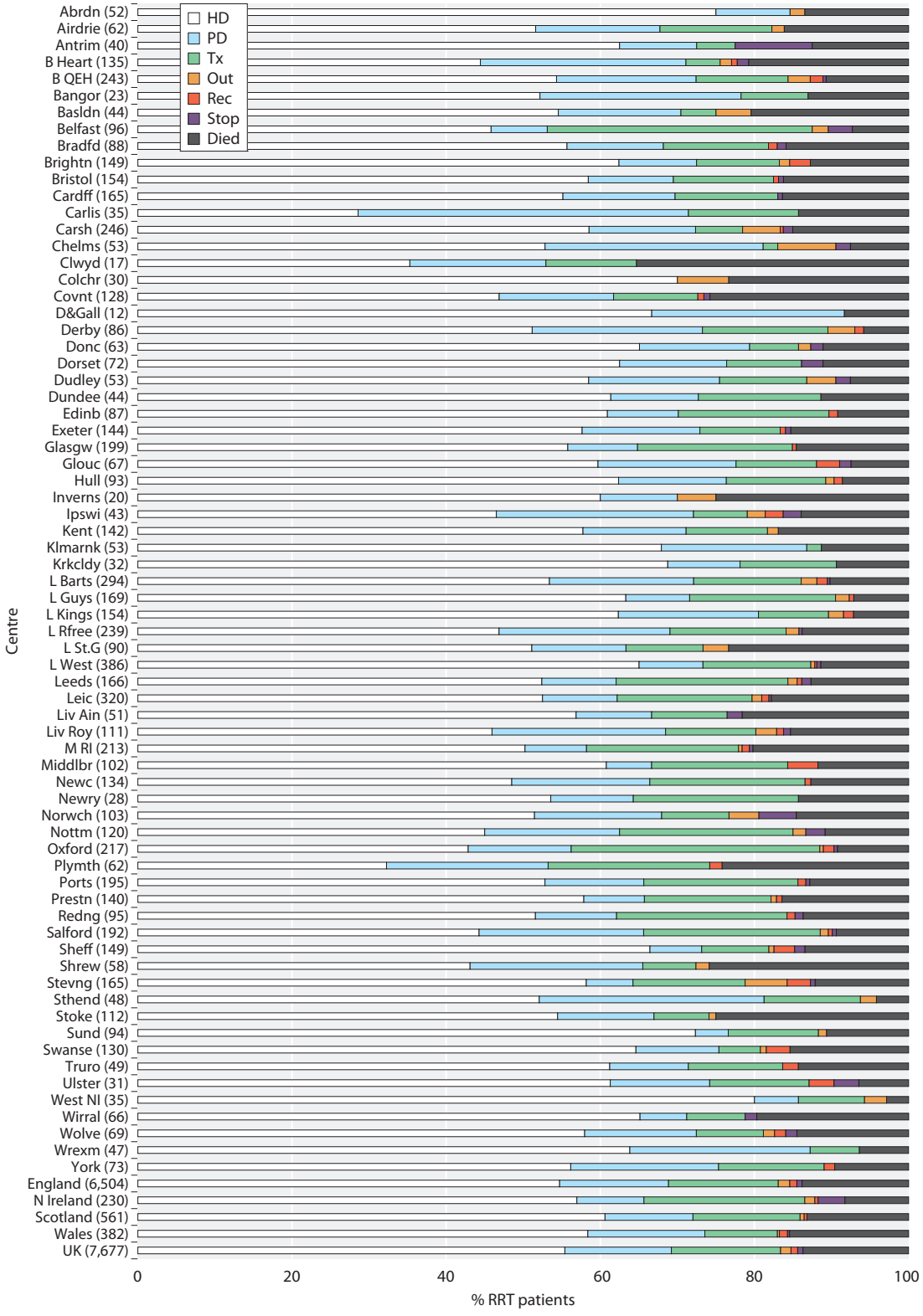


Figure 1.5 RRT modality at 1 year for incident adult RRT patients who started RRT in 2016 by centre

Number of patients in a centre in brackets

Out – moved out of a centre but did not reappear in another centre; Rec – recovered kidney function

Late presentation to nephrology services of incident adult RRT patients

Late presentation to a nephrologist is defined as a patient being seen by the renal service for the first time within 90 days of starting RRT and is used interchangeably with referral time in this report. The Scottish Renal Registry does not submit referral time data to the UKRR and so Scottish centres were excluded from these analyses. Due to small numbers, a two year cohort (2016–2017) was used at a centre level to estimate late referral to a nephrologist and centres with a completeness of <70% were excluded. A seven year cohort is used to show national longitudinal trends (table 1.11).

Table 1.8 Referral times of incident adult RRT patients by centre (2016–2017 2 year cohort)

	N on RRT		*N* with referral data	% data completeness		% presenting <90 days before RRT start		% presenting <1 yr before RRT start
Centre	2016	2017		2016	2017	All PRDs	Non-diabetes PRDs	All PRDs
ENGLAND								
B Heart	135	126	260	100.0	99.2	6.9	6.2	16.9
B QEH	243	259	502	100.0	100.0	18.1	21.8	36.7
Basldn	44	46	89	97.7	100.0	22.5	28.3	38.2
Bradfd	88	81	169	100.0	100.0	10.7	13.1	18.9
Brightn	149	154	299	98.7	98.7	22.7	25.4	36.8
Bristol	154	159	296	98.1	91.2	13.2	17.1	20.6
Camb								
Carlis	35	40	73	100.0	95.0	21.9	28.2	27.4
Carsh	246	233	474	98.4	99.6	13.7		33.3
Chelms	53	42	82	94.3	76.2	14.6	15.8	32.9
Colchr	30	44	39	46.7	88.6	25.6	33.3	48.7
Covnt	128	82	199	96.9	91.5	11.1	9.0	22.6
Derby	86	87	173	100.0	100.0	13.3	16.1	24.3
Donc	63	55	116	96.8	100.0	12.9	17.4	24.1
Dorset	72	100	169	97.2	99.0	18.3	22.1	27.2
Dudley	53	60	113	100.0	100.0	8.8	12.2	23.9
Exeter	144	134	276	98.6	100.0	12.0	12.5	23.9
Glouc	67	81	143	94.0	98.8	14.0	16.3	21.0
Hull	93	104	195	100.0	98.1	15.9	16.8	35.9
Ipswi	43	52		23.3	1.9			
Kent	142	139	280	100.0	99.3	9.6	10.5	17.1
L Barts	294	348	217	73.8	1.1	32.3	32.3	50.7
L Guys	169	170	323	95.9	94.7	13.9		25.7
L Kings	154	166	315	99.4	97.6	14.9	20.5	23.8
L Rfree	239	237	467	97.5	98.7	11.3	11.2	22.9
L St.G	90	92	79	17.8	85.9	40.5		57.0
L West	386	408	792	99.7	99.8	17.4	20.1	32.3
Leeds	166	174	340	100.0	100.0	15.6	18.7	31.5
Leic	320	287	604	99.4	99.7	19.2	15.5	30.3
Liv Ain	51	62	113	100.0	100.0	15.9	20.2	20.4
Liv Roy	111	142	248	99.1	97.2	20.6		31.5
M RI	213	230	400	97.2	83.9	19.8	24.2	34.0
Middlbr	102	114	216	100.0	100.0	17.1	20.5	28.7
Newc	134	150	284	100.0	100.0	14.1	16.3	26.1
Norwch	103	80	182	99.0	100.0	26.4	29.6	44.5
Nottm	120	133	253	100.0	100.0	15.0	18.7	20.9
Oxford	217	218	433	99.5	99.5	15.5	17.5	25.4
Plymth	62	95	154	100.0	96.8	14.3	15.9	28.6
Ports	195	204	349	83.1	91.7	16.3		27.5
Prestn	140	164	300	97.9	99.4	16.3	20.0	26.7
Redng	95	101	196	100.0	100.0	12.8	15.8	25.0

Table 1.8 Continued

Centre	*N* on RRT		*N* with referral data	% data completeness		% presenting <90 days before RRT start		% presenting <1 yr before RRT start
	2016	2017		2016	2017	All PRDs	Non-diabetes PRDs	All PRDs
Salford	192	172	283	72.4	83.7	20.8	22.9	35.7
Sheff	149	160	309	100.0	100.0	16.5	17.1	28.2
Shrew	58	64	122	100.0	100.0	20.5	27.3	28.7
Stevng	165	141	306	100.0	100.0	14.7	18.0	20.3
Sthend	48	50	94	95.8	96.0	8.5	9.9	23.4
Stoke	112	88	198	99.1	98.9	14.6	19.7	34.3
Sund	94	94	188	100.0	100.0	12.8	15.5	25.5
Truro	49	57	106	100.0	100.0	17.9	25.4	32.1
Wirral	66	61	125	97.0	100.0	29.6	36.4	52.0
Wolve	69	82	149	97.1	100.0	12.1	13.5	22.8
York	73	59	132	100.0	100.0	19.7	20.6	37.1
N IRELAND								
Antrim	40	48	84	100.0	91.7	14.3	15.0	22.6
Belfast	96	75	150	88.5	86.7	12.7	13.0	19.3
Newry	28	26	54	100.0	100.0	18.5	21.4	35.2
Ulster	31	31	61	100.0	96.8	13.1	14.0	19.7
West NI	35	33	67	100.0	97.0	7.5	8.0	17.9
WALES								
Bangor	23	26	49	100.0	100.0	6.1	5.6	12.2
Cardff	165	180	344	99.4	100.0	11.6	15.4	23.0
Clwyd	17	21	33	82.4	90.5	6.1	4.8	24.2
Swanse	130	131	261	100.0	100.0	19.5	24.2	26.8
Wrexm	47	24	71	100.0	100.0	11.3	14.0	25.4
TOTALS								
England	**6,504**	**6,681**	**12,269**	**94.6**	**91.5**	**16.4**	**17.9**	**29.1**
N Ireland	**230**	**213**	**416**	**95.2**	**92.5**	**13.0**	**13.9**	**21.9**
Wales	**382**	**382**	**758**	**99.0**	**99.5**	**13.7**	**17.1**	**23.9**
E, NI & W	**7,116**	**7,276**	**13,443**	**94.9**	**92.0**	**16.1**	**17.7**	**28.6**

Blank cells – no data returned by the centre or data completeness <70%
If centre had low referral completeness (<70%) for 1 of the 2 years, only a 1 year cohort was included in the analysis
For the analysis of late referral in non-diabetics, patients with missing PRD were excluded from the analysis and the results not shown if the completeness of PRD was <70%
PRD – primary renal disease

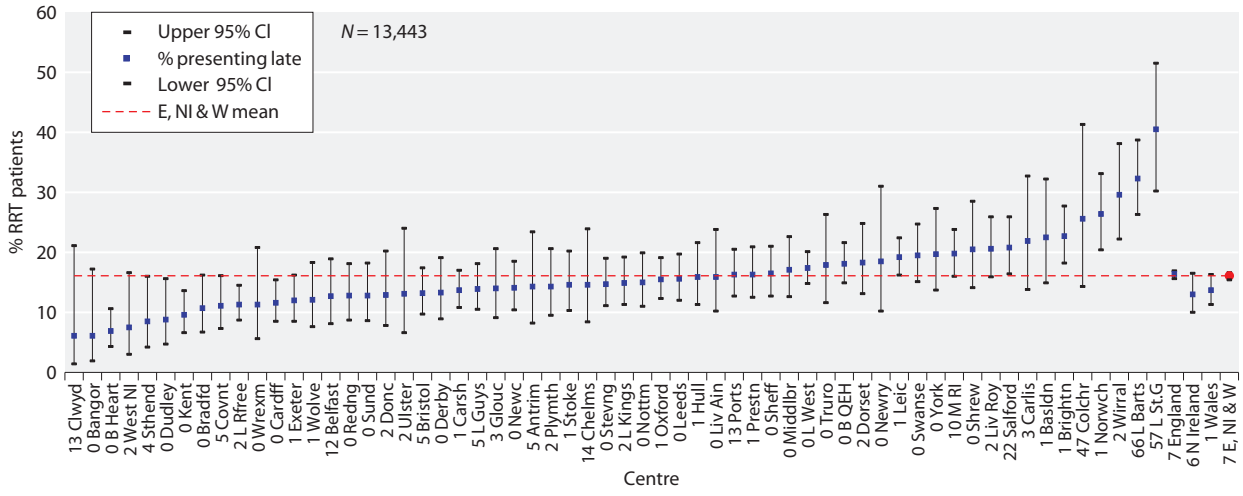


Figure 1.6 Percentage of incident adult RRT patients presenting late (<90 days) to a nephrologist (2016–2017 2 year cohort)
CI – confidence interval

Table 1.9 Characteristics of incident adult RRT patients by referral time (2016–2017 2 year cohort)

	Referral time	
Characteristic	<90 days	⩾90 days
Median age (yrs)	64.3	64.5
% male	65.6	63.4
% starting on PD	8.1	22.0
% on PD at 90 days	12.1	22.3
Mean haemoglobin at RRT start (g/L)*	94	101
Mean eGFR at RRT start (mL/min/1.73m^2)*	6.6	7.5

*Data available for approximately 50% of patients
eGFR – estimated glomerular filtration rate

Late presentation is shown by PRDs which were grouped into categories as shown in table 1.10, with the mapping of disease codes into groups explained in more detail in appendix A. The proportion of patients with each PRD presenting late is shown for patients with PRD data. The proportion of patients with no PRD data is shown on a separate line.

Table 1.10 Referral time of incident adult RRT patients by primary renal disease (PRD) (2016–2017 2 year cohort)

		Referral time			
		<90 days		⩾90 days	
PRD	*N* with data	*N*	%	*N*	%
Diabetes	3,491	266	7.6	3,225	92.4
Glomerulonephritis	1,661	193	11.6	1,468	88.4
Hypertension	808	110	13.6	698	86.4
Polycystic kidney	830	22	2.7	808	97.3
Pyelonephritis	761	100	13.1	661	86.9
Renal vascular disease	731	94	12.9	637	87.1
Other	2,074	728	35.1	1,346	64.9
Uncertain aetiology	1,925	307	15.9	1,618	84.1
Total (with data)	**12,281**	**1,820**	**14.8**	**10,461**	**85.2**
Missing	1,162	345	29.7	817	70.3

Table 1.11 Referral time of incident adult RRT patients by year of start (restricted to centres reporting continuous data for 2011–2017, resulting in different percentages for 2017)

	RRT start year (%)						
Referral time	2011	2012	2013	2014	2015	2016	2017
<90 days	18.8	18.2	18.1	18.3	18.6	18.2	18.1
3–6 mths	5.0	5.4	5.3	5.8	5.2	5.5	5.8
6–12 mths	8.5	8.0	7.5	9.1	9.6	9.4	8.4
⩾12 mths	67.6	70.0	72.7	76.0	81.4	83.6	84.4

Start estimated glomerular filtration rate in incident adult RRT patients

Start eGFR was calculated using the CKD Epidemiology Collaboration method for incident RRT patients by age group and by start modality. Care needs to be taken in interpreting these data because (i) start eGFR data completeness is poor (39% overall), (ii) if the date of RRT start is incorrect, the documented start eGFR may have been taken after the patient had started RRT.

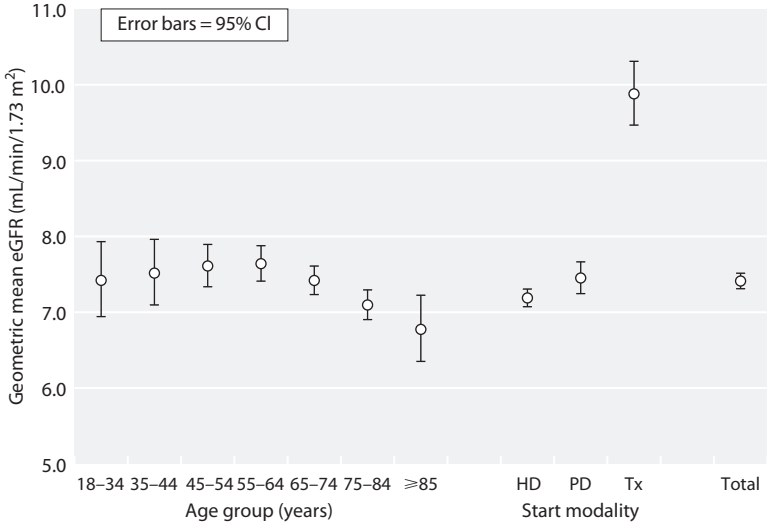


Figure 1.7 Geometric mean estimated glomerular filtration rates (eGFR) for adult patients incident to RRT in 2017 by age group and start modality
CI – confidence interval

Management of anaemia in incident adult RRT patients

The analyses of haemoglobin by modality and timing of presentation use haemoglobin measurements from after the start of RRT but still within the same quarter. The poor data completeness for ESA data in the incident RRT population limits analysis to the proportion of patients with haemoglobin measurements of ⩾100 g/L.

Table 1.12 Haemoglobin data for adult patients incident to RRT in 2017 by centre

Centre	All RRT patients		Median Hb (g/L) by modality			Median Hb (g/L) by presentation time		% data completeness
	Median Hb (g/L)	% Hb ⩾100 g/L	Tx	PD	HD	⩾90 days	<90 days	
ENGLAND								
B Heart	95	40.3		104	91	96	83	98.4
B QEH	98	47.7	114	101	95	100	89	92.3
Basldn	93	39.1		100	92	97	91	100.0
Bradfd	92	30.1			90	93		90.1
Brightn	101	52.0	112	108	98	101	98	97.4
Bristol	105	78.3	116	112	104	105	104	98.7
Camb								
Carlis	98	47.4			97	101		95.0
Carsh	96	36.9		104	95	97	93	95.3
Chelms	103	56.4			99	108		92.9
Colchr								22.7
Covnt	97	46.3	108	105	91	97		100.0
Derby	100	51.7		102	100	100	94	100.0
Donc	94	31.4		101	93	95		92.7
Dorset	102	51.0		110	98	105	87	96.0
Dudley	99	48.2		103	95	100		93.3
Exeter	105	76.2		113	103	105		94.0
Glouc	101	50.6		107	99	103	94	97.5
Hull	99	49.4		107	94	100	84	81.7
Ipswi	95	45.1		101	94			98.1
Kent	95	38.1	101	110	94	96	94	100.0
L Barts	99	48.8	119	104	95			98.9
L Guys	96	41.9	113	105	93	97	88	98.2
L Kings	97	40.8		102	94	99	89	94.6
L Rfree	101	54.3	105	106	97	101	94	97.9
L St.G	90	32.9		107	87	96	87	85.9
L West	102	58.9	108	104	101	103	99	86.5
Leeds	96	38.4	97	106	94	97	91	94.3
Leic	95	42.5	110	102	93	98	89	96.9
Liv Ain	100	55.0		116	98	102		96.8
Liv Roy	104	63.4	106	112	100	104	101	100.0
M RI	96	44.0	105	103	93	98	91	97.0
Middlbr	101	51.9		115	97	102	99	94.7
Newc	101	52.1	105	106	94	101	92	96.0
Norwch	100	50.0		116	97	103	90	92.5
Nottm	96	39.8	96	102	91	97	80	88.7
Oxford	98	45.4	105	104	97	98	97	99.1
Plymth	100	51.1	108	108	96	102	99	99.0
Ports	102	55.2	115	109	97	103	101	99.5
Prestn	99	48.1	101	105	97	99	97	95.1
Redng	98	41.9	100	105	94	99	89	92.1
Salford	101	53.6	101	110	93	102	95	87.8
Sheff	98	46.8	113	110	95	100	92	97.5
Shrew	104	57.1		106	103	104	101	98.4
Stevng	98	45.3	111	115	96	98	100	83.0
Sthend	97	40.0		105	91	99		100.0
Stoke	102	56.8		117	98	102	96	92.1
Sund	97	41.9		117	94	99	91	98.9
Truro	101	52.6			99	101	84	100.0
Wirral	99	50.0		91	101	96	101	88.5
Wolve	90	23.0		109	87	90		90.2
York	101	55.2		109	93	101		98.3

Table 1.12 Continued

Centre	All RRT patients		Median Hb (g/L) by modality			Median Hb (g/L) by presentation time		% data completeness
	Median Hb (g/L)	% Hb ⩾100 g/L	Tx	PD	HD	⩾90 days	<90 days	
N IRELAND								
Antrim	96	41.9			93	96		89.6
Belfast	108	68.1	113		96	109	98	92.0
Newry	109	75.0			100	109		92.3
Ulster	102	56.7			102	102		96.8
West NI	112	77.4			109	112		93.9
SCOTLAND								
Abrdn	96	38.0			94			90.9
Airdrie	97	44.0			96			74.6
D&Gall								29.4
Dundee	101	56.9			100			94.4
Edinb								44.4
Glasgw	100	50.3	110	108	97			84.1
Inverns								44.0
Klmarnk	97	38.5			96			81.3
Krkcldy								35.7
WALES								
Bangor	102	57.7			99	102		100.0
Cardff	98	48.6	111	106	95	99	91	98.3
Clwyd	102	55.0			102	101		95.2
Swanse	101	55.4		112	98	103	94	99.2
Wrexm	106	65.2		112	95	107		95.8
TOTALS								
England	**99**	**48.6**	**107**	**106**	**96**	**100**	**92**	**94.4**
N Ireland	**104**	**62.9**	**113**	**119**	**97**	**107**	**101**	**92.5**
Scotland	**99**	**48.9**	**112**	**111**	**97**			**70.2**
Wales	**101**	**52.9**	**110**	**111**	**97**	**102**	**97**	**98.4**
UK	**99**	**49.2**	**107**	**106**	**96**	**100***	**92***	**92.6**

Blank cells – no data returned by the centre or data completeness (including referral time) <70%
*Scotland does not submit referral time data to the UKRR and therefore presentation time for the UK is actually the median for E, NI & W
Hb – haemoglobin

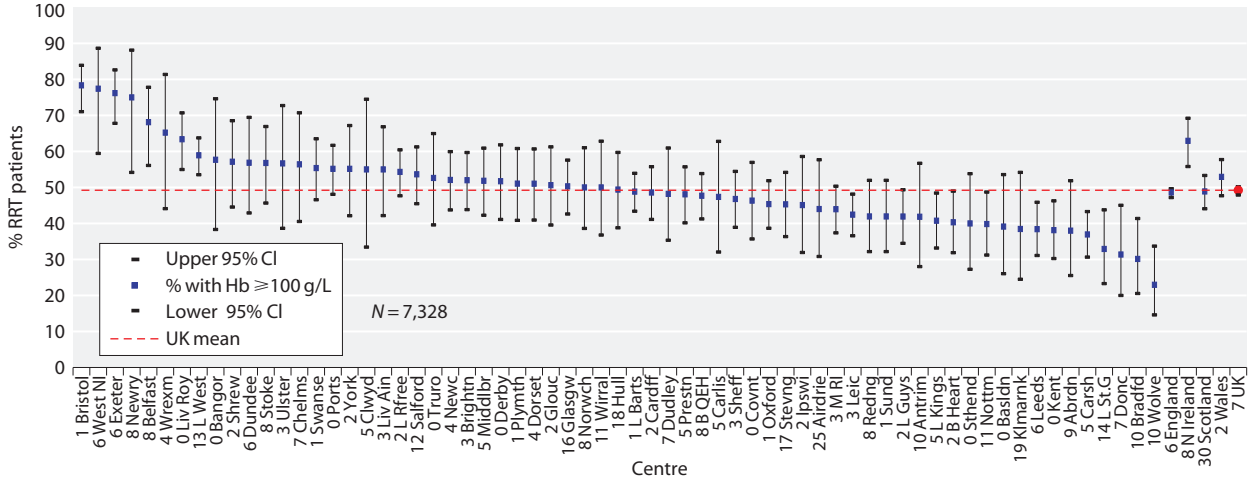


Figure 1.8 Percentage of adult patients incident to RRT in 2017 with haemoglobin ⩾100 g/L at start of RRT treatment by centre
CI – confidence interval; Hb – haemoglobin

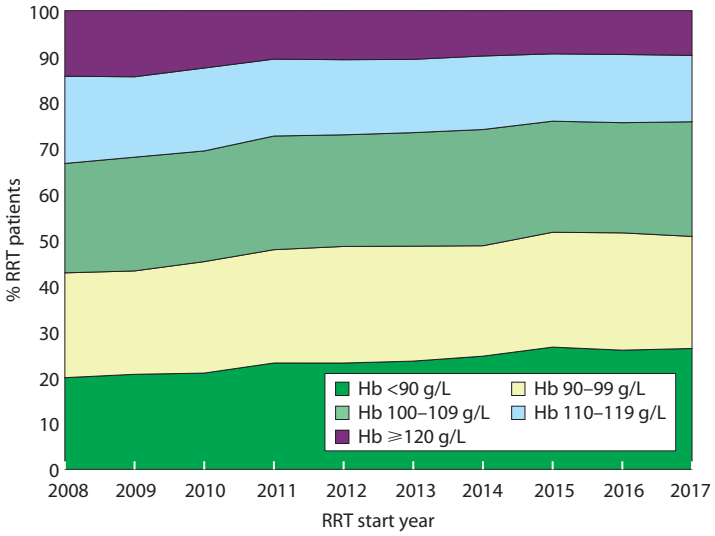


Figure 1.9 Distribution of haemoglobin in incident adult RRT patients by year of start between 2008 and 2017
Hb – haemoglobin

Biochemistry parameters in incident adult RRT patients

The latest Renal Association guideline on CKD mineral bone disease contains only one audit measure, which applies to patients with CKD and patients on RRT. It is the percentage of patients with adjusted calcium above the target range (see appendix A).

Table 1.13 Median adjusted calcium and percentage with adjusted calcium within and above the target range (2.2–2.5 mmol/L) in adult patients incident to RRT in 2017 by centre

Centre	Median adj Ca (mmol/L)	% adj Ca 2.2–2.5 mmol/L	% adj Ca >2.5 mmol/L	% data completeness
ENGLAND				
B Heart	2.3	76.8	11.2	99.2
B QEH	2.3	79.8	2.8	97.3
Basldn	2.4	84.8	8.7	100.0
Bradfd	2.3	83.8	8.8	98.8
Brightn	2.3	79.1	7.2	99.4
Bristol	2.3	86.8	8.8	100.0
Camb				
Carlis	2.3	85.0	2.5	100.0
Carsh	2.3	73.3	6.2	96.6
Chelms	2.3	82.5	5.0	95.2
Colchr				40.9
Covnt	2.3	79.8	3.8	96.3
Derby	2.4	81.6	11.5	100.0
Donc	2.3	81.8	14.6	100.0
Dorset	2.3	67.0	12.0	100.0
Dudley	2.4	78.3	15.0	100.0
Exeter	2.3	90.3	8.2	100.0
Glouc	2.4	90.1	4.9	100.0
Hull	2.3	88.1	5.9	97.1
Ipswi	2.3	78.4	2.0	98.1
Kent	2.4	82.0	13.7	100.0
L Barts	2.3	77.3	2.6	100.0
L Guys	2.4	85.8	6.5	99.4
L Kings	2.2	76.2	3.1	98.8
L Rfree	2.3	78.8	8.9	99.6
L St.G	2.4	72.8	14.8	88.0

Table 1.13 Continued

Centre	Median adj Ca (mmol/L)	% adj Ca 2.2–2.5 mmol/L	% adj Ca >2.5 mmol/L	% data completeness
L West	2.3	75.2	12.7	87.0
Leeds	2.3	82.3	5.3	97.1
Leic	2.3	86.6	6.7	98.6
Liv Ain	2.4	80.7	12.9	100.0
Liv Roy	2.3	87.3	7.0	100.0
M RI	2.4	83.0	7.9	99.6
Middlbr	2.2	57.5	5.3	99.1
Newc	2.4	79.2	12.8	99.3
Norwch	2.4	83.1	9.1	96.3
Nottm	2.3	75.8	6.8	99.3
Oxford	2.4	78.3	9.2	99.5
Plymth	2.3	84.2	6.3	100.0
Ports	2.3	81.4	6.9	100.0
Prestn	2.3	75.2	5.9	93.3
Redng	2.3	78.2	7.9	100.0
Salford	2.4	85.3	6.5	98.8
Sheff	2.3	80.0	5.0	100.0
Shrew	2.4	79.7	10.9	100.0
Stevng	2.3	81.3	4.3	98.6
Sthend	2.3	88.0	0.0	100.0
Stoke	2.4	82.1	10.7	95.5
Sund	2.3	80.9	8.5	100.0
Truro	2.3	73.7	8.8	100.0
Wirral	2.3	71.9	10.5	93.4
Wolve	2.3	82.7	4.9	98.8
York	2.4	86.4	10.2	100.0
N IRELAND				
Antrim	2.4	80.4	6.5	95.8
Belfast	2.3	80.8	4.1	97.3
Newry	2.4	84.6	15.4	100.0
Ulster	2.3	74.2	16.1	100.0
West NI	2.3	78.1	6.3	97.0
SCOTLAND				
Abrdn	2.4	81.5	9.3	98.2
Airdrie	2.3	80.3	6.6	91.0
D&Gall	2.3	73.3	6.7	88.2
Dundee	2.3	81.1	9.4	98.2
Edinb	2.3	73.1	5.4	73.8
Glasgw	2.3	76.2	10.3	92.0
Inverns	2.3	85.0	5.0	80.0
Klmarnk	2.3	88.4	7.0	89.6
Krkcldy				54.8
WALES				
Bangor	2.3	76.9	7.7	100.0
Cardff	2.4	80.5	10.1	99.4
Clwyd	2.4	95.0	5.0	95.2
Swanse	2.3	79.2	7.7	99.2
Wrexm	2.3	91.7	0.0	100.0
TOTALS				
England	**2.3**	**80.1**	**7.6**	**97.6**
N Ireland	**2.3**	**79.8**	**8.2**	**97.7**
Scotland	**2.3**	**78.4**	**8.0**	**86.1**
Wales	**2.3**	**81.3**	**8.2**	**99.2**
UK	**2.3**	**80.1**	**7.7**	**96.7**

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

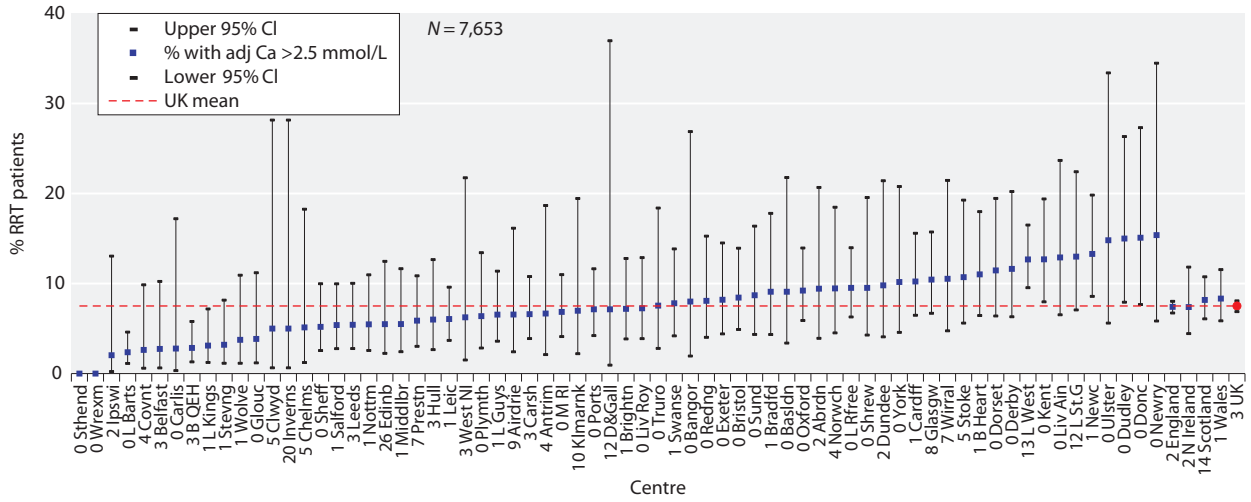


Figure 1.10 Percentage of adult patients incident to RRT in 2017 with adjusted calcium above the normal range (>2.5 mmol/L) by centre

Ca – calcium; CI – confidence interval

Dialysis access in incident adult dialysis patients

Incident dialysis access data were collected separately to the main UKRR quarterly data returns via the 2017 Multisite Dialysis Access Audit (see appendix A). Scotland is not included in this audit.

There are different techniques for PD catheter insertion. Surgical techniques include open and laparoscopic. Non-surgical techniques include percutaneous and peritoneoscopic insertion.

Table 1.14 Demographics and characteristics of patients in the 2017 Multisite Dialysis Access Audit by first dialysis access type

		HD – first dialysis access type				PD – first dialysis access type					
		N	AVF/ AVG	TL	NTL	*N*	Open surgery	Laparo-scopic	Peritoneo-scopic/ percutaneous	Missing PD technique	Total
Total											
N		4,168	1,532	1,453	1,183	1,131	366	232	443	90	5,299
%			36.8	34.9	28.4		32.4	20.5	39.2	8.0	
Age (%)	Median (yrs)	67	68	65	67	62	59	62	61	66	64
	(IQR)	(54,76)	(56,76)	(51,74)	(54,77)	(49,73)	(46,72)	(49,72)	(48,72)	(53,73)	(51,74)
	<45 yrs	510	24.9	45.1	30.0	236	36.4	19.1	40.3	4.2	746
	45–54 yrs	576	37.5	35.9	26.6	210	34.3	20.5	38.1	7.1	786
	55–64 yrs	869	37.9	35.7	26.5	215	28.8	24.2	38.6	8.4	1,084
	65–74 yrs	1,068	39.0	34.5	26.6	257	32.7	16.7	39.7	10.9	1,325
	⩾75 yrs	1,145	38.8	29.5	31.7	213	29.1	23.0	39.0	8.9	1,358
Body mass index (%)	<20	115	23.5	49.6	27.0	28	46.4	32.1	17.9	3.6	143
	20–24	549	38.3	34.4	27.3	164	39.6	18.9	40.9	0.6	713
	25–29	655	47.5	32.1	20.5	253	37.9	27.7	30.8	3.6	908
	30–34	467	45.0	35.8	19.3	126	43.7	23.0	31.0	2.4	593
	⩾35	397	50.9	27.2	21.9	73	46.6	23.3	30.1	0.0	470
	Missing	664	23.8	32.5	43.7	117	44.4	12.0	43.6	0.0	781
PRD (%)	Diabetes	1,120	40.9	36.0	23.1	296	29.4	22.0	40.2	8.4	1,416
	Glomerulonephritis	401	38.4	37.7	23.9	192	32.3	19.3	42.7	5.7	593
	Hypertension	232	45.7	35.3	19.0	77	28.6	19.5	48.1	3.9	309
	Polycystic kidney	171	71.9	22.2	5.8	84	42.9	25.0	22.6	9.5	255

Table 1.14 Continued

		HD – first dialysis access type				PD – first dialysis access type					
		N	AVF/ AVG	TL	NTL	*N*	Open surgery	Laparo-scopic	Peritoneo-scopic/ percutaneous	Missing PD technique	Total
	Pyelonephritis	205	42.9	32.2	24.9	53	39.6	20.8	18.9	20.8	258
	Renal vascular disease	226	47.8	28.8	23.5	49	32.7	14.3	40.8	12.2	275
	Other	807	18.0	35.2	46.8	134	34.3	17.2	40.3	8.2	941
	Uncertain aetiology	625	38.9	37.1	24.0	180	32.8	21.7	38.9	6.7	805
	Missing	381	28.1	34.6	37.3	66	25.8	21.2	48.5	4.5	447
Referral time (%)	<90 days	895	3.8	39.3	56.9	65	35.4	7.7	49.2	7.7	960
	90–179 days	195	21.5	49.2	29.2	54	46.3	13.0	27.8	13.0	249
	180–364 days	279	36.2	41.2	22.6	74	40.5	12.2	39.2	8.1	353
	⩾365 days	2,500	52.1	30.1	17.8	830	34.6	20.6	36.9	8.0	3,330
	Missing	299	17.7	45.8	36.5	108	0.9	37.0	56.5	5.6	407
Assessed by surgeon (%)	Yes	1,753	69.1	22.4	8.5	570	33.5	21.4	34.7	10.4	2,323
	No	1,940	6.1	47.6	46.3	408	34.1	17.6	45.6	2.7	2,348
	Missing	46	19.6	56.5	23.9	64	7.8	40.6	46.9	4.7	110
Sex (%)	Male	2,703	36.5	33.8	29.7	731	31.9	18.5	41.5	8.2	3,434
	Female	1,465	37.3	36.8	25.9	400	33.3	24.3	35.0	7.5	1,865
Ethnicity (%)	White	2,871	38.4	32.3	29.3	821	35.0	20.5	38.6	6.0	3,692
	South Asian	538	34.9	38.7	26.4	121	19.8	17.4	44.6	18.2	659
	Black	279	30.8	39.8	29.4	82	23.2	26.8	39.0	11.0	361
	Other	152	35.5	36.2	28.3	52	25.0	19.2	42.3	13.5	204
	Missing	328	30.8	46.0	23.2	55	41.8	20.0	32.7	5.5	383
eGFR at start (mL/min/ 1.73m^2)	Median (IQR)	7 (6,9)	7 (6,9)	7 (6,9)	7 (5,10)	8 (6,9)	8 (6,9)	8 (5,10)	8 (6,9)	7 (6,9)	7 (6,9)
Diabetes* (%)	Yes	1,719	39.7	35.7	24.6	419	29.1	20.3	43.4	7.2	2,138
	No	2,167	34.8	34.7	30.5	641	28.4	22.9	39.6	9.0	2,808
	Missing	282	33.7	31.2	35.1	71	87.3	0.0	9.9	2.8	353

*Diabetes at start of dialysis as per the Multisite Dialysis Access Audit, or as a comorbidity or PRD from the UKRR database
AVF – arteriovenous fistula; AVG – arteriovenous graft; eGFR – estimated glomerular filtration rate; IQR – interquartile range; NTL – non-tunnelled line; PRD – primary renal disease; TL – tunnelled line

Dialysis access is best interpreted in the context of all patients starting RRT, so data were supplemented with pre-emptive Tx numbers.

Dialysis access data are described in relation to age, PRD, timing of presentation and the timing of surgical review for definitive access formation. Delayed presentation/referral to renal services and delayed surgical review are both defined as being within 90 days (3 months) prior to the start of RRT.

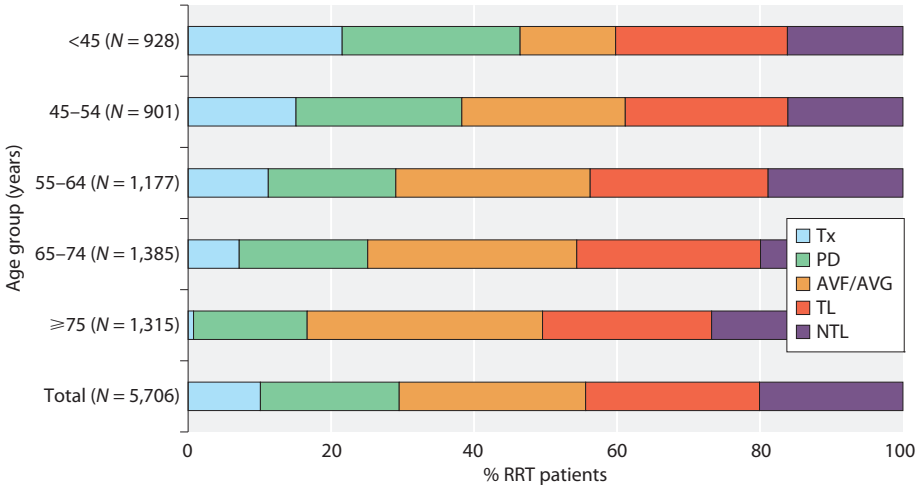


Figure 1.11 Dialysis access used for adult patients incident to RRT in 2017 by age group (2017 Multisite Dialysis Access Audit)

AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

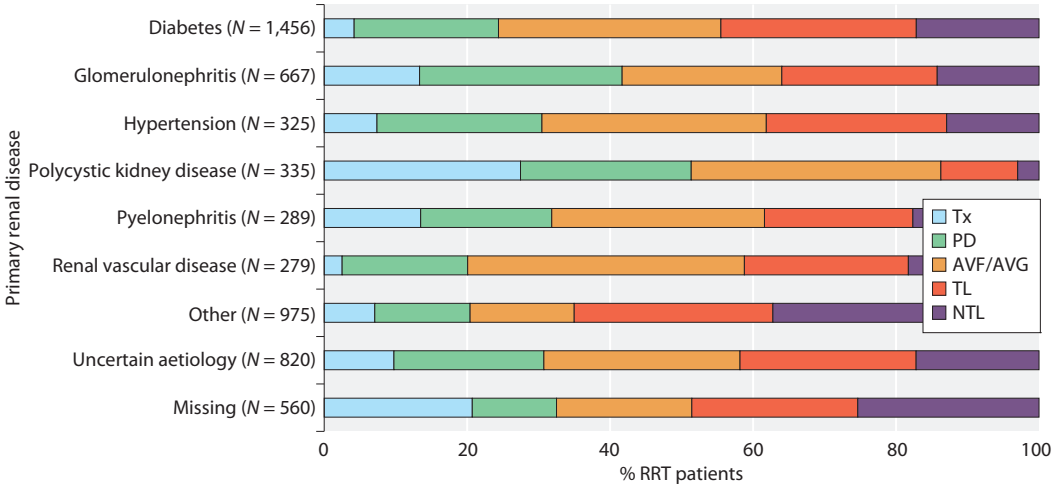


Figure 1.12 Dialysis access used for adult patients incident to RRT in 2017 by primary renal disease (2017 Multisite Dialysis Access Audit)

AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

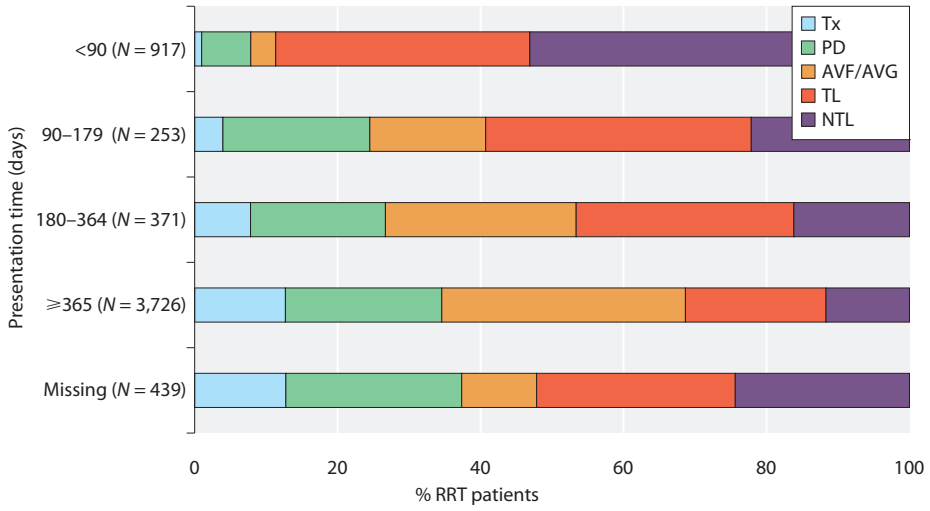


Figure 1.13 Dialysis access used for adult patients incident to RRT in 2017 by presentation time (2017 Multisite Dialysis Access Audit)

AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

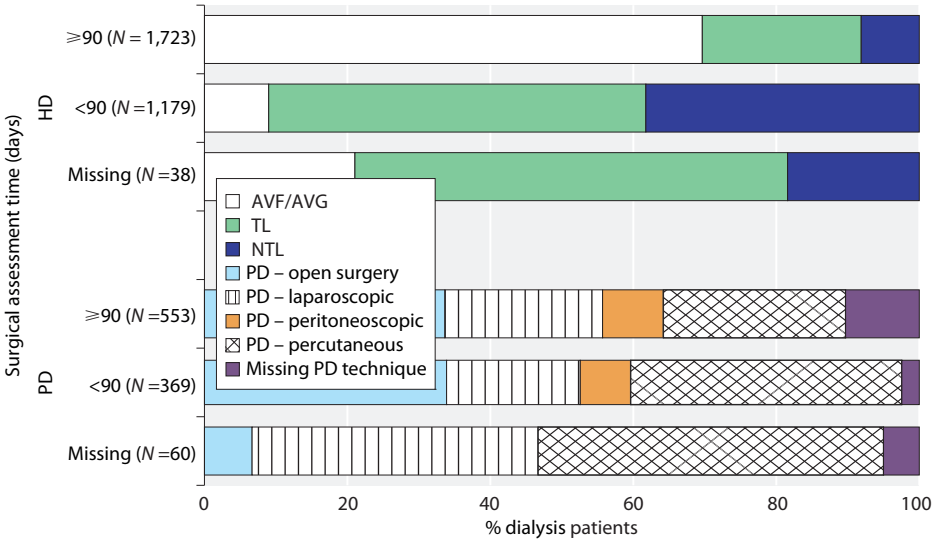


Figure 1.14 Dialysis access used for adult patients incident to dialysis in 2017 by surgical assessment time (2017 Multisite Dialysis Access Audit)

AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

The audit measures related to dialysis access at RRT start include the proportion of planned starts on RRT with a pre-emptive Tx or with definitive access. In addition, at least 60% of the planned HD starts should be with either an AVF or an AVG.

The proportions of patients who commenced dialysis with definitive access (AVF/AVG/PD catheter) were reported for centres returning adequate data.

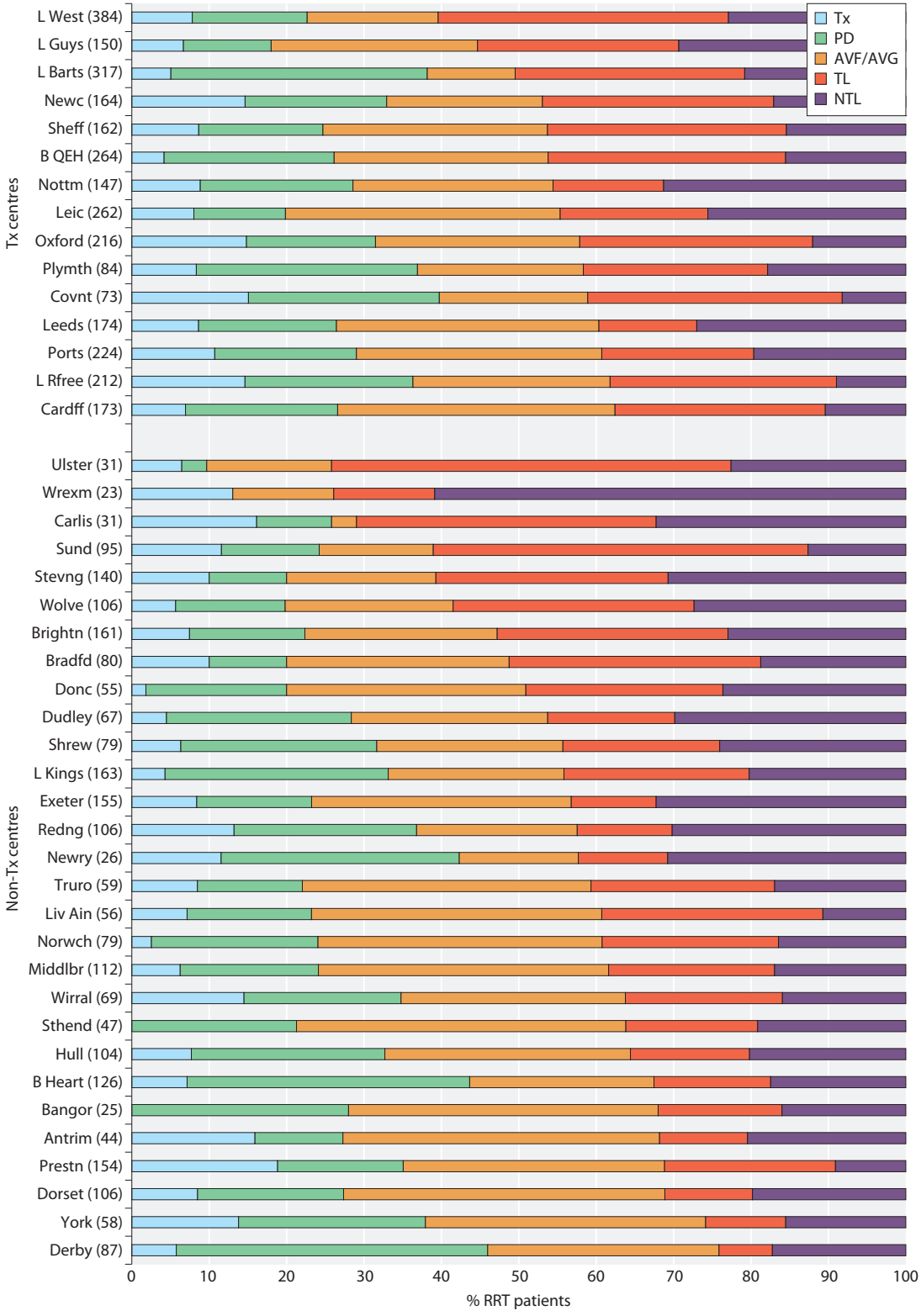


Figure 1.15 First dialysis access used for adult patients incident to RRT in 2017 by centre (2017 Multisite Dialysis Access Audit)

Number of incident patients on RRT in a centre in brackets (centres with <70% access data for the incident RRT population are excluded)
Centres are ordered by decreasing use of lines
AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

Table 1.15 Start modality and dialysis access used for adult patients incident to dialysis in 2017 by presentation and surgical assessment time before start of dialysis by centre (2017 Multisite Dialysis Access Audit)

	Early presenters (⩾90 days) (%)					Late presenters (<90 days) (%)					Early surgical assessment (⩾90 days) (%)		Start modality (%)		
Centre	*N*	PD	AVF/ AVG	TL	NTL	*N*	PD	AVF/ AVG	TL	NTL	Yes	No	HD	PD	Tx
Antrim	34	14.7	52.9	14.7	17.6	3	0.0	0.0	0.0	100.0	86.5	13.5	72.7	11.4	15.9
B Heart	111	38.7	26.1	15.3	19.8	6	50.0	16.7	33.3	0.0	76.9	23.1	56.3	36.5	7.1
B QEH	177	29.9	40.1	26.0	4.0	76	6.6	2.6	46.1	44.7	62.5	37.5	73.9	22.0	4.2
Bangor	22	27.3	45.5	18.2	9.1	3	33.3	0.0	0.0	66.7	80.0	20.0	72.0	28.0	0.0
Bradfd	65	12.3	35.4	36.9	15.4	7	0.0	0.0	28.6	71.4	61.1	38.9	80.0	10.0	10.0
Brightn	102	22.5	37.3	30.4	9.8	47	2.1	4.3	36.2	57.4	40.3	59.7	77.6	14.9	7.5
Camb	48	10.4	50.0	39.6	0.0	25	8.0	0.0	88.0	4.0	45.7	54.3			
Cardff	144	22.9	43.1	26.4	7.6	14	7.1	0.0	50.0	42.9	68.9	31.1	73.4	19.7	6.9
Carlis	18	16.7	5.6	61.1	16.7	8	0.0	0.0	12.5	87.5	36.4	63.6	74.2	9.7	16.1
Covnt	40	42.5	15.0	27.5	15.0	3	33.3	33.3	33.3	0.0	70.9	29.1	60.3	24.7	15.1
Derby	71	46.5	33.8	5.6	14.1	11	18.2	18.2	18.2	45.5	34.6	65.4	54.0	40.2	5.7
Donc	44	22.7	38.6	27.3	11.4	10	0.0	0.0	20.0	80.0	50.0	50.0	80.0	18.2	1.8
Dorset	74	23.0	59.5	8.1	9.5	23	13.0	0.0	26.1	60.9	48.5	51.5	72.6	18.9	8.5
Dudley	52	28.8	28.8	21.2	21.2	12	8.3	16.7	0.0	75.0	40.3	59.7	71.6	23.9	4.5
Exeter	111	20.7	46.8	10.8	21.6	22	0.0	0.0	22.7	77.3	25.4	74.6	76.8	14.8	8.4
Hull	74	33.8	41.9	17.6	6.8	22	4.5	9.1	13.6	72.7	56.8	43.2	67.3	25.0	7.7
L Guys	119	14.3	33.6	28.6	23.5	18	0.0	0.0	27.8	72.2	53.6	46.4	82.0	11.3	6.7
L Kings	133	32.3	27.8	23.3	16.5	22	18.2	0.0	36.4	45.5	56.8	43.2	66.9	28.8	4.3
L Rfree	162	28.4	33.3	30.9	7.4	18	0.0	0.0	61.1	38.9	56.9	43.1	63.7	21.7	14.6
L St.G	46	34.8	23.9	10.9	30.4	25	0.0	8.0	16.0	76.0	50.0	50.0			
L West	287	19.5	22.3	40.4	17.8	64	1.6	1.6	42.2	54.7	57.1	42.9	77.3	14.8	7.8
Leeds	140	20.7	42.1	12.1	25.0	19	10.5	0.0	26.3	63.2	52.2	47.8	73.6	17.8	8.6
Leic	196	15.8	45.4	18.4	20.4	44	0.0	9.1	31.8	59.1			80.2	11.8	8.0
Liv Ain	46	19.6	45.7	26.1	8.7	6	0.0	0.0	66.7	33.3	61.2	38.8	76.8	16.1	7.1
Middlbr	83	21.7	48.2	18.1	12.0	22	9.1	9.1	40.9	40.9	49.4	50.6	75.9	17.9	6.3
Newc	97	27.8	34.0	24.7	13.4	43	7.0	0.0	58.1	34.9	47.9	52.1	67.1	18.3	14.6
Newry	19	42.1	21.1	15.8	21.1	3	0.0	0.0	0.0	100.0	43.5	56.5	57.7	30.8	11.5
Norwch	61	27.9	47.5	13.1	11.5	16	0.0	0.0	62.5	37.5			75.9	21.5	2.5
Nottm	100	27.0	37.0	18.0	18.0	34	5.9	2.9	8.8	82.4	33.6	66.4	71.4	19.7	8.8
Oxford	143	23.1	37.8	29.4	9.8	39	2.6	7.7	59.0	30.8	49.7	50.3	68.5	16.7	14.8
Plymth	61	36.1	29.5	21.3	13.1	10	20.0	0.0	40.0	40.0	0.0	100.0	63.1	28.6	8.3
Ports	151	23.8	43.0	18.5	14.6	41	12.2	12.2	36.6	39.0			71.0	18.3	10.7
Prestn	101	19.8	50.5	21.8	7.9	23	21.7	4.3	47.8	26.1	56.5	43.5	64.9	16.2	18.8
Redng	67	29.9	32.8	13.4	23.9	20	20.0	0.0	10.0	70.0	24.4	75.6	63.2	23.6	13.2
Salford	119	31.1	25.2	24.4	19.3	28	17.9	3.6	32.1	46.4	56.7	43.3	63.7	24.6	11.7
Sheff	120	20.8	38.3	32.5	8.3	27	3.7	3.7	40.7	51.9	61.5	38.5	75.3	16.0	8.6
Shrew	52	34.6	36.5	19.2	9.6	22	9.1	0.0	27.3	63.6	64.9	35.1	68.4	25.3	6.3
Stevng	80	16.3	33.8	36.3	13.8	42	2.4	0.0	26.2	71.4	39.7	60.3	80.0	10.0	10.0
Sthend	42	23.8	45.2	16.7	14.3	4	0.0	0.0	25.0	75.0	46.8	53.2	78.7	21.3	0.0
Sund	69	17.4	18.8	55.1	8.7	15	0.0	6.7	53.3	40.0	32.1	67.9	75.8	12.6	11.6
Truro	38	18.4	57.9	18.4	5.3	16	6.3	0.0	43.8	50.0	61.1	38.9	78.0	13.6	8.5
Ulster	23	4.3	21.7	60.9	13.0	6	0.0	0.0	33.3	66.7	48.3	51.7	90.3	3.2	6.5
West NI	7	14.3	57.1	14.3	14.3	2	0.0	0.0	50.0	50.0	44.4	55.6	47.1	5.9	47.1
Wirral	51	27.5	39.2	23.5	9.8	7	0.0	0.0	28.6	71.4	39.0	61.0	65.2	20.3	14.5
Wolve	78	19.2	29.5	32.1	19.2	14	0.0	0.0	42.9	57.1	41.7	58.3	80.2	14.2	5.7
Wrexm	10	0.0	30.0	10.0	60.0	7	0.0	0.0	14.3	85.7	30.0	70.0	87.0	0.0	13.0
York	41	26.8	51.2	9.8	12.2	9	33.3	0.0	22.2	44.4	60.0	40.0	62.1	24.1	13.8
Total	**3,929**	**24.4**	**36.7**	**24.5**	**14.4**	**958**	**6.8**	**3.5**	**36.7**	**53.0**	**49.7**	**50.3**	**71.9**	**18.8**	**9.3**

Blank cells – no data returned by the centre or data completeness <70%
Centres with <70% access data, time of referral or assessment data for the incident RRT population are excluded
AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

Table 1.16 Dialysis access used by adult patients incident to RRT in 2017 at 3 months after start of RRT by presentation time and by centre (2017 Multisite Dialysis Access Audit)

	Early presenters (⩾90 days) (%)							Late presenters (<90 days) (%)								All patients 3 months after RRT start (%)						
Centre	*N*	Tx	PD	AVF/ AVG	TL	NTL	Other	*N*	Tx	PD	AVF/ AVG	TL	NTL	Other	Missing	Tx	PD	AVF/ AVG	TL	NTL	Other	Missing
Antrim	34	2.9	14.7	47.1	23.5	2.9	8.8	3	0.0	0.0	0.0	33.3	66.7	0.0	0.0	2.7	13.5	43.2	24.3	8.1	8.1	0.0
B Heart	111	0.0	41.4	31.5	20.7	0.0	6.3	6	0.0	50.0	16.7	33.3	0.0	0.0	0.0	0.0	41.9	30.8	21.4	0.0	6.0	0.0
B QEH	177	0.6	29.4	40.1	26.0	0.0	4.0	76	0.0	11.8	3.9	44.7	0.0	39.5	0.0	0.4	24.9	30.2	32.7	0.0	11.8	0.0
Bangor	22	9.1	22.7	31.8	31.8	0.0	4.5	3	0.0	33.3	0.0	66.7	0.0	0.0	0.0	8.0	24.0	28.0	36.0	0.0	4.0	0.0
Bradfd	65	1.5	9.2	41.5	44.6	0.0	3.1	7	0.0	0.0	0.0	85.7	0.0	14.3	0.0	1.4	8.3	37.5	48.6	0.0	4.2	0.0
Brightn	102	1.0	21.6	37.3	26.5	0.0	13.7	47	2.1	2.1	8.5	48.9	0.0	38.3	0.0	1.3	15.4	28.2	33.6	0.0	21.5	0.0
Camb	48	2.1	8.3	47.9	31.3	0.0	10.4	25	0.0	4.0	0.0	80.0	0.0	16.0	0.0	1.1	5.3	31.9	51.1	0.0	10.6	0.0
Cardff	144	0.7	22.2	47.9	25.7	0.7	2.8	14	0.0	7.1	14.3	71.4	7.1	0.0	0.0	0.6	20.5	44.1	31.1	1.2	2.5	0.0
Carlis	18	0.0	16.7	16.7	50.0	11.1	5.6	8	0.0	0.0	12.5	12.5	37.5	37.5	0.0	0.0	11.5	15.4	38.5	19.2	15.4	0.0
Covnt	40	2.5	37.5	12.5	42.5	2.5	2.5	3	0.0	33.3	33.3	33.3	0.0	0.0	0.0	1.6	25.8	21.0	48.4	1.6	1.6	0.0
Derby	71	2.8	45.1	39.4	9.9	0.0	2.8	11	0.0	18.2	27.3	45.5	0.0	9.1	0.0	2.4	41.5	37.8	14.6	0.0	3.7	0.0
Donc	44	2.3	22.7	31.8	34.1	2.3	6.8	10	0.0	10.0	0.0	50.0	0.0	40.0	0.0	1.9	20.4	25.9	37.0	1.9	13.0	0.0
Dorset	74	4.1	17.6	54.1	13.5	1.4	9.5	23	0.0	13.0	4.3	52.2	4.3	26.1	0.0	3.1	16.5	42.3	22.7	2.1	13.4	0.0
Dudley	52	0.0	32.7	28.8	32.7	0.0	5.8	12	0.0	8.3	16.7	50.0	0.0	25.0	0.0	0.0	28.1	26.6	35.9	0.0	9.4	0.0
Exeter	111	0.0	21.6	44.1	22.5	0.9	10.8	22	0.0	0.0	27.3	22.7	0.0	50.0	0.0	0.0	17.6	38.7	22.5	0.7	20.4	0.0
Hull	74	0.0	28.4	37.8	28.4	0.0	5.4	22	4.5	4.5	9.1	81.8	0.0	0.0	0.0	1.0	22.9	31.3	40.6	0.0	4.2	0.0
L Guys	119	3.4	14.3	37.0	40.3	0.0	5.0	18	0.0	0.0	5.6	88.9	0.0	5.6	0.0	2.9	12.5	33.1	49.3	0.0	2.2	0.0
L Kings	133	2.3	32.3	27.1	36.8	0.0	1.5	22	0.0	27.3	0.0	72.7	0.0	0.0	0.0	1.9	31.4	23.1	42.3	0.0	1.3	0.0
L Rfree	162	1.9	28.4	33.3	33.3	0.0	3.1	18	0.0	0.0	5.6	94.4	0.0	0.0	0.0	1.7	25.6	30.6	39.4	0.0	2.8	0.0
L St.G	46	2.2	34.8	26.1	28.3	6.5	2.2	25	0.0	4.0	12.0	48.0	8.0	28.0	0.0	1.4	23.6	22.2	36.1	8.3	8.3	0.0
L West	287	0.3	19.2	22.0	55.7	0.0	2.8	64	0.0	1.6	1.6	90.6	0.0	6.3	0.0	0.3	15.8	18.1	62.1	0.0	3.7	0.0
Leeds	140	3.6	20.7	40.0	31.4	0.7	3.6	19	5.3	26.3	5.3	63.2	0.0	0.0	0.0	3.8	21.4	35.8	35.2	0.6	3.1	0.0
Leic	196	1.5	15.8	41.8	32.1	0.5	8.2	44	0.0	0.0	4.5	72.7	0.0	22.7	0.0	1.3	12.9	35.0	40.0	0.4	10.4	0.0
Liv Ain	46	0.0	19.6	39.1	37.0	2.2	2.2	6	0.0	0.0	0.0	83.3	0.0	0.0	16.7	0.0	17.3	34.6	42.3	1.9	1.9	1.9
Middlbr	83	2.4	18.1	48.2	27.7	0.0	3.6	22	0.0	13.6	4.5	81.8	0.0	0.0	0.0	1.9	17.1	39.0	39.0	0.0	2.9	0.0
Newc	97	1.0	27.8	30.9	24.7	1.0	14.4	43	2.3	9.3	0.0	34.9	2.3	51.2	0.0	1.4	22.1	21.4	27.9	1.4	25.7	0.0
Newry	19	0.0	42.1	21.1	26.3	0.0	10.5	3	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	34.8	17.4	39.1	0.0	8.7	0.0
Norwch	61	0.0	27.9	45.9	21.3	0.0	4.9	16	0.0	0.0	12.5	50.0	18.8	18.8	0.0	0.0	22.1	39.0	27.3	3.9	7.8	0.0
Nottm	100	0.0	27.0	40.0	28.0	1.0	4.0	34	0.0	8.8	5.9	29.4	2.9	52.9	0.0	0.0	22.4	31.3	28.4	1.5	16.4	0.0
Oxford	143	6.3	18.2	34.3	35.0	0.0	6.3	39	0.0	2.6	7.7	69.2	0.0	20.5	0.0	5.0	16.0	28.7	42.5	0.0	7.7	0.0
Plymth	61	1.6	31.1	34.4	26.2	1.6	4.9	10	0.0	30.0	30.0	30.0	0.0	10.0	0.0	1.3	28.6	31.2	31.2	1.3	6.5	0.0
Ports	151	1.3	23.8	38.4	23.8	0.7	11.9	41	0.0	9.8	9.8	56.1	2.4	22.0	0.0	1.0	20.0	31.5	30.5	1.0	16.0	0.0
Prestn	101	5.0	14.9	48.5	26.7	0.0	5.0	23	0.0	21.7	4.3	56.5	0.0	17.4	0.0	4.0	16.1	40.3	33.1	0.0	6.5	0.0
Redng	67	1.5	26.9	32.8	32.8	0.0	6.0	20	0.0	20.0	0.0	55.0	0.0	25.0	0.0	1.1	24.2	24.2	41.8	0.0	8.8	0.0
Salford	119	0.0	35.3	26.9	26.9	0.0	10.9	28	0.0	32.1	0.0	53.6	0.0	14.3	0.0	0.0	34.9	21.5	33.6	0.0	10.1	0.0
Sheff	120	2.5	17.5	38.3	36.7	0.0	5.0	27	0.0	3.7	0.0	85.2	0.0	11.1	0.0	2.0	14.9	31.1	45.3	0.0	6.8	0.0
Shrew	52	0.0	28.8	40.4	19.2	0.0	11.5	22	0.0	13.6	0.0	40.9	0.0	45.5	0.0	0.0	24.3	28.4	25.7	0.0	21.6	0.0
Stevng	80	3.8	16.3	35.0	40.0	0.0	5.0	42	0.0	7.1	4.8	42.9	0.0	45.2	0.0	2.4	12.7	23.8	41.3	0.0	19.8	0.0
Sthend	42	2.4	26.2	40.5	26.2	0.0	4.8	4	0.0	25.0	0.0	75.0	0.0	0.0	0.0	2.2	26.1	37.0	30.4	0.0	4.3	0.0
Sund	69	1.4	14.5	20.3	59.4	1.4	2.9	15	0.0	0.0	13.3	86.7	0.0	0.0	0.0	1.2	11.9	19.0	64.3	1.2	2.4	0.0
Truro	38	2.6	13.2	50.0	23.7	0.0	10.5	16	0.0	0.0	6.3	62.5	0.0	31.3	0.0	1.9	9.3	37.0	35.2	0.0	16.7	0.0
Ulster	23	4.3	4.3	17.4	69.6	0.0	4.3	6	0.0	0.0	0.0	50.0	0.0	50.0	0.0	3.4	3.4	13.8	65.5	0.0	13.8	0.0
West NI	7	0.0	14.3	57.1	14.3	0.0	14.3	2	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0	11.1	44.4	33.3	0.0	11.1	0.0
Wirral	51	2.0	19.6	29.4	37.3	0.0	11.8	7	0.0	0.0	0.0	71.4	0.0	28.6	0.0	1.7	16.9	25.4	42.4	0.0	13.6	0.0
Wolve	78	0.0	15.4	38.5	30.8	2.6	12.8	14	0.0	7.1	0.0	42.9	0.0	50.0	0.0	0.0	13.3	30.6	33.7	2.0	20.4	0.0
Wrexm	10	0.0	0.0	30.0	40.0	0.0	30.0	7	0.0	0.0	0.0	14.3	0.0	85.7	0.0	0.0	0.0	15.0	30.0	0.0	55.0	0.0
York	41	0.0	26.8	48.8	19.5	2.4	2.4	9	0.0	33.3	0.0	55.6	11.1	0.0	0.0	0.0	28.0	40.0	26.0	4.0	2.0	0.0
Total	**3,929**	**1.7**	**22.2**	**35.5**	**31.4**	**0.9**	**8.2**	**958**	**0.3**	**10.3**	**6.4**	**60.0**	**3.4**	**19.6**	**0.0**	**1.4**	**20.2**	**30.2**	**37.8**	**0.8**	**9.6**	**0.0**

AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

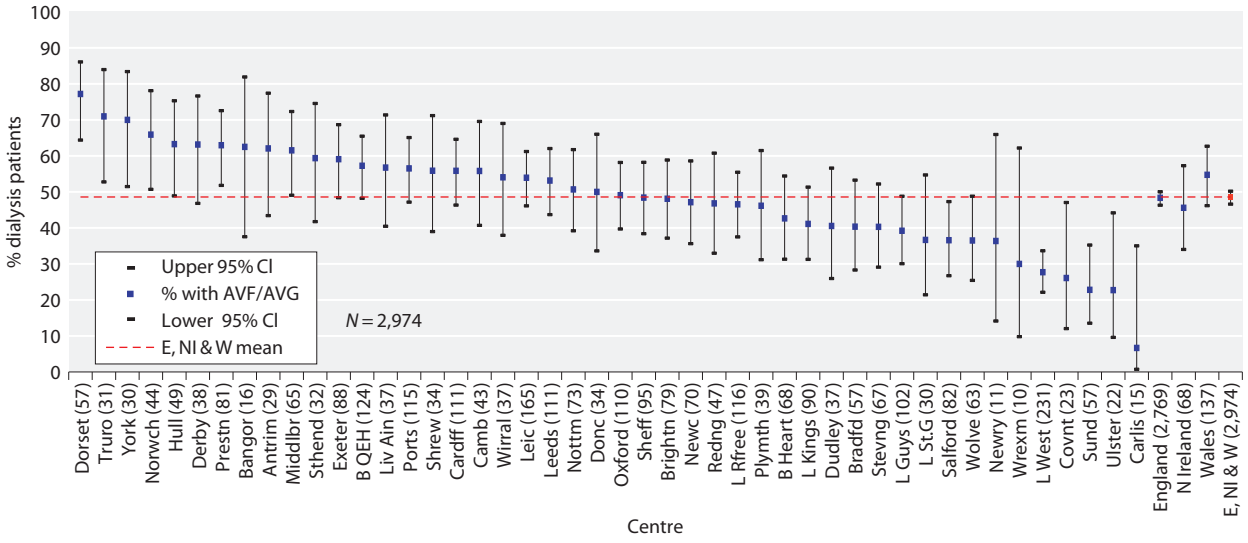


Figure 1.16 Percentage of adult patients incident to dialysis in 2017 who started dialysis using either an arteriovenous fistula (AVF) or an arteriovenous graft (AVG) by centre* (2017 Multisite Dialysis Access Audit)

*Excluding late presentation

Numbers in brackets represent the number of patients with data in each centre rather than missing data

No centres in Northern Ireland submitted sufficiently complete data on PD catheter insertion techniques for the following analyses.

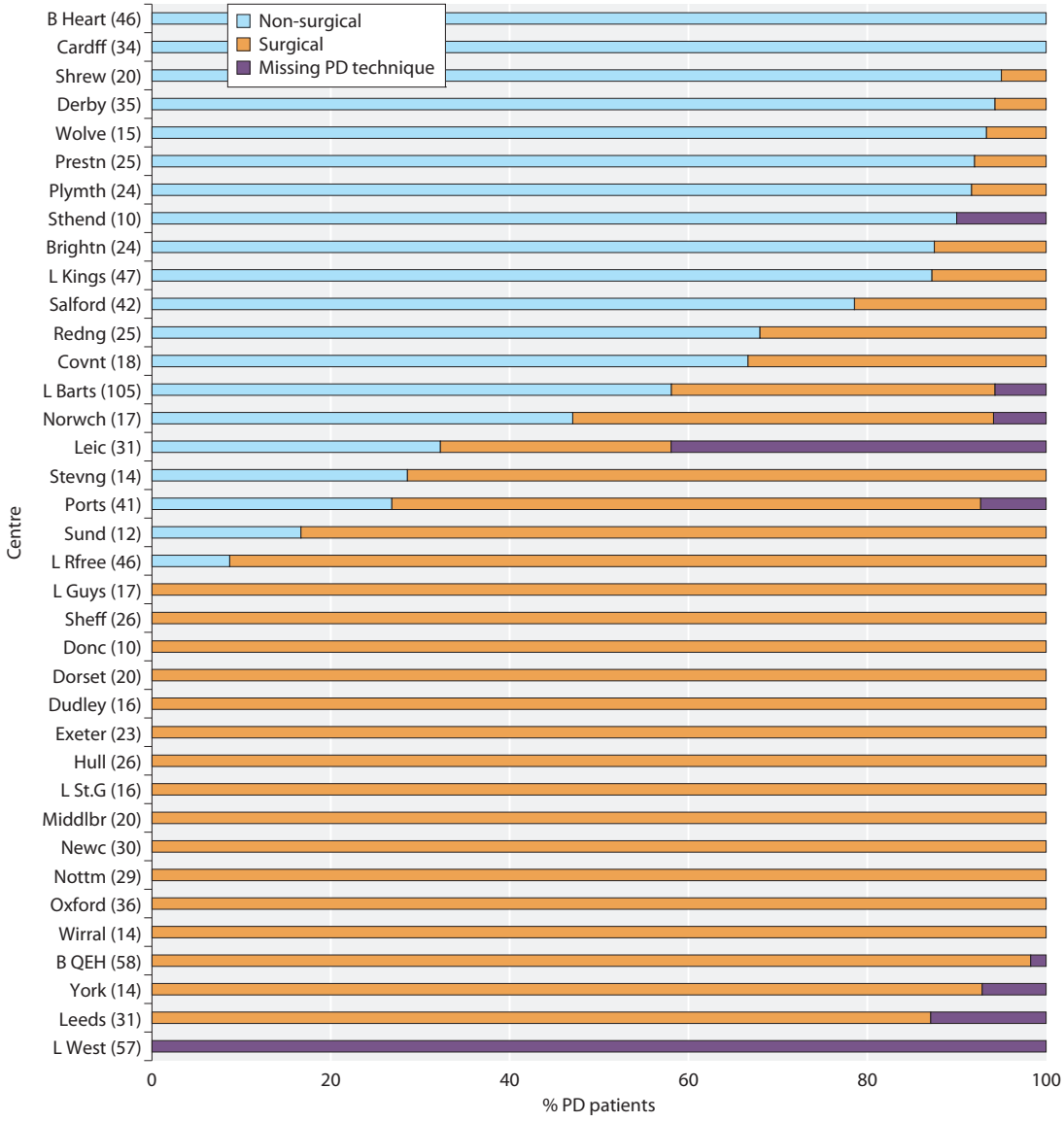


Figure 1.17 PD catheter insertion technique for adult patients incident to PD in 2017 by centre (2017 Multisite Dialysis Access Audit)

Numbers in brackets represent the number of patients with data in each centre
Centres are ordered by decreasing percentage of non-surgical PD insertion technique

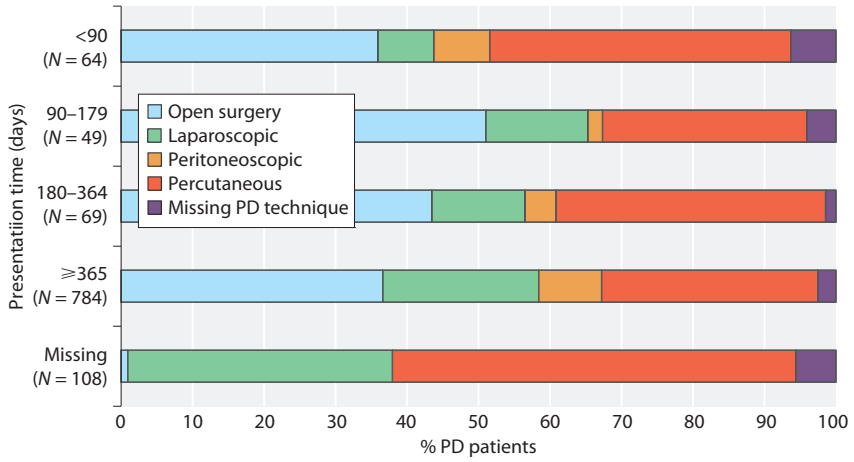


Figure 1.18 PD catheter insertion technique for adult patients incident to PD in 2017 by presentation time (2017 Multisite Dialysis Access Audit)

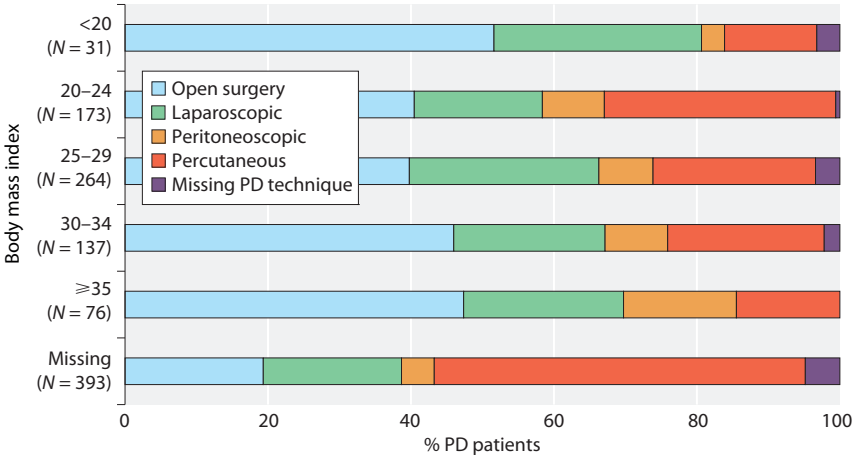


Figure 1.19 PD catheter insertion technique for adult patients incident to PD in 2017 by body mass index (2017 Multisite Dialysis Access Audit)

The Renal Association audit measure advises that PD catheter patency at one year should exceed 80% adjusting for those patients who have either died or changed modality for other reasons. A funnel plot (figure 1.20) shows the percentage of PD catheter failures within one year of initiating dialysis with catheter failure censored for Tx, elective transfer to HD or death. Patients starting PD in 2016 are used in this analysis to allow one year follow-up.

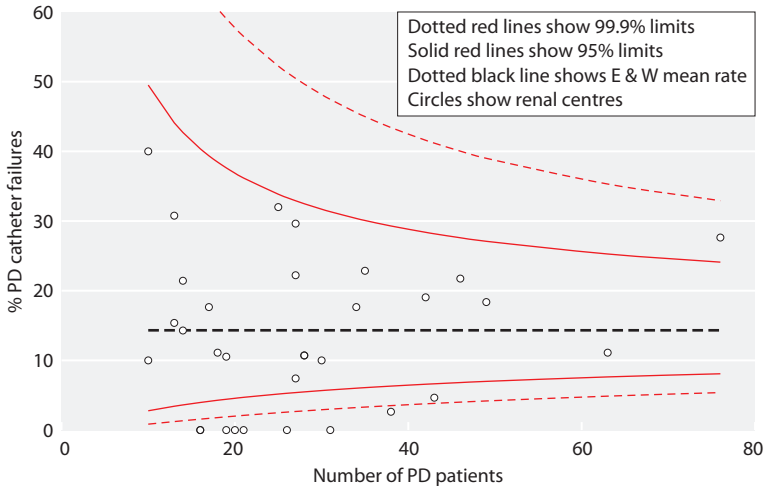


Figure 1.20 Percentage of PD catheter failures within 1 year of first ever PD session for adult patients incident to PD in 2016 (2016 Multisite Dialysis Access Audit)

Comparative access failures by access type within three months of initiating dialysis are shown using data drawn from both the 2016 and 2017 Multisite Dialysis Access Audits. Access failure was defined as a documented date of failure/discontinuation recorded within three months of starting dialysis, unless a centre comment indicated that it was a planned discontinuation.

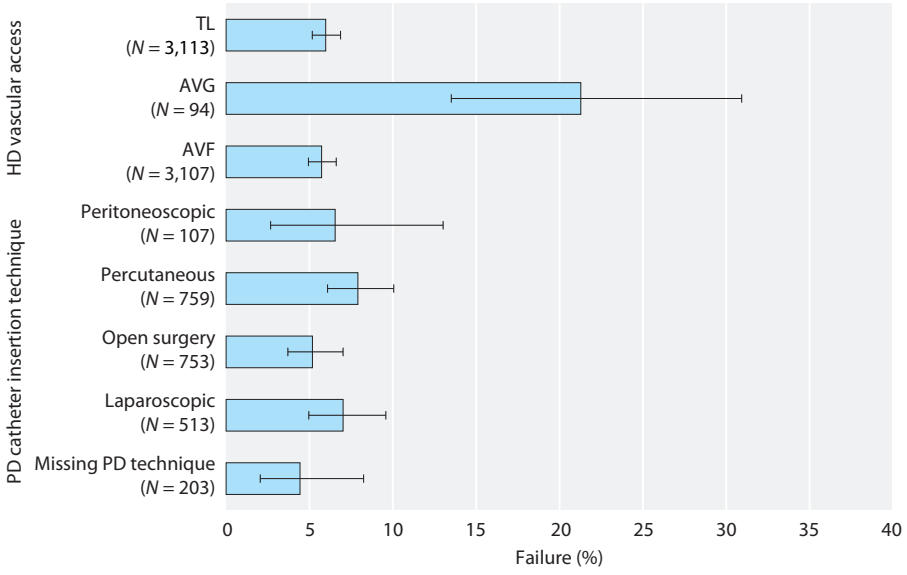


Figure 1.21 Percentage of incident adult dialysis patients experiencing failure of first access within 3 months by type of first access (2016 and 2017 Multisite Dialysis Access Audits)

AVF – arteriovenous fistula; AVG – arteriovenous graft; TL – tunnelled line

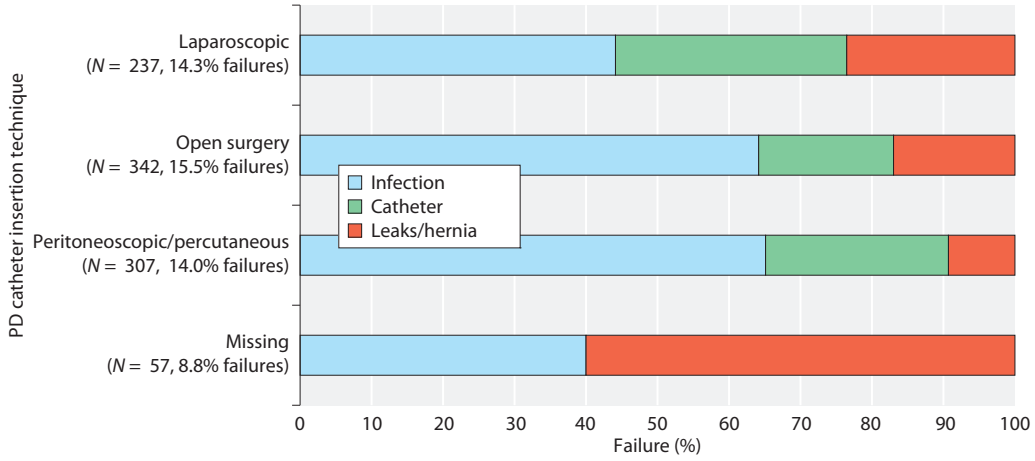


Figure 1.22 Cause of PD catheter access failure within 1 year of first ever PD session for adult patients incident to PD in 2016 (2016 Multisite Dialysis Access Audit)

Survival in incident adult RRT patients

The survival of patients who started RRT for ESKD is described with primary focus on the one year incident to RRT in 2016 cohort, followed up for a year. Some analyses use rolling incident cohorts over several years (two years or more as stated) to increase cohort patient numbers and more reliably identify survival differences between compared countries or centres. Analyses include patients who were coded as being on chronic dialysis for ESKD who died during the first 90 days, provided that data were returned to the UKRR. Analyses are often adjusted to age 60 years to allow comparisons between centres with different age distributions and one analysis is also adjusted for age, PRD and comorbidity. However, analyses are not generally adjusted for differences in ethnicity, PRD, socioeconomic status or comorbidity.

To enable comparisons with international registries, survival is described to day 90, one year and one year after the first 90 days. The UKRR defines day 0 as the first day of RRT, but some countries define day 90 of RRT as day 0 and do not include patients who died in the first 90 days. Analyses are not censored for Tx unless stated (for more details see appendix A).

Table 1.17 90 days and 1 year after 90 days survival (adjusted to age 60 years) of incident adult RRT patients (2015–2016 2 year cohort) by country

Interval	England	N Ireland	Scotland	Wales	UK
Survival at 90 days (%)	96.5	98.3	96.7	96.6	96.6
95% CI	96.2–96.9	97.3–99.3	95.8–97.6	95.5–97.7	96.2–96.9
Survival 1 year after 90 days (%)	90.4	93.6	89.5	89.9	90.4
95% CI	89.9–91.0	91.7–95.5	87.8–91.2	88.0–91.9	89.9–91.0

CI – confidence interval

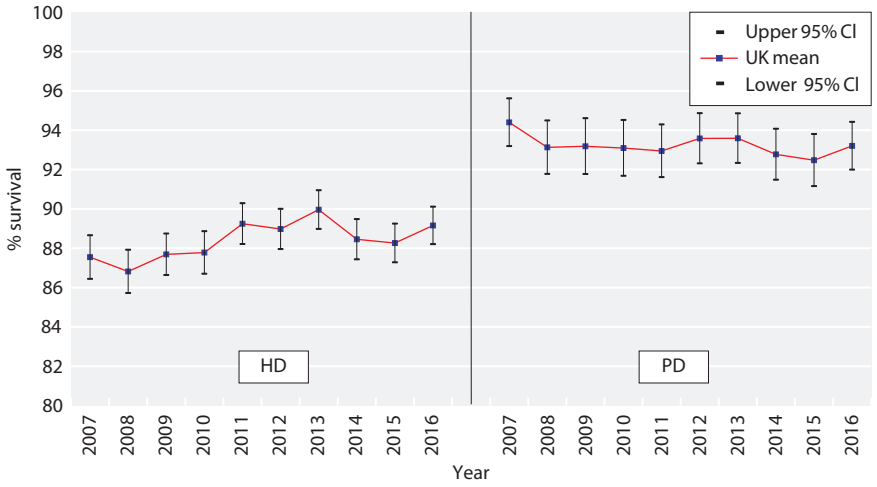


Figure 1.23 1 year after 90 days survival (adjusted to age 60 years) of incident adult RRT patients by start modality between 2007 and 2016
CI – confidence interval

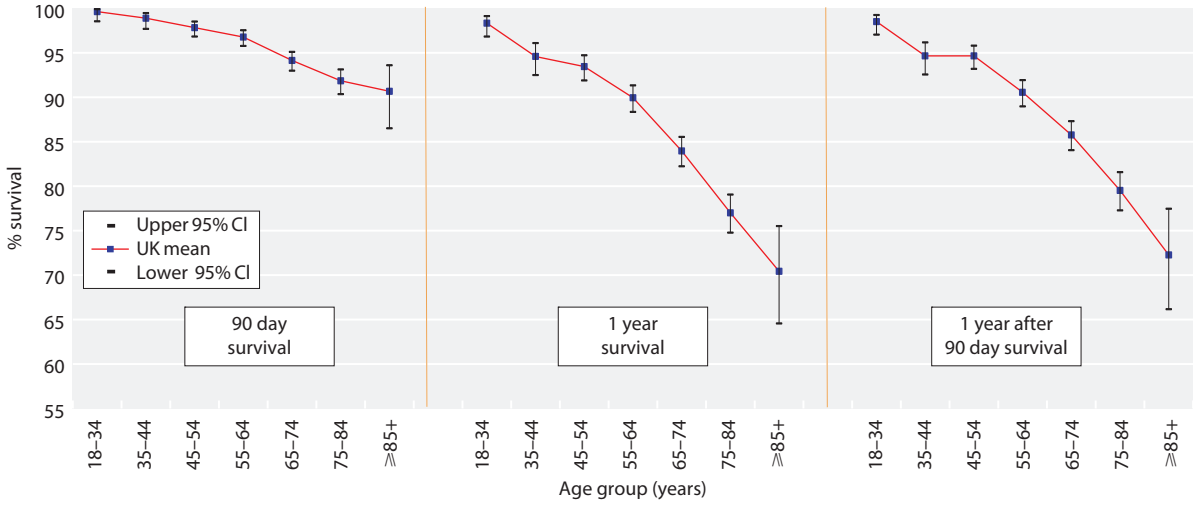


Figure 1.24 90 days, 1 year and 1 year after 90 days survival of incident adult RRT patients by age group (2016 cohort)
CI – confidence interval

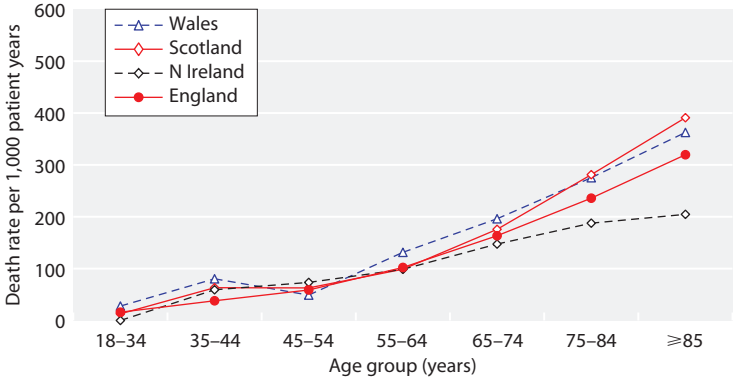


Figure 1.25 1 year after 90 days death rate per 1,000 incident RRT adult patient years by age group and country (2013–2016 4 year cohort)

A ten year rolling cohort was used to analyse the long term survival of incident patients from start of RRT (day 0), according to age at RRT start (figure 1.26), with median survival identifiable from the y-axis. The same cohort was used in analyses of the monthly and six monthly hazard of death on RRT by age group (figures 1.27 and 1.28).

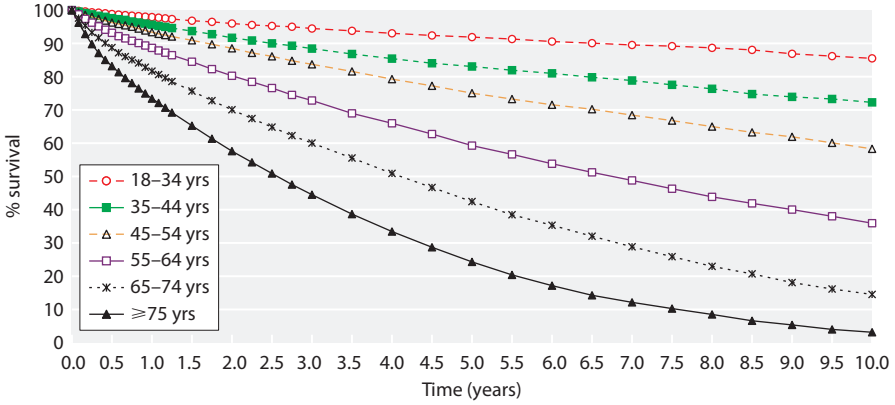


Figure 1.26 Survival (unadjusted) of incident adult RRT patients from day 0 by age group (2007–2016 10 year cohort)

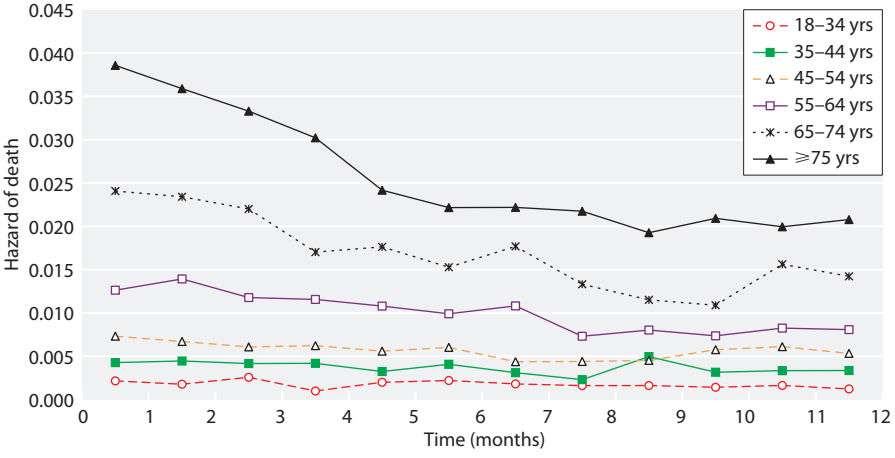


Figure 1.27 Monthly hazard of death (unadjusted) of incident adult RRT patients from day 0 to 1 year by age group (2007–2016 10 year cohort)

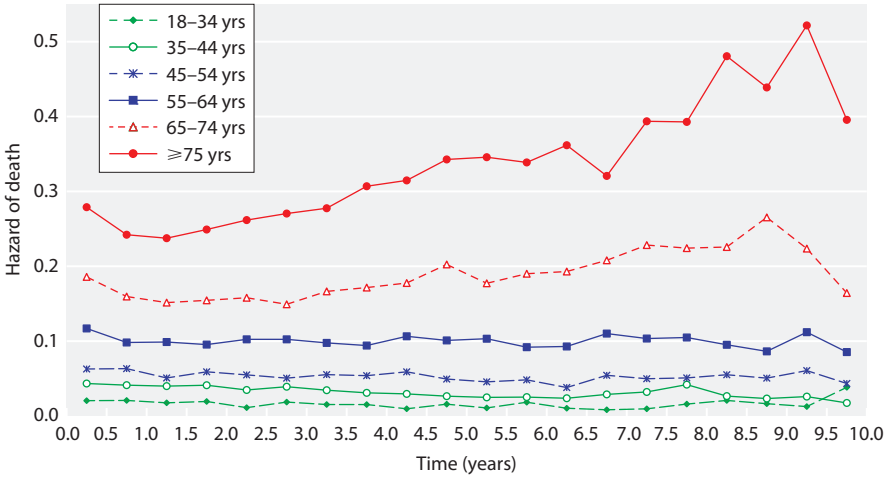


Figure 1.28 6 monthly hazard of death (unadjusted) of incident adult RRT patients from day 0 to 10 years by age group (2007–2016 10 year cohort)

Table 1.18 Survival (unadjusted) of incident adult RRT patients aged <65 years (1998–2016 19 year cohort)

	Unadjusted survival (%)											
Cohort	1 yr	2 yr	3 yr	4 yr	5 yr	6 yr	7 yr	8 yr	9 yr	10 yr	95% CI for latest yr	*N*
2016	**92.9**										**92.1–93.7**	**3,971**
2015	92.3	86.5									85.3–87.5	3,883
2014	92.8	86.8	81.4								80.1–82.6	3,675
2013	93.8	88.3	83.2	77.7							76.3–79.0	3,571
2012	93.2	87.5	82.0	76.9	72.6						71.1–74.1	3,528
2011	93.3	88.6	83.6	79.0	74.5	70.9					69.3–72.4	3,345
2010	92.2	86.6	81.7	77.3	72.8	69.6	66.4				64.8–68.0	3,364
2009	91.3	85.1	80.5	76.4	71.2	67.1	63.8	60.4			58.7–62.1	3,386
2008	91.6	86.1	81.2	76.9	73.2	69.5	65.6	62.3	59.4		57.7–61.0	3,439
2007	92.6	87.0	81.8	76.8	73.1	69.3	65.9	62.6	59.2	56.2	54.5–57.9	3,323
2006	90.8	85.1	80.2	75.8	72.0	68.2	64.1	61.2	58.1	55.5	53.7–57.2	3,155
2005	89.8	83.7	78.7	74.0	69.3	65.7	62.6	59.6	56.6	54.0	52.1–55.9	2,826
2004	89.7	83.4	78.0	72.5	67.9	64.1	61.0	57.1	54.6	53.0	51.0–54.9	2,555
2003	89.6	82.8	77.4	72.5	67.3	63.1	59.4	56.6	54.0	51.6	49.5–53.6	2,257
2002	88.9	80.9	75.1	69.4	65.4	61.4	58.0	54.9	51.8	49.7	47.5–51.9	2,012
2001	88.1	81.0	75.5	70.0	65.1	60.3	56.3	52.8	49.8	47.6	45.2–50.0	1,730
2000	89.3	81.3	74.4	69.3	63.8	59.0	55.5	52.3	49.9	47.1	44.5–49.6	1,520
1999	87.2	81.0	73.5	68.0	62.4	58.4	54.0	51.1	48.6	47.0	44.3–49.7	1,344
1998	87.5	80.2	74.0	69.6	64.3	59.2	55.1	53.0	50.0	47.5	44.5–50.3	1,163

CI – confidence interval

Table 1.19 Survival (unadjusted) of incident adult RRT patients aged ⩾65 years (1998–2016 19 year cohort)

Cohort	Unadjusted survival (%)										95% CI for latest yr	*N*
	1 yr	2 yr	3 yr	4 yr	5 yr	6 yr	7 yr	8 yr	9 yr	10 yr		
2016	**80.1**										**78.8–81.4**	**3,685**
2015	78.4	64.9									63.4–66.5	3,746
2014	78.7	64.4	52.3								50.7–54.0	3,583
2013	79.0	65.0	53.5	43.2							41.5–44.9	3,417
2012	77.5	65.4	54.4	44.2	35.5						33.9–37.2	3,316
2011	77.4	62.9	51.4	41.3	32.5	24.8					23.3–26.3	3,345
2010	76.2	63.3	51.4	42.0	32.3	25.5	19.8				18.4–21.2	3,273
2009	76.7	63.3	52.6	41.6	32.9	26.2	20.1	15.3			14.1–16.6	3,361
2008	74.9	61.3	49.9	40.5	32.2	25.7	20.5	16.1	12.2		11.0–13.3	3,165
2007	75.3	61.4	49.8	40.5	32.0	25.4	20.2	15.5	11.9	9.2	8.2–10.2	3,203
2006	72.4	58.5	47.1	37.5	29.1	23.2	17.6	13.5	10.7	8.5	7.6–9.6	3,097
2005	71.5	57.6	45.7	36.4	28.0	21.3	16.7	12.5	10.0	7.8	6.8–8.8	2,924
2004	69.3	54.2	42.6	34.1	26.9	21.0	16.3	12.9	9.8	7.5	6.5–8.6	2,610
2003	68.6	53.8	41.8	31.8	24.3	18.1	14.1	10.9	8.2	6.5	5.6–7.6	2,306
2002	66.6	51.3	40.8	32.2	24.0	18.4	13.7	10.9	8.2	6.3	5.3–7.5	2,067
2001	66.8	52.1	38.4	28.9	21.6	15.8	11.8	8.8	7.0	5.4	4.4–6.6	1,693
2000	66.3	52.3	39.6	28.7	22.2	16.9	12.8	9.3	7.2	5.4	4.3–6.6	1,482
1999	68.6	52.0	39.3	30.0	22.3	16.1	11.5	8.2	6.0	4.7	3.6–6.0	1,204
1998	62.8	45.3	35.7	26.4	19.5	13.7	10.2	7.3	5.4	4.4	3.2–5.8	1,007

CI – confidence interval

Due to small numbers of incident patients in a given year, centre one year survival is compared using a rolling four year cohort (table 1.20). Centres can be identified in the funnel plot (figure 1.29) using the number of patients in the centre in table 1.20. Given there are 70 centres with data, it would be expected that three centres would fall outside the 95% (1 in 20) confidence limits, entirely by chance.

Table 1.20 1 year after 90 days survival (adjusted to age 60 years) of incident adult RRT patients by centre (2013–2016 4 year cohort)

Centre	*N* on RRT	Adj 1 yr after 90 days survival (%)	Limits for funnel plot	
			Lower 95% limit	Upper 95% limit
D&Gall	51	94.1	79.1	96.1
Newry	87	92.6	82.5	95.2
Clwyd	87	88.5	82.5	95.2
Bangor	91	88.9	82.7	95.1
Inverns	92	91.4	82.8	95.1
Colchr	110	91.5	83.6	94.8
Ulster	111	92.8	83.6	94.8
West NI	125	93.5	84.1	94.6
Antrim	133	89.3	84.4	94.6
Krkcldy	143	90.0	84.7	94.4
Sthend	147	92.6	84.8	94.4
Klmarnk	152	89.3	84.9	94.4
Wrexm	159	92.6	85.0	94.3
Carlis	160	91.9	85.1	94.3
Basldn	161	90.0	85.1	94.3
Dundee	171	91.5	85.3	94.2
Ipswi	176	93.8	85.4	94.1
Truro	195	91.1	85.7	94.0
Chelms	196	92.9	85.7	94.0
Dudley	200	92.1	85.8	94.0
Liv Ain	205	87.0	85.8	93.9

Table 1.20 Continued

Centre	*N* on RRT	Adj 1 yr after 90 days survival (%)	Limits for funnel plot	
			Lower 95% limit	Upper 95% limit
Wirral	208	89.6	85.9	93.9
Donc	208	91.3	85.9	93.9
Plymth	210	90.4	85.9	93.9
York	215	88.9	86.0	93.9
Abrdn	220	92.9	86.0	93.8
Shrew	223	86.0	86.0	93.8
Airdrie	228	89.5	86.1	93.8
Sund	257	88.5	86.4	93.6
Glouc	272	94.7	86.6	93.6
Dorset	291	91.6	86.7	93.5
Derby	292	90.8	86.7	93.5
Wolve	300	88.1	86.8	93.5
Bradfd	301	88.3	86.8	93.5
Edinb	322	89.2	86.9	93.4
Belfast	325	91.9	87.0	93.4
Norwch	343	89.3	87.1	93.3
L St.G	349	91.5	87.1	93.3
Redng	373	92.8	87.2	93.2
Hull	376	91.5	87.3	93.2
Stoke	412	88.5	87.4	93.1
Newc	416	89.4	87.4	93.1
Middlbr	421	90.0	87.5	93.1
B Heart	423	90.4	87.5	93.1
Covnt	424	89.3	87.5	93.1
Nottm	439	92.0	87.5	93.0
Liv Roy	439	89.5	87.5	93.0
Swanse	456	88.2	87.6	93.0
Exeter	513	92.3	87.8	92.9
Kent	531	90.7	87.9	92.8
Brightn	540	89.0	87.9	92.8
Stevng	557	90.7	87.9	92.8
Sheff	562	91.5	87.9	92.8
Bristol	592	91.1	88.0	92.7
Salford	597	89.4	88.0	92.7
Prestn	605	90.6	88.1	92.7
L Guys	612	91.5	88.1	92.7
Leeds	619	90.2	88.1	92.7
L Kings	620	91.7	88.1	92.7
Cardff	631	89.0	88.1	92.7
M RI	709	89.5	88.3	92.6
Oxford	715	91.1	88.3	92.6
Glasgw	730	88.0	88.3	92.6
Ports	777	90.2	88.4	92.5
L Rfree	869	92.1	88.5	92.4
B QEH	904	91.4	88.6	92.4
Carsh	930	91.9	88.6	92.4
Leic	1,023	90.8	88.7	92.3
L Barts	1,118	91.0	88.8	92.2
L West	1,333	92.1	89.0	92.1

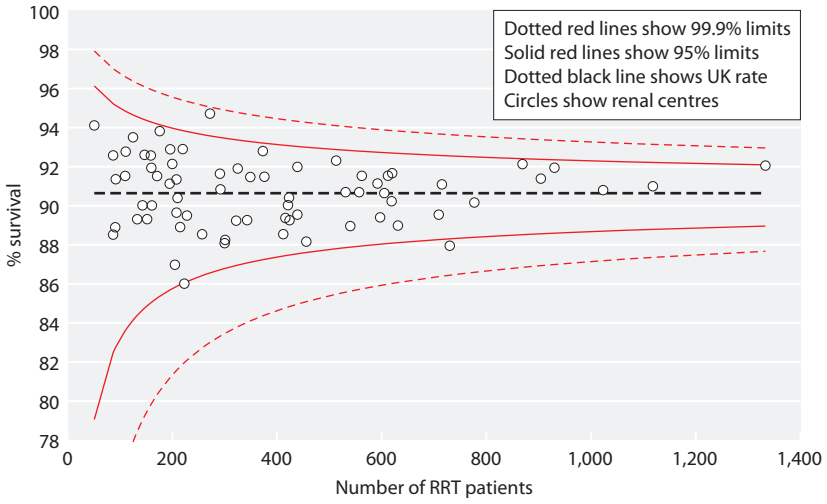


Figure 1.29 1 year after 90 days survival (adjusted to age 60 years) of incident adult RRT patients by centre (2013–2016 4 year cohort)

For those 32 centres that provided adequate comorbidity data for ⩾85% of patients, one year survival for the same four year cohort is shown sequentially adjusted for age, PRD and comorbidity (table 1.21).

Table 1.21 1 year after 90 days survival (adjusted to age 60 years, primary renal disease (PRD) and comorbidity) of incident adult RRT patients by centre (2013–2016 4 year cohort)

	1 yr after 90 days survival (%)			
Centre*	Unadj	Adj age	Adj age & PRD	Adj age, PRD & comorbidity
Bangor	81.5	86.9	87.0	86.9
Swanse	82.3	87.8	88.7	89.7
Shrew	82.7	87.4	88.6	88.7
Antrim	83.3	89.2	89.9	90.5
York	85.7	89.2	90.1	90.5
Cardff	86.0	89.0	89.4	90.8
B Heart	86.6	90.4	90.9	90.9
Kent	86.7	90.2	90.7	89.9
Middlbr	86.7	89.6	89.9	90.7
Bradfd	86.8	88.1	88.7	89.6
Sund	86.8	89.6	90.0	90.0
Norwch	87.3	90.5	91.0	90.6
Dorset	87.4	91.2	91.0	91.5
Basldn	87.7	91.2	91.5	91.4
Ulster	88.0	92.4	92.7	92.8
Newc	88.1	90.2	90.8	91.8
Wrexm	88.3	92.2	92.2	92.3
Bristol	88.5	91.4	91.8	92.3
Oxford	88.6	90.5	91.0	91.5
Exeter	88.7	92.6	93.2	93.2
B QEH	89.1	91.1	91.8	90.7
Leeds	89.1	90.1	90.2	90.4
Nottm	89.2	91.7	92.1	92.3
Hull	89.3	91.5	91.8	91.9

Table 1.21 Continued

Centre*	1 yr after 90 days survival (%)			
	Unadj	Adj age	Adj age & PRD	Adj age, PRD & comorbidity
L Kings	89.5	91.4	91.4	92.0
Redng	90.2	92.6	93.1	94.1
Chelms	90.4	93.2	93.6	93.8
Newry	90.5	92.3	92.9	93.3
West NI	90.9	93.4	93.7	94.4
L Guys	91.9	92.5	92.7	92.4
Dudley	92.0	93.8	94.1	94.3
Derby	92.2	93.3	93.8	93.9
Total	**88.0**	**90.7**	**91.1**	**91.4**

*Only centres with ⩾85% comorbidity completeness included

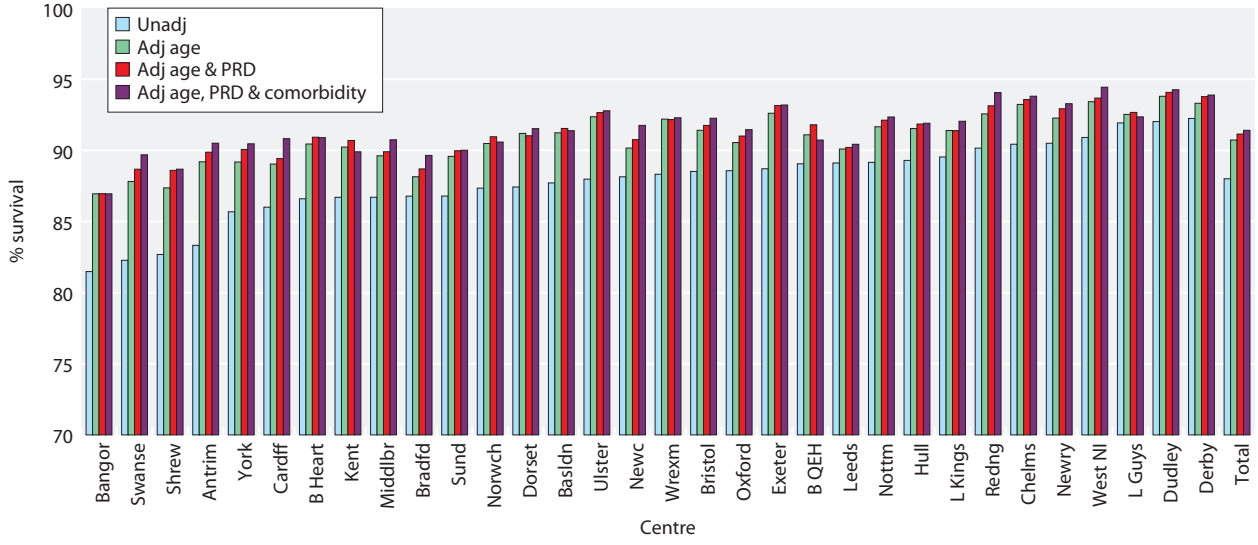


Figure 1.30 1 year after 90 days survival (adjusted to age 60 years, primary renal disease (PRD) and comorbidity) of incident adult RRT patients by centre (2013–2016 4 year cohort)

Cause of death in incident adult RRT patients

Cause of death was analysed in incident RRT patients using a four year incident cohort followed up for 90 days and 1 year after 90 days. The proportion of 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. Further detail on the survival of prevalent RRT patients is in chapter 2.

Table 1.22 Cause of death in the first 90 days and one year after 90 days in incident adult RRT patients by age group (2013–2016 4 year cohort*)

	First 90 days				1 year after 90 days			
	All ages				All ages			
Cause of death	*N*	%	<65 yrs (%)	⩾65 yrs (%)	*N*	%	<65 yrs (%)	⩾65 yrs (%)
Cardiac disease	250	24.4	23.3	24.8	545	19.9	24.3	18.2
Cerebrovascular disease	37	3.6	5.5	3.1	114	4.2	5.7	3.6
Infection	200	19.6	18.2	20.0	550	20.1	19.4	20.4
Malignancy	100	9.8	15.7	8.0	347	12.7	12.2	12.9
Treatment withdrawal	197	19.3	10.2	22.0	479	17.5	10.5	20.2
Other	179	17.5	21.6	16.3	515	18.8	21.6	17.7
Uncertain aetiology	60	5.9	5.5	6.0	188	6.9	6.4	7.1
Total (with data)	**1,023**	**100.0**	**100.0**	**100.0**	**2,738**	**100.0**	**100.0**	**100.0**
Missing	724	41.4	41.9	41.9	1,459	34.8	34.0	35.1

*For the cause of death in the first 90 days, October 2012 to September 2017 incident patients were included, while cause of death by 1 year after 90 days was analysed in a cohort of incident patients starting RRT between October 2011 and September 2016



Chapter 2

Adults on renal replacement therapy (RRT) in the UK at the end of 2017

Contents

Introduction 47
Rationale for analyses 48
Key findings 49
Analyses 50
Changes to the prevalent adult RRT population 50
Demographics and treatment modality of prevalent adult RRT patients 53
Dialysis access in prevalent adult dialysis patients 61
Survival in adult dialysis patients 61
Cause of death in adult RRT patients 65

Introduction

This chapter describes the population of adult patients with end-stage kidney disease (ESKD) who were on renal replacement therapy (RRT) in the UK at the end of 2017 (figure 2.1). Patients may have started RRT prior to 2017 or during 2017. Three RRT modalities are available to patients with ESKD – haemodialysis (HD), peritoneal dialysis (PD) and kidney transplantation. HD may be undertaken in-centre (ICHD) or at home (HHD).

The size of the prevalent population on each RRT modality reflects uptake to the modality by new RRT patients (chapter 1); the number of patients switching from one modality to another; and the length of time patients remain on a modality before they switch to another, withdraw from RRT or die.

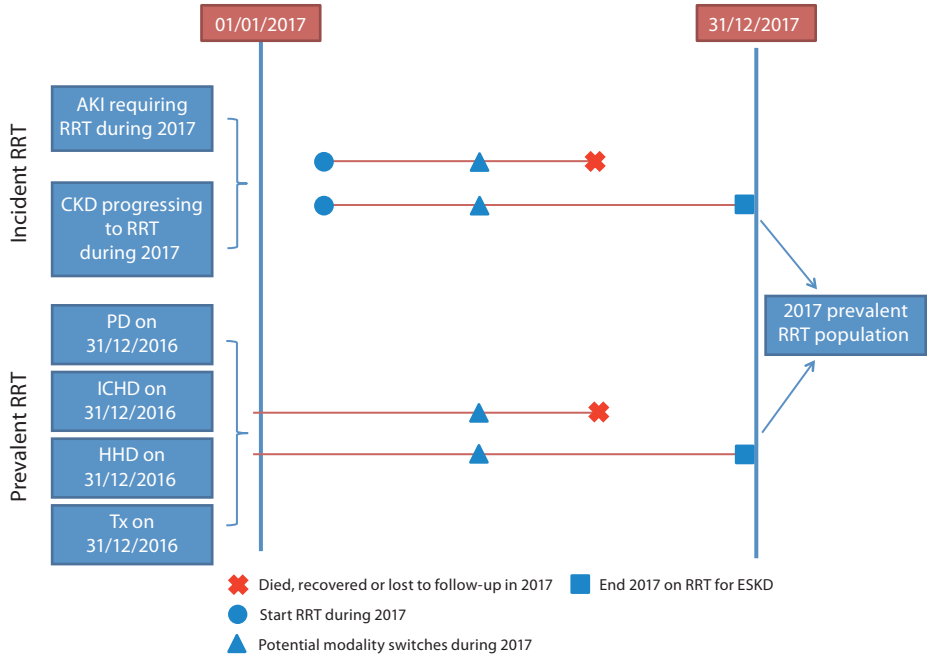


Figure 2.1 Pathways adult patients could follow to be included in the UK 2017 prevalent RRT population

Note that patients receiving dialysis for acute kidney injury (AKI) are only included in this chapter if they had a timeline or RRT modality code for chronic RRT at the end of 2017 or if they had been on RRT for ⩾90 days and were on RRT at the end of 2017
CKD – chronic kidney disease; Tx – transplant

Survival and cause of death analyses were undertaken on historic prevalent cohorts to allow sufficient follow-up time.

Rationale for analyses

The analyses focus on a description of the 2017 prevalent adult RRT population, including the number on RRT per million population (pmp). These analyses are performed annually to help clinicians and policy makers plan future RRT requirements in the UK. Variation in case-mix is also reported to aid understanding of how to improve equity of RRT provision in the UK.

The Renal Association guidelines (https://renal.org/guidelines/) provide audit measures relevant to the care of patients on RRT and, where data permit, their attainment by UK renal centres in 2017 is reported in the relevant chapters of this report. Audit measures in guidelines that have been archived (for example, 'Haemodialysis', 'Blood borne viruses' and 'Nutrition') are not included.

Some audit measures in current guidelines – for example, the target for glycated haemoglobin in those on hypoglycaemia-inducing treatment – cannot be reported because the completeness of the required data is too low. Further detail about the completeness of data returned to the UK Renal Registry (UKRR) is available on the UKRR website. Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted.

Where revised target ranges are published, the measures in place at the time of patient care are reported. However, where new guidelines remove audit measures, those targets are no longer reported.

For definitions and methods relating to this chapter see appendix A.

Cambridge renal centre (Addenbrooke's Hospital) was unable to submit patient level data for 2015–2017. While data extraction issues have now been resolved, the UKRR and Cambridge are working to load and validate the backlog of data for these years. Using aggregate numbers of patients starting RRT by treatment modality, it is possible to report treatment rates for Cambridge, but no other quality assurance for the service provided.

Key findings

- 64,887 adult patients were receiving RRT for ESKD in the UK on 31/12/2017, an increase of 3.0% from 2016
- RRT prevalence was 983 pmp compared to 523 pmp in 2000
- The ICHD population increased by 1.4%, the HHD population by 3.9% and the Tx population by 5.1%; the PD population fell by 2.3% compared to 2016
- The number of patients receiving HHD increased slightly to 1,315 from 1,266 in 2016
- The median age of RRT patients was 59.2 years (HD 66.8 years, PD 64.4 years and Tx 54.8 years). In 2000 the median age was 54.8 years (HD 63.3 years, PD 58.5 years and Tx 48.6 years)
- 61.1% of RRT patients were male
- Tx continued as the most common treatment modality (55.2%) – ICHD comprised 37.3%, PD 5.4% and HHD 2.0% of the RRT population
- The most common identifiable primary renal disease (PRD) was glomerulonephritis (19.7%), followed by diabetes (17.8%) and other (17.0%)
- There was no cause of death data available for 38.3% of deaths. For those with data, the leading cause of death in younger patients ($<$65 years) was cardiac disease (28.9%) and in older patients ($\geqslant$65 years) was treatment withdrawal (20.9%) and infection (20.9%), followed by cardiac disease (20.3%).

Analyses

Changes to the prevalent adult RRT population

For the 71 adult renal centres, the number of prevalent patients on RRT was calculated as a proportion of the estimated centre catchment population (calculated as detailed in appendix A).

Table 2.1 Number of prevalent adult RRT patients by year and by centre; number of RRT patients as a proportion of the catchment population

Centre	*N* on RRT					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017		
ENGLAND							
B Heart	654	635	653	652	654	0.77	846
B QEH	2,045	2,133	2,248	2,389	2,524	1.78	1,419
Basldn	270	278	274	275	301	0.43	693
Bradfd	520	548	584	636	674	0.68	987
Brightn	871	914	950	992	1,013	1.36	746
Bristol	1,424	1,458	1,477	1,468	1,473	1.51	977
Camb	1,193	1,235	1,539	1,551	1,420	1.21	1,171
Carlis	227	250	281	278	281	0.34	837
Carsh	1,479	1,551	1,584	1,642	1,681	2.00	839
Chelms	241	261	285	274	283	0.53	529
Colchr	115	119	120	124	127	0.31	405
Covnt	928	959	960	976	962	0.93	1,030
Derby	464	513	539	542	556	0.74	756
Donc	259	284	302	330	333	0.43	775
Dorset	627	664	681	687	734	0.90	813
Dudley	310	305	314	345	368	0.46	796
Exeter	889	945	968	1,013	1,054	1.14	924
Glouc	409	428	443	471	504	0.61	820
Hull	813	801	855	852	871	1.07	815
Ipswi	355	367	404	414	431	0.42	1,032
Kent	958	1,013	1,039	1,073	1,091	1.28	851
L Barts	2,089	2,207	2,277	2,368	2,497	1.92	1,303
L Guys	1,828	1,913	2,012	2,097	2,159	1.13	1,905
L Kings	963	1,023	1,084	1,110	1,145	1.23	933
L Rfree	1,921	2,006	2,093	2,176	2,193	1.59	1,379
L St.G	755	790	842	851	843	0.84	1,009
L West	3,119	3,229	3,312	3,411	3,498	2.51	1,393
Leeds	1,464	1,500	1,523	1,549	1,621	1.75	927
Leic	2,067	2,143	2,179	2,302	2,374	2.55	931
Liv Ain	190	217	221	227	216	0.51	426
Liv Roy	1,264	1,266	1,236	1,212	1,255	1.05	1,199
M RI	1,853	1,793	1,881	1,973	2,059	1.60	1,284
Middlbr	827	854	901	889	898	1.05	854
Newc	962	977	1,009	1,051	1,118	1.17	952
Norwch	689	686	740	771	776	0.82	942
Nottm	1,073	1,061	1,113	1,154	1,174	1.14	1,031
Oxford	1,563	1,655	1,691	1,767	1,878	1.77	1,061
Plymth	502	502	503	512	540	0.49	1,098
Ports	1,544	1,591	1,669	1,690	1,746	2.12	824
Prestn	1,089	1,171	1,215	1,204	1,268	1.56	811
Redng	731	760	775	789	796	0.95	835
Salford	881	971	974	1,020	1,115	1.56	715
Sheff	1,328	1,360	1,383	1,423	1,441	1.44	1,003

Table 2.1 Continued

Centre	*N* on RRT					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017		
Shrew	338	349	367	375	376	0.52	717
Stevng	755	778	816	895	901	1.26	715
Sthend	220	238	246	236	252	0.33	760
Stoke	724	775	788	826	813	0.93	873
Sund	421	450	459	507	541	0.65	835
Truro	371	379	413	426	423	0.43	978
Wirral	248	278	281	337	387	0.60	646
Wolve	567	574	582	571	581	0.70	830
York	409	461	490	534	554	0.52	1,075
N IRELAND							
Antrim	224	229	239	244	248	0.30	814
Belfast	726	747	771	819	843	0.66	1,281
Newry	199	207	225	237	241	0.27	893
Ulster	155	149	170	168	184	0.27	669
West NI	238	274	293	307	313	0.36	861
SCOTLAND							
Abrdn	517	501	531	555	563	0.61	917
Airdrie	389	395	425	440	468	0.57	828
D&Gall	119	130	130	131	135	0.15	889
Dundee	398	401	420	419	439	0.47	926
Edinb	737	747	769	778	837	0.99	848
Glasgw	1,585	1,606	1,708	1,753	1,774	1.66	1,067
Inverns	216	225	253	259	263	0.28	951
Klmarnk	296	299	310	317	338	0.37	914
Krkcldy	283	277	295	294	299	0.32	922
WALES							
Bangor	99	102	182	179	194	0.23	840
Cardff	1,582	1,593	1,612	1,627	1,684	1.50	1,121
Clwyd	152	166	185	177	181	0.20	902
Swanse	692	705	766	774	791	0.94	844
Wrexm	251	282	293	310	319	0.25	1,255
TOTALS							
England	**47,806**	**49,618**	**51,575**	**53,237**	**54,773**	**55.62**	**985**
N Ireland	**1,542**	**1,606**	**1,698**	**1,775**	**1,829**	**1.87**	**978**
Scotland	**4,540**	**4,581**	**4,841**	**4,946**	**5,116**	**5.42**	**943**
Wales	**2,776**	**2,848**	**3,038**	**3,067**	**3,169**	**3.13**	**1,014**
UK	**56,664**	**58,653**	**61,152**	**63,025**	**64,887**	**66.04**	**983**

Country dialysis populations were calculated by summing the dialysis patients from centres in each country. Estimated country populations were derived from Office for National Statistics figures rather than from summing the estimated catchment populations of renal centres which may cross country borders
pmp – per million population

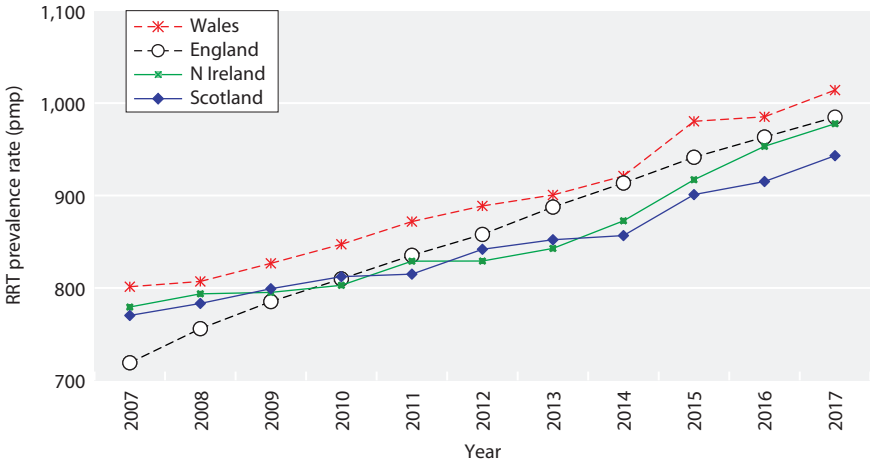


Figure 2.2 Adult RRT prevalence rates by country between 2007 and 2017
pmp – per million population

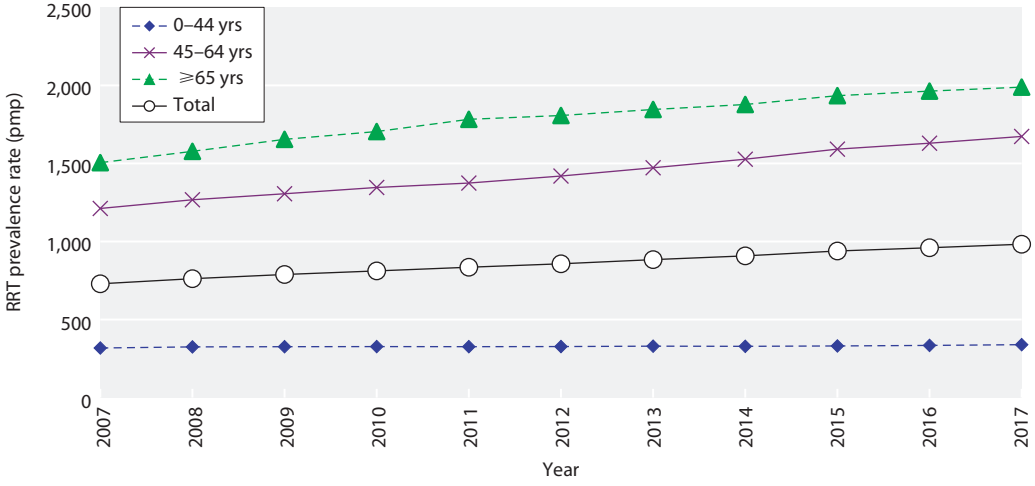


Figure 2.3 Adult RRT prevalence rates by age group between 2007 and 2017
pmp – per million population

Demographics and treatment modality of prevalent adult RRT patients

The proportion of RRT 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 2.2 Demographics and treatment modality of adult patients prevalent to RRT on 31/12/2017 by centre

								Ethnicity				
Centre	*N* on RRT	% on ICHD	% on PD	% on HHD	% with Tx	Median age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing
ENGLAND												
B Heart	654	57.3	13.5	3.2	26.0	62.8	61.9	58.6	29.4	10.6	1.5	0.0
B QEH	2,524	37.8	6.4	2.1	53.7	57.8	59.0	59.6	26.5	10.0	4.0	2.0
Basldn	301	55.8	9.3	2.3	32.6	61.8	68.1	86.4	3.7	4.7	5.1	2.0
Bradfd	674	39.9	3.0	1.3	55.8	56.5	59.6	53.1	42.9	2.5	1.5	0.4
Brightn	1,013	42.0	5.8	3.9	48.3	60.5	64.0	91.3	5.1	1.9	1.7	2.7
Bristol	1,473	33.4	3.9	1.2	61.5	59.1	62.1	88.6	4.0	5.5	1.9	0.1
Camb	1,420	24.4	2.2	*	73.5							
Carlis	281	34.9	10.0	0.0	55.2	60.3	64.8	98.6	1.4	0.0	0.0	1.1
Carsh	1,681	50.1	5.7	1.6	42.6	61.9	62.5	69.1	14.6	10.1	6.2	2.5
Chelms	283	45.2	12.4	1.1	41.3	64.5	68.9	89.0	2.8	2.5	5.7	0.7
Colchr	127	100.0	0.0	0.0	0.0	73.5	64.6	100.0	0.0	0.0	0.0	0.8
Covnt	962	34.2	5.4	1.5	58.9	58.1	62.9	79.4	14.9	4.9	0.8	0.1
Derby	556	34.4	14.2	9.4	42.1	60.6	61.9	83.0	11.2	2.7	3.1	0.7
Donc	333	53.5	8.7	2.7	35.1	64.5	62.8	93.7	2.4	1.2	2.7	0.0
Dorset	734	40.1	4.8	1.4	53.8	64.6	60.6	96.7	1.4	0.4	1.5	0.1
Dudley	368	55.4	14.9	3.5	26.1	65.5	64.1	83.2	11.7	3.8	1.4	0.0
Exeter	1,054	43.1	7.1	1.2	48.6	63.7	62.4	96.7	0.4	0.9	2.0	0.1
Glouc	504	48.2	8.9	1.0	41.9	64.0	61.1	92.4	3.4	2.2	2.0	0.2
Hull	871	40.0	6.4	0.7	52.9	58.9	64.5	97.0	1.7	0.3	0.9	1.4
Ipswi	431	33.9	10.4	1.9	53.8	63.0	65.2	82.3	1.2	3.2	13.3	4.4
Kent	1,091	38.8	4.8	1.9	54.5	60.8	60.4	93.5	3.4	1.0	2.1	0.1
L Barts	2,497	41.2	9.5	1.2	48.1	56.5	60.2	34.2	31.5	22.7	11.7	0.0
L Guys	2,159	30.8	1.8	1.9	65.4	55.1	59.1	61.4	7.6	25.2	5.8	1.9
L Kings	1,145	49.9	8.5	1.7	39.9	59.8	61.4	47.7	11.5	35.9	4.8	0.1
L Rfree	2,193	31.2	6.6	0.8	61.4	58.0	59.8	46.4	21.1	23.0	9.5	2.7
L St.G	843	37.5	4.4	0.6	57.5	60.0	58.1	44.8	23.6	23.5	8.2	5.9
L West	3,498	41.4	3.5	0.3	54.8	60.3	60.7	40.1	32.2	18.5	9.2	0.0
Leeds	1,621	33.2	3.6	1.4	61.8	56.3	60.1	78.5	15.0	4.6	1.9	0.2
Leic	2,374	37.9	4.1	3.0	55.0	60.0	60.2	73.6	19.8	4.4	2.2	3.5
Liv Ain	216	76.9	10.2	6.5	6.5	68.5	62.5	97.2	0.5	1.4	0.9	2.3
Liv Roy	1,255	28.4	5.6	3.1	62.9	56.5	60.6	91.5	1.8	2.8	3.9	1.1
M RI	2,059	24.3	3.4	3.7	68.6	56.5	59.4	72.2	14.2	10.6	3.0	1.4
Middlbr	898	36.3	2.3	1.3	60.0	59.8	62.6	93.9	4.9	0.4	0.8	0.0
Newc	1,118	29.2	5.3	1.9	63.6	58.3	62.3	93.4	3.5	1.1	2.1	0.0
Norwch	776	38.9	5.5	1.8	53.7	62.3	61.9	97.2	1.2	0.5	1.2	0.0
Nottm	1,174	30.0	6.0	2.9	61.2	58.0	59.0	82.2	8.7	6.4	2.7	0.1
Oxford	1,878	24.0	3.6	0.9	71.5	57.0	62.0	81.3	10.1	4.2	4.3	7.1
Plymth	540	26.3	9.1	1.9	62.8	61.2	64.6	96.7	0.4	0.4	2.6	0.2
Ports	1,746	31.2	4.8	3.7	60.3	59.6	61.6	93.2	3.4	1.1	2.2	3.6
Prestn	1,268	40.8	2.7	3.9	52.7	60.4	61.4	84.6	14.0	0.9	0.5	0.0
Redng	796	37.9	4.9	0.8	56.4	61.5	61.8	69.4	22.8	5.5	2.3	5.9
Salford	1,115	34.7	10.5	3.7	51.1	58.5	60.0	81.2	14.5	2.4	1.9	0.0
Sheff	1,441	38.1	3.8	3.5	54.6	59.5	62.0	88.9	5.7	2.3	3.2	1.4
Shrew	376	48.9	11.2	5.9	34.0	63.2	64.6	93.9	3.2	1.1	1.9	0.5
Stevng	901	51.7	2.6	3.3	42.4	60.5	61.2	70.9	17.0	8.5	3.6	3.8
Sthend	252	47.6	13.5	0.8	38.1	62.8	57.9	84.5	6.0	4.4	5.2	0.0
Stoke	813	37.4	9.0	3.4	50.2	61.5	60.9	92.7	4.5	1.1	1.7	0.7
Sund	541	44.9	3.0	3.9	48.2	60.9	61.7	96.1	2.8	0.6	0.6	0.0

Table 2.2 Continued

Centre	*N* on RRT	% on ICHD	% on PD	% on HHD	% with Tx	Median age (yrs)	% male	Ethnicity				
								% White	% South Asian	% Black	% Other	% missing
Truro	423	37.8	3.5	2.1	56.5	62.8	58.2	98.6	0.2	0.2	0.9	0.0
Wirral	387	52.5	4.9	2.3	40.3	61.4	58.4	96.1	2.1	0.5	1.3	0.0
Wolve	581	52.0	9.3	5.5	33.2	60.3	64.0	66.3	21.2	10.7	1.7	0.3
York	554	33.0	6.3	2.3	58.3	60.7	62.3	96.8	1.7	0.6	0.9	3.8
N IRELAND												
Antrim	248	47.2	5.6	1.6	45.6	63.7	63.7	99.6	0.0	0.4	0.0	0.0
Belfast	843	21.4	2.0	0.9	75.7	56.1	61.3	97.6	1.0	0.8	0.6	5.3
Newry	241	32.4	9.5	0.8	57.3	60.5	54.4	98.8	0.4	0.4	0.4	0.0
Ulster	184	59.2	3.3	0.5	37.0	67.8	58.2	95.1	1.1	2.2	1.6	0.0
West NI	313	36.1	2.9	1.0	60.1	59.6	58.8	98.4	1.0	0.3	0.3	0.0
SCOTLAND												
Abrdn	563	39.6	3.9	0.7	55.8	57.8	58.3					62.9
Airdrie	468	41.0	3.4	0.4	55.1	57.4	58.3	95.9	2.7	0.6	0.9	27.8
D&Gall	135	37.8	4.4	1.5	56.3	59.4	63.0					76.3
Dundee	439	42.6	4.1	0.5	52.8	60.0	59.9					64.0
Edinb	837	37.4	4.1	0.5	58.1	57.6	61.9					74.3
Glasgw	1,774	32.4	2.7	0.8	64.1	57.6	59.2					78.2
Inverns	263	31.6	3.8	1.9	62.7	57.6	55.5					41.8
Klmarnk	338	42.6	7.1	3.0	47.3	59.0	57.4					60.1
Krkcldy	299	46.8	3.3	0.0	49.8	60.9	53.5					77.3
WALES												
Bangor	194	37.6	8.8	5.7	47.9	63.0	65.5	97.9	0.0	1.0	1.0	0.0
Cardff	1,684	31.4	4.3	2.3	62.1	58.0	63.5	92.1	5.0	0.7	2.2	1.0
Clwyd	181	39.8	6.6	1.1	52.5	64.0	65.7	97.8	1.7	0.0	0.6	0.0
Swanse	791	44.0	9.4	4.3	42.4	63.7	64.1	97.6	1.5	0.4	0.5	1.0
Wrexm	319	37.0	8.5	1.3	53.3	60.3	63.0	98.1	0.6	0.6	0.6	0.0
TOTALS												
England	**54,773**	**37.6**	**5.6**	**2.1**	**54.7**	**59.3**	**61.1**	74.0	13.5	8.5	4.0	**1.5**
N Ireland	**1,829**	**32.6**	**3.8**	**1.0**	**62.6**	**58.8**	**60.0**	97.9	0.8	0.7	0.6	**2.5**
Scotland	**5,116**	**37.3**	**3.7**	**0.9**	**58.2**	**58.1**	**59.0**					**66.9**
Wales	**3,169**	**36.0**	**6.4**	**2.8**	**54.8**	**60.3**	**63.8**	94.8	3.2	0.6	1.4	**0.8**
UK	**64,887**	**37.3**	**5.4**	**2.0**	**55.2**	**59.2**	**61.1**	76.1	12.4	7.8	3.7	**6.7**

Blank cells – no data returned by the centre or data completeness <70%
Breakdown by ethnicity not shown for <70% data completeness, but centres with <70% data completeness are included in national averages
*Breakdown of HD patients into ICHD and HHD is not available for Cambridge – the ICHD figure is the total HD percentage
The England and UK totals include the Cambridge patient modality split but the age, sex and ethnicity totals do not include Cambridge

PRDs were grouped into categories as shown in table 2.3, with the mapping of disease codes into groups explained in more detail in appendix A. The proportion of RRT patients in each ethnic group and with each PRD is shown for patients with ethnicity and PRD data, respectively, and these total 100% of patients with data. The proportions of patients with no ethnicity and no PRD data are shown on separate lines.

Table 2.3 Demographics, primary renal diseases (PRDs) and prevalent treatment modality of adult patients prevalent to RRT on 31/12/2017 by age group

	Age group (yrs)								
	18–34	35–44	45–54	55–64	65–74	75–84	⩾ 85	Total	Median age (yrs)
Total									
N on RRT	5,126	7,101	12,911	14,982	13,295	8,326	1,726	63,467	59.2
% on RRT	8.1	11.2	20.3	23.6	20.9	13.1	2.7	100.0	
Sex (%)									
Male	7.9	11.0	20.2	23.7	20.9	13.4	3.0	61.1	59.5
Female	8.4	11.5	20.6	23.5	21.1	12.6	2.3	38.9	58.8
Ethnicity (%)									
White	8.0	10.5	20.2	22.8	21.7	13.8	3.1	76.1	59.7
South Asian	9.8	13.6	17.6	25.6	21.3	10.7	1.5	12.4	59.0
Black	6.4	12.8	26.8	26.4	13.7	11.7	2.1	7.8	56.2
Other	10.5	14.9	21.4	22.9	18.6	9.8	2.0	3.7	56.0
Missing	6.9	10.3	19.6	26.3	21.7	13.0	2.3	6.7	60.0
PRD (%)									
Diabetes	2.4	9.0	19.8	27.5	24.8	14.1	2.3	17.8	61.8
Glomerulonephritis	9.4	14.0	23.1	24.8	18.8	8.7	1.2	19.7	56.2
Hypertension	3.0	8.5	20.5	22.7	21.1	19.3	4.9	6.3	62.8
Polycystic kidney	1.7	5.9	22.2	33.5	26.2	9.6	0.8	10.3	60.9
Pyelonephritis	11.7	14.8	24.5	20.8	15.6	10.1	2.4	10.4	54.5
Renal vascular disease	1.9	2.0	5.3	13.5	28.3	38.5	10.6	3.0	74.8
Other	16.4	14.1	19.1	19.6	18.6	10.4	1.8	17.0	55.2
Uncertain aetiology	7.9	11.0	18.4	20.2	20.7	16.8	5.1	15.5	61.3
Missing	4.7	2.7	2.4	2.5	2.7	3.6	3.7	2.9	59.7
Modality (%)									
ICHD	4.3	6.3	13.8	20.1	24.7	24.5	6.3	37.3	67.5
HHD	9.4	12.9	26.5	26.5	18.3	6.2	0.2	2.0	55.3
PD	6.5	8.6	15.3	21.2	23.6	20.9	3.9	5.4	64.4
Tx	10.8	14.7	25.1	26.2	18.2	4.8	0.2	55.2	54.8

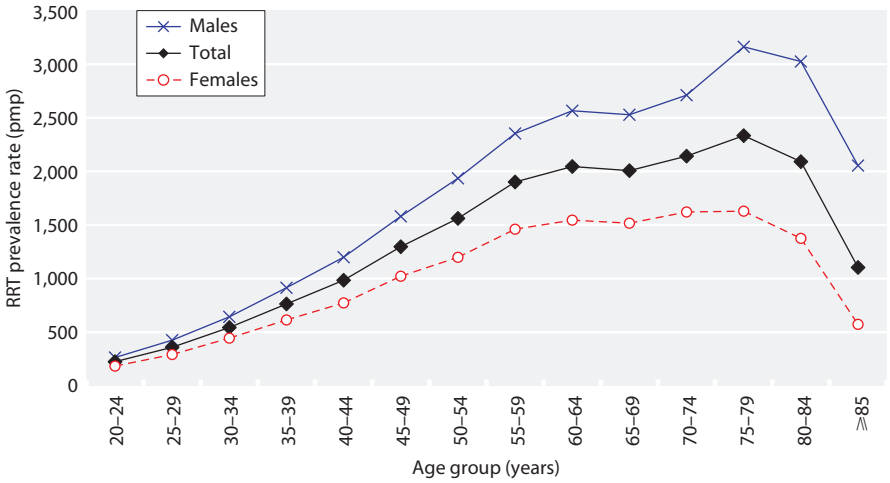


Figure 2.4 Prevalence rates for adult patients on RRT on 31/12/2017 by age group and sex

For each modality, the percentage of patients of each year of age is shown, with the totals of each modality adding to 100%.

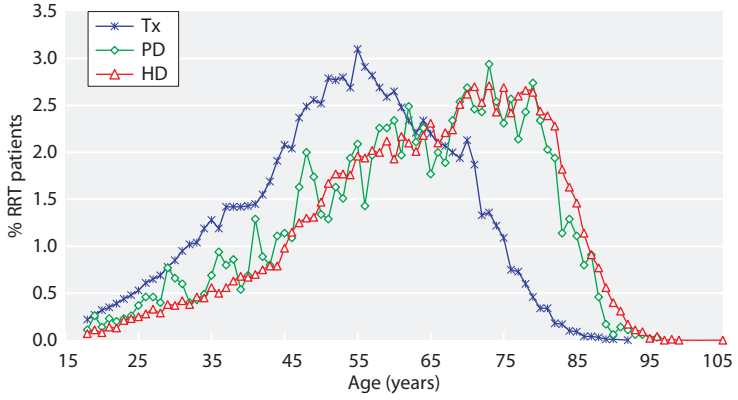


Figure 2.5 Age profile of adult patients prevalent to RRT on 31/12/2017 by RRT modality

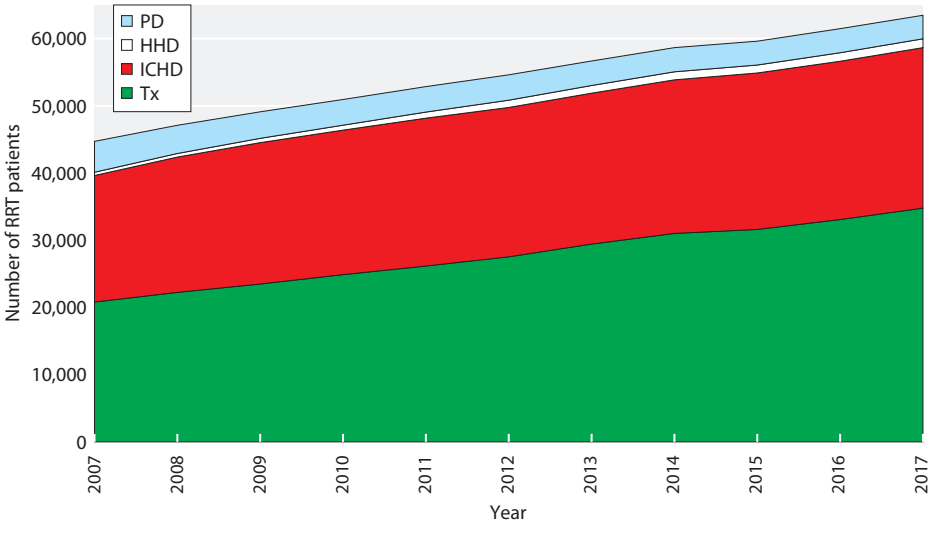


Figure 2.6 Growth in numbers of prevalent adult RRT patients by treatment modality between 2007 and 2017

Table 2.4 Change in adult RRT prevalence rates by modality between 2013 and 2017

	Prevalence (pmp)					% growth in prevalence				
Year	HD	PD	Dialysis	Tx	RRT	HD	PD	Dialysis	Tx	RRT
2013	368	57	425	459	884					
2014	372	56	428	480	908	1.1	−2.1	0.7	4.6	2.7
2015	385	55	440	499	939	3.3	−0.9	2.8	4.0	3.4
2016	385	55	439	521	960	0.0	−0.5	−0.1	4.2	2.2
2017	387	53	440	542	983	0.5	−2.6	0.1	4.2	2.3
Average annual growth 2013–2017						**1.3**	**−1.5**	**0.9**	**4.3**	**2.7**

pmp – per million population

In table 2.5, for each PRD category, the proportion of patients on each treatment modality 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 2.5 Treatment modality of adult patients prevalent to RRT on 31/12/2017 by primary renal disease (PRD)

			Modality (%)		
PRD	*N* on RRT	% RRT population	HD	PD	Tx
Diabetes	10,969	17.8	57.9	6.9	35.2
Glomerulonephritis	12,120	19.7	28.9	4.9	66.1
Hypertension	3,909	6.3	46.7	6.7	46.7
Polycystic kidney	6,372	10.3	21.8	3.7	74.5
Pyelonephritis	6,391	10.4	31.1	3.4	65.5
Renal vascular disease	1,844	3.0	68.8	9.8	21.5
Other	10,463	17.0	36.7	4.8	58.5
Uncertain aetiology	9,548	15.5	41.1	6.0	52.9
Total (with data)	**61,616**	**100.0**			
Missing	1,851	2.9	58.8	9.7	31.5

The treatment modality distribution for prevalent adult RRT patients is further divided by treatment location for HD patients – hospital unit, satellite unit or home – and for PD patients by type of PD – automated PD (APD) and continuous ambulatory PD (CAPD).

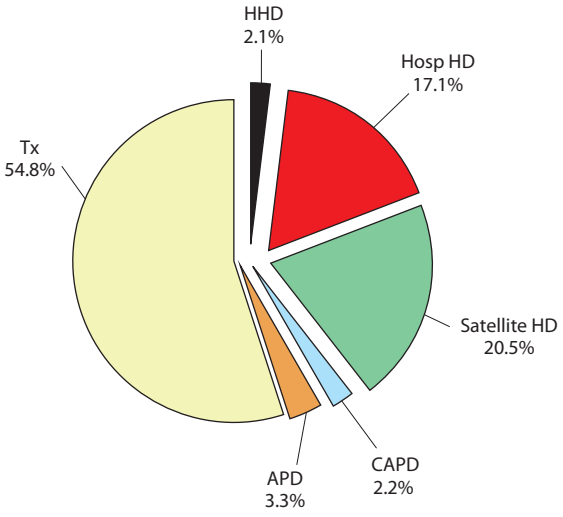


Figure 2.7 Detailed treatment modality of adult patients prevalent to RRT on 31/12/2017
APD – automated PD; CAPD – continuous ambulatory PD

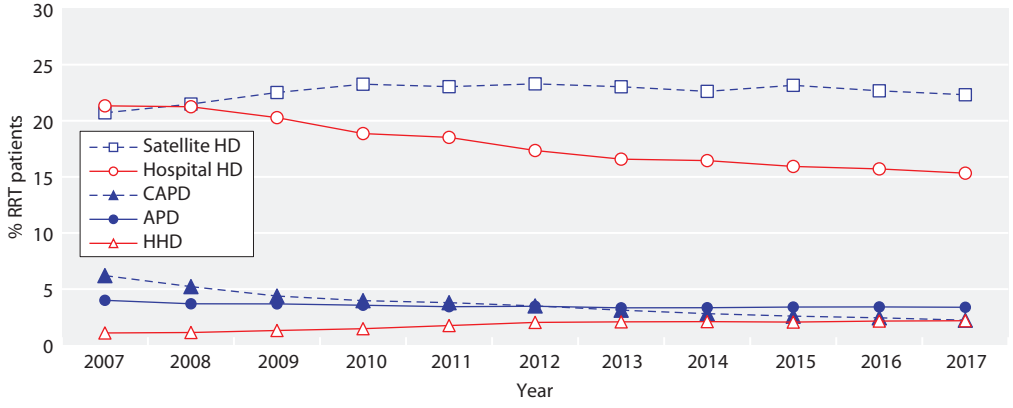


Figure 2.8 Detailed dialysis modality changes in prevalent adult RRT patients between 2007 and 2017
APD – automated PD; CAPD – continuous ambulatory PD

Table 2.6 Adult patients prevalent to dialysis on 31/12/2017 by detailed dialysis modality and centre

		% on HD				% on PD		
Centre	*N* on dialysis	All HD	HHD	Hospital	Satellite	All PD	CAPD	APD
ENGLAND								
B Heart	484	81.8	4.3	72.5	5.0	18.2	3.5	14.7
B QEH	1,169	86.1	4.6	11.3	70.2	13.9	3.6	10.3
Basldn	203	86.2	3.5	64.0	18.7	13.8	6.4	7.4
Bradfd	298	93.3	3.0	76.2	14.1	6.7	1.7	5.0
Brightn	524	88.7	7.6	36.3	44.9	11.3	5.5	5.7
Bristol	567	89.8	3.0	16.4	70.4	10.2	5.1	5.1
Camb	377							
Carlis	126	77.8	0.0	57.1	20.6	22.2	1.6	20.6
Carsh	965	90.1	2.8	18.6	68.7	10.0	2.1	7.9
Chelms	166	78.9	1.8	77.1	0.0	21.1	6.6	14.5
Colchr	127	100.0	0.0	100.0	0.0	0.0	0.0	0.0
Covnt	395	86.8	3.5	83.3	0.0	13.2	13.2	0.0
Derby	322	75.5	16.2	59.3	0.0	24.5	16.2	8.4
Donc	216	86.6	4.2	43.1	39.4	13.4	2.3	11.1
Dorset	339	89.7	3.0	22.7	64.0	10.3	2.1	7.7
Dudley	272	79.8	4.8	31.3	43.8	20.2	12.1	8.1
Exeter	542	86.2	2.4	10.2	73.6	13.8	5.2	8.7
Glouc	293	84.6	1.7	66.6	16.4	15.4	2.1	13.3
Hull	410	86.3	1.5	44.2	40.7	13.7	6.8	6.8
Ipswi	199	77.4	4.0	63.8	9.6	22.6	11.1	11.1
Kent	496	89.5	4.2	30.7	54.6	10.5	8.5	2.0
L Barts	1,297	81.8	2.4	35.2	44.3	18.2	2.2	16.0
L Guys	746	94.8	5.5	13.4	75.9	5.2	1.1	4.2
L Kings	688	85.9	2.9	15.7	67.3	14.1	6.7	7.4
L Rfree	847	82.9	2.0	3.4	77.5	17.1	6.1	11.0
L St.G	358	89.7	1.4	17.3	71.0	10.3	4.2	5.6
L West	1,582	92.3	0.8	19.5	72.1	7.7	3.8	3.9
Leeds	620	90.5	3.7	21.1	65.7	9.5	3.4	6.1
Leic	1,068	90.9	6.7	17.8	66.4	9.1	1.4	7.7
Liv Ain	202	89.1	6.9	8.9	73.3	10.9	0.0	10.9
Liv Roy	466	85.0	8.4	38.0	38.6	15.0	7.7	7.3
M RI	647	89.2	11.9	26.7	50.5	10.8	3.6	7.3
Middlbr	359	94.2	3.3	26.5	64.4	5.9	5.9	0.0
Newc	407	85.5	5.2	66.3	14.0	14.5	1.0	13.5
Norwch	359	88.0	3.9	52.4	31.8	12.0	11.4	0.6
Nottm	456	84.7	7.5	33.3	43.9	15.4	5.0	10.3
Oxford	535	87.3	3.0	34.2	50.1	12.7	4.3	8.2
Plymth	201	75.6	5.0	60.7	10.0	24.4	8.0	16.4
Ports	694	87.9	9.4	17.2	61.4	12.1	12.1	0.0
Prestn	600	94.3	8.2	21.0	65.2	5.7	1.7	4.0
Redng	347	88.8	1.7	41.8	45.2	11.2	7.5	3.8
Salford	545	78.5	7.5	21.5	49.5	21.5	7.2	14.3
Sheff	654	91.6	7.7	36.5	47.4	8.4	8.4	0.0
Shrew	248	83.1	8.9	43.6	30.7	16.9	2.8	14.1
Stevng	519	95.6	5.8	42.4	47.4	4.4	4.4	0.0
Sthend	156	78.2	1.3	76.9	0.0	21.8	21.8	0.0
Stoke	405	82.0	6.9	48.4	26.7	18.0	2.0	11.4
Sund	280	94.3	7.5	55.7	31.1	5.7	2.9	2.9
Truro	184	91.9	4.9	37.0	50.0	8.2	3.3	4.9
Wirral	231	91.8	3.9	42.4	45.5	8.2	2.2	6.1
Wolve	388	86.1	8.3	59.8	18.0	13.9	3.6	8.5
York	231	84.9	5.6	29.0	50.2	15.2	11.7	3.5

Table 2.6 Continued

Centre	*N* on dialysis	% on HD				% on PD		
		All HD	HHD	Hospital	Satellite	All PD	CAPD	APD
N IRELAND								
Antrim	135	89.6	3.0	86.7	0.0	10.4	0.0	10.4
Belfast	205	91.7	3.9	87.8	0.0	8.3	0.0	8.3
Newry	103	77.7	1.9	75.7	0.0	22.3	1.0	21.4
Ulster	116	94.8	0.9	94.0	0.0	5.2	0.0	5.2
West NI	125	92.8	2.4	90.4	0.0	7.2	0.0	6.4
SCOTLAND								
Abrdn	249	91.2	1.6	89.6	0.0	8.8	6.8	2.0
Airdrie	210	92.4	1.0	91.4	0.0	7.6	4.3	3.3
D&Gall	59	89.8	3.4	86.4	0.0	10.2	3.4	6.8
Dundee	207	91.3	1.0	90.3	0.0	8.7	8.7	0.0
Edinb	351	90.3	1.1	89.2	0.0	9.7	1.4	8.3
Glasgw	637	92.5	2.4	90.1	0.0	7.5	1.6	6.0
Inverns	98	89.8	5.1	84.7	0.0	10.2	10.2	0.0
Klmarnk	178	86.5	5.6	80.9	0.0	13.5	1.1	12.4
Krkcldy	150	93.3	0.0	93.3	0.0	6.7	0.7	6.0
WALES								
Bangor	101	83.2	10.9	49.5	22.8	16.8	4.0	12.9
Cardff	639	88.7	6.0	6.1	76.7	11.3	6.1	5.2
Clwyd	86	86.1	2.3	83.7	0.0	14.0	8.1	5.8
Swanse	456	83.8	7.5	43.0	33.3	16.2	7.0	9.2
Wrexm	149	81.9	2.7	68.5	10.7	18.1	0.0	18.1
TOTALS								
England	24,810	87.6	4.8	32.3	50.5	12.5	5.0	7.3
N Ireland*	684	89.9	2.6	87.3	0.0	10.1	0.2	9.8
Scotland*	2,139	91.2	2.1	89.2	0.0	8.8	3.5	5.3
Wales	1,431	85.9	6.2	32.1	47.6	14.1	5.7	8.4
UK	29,064	87.8	4.6	37.8	45.4	12.2	4.8	7.3

Blank cells – no data returned by the centre
*There were no satellite units in Northern Ireland; all HD patients in Scotland were shown as receiving treatment at home or in hospital as no data were available regarding satellite dialysis
APD – automated PD; CAPD – continuous ambulatory PD

The proportion of HD patients in a centre on HHD versus satellite HD is shown in figure 2.9, with the remaining patients on hospital HD. Patients on HHD will be reported in a separate chapter in next year's annual report.

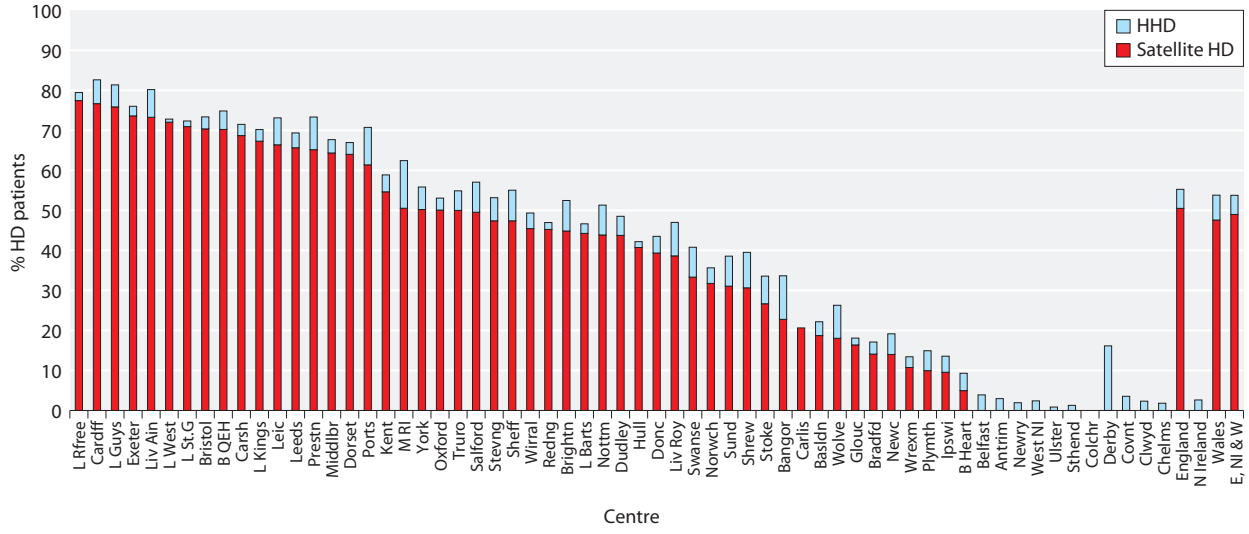


Figure 2.9 Adult patients prevalent to HD on 31/12/2017 treated with satellite HD or HHD by centre

Dialysis access in prevalent adult dialysis patients

The type of dialysis access used by the prevalent dialysis population is described in chapter 3.

Survival in adult dialysis patients

Survival was analysed in prevalent patients receiving dialysis on 31/12/2016 and followed-up for one year in 2017. Survival in patients with a Tx is presented in chapter 5.

Survival analyses, where stated, are adjusted to age 60 years to allow comparisons between centres with different age distributions. Analyses are of dialysis cohorts as defined in the titles of each table and figure.

The age adjusted one year survival of dialysis patients by centre is presented in a funnel plot (figure 2.10), with centres identifiable from the x-axis using the number of prevalent dialysis patients by centre in table 2.7.

Table 2.7 1 year survival (adjusted to age 60 years) of adult patients prevalent to dialysis on 31/12/2016 by centre

Centre	*N* on dialysis	Adj 1 yr survival (%)	Limits for funnel plot	
			Lower 95% limit	Upper 95% limit
D&Gall	58	86.8	77.1	94.3
Clwyd	84	86.7	79.4	93.5
Bangor	84	93.3	79.4	93.5
Inverns	97	84.8	80.1	93.2
Newry	99	83.5	80.2	93.2
Ulster	112	93.6	80.8	93.0
Colchr	114	89.9	80.9	92.9
Carlis	123	86.2	81.2	92.8
Antrim	137	86.5	81.6	92.6
Sthend	139	88.4	81.7	92.6
Wrexm	142	92.5	81.8	92.5
West NI	143	89.1	81.8	92.5
Krkcldy	153	82.7	82.0	92.4
Klmarnk	158	85.5	82.1	92.4
Plymth	164	82.7	82.3	92.3
Chelms	165	92.7	82.3	92.3
Truro	176	88.1	82.5	92.2
Ipswi	186	90.8	82.7	92.1
Dundee	187	87.4	82.7	92.1
Basldn	198	88.1	82.9	92.0
Airdrie	199	85.3	82.9	92.0
Liv Ain	204	83.8	83.0	91.9
Wirral	206	89.6	83.0	91.9
York	216	89.9	83.1	91.8
Donc	216	86.2	83.1	91.8
Shrew	224	89.4	83.2	91.8
Abrdn	238	87.1	83.4	91.7
Belfast	242	89.7	83.5	91.7
Sund	242	87.9	83.5	91.7
Dudley	253	90.9	83.6	91.6
Bradfd	255	89.7	83.6	91.6
Glouc	274	90.5	83.8	91.5
Edinb	305	87.9	84.0	91.3
Derby	306	87.7	84.1	91.3
Dorset	321	89.6	84.2	91.3
Middlbr	334	84.7	84.2	91.2
Redng	338	86.1	84.3	91.2
Newc	345	90.0	84.3	91.2
L St.G	361	88.9	84.4	91.1
Wolve	366	88.7	84.4	91.1
Hull	373	87.8	84.5	91.1
Norwch	377	88.4	84.5	91.1
Stoke	403	86.3	84.6	91.0
Swanse	408	87.8	84.7	91.0
Covnt	427	86.4	84.8	90.9
Liv Roy	430	89.2	84.8	90.9
B Heart	456	85.0	84.9	90.8
Nottm	457	85.8	84.9	90.8
Kent	459	86.7	84.9	90.8
Salford	462	87.8	84.9	90.8
Brightn	481	86.9	85.0	90.8
Oxford	505	88.8	85.1	90.7
Exeter	513	89.0	85.1	90.7
Bristol	530	87.2	85.1	90.7

Table 2.7 Continued

Centre	*N* on dialysis	Adj 1 yr survival (%)	Limits for funnel plot	
			Lower 95% limit	Upper 95% limit
Leeds	534	88.2	85.1	90.7
Stevng	539	85.6	85.2	90.6
M RI	560	88.2	85.2	90.6
Cardff	562	87.6	85.2	90.6
Prestn	579	88.8	85.3	90.6
Glasgw	588	86.7	85.3	90.5
Sheff	639	87.2	85.4	90.5
L Kings	643	88.7	85.4	90.5
Ports	669	87.1	85.5	90.4
L Guys	696	89.6	85.6	90.4
L Rfree	822	86.1	85.8	90.2
Carsh	920	89.7	85.9	90.1
Leic	966	89.6	86.0	90.1
B QEH	1,115	91.7	86.1	89.9
L Barts	1,152	89.3	86.2	89.9
L West	1,509	88.8	86.4	89.7

Centres are ordered by increasing number of patients

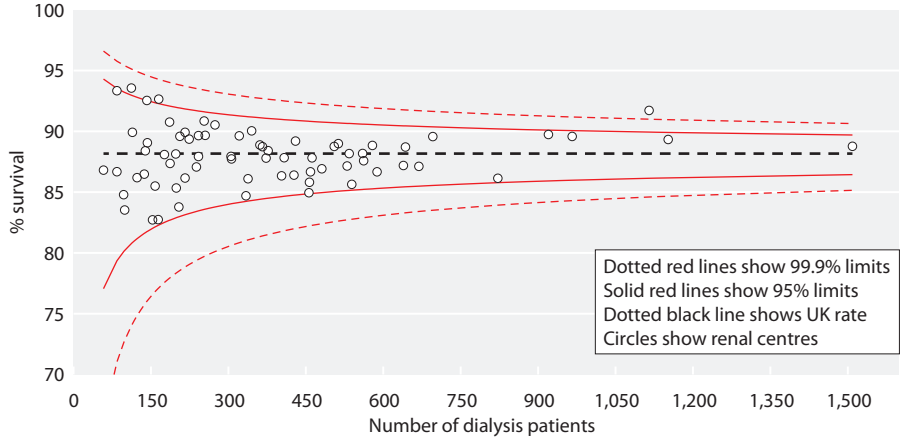


Figure 2.10 1 year survival (adjusted to age 60 years) of adult patients prevalent to dialysis on 31/12/2016 by centre

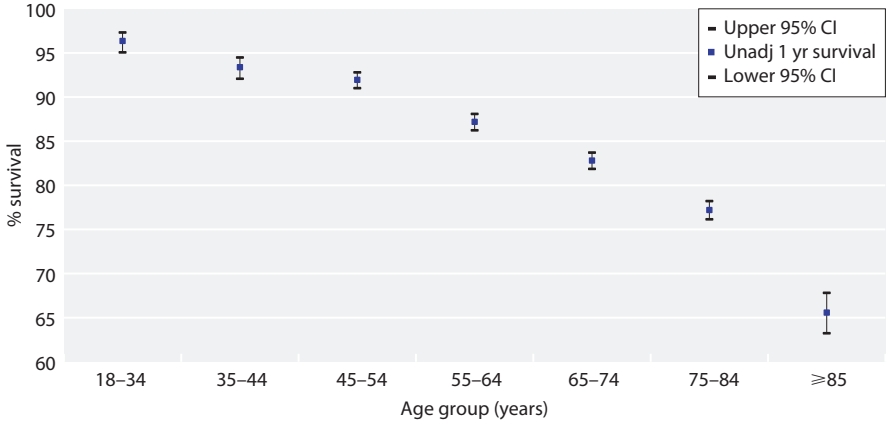


Figure 2.11 1 year survival (unadjusted) of adult patients prevalent to dialysis on 31/12/2016 by age group
CI – confidence interval

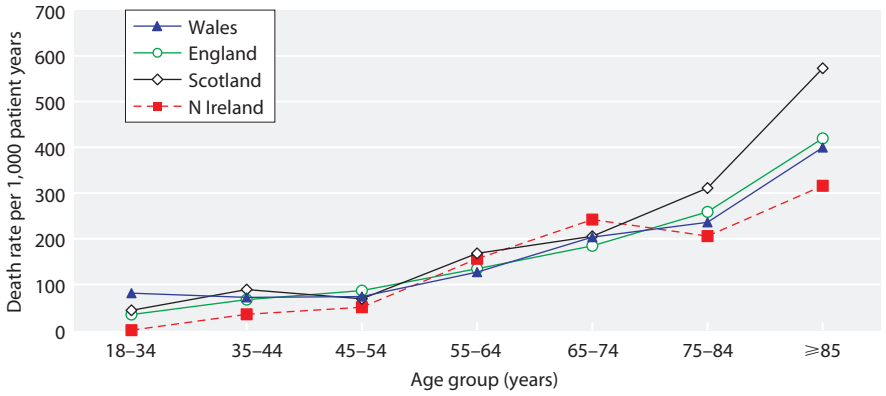


Figure 2.12 1 year death rate per 1,000 patient years for adult patients prevalent to dialysis on 31/12/2016 by country and age group

The serial one year death rate in prevalent adult dialysis patients by country is shown in figure 2.13, adjusted to age 60 years.

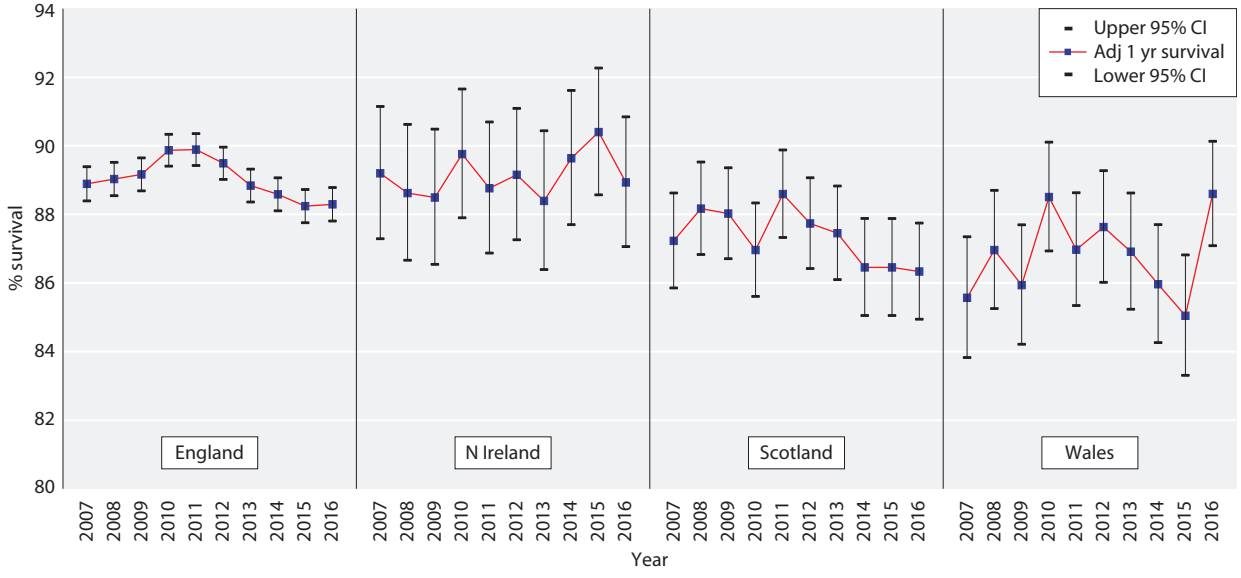


Figure 2.13 1 year survival (adjusted to age 60 years) for prevalent adult dialysis patients by country between 2007 and 2016
CI – confidence interval

The relative risk of death by age group for prevalent RRT patients compared to the general population's risk of death, calculated using Office for National Statistics UK population and deaths data, is shown in table 2.8.

Table 2.8 Death rate by age group for adult patients prevalent to RRT on 31/12/2016 followed-up for 1 year compared with the general population and with previous analyses in the 1998–2001 cohort

Age group (yrs)	UK population mid-2016 (thousands)	UK deaths in 2017	Death rate per 1,000 population	Expected number of deaths in UKRR population	UKRR deaths in 2017	UKRR death rate per 1,000 prevalent RRT patients	Relative risk of death in 2017	Relative risk of death 1998–2001 cohort
20–24	4,254	1,426	0.3	0	3	3	9.6	41.1
25–29	4,511	2,002	0.4	1	23	15	33.0	41.8
30–34	4,408	2,807	0.6	2	31	13	20.8	31.2
35–39	4,180	4,154	1.0	3	48	16	16.1	26.0
40–44	4,174	5,891	1.4	5	105	27	19.4	22.6
45–49	4,619	9,897	2.1	12	158	28	13.2	19.0
50–54	4,632	14,889	3.2	22	275	40	12.4	12.8
55–59	4,067	20,134	5.0	35	399	57	11.4	10.1
60–64	3,534	27,913	7.9	52	507	77	9.8	10.4
65–69	3,637	42,198	11.6	74	660	103	8.9	7.9
70–74	2,852	59,532	20.9	119	846	149	7.1	7.2
75–79	2,155	74,296	34.5	149	885	205	5.9	5.3
80–84	1,607	97,678	60.8	175	797	277	4.5	4.0
⩾85	1,564	239,437	153.1	217	589	415	2.7	3.0
Total	**50,194**	**602,254**	**12.0**	**702**	**5,326**	**91**	**7.6**	**7.7**

Cause of death in adult RRT patients

Cause of death was analysed in prevalent patients receiving RRT on 31/12/2016 and followed-up for one year in 2017. The proportion of RRT 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 2.9 Cause of death in adult patients prevalent to RRT on 31/12/2016 followed-up in 2017 by age group

	RRT all ages		RRT <65 yrs		RRT ⩾65 yrs	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	747	22.7	270	28.9	477	20.3
Cerebrovascular disease	123	3.7	46	4.9	77	3.3
Infection	659	20.0	167	17.8	492	20.9
Malignancy	356	10.8	106	11.3	250	10.6
Treatment withdrawal	592	18.0	99	10.6	493	20.9
Other	592	18.0	190	20.3	402	17.1
Uncertain aetiology	221	6.7	58	6.2	163	6.9
Total (with data)	**3,290**	**100.0**	**936**	**100.0**	**2,354**	**100.0**
Missing	2,038	38.3	615	39.7	1,423	37.7

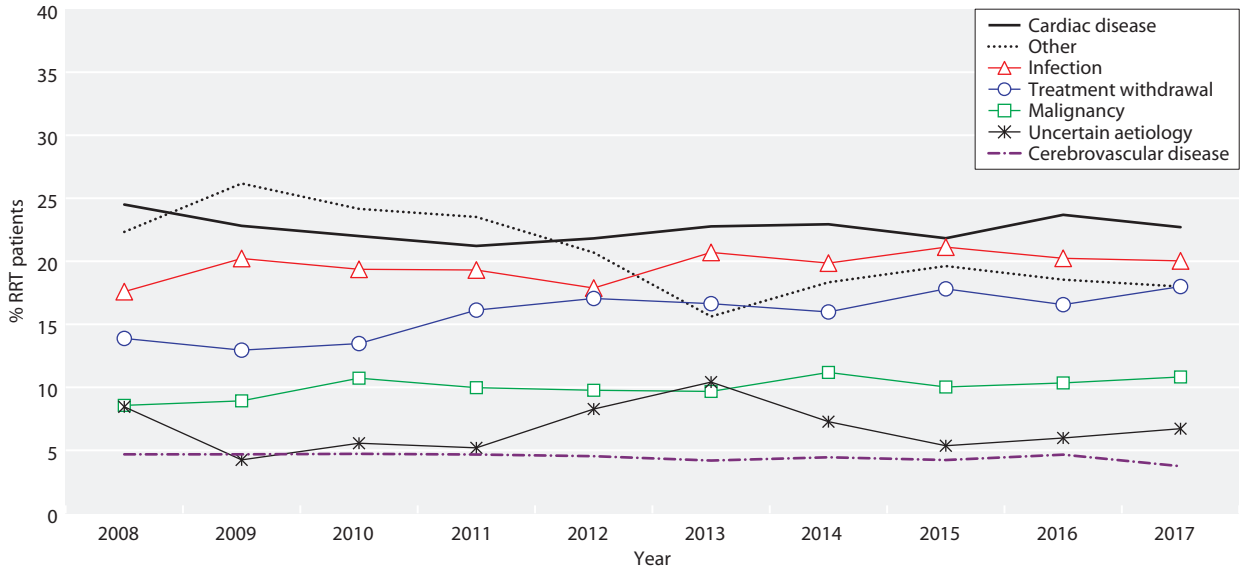


Figure 2.14 Cause of death for prevalent adult RRT patients between 2008 and 2017



Chapter 3

Adults on in-centre haemodialysis (ICHD) in the UK at the end of 2017

Contents

Introduction 69
Rationale for analyses 71
Key findings 73
Analyses 74
- Changes to the prevalent adult ICHD population 74
- Demographics of prevalent adult ICHD patients 76
- Adequacy of dialysis in prevalent adult ICHD patients 78
- Biochemistry parameters in prevalent adult ICHD patients 82
- Anaemia in prevalent adult ICHD patients 87
- Dialysis access in prevalent adult dialysis patients 93
- Infections in adult haemodialysis patients 95
- Cause of death in adult ICHD patients 99

Introduction

This chapter describes the population of adult patients with end-stage kidney disease (ESKD) who were receiving regular in-centre haemodialysis (ICHD) in the UK at the end of 2017 (figure 3.1). This population comprises patients who were on ICHD at the end of 2016 and remained on ICHD throughout 2017, as well as patients who commenced/re-commenced ICHD in 2017. This latter group includes both incident renal replacement therapy (RRT) patients who ended 2017 on ICHD and prevalent RRT patients who switched to ICHD from home haemodialysis (HHD), peritoneal dialysis (PD), or a transplant (Tx) in 2017. Consequently, the cohort of patients receiving ICHD in a centre not only reflects differences in underlying population case-mix, but also differences in the rates of acceptance onto RRT, survival on ICHD, transplantation and home therapies (HHD and PD), and the care of patients on those other modalities, as described in other chapters of this report. Patients on HHD will be reported in a separate chapter in next year's annual report.

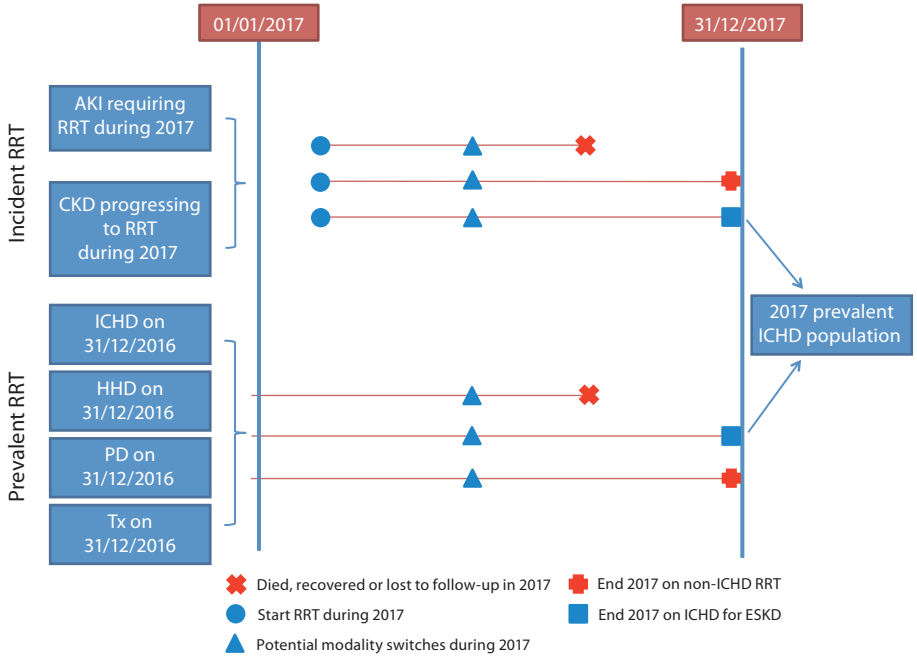


Figure 3.1 Pathways adult patients could follow to be included in the UK 2017 prevalent ICHD population

Note that patients receiving dialysis for acute kidney injury (AKI) are only included in this chapter if they had a timeline or RRT modality code for chronic ICHD at the end of 2017 or if they had been on RRT for ⩾90 days and were on ICHD at the end of 2017
CKD – chronic kidney disease

The infection analyses used a rolling two year cohort as per the audit measures (table 3.1). The cause of death analyses were undertaken on historic prevalent cohorts to allow sufficient follow-up time.

This chapter addresses the following key aspects of care of patients on ICHD for which there are Renal Association guidelines (table 3.1):

- **Complications associated with ESKD and ICHD** – these include anaemia and mineral bone disorders
- **Adequacy of ICHD** – measures of dialysis care include urea clearance and frequency and length of dialysis sessions. Currently, the urea reduction ratio (URR) is the only urea clearance measure routinely reported to the UK Renal Registry (UKRR)
- **Type of ICHD access** – definitive access – either a surgically created arteriovenous fistula (AVF) or arteriovenous graft (AVG). Alternatively, more temporary access can be provided through a central venous catheter (CVC) – either a tunnelled line (TL) or a non-tunnelled line (NTL)
- **Infections associated with ICHD** – rates of the four infections subject to mandatory reporting to Public Health England (PHE) are reported in this chapter – methicillin-resistant *Staphylococcus aureus* (MRSA), methicillin-sensitive *Staphylococcus aureus* (MSSA), *Escherichia coli* bacteraemia and *Clostridium difficile*.

Rationale for analyses

The analyses begin with a description of the 2017 prevalent adult ICHD population, including the number on ICHD per million population (pmp), dialysis duration and frequency. Also reported is dialysis adequacy measured by URR, because this formed part of the specialised services quality dashboard during this period.

The Renal Association guidelines (https://renal.org/guidelines/) provide audit measures relevant to the care of patients on ICHD and, where data permit, their attainment by UK renal centres in 2017 is reported in this chapter (table 3.1). Audit measures in guidelines that have been archived (for example, 'Haemodialysis', 'Blood borne viruses' and 'Nutrition') are not included, with the exception of the potassium and bicarbonate measures, which will remain in the forthcoming 2019 haemodialysis (HD) guideline, albeit with an amended target range for bicarbonate of 18–26 mmol/L.

Some audit measures in current guidelines – for example, the target for glycated haemoglobin in those on hypoglycaemia-inducing treatment – 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 on the UKRR website. Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted.

Where revised target ranges are published, the measures in place at the time of patient care are reported. However, where new guidelines remove audit measures, those targets are no longer reported – in this chapter this applies to phosphate and parathyroid hormone.

Table 3.1 The Renal Association audit measures relevant to ICHD that are reported in this chapter

The Renal Association guideline	Audit criteria	Related analysis/analyses
CKD mineral bone disorder (2018)	Percentage of patients with serum calcium above the normal reference range of 2.2–2.5 mmol/L	Table 3.6, figure 3.6
HD (forthcoming 2019 guideline and in archived 2009 guideline)	Proportion of patients with pre-dialysis bicarbonate 18–26 mmol/L	Table 3.7, figure 3.8
	Proportion of patients with pre-dialysis potassium 4.0–6.0 mmol/L	Table 3.7, figure 3.9
Anaemia (2017)	Proportion of patients with serum ferritin <100 μg/L at start of treatment with erythropoiesis stimulating agent (ESA)	Table 3.8, figure 3.13 (the UKRR does not hold treatment with ESA start dates)
	Proportion of patients with haemoglobin <100 g/L not on ESA	Table 3.9
	Proportion of patients on ESA with haemoglobin >120 g/L	Table 3.9, figure 3.15
	Mean (median) ESA dose in patients maintained on ESA therapy	Table 3.9
Vascular access (2015)	Proportion of prevalent dialysis patients with definitive access (AVF/AVG/PD catheter) – ⩾80%	Figure 3.17
	Annual rate of MRSA <1 episode/100 patient years (measured over 2 years)	Table 3.10, figures 3.18, 3.20
	Annual rate of MSSA <2.5 episodes/100 patient years (measured over 2 years)	Table 3.10, figures 3.19, 3.21
Planning, initiating and withdrawing RRT (2014)	Number of patients withdrawing from ICHD as a proportion of all deaths on ICHD	Table 3.11, figure 3.22

AVF – arteriovenous fistula; AVG – arteriovenous graft; ESA – erythropoiesis stimulating agent; MRSA – methicillin-resistant *Staphylococcus aureus*; MSSA – methicillin-sensitive *Staphylococcus aureus*

For definitions and methods relating to this chapter see appendix A. The number preceding the centre name in each caterpillar plot indicates the percentage of missing data for that centre. Caterpillar plots exclude centres with <70% data completeness but include centres with small numbers of patients.

Cambridge renal centre (Addenbrooke's Hospital) was unable to submit patient level data for 2015–2017. While data extraction issues have now been resolved, the UKRR and Cambridge are working to load and validate the backlog of data for these years. Using aggregate numbers of patients starting RRT by treatment modality, it is possible to report treatment rates for Cambridge, but no other quality assurance for the service provided.

Key findings

- 24,218 adult patients were receiving ICHD for ESKD in the UK on 31/12/2017, which represented 37.3% of the RRT population
- The median age of ICHD patients was 67.5 years and 61.9% were male
- 86.8% of ICHD patients achieved a dialysis adequacy of URR >65%
- 94.5% of ICHD patients had dialysis 3 times a week
- 74.5% of ICHD patients had dialysis for 4–5 hours per session
- The median adjusted calcium for ICHD patients was 2.3 mmol/L and 10.8% were above the target range 2.2–2.5 mmol/L
- The median haemoglobin and ferritin for ICHD patients was 111 g/L and 416 μg/L, respectively, and 92.6% were on an ESA at a median dose of 8,000 IU/week
- 0.8% of ICHD patients had a haemoglobin <100 g/L not on an ESA and 19.2% had a haemoglobin >120 g/L on an ESA
- Of the 40 centres that provided adequate long term dialysis access data in England, Northern Ireland and Wales, 15 centres achieved the 80% target for definitive access amongst prevalent dialysis patients (AVF/AVG/PD catheter)
- The 2 year rates (2016–2017) of MRSA and MSSA bacteraemia were 0.19/100 patient years and 2.55/100 patient years, respectively
- There was no cause of death data available for 37.9% of deaths. For those with data, the leading cause of death in younger patients (<65 years) was cardiac disease (31.4%) and in older patients (⩾65 years) was treatment withdrawal (23.7%).

Analyses

Changes to the prevalent adult ICHD population

For the 71 adult renal centres, the number of prevalent patients on ICHD was calculated as both a proportion of the prevalent patients on RRT and as a proportion of the estimated centre catchment population (calculated as detailed in appendix A).

Table 3.2 Number of prevalent adult ICHD patients and proportion of adult RRT patients on ICHD by year and by centre; number of ICHD patients as a proportion of the catchment population

	N on ICHD					% on ICHD					Estimated catchment population (millions)	2017 crude rate (pmp)
Centre	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017		
ENGLAND												
B Heart	412	397	406	376	375	63.0	62.5	62.2	57.7	57.3	0.77	485
B QEH	878	900	957	956	953	42.9	42.2	42.6	40.0	37.8	1.78	536
Basldn	160	172	159	153	168	59.3	61.9	58.0	55.6	55.8	0.43	387
Bradfd	198	216	229	243	269	38.1	39.4	39.2	38.2	39.9	0.68	394
Brightn	354	378	387	419	425	40.6	41.4	40.7	42.2	42.0	1.36	313
Bristol	485	506	503	489	492	34.1	34.7	34.1	33.3	33.4	1.51	326
Camb	359	332	583	429	346	30.1	26.9	37.9	27.7	24.4	1.21	285
Carlis	67	74	81	94	98	29.5	29.6	28.8	33.8	34.9	0.34	292
Carsh	736	756	798	819	842	49.8	48.7	50.4	49.9	50.1	2.00	420
Chelms	121	133	142	129	128	50.2	51.0	49.8	47.1	45.2	0.53	239
Colchr	115	119	120	124	127	100.0	100.0	100.0	100.0	100.0	0.31	405
Covnt	359	359	348	366	329	38.7	37.4	36.3	37.5	34.2	0.93	352
Derby	184	200	209	199	191	39.7	39.0	38.8	36.7	34.4	0.74	260
Donc	162	175	172	185	178	62.5	61.6	57.0	56.1	53.5	0.43	415
Dorset	264	272	285	273	294	42.1	41.0	41.9	39.7	40.1	0.90	326
Dudley	161	160	161	188	204	51.9	52.5	51.3	54.5	55.4	0.46	441
Exeter	399	411	435	443	454	44.9	43.5	44.9	43.7	43.1	1.14	398
Glouc	210	209	224	235	243	51.3	48.8	50.6	49.9	48.2	0.61	395
Hull	318	319	350	323	348	39.1	39.8	40.9	37.9	40.0	1.07	326
Ipswi	120	122	143	147	146	33.8	33.2	35.4	35.5	33.9	0.42	349
Kent	370	389	409	409	423	38.6	38.4	39.4	38.1	38.8	1.28	330
L Barts	933	943	980	1,004	1,030	44.7	42.7	43.0	42.4	41.2	1.92	537
L Guys	585	599	628	645	666	32.0	31.3	31.2	30.8	30.8	1.13	588
L Kings	493	530	554	566	571	51.2	51.8	51.1	51.0	49.9	1.23	465
L Rfree	696	694	694	709	685	36.2	34.6	33.2	32.6	31.2	1.59	431
L St.G	276	305	334	343	316	36.6	38.6	39.7	40.3	37.5	0.84	378
L West	1,384	1,397	1,424	1,455	1,448	44.4	43.3	43.0	42.7	41.4	2.51	576
Leeds	489	502	490	508	538	33.4	33.5	32.2	32.8	33.2	1.75	308
Leic	831	837	856	890	899	40.2	39.1	39.3	38.7	37.9	2.55	352
Liv Ain	146	151	159	173	166	76.8	69.6	71.9	76.2	76.9	0.51	328
Liv Roy	322	338	345	325	357	25.5	26.7	27.9	26.8	28.4	1.05	341
M RI	457	467	474	465	500	24.7	26.0	25.2	23.6	24.3	1.60	312
Middlbr	332	324	340	321	326	40.1	37.9	37.7	36.1	36.3	1.05	310
Newc	251	265	292	295	327	26.1	27.1	28.9	28.1	29.2	1.17	279
Norwch	301	294	311	315	302	43.7	42.9	42.0	40.9	38.9	0.82	367
Nottm	342	332	358	365	352	31.9	31.3	32.2	31.6	30.0	1.14	309
Oxford	407	444	412	429	451	26.0	26.8	24.4	24.3	24.0	1.77	255
Plymth	128	133	129	136	142	25.5	26.5	25.6	26.6	26.3	0.49	289
Ports	568	571	613	562	545	36.8	35.9	36.7	33.3	31.2	2.12	257
Prestn	513	524	533	523	517	47.1	44.7	43.9	43.4	40.8	1.56	331
Redng	275	284	295	295	302	37.6	37.4	38.1	37.4	37.9	0.95	317
Salford	363	395	387	376	387	41.2	40.7	39.7	36.9	34.7	1.56	248

Table 3.2 Continued

Centre	*N* on ICHD					% on ICHD					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017		
Sheff	547	540	547	561	549	41.2	39.7	39.6	39.4	38.1	1.44	382
Shrew	170	178	178	186	184	50.3	51.0	48.5	49.6	48.9	0.52	351
Stevng	431	459	481	502	466	57.1	59.0	58.9	56.1	51.7	1.26	370
Sthend	118	115	124	111	120	53.6	48.3	50.4	47.0	47.6	0.33	362
Stoke	286	303	300	311	304	39.5	39.1	38.1	37.7	37.4	0.93	326
Sund	195	208	219	245	243	46.3	46.2	47.7	48.3	44.9	0.65	375
Truro	142	139	150	160	160	38.3	36.7	36.3	37.6	37.8	0.43	370
Wirral	198	197	174	188	203	79.8	70.9	61.9	55.8	52.5	0.60	339
Wolve	287	294	295	286	302	50.6	51.2	50.7	50.1	52.0	0.70	431
York	128	132	149	184	183	31.3	28.6	30.4	34.5	33.0	0.52	355
N IRELAND												
Antrim	124	122	120	122	117	55.4	53.3	50.2	50.0	47.2	0.30	384
Belfast	197	192	174	185	180	27.1	25.7	22.6	22.6	21.4	0.66	274
Newry	90	90	85	86	78	45.2	43.5	37.8	36.3	32.4	0.27	289
Ulster	101	95	106	101	109	65.2	63.8	62.4	60.1	59.2	0.27	397
West NI	108	114	119	125	113	45.4	41.6	40.6	40.7	36.1	0.36	311
SCOTLAND												
Abrdn	216	197	213	227	223	41.8	39.3	40.1	40.9	39.6	0.61	363
Airdrie	191	181	195	185	192	49.1	45.8	45.9	42.0	41.0	0.57	340
D&Gall	45	46	51	47	51	37.8	35.4	39.2	35.9	37.8	0.15	336
Dundee	167	164	185	177	187	42.0	40.9	44.0	42.2	42.6	0.47	394
Edinb	267	262	279	283	313	36.2	35.1	36.3	36.4	37.4	0.99	317
Glasgw	572	538	579	571	574	36.1	33.5	33.9	32.6	32.4	1.66	345
Inverns	68	66	90	86	83	31.5	29.3	35.6	33.2	31.6	0.28	300
Klmarnk	130	124	126	133	144	43.9	41.5	40.6	42.0	42.6	0.37	389
Krkcldy	147	143	149	144	140	51.9	51.6	50.5	49.0	46.8	0.32	432
WALES												
Bangor	72	70	69	64	73	72.7	68.6	37.9	35.8	37.6	0.23	316
Cardff	447	458	470	486	529	28.3	28.8	29.2	29.9	31.4	1.50	352
Clwyd	73	86	77	69	72	48.0	51.8	41.6	39.0	39.8	0.20	359
Swanse	309	294	338	340	348	44.7	41.7	44.1	43.9	44.0	0.94	371
Wrexm	99	112	107	115	118	39.4	39.7	36.5	37.1	37.0	0.25	464
TOTALS												
England	**19,026**	**19,493**	**20,326**	**20,433**	**20,574**	**39.8**	**39.3**	**39.4**	**38.4**	**37.6**	**55.62**	**370**
N Ireland	**620**	**613**	**604**	**619**	**597**	**40.2**	**38.2**	**35.6**	**34.9**	**32.6**	**1.87**	**319**
Scotland	**1,803**	**1,721**	**1,867**	**1,853**	**1,907**	**39.7**	**37.6**	**38.6**	**37.5**	**37.3**	**5.42**	**352**
Wales	**1,000**	**1,020**	**1,061**	**1,074**	**1,140**	**36.0**	**35.8**	**34.9**	**35.0**	**36.0**	**3.13**	**365**
UK	**22,449**	**22,847**	**23,858**	**23,979**	**24,218**	**39.6**	**39.0**	**39.0**	**38.0**	**37.3**	**66.04**	**367**

Country dialysis populations were calculated by summing the dialysis patients from centres in each country. Estimated country populations were derived from Office for National Statistics figures rather than from summing the estimated catchment populations of renal centres which may cross country borders

Breakdown of HD patients into ICHD and HHD is not available for Cambridge – the ICHD figure is the total HD percentage

pmp – per million population

Demographics of prevalent adult ICHD patients

The proportion of ICHD 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 3.3 Demographics of adult patients prevalent to ICHD on 31/12/2017 by centre

						Ethnicity				
Centre	*N* on RRT	*N* on ICHD	% on ICHD	Median age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing
ENGLAND										
B Heart	654	375	57.3	67.4	59.7	53.1	34.7	10.9	1.3	0.0
B QEH	2,524	953	37.8	65.9	59.1	51.4	29.6	14.2	4.8	2.2
Basldn	301	168	55.8	66.8	67.9	85.2	3.1	5.6	6.2	3.6
Bradfd	674	269	39.9	64.7	60.6	47.2	47.9	2.6	2.2	0.7
Brightn	1,013	425	42.0	69.4	66.1	90.8	5.2	2.2	1.7	5.6
Bristol	1,473	492	33.4	69.7	64.0	83.3	4.7	9.6	2.4	0.0
Camb										
Carlis	281	98	34.9	67.0	63.3	100.0	0.0	0.0	0.0	2.0
Carsh	1,681	842	50.1	69.6	63.2	63.1	16.2	13.3	7.4	4.2
Chelms	283	128	45.2	69.7	68.0	89.8	3.9	2.4	3.9	0.8
Colchr	127	127	100.0	73.5	64.6	100.0	0.0	0.0	0.0	0.8
Covnt	962	329	34.2	69.8	62.3	75.3	16.5	7.0	1.2	0.3
Derby	556	191	34.4	65.0	60.7	80.4	11.1	4.8	3.7	1.0
Donc	333	178	53.5	70.3	59.0	93.3	2.2	1.7	2.8	0.0
Dorset	734	294	40.1	71.5	66.0	94.9	2.7	0.7	1.7	0.0
Dudley	368	204	55.4	68.5	64.2	82.4	11.8	4.9	1.0	0.0
Exeter	1,054	454	43.1	73.0	67.2	97.4	0.4	1.1	1.1	0.2
Glouc	504	243	48.2	72.3	64.6	92.1	2.5	3.3	2.1	0.4
Hull	871	348	40.0	67.8	67.0	97.4	2.1	0.3	0.3	2.3
Ipswi	431	146	33.9	72.0	65.1	83.8	0.7	4.2	11.3	2.7
Kent	1,091	423	38.8	69.0	61.9	93.6	3.1	1.4	1.9	0.2
L Barts	2,497	1,030	41.2	61.9	61.1	25.3	32.8	28.9	12.9	0.0
L Guys	2,159	666	30.8	62.6	60.5	45.7	5.2	42.4	6.7	4.1
L Kings	1,145	571	49.9	63.4	60.4	44.6	12.3	39.8	3.3	0.2
L Rfree	2,193	685	31.2	66.6	62.3	40.8	22.8	28.9	7.5	4.5
L St.G	843	316	37.5	66.5	57.0	29.1	29.4	34.3	7.3	8.5
L West	3,498	1,448	41.4	66.3	58.6	31.8	35.8	24.6	7.7	0.0
Leeds	1,621	538	33.2	61.7	61.5	72.8	18.7	6.7	1.9	0.4
Leic	2,374	899	37.9	68.8	64.1	67.7	23.0	6.4	3.0	5.8
Liv Ain	216	166	76.9	72.2	65.1	96.9	0.0	1.9	1.2	3.0
Liv Roy	1,255	357	28.4	63.0	63.3	87.4	1.4	5.2	6.0	2.5
M RI	2,059	500	24.3	64.9	57.8	55.9	14.5	26.0	3.6	0.6
Middlbr	898	326	36.3	68.6	61.7	91.7	7.4	0.9	0.0	0.0
Newc	1,118	327	29.2	66.0	67.3	90.5	4.0	2.1	3.4	0.0
Norwch	776	302	38.9	72.7	62.6	96.7	1.3	0.3	1.7	0.0
Nottm	1,174	352	30.0	71.1	61.1	74.4	11.9	10.2	3.4	0.0
Oxford	1,878	451	24.0	69.6	59.2	75.7	10.7	7.5	6.1	8.6
Plymth	540	142	26.3	72.5	65.5	97.9	0.0	0.7	1.4	0.0
Ports	1,746	545	31.2	68.7	63.1	91.8	2.8	1.8	3.6	7.7
Prestn	1,268	517	40.8	67.7	61.7	80.5	17.6	1.5	0.4	0.0
Redng	796	302	37.9	67.6	59.3	70.0	21.4	6.4	2.1	7.3
Salford	1,115	387	34.7	64.5	63.6	72.6	20.9	3.9	2.6	0.0
Sheff	1,441	549	38.1	68.1	62.5	85.4	7.1	3.7	3.7	2.6
Shrew	376	184	48.9	71.1	64.1	93.4	3.3	0.5	2.7	0.5
Stevng	901	466	51.7	68.0	59.7	70.0	16.1	9.4	4.4	6.9
Sthend	252	120	47.6	66.1	58.3	82.5	7.5	5.8	4.2	0.0
Stoke	813	304	37.4	71.3	61.8	90.0	4.7	2.3	3.0	1.3
Sund	541	243	44.9	66.4	65.0	95.1	3.7	0.4	0.8	0.0

Table 3.3 Continued

Centre	*N* on RRT	*N* on ICHD	% on ICHD	Median age (yrs)	% male	Ethnicity				
						% White	% South Asian	% Black	% Other	% missing
Truro	423	160	37.8	72.5	62.5	99.4	0.0	0.0	0.6	0.0
Wirral	387	203	52.5	67.5	53.2	96.1	2.5	0.0	1.5	0.0
Wolve	581	302	52.0	66.9	67.2	62.5	22.9	12.6	2.0	0.3
York	554	183	33.0	69.7	66.7	95.4	2.3	1.2	1.2	5.5
N IRELAND										
Antrim	248	117	47.2	75.6	65.0	99.1	0.0	0.9	0.0	0.0
Belfast	843	180	21.4	70.5	67.2	98.1	0.0	1.3	0.6	12.2
Newry	241	78	32.4	67.0	51.3	97.4	1.3	1.3	0.0	0.0
Ulster	184	109	59.2	76.4	59.6	93.6	0.9	2.8	2.8	0.0
West NI	313	113	36.1	72.0	56.6	98.2	1.8	0.0	0.0	0.0
SCOTLAND										
Abrdn	563	223	39.6	67.2	61.9					86.1
Airdrie	468	192	41.0	64.3	57.3	97.4	1.9	0.6	0.0	18.8
D&Gall	135	51	37.8	68.5	64.7					84.3
Dundee	439	187	42.6	66.9	61.5					82.4
Edinb	837	313	37.4	62.2	62.9					78.3
Glasgw	1,774	574	32.4	65.4	57.7					87.6
Inverns	263	83	31.6	69.0	59.0					67.5
Klmarnk	338	144	42.6	65.5	56.9					79.9
Krkcldy	299	140	46.8	67.7	47.1					85.7
WALES										
Bangor	194	73	37.6	71.0	64.4	97.3	0.0	1.4	1.4	0.0
Cardff	1,684	529	31.4	66.3	63.1	89.5	7.2	1.6	1.7	2.6
Clwyd	181	72	39.8	68.1	70.8	100.0	0.0	0.0	0.0	0.0
Swanse	791	348	44.0	71.3	69.8	97.7	1.2	0.9	0.3	1.1
Wrexm	319	118	37.0	70.7	58.5	100.0	0.0	0.0	0.0	0.0
TOTALS										
England	**53,353**	**20,228**	**37.9**	**67.5**	**62.0**	**68.7**	**15.3**	**11.9**	**4.2**	**2.1**
N Ireland	**1,829**	**597**	**32.6**	**72.2**	**61.3**	**97.4**	**0.7**	**1.2**	**0.7**	**3.7**
Scotland	**5,116**	**1,907**	**37.3**	**65.5**	**58.8**					**76.8**
Wales	**3,169**	**1,140**	**36.0**	**68.5**	**65.3**	**94.3**	**3.7**	**1.1**	**1.0**	**1.6**
UK	**63,467**	**23,872**	**37.6**	**67.5**	**61.9**	**71.0**	**14.2**	**11.0**	**3.9**	**8.1**

Blank cells – no data returned by the centre or data completeness <70%
Breakdown by ethnicity not shown for centres with <70% data completeness, but these centres are included in national averages
Cambridge is excluded from this table

Primary renal diseases (PRDs) were grouped into categories as shown in table 3.4, with the mapping of disease codes into groups explained in more detail in appendix A. The proportion of ICHD 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 3.4 Primary renal diseases (PRDs) of adult patients prevalent to ICHD on 31/12/2017

PRD	*N* on ICHD	% ICHD population	Age <65 yrs		Age ⩾65 yrs		M:F ratio
			N	%	*N*	%	
Diabetes	6,194	27.1	2,839	28.1	3,355	26.4	1.6
Glomerulonephritis	3,171	13.9	1,734	17.2	1,437	11.3	2.1
Hypertension	1,751	7.7	705	7.0	1,046	8.2	2.2
Polycystic kidney	1,281	5.6	647	6.4	634	5.0	1.0
Pyelonephritis	1,836	8.0	867	8.6	969	7.6	1.6
Renal vascular disease	1,240	5.4	171	1.7	1,069	8.4	2.1
Other	3,586	15.7	1,751	17.3	1,835	14.4	1.3
Uncertain aetiology	3,764	16.5	1,388	13.7	2,376	18.7	1.6
Total (with data)	**22,823**	**100.0**	**10,102**	**100.0**	**12,721**	**100.0**	
Missing	1,049	4.4	513	4.8	536	4.0	1.5

Adequacy of dialysis in prevalent adult ICHD patients

URR and session duration were calculated only for patients who were undertaking ICHD three times per week. Patients who had missing data for the number of dialysis sessions per week were assumed to be dialysing three times per week for the purposes of calculating the median URR. These analyses were undertaken on the 2017 prevalent ICHD population, using data collected at the end of the third quarter, because of better data completeness compared to the fourth quarter of the year.

Table 3.5 Median urea reduction ratio (URR) and distribution of session frequency and time of adult patients prevalent to ICHD on 31/12/2017 using end of third quarter data (30/09/2017)

Centre	Median URR (%)	% URR >65%	% session frequency/week			% session time			% data completeness		
			<3 sessions	3 sessions	>3 sessions	<4 hours	4–5 hours	>5 hours	URR	Session frequency	Session time
ENGLAND											
B Heart	74	83.6	11.0	88.0	1.0	10.9	88.7	0.4	99.0	84.8	83.1
B QEH	81	93.2	4.3	94.6	1.1	17.8	82.2	0.0	99.7	99.4	99.4
Basldn	71	83.8	1.3	93.5	5.2	30.6	69.4	0.0	99.3	96.9	96.6
Bradfd	72	81.8	8.1	91.9	0.0	27.9	72.1	0.0	93.0	98.4	99.6
Brightn	74	89.3	0.0	98.8	1.3	6.1	93.9	0.0	99.8	100.0	99.0
Bristol	73	82.4	5.5	93.9	0.6	25.1	74.9	0.0	100.0	100.0	100.0
Camb											
Carlis	77	90.6	2.4	97.6	0.0	7.5	92.5	0.0	98.8	93.2	93.0
Carsh			1.4	98.3	0.3	7.0	92.9	0.1	4.9	99.7	99.6
Chelms	73	81.3	1.8	96.4	1.8	40.6	59.4	0.0	98.2	97.4	97.3
Colchr			2.8	97.2	0.0	5.7	94.3	0.0	0.0	97.3	97.3
Covnt	76	88.5	8.6	89.8	1.5	29.6	70.0	0.3	96.3	97.9	96.0
Derby	76	89.8	0.5	96.7	2.7				97.8	98.9	32.2
Donc	78	90.6	0.0	100.0	0.0	27.5	72.5	0.0	97.7	97.7	97.7
Dorset	77	93.2	0.7	99.3	0.0	4.5	95.5	0.0	87.0	99.3	99.6
Dudley	74	85.7	3.1	96.3	0.6	12.9	87.1	0.0	72.3	84.7	84.2

Table 3.5 Continued

Centre	Median URR (%)	% URR >65%	% session frequency/week			% session time			% data completeness		
			<3 sessions	3 sessions	>3 sessions	<4 hours	4–5 hours	>5 hours	URR	Session frequency	Session time
Exeter	74	89.0	3.2	96.1	0.7	49.9	50.1	0.0	99.5	99.8	100.0
Glouc	76	88.5	3.9	95.2	0.9				99.5	99.6	0.0
Hull	77	92.9							99.4	0.3	1.6
Ipswi			10.3	89.7	0.0	12.5	87.5	0.0	0.0	99.3	97.6
Kent	72	80.0	2.4	95.2	2.4	66.4	33.6	0.0	97.5	99.0	99.7
L Barts									0.0	0.0	0.0
L Guys	75	90.8	5.1	94.4	0.5	24.0	76.0	0.0	99.3	99.8	99.8
L Kings	72	82.0	0.0	100.0	0.0	34.7	65.3	0.0	91.6	100.0	100.0
L Rfree			14.7	84.6	0.6				0.0	98.1	0.0
L St.G			0.7	99.3	0.0	4.6	95.4	0.0	0.3	96.6	88.1
L West	79	93.4	7.0	92.6	0.5	22.7	76.3	1.0	87.5	95.3	95.0
Leeds	73	84.1	7.3	92.7	0.0	22.6	77.4	0.0	100.0	99.0	100.0
Leic	75	84.3	0.6	99.4	0.0	8.3	87.3	4.3	98.7	97.9	74.4
Liv Ain			1.4	97.8	0.7	22.6	77.4	0.0	0.0	98.6	99.3
Liv Roy			0.6	87.2	12.2	6.6	93.4	0.0	0.0	95.1	99.7
M RI									1.1	22.7	22.0
Middlbr	74	82.6	2.4	96.2	1.4	33.7	64.5	1.8	99.7	99.7	100.0
Newc			1.3	98.0	0.7	16.9	81.8	1.4	14.2	100.0	100.0
Norwch	76	90.0	1.0	97.6	1.4	57.6	42.4	0.0	99.3	100.0	100.0
Nottm	75	88.2	0.3	94.6	5.1	6.9	92.8	0.3	90.6	100.0	100.0
Oxford	75	88.6	0.0	100.0	0.0	32.3	67.7	0.0	98.5	100.0	100.0
Plymth	74	83.6	3.3	95.9	0.8				99.2	96.1	0.0
Ports	76	92.8	7.1	89.6	3.3				99.1	98.5	0.0
Prestn	73	77.4							83.7	0.0	0.0
Redng			0.8	98.8	0.4	20.6	79.4	0.0	3.9	97.3	97.7
Salford			3.0	81.1	15.9	17.6	82.4	0.0	63.1	100.0	94.5
Sheff	74	89.0	3.1	96.9	0.0	84.4	15.4	0.2	97.4	99.4	90.1
Shrew			3.1	95.7	1.2	23.2	76.8	0.0	0.0	99.4	99.4
Stevng	73	78.1	7.8	89.5	2.7	71.2	28.8	0.0	98.5	98.0	97.8
Sthend	67	64.2	14.4	85.6	0.0	57.9	42.1	0.0	100.0	100.0	100.0
Stoke	74	84.3	4.3	92.0	3.6	12.4	87.6	0.0	91.1	98.6	100.0
Sund			0.9	91.4	7.7	28.0	72.0	0.0	0.5	100.0	78.1
Truro	70	67.0	6.9	91.5	1.5	55.8	43.4	0.8	89.4	90.9	97.7
Wirral	76	90.1	1.6	90.8	7.6	21.7	77.7	0.6	97.7	96.4	100.0
Wolve	75	90.5	1.1	98.1	0.8				95.8	98.5	69.3
York	76	94.4	2.6	90.8	6.6	12.2	87.8	0.0	100.0	86.9	86.3
N IRELAND											
Antrim	72	77.3	0.9	99.1	0.0	12.7	87.3	0.0	100.0	99.1	100.0
Belfast	74	89.2	0.6	97.1	2.4	16.1	83.3	0.6	99.4	98.3	100.0
Newry	75	94.3	14.9	85.1	0.0	53.1	46.9	0.0	82.8	98.7	100.0
Ulster	72	78.4	2.0	96.0	2.0	16.5	83.5	0.0	100.0	98.0	100.0
West NI	72	81.1	3.7	89.8	6.5	60.8	39.2	0.0	96.0	98.2	98.0
SCOTLAND											
Abrdn	71	79.0	0.9	92.1	7.0	3.6	93.9	2.5	100.0	98.6	98.5
Airdrie	70	77.8	3.3	95.4	1.3	14.6	82.1	3.3	100.0	94.4	98.7
D&Gall	71	71.1	0.0	93.6	6.4	22.2	75.6	2.2	97.8	95.9	97.8
Dundee	75	90.2	0.0	98.7	1.3	6.6	93.4	0.0	100.0	92.7	92.6
Edinb	72	84.2	1.1	97.7	1.1	37.0	63.0	0.0	98.6	94.3	94.9
Glasgw	72	82.6	0.4	99.4	0.2	7.2	89.3	3.5	99.5	93.5	98.4
Inverns	76	90.3	1.3	93.3	5.3	22.9	77.1	0.0	100.0	97.4	97.2
Klmarnk	76	91.6	0.0	100.0	0.0	1.7	90.4	7.8	100.0	96.6	96.6
Krkcldy	72	83.5	3.3	95.9	0.8	20.5	78.6	0.9	100.0	97.6	96.7

Table 3.5 Continued

Centre	Median URR (%)	% URR >65%	% session frequency/week			% session time			% data completeness		
			<3 sessions	3 sessions	>3 sessions	<4 hours	4–5 hours	>5 hours	URR	Session frequency	Session time
WALES											
Bangor	76	91.1	4.8	88.9	6.3				100.0	100.0	0.0
Cardff	76	89.2							99.8	0.0	0.0
Clwyd	71	81.4	0.0	100.0	0.0				100.0	96.6	0.0
Swanse	75	89.3	5.7	93.1	1.3	35.1	63.9	1.0	99.3	98.5	98.3
Wrexm	76	93.0	7.5	92.5	0.0				100.0	99.1	0.0
TOTALS											
England	**75**	**87.1**	**4.0**	**94.3**	**1.7**	**25.9**	**73.7**	**0.4**	**71.2**	**87.0**	**76.2**
N Ireland	**73**	**83.7**	**3.4**	**94.3**	**2.3**	**28.0**	**71.8**	**0.2**	**97.0**	**98.4**	**99.6**
Scotland	**73**	**83.5**	**1.0**	**97.1**	**1.9**	**13.8**	**83.8**	**2.4**	**99.5**	**95.0**	**97.0**
Wales	**75**	**89.2**	**5.3**	**93.2**	**1.5**	**35.1**	**63.9**	**1.0**	**99.7**	**53.2**	**30.0**
UK	**75**	**86.8**	**3.8**	**94.5**	**1.7**	**24.9**	**74.5**	**0.6**	**75.5**	**86.3**	**76.3**

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

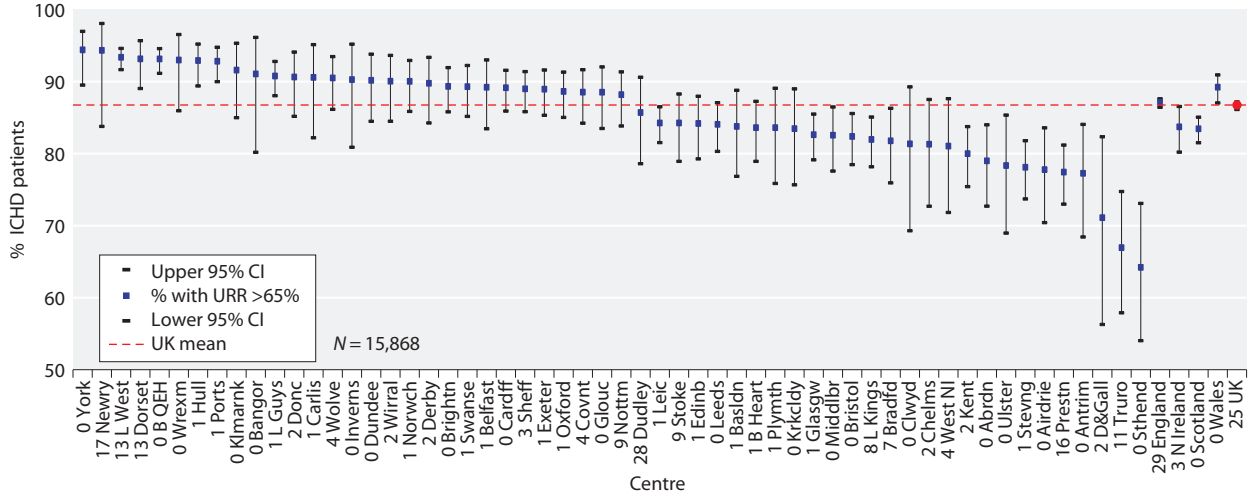


Figure 3.2 Percentage of adult patients prevalent to ICHD on 31/12/2017 with urea reduction ratio (URR) >65% by centre
CI – confidence interval

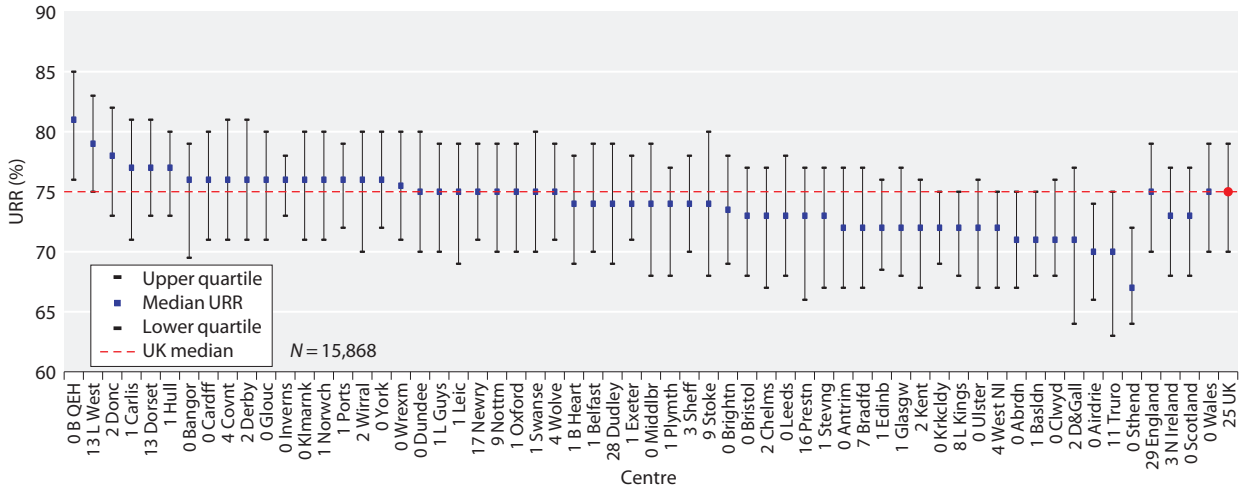


Figure 3.3 Median urea reduction ratio (URR) achieved in adult patients prevalent to ICHD on 31/12/2017 by centre

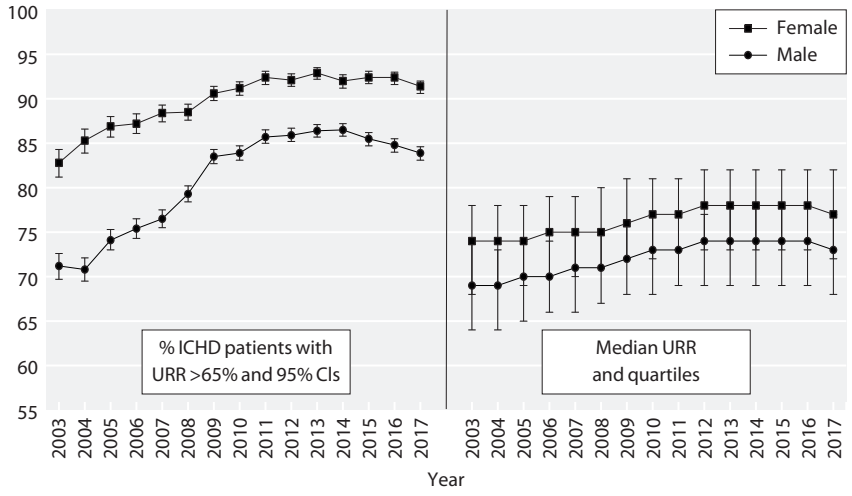


Figure 3.4 Change in the percentage of prevalent adult ICHD patients with urea reduction ratio (URR) >65% and the median URR by sex between 2003 and 2017

CI – confidence interval

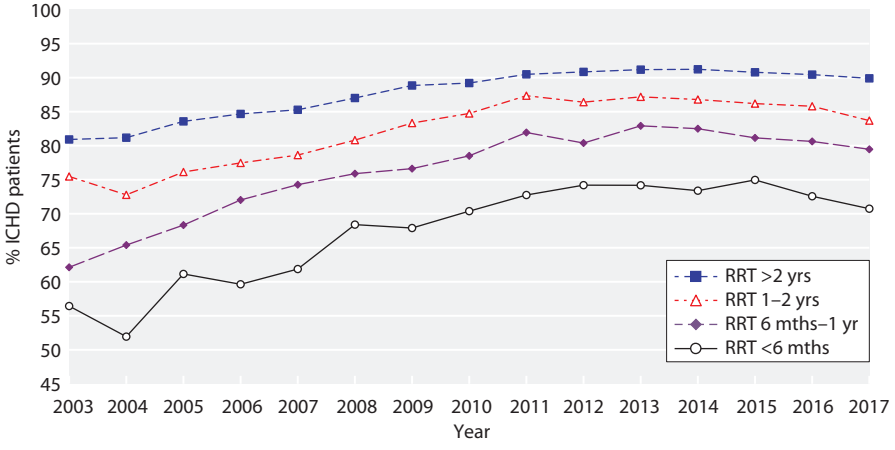


Figure 3.5 Percentage of prevalent adult ICHD patients achieving urea reduction ratio (URR) >65% by time on ICHD between 2003 and 2017

Biochemistry parameters in prevalent adult ICHD patients

The latest Renal Association guideline on CKD mineral bone disease contains only one audit measure, which is the percentage of patients with adjusted calcium above the target range.

Table 3.6 Median adjusted calcium and percentage with adjusted calcium within and above the target range (2.2–2.5 mmol/L) in adult patients prevalent to ICHD on 31/12/2017 by centre

Centre	Median adj Ca (mmol/L)	% adj Ca 2.2–2.5 mmol/L	% adj Ca >2.5 mmol/L	% data completeness
ENGLAND				
B Heart	2.4	71.4	25.0	100.0
B QEH	2.3	78.9	5.9	99.8
Basldn	2.4	80.4	13.7	100.0
Bradfd	2.4	78.7	13.8	99.6
Brightn	2.3	74.9	9.2	100.0
Bristol	2.4	85.2	11.6	100.0
Camb				
Carlis	2.3	73.6	11.5	100.0
Carsh	2.3	80.4	7.1	99.9
Chelms	2.2	66.1	2.7	99.1
Colchr	2.3	82.6	9.6	99.1
Covnt	2.3	81.1	5.2	97.8
Derby	2.4	86.6	9.9	100.0
Donc	2.4	86.7	7.3	100.0
Dorset	2.3	82.5	4.8	99.3
Dudley	2.4	81.1	14.1	100.0
Exeter	2.3	88.8	7.1	100.0
Glouc	2.3	84.6	7.7	100.0
Hull	2.4	78.1	16.3	100.0
Ipswi	2.3	73.9	9.7	100.0
Kent	2.4	70.2	24.7	100.0
L Barts	2.3	76.2	7.6	100.0
L Guys	2.4	82.1	11.3	100.0
L Kings	2.3	80.6	4.5	100.0
L Rfree	2.3	82.1	7.4	99.8
L St.G	2.4	77.1	10.2	97.3
L West	2.3	73.0	13.2	84.5
Leeds	2.4	81.5	9.8	100.0
Leic	2.4	81.7	10.1	100.0
Liv Ain	2.4	79.9	13.2	100.0
Liv Roy	2.3	82.0	8.6	98.5
M RI	2.4	79.1	14.6	94.5
Middlbr	2.3	69.1	4.8	100.0
Newc	2.4	86.8	7.6	100.0
Norwch	2.4	76.6	16.0	100.0
Nottm	2.4	82.1	10.7	100.0
Oxford	2.4	84.3	9.6	100.0
Plymth	2.4	82.0	11.7	98.5
Ports	2.3	78.4	9.3	99.8
Prestn	2.3	80.3	1.8	92.9
Redng	2.4	85.2	10.4	100.0
Salford	2.4	75.6	12.5	100.0
Sheff	2.3	76.8	9.8	99.4
Shrew	2.4	78.1	18.9	100.0
Stevng	2.3	86.2	7.5	99.5
Sthend	2.4	76.4	17.3	100.0
Stoke	2.4	79.2	12.7	100.0
Sund	2.3	71.6	8.1	100.0
Truro	2.3	75.2	13.8	99.3
Wirral	2.3	80.7	7.3	100.0

Table 3.6 Continued

Centre	Median adj Ca (mmol/L)	% adj Ca 2.2–2.5 mmol/L	% adj Ca >2.5 mmol/L	% data completeness
Wolve	2.4	71.6	22.0	99.3
York	2.4	82.7	16.1	100.0
N IRELAND				
Antrim	2.4	83.3	10.8	100.0
Belfast	2.3	79.5	4.2	100.0
Newry	2.4	78.1	13.7	100.0
Ulster	2.5	71.3	28.7	99.0
West NI	2.3	84.1	4.7	100.0
SCOTLAND				
Abrdn	2.4	68.3	29.4	100.0
Airdrie	2.3	84.2	10.5	100.0
D&Gall	2.3	73.5	8.2	100.0
Dundee	2.4	79.8	13.5	100.0
Edinb	2.4	71.0	20.9	99.0
Glasgw	2.4	81.0	11.1	100.0
Inverns	2.4	84.7	13.9	96.0
Klmarnk	2.4	72.2	24.1	100.0
Krkcldy	2.4	82.0	8.2	98.4
WALES				
Bangor	2.4	85.7	9.5	100.0
Cardff	2.4	75.0	16.0	100.0
Clwyd	2.4	83.6	13.1	100.0
Swanse	2.3	87.8	5.3	99.7
Wrexm	2.3	86.7	2.9	98.1
TOTALS				
England	**2.3**	**79.2**	**10.3**	**98.3**
N Ireland	**2.4**	**79.4**	**11.3**	**99.8**
Scotland	**2.4**	**77.4**	**15.9**	**99.5**
Wales	**2.4**	**81.4**	**10.7**	**99.7**
UK	**2.3**	**79.2**	**10.8**	**98.5**

Blank cells – no data returned by the centre
Ca – calcium

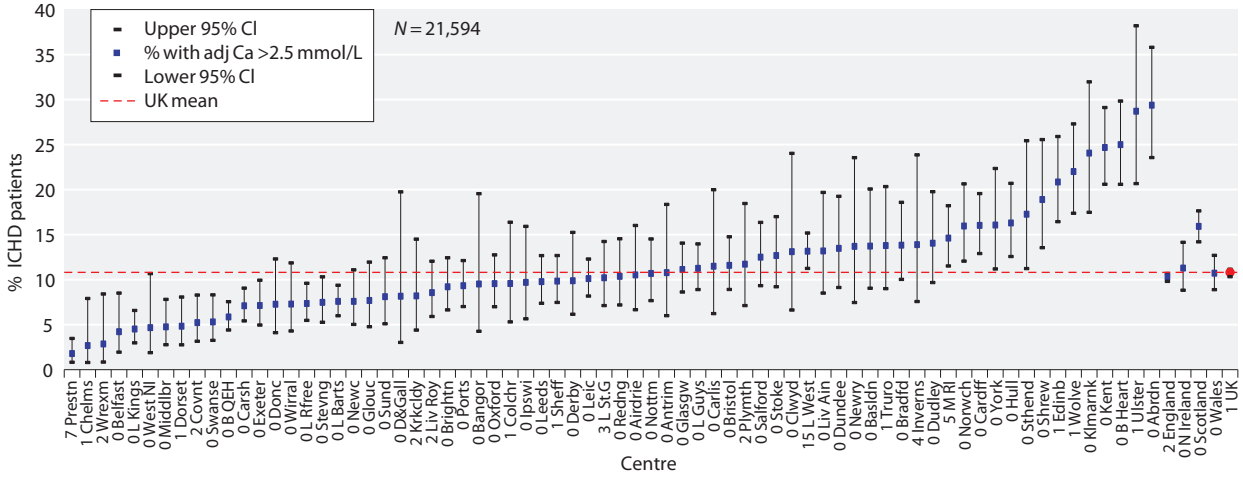


Figure 3.6 Percentage of adult patients prevalent to ICHD on 31/12/2017 with adjusted calcium above the target range (>2.5 mmol/L) by centre
Ca – calcium; CI – confidence interval

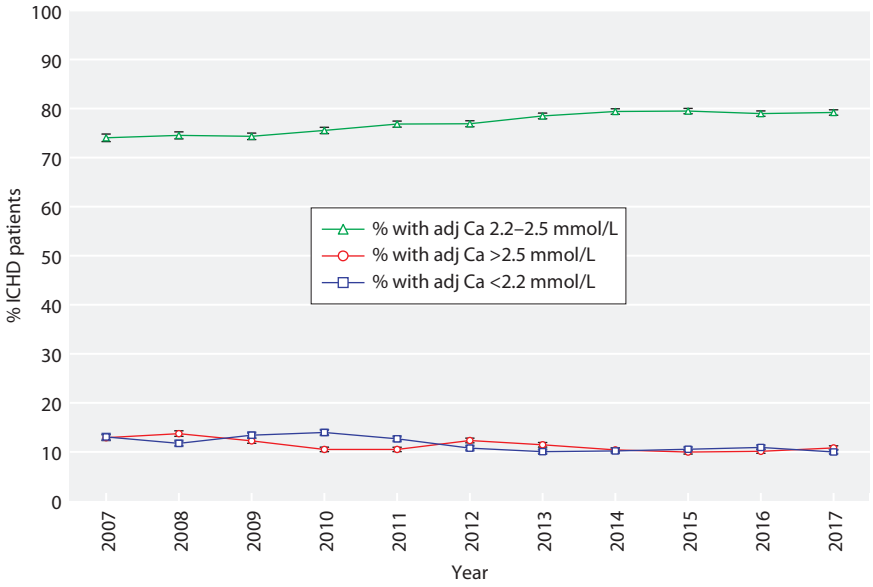


Figure 3.7 Change in percentage of prevalent adult ICHD patients within, above and below the target range for adjusted calcium (2.2–2.5 mmol/L) between 2007 and 2017
Ca – calcium

The forthcoming Renal Association guideline on HD contains audit measures for pre-dialysis potassium and bicarbonate, which were also present in the now archived 2009 guideline, although here we report the updated target range for bicarbonate (18–26 mmol/L). The Scottish Renal Registry does not send data for pre-dialysis potassium and bicarbonate.

Table 3.7 Median pre-dialysis potassium and bicarbonate and percentage attaining target ranges in adult patients prevalent to ICHD on 31/12/2017 by centre

	Pre-dialysis potassium					Pre-dialysis bicarbonate				
Centre	Median (mmol/L)	% <4.0 mmol/L	% 4.0–6.0 mmol/L	% >6.0 mmol/L	% data completeness	Median (mmol/L)	% <18 mmol/L	% 18–26 mmol/L	% >26 mmol/L	% data completeness
ENGLAND										
B Heart	4.9	6.9	88.7	4.5	100.0	22	6.9	89.6	3.6	99.7
B QEH	4.9	10.0	82.0	8.0	99.8	24	0.4	87.4	12.3	99.8
Basldn	4.7	10.5	84.3	5.2	100.0	23	0.6	92.2	7.2	100.0
Bradfd	4.6	14.2	81.5	4.3	100.0	23	2.8	84.7	12.6	100.0
Brightn					0.0	24	2.3	82.9	14.8	100.0
Bristol	4.6	23.4	74.5	2.2	100.0	24	2.2	84.1	13.7	100.0
Camb										
Carlis					0.0	21	9.2	85.1	5.8	100.0
Carsh					0.0	24	0.5	81.2	18.3	74.0
Chelms	5.0	1.8	89.3	8.9	99.1	22	2.7	97.3	0.0	99.1
Colchr	5.1	4.4	92.2	3.5	99.1	23	0.9	97.4	1.7	99.1
Covnt					0.0	24	3.6	68.5	27.9	97.4
Derby					0.0	23	4.1	88.4	7.6	100.0
Donc	4.6	13.3	82.4	4.2	100.0	24	1.8	87.9	10.3	100.0
Dorset	4.8	8.6	86.6	4.8	99.3	22	4.1	87.4	8.6	99.3
Dudley	4.9	6.5	89.1	4.4	99.5					65.4
Exeter	4.6	20.0	77.4	2.6	100.0	23	1.2	88.8	10.0	100.0
Glouc					0.0	24	1.4	80.5	18.1	100.0
Hull	4.7	10.7	83.7	5.6	100.0	24	0.9	79.9	19.1	100.0

Table 3.7 Continued

Centre	Pre-dialysis potassium					Pre-dialysis bicarbonate				
	Median (mmol/L)	% <4.0 mmol/L	% 4.0–6.0 mmol/L	% >6.0 mmol/L	% data completeness	Median (mmol/L)	% <18 mmol/L	% 18–26 mmol/L	% >26 mmol/L	% data completeness
Ipswi					0.0	23	1.5	88.8	9.7	100.0
Kent	4.7	18.6	74.8	6.6	100.0	21	8.4	88.6	3.1	100.0
L Barts					0.0	25	1.2	71.5	27.3	99.9
L Guys	4.8	17.6	75.2	7.3	100.0	23	3.4	81.0	15.6	92.6
L Kings					0.0	24	0.2	92.7	7.2	100.0
L Rfree	4.9	15.8	76.4	7.8	99.8	23	3.6	88.7	7.7	80.4
L St.G					0.0	26	0.4	59.2	40.4	87.3
L West					0.0					56.1
Leeds	5.2	3.5	87.4	9.2	100.0	24	1.8	87.0	11.2	100.0
Leic	4.9	10.5	81.9	7.6	100.0	25	1.7	71.5	26.8	99.6
Liv Ain					0.0	26	0.7	70.1	29.2	100.0
Liv Roy					0.0	28	0.3	41.4	58.3	92.5
M RI					0.0	23	4.2	90.5	5.4	94.3
Middlbr	4.9	7.5	86.4	6.1	100.0	26	0.7	64.0	35.4	100.0
Newc					0.0	24	1.3	76.9	21.8	100.0
Norwch	5.2	3.2	85.5	11.4	100.0	22	1.8	93.6	4.7	98.9
Nottm	4.9	7.6	88.4	4.1	100.0	24	0.6	86.5	12.9	100.0
Oxford	4.9	7.4	84.8	7.8	100.0	23	5.4	86.5	8.1	100.0
Plymth	4.9	10.2	78.1	11.7	98.5	26	0.0	53.9	46.1	98.5
Ports	4.8	8.5	85.5	6.0	99.8	24	2.8	80.4	16.9	99.8
Prestn					0.0	23	2.9	89.4	7.7	99.8
Redng					0.0	25	0.7	77.4	21.9	100.0
Salford					0.0					0.0
Sheff	5.0	8.3	79.5	12.2	99.4	25	2.4	73.4	24.2	99.4
Shrew					0.0	21	9.1	87.2	3.7	100.0
Stevng	5.0	5.6	87.4	7.0	99.5	24	1.9	89.7	8.4	99.5
Sthend	4.6	12.7	84.6	2.7	100.0	25	0.0	74.6	25.5	100.0
Stoke					20.4	26	0.0	54.8	45.2	99.7
Sund					0.0	29	0.0	21.6	78.4	100.0
Truro	4.9	14.5	80.0	5.5	99.3	22	2.1	84.8	13.1	99.3
Wirral					0.0	25	0.5	69.8	29.7	100.0
Wolve	4.9	6.0	89.2	4.9	99.3	20	13.1	86.6	0.4	99.3
York	5.3	3.0	82.1	14.9	100.0	23	3.6	83.3	13.1	100.0
N IRELAND										
Antrim	4.8	6.9	86.3	6.9	100.0	27	0.0	38.2	61.8	100.0
Belfast	5.1	5.4	84.3	10.2	100.0	23	1.2	92.7	6.1	99.4
Newry	4.9	6.9	86.3	6.9	100.0					24.7
Ulster	5.1	5.9	88.2	5.9	100.0	23	3.9	92.2	3.9	100.0
West NI	5.0	6.5	85.1	8.4	100.0	23	2.8	92.5	4.7	100.0
WALES										
Bangor					0.0	22	0.0	93.7	6.4	100.0
Cardff					0.0	22	10.0	81.8	8.1	100.0
Clwyd					0.0	23	1.6	91.8	6.6	100.0
Swanse					0.0	24	2.2	80.9	16.9	99.7
Wrexm					0.0	26	1.0	50.5	48.6	98.1
TOTALS										
England	**4.9**	**10.8**	**82.4**	**6.8**	**55.0**	**24**	**2.6**	**80.4**	**17.0**	**92.0**
N Ireland	**4.9**	**6.2**	**85.8**	**8.0**	**100.0**	**23**	**2.0**	**81.0**	**17.0**	**89.8**
Wales					**0.0**	**23**	**5.5**	**79.7**	**14.9**	**99.7**
E, NI & W	**4.9**	**10.6**	**82.6**	**6.9**	**53.5**	**24**	**2.8**	**80.3**	**16.9**	**92.3**

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

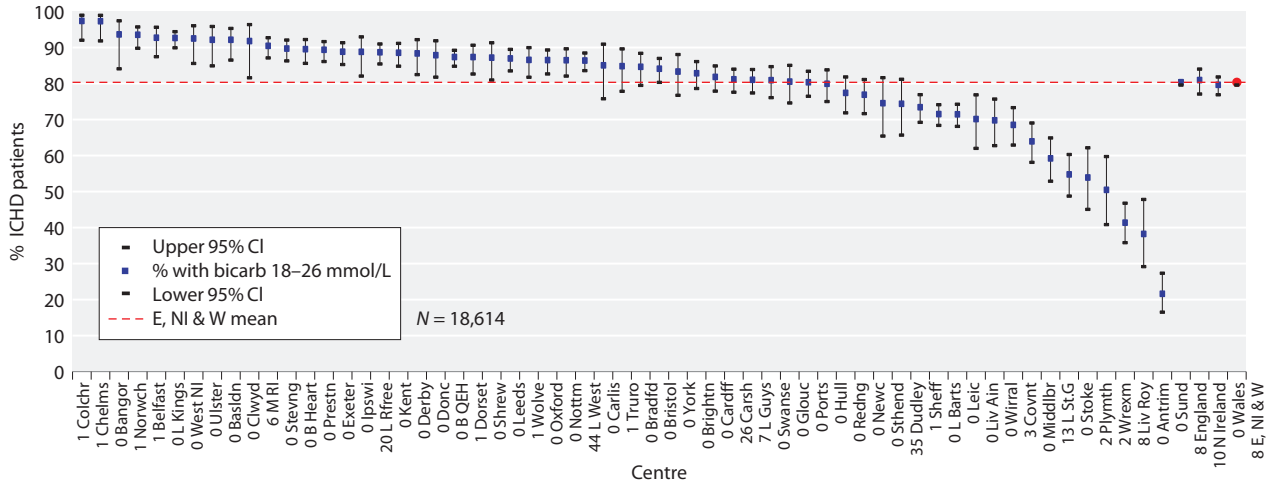


Figure 3.8 Percentage of adult patients prevalent to ICHD on 31/12/2017 with pre-dialysis bicarbonate within the target range (18–26 mmol/L) by centre

Bicarb – bicarbonate; CI – confidence interval

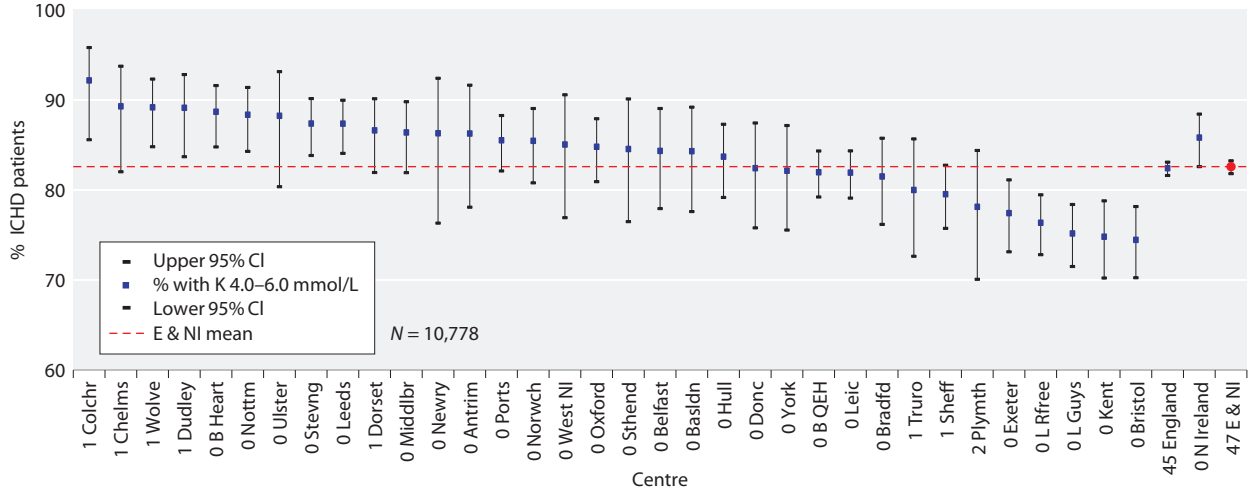


Figure 3.9 Percentage of adult patients prevalent to ICHD on 31/12/2017 with pre-dialysis potassium within the target range (4.0–6.0 mmol/L) by centre

CI – confidence interval; K – potassium

Pre-dialysis potassium has only been adequately collected by the UKRR since 2016 and therefore longitudinal analyses are not shown.

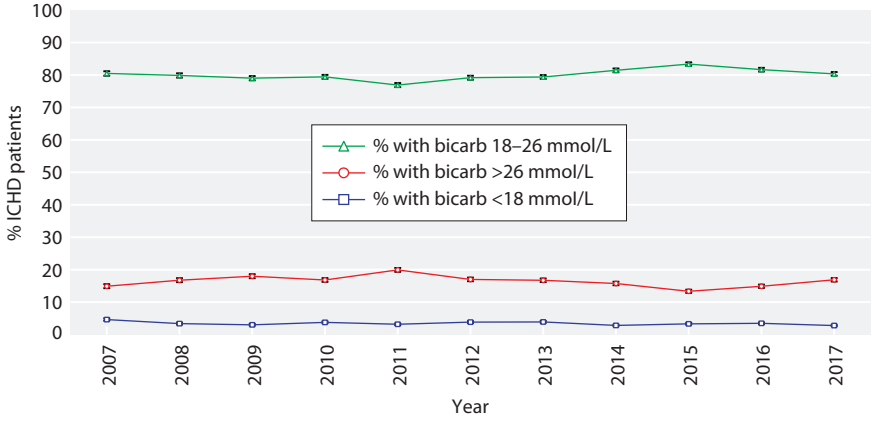


Figure 3.10 Change in percentage of prevalent adult ICHD patients within, above and below the target range for pre-dialysis bicarbonate (18–26 mmol/L) between 2007 and 2017

Bicarb – bicarbonate

Anaemia in prevalent adult ICHD patients

Inadequate data completeness in relation to ESAs makes auditing against national guidelines difficult to interpret. An important assumption is that patients for whom no ESA data have been submitted to the UKRR are not on ESA treatment, provided the centre has submitted ESA data for other patients on ICHD.

Table 3.8 Median haemoglobin and ferritin and percentage attaining target ranges in adult patients prevalent to ICHD on 31/12/2017 by centre

	Haemoglobin				Ferritin		
Centre	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (µg/L)	% <100 µg/L	% data completeness
ENGLAND							
B Heart	112	19.9	20.8	100.0	242	20.1	96.1
B QEH	108	24.5	12.5	99.8	380	4.4	99.7
Basldn	111	17.6	20.9	100.0	309	16.3	100.0
Bradfd	117	16.5	42.1	100.0	478	6.7	100.0
Brightn	112	19.7	23.5	100.0	521	2.0	100.0
Bristol	110	7.9	22.1	100.0	635	1.1	100.0
Camb							
Carlis	110	13.8	23.0	100.0	573	4.6	100.0
Carsh	110	22.4	15.7	100.0	323	8.2	99.1
Chelms	113	9.8	26.8	99.1	562	2.7	99.1
Colchr	112	20.0	20.9	99.1			5.2
Covnt	107	28.4	9.5	97.8	363	4.2	98.1
Derby	113	15.7	30.8	100.0	500	1.2	100.0
Donc	108	26.1	14.5	100.0	413	0.6	100.0
Dorset	111	20.5	20.1	98.9	534	1.5	97.8
Dudley	115	8.8	25.3	98.4	278	10.4	98.9
Exeter	112	7.6	23.5	100.0	314	6.7	100.0
Glouc	112	16.3	21.3	100.0	357	7.0	96.4
Hull	110	26.3	16.3	100.0	408	4.4	99.7
Ipswi	111	19.4	17.9	100.0	548	6.0	100.0
Kent	112	22.4	25.4	100.0	547	6.9	99.8

Table 3.8 Continued

Centre	Haemoglobin				Ferritin		
	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (μg/L)	% <100 μg/L	% data completeness
L Barts	110	19.3	18.9	100.0	640	5.0	99.9
L Guys	108	25.8	15.4	100.0	477	4.6	99.8
L Kings	111	18.5	14.3	100.0	476	4.6	98.9
L Rfree	110	21.7	19.6	99.8	440	7.5	99.5
L St.G	105	32.5	12.7	96.9	403	3.3	92.8
L West	113	13.7	21.9	90.7	297	5.8	90.2
Leeds	105	28.3	11.2	100.0	468	3.9	99.6
Leic	113	18.0	28.5	99.9	326	6.8	99.8
Liv Ain	109	22.9	20.1	100.0	545	7.2	96.5
Liv Roy	112	17.4	23.9	98.5	410	7.4	98.2
M RI	113	22.3	25.3	94.5	415	1.8	83.6
Middlbr	110	21.8	16.0	100.0	814	6.1	99.7
Newc	110	20.1	24.1	100.0	330	8.3	100.0
Norwch	111	24.8	22.7	100.0	425	6.4	100.0
Nottm	108	19.9	12.3	99.4	469	2.5	100.0
Oxford	112	25.0	25.0	100.0	301	7.4	99.8
Plymth	115	18.8	32.0	98.5	465	8.6	98.5
Ports	110	21.6	20.4	99.8	415	4.6	99.2
Prestn	110	20.6	18.1	99.8	648	3.5	95.2
Redng	112	17.0	27.8	100.0	443	3.0	100.0
Salford	109	32.6	24.7	100.0			0.0
Sheff	111	25.0	22.8	99.4	459	3.7	99.4
Shrew	114	14.0	32.3	100.0	418	2.4	100.0
Stevng	110	21.7	18.7	99.5	565	3.5	98.4
Sthend	110	20.0	10.9	100.0	292	1.8	100.0
Stoke	112	14.8	27.8	100.0	354	2.8	99.3
Sund	113	19.8	23.9	100.0	243	8.1	99.6
Truro	106	26.9	10.3	99.3	430	3.4	99.3
Wirral	111	17.2	21.4	100.0	478	6.8	99.5
Wolve	109	23.1	26.1	99.3	415	8.2	99.3
York	109	20.8	17.3	100.0	412	4.8	100.0
N IRELAND							
Antrim	108	25.0	19.0	98.0	409	4.9	100.0
Belfast	116	12.0	33.7	100.0	488	4.8	100.0
Newry	109	20.5	24.7	100.0	465	4.1	100.0
Ulster	116	6.9	36.3	100.0	668	2.0	100.0
West NI	114	12.1	26.2	100.0	609	2.8	100.0
SCOTLAND							
Abrdn	106	34.1	11.8	100.0	501	4.0	95.3
Airdrie	111	22.8	14.0	100.0	617	3.6	98.8
D&Gall	107	22.4	14.3	100.0	609	2.0	100.0
Dundee	112	13.5	17.4	100.0	292	13.5	100.0
Edinb	115	14.2	34.5	98.3	456	9.1	99.7
Glasgw	111	20.7	26.9	100.0	495	5.2	100.0
Inverns	111	22.2	19.4	96.0	301	9.7	82.7
Klmarnk	109	25.6	16.5	100.0	275	16.5	100.0
Krkcldy	113	13.1	27.9	98.4	389	10.6	99.2
WALES							
Bangor	112	14.3	22.2	100.0	446	6.3	100.0
Cardff	110	22.6	23.3	100.0	311	7.7	100.0
Clwyd	114	14.8	24.6	100.0	295	1.6	100.0
Swanse	111	20.3	14.4	99.7	386	10.0	99.7
Wrexm	112	17.1	33.3	98.1	481	0.0	100.0

Table 3.8 Continued

Centre	Haemoglobin				Ferritin		
	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (μg/L)	% <100 μg/L	% data completeness
TOTALS							
England	**110**	**20.4**	**20.6**	**98.9**	**415**	**5.5**	**95.7**
N Ireland	**114**	**14.6**	**28.8**	**99.6**	**529**	**3.8**	**100.0**
Scotland	**111**	**20.7**	**22.7**	**99.4**	**440**	**7.7**	**98.5**
Wales	**111**	**20.4**	**21.5**	**99.7**	**350**	**7.2**	**99.9**
UK	**111**	**20.3**	**21.0**	**99.0**	**416**	**5.7**	**96.2**

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

Table 3.9 Distribution of haemoglobin and erythropoiesis stimulating agent (ESA) dose values in adult patients prevalent to ICHD on 31/12/2017 by centre

Centre	ESA		Haemoglobin and ESA	
	% on ESA	Median dose (IU/week)	% <100 g/L and not on ESA	% >120 g/L and on ESA
ENGLAND				
B Heart	87.2	6,000	0.6	11.9
B QEH	0.2			
Basldn	95.4	8,000	0.7	20.3
Bradfd	97.2	6,000	0.4	39.4
Brightn	93.1	5,000	0.0	21.7
Bristol	91.6	8,000	0.2	18.9
Camb				
Carlis	82.8	4,000	1.1	11.5
Carsh	2.3			
Chelms	96.5	10,000	0.0	23.2
Colchr	0.0			
Covnt	84.0	8,000	2.0	6.2
Derby	0.0			
Donc	94.5	6,000	0.6	14.5
Dorset	91.1	6,000	0.4	15.7
Dudley	1.6			
Exeter	93.6	6,000	0.0	20.7
Glouc	91.4		0.5	19.0
Hull	50.2			
Ipswi	56.7			
Kent	94.9	9,000	1.0	22.1
L Barts	0.1			
L Guys	0.2			
L Kings	94.5	7,000	0.0	11.9
L Rfree	0.0			
L St.G	0.0			
L West	0.0			
Leeds	94.9	5,000	0.0	9.0
Leic	98.4	6,000	0.2	27.7
Liv Ain	0.0			
Liv Roy	0.3			
M RI	0.0			
Middlbr	71.1	4,000	5.4	8.8
Newc	92.4	6,200	1.0	22.8
Norwch	95.7	9,000	0.7	20.9
Nottm	91.5	6,000	0.3	8.2
Oxford	94.4	12,000	0.0	23.3

Table 3.9 Continued

Centre	ESA		Haemoglobin and ESA	
	% on ESA	Median dose (IU/week)	% <100 g/L and not on ESA	% >120 g/L and on ESA
Plymth	0.0			
Ports	5.5			
Prestn	94.4		0.0	15.0
Redng	93.7	13,077	3.3	26.7
Salford	12.5			
Sheff	87.7	6,000	3.0	19.1
Shrew	0.6			
Stevng	95.3	10,000	0.0	15.7
Sthend	91.8	8,000	0.0	7.3
Stoke	0.0			
Sund	90.1	7,846	0.0	19.8
Truro	0.0			
Wirral	89.6	9,000	0.0	15.1
Wolve	83.7	8,000	1.9	17.9
York	88.7	5,000	1.8	12.5
N IRELAND				
Antrim	92.2	6,000	1.0	15.0
Belfast	95.8	8,000	0.0	31.9
Newry	93.2	6,000	0.0	21.9
Ulster	93.1	4,000	0.0	32.4
West NI	98.1	6,000	0.0	27.1
SCOTLAND				
Abrdn	95.9	6,000	1.4	20.3
Airdrie	100.0	8,000	0.0	24.4
D&Gall	98.0	8,000	0.0	25.0
Dundee	91.5	6,000	1.2	24.2
Edinb	77.0	4,000	4.3	25.2
Glasgw	99.3	8,000	0.2	24.9
Inverns	97.4	6,000	1.3	26.0
Klmarnk	99.2	8,000	0.8	22.7
Krkcldy	96.0	8,000	0.0	27.0
WALES				
Bangor	90.5		0.0	22.2
Cardff	39.1			
Clwyd	47.5			
Swanse	95.0	8,000	0.6	12.8
Wrexm	61.7			
TOTAL*				
	92.6	**8,000**	**0.8**	**19.2**

Blank cells – no data returned by the centre or data completeness <70% (or <70% patients were on an ESA)

*This is the total of only those centres with at least 70% of ICHD patients on an ESA

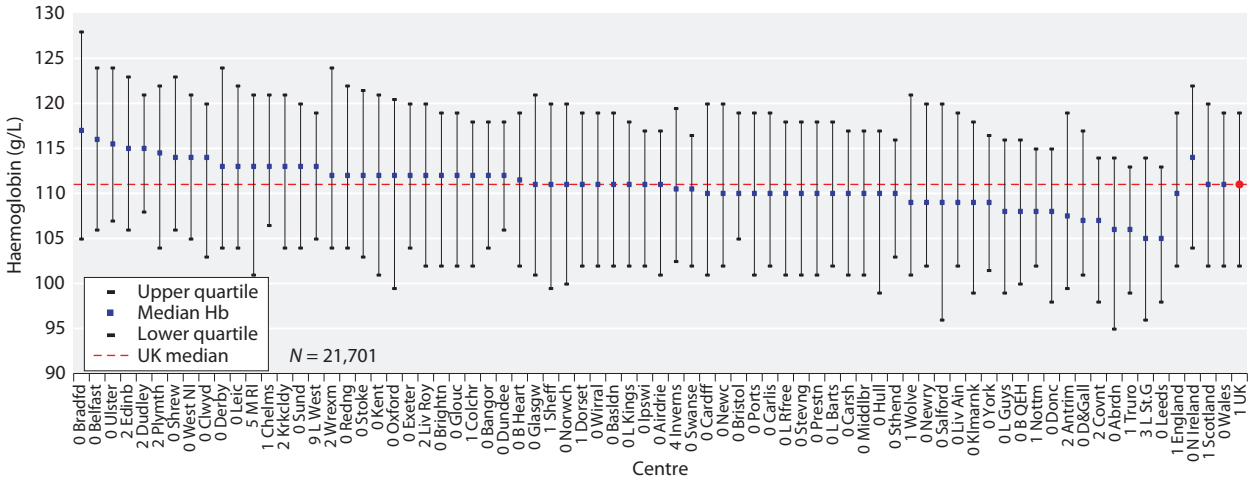


Figure 3.11 Median haemoglobin in adult patients prevalent to ICHD on 31/12/2017 by centre
Hb – haemoglobin

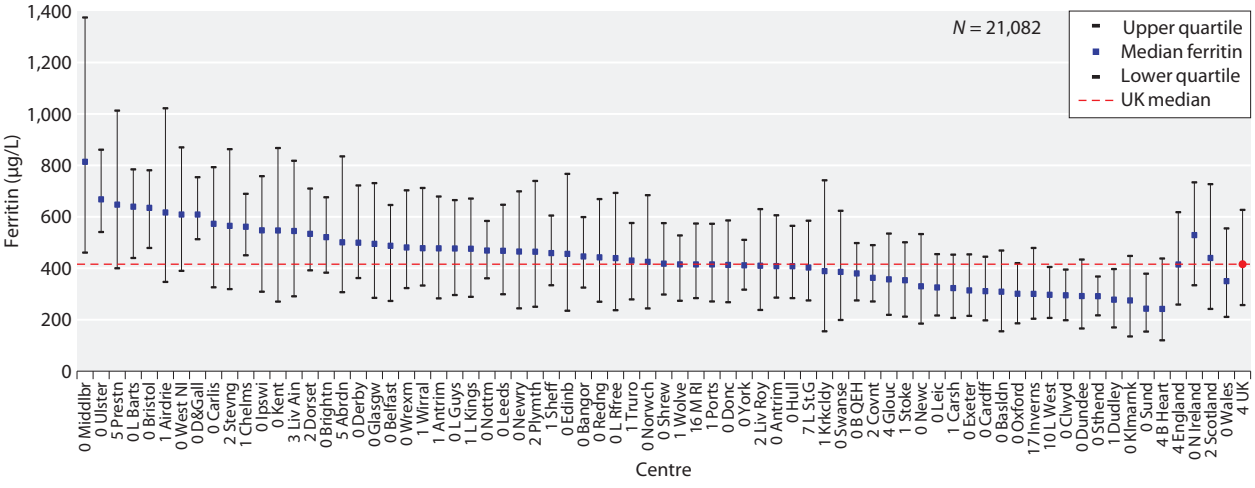


Figure 3.12 Median ferritin in adult patients prevalent to ICHD on 31/12/2017 by centre

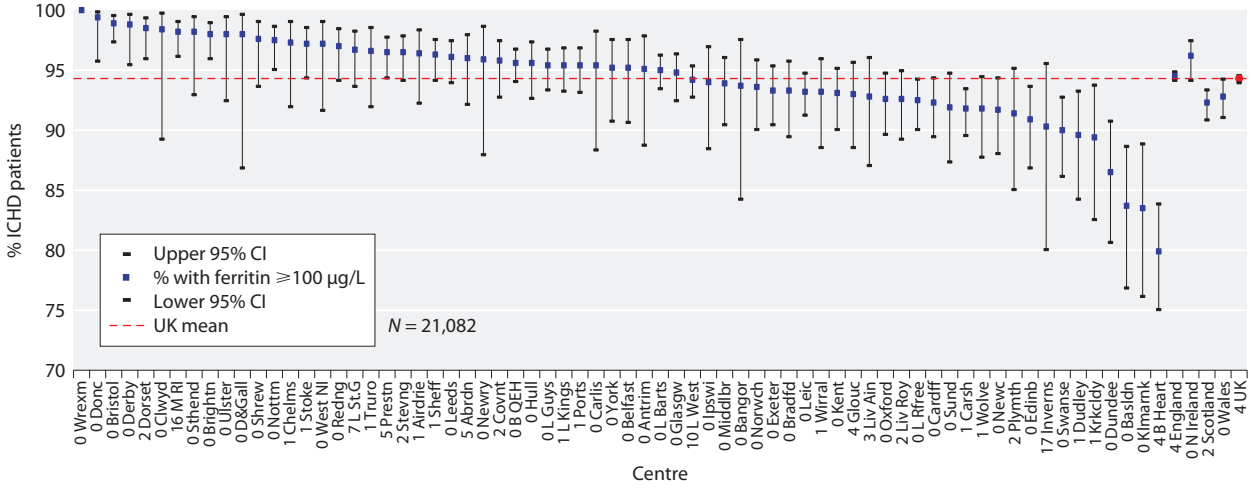


Figure 3.13 Percentage of adult patients prevalent to ICHD on 31/12/2017 with ferritin ⩾100 µg/L by centre
CI – confidence interval

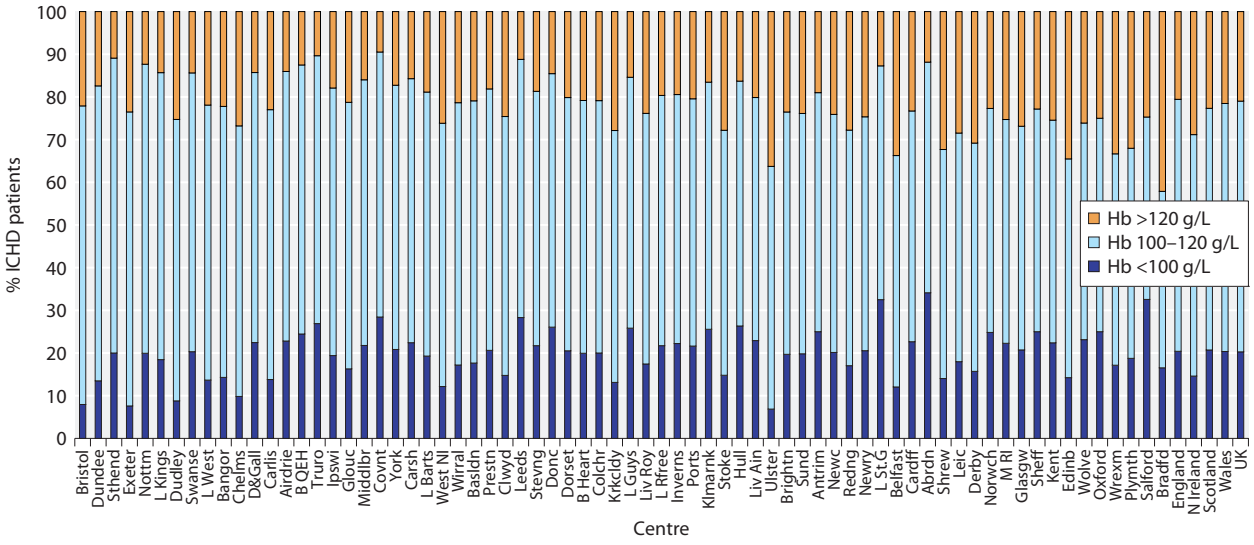


Figure 3.14 Distribution of haemoglobin in adult patients prevalent to ICHD on 31/12/2017 by centre
Hb – haemoglobin

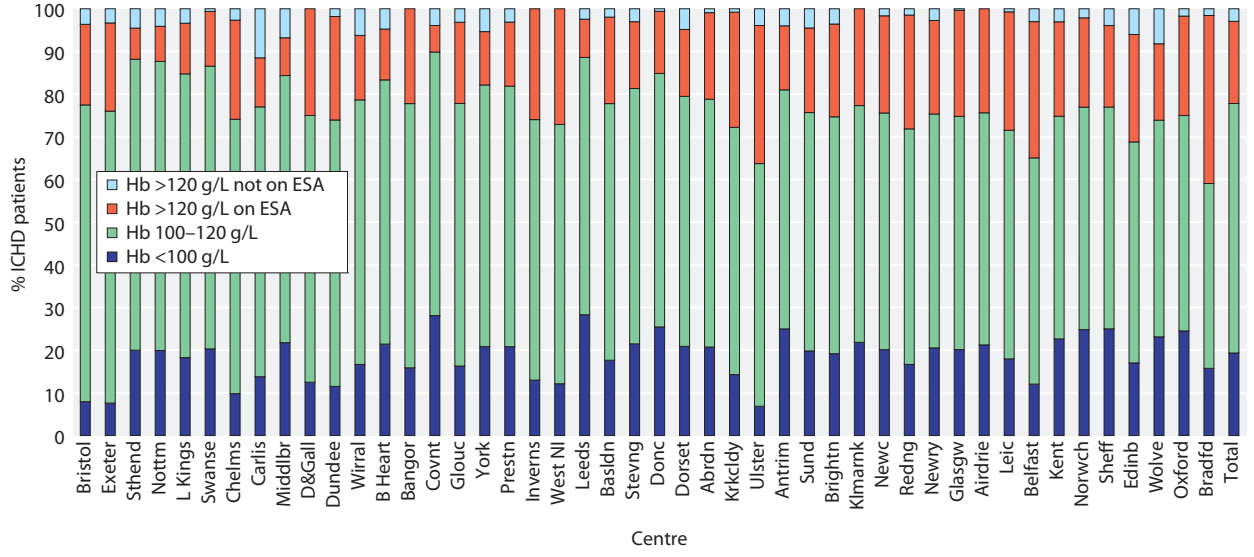


Figure 3.15 Distribution of haemoglobin in adult patients prevalent to ICHD on 31/12/2017 and the proportion with haemoglobin >120 g/L receiving erythropoiesis stimulating agent (ESA) by centre
Figure (including total) does not include centres with <70% data completeness (or <70% ESA use)
Hb – haemoglobin

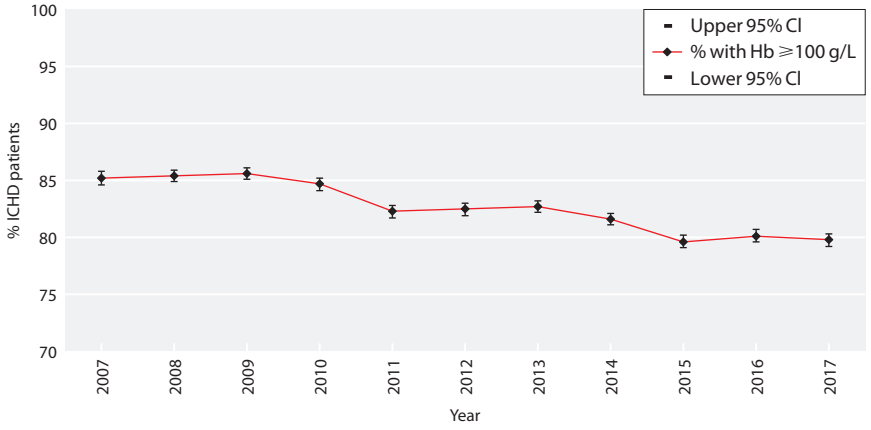


Figure 3.16 Percentage of prevalent adult ICHD patients with haemoglobin ⩾ 100 g/L between 2007 and 2017
CI – confidence interval; Hb – haemoglobin

Dialysis access in prevalent adult dialysis patients

Prevalent dialysis access data were collected separately to the main UKRR quarterly data returns via the 2017 Multisite Dialysis Access Audit (see appendix A). Scotland is not included in this audit.

The type of prevalent dialysis access is presented in figure 3.17 for the 40 of 62 centres in England, Northern Ireland and Wales that returned vascular access data on ⩾70% of their prevalent dialysis patients. Rates of PD may impact the types of vascular access used for ICHD and this is reflected in the combined audit measures for dialysis access.

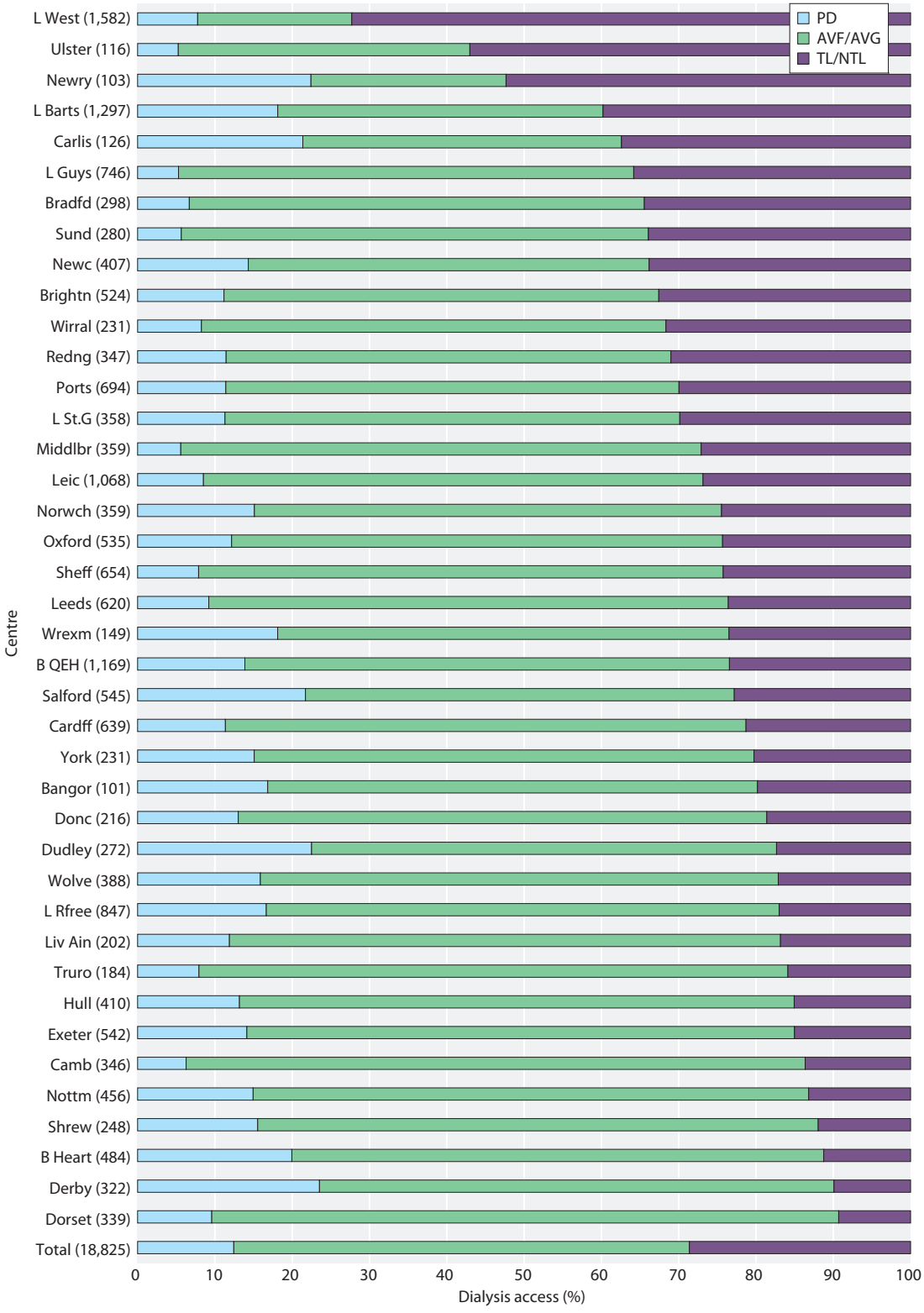


Figure 3.17 Dialysis access in adult patients prevalent to dialysis on 31/12/2017 by centre (2017 Multisite Dialysis Access Audit)

Number of patients on dialysis in a centre in brackets (centres with <70% access data for the prevalent dialysis population are excluded)
Centres are sorted by decreasing proportion of patients on RRT with a line
AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line

Infections in adult haemodialysis patients

PHE has carried out mandatory enhanced surveillance of MRSA bacteraemia since October 2005 and of MSSA bacteraemia since January 2011 for NHS acute trusts, with the subsequent addition of *E. coli* bacteraemia and *C. difficile* reporting. Patient-level infection data are reported in real time to PHE. For the first time, Wales provided data, which were extracted locally from the renal and hospital IT systems.

In previous reports, infection data were validated by securely emailing individual renal centres to confirm that infections were related to dialysis patients. Historically, this has resulted in only a small number of alterations in cases and so was not undertaken for these analyses. The definition of each type of infectious episode is detailed in appendix A.

A rolling two year cohort is reported in line with Renal Association guidelines. These analyses include all patients on HD, whether on HHD or ICHD.

Table 3.10 Rate of infection episodes per 100 HD patient years in prevalent adult HD patients in England and Wales from January 2016 to December 2017 by centre

Centre	HD patient years	Rate per 100 HD patient years			
		MRSA	MSSA	*C. difficile*	*E.coli*
ENGLAND					
B Heart	808	0.12	1.73	0.99	1.49
B QEH	2,130	0.23	2.35	0.99	1.69
Basldn	348	0.29	3.17	2.88	0.86
Bradfd	514	0.58	3.69	0.97	1.94
Brightn	919	0.11	2.29	2.07	2.39
Bristol	1,043	0.58	1.73	1.05	2.21
Camb					
Carlis	190	0.00	5.27	1.05	2.11
Carsh	1,712	0.23	1.93	0.82	1.87
Chelms	270	0.37	2.60	2.97	0.74
Colchr	251	0.00	3.19	0.80	3.59
Covnt	753	0.00	1.59	0.53	1.46
Derby	500	0.00	1.00	0.80	1.20
Donc	391	0.00	3.58	0.26	1.53
Dorset	589	0.00	1.36	1.36	2.04
Dudley	397	0.00	3.52	1.01	2.01
Exeter	910	0.11	2.31	1.21	1.43
Glouc	496	0.00	3.43	1.41	0.61
Hull	681	0.00	2.79	1.18	2.50
Ipswi	298	0.34	3.69	1.68	2.35
Kent	889	0.11	4.16	0.45	2.59
L Barts	2,065	0.34	3.63	0.53	2.23
L Guys	1,380	0.36	2.25	0.43	1.16
L Kings	1,168	0.43	1.80	0.60	1.11
L Rfree	1,429	0.21	1.33	1.75	2.31
L St.G	664	0.00	3.01	1.05	2.41
L West	2,983	0.13	1.88	1.24	1.54
Leeds	1,060	0.28	2.93	1.13	2.17
Leic	1,912	0.10	2.20	0.73	2.04
Liv Ain	360	0.00	5.56	1.67	0.83
Liv Roy	780	0.00	2.44	1.92	1.92
M RI	1,106	0.36	3.43	1.63	1.36
Middlbr	671	0.00	2.53	1.49	2.38
Newc	656	0.15	4.72	1.22	1.52
Norwch	663	0.15	0.91	0.60	1.51

Table 3.10 Continued

Centre	HD patient years	Rate per 100 HD patient years			
		MRSA	MSSA	*C. difficile*	*E.coli*
Nottm	804	0.00	2.99	0.75	2.24
Oxford	930	0.21	1.61	0.86	2.26
Plymth	283	0.00	3.18	1.41	2.12
Ports	1,285	0.16	2.88	1.09	1.95
Prestn	1,138	0.18	2.72	0.44	1.93
Redng	606	0.00	2.47	0.49	4.45
Salford	794	0.50	3.02	0.88	1.64
Sheff	1,216	0.08	2.63	1.32	1.40
Shrew	407	0.00	0.74	0.98	2.95
Stevng	1,068	0.28	1.22	0.94	1.59
Sthend	247	0.00	4.45	0.40	1.62
Stoke	684	0.00	2.05	1.02	3.36
Sund	498	0.80	3.42	1.41	1.61
Truro	329	0.00	2.74	1.82	0.61
Wirral	397	0.25	2.27	1.01	1.26
Wolve	633	0.00	1.11	0.79	1.58
York	378	0.00	4.77	1.32	2.65
WALES					
Bangor	156	0.00	4.49	3.21	1.92
Cardff	1,037	0.39	3.18	1.45	2.22
Clwyd	149	0.67	2.68	2.68	2.01
Swanse	754	0.13	4.64	2.39	3.18
Wrexm	239	0.42	2.92	3.34	2.09
TOTALS					
England	**42,681**	**0.19**	**2.49**	**1.05**	**1.87**
Wales	**2,336**	**0.30**	**3.68**	**2.14**	**2.48**
E & W	**45,017**	**0.19**	**2.55**	**1.11**	**1.91**

Blank cells – no data returned by the centre
C. difficile – Clostridium difficile; E. coli – Escherichia coli; MRSA – methicillin-resistant *Staphylococcus aureus*; MSSA – methicillin-sensitive *Staphylococcus aureus*

Funnel plots show each centre's estimated infection rate per 100 HD patient years for MRSA and MSSA against the number of patient years at risk to take into account the greater variation expected as centre size decreases.

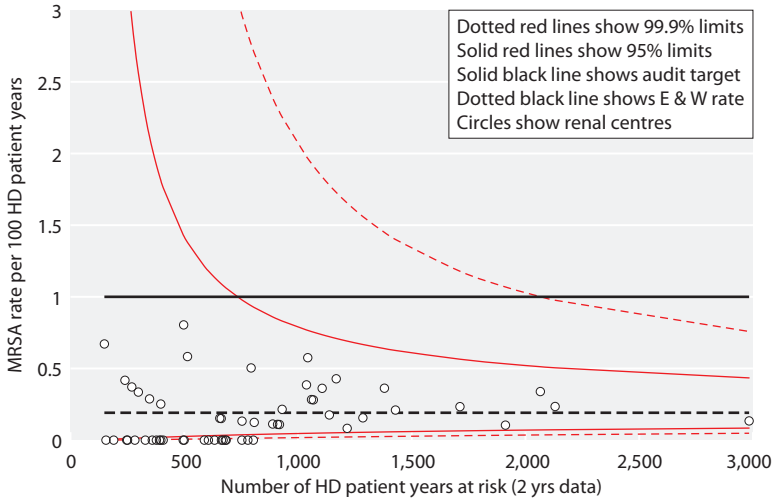


Figure 3.18 Methicillin-resistant *Staphylococcus aureus* (MRSA) rates by centre per 100 HD adult patient years (2016–2017 data) compared to audit target

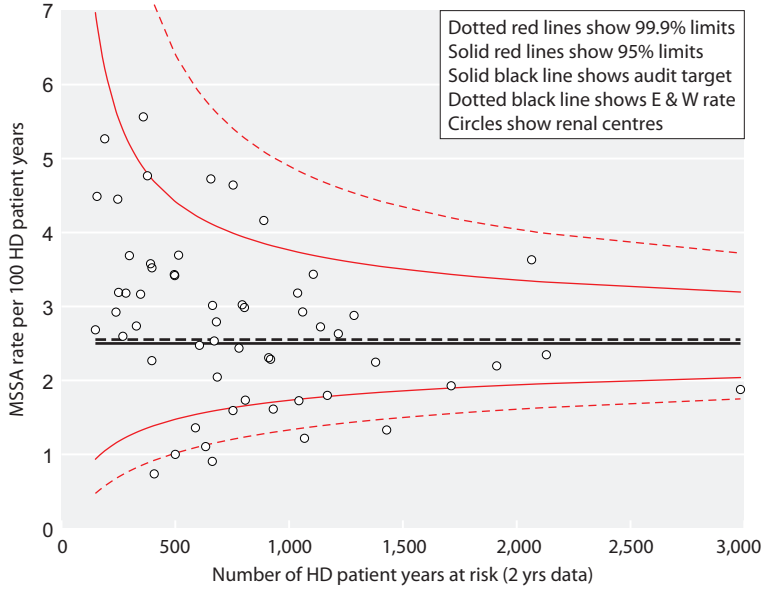


Figure 3.19 Methicillin-sensitive *Staphylococcus aureus* (MSSA) rates by centre per 100 HD adult patient years (2016–2017 data) compared to audit target

Trends in MRSA and MSSA rates are displayed using box and whisker plots, displaying the median, interquartile range and range of centre rates (more detail is available in appendix A).

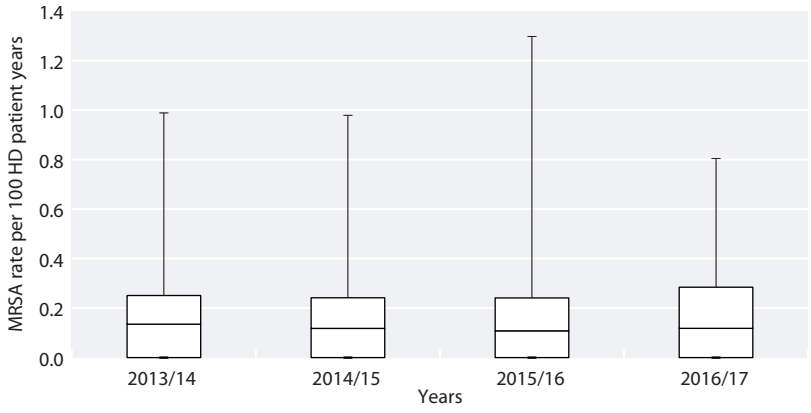


Figure 3.20 Distribution of methicillin-resistant *Staphylococcus aureus* (MRSA) centre rates per 100 HD adult patient years by rolling 2 calendar year cohort (Wales included in the 2016–2017 cohort only)

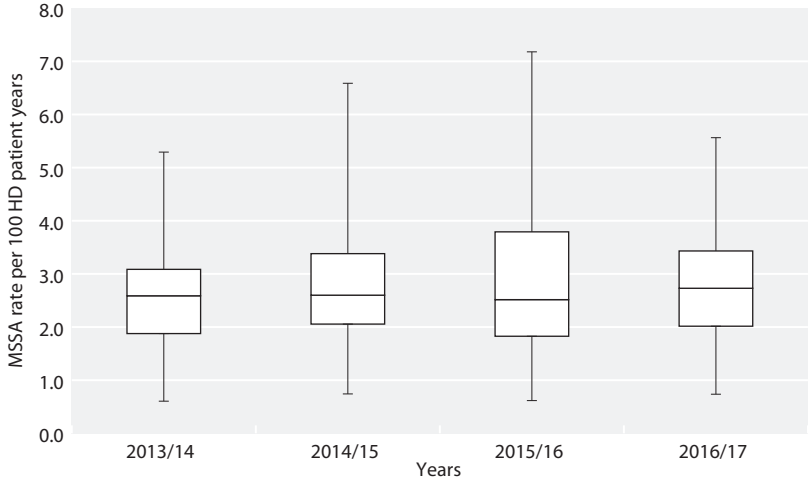


Figure 3.21 Distribution of methicillin-sensitive *Staphylococcus aureus* (MSSA) centre rates per 100 HD adult patient years by rolling 2 calendar year cohort (Wales included in the 2016–17 cohort only)

Cause of death in adult ICHD patients

Cause of death was analysed in prevalent patients receiving ICHD on 31/12/2016 and followed-up for one year in 2017. The proportion of ICHD 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. Further detail on the survival of prevalent RRT patients is in chapter 2.

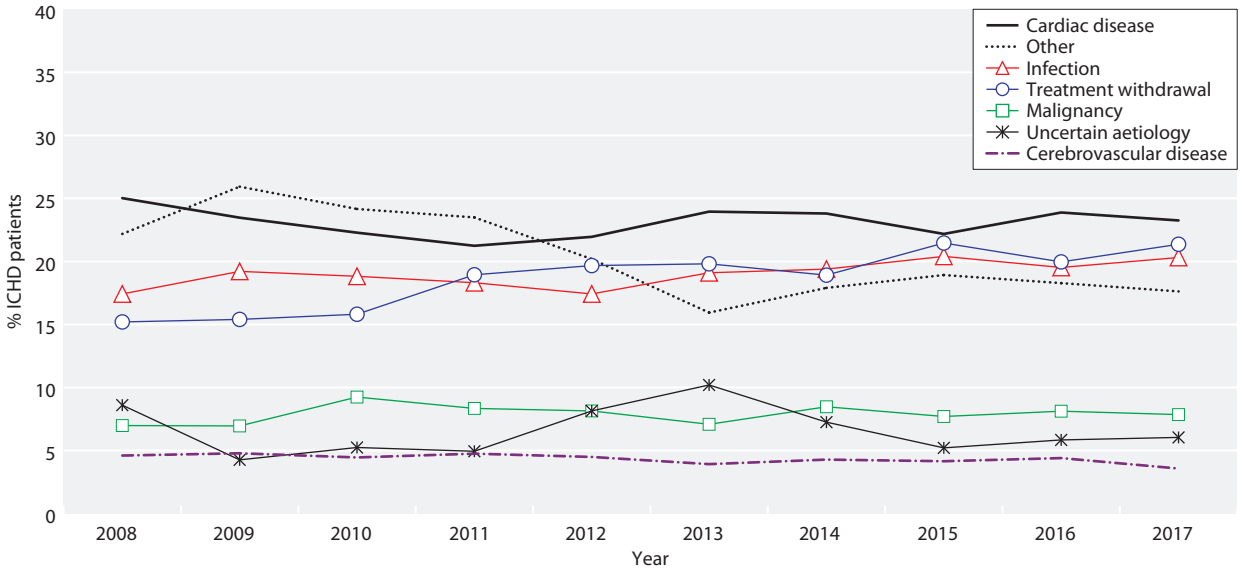


Figure 3.22 Cause of death for prevalent adult ICHD patients between 2008 and 2017

Table 3.11 Cause of death in adult patients prevalent to ICHD on 31/12/2016 followed-up in 2017 by age group

	ICHD all ages		ICHD <65 yrs		ICHD ⩾65 yrs	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	554	23.3	180	31.4	374	20.7
Cerebrovascular disease	85	3.6	28	4.9	57	3.2
Infection	484	20.3	115	20.1	369	20.4
Malignancy	187	7.9	33	5.8	154	8.5
Treatment withdrawal	509	21.4	81	14.1	428	23.7
Other	420	17.6	106	18.5	314	17.4
Uncertain aetiology	144	6.0	30	5.2	114	6.3
Total (with data)	**2,383**	**100.0**	**573**	**100.0**	**1,810**	**100.0**
Missing	1,451	37.9	387	40.3	1,064	37.0

Chapter 4

Adults on peritoneal dialysis (PD) in the UK at the end of 2017

Contents

Introduction 103
Rationale for analyses 105
Key findings 107
Analyses 108
Changes to the prevalent adult PD population 108
Demographics of prevalent adult PD patients 110
Biochemistry parameters in prevalent adult PD patients 112
Anaemia in prevalent adult PD patients 116
PD catheter insertion techniques and catheter patency in prevalent adult PD patients 122
Infections in adult PD patients 122
Cause of death in adult PD patients 124

Introduction

This chapter describes the population of adult patients with end-stage kidney disease (ESKD) who were receiving regular peritoneal dialysis (PD) in the UK at the end of 2017 (figure 4.1). This population comprises patients who were on PD at the end of 2016 and remained on PD throughout 2017, as well as patients who commenced/re-commenced PD in 2017. This latter group includes both incident renal replacement therapy (RRT) patients who ended 2017 on PD and prevalent RRT patients who switched to PD from in-centre haemodialysis (ICHD), home haemodialysis (HHD) or a transplant (Tx) in 2017. Consequently, the cohort of patients receiving PD in a centre not only reflects differences in underlying population case-mix, but also differences in the rates of acceptance onto RRT, survival on PD, transplantation and haemodialysis (ICHD and HHD), and the care of patients on those other modalities, as described in other chapters of this report. Patients on HHD will be reported in a separate chapter in next year's annual report.

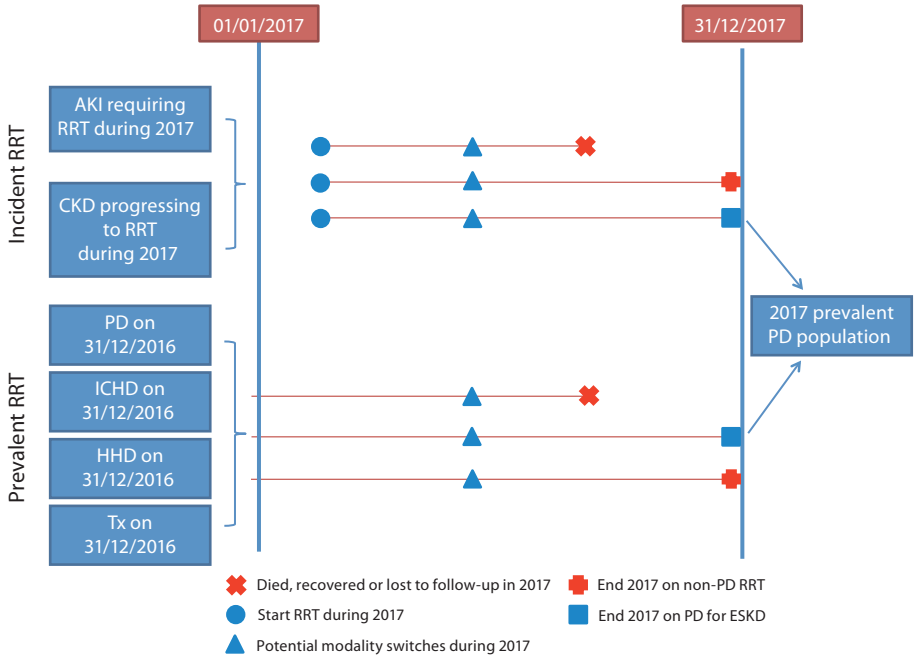


Figure 4.1 Pathways adult patients could follow to be included in the UK 2017 prevalent PD population

Note that patients receiving dialysis for acute kidney injury (AKI) are only included in this chapter if they had a timeline or RRT modality code for chronic PD at the end of 2017 or if they had been on RRT for ⩾90 days and were on PD at the end of 2017
CKD – chronic kidney disease

The infection analyses used a rolling two year cohort to be consistent with the reporting of infections in chapter 3. The cause of death analyses were undertaken on historic prevalent cohorts to allow sufficient follow-up time.

This chapter addresses the following key aspects of care of patients on PD for which there are Renal Association guidelines (table 4.1):

- **Complications associated with ESKD and PD** – these include anaemia, mineral bone disorders and metabolic acidosis
- **Infections associated with PD** – rates of PD peritonitis and the four infections subject to mandatory reporting to Public Health England (PHE) are reported in this chapter – methicillin-resistant *Staphylococcus aureus* (MRSA), methicillin-sensitive *Staphylococcus aureus* (MSSA), *Escherichia coli* bacteraemia and *Clostridium difficile*.

Rationale for analyses

The analyses begin with a description of the 2017 prevalent adult PD population, including the number on PD per million population (pmp).

The Renal Association guidelines (https://renal.org/guidelines/) provide audit measures relevant to the care of patients on PD and, where data permit, their attainment by UK renal centres in 2017 is reported in this chapter (table 4.1). Audit measures in guidelines that have been archived (for example, 'Blood borne viruses' and 'Nutrition') are not included.

Some audit measures in current guidelines – for example, the target for glycated haemoglobin in those on hypoglycaemia-inducing treatment – cannot be reported because the completeness of the required data items is too low. Further detail about the completeness of data returned to the UK Renal Registry (UKRR) is available on the UKRR website. Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted.

Where revised target ranges are published, the measures in place at the time of patient care are reported. However, where new guidelines remove audit measures, those targets are no longer reported – in this chapter this applies to phosphate and parathyroid hormone.

Table 4.1 The Renal Association audit measures relevant to PD that are reported in this chapter

The Renal Association guideline	Audit criteria	Related analysis/analyses
CKD mineral bone disorder (2018)	Percentage of patients with serum calcium above the normal reference range of 2.2–2.5 mmol/L	Table 4.5, figure 4.2
PD (2017)	Plasma bicarbonate should be maintained in the normal reference range 22–30 mmol/L	Table 4.5, figure 4.4
Anaemia (2017)	Proportion of patients with serum ferritin <100 μg/L at start of treatment with erythropoiesis stimulating agent (ESA)	Table 4.6, figure 4.8 (the UKRR does not hold treatment with ESA start dates)
	Proportion of patients with haemoglobin <100 g/L not on ESA	Table 4.7
	Proportion of patients on ESA with haemoglobin >120 g/L	Table 4.7, figure 4.10
	Mean (median) ESA dose in patients maintained on ESA therapy	Table 4.7
Peritoneal access (2009)	>80% of PD catheters should be patent at 1 year (censoring for death and elective modality change)	See chapter 1
	Complications following PD catheter insertion	See chapter 1
	Peritonitis within 2 weeks of PD catheter insertion <5%	Figure 4.12
Planning, initiating and withdrawing RRT (2014)	Number of patients withdrawing from PD as a proportion of all deaths on PD	Table 4.9, figure 4.13

ESA – erythropoiesis stimulating agent

For definitions and methods relating to this chapter see appendix A. The number preceding the centre name in each caterpillar plot indicates the percentage of missing data for that centre. Caterpillar plots exclude centres with <70% data completeness but include centres with small numbers of patients.

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

Cambridge renal centre (Addenbrooke's Hospital) was unable to submit patient level data for 2015–2017. While data extraction issues have now been resolved, the UKRR and Cambridge are working to load and validate the backlog of data for these years. Using aggregate numbers of patients starting RRT by treatment modality, it is possible to report treatment rates for Cambridge, but no other quality assurance for the service provided.

Key findings

- 3,531 adult patients were receiving PD for ESKD in the UK on 31/12/2017, which represented 5.4% of the RRT population
- The median age of PD patients was 64.4 years and 60.5% were male
- The median adjusted calcium for PD patients was 2.4 mmol/L and 14.5% were above the target range 2.2–2.5 mmol/L
- The median bicarbonate for PD patients was 25 mmol/L and 80.4% were within the target range 22–30 mmol/L
- The median haemoglobin and ferritin for PD patients was 111 g/L and 308 μg/L, respectively, and 78.6% were on an ESA at a median dose of 4,000 IU/week
- The 2 year PD peritonitis rate (2016–2017 – England only) was 45/100 PD patient years (1 : 26.7 months)
- There was no cause of death data available for 40.0% of deaths. For those with data, the leading cause of death in younger patients ($<$65 years) was cardiac disease (30.1%) and in older patients ($\geqslant$65 years) was treatment withdrawal (25.1%).

Analyses

Changes to the prevalent adult PD population

For the 71 adult renal centres, the number of prevalent patients on PD was calculated as both a proportion of the prevalent patients on RRT and as a proportion of the estimated centre catchment population (calculated as detailed in appendix A).

Table 4.2 Number of prevalent adult PD patients and proportion of adult RRT patients on PD by year and by centre; number of PD patients as a proportion of the catchment population

	N on PD					% on PD					Estimated catchment population (millions)	2017 crude rate (pmp)
Centre	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017		
ENGLAND												
B Heart	40	34	51	88	88	6.1	5.4	7.8	13.5	13.5	0.77	114
B QEH	137	143	142	143	162	6.7	6.7	6.3	6.0	6.4	1.78	91
Basldn	30	28	35	34	28	11.1	10.1	12.8	12.4	9.3	0.43	64
Bradfd	30	21	18	25	20	5.8	3.8	3.1	3.9	3.0	0.68	29
Brightn	79	64	67	64	59	9.1	7.0	7.1	6.5	5.8	1.36	43
Bristol	67	67	57	53	58	4.7	4.6	3.9	3.6	3.9	1.51	38
Camb	24	31	44	23	31	2.0	2.5	2.9	1.5	2.2	1.21	26
Carlis	27	26	38	35	28	11.9	10.4	13.5	12.6	10.0	0.34	83
Carsh	120	136	113	113	96	8.1	8.8	7.1	6.9	5.7	2.00	48
Chelms	21	27	27	33	35	8.7	10.3	9.5	12.0	12.4	0.53	65
Colchr	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.31	0
Covnt	81	90	78	67	52	8.7	9.4	8.1	6.9	5.4	0.93	56
Derby	82	85	78	77	79	17.7	16.6	14.5	14.2	14.2	0.74	107
Donc	35	27	23	27	29	13.5	9.5	7.6	8.2	8.7	0.43	68
Dorset	48	51	42	36	35	7.7	7.7	6.2	5.2	4.8	0.90	39
Dudley	56	54	57	50	55	18.1	17.7	18.2	14.5	14.9	0.46	119
Exeter	74	94	82	84	75	8.3	9.9	8.5	8.3	7.1	1.14	66
Glouc	33	43	37	42	45	8.1	10.0	8.4	8.9	8.9	0.61	73
Hull	80	77	75	72	56	9.8	9.6	8.8	8.5	6.4	1.07	52
Ipswi	30	31	37	34	45	8.5	8.4	9.2	8.2	10.4	0.42	108
Kent	64	66	60	58	52	6.7	6.5	5.8	5.4	4.8	1.28	41
L Barts	193	223	207	202	236	9.2	10.1	9.1	8.5	9.5	1.92	123
L Guys	29	29	33	39	39	1.6	1.5	1.6	1.9	1.8	1.13	34
L Kings	104	91	90	91	97	10.8	8.9	8.3	8.2	8.5	1.23	79
L Rfree	132	143	154	159	145	6.9	7.1	7.4	7.3	6.6	1.59	91
L St.G	48	48	48	44	37	6.4	6.1	5.7	5.2	4.4	0.84	44
L West	61	64	71	101	122	2.0	2.0	2.1	3.0	3.5	2.51	49
Leeds	70	63	57	47	59	4.8	4.2	3.7	3.0	3.6	1.75	34
Leic	151	122	108	89	97	7.3	5.7	5.0	3.9	4.1	2.55	38
Liv Ain	30	39	38	27	22	15.8	18.0	17.2	11.9	10.2	0.51	43
Liv Roy	58	60	67	71	70	4.6	4.7	5.4	5.9	5.6	1.05	67
M RI	81	73	65	62	70	4.4	4.1	3.5	3.1	3.4	1.60	44
Middlbr	12	11	22	26	21	1.5	1.3	2.4	2.9	2.3	1.05	20
Newc	42	52	46	53	59	4.4	5.3	4.6	5.0	5.3	1.17	50
Norwch	39	35	38	48	43	5.7	5.1	5.1	6.2	5.5	0.82	52
Nottm	83	84	82	82	70	7.7	7.9	7.4	7.1	6.0	1.14	61
Oxford	99	82	95	95	68	6.3	5.0	5.6	5.4	3.6	1.77	38
Plymth	36	34	34	40	49	7.2	6.8	6.8	7.8	9.1	0.49	100
Ports	85	79	71	75	84	5.5	5.0	4.3	4.4	4.8	2.12	40
Prestn	56	58	53	40	34	5.1	5.0	4.4	3.3	2.7	1.56	22
Redng	76	72	66	56	39	10.4	9.5	8.5	7.1	4.9	0.95	41
Salford	84	94	94	106	117	9.5	9.7	9.7	10.4	10.5	1.56	75

Table 4.2 Continued

Centre	*N* on PD					% on PD					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017		
Sheff	70	62	64	55	55	5.3	4.6	4.6	3.9	3.8	1.44	38
Shrew	32	32	32	39	42	9.5	9.2	8.7	10.4	11.2	0.52	80
Stevng	45	27	15	21	23	6.0	3.5	1.8	2.3	2.6	1.26	18
Sthend	18	20	17	30	34	8.2	8.4	6.9	12.7	13.5	0.33	103
Stoke	87	83	75	79	73	12.0	10.7	9.5	9.6	9.0	0.93	78
Sund	12	18	18	17	16	2.9	4.0	3.9	3.4	3.0	0.65	25
Truro	24	21	22	18	15	6.5	5.5	5.3	4.2	3.5	0.43	35
Wirral	35	22	21	22	19	14.1	7.9	7.5	6.5	4.9	0.60	32
Wolve	84	79	79	69	54	14.8	13.8	13.6	12.1	9.3	0.70	77
York	27	29	29	33	35	6.6	6.3	5.9	6.2	6.3	0.52	68
N IRELAND												
Antrim	15	13	20	16	14	6.7	5.7	8.4	6.6	5.6	0.30	46
Belfast	27	15	24	24	17	3.7	2.0	3.1	2.9	2.0	0.66	26
Newry	18	16	22	21	23	9.0	7.7	9.8	8.9	9.5	0.27	85
Ulster	6	4	6	6	6	3.9	2.7	3.5	3.6	3.3	0.27	22
West NI	15	14	12	10	9	6.3	5.1	4.1	3.3	2.9	0.36	25
SCOTLAND												
Abrdn	25	27	26	21	22	4.8	5.4	4.9	3.8	3.9	0.61	36
Airdrie	14	9	16	24	16	3.6	2.3	3.8	5.5	3.4	0.57	28
D&Gall	15	15	11	10	6	12.6	11.5	8.5	7.6	4.4	0.15	39
Dundee	20	23	17	21	18	5.0	5.7	4.0	5.0	4.1	0.47	38
Edinb	30	21	26	36	34	4.1	2.8	3.4	4.6	4.1	0.99	34
Glasgw	44	39	55	54	48	2.8	2.4	3.2	3.1	2.7	1.66	29
Inverns	13	15	13	11	10	6.0	6.7	5.1	4.2	3.8	0.28	36
Klmarnk	43	36	37	33	24	14.5	12.0	11.9	10.4	7.1	0.37	65
Krkcldy	19	15	21	18	10	6.7	5.4	7.1	6.1	3.3	0.32	31
WALES												
Bangor	13	16	15	16	17	13.1	15.7	8.2	8.9	8.8	0.23	74
Cardff	73	79	79	75	72	4.6	5.0	4.9	4.6	4.3	1.50	48
Clwyd	13	11	20	15	12	8.6	6.6	10.8	8.5	6.6	0.20	60
Swanse	58	53	62	67	74	8.4	7.5	8.1	8.7	9.4	0.94	79
Wrexm	22	30	37	32	27	8.8	10.6	12.6	10.3	8.5	0.25	106
TOTALS												
England	**3,161**	**3,144**	**3,072**	**3,094**	**3,072**	**6.6**	**6.3**	**6.0**	**5.8**	**5.6**	**55.62**	**55**
N Ireland	**81**	**62**	**84**	**77**	**69**	**5.3**	**3.9**	**4.9**	**4.3**	**3.8**	**1.87**	**37**
Scotland	**223**	**200**	**222**	**228**	**188**	**4.9**	**4.4**	**4.6**	**4.6**	**3.7**	**5.42**	**35**
Wales	**179**	**189**	**213**	**205**	**202**	**6.4**	**6.6**	**7.0**	**6.7**	**6.4**	**3.13**	**65**
UK	**3,644**	**3,595**	**3,591**	**3,604**	**3,531**	**6.4**	**6.1**	**5.9**	**5.7**	**5.4**	**66.04**	**53**

Country dialysis populations were calculated by summing the dialysis patients from centres in each country. Estimated country populations were derived from Office for National Statistics figures rather than from summing the estimated catchment populations of renal centres which may cross country borders
pmp – per million population

Demographics of prevalent adult PD patients

The proportion of PD 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 4.3 Demographics of adult patients prevalent to PD on 31/12/2017 by centre

						Ethnicity				
Centre	*N* on RRT	*N* on PD	% on PD	Median age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing
ENGLAND										
B Heart	654	88	13.5	65.0	65.9	62.5	21.6	13.6	2.3	0.0
B QEH	2,524	162	6.4	59.4	61.7	58.8	19.6	14.2	7.4	8.6
Basldn	301	28	9.3	68.7	67.9	92.9	3.6	3.6	0.0	0.0
Bradfd	674	20	3.0	52.0	40.0	60.0	35.0	0.0	5.0	0.0
Brightn	1,013	59	5.8	70.1	69.5	91.1	7.1	0.0	1.8	5.1
Bristol	1,473	58	3.9	64.9	70.7	94.8	1.7	3.4	0.0	0.0
Camb										
Carlis	281	28	10.0	73.1	64.3	100.0	0.0	0.0	0.0	3.6
Carsh	1,681	96	5.7	67.7	56.3	77.4	15.1	6.5	1.1	3.1
Chelms	283	35	12.4	66.4	62.9	91.2	2.9	0.0	5.9	2.9
Colchr	127	0	0.0							
Covnt	962	52	5.4	66.0	63.5	80.8	13.5	5.8	0.0	0.0
Derby	556	79	14.2	63.4	63.3	91.1	7.6	0.0	1.3	0.0
Donc	333	29	8.7	64.5	51.7	96.6	0.0	3.4	0.0	0.0
Dorset	734	35	4.8	71.2	57.1	97.1	0.0	2.9	0.0	2.9
Dudley	368	55	14.9	66.7	50.9	87.3	10.9	0.0	1.8	0.0
Exeter	1,054	75	7.1	68.9	56.0	81.3	1.3	0.0	17.3	0.0
Glouc	504	45	8.9	64.5	55.6	86.7	6.7	2.2	4.4	0.0
Hull	871	56	6.4	60.0	60.7	98.2	1.8	0.0	0.0	0.0
Ipswi	431	45	10.4	70.3	60.0	68.6	0.0	5.7	25.7	22.2
Kent	1,091	52	4.8	70.5	65.4	94.2	1.9	1.9	1.9	0.0
L Barts	2,497	236	9.5	60.2	60.6	28.8	39.0	17.8	14.4	0.0
L Guys	2,159	39	1.8	57.2	51.3	59.5	8.1	27.0	5.4	5.1
L Kings	1,145	97	8.5	59.0	53.6	49.5	12.4	34.0	4.1	0.0
L Rfree	2,193	145	6.6	63.9	54.5	44.2	26.8	21.7	7.2	4.8
L St.G	843	37	4.4	68.6	54.1	56.3	12.5	21.9	9.4	13.5
L West	3,498	122	3.5	66.1	60.7	50.0	26.2	17.2	6.6	0.0
Leeds	1,621	59	3.6	52.7	52.5	83.1	13.6	1.7	1.7	0.0
Leic	2,374	97	4.1	61.9	56.7	80.9	10.6	4.3	4.3	3.1
Liv Ain	216	22	10.2	58.0	50.0	100.0	0.0	0.0	0.0	0.0
Liv Roy	1,255	70	5.6	60.2	60.0	87.0	4.3	5.8	2.9	1.4
M RI	2,059	70	3.4	61.9	60.0	72.1	19.1	7.4	1.5	2.9
Middlbr	898	21	2.3	62.9	61.9	100.0	0.0	0.0	0.0	0.0
Newc	1,118	59	5.3	62.1	66.1	98.3	0.0	1.7	0.0	0.0
Norwch	776	43	5.5	66.0	76.7	95.3	2.3	2.3	0.0	0.0
Nottm	1,174	70	6.0	63.6	54.3	81.4	10.0	5.7	2.9	0.0
Oxford	1,878	68	3.6	68.8	67.6	84.5	3.4	6.9	5.2	14.7
Plymth	540	49	9.1	70.1	67.3	95.8	0.0	0.0	4.2	2.0
Ports	1,746	84	4.8	64.3	73.8	94.9	1.3	1.3	2.6	7.1
Prestn	1,268	34	2.7	65.5	67.6	88.2	11.8	0.0	0.0	0.0
Redng	796	39	4.9	68.8	61.5	77.1	17.1	5.7	0.0	10.3
Salford	1,115	117	10.5	61.9	64.1	81.2	17.1	0.9	0.9	0.0
Sheff	1,441	55	3.8	68.9	65.5	90.6	5.7	1.9	1.9	3.6
Shrew	376	42	11.2	65.8	73.8	95.2	2.4	2.4	0.0	0.0
Stevng	901	23	2.6	71.0	60.9	86.4	9.1	4.5	0.0	4.3
Sthend	252	34	13.5	72.2	64.7	88.2	8.8	2.9	0.0	0.0
Stoke	813	73	9.0	67.0	57.5	97.2	1.4	0.0	1.4	1.4
Sund	541	16	3.0	66.3	43.8	93.8	0.0	0.0	6.3	0.0

Table 4.3 Continued

Centre	*N* on RRT	*N* on PD	% on PD	Median age (yrs)	% male	Ethnicity				
						% White	% South Asian	% Black	% Other	% missing
Truro	423	15	3.5	73.2	60.0	100.0	0.0	0.0	0.0	0.0
Wirral	387	19	4.9	69.2	73.7	94.7	0.0	5.3	0.0	0.0
Wolve	581	54	9.3	64.8	63.0	57.4	29.6	11.1	1.9	0.0
York	554	35	6.3	68.2	77.1	96.9	3.1	0.0	0.0	8.6
N IRELAND										
Antrim	248	14	5.6	65.0	71.4	100.0	0.0	0.0	0.0	0.0
Belfast	843	17	2.0	66.9	41.2	100.0	0.0	0.0	0.0	29.4
Newry	241	23	9.5	76.1	60.9	100.0	0.0	0.0	0.0	0.0
Ulster	184	6	3.3	74.7	50.0	100.0	0.0	0.0	0.0	0.0
West NI	313	9	2.9	73.7	66.7	100.0	0.0	0.0	0.0	0.0
SCOTLAND										
Abrdn	563	22	3.9	55.8	50.0					81.8
Airdrie	468	16	3.4	66.5	43.8	92.3	0.0	0.0	7.7	18.8
D&Gall	135	6	4.4	71.2	66.7					100.0
Dundee	439	18	4.1	65.1	55.6					94.4
Edinb	837	34	4.1	67.4	38.2					91.2
Glasgw	1,774	48	2.7	59.5	47.9					93.8
Inverns	263	10	3.8	69.0	50.0					90.0
Klmarnk	338	24	7.1	55.5	66.7					79.2
Krkcldy	299	10	3.3	61.3	50.0					90.0
WALES										
Bangor	194	17	8.8	68.3	58.8	100.0	0.0	0.0	0.0	0.0
Cardff	1,684	72	4.3	68.0	62.5	91.7	5.6	1.4	1.4	0.0
Clwyd	181	12	6.6	70.8	58.3	91.7	8.3	0.0	0.0	0.0
Swanse	791	74	9.4	67.4	56.8	97.1	1.4	0.0	1.4	5.4
Wrexm	319	27	8.5	67.7	70.4	96.3	0.0	3.7	0.0	0.0
TOTALS										
England	**53,353**	**3,041**	**5.7**	**64.2**	**61.2**	**74.9**	**12.9**	**7.9**	**4.3**	**2.7**
N Ireland	**1,829**	**69**	**3.8**	**73.3**	**58.0**	**100.0**	**0.0**	**0.0**	**0.0**	**7.2**
Scotland	**5,116**	**188**	**3.7**	**62.0**	**50.0**					**83.5**
Wales	**3,169**	**202**	**6.4**	**67.8**	**60.9**	**94.9**	**3.0**	**1.0**	**1.0**	**2.0**
UK	**63,467**	**3,500**	**5.5**	**64.4**	**60.5**	**76.6**	**12.1**	**7.3**	**4.1**	**7.1**

Blank cells – no data returned by the centre or data completeness <70%
Breakdown by ethnicity not shown for centres with <70% data completeness, but these centres are included in national averages
Cambridge is excluded from this table

Primary renal diseases (PRDs) were grouped into categories as shown in table 4.4, with the mapping of disease codes into groups explained in more detail in appendix A. The proportion of PD 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 4.4 Primary renal diseases (PRDs) of adult patients prevalent to PD on 31/12/2017

PRD	*N* on PD	% PD population	Age <65 yrs		Age ⩾65 yrs		M : F ratio
			N	%	*N*	%	
Diabetes	757	22.8	414	24.2	343	21.3	1.8
Glomerulonephritis	598	18.0	383	22.4	215	13.4	1.8
Hypertension	260	7.8	104	6.1	156	9.7	2.3
Polycystic kidney	236	7.1	154	9.0	82	5.1	1.0
Pyelonephritis	218	6.6	110	6.4	108	6.7	1.1
Renal vascular disease	180	5.4	37	2.2	143	8.9	2.3
Other	498	15.0	282	16.5	216	13.4	1.2
Uncertain aetiology	573	17.3	229	13.4	344	21.4	1.3
Total (with data)	**3,320**	**100.0**	**1,713**	**100.0**	**1,607**	**100.0**	
Missing	180	5.1	91	5.0	89	5.2	1.5

Biochemistry parameters in prevalent adult PD patients

The latest Renal Association guideline on CKD mineral bone disease contains only one audit measure, which is the percentage of patients with adjusted calcium above the target range. The Renal Association guideline on PD contains one biochemical audit measure, which is the proportion of patients with bicarbonate in the target range. The Scottish Renal Registry does not submit bicarbonate data.

Table 4.5 Median adjusted calcium and percentage with adjusted calcium within and above the target range (2.2–2.5 mmol/L); and median bicarbonate and percentage with bicarbonate below, within and above the target range (22–30 mmol/L) in adult patients prevalent to PD on 31/12/2017 by centre

Centre	Adjusted calcium				Bicarbonate				
	Median (mmoI/L)	% 2.2–2.5 mmoI/L	% >2.5 mmoI/L	% data completeness	Median (mmoI/L)	% <22 mmol/L	% 22–30 mmoI/L	% >30 mmol/L	% data completeness
ENGLAND									
B Heart	2.4	73.7	14.5	100.0	21	51.3	48.7	0.0	100.0
B QEH	2.3	78.3	7.7	99.3	24	25.4	73.9	0.8	90.3
Basldn	2.5	80.8	19.2	100.0	27	0.0	96.2	3.9	100.0
Bradfd	2.4	80.0	20.0	100.0	25	20.0	75.0	5.0	100.0
Brightn	2.4	75.0	13.5	100.0	27	5.8	82.7	11.5	100.0
Bristol	2.4	83.0	17.0	100.0	24	19.6	80.4	0.0	97.9
Camb									
Carlis	2.3	84.6	3.9	100.0	26	7.7	92.3	0.0	100.0
Carsh	2.4	75.6	12.2	96.5					0.0
Chelms	2.4	62.5	16.7	80.0	25	13.0	87.0	0.0	76.7
Colchr									
Covnt	2.4	88.6	6.8	95.7	25	11.6	86.1	2.3	93.5
Derby	2.4	83.6	13.4	100.0	26	13.6	83.3	3.0	98.5
Donc	2.4	90.9	4.6	100.0	24	27.3	72.7	0.0	100.0
Dorset	2.3	82.1	7.1	96.6	23	33.3	59.3	7.4	93.1
Dudley	2.6	44.7	51.1	100.0	27	4.3	87.2	8.5	100.0
Exeter	2.3	89.9	5.8	100.0	24	10.1	89.9	0.0	100.0

Table 4.5 Continued

Centre	Adjusted calcium				Bicarbonate				
	Median (mmoI/L)	% 2.2–2.5 mmoI/L	% >2.5 mmoI/L	% data completeness	Median (mmoI/L)	% <22 mmol/L	% 22–30 mmoI/L	% >30 mmol/L	% data completeness
Glouc	2.4	75.7	18.9	97.4	25	7.9	89.5	2.6	100.0
Hull	2.4	76.7	18.6	100.0	26	9.3	88.4	2.3	100.0
Ipswi	2.3	88.9	2.8	97.3	27	2.8	91.7	5.6	97.3
Kent	2.5	62.5	37.5	100.0	24	22.5	77.5	0.0	100.0
L Barts	2.3	78.5	7.0	99.5	25	16.0	79.5	4.5	99.5
L Guys	2.4	84.4	12.5	100.0	25	12.5	87.5	0.0	100.0
L Kings	2.3	78.6	7.1	100.0	26	7.1	87.1	5.7	100.0
L Rfree	2.4	73.8	15.9	100.0	24	19.6	77.6	2.8	84.9
L St.G	2.5	69.7	30.3	97.1	25	15.2	84.9	0.0	97.1
L West				69.0					68.0
Leeds	2.4	69.4	26.5	100.0	27	18.4	73.5	8.2	100.0
Leic	2.4	85.2	13.6	100.0	25	9.0	82.1	9.0	96.3
Liv Ain	2.4	87.5	6.3	88.9	27	6.3	87.5	6.3	88.9
Liv Roy	2.3	89.8	8.5	98.3	26	6.8	88.1	5.1	98.3
M RI	2.4	75.9	19.0	98.3	24	25.9	74.1	0.0	98.3
Middlbr	2.3	81.3	6.3	100.0	28	0.0	81.3	18.8	100.0
Newc	2.4	60.0	32.0	100.0	25	10.0	88.0	2.0	100.0
Norwch	2.4	84.2	10.5	100.0	22	39.5	60.5	0.0	100.0
Nottm	2.3	78.6	7.1	98.3					38.6
Oxford	2.4	80.0	16.7	100.0	25	18.5	81.5	0.0	90.0
Plymth	2.4	83.3	11.9	100.0	25	12.2	82.9	4.9	97.6
Ports	2.4	87.1	10.0	100.0	27	2.9	91.3	5.8	98.6
Prestn	2.3	77.4	12.9	100.0	25	16.1	80.7	3.2	100.0
Redng	2.4	82.4	11.8	100.0	27	0.0	91.2	8.8	100.0
Salford	2.4	78.4	16.7	100.0					0.0
Sheff	2.3	81.6	6.1	100.0	24	20.8	79.2	0.0	98.0
Shrew	2.4	72.2	22.2	100.0	26	19.4	72.2	8.3	100.0
Stevng	2.4	80.0	20.0	93.8	24	23.1	69.2	7.7	81.3
Sthend	2.3	79.3	3.5	96.7	26	3.3	90.0	6.7	100.0
Stoke	2.4	79.7	18.8	95.5	27	1.5	86.4	12.1	98.5
Sund	2.4	69.2	30.8	100.0					0.0
Truro	2.5	71.4	28.6	100.0	26	7.7	92.3	0.0	92.9
Wirral	2.3	75.0	0.0	100.0	26	25.0	68.8	6.3	100.0
Wolve	2.4	80.9	12.8	95.9	23	29.8	70.2	0.0	95.9
York	2.4	83.3	13.3	100.0	26	10.0	86.7	3.3	100.0
N IRELAND									
Antrim	2.4	72.7	9.1	100.0	24	9.1	90.9	0.0	100.0
Belfast	2.3	73.3	13.3	100.0	25	6.7	93.3	0.0	100.0
Newry	2.4	79.0	21.1	100.0	27	0.0	94.7	5.3	100.0
Ulster				100.0					100.0
West NI				100.0					100.0
SCOTLAND									
Abrdn	2.5	61.1	33.3	100.0					
Airdrie	2.4	84.6	0.0	100.0					
D&Gall				83.3					
Dundee	2.5	73.3	26.7	100.0					
Edinb				64.3					
Glasgw	2.4	73.7	26.3	100.0					
Inverns				80.0					
Klmarnk	2.4	77.3	18.2	100.0					
Krkcldy				77.8					

Table 4.5 Continued

Centre	Adjusted calcium				Bicarbonate				
	Median (mmol/L)	% 2.2–2.5 mmol/L	% >2.5 mmol/L	% data completeness	Median (mmol/L)	% <22 mmol/L	% 22–30 mmol/L	% >30 mmol/L	% data completeness
WALES									
Bangor	2.4	93.3	6.7	100.0	27	0.0	93.3	6.7	100.0
Cardff	2.4	81.7	15.0	98.4					63.9
Clwyd	2.5	83.3	16.7	100.0	24	16.7	83.3	0.0	100.0
Swanse	2.4	83.6	13.1	98.4	26	6.8	76.3	17.0	95.2
Wrexm	2.4	89.5	10.5	100.0	28	0.0	89.5	10.5	100.0
TOTALS									
England	**2.4**	**78.3**	**14.1**	**97.7**	**25**	**16.2**	**80.0**	**3.8**	**86.9**
N Ireland	**2.4**	**76.7**	**16.7**	**100.0**	**26**	**6.7**	**88.3**	**5.0**	**100.0**
Scotland	**2.4**	**74.3**	**21.5**	**90.6**					**0.0**
Wales	**2.4**	**84.4**	**13.2**	**98.8**	**26**	**7.6**	**81.9**	**10.4**	**85.2**
UK	**2.4**	**78.5**	**14.5**	**97.4**	**25**	**15.4**	**80.4**	**4.2**	**87.1**

Blank cells – no data returned by the centre or <10 patients in the centre or data completeness <70%

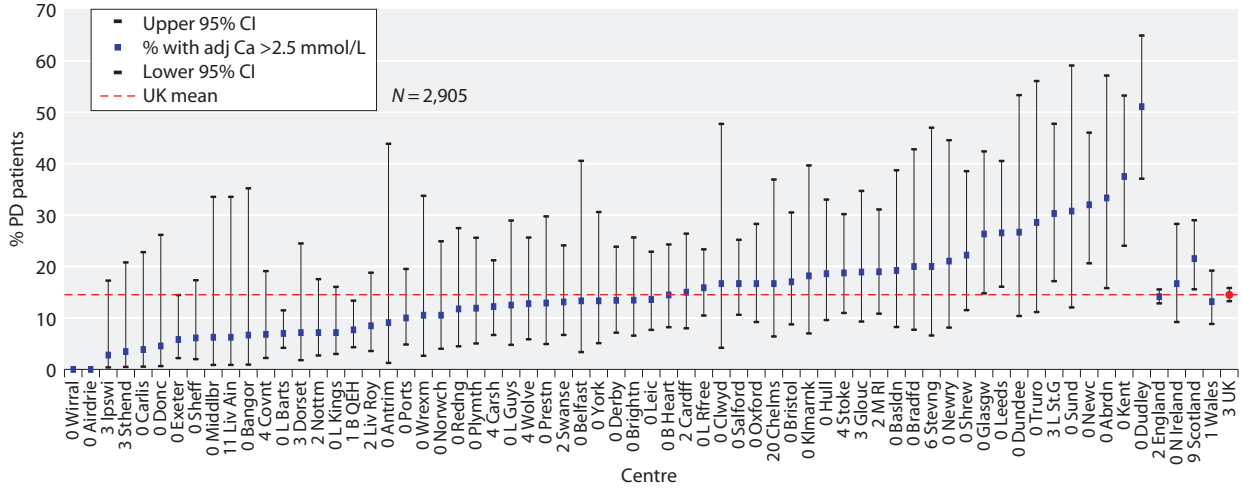


Figure 4.2 Percentage of adult patients prevalent to PD on 31/12/2017 with adjusted calcium above the target range (>2.5 mmol/L) by centre

Ca – calcium; CI – confidence interval

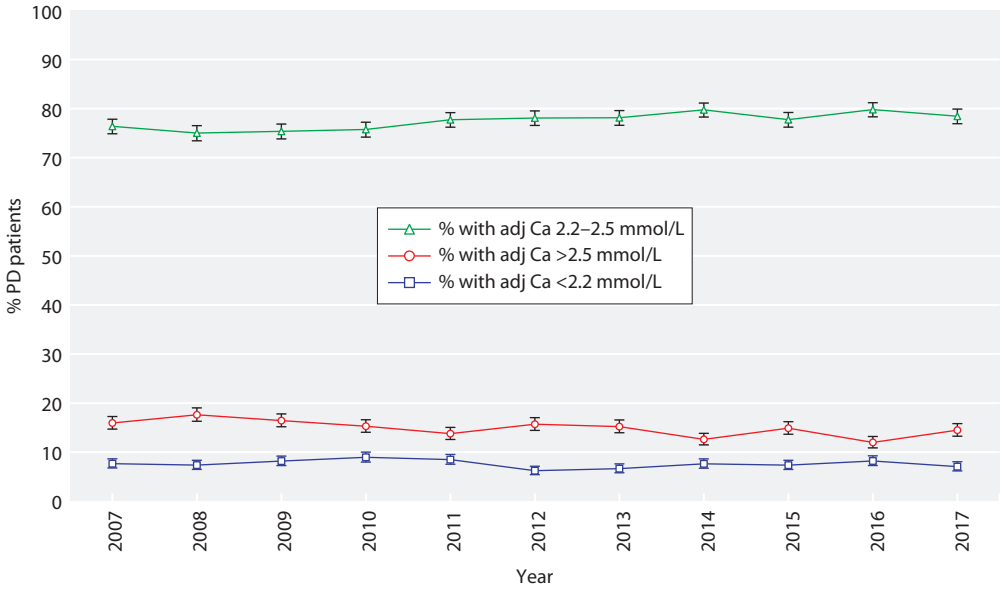


Figure 4.3 Change in percentage of prevalent adult PD patients within, above and below the target range for adjusted calcium (2.2–2.5 mmol/L) between 2007 and 2017

Ca – calcium

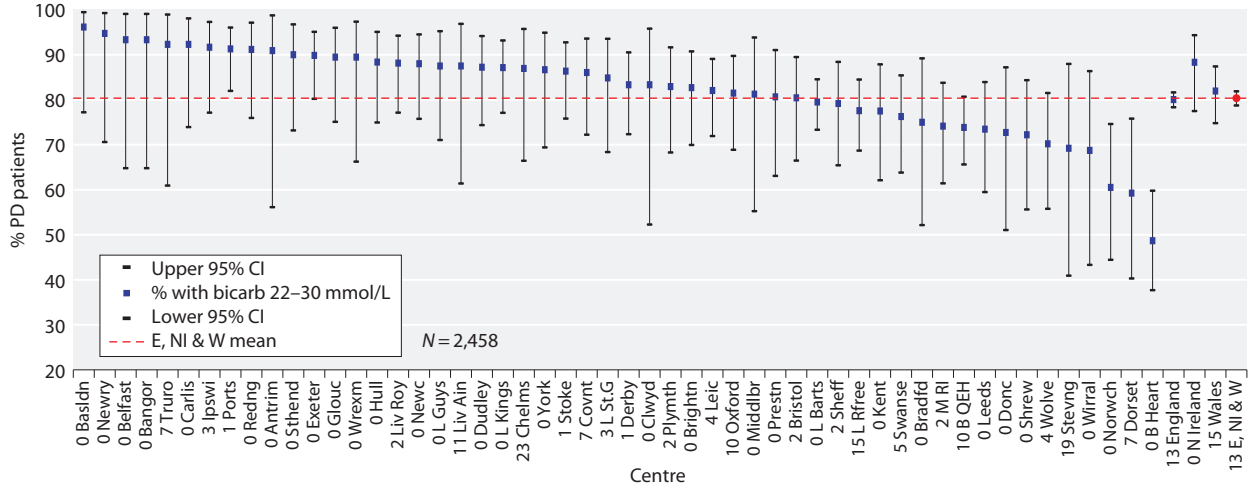


Figure 4.4 Percentage of adult patients prevalent to PD on 31/12/2017 with bicarbonate within the target range (22–30 mmol/L) by centre

Bicarb – bicarbonate; CI – confidence interval

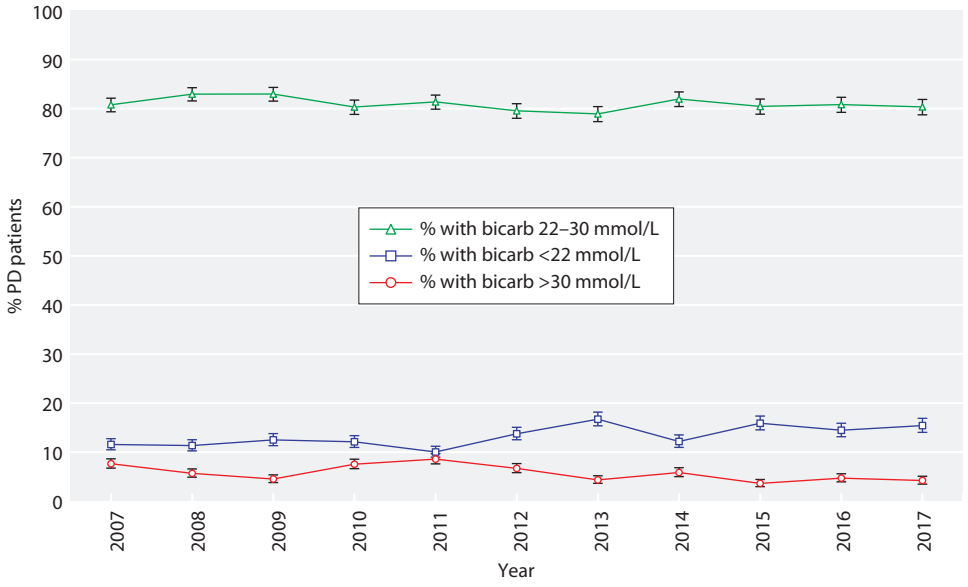


Figure 4.5 Percentage of prevalent adult PD patients within, above and below the target range for bicarbonate (22–30 mmol/L) between 2007 and 2017

Bicarb – bicarbonate

Anaemia in prevalent adult PD patients

Inadequate data completeness in relation to ESAs makes auditing against national guidelines difficult to interpret. An important assumption is that patients for whom no ESA data have been submitted to the UKRR are not on ESA treatment, provided the centre has submitted ESA data for other patients on PD. The Scottish Renal Registry does not submit ESA data for PD patients.

Table 4.6 Median haemoglobin and ferritin and percentage attaining target ranges in adult patients prevalent to PD on 31/12/2017 by centre

	Haemoglobin				Ferritin		
Centre	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (µg/L)	% <100 µg/L	% data completeness
ENGLAND							
B Heart	111	28.9	32.9	100.0	148	36.8	100.0
B QEH	107	30.1	16.1	99.3	319	8.4	99.3
Basldn	110	23.1	11.5	100.0	101	50.0	92.3
Bradfd	107	30.0	20.0	100.0	315	10.0	100.0
Brightn	115	13.5	32.7	100.0	372	3.9	98.1
Bristol	110	12.8	25.5	100.0	366	2.2	97.9
Camb							
Carlis	114	7.7	23.1	100.0	362	15.4	100.0
Carsh	108	25.0	19.0	98.8	155	30.1	97.7
Chelms	111	30.4	17.4	76.7	147	26.9	86.7
Colchr							
Covnt	103	34.1	11.4	95.7	195	22.7	95.7
Derby	111	17.9	29.9	100.0	517	0.0	100.0
Donc	115	18.2	36.4	100.0	392	0.0	100.0
Dorset	114	27.6	31.0	100.0	369	6.9	100.0
Dudley	115	25.5	34.0	100.0	160	41.9	91.5
Exeter	115	4.3	30.4	100.0	258	8.7	100.0

Table 4.6 Continued

Centre	Haemoglobin				Ferritin		
	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (μg/L)	% <100 μg/L	% data completeness
Glouc	113	13.2	31.6	100.0	126	32.4	89.5
Hull	112	16.3	18.6	100.0	424	4.7	100.0
Ipswi	109	25.0	19.4	97.3	452	8.3	97.3
Kent	116	12.5	40.0	100.0	379	5.0	100.0
L Barts	109	26.6	25.6	99.0	271	15.3	94.0
L Guys	110	25.0	12.5	100.0	140	38.7	96.9
L Kings	112	18.6	17.1	100.0	171	22.0	71.4
L Rfree	110	24.6	22.2	100.0	583	8.7	100.0
L St.G	105	27.3	15.2	97.1	300	15.2	97.1
L West	110	14.3	14.3	70.0	358	4.1	73.0
Leeds	108	20.4	14.3	100.0	404	6.1	100.0
Leic	110	14.8	25.9	100.0	355	17.5	98.8
Liv Ain	112	23.5	23.5	94.4	475	6.3	88.9
Liv Roy	113	15.3	28.8	98.3	346	6.8	98.3
M RI	111	27.6	20.7	98.3	254	6.9	98.3
Middlbr	114	6.3	25.0	100.0	202	18.8	100.0
Newc	107	34.0	16.0	100.0	458	6.1	98.0
Norwch	108	18.4	18.4	100.0	407	2.6	100.0
Nottm	106	28.1	14.0	100.0	525	3.6	98.3
Oxford	109	23.3	20.0	100.0	298	3.3	100.0
Plymth	115	19.0	45.2	100.0	329	9.8	97.6
Ports	118	15.7	32.9	100.0	393	1.4	98.6
Prestn	113	22.6	35.5	100.0	498	10.3	93.6
Redng	113	14.7	26.5	100.0	416	8.8	100.0
Salford	112	16.7	24.5	100.0			0.0
Sheff	112	22.4	26.5	100.0	528	4.3	95.9
Shrew	113	13.9	22.2	100.0	273	8.3	100.0
Stevng	105	25.0	18.8	100.0	349	6.7	93.8
Sthend	114	16.7	33.3	100.0	236	6.9	96.7
Stoke	112	15.2	25.8	98.5	259	4.8	94.0
Sund	111	15.4	30.8	100.0	470	25.0	92.3
Truro	110	28.6	21.4	100.0	185	21.4	100.0
Wirral	112	25.0	6.3	100.0	540	0.0	100.0
Wolve	111	23.4	19.1	95.9	94	50.0	98.0
York	109	16.7	16.7	100.0	350	6.7	100.0
N IRELAND							
Antrim	107	9.1	27.3	100.0	323	0.0	100.0
Belfast	119	13.3	33.3	100.0	323	6.7	100.0
Newry	110	5.3	5.3	100.0	309	10.5	100.0
Ulster				100.0			100.0
West NI				100.0			100.0
SCOTLAND							
Abrdn	111	11.1	22.2	100.0	478	6.7	83.3
Airdrie	106	30.8	23.1	100.0	316	16.7	92.3
D&Gall				100.0			83.3
Dundee	109	0.0	26.7	100.0	213	13.3	100.0
Edinb	117	18.2	27.3	78.6			53.6
Glasgw	117	10.5	39.5	100.0	209	26.3	100.0
Inverns				80.0			80.0
Klmarnk	113	22.7	18.2	100.0	414	22.7	100.0
Krkcldy				88.9			88.9

Table 4.6 Continued

Centre	Haemoglobin				Ferritin		
	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (μg/L)	% <100 μg/L	% data completeness
WALES							
Bangor	117	26.7	20.0	100.0	148	26.7	100.0
Cardff	114	19.7	29.5	100.0	187	25.9	95.1
Clwyd	109	8.3	16.7	100.0	319	0.0	100.0
Swanse	114	8.1	25.8	100.0	257	8.5	95.2
Wrexm	114	0.0	31.6	100.0	190	5.3	100.0
TOTALS							
England	**111**	**21.2**	**23.7**	**98.0**	**314**	**12.9**	**92.1**
N Ireland	**114**	**6.7**	**20.0**	**100.0**	**362**	**6.7**	**100.0**
Scotland	**113**	**14.0**	**25.3**	**94.3**	**307**	**17.4**	**86.8**
Wales	**114**	**13.0**	**26.6**	**100.0**	**215**	**15.3**	**96.5**
UK	**111**	**20.1**	**23.9**	**98.0**	**308**	**13.2**	**92.2**

Blank cells – no data returned by the centre or <10 patients in the centre or data completeness <70%

Table 4.7 Distribution of haemoglobin and erythropoiesis stimulating agent (ESA) dose values in adult patients prevalent to PD on 31/12/2017 by centre

Centre	ESA		Haemoglobin and ESA	
	% on ESA	Median dose (IU/week)	% <100g/L and not on ESA	% >120g/L and on ESA
ENGLAND				
B Heart	61.8			
B QEH	0.0			
Basldn	80.8	4,000	0.0	3.8
Bradfd	90.0	6,000	0.0	10.0
Brightn	3.8			
Bristol	74.5	4,000	0.0	12.8
Camb				
Carlis	61.5			
Carsh	0.0			
Chelms	70.0	3,000	8.7	13.0
Colchr				
Covnt	70.0	8,000	4.5	2.3
Derby	0.0			
Donc	54.5			
Dorset	75.9	3,700	0.0	20.7
Dudley	2.1			
Exeter	75.4	4,308	0.0	15.9
Glouc	65.8			
Hull	53.5			
Ipswi	0.0			
Kent	50.0			
L Barts	0.0			
L Guys	0.0			
L Kings	78.6	4,000	1.4	14.3
L Rfree	0.0			
L St.G	0.0			
L West	1.0			
Leeds	81.6	4,000	0.0	4.1
Leic	81.5	4,100	0.0	16.0
Liv Ain	0.0			

Table 4.7 Continued

Centre	ESA		Haemoglobin and ESA	
	% on ESA	Median dose (IU/week)	% <100g/L and not on ESA	% >120g/L and on ESA
Liv Roy	0.0			
M RI	0.0			
Middlbr	75.0	2,500	0.0	12.5
Newc	2.0			
Norwch	76.3	3,000	0.0	10.5
Nottm	84.2	3,600	0.0	8.8
Oxford	83.3	6,000	0.0	8.3
Plymth	0.0			
Ports	4.3			
Prestn	80.6		0.0	25.8
Redng	8.8			
Salford	75.5	6,000	2.9	15.7
Sheff	61.2			
Shrew	0.0			
Stevng	62.5			
Sthend	66.7			
Stoke	0.0			
Sund	84.6	1,154	0.0	23.1
Truro	0.0			
Wirral	100.0	4,000	0.0	6.3
Wolve	69.4			
York	70.0	2,660	0.0	6.7
N IRELAND				
Antrim	81.8		0.0	9.1
Belfast	80.0	2,000	0.0	26.7
Newry	78.9	6,000	0.0	5.3
Ulster	66.7			
West NI	88.9			
WALES				
Bangor	26.7			
Cardff	37.7			
Clwyd	58.3			
Swanse	79.0	5,000	0.0	16.1
Wrexm	36.8			
TOTAL*				
	78.6	**4,000**	**0.9**	**12.7**

Blank cells – no data returned by the centre or <10 patients in the centre or data completeness <70% (or <70% patients were on an ESA)

*This is the total of only those centres with at least 70% of PD patients on an ESA

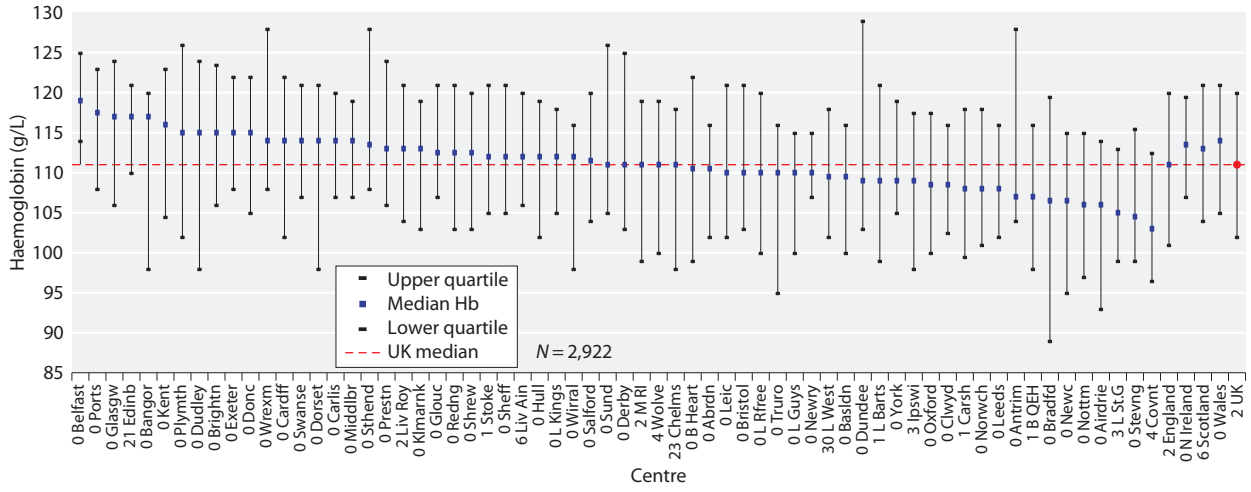


Figure 4.6 Median haemoglobin in adult patients prevalent to PD on 31/12/2017 by centre
Hb – haemoglobin

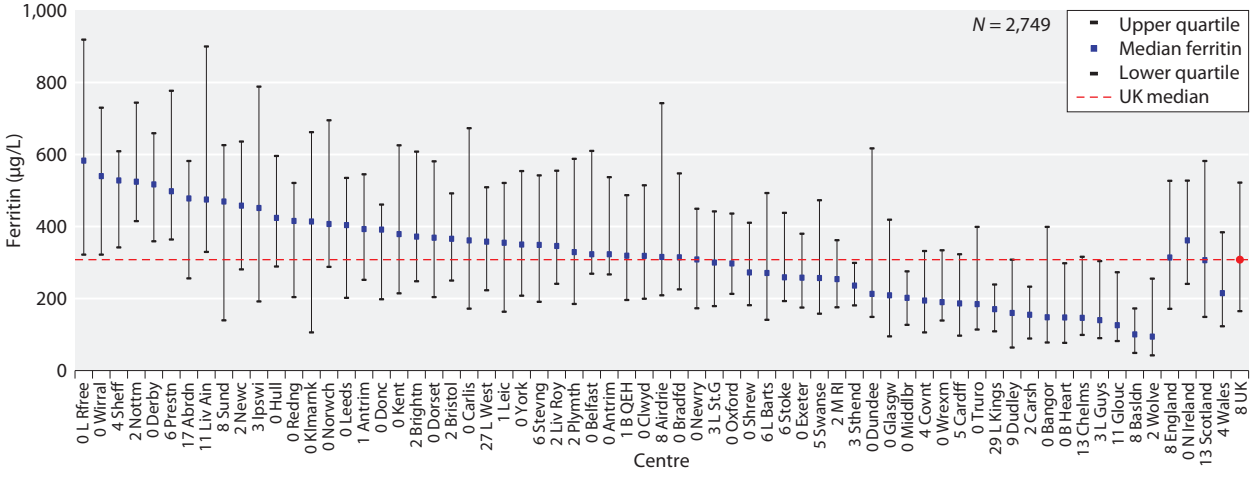


Figure 4.7 Median ferritin in adult patients prevalent to PD on 31/12/2017 by centre

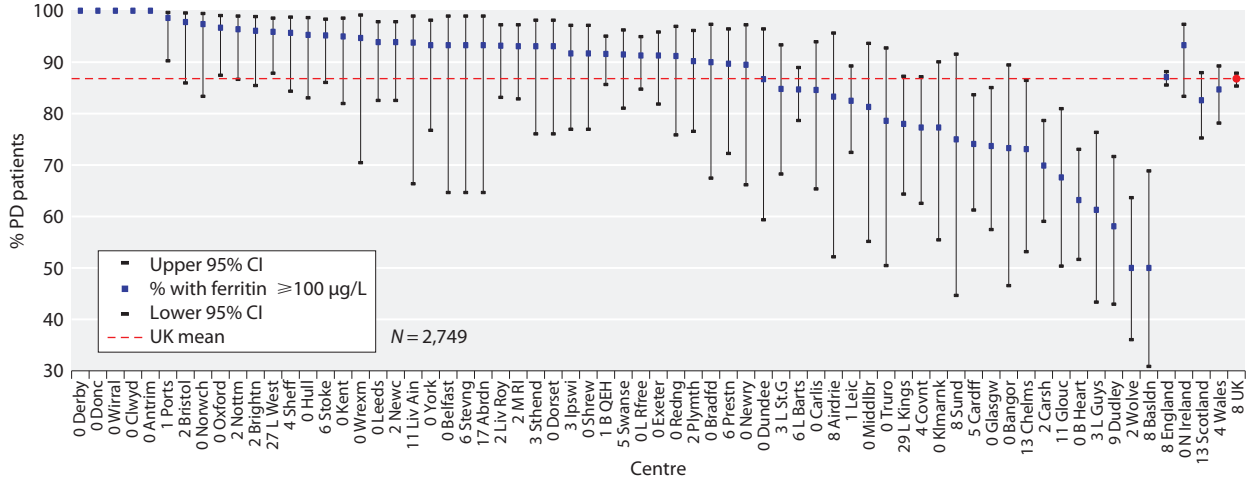


Figure 4.8 Percentage of adult patients prevalent to PD on 31/12/2017 with ferritin ⩾100 µg/L by centre
CI – confidence interval

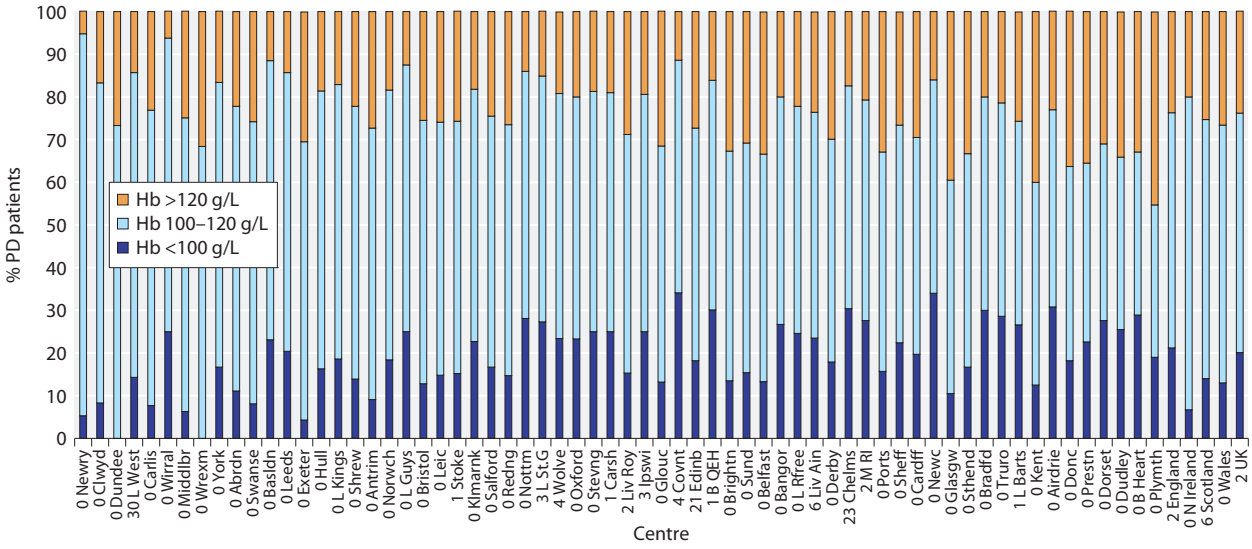


Figure 4.9 Distribution of haemoglobin in adult patients prevalent to PD on 31/12/2017 by centre
Hb – haemoglobin

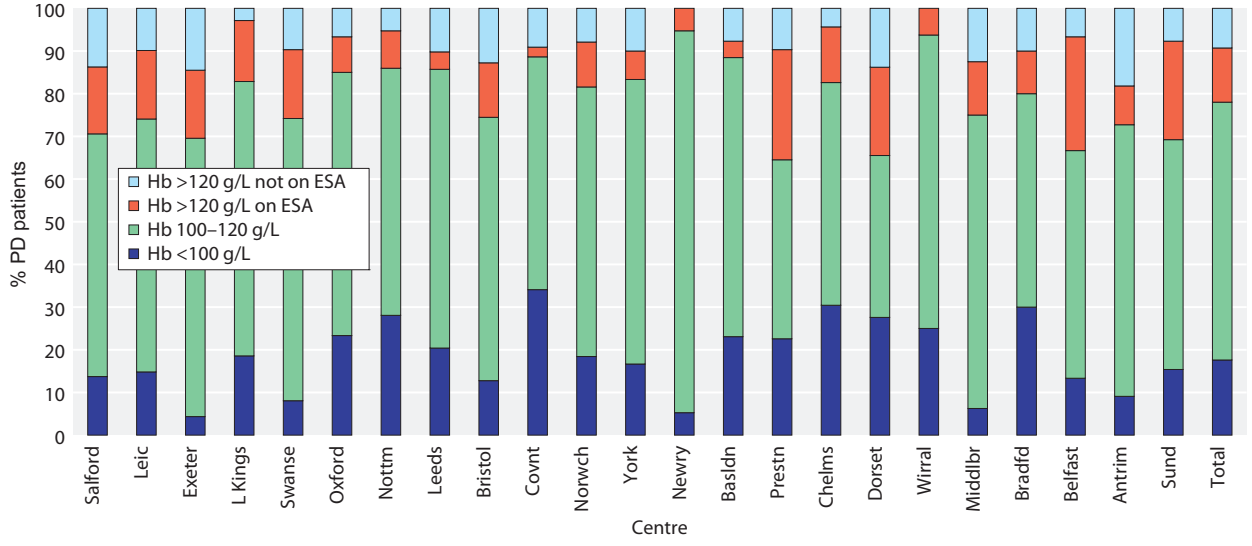


Figure 4.10 Distribution of haemoglobin in adult patients prevalent to PD on 31/12/2017 and the proportion with haemoglobin >120 g/L receiving erythropoiesis stimulating agent (ESA) by centre
Figure (including total) does not include centres with <70% data completeness (or <70% ESA use)
Hb – haemoglobin

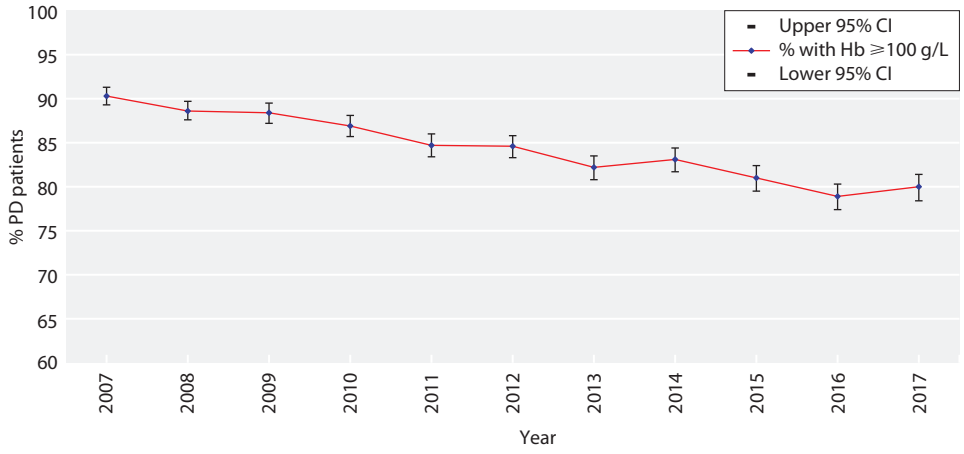


Figure 4.11 Percentage of prevalent adult PD patients with haemoglobin ⩾100 g/L between 2007 and 2017
CI – confidence interval; Hb – haemoglobin

PD catheter insertion techniques and catheter patency in prevalent adult PD patients

PD catheter insertion techniques and PD catheter patency at one year are presented in chapter 1.

Infections in adult PD patients

PHE has carried out mandatory enhanced surveillance of MRSA bacteraemia since October 2005 and of MSSA bacteraemia since January 2011 for NHS acute trusts, with the subsequent addition of *E. coli* bacteraemia and *C. difficile* reporting. Patient-level infection data are reported in real time to PHE. For the first time, Wales provided data, which were extracted locally from the renal and hospital IT systems.

In previous reports, infection data were validated by securely emailing individual renal centres to confirm that infections were related to dialysis patients. Historically, this has resulted in only a small number of alterations in cases and so was not undertaken for these analyses. Given the small numbers of infections in PD patients, data are only shown at the national level and are compared to infection rates in haemodialysis (HD) patients. The definition of each type of infectious episode is detailed in appendix A.

A rolling two year cohort is reported to be consistent with the reporting of infections in chapter 3. These analyses include all patients on HD, whether on HHD or ICHD.

Table 4.8 Number and rate of infection episodes per 100 patient years in prevalent adult PD patients in England and Wales compared to prevalent adult HD patients in England and Wales from January 2016 to December 2017

	Infection			
	MRSA	MSSA	*C. difficile*	*E.coli*
Number of episodes				
HD	86	1,149	498	858
PD	3	32	76	65
Rate per 100 patient years (with range between centres)				
HD	0.19 (0.0–0.80)	2.55 (0.74–5.56)	1.11 (0.26–3.34)	1.91 (0.61–4.45)
PD	0.05 (0.0–1.53)	0.48 (0.0–2.61)	1.15 (0.0–9.35)	0.98 (0.0–4.65)

C. difficile – *Clostridium difficile*; *E. coli* – *Escherichia coli;* MRSA – methicillin-resistant *Staphylococcus aureus*; MSSA – methicillin-sensitive *Staphylococcus aureus*

PD peritonitis infection rates are collected for English renal centres by the UKRR in collaboration with NHS England and have previously been available to centres as part of the renal indicators dashboard. The funnel plot below shows each centre's rolling two year (2016–2017) peritonitis rate per 100 PD patient years against the number of patient years at risk to take into account the greater variation expected as centre size decreases. In future, results will be published allowing centres to be identified.

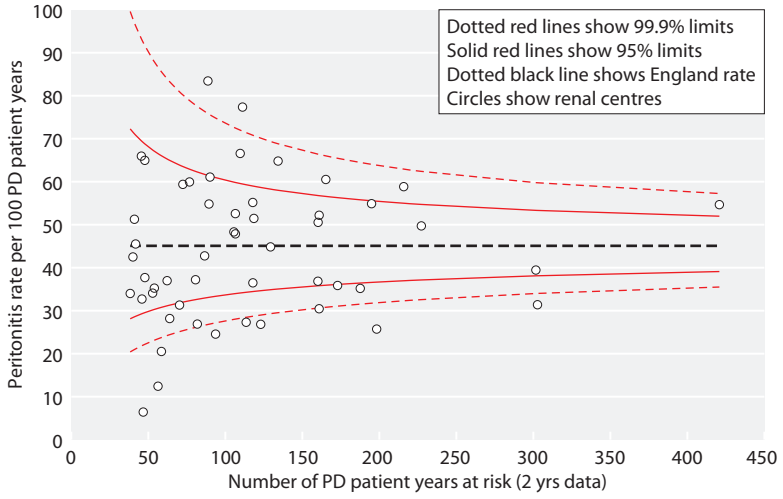


Figure 4.12 PD peritonitis rates by centre per 100 PD patient years (2016–2017 data)

Cause of death in adult PD patients

Cause of death was analysed in prevalent patients receiving PD on 31/12/2016 and followed-up for one year in 2017. The proportion of PD 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. Further detail on the survival of prevalent RRT patients is in chapter 2.

Table 4.9 Cause of death in adult patients prevalent to PD on 31/12/2016 followed-up in 2017 by age group

	PD all ages		PD <65 yrs		PD ⩾ 65 yrs	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	62	21.4	25	30.1	37	17.9
Cerebrovascular disease	15	5.2	8	9.6	7	3.4
Infection	59	20.3	14	16.9	45	21.7
Malignancy	17	5.9	6	7.2	11	5.3
Treatment withdrawal	61	21.0	9	10.8	52	25.1
Other	52	17.9	16	19.3	36	17.4
Uncertain aetiology	24	8.3	5	6.0	19	9.2
Total (with data)	**290**	**100.0**	**83**	**100.0**	**207**	**100.0**
Missing	193	40.0	57	40.7	136	39.7

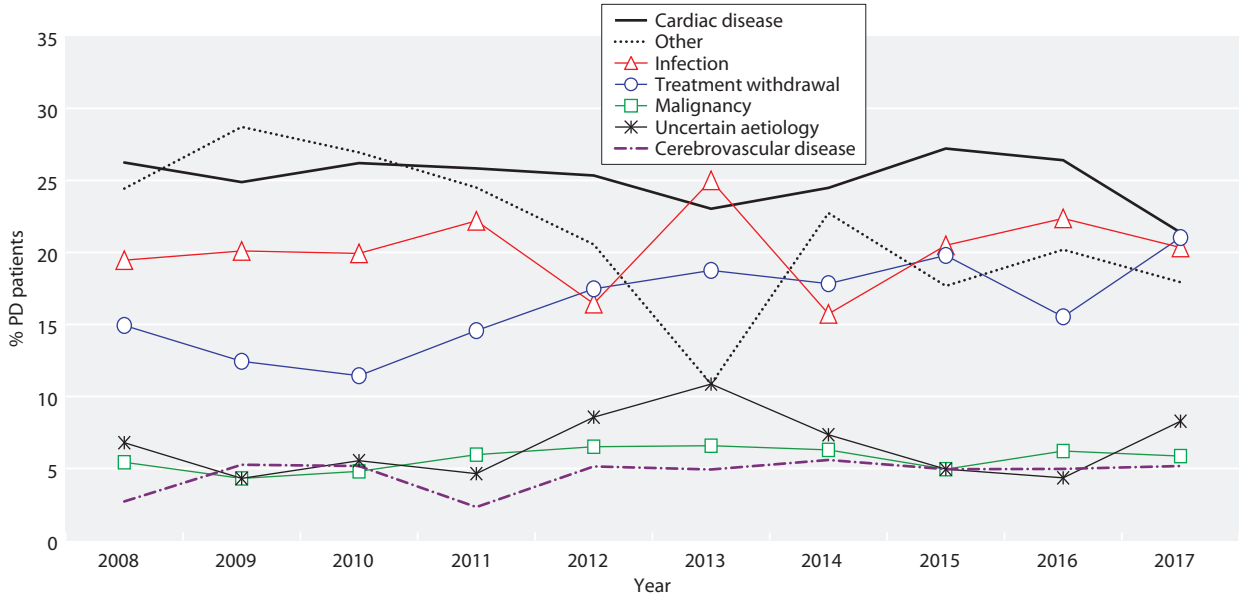


Figure 4.13 Cause of death for prevalent adult PD patients between 2008 and 2017

Chapter 5

Adults with a kidney transplant (Tx) in the UK at the end of 2017

Contents

Introduction 127
Rationale for analyses 129
Key findings 131
Analyses 132
- Kidney Tx activity 132
- Early kidney Tx outcomes 132
- Changes to the prevalent adult kidney Tx population 135
- Demographics of prevalent adult kidney Tx patients 139
- Graft function and anaemia in prevalent adult kidney Tx patients 141
- Blood pressure in prevalent adult kidney Tx patients 143
- Biochemistry parameters in prevalent adult kidney Tx patients 144
- Survival of adult kidney Tx patients 145
- Cause of death in adult kidney Tx patients 145

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 2017 (figure 5.1). 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 renal replacement therapy (RRT). 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.

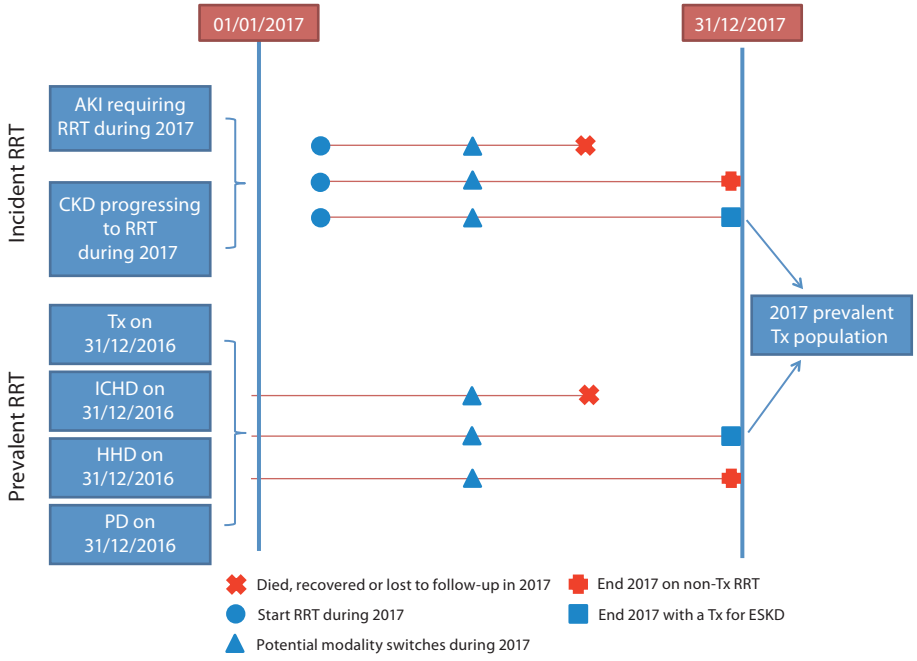


Figure 5.1 Pathways adult patients could follow to be included in the UK 2017 prevalent Tx population

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

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 Renal Association guidelines (table 5.1):

- **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 https://www.organdonation.nhs.uk/statistics/. The 2017 prevalent adult Tx population is described, including the number transplanted per million population (pmp).

The Renal Association guidelines (https://renal.org/guidelines/) provide audit measures relevant to the care of patients with a Tx, and where data permit, their attainment by UK renal centres in 2017 is reported in this chapter (table 5.1).

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 on the UKRR website. Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted.

Where revised target ranges are published, the measures in place at the time of patient care are reported, such as with the revised targets for blood pressure published in 2017 as detailed below.

Table 5.1 The Renal Association audit measures relevant to Tx that are reported in this chapter

The Renal 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 5.8, figures 5.11, 5.12 (proteinuria was not adequately collected)
	Proportion of patients achieving dyslipidaemia targets	Table 5.8
	Incidence of hyperparathyroidism	Table 5.8
	Prevalence of anaemia	Table 5.8, figures 5.9, 5.10
Anaemia (2017)	Treatment guidelines for anaemia in kidney Tx patients should be similar to those for CKD patients not on dialysis	Table 5.8, figures 5.9, 5.10

In 2017, 23 of the 71 adult renal 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. The number preceding the centre name in each caterpillar plot indicates the percentage of missing data for that centre. Caterpillar plots exclude centres with <70% data completeness but include centres with small numbers of patients.

As Colchester 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.

Cambridge renal centre (Addenbrooke's Hospital), a Tx centre, was unable to submit patient level data for 2015–2017. While data extraction issues have now been resolved, the UKRR and Cambridge are working to load and validate the backlog of data for these years. Using aggregate numbers of patients starting RRT by treatment modality, it is possible to report treatment rates for Cambridge, but no other quality assurance for the service provided.

Key findings

- 35,823 adult patients had a kidney Tx for ESKD in the UK on 31/12/2017, which represented 55.2% of the RRT population
- The median age of kidney Tx patients was 54.8 years and 60.6% were male
- There was a 4% increase in overall kidney Tx numbers performed in 2017 compared to 2016, with an increase in kidney Tx from DBDs (10%), but falls from DCDs (−2%) and from LKDs (−1%)
- The median eGFR for kidney Tx patients 1 year after transplantation was 57.2 mL/min/1.73 m^2 from LKD, 52.3 mL/min/1.73 m^2 from DBD and 47.6 mL/min/1.73 m^2 from DCD
- 15.9% of kidney Tx patients had eGFR $<$30 mL/min/1.73 m^2
- The median decline in eGFR slope beyond the first year after transplantation was 0.77 mL/min/1.73 m^2/year
- There was no cause of death data available for 38.3% of deaths. For those Tx patients with data, the leading cause of death was malignancy (25.7%), followed by cardiac disease (20.5%), which overtook infection (19.3%) since 2016.

Analyses

Kidney Tx activity

NHSBT provided the UKRR with summary data on kidney Tx activity (table 5.2). More detailed results are available at https://www.organdonation.nhs.uk/statistics/. The number of patients receiving a pre-emptive Tx is reported by centre in chapter 1.

Table 5.2 Number of kidney and kidney plus other organ Tx (adult and paediatric) in the UK, 2015–2017 calendar years

Organ	2015	2016	2017	% change 2016–2017
Kidney DBD[a]	1,130	1,234	1,362	10
Kidney DCD[b]	802	909	894	−2
Kidney LKD	1,047	1,021	1,015	−1
Kidney and liver	21	18	14	−22
Kidney and heart[c]	0	1	0	
Kidney and pancreas[d]	175	147	172	17
Kidney and pancreas islets[c]	0	0	4	
Small bowel (inc kidney)	2	1	1	0
Total kidney Tx	3,177	3,331	3,462	4

[a]Includes en bloc kidney Tx (4 in 2015, 6 in 2016 and 3 in 2017) and double kidney Tx (15 in 2015, 15 in 2016 and 14 in 2017)
[b]Includes en bloc kidney Tx (8 in 2015, 8 in 2016 and 7 in 2017) and double kidney Tx (31 in 2015, 39 in 2016 and 26 in 2017)
[c]Includes DCD Tx (1 kidney and heart Tx in 2016 and 1 kidney and pancreas islet Tx in 2017)
[d]Includes DCD Tx (50 in 2015, 44 in 2016 and 48 in 2017)
DBD – donor after brain death; DCD – donor after circulatory death; LKD – living kidney donor

Early kidney Tx outcomes

Kidney Tx recipient outcome data from NHSBT are reported against the Tx centre rather than the referring centre (table 5.3). Note that the survival rates were risk-adjusted and used financial year cohorts as per NHSBT methodology (see table footnote).

Table 5.3 Risk-adjusted first adult kidney-only Tx, graft and patient survival by Tx type and Tx centre* (cohorts detailed in footnote)

	Deceased donor				Living donor			
	Adj 1 yr survival (%)		Adj 5 yr survival (%)		Adj 1 yr survival (%)		Adj 5 yr survival (%)	
Centre	Graft	Patient	Graft	Patient	Graft	Patient	Graft	Patient
B QEH	94	97	82	92	97	98	93	92
Belfast	94	97	85	81	97	100	95	81
Bristol	96	95	87	89	97	100	95	89
Camb	96	97	89	88	99	99	94	88
Cardff	96	95	91	88	96	96	92	88
Covnt	94	94	77	85	100	100	92	85
Edin	96	98	86	89	100	100	89	89
Glasgw	92	96	91	91	96	100	92	91
L Barts	90	94	83	83	98	99	89	83
L Guy's	93	97	90	90	98	98	94	90
L Rfree	94	98	89	91	99	100	95	91
L St.G	93	98	89	94	98	99	94	94
L West	96	97	85	91	97	99	90	91
Leeds	94	97	84	86	98	99	89	86
Leic	95	98	88	90	98	98	90	90

Table 5.3 Continued

	Deceased donor				Living donor			
	Adj 1 yr survival (%)		Adj 5 yr survival (%)		Adj 1 yr survival (%)		Adj 5 yr survival (%)	
Centre	Graft	Patient	Graft	Patient	Graft	Patient	Graft	Patient
Liv Roy	95	95	87	81	97	98	88	81
M RI	97	96	88	90	97	99	95	90
Newc	95	95	83	83	99	100	94	83
Nottm	95	98	86	85	96	98	89	85
Oxford	95	98	89	87	96	99	94	87
Plymth	91	94	81	91	98	100	90	91
Ports	91	95	86	88	100	99	94	88
Sheff	95	97	86	89	98	98	97	89
UK total	**95**	**97**	**87**	**88**	**98**	**99**	**93**	**88**

Cohorts for survival rate estimation: 1 year survival: 1/4/2012–31/03/2016; 5 year survival: 1/4/2008–31/3/2012; 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

*Information courtesy of NHSBT: number of Tx, patients and 95% confidence interval (CI) for each estimate; statistical methodology for computing risk-adjusted estimates can be obtained from the NHSBT website (https://nhsbtdbe.blob.core.windows.net/umbraco-assets-corp/4607/kidney-annual-report-2016-17.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 for eGFR at one year (2010–2016) was 97.2%.

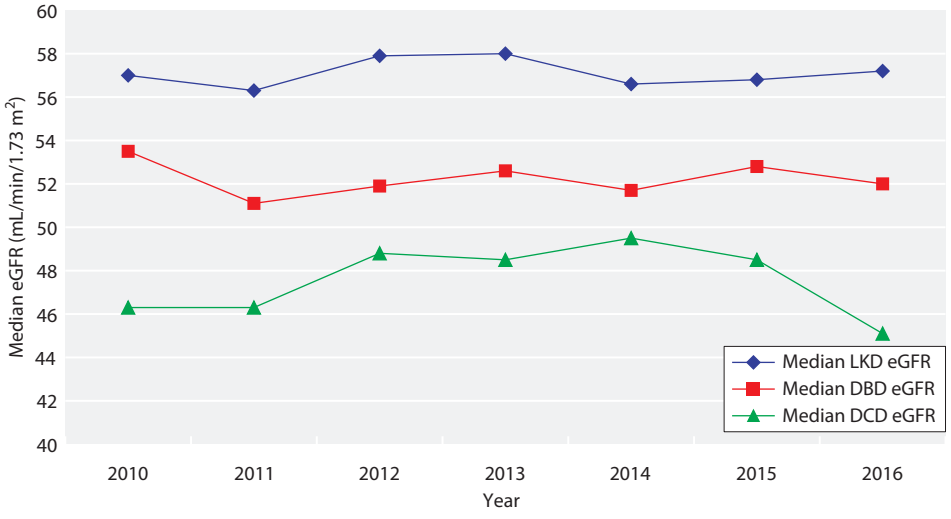


Figure 5.2 Median estimated glomerular filtration rate (eGFR) for kidney Tx at 1 year by donor type and year of transplantation between 2010 and 2016

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

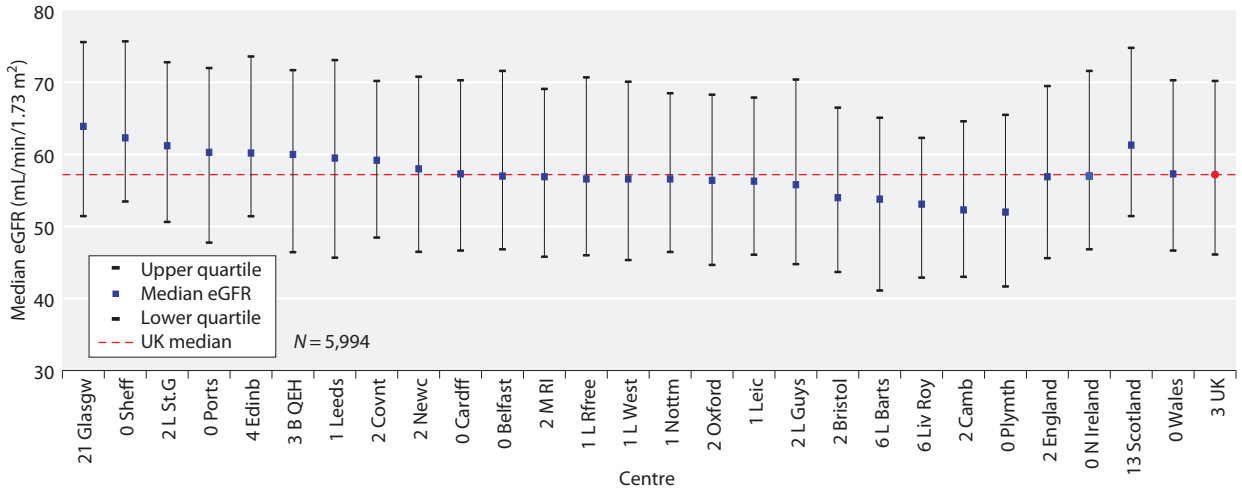


Figure 5.3 Median estimated glomerular filtration rate (eGFR) at 1 year post-living kidney donor (LKD) Tx by centre and year of transplantation between 2010 and 2016

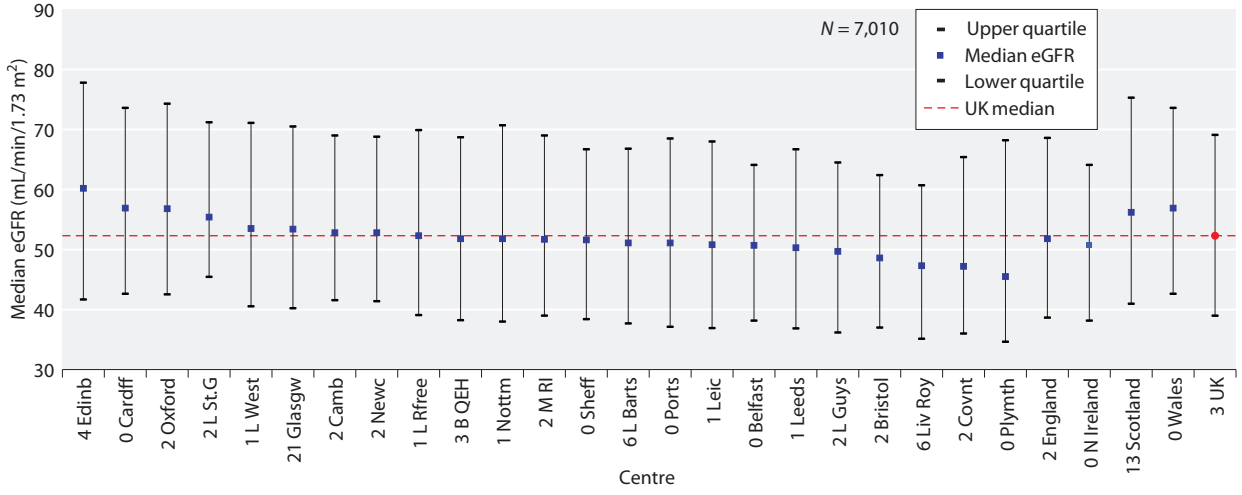


Figure 5.4 Median estimated glomerular filtration rate (eGFR) at 1 year post-donor after brain death (DBD) Tx by centre and by year of transplantation between 2010 and 2016

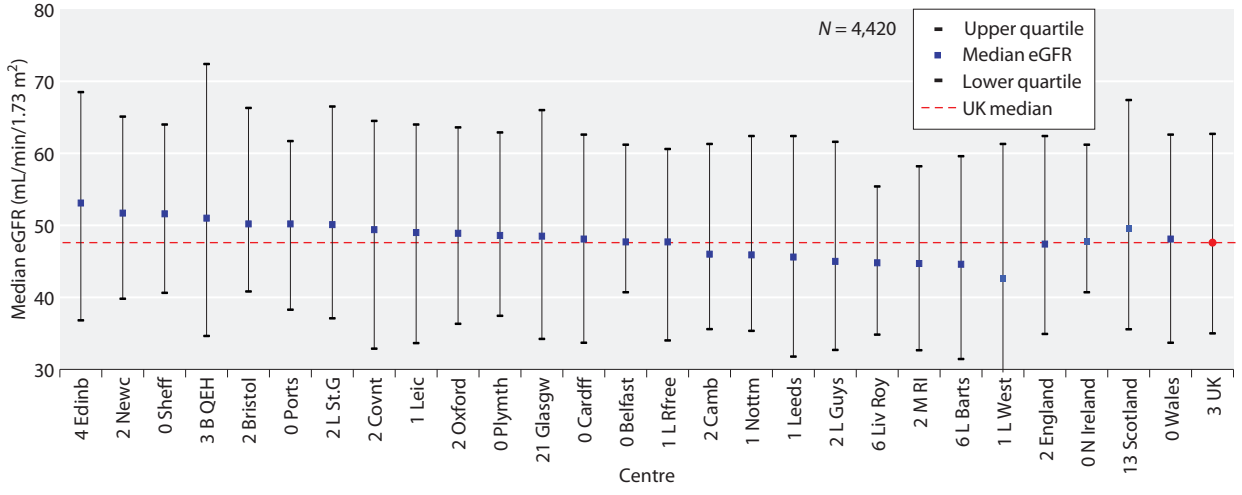


Figure 5.5 Median estimated glomerular filtration rate (eGFR) at 1 year post-donor after circulatory death (DCD) Tx by centre and by year of transplantation between 2010 and 2016

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 5.4 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 31/12/2017

		Data completeness (%)						
Centre	*N* with Tx	eGFR	Blood pressure	Haemoglobin	Total cholesterol	Adjusted calcium	Phosphate	PTH
TX CENTRES								
B QEH	1,313	94.8	94.5	94.7	95.1	94.7	94.0	0.0
Belfast	604	99.2	84.4	98.5	99.7	98.7	98.5	31.6
Bristol	885	99.6	79.4	99.2	94.5	99.3	99.1	98.5
Camb								
Cardff	1,020	98.3	95.0	97.9	94.1	97.8	97.8	20.7
Covnt	543	93.9	78.1	94.3	70.4	92.3	59.7	35.7
Edinb	463	76.0		47.1		48.8	48.8	
Glasgw	1,083	98.4		98.6		98.3	97.6	
L Barts	1,150	66.3	0.0	99.0	98.8	98.9	98.9	97.0
L Guys	1,379	98.6	0.0	98.3	59.3	96.2	96.1	31.3
L Rfree	1,308	97.9	85.8	97.4	65.1	93.3	93.1	67.7
L St.G	469	96.6	65.7	96.2	84.7	96.4	96.4	46.7
L West	1,857	94.6	0.0	94.5	44.6	94.2	94.6	33.9
Leeds	976	99.1	94.6	98.9	97.8	97.3	96.7	31.9
Leic	1,276	95.3	17.9	94.4	95.2	94.0	93.8	53.9
Liv Roy	764	95.9	0.1	95.7	60.7	94.2	94.9	73.2
M RI	1,347	97.6	4.5	97.5	67.3	97.5	97.5	63.6
Newc	693	98.9	96.8	98.9	87.9	98.9	98.9	78.2
Nottm	690	99.3	95.4	97.4	77.4	97.3	97.4	89.7
Oxford	1,276	99.0	7.4	98.8	45.4	98.7	98.5	36.4
Plymth	328	97.9	91.8	97.9	72.0	96.0	95.4	64.6
Ports	1,010	95.5	34.1	95.3	59.6	94.9	88.6	33.4
Sheff	771	97.8	94.2	97.8	60.4	97.5	97.4	0.0
DIALYSIS CENTRES								
Abrdn	300	99.3		99.3		96.7	96.7	
Airdrie	246	41.5		98.0		97.6	96.3	
Antrim	107	100.0	72.9	100.0	98.1	100.0	100.0	94.4
B Heart	168	95.8	0.0	95.8	75.0	95.2	95.2	32.1
Bangor	88	97.7	83.0	97.7	96.6	97.7	97.7	23.9
Basldn	93	97.9	91.4	97.9	77.4	97.9	89.3	22.6
Bradfd	371	97.6	74.1	97.6	76.8	86.5	61.2	40.7
Brightn	472	97.9	29.0	97.9	72.9	95.1	95.1	39.6
Carlis	149	85.9	0.0	85.9	66.4	84.6	77.9	36.9
Carsh	697	84.7	4.3	84.8	46.2	82.5	81.9	23.5
Chelms	113	83.2	92.9	79.7	82.3	79.7	47.8	11.5
Clwyd	94	96.8	31.9	96.8	98.9	96.8	96.8	73.4
D&Gall	74	97.3		98.7		98.7	90.5	
Derby	223	97.3	96.0	97.3	93.3	96.4	96.4	95.5
Donc	113	99.1	99.1	99.1	88.5	98.2	98.2	20.4
Dorset	381	88.5	58.5	87.1	67.2	85.6	68.2	33.6
Dudley	93	98.9	41.9	97.9	82.8	97.9	97.9	49.5
Dundee	227	98.7		98.2		97.8	96.0	
Exeter	500	99.6	93.6	99.2	88.8	98.8	98.6	44.0
Glouc	206	95.6	80.1	95.6	62.1	94.7	94.7	19.4

Table 5.4 Continued

Centre	*N* with Tx	Data completeness (%)						
		eGFR	Blood pressure	Haemoglobin	Total cholesterol	Adjusted calcium	Phosphate	PTH
Hull	451	96.5	3.3	93.4	30.8	92.2	91.8	21.7
Inverns	160	81.9		83.8		71.3	71.3	
Ipswi	227	99.6	96.0	99.1	67.4	98.7	98.2	58.6
Kent	576	99.0	96.7	98.1	68.2	96.7	96.5	15.8
Klmarnk	153	98.7		97.4		98.0	97.4	
Krkcldy	148	89.2		54.1		50.7	50.0	
L Kings	448	98.7	99.1	98.7	76.8	98.7	98.7	71.2
Liv Ain	13	100.0	0.0	100.0	30.8	100.0	100.0	92.3
Middlbr	539	94.8	27.3	94.3	32.1	93.3	92.2	12.6
Newry	137	99.3	89.1	98.5	100.0	97.8	98.5	98.5
Norwch	403	98.5	1.7	98.5	97.5	97.8	97.5	28.5
Prestn	645	98.3	0.0	98.3	69.6	96.0	94.6	45.9
Redng	435	98.2	91.5	97.7	60.2	97.5	81.6	43.7
Salford	561	98.9	0.0	98.6	72.7	98.9	98.8	0.2
Shrew	126	93.7	9.5	94.4	87.3	89.7	89.7	26.2
Stevng	361	96.1	0.0	98.1	32.4	92.8	92.2	67.3
Sthend	93	100.0	83.9	96.8	37.6	94.6	89.3	10.8
Stoke	397	99.5	0.3	99.5	99.5	99.5	99.5	72.5
Sund	247	98.4	0.0	98.0	54.7	98.4	98.0	93.5
Swanse	327	99.1	96.6	99.1	80.1	99.1	98.8	72.8
Truro	230	99.6	6.1	99.1	97.4	99.6	99.6	95.7
Ulster	66	98.5	95.5	98.5	97.0	93.9	98.5	9.1
West NI	180	98.9	97.2	97.2	98.3	97.8	97.8	91.1
Wirral	132	90.9	3.8	88.6	43.9	88.6	88.6	46.2
Wolve	190	92.6	64.2	91.1	62.1	89.0	70.5	34.7
Wrexm	165	99.4	96.4	99.4	99.4	99.4	99.4	99.4
York	310	98.7	78.4	98.1	71.0	97.1	95.2	31.6
TOTALS								
England	**27,998**	**95.4**	**42.6**	**96.5**	**70.5**	**95.4**	**93.2**	**45.8**
N Ireland	**1,094**	**99.2**	**86.6**	**98.5**	**99.2**	**98.3**	**98.5**	**54.6**
Scotland	**2,854**	**88.6**		**87.0**		**86.0**	**85.2**	
Wales	**1,694**	**98.5**	**91.3**	**98.2**	**92.3**	**98.2**	**98.1**	**41.5**
UK	**33,640**	**95.2**	**42.8**	**95.8**	**66.6**	**94.8**	**93.0**	**42.0**

Blank cells – no data returned by the centre
Scottish centres were excluded from blood pressure, cholesterol and PTH analyses because data were not provided by the Scottish Renal Registry. UK completeness excludes Scotland for these analyses
Patients with missing ethnicity were classed as White for the eGFR calculation

For the 71 adult renal centres, the number of prevalent patients with a Tx was calculated as both a proportion of the prevalent patients on RRT and as a proportion of the estimated centre catchment population (calculated as detailed in appendix A).

Table 5.5 Number of prevalent adult Tx patients and proportion of adult RRT 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)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017		
TX CENTRES												
B QEH	976	1,038	1,099	1,234	1,355	47.7	48.7	48.9	51.7	53.7	1.78	762
Belfast	487	527	564	601	638	67.1	70.5	73.2	73.4	75.7	0.66	970
Bristol	846	862	895	907	906	59.4	59.1	60.6	61.8	61.5	1.51	601
Camb	791	850	912	1,099	1,043	66.3	68.8	59.3	70.9	73.5	1.21	860
Cardff	1,022	1,021	1,035	1,035	1,045	64.6	64.1	64.2	63.6	62.1	1.50	695
Covnt	469	498	518	531	567	50.5	51.9	54.0	54.4	58.9	0.93	607
Edinb	435	458	458	453	486	59.0	61.3	59.6	58.2	58.1	0.99	492
Glasgw	941	1,001	1,048	1,105	1,137	59.4	62.3	61.4	63.0	64.1	1.66	684
L Barts	948	1,026	1,067	1,139	1,200	45.4	46.5	46.9	48.1	48.1	1.92	626
L Guys	1,169	1,231	1,302	1,365	1,413	63.9	64.3	64.7	65.1	65.4	1.13	1,247
L Rfree	1,073	1,153	1,224	1,288	1,346	55.9	57.5	58.5	59.2	61.4	1.59	847
L St.G	426	432	456	460	485	56.4	54.7	54.2	54.1	57.5	0.84	581
L West	1,659	1,749	1,799	1,840	1,916	53.2	54.2	54.3	53.9	54.8	2.51	763
Leeds	886	916	953	977	1,001	60.5	61.1	62.6	63.1	61.8	1.75	572
Leic	1,016	1,116	1,155	1,250	1,306	49.2	52.1	53.0	54.3	55.0	2.55	512
Liv Roy	848	836	787	777	789	67.1	66.0	63.7	64.1	62.9	1.05	754
M RI	1,253	1,202	1,293	1,385	1,412	67.6	67.0	68.7	70.2	68.6	1.60	881
Newc	646	638	647	679	711	67.2	65.3	64.1	64.6	63.6	1.17	606
Nottm	619	612	644	678	718	57.7	57.7	57.9	58.8	61.2	1.14	630
Oxford	1,031	1,109	1,165	1,224	1,343	66.0	67.0	68.9	69.3	71.5	1.77	759
Plymth	331	327	332	328	339	65.9	65.1	66.0	64.1	62.8	0.49	689
Ports	864	896	929	978	1,052	56.0	56.3	55.7	57.9	60.3	2.12	496
Sheff	668	715	728	754	787	50.3	52.6	52.6	53.0	54.6	1.44	548
DIALYSIS CENTRES												
Abrdn	269	271	287	303	314	52.0	54.1	54.0	54.6	55.8	0.61	511
Airdrie	184	205	214	231	258	47.3	51.9	50.4	52.5	55.1	0.57	457
Antrim	82	93	97	105	113	36.6	40.6	40.6	43.0	45.6	0.30	371
B Heart	179	186	183	169	170	27.4	29.3	28.0	25.9	26.0	0.77	220
Bangor	0	3	83	89	93	0.0	2.9	45.6	49.7	47.9	0.23	403
Basldn	80	78	75	80	98	29.6	28.1	27.4	29.1	32.6	0.43	225
Bradfd	289	305	330	361	376	55.6	55.7	56.5	56.8	55.8	0.68	551
Brightn	392	421	451	472	489	45.0	46.1	47.5	47.6	48.3	1.36	360
Carlis	132	149	162	149	155	58.1	59.6	57.7	53.6	55.2	0.34	461
Carsh	600	633	644	681	716	40.6	40.8	40.7	41.5	42.6	2.00	357
Chelms	97	99	114	109	117	40.2	37.9	40.0	39.8	41.3	0.53	219
Clwyd	63	64	81	89	95	41.4	38.6	43.8	50.3	52.5	0.20	473
D&Gall	57	67	65	71	76	47.9	51.5	50.0	54.2	56.3	0.15	500
Derby	169	193	214	224	234	36.4	37.6	39.7	41.3	42.1	0.74	318
Donc	61	74	97	109	117	23.6	26.1	32.1	33.0	35.1	0.43	272
Dorset	311	335	347	369	395	49.6	50.5	51.0	53.7	53.8	0.90	438
Dudley	80	75	83	93	96	25.8	24.6	26.4	27.0	26.1	0.46	208
Dundee	207	210	216	219	232	52.0	52.4	51.4	52.3	52.8	0.47	489
Exeter	413	436	446	477	512	46.5	46.1	46.1	47.1	48.6	1.14	449
Glouc	165	172	177	185	211	40.3	40.2	40.0	39.3	41.9	0.61	343
Hull	406	395	422	453	461	49.9	49.3	49.4	53.2	52.9	1.07	431
Inverns	133	141	147	155	165	61.6	62.7	58.1	59.8	62.7	0.28	597
Ipswi	202	210	223	230	232	56.9	57.2	55.2	55.6	53.8	0.42	555
Kent	504	540	554	584	595	52.6	53.3	53.3	54.4	54.5	1.28	464
Klmarnk	116	128	137	143	160	39.2	42.8	44.2	45.1	47.3	0.37	433
Krkcldy	117	119	125	132	149	41.3	43.0	42.4	44.9	49.8	0.32	460
L Kings	361	391	428	435	457	37.5	38.2	39.5	39.2	39.9	1.23	373
Liv Ain	5	15	14	14	14	2.6	6.9	6.3	6.2	6.5	0.51	28

Table 5.5 Continued

Centre	*N* with Tx					% with Tx					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017	2013	2014	2015	2016	2017		
Middlbr	470	506	524	531	539	56.8	59.3	58.2	59.7	60.0	1.05	513
Newry	89	99	115	127	138	44.7	47.8	51.1	53.6	57.3	0.27	511
Norwch	323	327	366	392	417	46.9	47.7	49.5	50.8	53.7	0.82	506
Prestn	485	551	588	600	668	44.5	47.1	48.4	49.8	52.7	1.56	427
Redng	373	397	409	431	449	51.0	52.2	52.8	54.6	56.4	0.95	471
Salford	407	465	478	510	570	46.2	47.9	49.1	50.0	51.1	1.56	365
Shrew	118	124	134	131	128	34.9	35.5	36.5	34.9	34.0	0.52	244
Stevng	251	265	297	346	382	33.2	34.1	36.4	38.7	42.4	1.26	303
Sthend	83	102	103	92	96	37.7	42.9	41.9	39.0	38.1	0.33	289
Stoke	328	356	380	402	408	45.3	45.9	48.2	48.7	50.2	0.93	438
Sund	213	223	220	239	261	50.6	49.6	47.9	47.1	48.2	0.65	403
Swanse	305	318	330	328	335	44.1	45.1	43.1	42.4	42.4	0.94	358
Truro	198	210	231	239	239	53.4	55.4	55.9	56.1	56.5	0.43	552
Ulster	43	46	56	60	68	27.7	30.9	32.9	35.7	37.0	0.27	247
West NI	109	143	158	169	188	45.8	52.2	53.9	55.0	60.1	0.36	517
Wirral	5	51	74	117	156	2.0	18.3	26.3	34.7	40.3	0.60	260
Wolve	182	182	185	186	193	32.1	31.7	31.8	32.6	33.2	0.70	276
Wrexm	128	139	144	155	170	51.0	49.3	49.1	50.0	53.3	0.25	669
York	242	289	301	303	323	59.2	62.7	61.4	56.7	58.3	0.52	627
TOTALS												
England	**24,643**	**25,961**	**27,159**	**28,606**	**29,963**	**51.5**	**52.3**	**52.7**	**53.7**	**54.7**	**55.62**	**539**
N Ireland	**810**	**908**	**990**	**1,062**	**1,145**	**52.5**	**56.5**	**58.3**	**59.8**	**62.6**	**1.87**	**612**
Scotland	**2,459**	**2,600**	**2,697**	**2,812**	**2,977**	**54.2**	**56.8**	**55.7**	**56.9**	**58.2**	**5.42**	**549**
Wales	**1,518**	**1,545**	**1,673**	**1,696**	**1,738**	**54.7**	**54.2**	**55.1**	**55.3**	**54.8**	**3.13**	**556**
UK	**29,430**	**31,014**	**32,519**	**34,176**	**35,823**	**51.9**	**52.9**	**53.2**	**54.2**	**55.2**	**66.04**	**543**

Country Tx populations were calculated by summing the Tx patients from centres in each country. Estimated country populations were derived from the Office for National Statistics figures rather than from summing the estimated catchment populations of renal centres which may cross country borders
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 5.6 Demographics of adult patients prevalent to Tx on 31/12/2017 by centre

						Ethnicity				
Centre	*N* on RRT	*N* with Tx	% with Tx	Median age (yrs)	% male	% White	% South Asian	% Black	% Other	% missing
TX CENTRES										
B QEH	2,524	1,355	53.7	52.8	58.4	65.0	25.5	6.7	2.8	1.2
Belfast	843	638	75.7	54.4	59.9	97.4	1.3	0.6	0.6	2.8
Bristol	1,473	906	61.5	55.5	60.7	90.8	3.9	3.5	1.8	0.1
Camb										
Cardff	1,684	1,045	62.1	54.4	63.9	93.3	4.0	0.2	2.5	0.2
Covnt	962	567	58.9	53.5	63.1	82.0	14.1	3.2	0.7	0.0
Edinb	837	486	58.1	54.8	62.8					71.0
Glasgw	1,774	1,137	64.1	54.5	60.2					73.1
L Barts	2,497	1,200	48.1	51.9	59.6	42.8	29.2	17.8	10.2	0.0
L Guys	2,159	1,413	65.4	52.5	59.2	68.2	8.8	17.5	5.5	0.8
L Rfree	2,193	1,346	61.4	53.6	59.1	49.4	19.8	19.8	10.9	1.6
L St.G	843	485	57.5	56.0	59.4	53.3	21.0	16.9	8.8	3.7
L West	3,498	1,916	54.8	56.4	62.5	45.5	29.9	13.9	10.6	0.1
Leeds	1,621	1,001	61.8	54.4	59.7	81.0	13.5	3.6	1.9	0.1
Leic	2,374	1,306	55.0	55.3	57.7	76.0	19.2	3.1	1.6	2.1
Liv Roy	1,255	789	62.9	54.4	60.2	93.2	1.8	1.7	3.3	0.5
M RI	2,059	1,412	68.6	54.1	59.8	78.3	14.2	4.7	2.8	1.6
Newc	1,118	711	63.6	55.2	59.8	94.1	3.7	0.6	1.7	0.0
Nottm	1,174	718	61.2	53.5	59.5	86.3	7.1	4.3	2.2	0.1
Oxford	1,878	1,343	71.5	54.5	62.5	83.0	10.2	3.0	3.7	6.3
Plymth	540	339	62.8	57.0	64.0	96.2	0.6	0.3	2.9	0.0
Ports	1,746	1,052	60.3	55.6	59.9	93.8	4.0	0.8	1.3	1.1
Sheff	1,441	787	54.6	53.6	61.8	91.2	4.9	1.1	2.8	0.5
DIALYSIS CENTRES										
Abrdn	563	314	55.8	50.3	57.0					45.5
Airdrie	468	258	55.1	53.3	59.7					34.9
Antrim	248	113	45.6	54.5	61.1	100.0	0.0	0.0	0.0	0.0
B Heart	654	170	26.0	54.1	64.7	66.5	24.1	7.6	1.8	0.0
Bangor	194	93	47.9	55.1	64.5	97.8	0.0	1.1	1.1	0.0
Basldn	301	98	32.6	53.5	70.4	85.7	5.1	4.1	5.1	0.0
Bradfd	674	376	55.8	52.7	60.4	55.7	40.8	2.7	0.8	0.3
Brightn	1,013	489	48.3	55.5	61.3	91.4	4.9	2.0	1.6	0.0
Carlis	281	155	55.2	56.0	65.8	97.4	2.6	0.0	0.0	0.0
Carsh	1,681	716	42.6	55.9	62.4	74.4	13.1	7.0	5.5	0.6
Chelms	283	117	41.3	58.0	71.8	88.0	0.9	3.4	7.7	0.0
Clwyd	181	95	52.5	56.8	63.2	96.8	2.1	0.0	1.1	0.0
D&Gall	135	76	56.3	54.8	60.5					69.7
Derby	556	234	42.1	55.5	62.4	81.1	12.9	2.1	3.9	0.4
Donc	333	117	35.1	56.1	70.9	94.0	3.4	0.0	2.6	0.0
Dorset	734	395	53.8	58.7	57.2	98.0	0.5	0.0	1.5	0.0
Dudley	368	96	26.1	58.0	69.8	80.2	13.5	4.2	2.1	0.0
Dundee	439	232	52.8	54.5	58.6					46.6
Exeter	1,054	512	48.6	55.6	59.2	98.2	0.2	1.0	0.6	0.0
Glouc	504	211	41.9	55.7	58.8	93.8	3.8	0.9	1.4	0.0
Hull	871	461	52.9	54.5	63.1	96.5	1.5	0.4	1.5	0.9
Inverns	263	165	62.7	52.7	53.9	95.9	0.8	3.3	0.0	25.5
Ipswi	431	232	53.8	57.5	65.9	83.3	1.8	1.8	13.2	2.2

Table 5.6 Continued

Centre	*N* on RRT	*N* with Tx	% with Tx	Median age (yrs)	% male	Ethnicity				
						% White	% South Asian	% Black	% Other	% missing
Kent	1,091	595	54.5	56.0	58.7	93.3	3.9	0.7	2.2	0.0
Klmarnk	338	160	47.3	55.4	57.5					38.1
Krkcldy	299	149	49.8	55.0	59.7					68.5
L Kings	1,145	457	39.9	56.4	63.9	51.4	10.7	31.1	6.8	0.0
Liv Ain	216	14	6.5	46.0	57.1	100.0	0.0	0.0	0.0	0.0
Middlbr	898	539	60.0	56.1	63.5	95.0	3.7	0.2	1.1	0.0
Newry	241	138	57.3	54.7	55.1	99.3	0.0	0.0	0.7	0.0
Norwch	776	417	53.7	56.5	59.7	97.6	1.0	0.5	1.0	0.0
Prestn	1,268	668	52.7	55.3	61.1	87.4	11.4	0.6	0.6	0.0
Redng	796	449	56.4	57.1	63.3	68.1	24.5	4.9	2.6	4.5
Salford	1,115	570	51.1	54.7	57.0	86.8	10.4	1.2	1.6	0.0
Shrew	376	128	34.0	56.4	60.9	93.0	3.9	1.6	1.6	0.0
Stevng	901	382	42.4	54.1	63.1	70.9	18.9	7.6	2.6	0.3
Sthend	252	96	38.1	55.9	54.2	87.5	2.1	2.1	8.3	0.0
Stoke	813	408	50.2	53.7	60.3	93.4	5.2	0.5	1.0	0.2
Sund	541	261	48.2	56.1	61.3	96.9	2.3	0.8	0.0	0.0
Swanse	791	335	42.4	56.7	60.6	97.6	2.1	0.0	0.3	0.0
Truro	423	239	56.5	58.4	56.5	97.9	0.4	0.4	1.3	0.0
Ulster	184	68	37.0	53.5	55.9	97.1	1.5	1.5	0.0	0.0
West NI	313	188	60.1	51.5	59.0	98.4	0.5	0.5	0.5	0.0
Wirral	387	156	40.3	56.5	62.8	96.8	1.3	0.6	1.3	0.0
Wolve	581	193	33.2	52.4	59.1	74.0	18.2	7.3	0.5	0.5
Wrexm	319	170	53.3	52.2	65.3	97.1	1.2	0.6	1.2	0.0
York	554	323	58.3	55.8	57.9	97.8	1.3	0.0	1.0	2.5
TOTALS										
England	**53,353**	**28,920**	**54.2**	**54.9**	**60.6**	**77.2**	**12.6**	**6.3**	**3.9**	**0.9**
N Ireland	**1,829**	**1,145**	**62.6**	**54.0**	**59.0**	**98.0**	**0.9**	**0.5**	**0.5**	**1.6**
Scotland	**5,116**	**2,977**	**58.2**	**54.1**	**59.6**					**59.6**
Wales	**3,169**	**1,738**	**54.8**	**55.0**	**63.4**	**94.9**	**3.1**	**0.2**	**1.8**	**0.1**
UK	**63,467**	**34,780**	**54.8**	**54.8**	**60.6**	**79.0**	**11.5**	**5.8**	**3.6**	**5.9**

Blank cells – no data returned by the centre or data completeness <70%
Breakdown by ethnicity not shown for centres with <70% data completeness, but these centres are included in national averages
Cambridge is excluded from this table

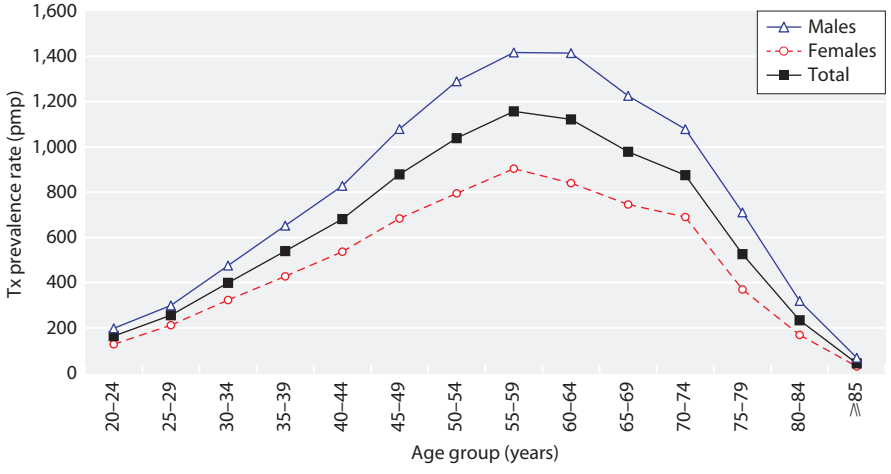


Figure 5.6 Adult Tx prevalence rate on 31/12/2017 by age group and sex
pmp – per million population

The distribution of primary renal diseases (PRDs) as a cause of ESKD in the incident Tx population is compared to the prevalent Tx population. Comparisons to dialysis populations are shown in chapters 1 and 2. PRDs were grouped into categories as shown in table 5.7, 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 5.7 Primary renal diseases (PRDs) of adult patients incident to Tx in 2017 and adult patients prevalent to Tx on 31/12/2017

	Incident Tx		Prevalent Tx	
PRD	*N*	%	*N*	%
Diabetes	503	17.2	3,856	11.3
Glomerulonephritis	703	24.0	8,017	23.4
Hypertension	175	6.0	1,825	5.3
Polycystic kidney	367	12.5	4,745	13.9
Pyelonephritis	259	8.8	4,185	12.2
Renal vascular disease	40	1.4	396	1.2
Other	496	16.9	6,122	17.9
Uncertain aetiology	389	13.3	5,051	14.8
Total (with data)	**2,932**	**100.0**	**34,197**	**100.0**
Missing	208	6.6	583	1.7

Graft function and anaemia in prevalent adult kidney Tx patients

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

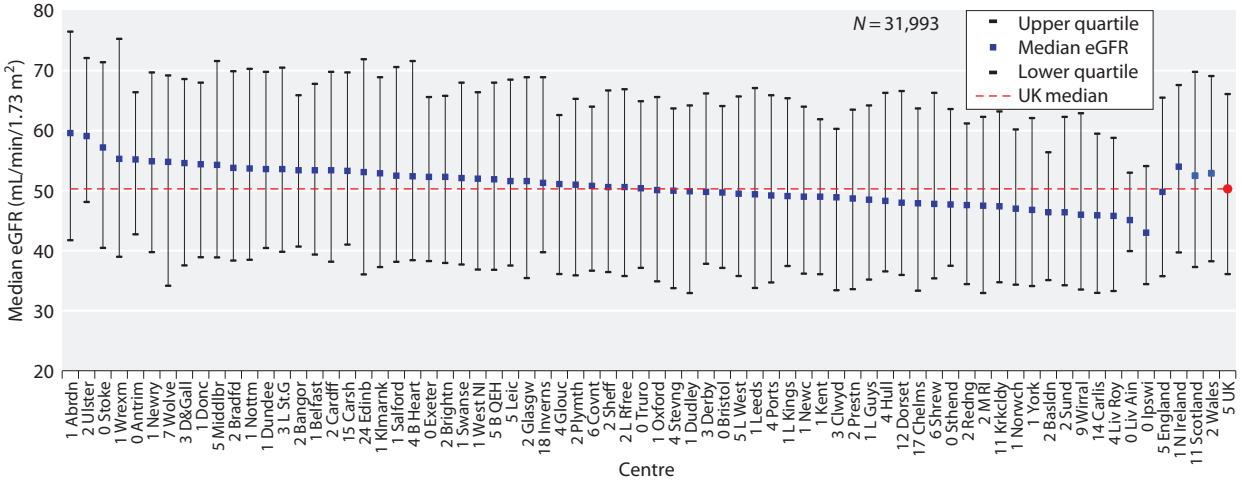


Figure 5.7 Median estimated glomerular filtration rate (eGFR) in adult patients prevalent to Tx on 31/12/2017 by centre

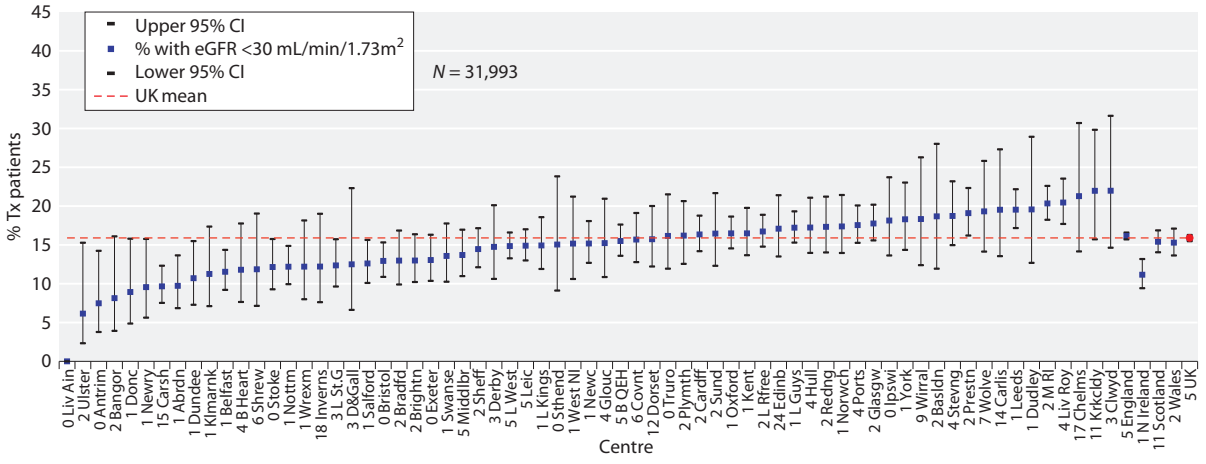


Figure 5.8 Percentage of adult patients prevalent to Tx on 31/12/2017 with an estimated glomerular filtration rate (eGFR) <30 mL/min/1.73 m^2 by centre

CI – confidence interval

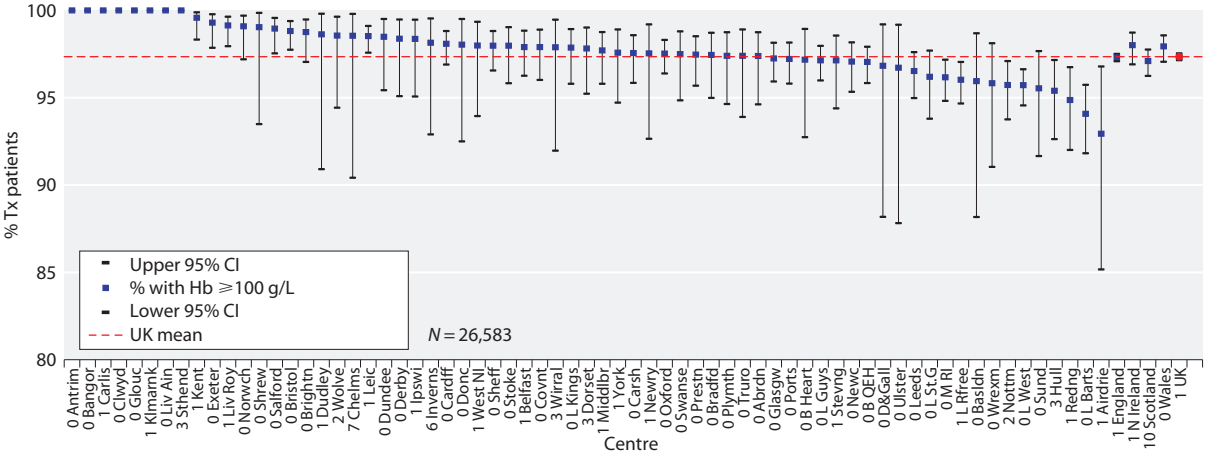


Figure 5.9 Percentage of adult patients prevalent to Tx on 31/12/2017 with an estimated glomerular filtration rate (eGFR) ⩾30 mL/min/1.73 m^2 achieving haemoglobin ⩾100 g/L by centre

CI – confidence interval; Hb – haemoglobin

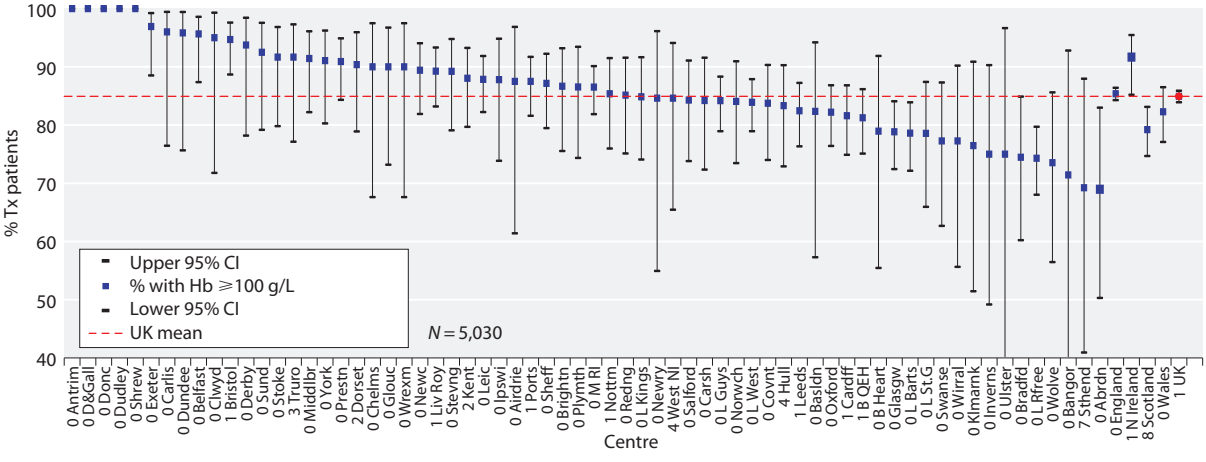


Figure 5.10 Percentage of adult patients prevalent to Tx on 31/12/2017 with an estimated glomerular filtration rate (eGFR) <30 mL/min/1.73 m^2 achieving haemoglobin ⩾100 g/L by centre

CI – confidence interval; Hb – haemoglobin

Blood pressure in prevalent adult kidney Tx patients

Blood pressure data completeness was variable (table 5.4) and only centres with ⩾70% data completeness were included in the analysis. It is possible that bias may be introduced if blood pressure readings in particular ranges are more frequently reported. A lack of data on proteinuria did not allow differentiation for the purposes of reporting against the audit measure.

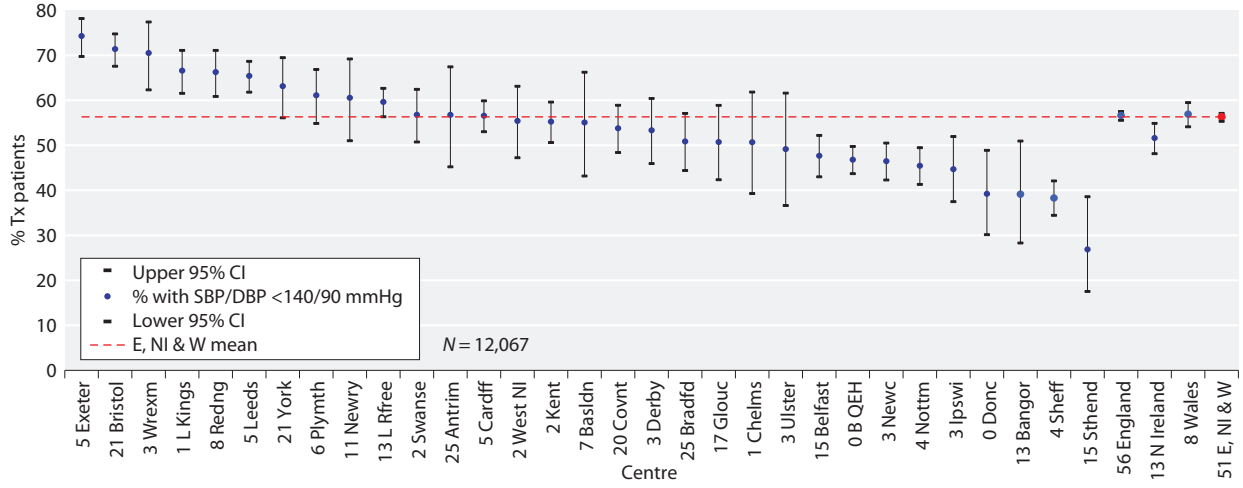


Figure 5.11 Percentage of adult patients prevalent to Tx on 31/12/2017 with estimated glomerular filtration rate (eGFR) ⩾30 mL/min/1.73 m^2 achieving blood pressure of <140/90 mmHg by centre

CI – confidence interval; DBP – diastolic blood pressure; SBP –systolic blood pressure

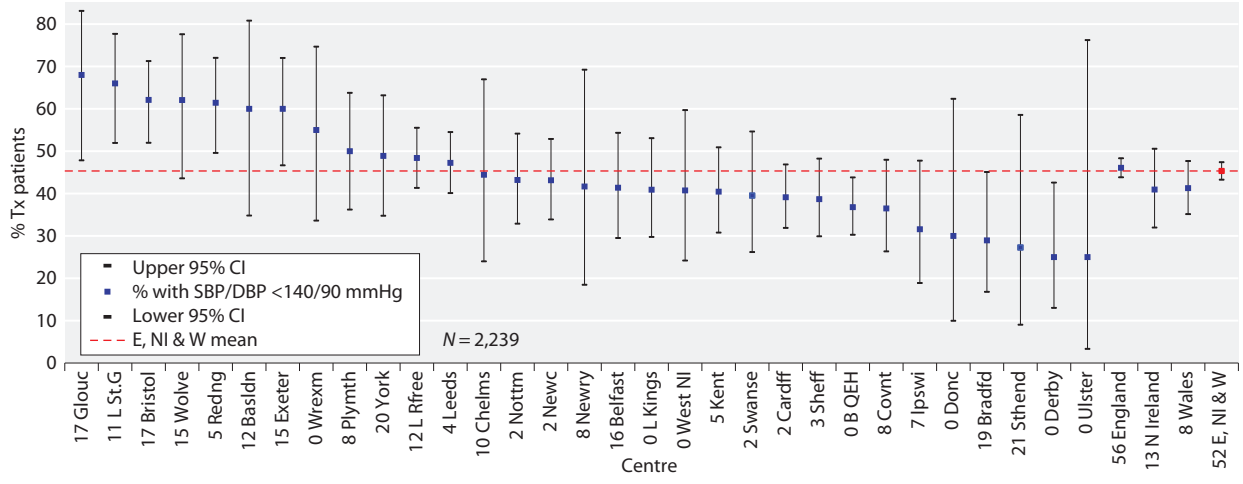


Figure 5.12 Percentage of adult patients prevalent to Tx on 31/12/2017 with estimated glomerular filtration rate (eGFR) <30 mL/min/1.73 m^2 achieving blood pressure of <140/90 mmHg by centre

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 function in the prevalent Tx population and by comparing to the prevalent dialysis population.

Table 5.8 Estimated glomerular filtration rate (eGFR), blood pressure and biochemical parameters in adult patients prevalent to Tx on 31/12/2017 compared with adult patients prevalent to dialysis on 31/12/2017 by CKD stage

	Tx CKD stage (eGFR)				
	Stage 1–2T (⩾60 mL/min/1.73 m^2)	Stage 3T (30–59 mL/min/1.73 m^2)	Stage 4T (15–29 mL/min/1.73 m^2)	Stage 5T (<15 mL/min/1.73 m^2)	Prevalent dialysis Stage 5D
N	10,725	16,200	4,356	727	21,869
%	33.5	50.6	13.6	2.3	
eGFR (mL/min/1.73 m^2)					
mean ± SD	76.8 ± 13.4	45.3 ± 8.4	23.6 ± 4.1	11.6 ± 2.5	
median	73.5	45.5	24.1	12.1	
SBP (mmHg)					
mean ± SD	134.6 ± 16.4	137.1 ± 17.3	141.1 ± 19.6	144.4 ± 20.4	134.3 ± 24.9
% ⩾140 mmHg	35.4	41.4	50.9	58.4	39.1
DBP (mmHg)					
mean ± SD	80.0 ± 10.4	79.5 ± 10.9	79.3 ± 11.6	81.6 ± 13.1	69.0 ± 14.9
% ⩾90 mmHg	16.1	16.5	17.5	23.8	8.9
Total cholesterol (mmol/L)					
mean ± SD	4.5 ± 1.0	4.6 ± 1.1	4.6 ± 1.2	4.7 ± 1.4	3.9 ± 1.1
% ⩾4.0 mmol/L	68.3	69.8	70.0	67.8	43.2
Haemoglobin (g/L)					
mean ± SD	137 ± 16	129 ± 17	117 ± 16	106 ± 16	110 ± 14
% <100 g/L	1.5	3.4	12.0	33.5	19.8
Phosphate (mmol/L)					
mean ± SD	0.9 ± 0.2	1.0 ± 0.2	1.1 ± 0.3	1.5 ± 0.4	1.6 ± 0.5
% >1.7 mmol/L	0.0	0.2	1.9	19.9	34.7
Adjusted Ca (mmol/L)					
mean ± SD	2.4 ± 0.1	2.4 ± 0.1	2.4 ± 0.2	2.4 ± 0.2	2.4 ± 0.2
% >2.5 mmol/L	26.6	26.5	22.8	17.4	16.6
% <2.2 mmol/L	3.0	3.6	6.8	17.0	15.8
PTH (pmol/L)					
median	8.3	9.7	15.2	28.5	31.7
% >72 pmol/L	0.3	0.5	3.4	11.9	18.0

Ca – 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 01/01/2006 and 31/12/2015 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. These data are currently being analysed further in a separate piece of research work.

Table 5.9 Differences in median estimated glomerular filtration rate (eGFR) slope between subgroups of adult patients prevalent to Tx on 31/12/2017

	Subgroup	*N*	Median slope	Lower quartile	Upper quartile
Age at Tx (yrs)	<40	4,726	−1.31	−4.54	0.80
	40–55	6,567	−0.55	−2.83	1.28
	>55	6,831	−0.64	−3.09	1.16
Ethnicity	White	13,259	−0.63	−2.99	1.17
	South Asian	2,063	−1.33	−4.37	0.87
	Black	1,242	−1.35	−4.62	0.94
	Other	596	−0.84	−3.76	1.08
Sex	Male	11,112	−0.49	−2.85	1.30
	Female	7,012	−1.27	−3.98	0.80
Diabetes	No diabetes	15,154	−0.66	−3.12	1.15
	Diabetes	2,797	−1.47	−4.26	0.81
Tx donor	Deceased	11,614	−0.79	−3.34	1.18
	Living	6,510	−0.72	−3.27	1.04
Year of Tx	2007	1,584	−0.77	−2.47	0.45
	2008	1,811	−0.70	−2.50	0.57
	2009	1,900	−0.87	−2.74	0.56
	2010	1,993	−0.77	−2.71	0.73
	2011	1,963	−0.62	−2.94	1.10
	2012	2,175	−0.85	−3.39	1.19
	2013	2,351	−1.00	−3.79	1.29
	2014	2,227	−0.67	−4.21	2.14
	2015	2,120	−0.62	−6.27	4.12
Status of Tx patients at end of follow-up	Died	1,367	−1.00	−4.13	1.34
	Graft failed	1,422	−6.36	−12.42	−3.15
	Re-transplanted	75	−3.69	−7.21	−1.30
	Graft functioning	15,335	−0.49	−2.61	1.28
Total		**18,124**	**−0.77**	**−3.31**	**1.12**

Survival of adult kidney Tx patients

Survival of incident and prevalent RRT patients is described in detail in chapters 1 and 2, respectively. Survival of incident Tx patients is reported in table 5.3. NHSBT reports the survival of Tx recipients.

Cause of death in adult kidney Tx patients

Cause of death was analysed in patients prevalent to RRT on 31/12/2016 and followed-up for one year in 2017, with comparisons between Tx and dialysis presented in table 5.10. Work is being undertaken to better understand and code the cause of death in Tx recipients. The proportion of RRT 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 5.10 Cause of death in adult patients prevalent to RRT on 31/12/2016 followed-up in 2017 by modality

	All modalities		Dialysis		Tx	
Cause of death	*N*	%	*N*	%	*N*	%
Cardiac disease	747	22.7	631	23.2	116	20.5
Cerebrovascular disease	123	3.7	101	3.7	22	3.9
Infection	659	20.0	550	20.2	109	19.3
Malignancy	356	10.8	211	7.7	145	25.7
Treatment withdrawal	592	18.0	576	21.1	16	2.8
Other	592	18.0	485	17.8	107	18.9
Uncertain aetiology	221	6.7	171	6.3	50	8.8
Total (with data)	**3,290**	**100.0**	**2,725**	**100.0**	**565**	**100.0**
Missing	2,038	38.3	1,688	38.3	350	38.3

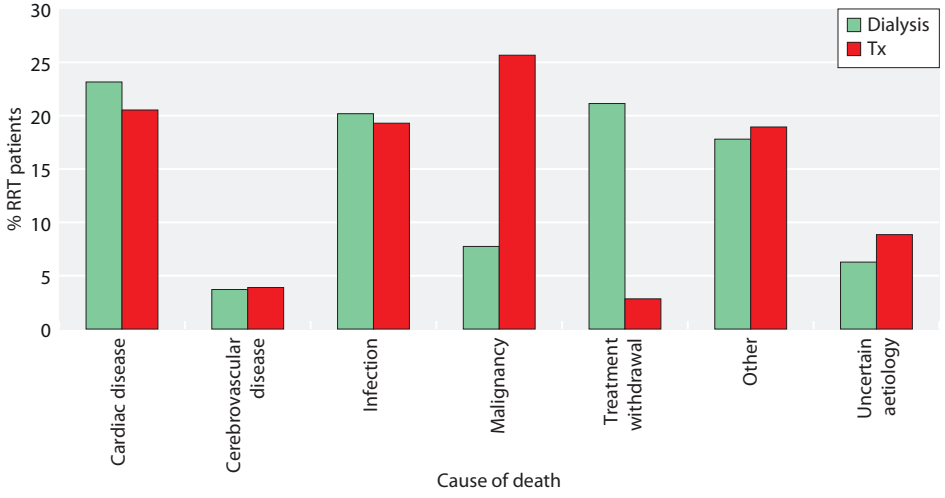


Figure 5.13 Cause of death for adult patients prevalent to RRT on 31/12/2016 followed-up in 2017 by modality

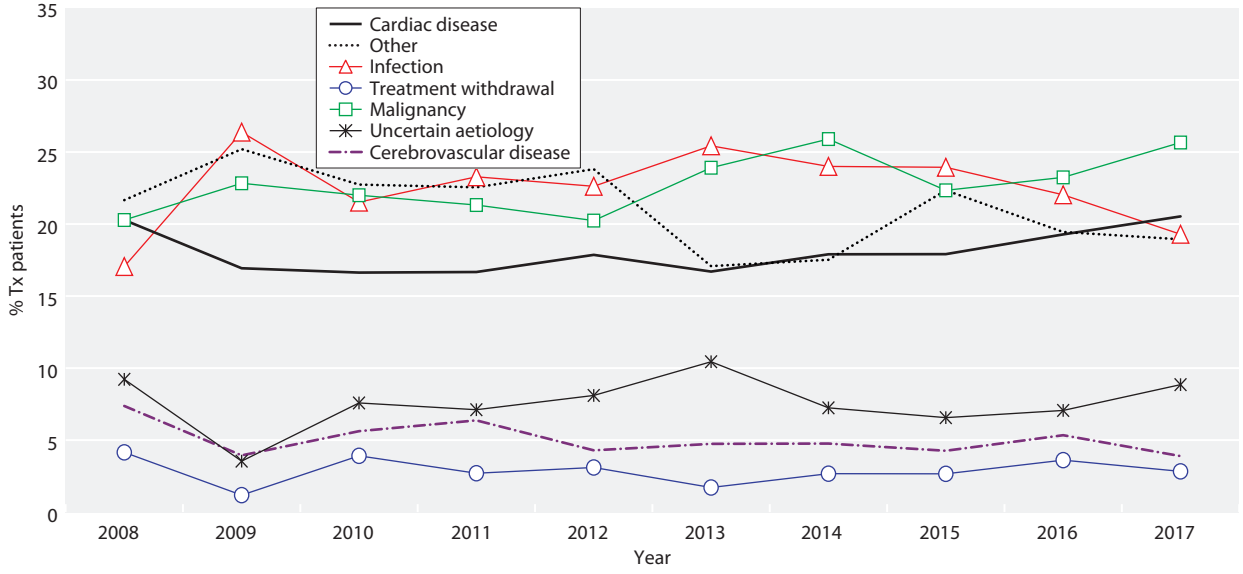


Figure 5.14 Cause of death for adult patients prevalent to Tx between 2008 and 2017



Chapter 6

Access to kidney transplantation for adults in the UK – data to the end of 2017

Contents

Introduction 149
Rationale for analyses 151
Key findings 152
Analyses 153
Access to kidney transplantation for adults by patient characteristics 153
Access to kidney transplantation for adults by renal centre 154
Access to kidney transplantation for adults by transplant versus non-transplant centre 160

Introduction

This chapter aims to evaluate whether access to kidney transplant (Tx) wait-listing and access to kidney transplantation are equitable for adults in the UK. Rates of wait-listing and rates of transplantation after wait-listing were analysed according to patient characteristics. Time from starting renal replacement therapy (RRT) to wait-listing was also analysed. Differences between renal centres and between Tx versus non-Tx renal centres were analysed, with adjustment for patient characteristics. Kidney Tx from living donors were included in the analyses as described below.

Tx from donors after brain death (DBD) were considered separately from Tx from donors after circulatory death (DCD) or living kidney donors (LKD), because of differences in the process of allocation. DBD kidneys are allocated according to the national allocation policy, while one DCD kidney from each donor is allocated regionally according to the 2006 DBD allocation scheme and the second DCD kidney is offered to the local Tx renal centre. The process of LKD transplantation is managed by the Tx renal centre (and referring non-Tx renal centre).

This chapter uses a three year incident RRT cohort between 01/01/2012 and 31/12/2014 as explained in figure 6.1. To assess Tx wait-listing, patients were followed-up for a maximum of two years after starting RRT (latest 31/12/2016). To assess transplantation after wait-listing, those wait-listed before 31/12/2015 were followed-up for a maximum of two years after wait-listing (latest 31/12/2017). Patients aged $\geqslant$65 years ($N =$ 10,438), patients listed for multi-organ Tx other than kidney and pancreas ($N = 40$) and patients who were suspended for $>$30 days within 90 days of wait-listing ($N = 656$) were excluded.

In addition to patients wait-listed during the study period, patients who received a LKD Tx within two years of starting dialysis were also considered to have been wait-listed for the purposes of this analysis, even those not added to the deceased donor Tx waiting list before transplantation.

For patients wait-listed after starting dialysis, time from starting dialysis to wait-listing was recorded, while patients wait-listed before starting dialysis were recorded as listed on the day of dialysis initiation. Patients receiving a pre-emptive Tx (living or deceased donor) were recorded as wait-listed on the day of transplantation (i.e. time from starting RRT to wait-listing was zero days). Patients who received a LKD Tx after starting dialysis who had *not* been formally wait-listed prior to transplantation were recorded as wait-listed six months before the date of their Tx. This aimed to account for the time needed to prepare patients for a LKD Tx, assuming suitability for wait-listing six months before LKD transplantation.

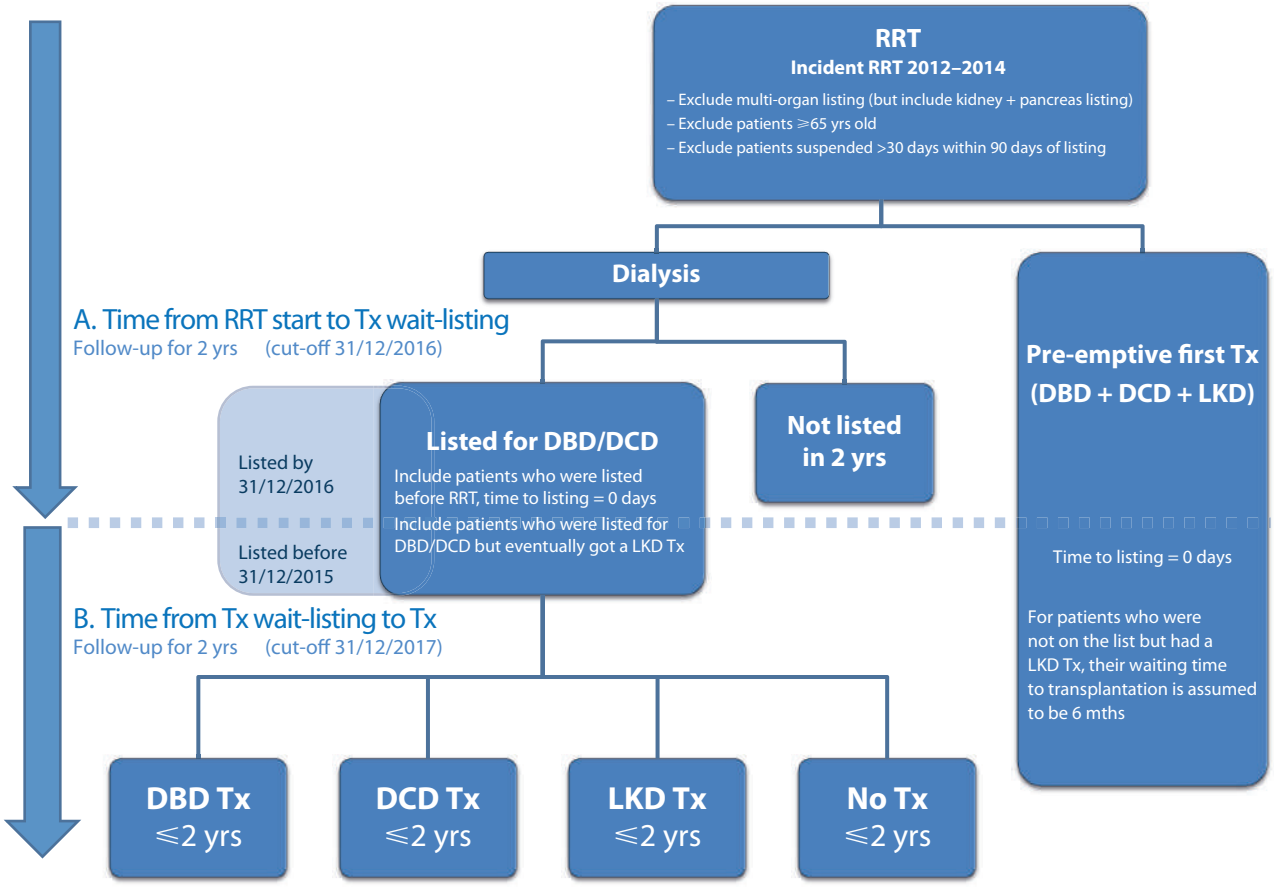


Figure 6.1 A – adult patients incident to RRT 01/01/2012–31/12/2014 who were wait-listed or transplanted within 2 years of RRT start; B – time to transplantation of adult patients incident to RRT 01/01/2012–31/12/2014 and wait-listed by 31/12/2015 who received a Tx within 2 years of wait-listing

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

This chapter addresses the following key aspects of care of patients on RRT for which there are Renal Association guidelines (table 6.1):

- **Wait-listing** – this includes the proportion of patients wait-listed at RRT start, the proportion wait-listed two years after RRT start and the time to wait-listing from RRT start
- **Pre-emptive Tx** – this is the proportion of patients who start RRT by receiving a kidney Tx from either a living or a deceased donor.

Rationale for analyses

Early Tx wait-listing increases the probability of transplantation from a deceased donor because the current national kidney allocation scheme prioritises potential Tx recipients who have accrued more time on the waiting list. Therefore, centres achieving earlier Tx wait-listing provide their patients with a clinical advantage.

The Renal Association guidelines (https://renal.org/guidelines/) provide audit measures relevant to the care of patients on RRT and, where data permit, their attainment by UK renal centres in 2017 is reported in this chapter (table 6.1).

Table 6.1 The Renal Association audit measures relevant to wait-listing and transplantation that are reported in this chapter

The Renal Association guideline	Audit criteria	Related analysis/analyses
Planning, initiating and withdrawing RRT (2014)	Proportion of incident patients on UK Tx waiting list at RRT initiation	Table 6.4
	Proportion of incident RRT patients transplanted pre-emptively from living donors and deceased donors	Table 6.4; also reported in chapters 1 and 5

In 2017, 23 of the 71 adult renal 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.

Cambridge renal centre (Addenbrooke's Hospital) was unable to submit patient level data for 2015–2017. While data extraction issues have now been resolved, the UKRR and Cambridge are working to load and validate the backlog of data for these years.

Key findings

- There was no significant difference in the likelihood of kidney Tx wait-listing for adult non-White patients within 2 years of starting RRT, compared to adult White patients. This represents an improvement in equity of access to the Tx waiting list compared to findings from 2008–2010. However, once on the Tx waiting list, non-White patients had a 61% lower chance of receiving a kidney Tx of any type within 2 years (odds ratio (OR) 0.39, 95% confidence interval (CI) 0.35–0.44)
- Compared to men, women had a 13% lower chance of being added to the kidney Tx waiting list within 2 years of starting RRT (OR 0.87, 95% CI 0.80–0.94). Once on the Tx waiting list, women had a 16% lower chance of receiving a kidney Tx of any type within 2 years (OR 0.84, 95% CI 0.75–0.93)
- Compared to patients treated at Tx centres, patients treated at non-Tx centres were less likely to be wait-listed for transplantation within 2 years of starting dialysis (OR 0.68, 95% CI 0.62–0.74), but were more likely to receive a DCD kidney within 2 years of wait-listing (OR 1.38, 95% CI 1.19–1.60). There was not a significant difference in the chance for patients in Tx versus non-Tx centres to receive a DBD Tx within 2 years of wait-listing. However, patients at non-Tx centres were less likely to receive a LKD kidney Tx (OR 0.65, 95% CI 0.58–0.74). Overall, this equated to a reduced chance of receiving a Tx from any donor type for patients treated at non-Tx centres (OR 0.88, 95% CI 0.79–0.99).

Analyses

Access to kidney transplantation for adults by patient characteristics

A logistic regression analysis for the relationship between patient characteristics – age, ethnicity, sex and primary renal disease (PRD) – and the odds of Tx wait-listing within two years of starting RRT is shown (calculated as detailed in appendix A). For the purposes of these analyses, PRD was divided only into diabetic nephropathy, non-diabetic nephropathy and missing data.

Odds of Tx wait-listing from RRT start

Table 6.2 Multivariable logistic regression model showing the relationship between adult patient characteristics and odds of Tx wait-listing within 2 years of starting RRT (cohort incident to RRT 01/01/2012–31/12/2014)

			Tx wait-listing ⩽2 yrs of RRT start	
		N (%)	OR	95% CI
Age (yrs)	18–29	774 (7.6)	1.00	ref
	30–39	1,255 (12.3)	0.66	0.52–0.83
	40–49	2,453 (24.1)	0.40	0.32–0.49
	50–59	3,508 (34.5)	0.23	0.19–0.29
	60–64	2,180 (21.4)	0.13	0.10–0.16
Ethnicity	White	6,762 (66.5)	1.00	ref
	Non-White	2,627 (25.8)	1.10	1.00–1.21
	Missing	781 (7.7)	0.93	0.80–1.09
Sex	Male	6,257 (61.5)	1.00	ref
	Female	3,913 (38.5)	0.87	0.80–0.94
PRD	Not diabetic	7,090 (69.7)	1.00	ref
	Diabetic	2,813 (27.7)	0.51	0.47–0.56
	Missing	267 (2.6)	0.47	0.36–0.61

CI – confidence interval; OR – odds ratio; PRD – primary renal disease

Data were missing for ethnicity and PRD either because a renal centre failed to complete relevant fields on their renal IT system or from a failure to extract these data. Missing ethnicity and missing PRD were included as categories in the analysis because the data may not be missing at random. Over 80% of missing ethnicity data were from Scotland, which does not routinely collect these data. For missing PRD data, patients with increased comorbidity are likely to die sooner, allowing inadequate time for their physician to enter relevant comorbidity data; the very process of working up and listing a patient makes it less likely that data will be missing.

Odds of a Tx after Tx wait-listing

The results of logistic regression analyses for the relationship between patient characteristics and the likelihood of receiving a kidney Tx within two years of wait-listing are shown.

Table 6.3 Multivariable logistic regression model showing the relationship between adult patient characteristics and odds of receiving a kidney Tx by donor type (including living kidney donor) within 2 years of wait-listing (cohort incident to RRT 01/01/2012–31/12/2014 and wait-listed by 31/12/2015)

			Receiving Tx ⩽2 yrs of wait-listing					
			DBD		DCD		Any Tx	
		N (%)	OR	95% CI	OR	95% CI	OR	95% CI
Age (yrs)	18–29	656 (11.2)	1.00	ref	1.00	ref	1.00	ref
	30–39	966 (16.5)	1.09	0.86–1.38	1.15	0.86–1.55	0.73	0.58–0.93
	40–49	1,627 (27.7)	0.73	0.58–0.92	1.16	0.88–1.52	0.42	0.34–0.52
	50–59	1,830 (31.2)	0.45	0.36–0.57	1.34	1.03–1.75	0.31	0.25–0.38
	60–64	790 (13.5)	0.33	0.24–0.44	1.39	1.03–1.88	0.23	0.18–0.28
Ethnicity	White	3,865 (65.8)	1.00	ref	1.00	ref	1.00	ref
	Non-White	1,595 (27.1)	0.67	0.56–0.79	0.72	0.61–0.86	0.39	0.35–0.44
	Missing	417 (7.1)	1.10	0.85–1.42	0.95	0.72–1.26	1.02	0.82–1.26
Sex	Male	3,668 (62.4)	1.00	ref	1.00	ref	1.00	ref
	Female	2,209 (37.6)	0.94	0.82–1.09	0.75	0.65–0.88	0.84	0.75–0.93
PRD	Not diabetic	4,526 (77.0)	1.00	ref	1.00	ref	1.00	ref
	Diabetic	1,235 (21.0)	2.13	1.82–2.5	1.25	1.05–1.48	0.93	0.81–1.06
	Missing	116 (2.0)	1.40	0.87–2.27	0.64	0.34–1.2	0.92	0.62–1.37

CI – confidence interval; DBD – donor after brain death; DCD – donor after circulatory death; OR – odds ratio; PRD – primary renal disease

Access to kidney transplantation for adults by renal centre

Proportion and time from RRT to Tx wait-listing by renal centre

The proportion of patients receiving a pre-emptive Tx and the proportion wait-listed at RRT start (including those with a Tx) was calculated by renal centre. The proportion of patients wait-listed within two years of starting RRT by renal centre after adjusting for patient characteristics (age, ethnicity, sex and PRD) is shown, as well as the median time (days) to listing. The CI of median time from starting RRT to wait-listing for each renal centre in figure 6.3 was derived from simulations based on the actual data. For eight centres (those with fewer events and/or longer waiting times) median values could not be estimated, so final event times are shown (calculated as detailed in appendix A). For one centre, Belfast, >50% of patients were either pre-emptively transplanted or wait-listed before starting RRT, giving a median time to listing of zero days.

Table 6.4 Proportion of adult patients in each renal centre wait-listed or transplanted at RRT start and proportion of patients wait-listed for a Tx prior to or within 2 years of starting RRT (cohort incident to RRT 01/01/2012–31/12/2014)

Centre	*N* on RRT	% with pre-emptive Tx	% with LKD pre-emptive Tx	% wait-listed at RRT start including Tx	% wait-listed at 2 yrs (unadj)	% wait-listed at 2 yrs (risk adj)*	Median time to listing[a] (days)	Final event time (days)
TX CENTRES								
B QEH	357	10.6	7.6	28.6	51.3	50.3	616	
Belfast	112	40.2	32.1	53.6	69.6	64.4	0	
Bristol	217	17.5	8.8	35.9	59.9	57.0	227	
Camb	154	42.9	15.6	50.0	65.6	62.4	0	
Cardff	217	17.1	12.9	34.1	54.8	49.8	296	
Covnt	136	11.8	8.1	20.6	51.5	51.3	535	
Edinb	155	23.9	12.3	36.1	56.8	53.8	333	
Glasgw	265	20.4	14.0	40.4	67.9	61.0	139	
L Barts	527	6.1	4.4	20.1	56.7	57.3	464	
L Guys	249	23.3	13.3	34.9	54.2	51.6	435	
L Rfree	350	14.6	8.0	34.3	65.7	62.0	173	
L St.G	140	13.6	8.6	30.0	58.6	54.3	448	
L West	534	15.5	12.0	36.0	71.2	64.6	216	
Leeds	264	19.3	3.0	42.1	64.0	59.7	116	
Leic	374	17.1	8.6	39.0	65.5	59.4	133	
Liv Roy	177	24.3	14.7	31.1	46.3	47.6	904	
M RI	280	23.2	12.5	35.0	61.8	58.1	242	
Newc	161	15.5	13.7	28.0	49.1	48.8	779	
Nottm	152	19.7	8.6	42.8	59.9	54.8	134	
Oxford	268	19.4	6.3	41.0	66.4	58.8	140	
Plymth	66	21.2	10.6	42.4	68.2	61.7	96	
Ports	273	14.3	9.5	36.6	62.6	57.2	188	
Sheff	221	13.1	7.7	36.7	57.5	53.5	232	
DIALYSIS CENTRES								
Abrdn	86	0.0	0.0	19.8	41.9	40.0	1,309	
Airdrie	75	0.0	0.0	21.3	58.7	56.4	323	
Antrim	30	0.0	0.0	20.0	40.0	37.5	906	
B Heart	145	3.5	2.8	24.1	49.7	46.9	749	
Bangor	19	0.0	0.0	10.5	26.3	25.5	n/a	1,478
Basldn	66	1.5	0.0	24.2	54.6	52.5	450	
Bradfd	122	13.1	1.6	27.9	49.2	52.0	731	
Brightn	184	8.2	4.9	25.0	46.7	46.3	889	
Carlis	54	11.1	3.7	31.5	68.5	61.6	226	
Carsh	317	10.7	6.6	25.9	49.8	47.8	744	
Chelms	67	0.0	0.0	14.9	50.8	49.1	623	
Clwyd	28	3.6	0.0	10.7	35.7	35.7	n/a	512
Colchr	30	0.0	0.0	10.0	46.7	47.0	743	
D&Gall	20	0.0	0.0	30.0	75.0	66.6	65	
Derby	121	1.7	0.8	24.8	49.6	48.2	708	
Donc	73	0.0	0.0	23.3	63.0	59.9	232	
Dorset	79	10.1	2.5	30.4	55.7	52.9	380	
Dudley	74	1.4	1.4	16.2	35.1	37.4	n/a	1,624
Dundee	56	0.0	0.0	25.0	55.4	50.5	342	
Exeter	119	9.2	4.2	24.4	58.8	54.5	314	
Glouc	84	4.8	4.8	25.0	54.8	55.2	619	
Hull	130	4.6	1.5	16.9	49.2	49.3	740	
Inverns	32	0.0	0.0	34.4	62.5	58.2	126	
Ipswi	49	8.2	2.0	18.4	42.9	43.7	1,055	
Kent	167	16.8	11.4	26.4	55.1	53.6	480	
Klmarnk	57	0.0	0.0	17.5	43.9	40.9	813	
Krkcldy	33	0.0	0.0	6.1	30.3	30.5	n/a	907
L Kings	227	3.1	1.3	9.7	37.0	39.1	1,499	
Liv Ain	85	4.7	2.4	15.3	36.5	37.6	n/a	1,492

Table 6.4 Continued

Centre	*N* on RRT	% with pre-emptive Tx	% with LKD pre-emptive Tx	% wait-listed at RRT start including Tx	% wait-listed at 2 yrs (unadj)	% wait-listed at 2 yrs (risk adj)*	Median time to listing[a] (days)	Final event time (days)
Middlbr	148	19.6	8.8	37.8	66.2	61.0	186	
Newry	28	0.0	0.0	21.4	53.6	49.8	504	
Norwch	84	2.4	1.2	16.7	42.9	43.4	1,102	
Prestn	217	12.9	7.4	28.6	53.5	51.4	523	
Redng	133	8.3	5.3	22.6	54.9	51.2	425	
Salford	213	5.6	2.8	29.1	61.0	56.5	292	
Shrew	72	1.4	1.4	20.8	31.9	31.8	n/a	520
Stevng	206	12.1	5.3	33.0	61.2	58.2	255	
Sthend	41	12.2	12.2	34.2	65.9	59.8	110	
Stoke	122	2.5	0.8	20.5	52.5	50.3	505	
Sund	95	10.5	6.3	20.0	51.6	50.9	570	
Swanse	122	4.9	2.5	20.5	37.7	37.6	1,610	
Truro	46	15.2	6.5	37.0	71.7	64.7	120	
Ulster	27	0.0	0.0	29.6	63.0	56.0	110	
West NI	31	3.2	3.2	32.3	58.1	58.2	386	
Wirral	67	6.0	0.0	22.4	53.7	54.0	457	
Wolve	125	4.0	1.6	16.8	41.6	43.3	n/a	1,525
Wrexm	37	13.5	8.1	27.0	37.8	38.5	n/a	1,409
York	78	18.0	6.4	38.5	56.4	54.8	278	

*Risk adjusted by age, ethnicity, sex and primary renal disease, modelled with logistic regression
[a]Median time to listing is estimated by Kaplan Meier method
n/a – median values could not be estimated for centres with fewer events and/or longer waiting times, so final event times are shown
LKD – living kidney donor

A funnel plot (figure 6.2) shows the centre rate of listing at two years after starting RRT, risk adjusted by age group, ethnicity, sex and PRD. A second funnel plot (figure 6.3) shows the median time to wait-listing. Centres can be identified from the x-axis using the number of patients on RRT in table 6.4.

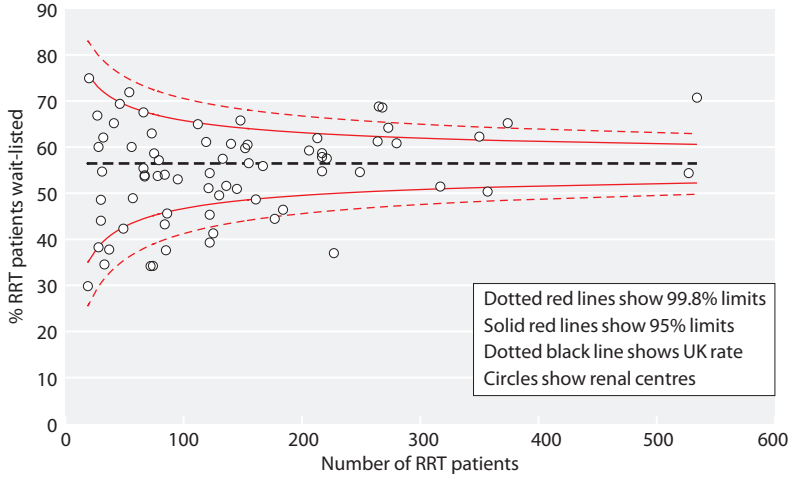


Figure 6.2 Percentage of adult RRT patients wait-listed prior to or within 2 years of starting RRT by centre (cohort incident to RRT 01/01/2012–31/12/2014)

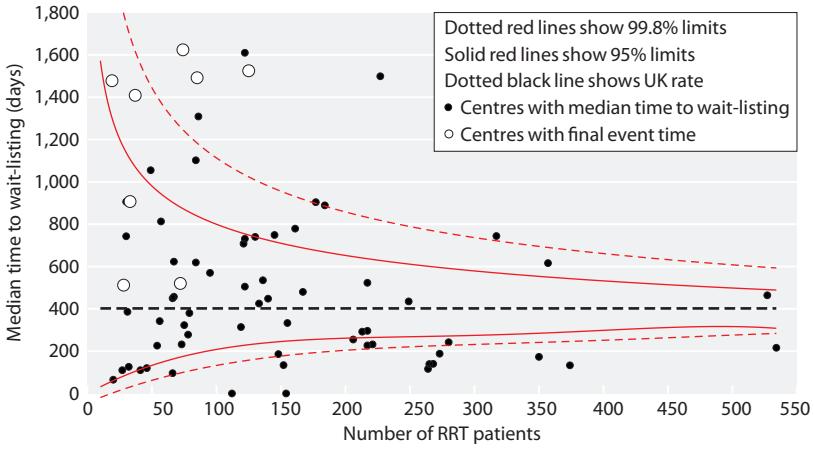


Figure 6.3 Median time (or final event time) from starting RRT to wait-listing by centre (cohort incident to RRT 01/01/2012–31/12/2014)

Proportion with a Tx after Tx wait-listing by renal centre

The Tx rates at two years from the time of wait-listing for patients who started RRT between 01/01/2012 and 31/12/2014 and who were on the waiting list by 31/12/2015 were assessed by donor type, because of the different allocation policies between DBD, DCD and LKD. Both crude and risk adjusted (by age group, ethnicity, sex and PRD) Tx rates are shown by donor type and by centre.

Table 6.5 Proportion of adult RRT patients receiving a Tx within 2 years of wait-listing by donor type (including living kidney donor) and centre (cohort incident to RRT 01/01/2012–31/12/2014 and wait-listed by 31/12/2015)

		DBD			DCD			Any Tx		
			% with Tx ⩽2 yrs of wait-listing			% with Tx ⩽2 yrs of wait-listing			% with Tx ⩽2 yrs of wait-listing	
Centre	*N* wait-listed	*N* with Tx	Unadj	Risk adj*	*N* with Tx	Unadj	Risk adj*	*N* with Tx	Unadj	Risk adj*
TX CENTRES										
B QEH	186	18	9.7	10.9	8	4.3	4.5	72	38.7	40.8
Belfast	79	8	10.1	9.5	4	5.1	4.9	60	75.9	67.0
Bristol	132	24	18.2	18.2	7	5.3	5.0	68	51.5	48.5
Camb	105	16	15.2	15.2	44	41.9	41.1	90	85.7	78.4
Cardff	123	15	12.2	11.9	30	24.4	22.4	90	73.2	69.6
Covnt	73	10	13.7	15.4	6	8.2	8.2	45	61.6	62.5
Edinb	88	22	25.0	21.2	11	12.5	12.9	64	72.7	66.0
Glasgw	180	35	19.4	18.0	22	12.2	11.9	116	64.4	59.8
L Barts	307	37	12.1	13.6	27	8.8	9.7	143	46.6	54.0
L Guys	137	22	16.1	16.7	28	20.4	24.4	96	70.1	73.8
L Rfree	243	43	17.7	19.0	44	18.1	19.6	143	58.8	66.4
L St.G	86	13	15.1	18.2	9	10.5	11.8	42	48.8	57.6
L West	388	43	11.1	12.3	21	5.4	5.7	182	46.9	55.5
Leeds	173	39	22.5	23.7	51	29.5	29.1	118	68.2	66.7
Leic	245	47	19.2	19.4	22	9.0	9.2	128	52.2	52.4
Liv Roy	87	14	16.1	16.3	16	18.4	18.5	65	74.7	68.0
M RI	176	28	15.9	15.8	20	11.4	11.5	109	61.9	62.9
Newc	85	14	16.5	15.9	16	18.8	18.1	67	78.8	75.5
Nottm	93	17	18.3	18.4	21	22.6	22.6	57	61.3	60.0
Oxford	185	49	26.5	26.1	27	14.6	14.2	118	63.8	65.5
Plymth	45	11	24.4	24.7	14	31.1	29.1	38	84.4	78.9
Ports	169	41	24.3	22.6	8	4.7	4.4	89	52.7	49.9
Sheff	132	18	13.6	12.2	9	6.8	6.4	62	47.0	43.7

Table 6.5 Continued

Centre	*N* wait-listed	DBD *N* with Tx	DBD % with Tx ⩽2 yrs of wait-listing Unadj	DBD % with Tx ⩽2 yrs of wait-listing Risk adj*	DCD *N* with Tx	DCD % with Tx ⩽2 yrs of wait-listing Unadj	DCD % with Tx ⩽2 yrs of wait-listing Risk adj*	Any Tx *N* with Tx	Any Tx % with Tx ⩽2 yrs of wait-listing Unadj	Any Tx % with Tx ⩽2 yrs of wait-listing Risk adj*
DIALYSIS CENTRES										
Abrdn	34	8	23.5	22.7	9	26.5	27.5	21	61.8	60.6
Airdrie	44	12	27.3	24.2	7	15.9	14.9	27	61.4	56.5
Antrim	13	2	15.4	16.2	1	7.7	6.7	6	46.2	45.1
B Heart	74	13	17.6	16.4	4	5.4	5.6	28	37.8	40.0
Bangor	5	2	40.0	28.6	0	0.0	0.0	5	100.0	78.4
Basldn	36	4	11.1	10.9	4	11.1	11.2	16	44.4	44.1
Bradfd	62	14	22.6	24.0	26	41.9	45.8	45	72.6	74.4
Brightn	89	18	20.2	19.6	10	11.2	11.0	49	55.1	51.3
Carlis	35	11	31.4	36.1	7	20.0	18.8	24	68.6	66.1
Carsh	163	26	16.0	16.2	17	10.4	11.1	93	57.1	59.2
Chelms	35	9	25.7	23.8	15	42.9	38.5	27	77.1	75.9
Clwyd	10	2	20.0	20.2	2	20.0	22.0	5	50.0	48.1
Colchr	15	5	33.3	30.1	6	40.0	38.0	12	80.0	75.2
D&Gall	15	2	13.3	10.0	4	26.7	26.4	11	73.3	64.8
Derby	61	14	23.0	23.1	9	14.8	13.9	28	45.9	45.4
Donc	49	6	12.2	11.8	9	18.4	17.1	20	40.8	39.6
Dorset	45	12	26.7	22.5	2	4.4	4.3	19	42.2	38.9
Dudley	27	3	11.1	9.1	5	18.5	17.8	15	55.6	50.4
Dundee	33	9	27.3	25.4	1	3.0	3.0	17	51.5	49.9
Exeter	70	17	24.3	21.9	8	11.4	10.4	39	55.7	51.5
Glouc	47	9	19.1	19.1	7	14.9	14.3	27	57.4	55.4
Hull	65	8	12.3	11.5	21	32.3	30.7	44	67.7	61.8
Inverns	22	2	9.1	8.8	3	13.6	13.9	9	40.9	39.5
Ipswi	23	5	21.7	23.9	10	43.5	42.2	19	82.6	77.6
Kent	95	18	18.9	17.8	21	22.1	20.7	68	71.6	67.3
Klmarnk	26	2	7.7	6.6	3	11.5	11.0	12	46.2	43.5
Krkcldy	10	1	10.0	8.7	3	30.0	28.7	5	50.0	45.5
L Kings	88	19	21.6	24.2	15	17.0	18.4	48	54.5	60.2
Liv Ain	32	4	12.5	12.1	9	28.1	27.5	20	62.5	60.0
Middlbr	102	15	14.7	13.7	30	29.4	27.5	80	78.4	73.4
Newry	18	4	22.2	20.7	0	0.0	0.0	8	44.4	44.4
Norwch	38	5	13.2	12.4	15	39.5	38.1	28	73.7	65.9
Prestn	119	24	20.2	20.2	15	12.6	11.8	67	56.3	54.2
Redng	74	16	21.6	20.8	17	23.0	22.2	51	68.9	72.5
Salford	132	18	13.6	13.5	13	9.8	9.7	56	42.4	42.8
Shrew	23	2	8.7	8.8	3	13.0	13.0	10	43.5	44.0
Stevng	129	22	17.1	17.8	32	24.8	25.4	89	69.0	69.4
Sthend	27	3	11.1	11.1	5	18.5	17.8	19	70.4	68.3
Stoke	64	11	17.2	16.6	5	7.8	7.3	33	51.6	49.2
Sund	52	6	11.5	11.6	13	25.0	23.6	40	76.9	72.9
Swanse	45	9	20.0	15.8	7	15.6	14.0	29	64.4	56.5
Truro	33	7	21.2	19.3	10	30.3	28.8	25	75.8	68.6
Ulster	16	1	6.3	5.1	2	12.5	11.2	9	56.3	54.0
West NI	17	1	5.9	5.7	0	0.0	0.0	9	52.9	48.7
Wirral	37	10	27.0	22.7	6	16.2	15.0	24	64.9	58.4
Wolve	53	5	9.4	11.6	2	3.8	3.9	12	22.6	24.8
Wrexm	14	3	21.4	23.0	0	0.0	0.0	9	64.3	58.8
York	44	12	27.3	25.7	10	22.7	21.8	31	70.5	61.6

*Risk adjusted by age group, ethnicity, sex and primary renal disease, modelled with logistic regression
DBD – donor after brain death; DCD – donor after circulatory death

The following funnel plots show the centre Tx rates at two years from wait-listing, for patients who started RRT between 01/01/2012 and 31/12/2014 and who were on the waiting list by 31/12/2015, risk adjusted by age group, ethnicity, sex and PRD.

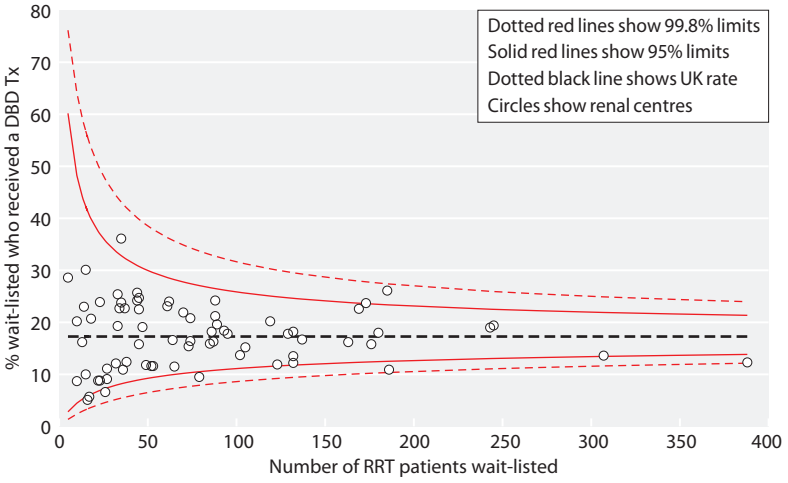


Figure 6.4 Percentage of adult RRT patients wait-listed by 31/12/2015 who received a Tx from a donor after brain death (DBD) within 2 years by centre (cohort incident to RRT 01/01/2012–31/12/2014)

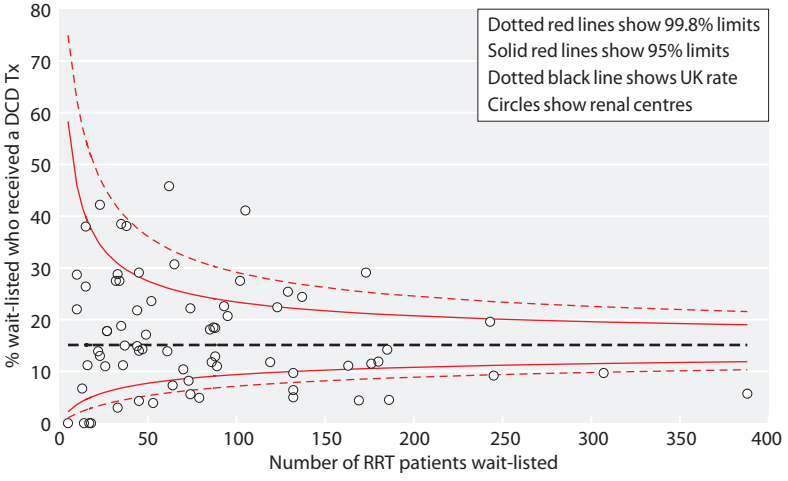


Figure 6.5 Percentage of adult RRT patients wait-listed by 31/12/2015 who received a Tx from a donor after circulatory death (DCD) within 2 years by centre (cohort incident to RRT 01/01/2012–31/12/2014)

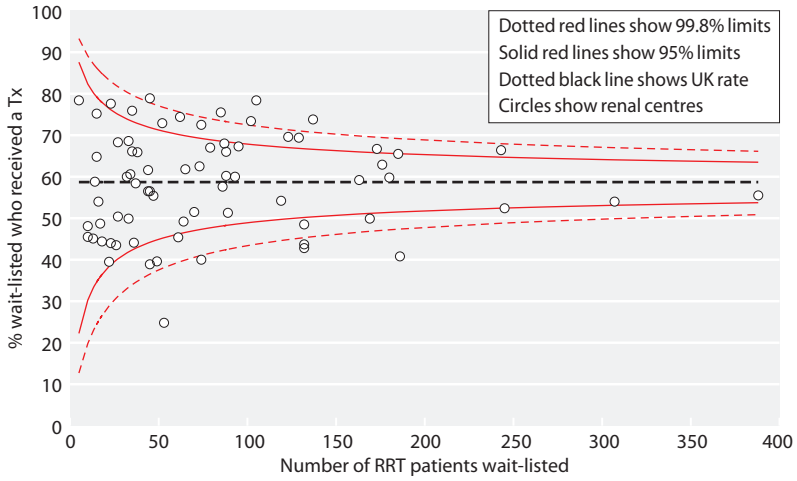


Figure 6.6 Percentage of adult RRT patients wait-listed by 31/12/2015 who received a Tx from any donor type (deceased or living) within 2 years by centre (cohort incident to RRT 01/01/2012–31/12/2014)

Access to kidney transplantation for adults by transplant versus non-transplant centre

Patients treated at Tx renal centres were compared to those treated at non-Tx renal centres.

Table 6.6 Odds of adult RRT patients being wait-listed within 2 years of RRT start and odds of wait-listed patients being transplanted within 2 years of wait-listing by Tx status of renal centre (cohort incident to RRT 01/01/2012–31/12/2014 and wait-listed by 31/12/2015), risk adjusted by age group, ethnicity, sex and primary renal disease, modelled with logistic regression

	Tx type	OR	95% CI
Odds of patients being wait-listed ⩽2 yrs in non-Tx centre		0.68	0.62–0.74
Odds of wait-listed patients receiving a Tx ⩽2 yrs in non-Tx centre	Any	0.88	0.79–0.99
	DBD	1.05	0.91–1.21
	DCD	1.38	1.19–1.60
	LKD	0.65	0.58–0.74

CI – confidence interval; DBD – donor after brain death; DCD – donor after circulatory death; LKD – living kidney donor; OR – odds ratio

Chapter 7

Children on renal replacement therapy (RRT) for end-stage kidney disease (ESKD) in the UK in 2017

Contents

Introduction 163
Rationale for analyses 165
Key findings 167
Analyses 168
- Data completeness for prevalent paediatric RRT patients 168
- Changes to the incident paediatric RRT population 169
- Start modality of incident paediatric RRT patients 170
- Pre-emptive transplantation in incident paediatric RRT patients 171
- Demographics of prevalent paediatric RRT patients 172
- Treatment modality in prevalent paediatric RRT patients 172
- Causes of ESKD in prevalent paediatric RRT patients 173
- Growth of prevalent paediatric RRT patients 174
- Cardiovascular risk factor evaluation in prevalent paediatric RRT patients 176
- Biochemistry parameters in prevalent paediatric RRT patients 179
- Transfer to adult renal services for prevalent paediatric RRT patients 181
- Survival in paediatric RRT patients 181

Introduction

This chapter describes the population of children (aged <18 years) with end-stage kidney disease (ESKD) who were on renal replacement therapy (RRT) in the UK for at least 90 days in 2017 under the care of paediatric renal centres (figure 7.1). This includes patients with a transplant (Tx) and patients on dialysis – in-centre haemodialysis (ICHD), home haemodialysis (HHD) and peritoneal dialysis (PD). Patients coded as acute kidney injury (AKI) or ESKD who died or recovered within the first 90 days of RRT are excluded from the analyses. The populations included in this chapter are:

- **Incident population** – patients who started RRT during 2017 and remained on RRT for at least 90 days
- **Prevalent population** – patients who were on RRT at the end of 2017, aged <18 years and still under the care of a paediatric renal centre
- **Five-year populations** – patients who started RRT and remained on RRT for at least 90 days in the periods 2003–2007, 2008–2012 and 2013–2017.

There are 13 paediatric renal centres in the UK, all of which are equipped to provide both haemodialysis (HD) and PD. Ten of these centres also perform kidney transplantation.

Children aged 16–18 years may be managed in either paediatric or adult services. This is variable across the UK and dependent on local practices, social factors and patient/family wishes. In this chapter, data for patients aged <18 years who were managed within UK paediatric renal centres are described, with a focus on those aged <16 years, because this group represents a complete cohort. Children aged 16–18 years who have only ever received nephrology care from adult centres were not included in the analyses.

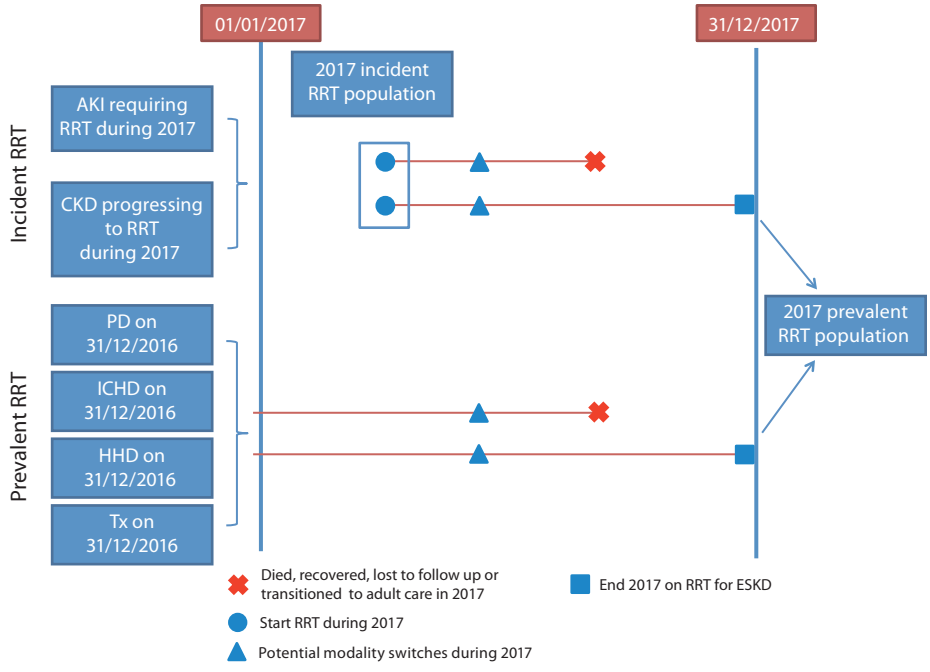


Figure 7.1 Pathways paediatric patients could follow to be included in the UK 2017 incident and/or prevalent RRT populations

Note that patients starting RRT in 2017 are only included in this chapter if they remained on RRT for ⩾90 days
CKD – chronic kidney disease

This chapter addresses the following key aspects of care of children incident to or on RRT for which there are evidence-based guidelines (table 7.1):

- **Growth** – this includes age and sex adjusted heights and weights
- **Cardiovascular risk factors** – these include age adjusted blood pressure, cholesterol and body mass index (BMI)
- **Complications associated with RRT** – these include anaemia and mineral bone disorders.

Data for height, weight, BMI and blood pressure vary with age, sex and size and are therefore presented as z-scores. Z-scores are a means of expressing the deviation of a given measurement from the age and size specific population mean. This relies on the completeness of height data during the period in question.

Rationale for analyses

The analyses begin with a description of the 2017 incident and prevalent paediatric RRT populations, including the number on RRT per million age-related population (pmarp). The height and weight of children are measures of healthy growth and may be impacted by kidney disease as well as its treatment.

The published guidelines listed below provide audit measures relevant to the care of paediatric patients on RRT and, where data permit, their attainment by UK renal centres in 2017 is reported in this chapter (table 7.1). For children, reporting estimated glomerular filtration rate (eGFR) is dependent on the completeness of both creatinine and height data. The completeness of both transferrin saturation and percentage hypochromic red cells are too low to be reported as measures of iron stores. Detail about the completeness of data returned to the UK Renal Registry (UKRR) is available on the UKRR website. Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted – this includes reticulocyte haemoglobin content.

Where revised target ranges are published, the measures in place at the time of patient care are reported. However, where new guidelines remove audit measures, those targets are no longer reported.

Table 7.1 Audit measures relevant to RRT incidence and prevalence that are reported in this chapter

Audit guideline	Audit criteria	Related analysis/analyses
The Renal Association: Treatment of adults and children with renal failure: standards and audit measures (2002)	Height and weight to be monitored at each clinic visit and plotted on the growth charts of healthy children and adolescents	Figures 7.6–7.13
	Blood pressure during PD or after HD to be maintained at <90th percentile for age, sex and height. Blood pressure in Tx patients to be maintained at <90th percentile for age, sex and height	Tables 7.14, 7.15, figures 7.14, 7.15
	Serum phosphate and calcium should be kept within the normal range. Parathyroid hormone (PTH) levels should be maintained within twice the upper limit of the normal range but, contrary to adult standards, may be kept within the normal range if growth is normal	Table 7.17
	Serum bicarbonate concentrations should be 20–26 mmol/L	Table 7.17
	Typically maintain the aspirational haemoglobin range 100–120 g/L for young people and children aged ⩾2 years and 95–115 g/L for children <2 years, reflecting the lower normal range in that age group	Table 7.17
National Heart Lung and Blood Institute and Kidney Disease Improving Global Outcomes (2013)	Screening children at risk of secondary dyslipidaemias including those with CKD	Table 7.15

For definitions and methods relating to this chapter see appendix A. Caterpillar plots exclude centres with <70% data completeness. Suppression of small numbers to minimise risk of patient re-identification limits in-depth analysis of centre level data.

A patient first seen by renal services within 90 days of starting RRT for ESKD is defined as a 'late presentation'. In this report 'late presentation' is used interchangeably with 'late referral'.

Key findings

- 99 patients aged <16 years started RRT for ESKD in the UK in 2017 compared to 112 patients in 2016
- RRT incidence in patients aged <16 years was 7.9 pmarp
- 966 patients aged <18 years had received RRT for ⩾90 days at UK paediatric renal centres on 31/12/2017, compared to 964 patients in 2016
- RRT prevalence in patients aged <16 years was 64.8 pmarp. 76.3% had a functioning Tx (45.1% living donor and 31.2% deceased donor), 13.1% were receiving HD and 10.6% were receiving PD
- Tubulointerstitial disease accounted for >50% of all primary renal diseases (PRDs) in prevalent paediatric patients, with a high male : female ratio (3.4 : 1)
- Between 2003 and 2017, a third of patients aged <16 years who were referred early received a pre-emptive Tx
- At the time of transfer to adult services, 84.4% of paediatric patients had a functioning kidney Tx
- The median height z-score for children on dialysis was −1.9 compared with −1.1 for those with a functioning Tx
- The median weight z-score for children on dialysis was −1.1 compared with −0.1 for those with a functioning Tx
- The median systolic blood pressure z-score for children on dialysis was 1.0 compared with 0.4 for those with a functioning Tx
- Of those with complete data, 71.4% of the prevalent paediatric RRT population had 1 or more risk factors for cardiovascular disease; 6.0% had 3 risk factors
- 53.3% and 55.6% of prevalent HD patients achieved systolic blood pressure (SBP) and diastolic blood pressure (DBP) values <90th percentile, respectively
- 60.0% and 66.7% of prevalent PD patients achieved SBP and DBP values <90th percentile, respectively
- 82.9% and 76.5% of prevalent Tx patients achieved SBP and DBP values <90th percentile, respectively.

Analyses

Data completeness for prevalent paediatric RRT patients

Data returns of key variables for paediatric Tx and dialysis patients <18 years old at the end of 2017 are shown in tables 7.2 and 7.3, respectively, with further detail available on the UKRR website.

Table 7.2 Data completeness for paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by centre

		Data completeness (%)														
Centre	*N* with Tx	Height at start	Weight at start	BMI	SBP	DBP	Hb	Creat at start	Ferr	ESA	IV iron	Chol	Bicarb	PTH	Ca	Phos
Bham_P	82	95.1	97.6	98.8	98.8	98.8	97.6	97.6	67.1	2.4	1.2	96.3	97.6	24.4	97.6	97.6
Blfst_P	24	79.2	87.5	91.7	91.7	83.3	91.7	91.7	83.3	91.7	91.7	79.2	91.7	83.3	91.7	91.7
Brstl_P	47	93.6	100.0	91.5	97.9	89.4	97.9	100.0	70.2	97.9	95.7	63.8	95.7	74.5	93.6	95.7
Cardf_P	25	96.0	96.0	96.0	100.0	40.0	100.0	96.0	100.0	100.0	0.0	100.0	100.0	96.0	100.0	100.0
Glasg_P	43	93.0	97.7	100.0	100.0	100.0	95.4	97.7	60.5	100.0	100.0	34.9	97.7	95.4	95.4	95.4
L Eve_P	87	70.1	74.7	92.0	93.1	93.1	100.0	75.9	52.9	100.0	100.0	77.0	100.0	100.0	100.0	100.0
L GOSH_P	144	90.3	95.1	97.9	97.9	0.0	99.3	95.1	81.3	97.9	0.7	64.6	99.3	94.4	99.3	99.3
Leeds_P	57	91.2	100.0	96.5	98.3	98.3	100.0	100.0	56.1	100.0	100.0	31.6	100.0	86.0	100.0	100.0
Livpl_P	38	76.3	81.6	97.4	97.4	97.4	100.0	92.1	94.7	97.4	97.4	89.5	100.0	92.1	100.0	100.0
Manch_P	67	95.5	98.5	98.5	100.0	100.0	100.0	98.5	88.1	100.0	100.0	71.6	100.0	100.0	100.0	100.0
Newc_P	28	92.9	92.9	64.3	96.4	0.0	100.0	92.9	85.7	100.0	0.0	67.9	100.0	96.4	100.0	100.0
Nottm_P	73	78.1	94.5	90.4	87.7	84.9	98.6	95.9	93.2	100.0	100.0	90.4	97.3	93.2	95.9	95.9
Soton_P	34	76.5	76.5	97.1	97.1	97.1	100.0	85.3	100.0	100.0	100.0	79.4	100.0	100.0	100.0	100.0
UK	**749**	**86.8**	**92.3**	**94.7**	**96.5**	**71.0**	**98.8**	**93.6**	**76.8**	**88.4**	**62.4**	**72.1**	**98.7**	**85.9**	**98.3**	**98.4**

Bicarb – bicarbonate; BMI – body mass index; Ca – calcium; Chol – cholesterol; Creat – creatinine; DBP – diastolic blood pressure; ESA – erythropoiesis stimulating agent; Ferr – ferritin; Hb – haemoglobin; IV – intravenous; Phos – phosphate; PTH – parathyroid hormone; SBP – systolic blood pressure

Table 7.3 Data completeness for paediatric patients (<18 years old) prevalent to dialysis on 31/12/2017 by centre

		Data completeness (%)													
Centre	*N* on dialysis	Height at start	Weight at start	BMI	SBP	DBP	Hb	Ferr	ESA	IV iron	Chol	Bicarb	PTH	Ca	Phos
Bham_P	35	85.7	94.3	97.1	100.0	88.6	97.1	94.3	0.0	0.0	94.3	97.1	42.9	97.1	97.1
Blfst_P	5	100.0	100.0	80.0	80.0	0.0	80.0	80.0	80.0	80.0	60.0	80.0	80.0	80.0	80.0
Brstl_P	16	50.0	81.3	93.8	100.0	31.3	100.0	87.5	100.0	62.5	68.8	100.0	100.0	100.0	100.0
Cardf_P	6	100.0	100.0	83.3	83.3	16.7	100.0	100.0	100.0	0.0	66.7	100.0	100.0	100.0	100.0
Glasg_P	17	94.1	94.1	100.0	100.0	100.0	100.0	100.0	100.0	100.0	64.7	100.0	100.0	100.0	100.0
L Eve_P	24	83.3	83.3	100.0	100.0	75.0	100.0	100.0	100.0	100.0	62.5	100.0	100.0	100.0	100.0
L GOSH_P	41	70.7	82.9	92.7	100.0	0.0	100.0	90.2	97.6	2.4	63.4	100.0	97.6	100.0	100.0
Leeds_P	9	88.9	88.9	77.8	88.9	88.9	100.0	100.0	100.0	100.0	88.9	100.0	100.0	100.0	100.0
Livpl_P	13	92.3	100.0	92.3	84.6	69.2	100.0	100.0	84.6	84.6	69.2	100.0	92.3	100.0	100.0
Manch_P	23	100.0	100.0	100.0	100.0	30.4	100.0	100.0	100.0	100.0	73.9	100.0	100.0	100.0	100.0
Newc_P	10	20.0	30.0	70.0	100.0	0.0	90.0	90.0	100.0	0.0	70.0	90.0	90.0	90.0	90.0
Nottm_P	18	66.7	88.9	88.9	66.7	50.0	100.0	100.0	100.0	100.0	88.9	100.0	100.0	100.0	100.0
Soton_P	0														
UK	**217**	**78.8**	**87.6**	**93.1**	**94.9**	**48.4**	**98.6**	**95.4**	**82.0**	**53.9**	**73.7**	**98.6**	**88.9**	**98.6**	**98.6**

Bicarb – bicarbonate; BMI – body mass index; Ca – calcium; Chol – cholesterol; DBP – diastolic blood pressure; ESA – erythropoiesis stimulating agent; Ferr – ferritin; Hb – haemoglobin; IV – intravenous; Phos – phosphate; PTH – parathyroid hormone; SBP – systolic blood pressure

Changes to the incident paediatric RRT population

The number of incident patients on RRT <16 years old was calculated as an estimated age-related rate per million population (calculated as detailed in appendix A) and grouped by age, sex, five year time period, ethnicity, centre and PRD.

Table 7.4 Paediatric patients (<16 years old) incident to RRT in 2017 by age and sex

	All patients		Male		Female	
Age group (yrs)	*N*	pmarp	*N*	pmarp	*N*	pmarp
0–<2	18	11.6	12	15.1	6	7.9
2–<4	13	8.2	11	13.5	2	2.6
4–<8	21	6.3	12	7.1	9	5.6
8–<12	19	6.0	10	6.1	9	5.8
12–<16	28	9.7	22	14.9	6	4.3
<16 yrs	**99**	**7.9**	**67**	**10.5**	**32**	**5.2**

pmarp – per million age-related population

Table 7.5 Paediatric patients (<16 years old) incident to RRT by age and 5 year time period

	2003–2007		2008–2012		2013–2017	
Age group (yrs)	*N*	pmarp	*N*	pmarp	*N*	pmarp
0–<2	85	12.0	98	12.5	111	14.2
2–<4	37	5.5	58	7.5	75	9.1
4–<8	87	6.2	89	6.2	119	7.4
8–<12	112	7.5	125	8.9	133	8.9
12–<16	209	13.4	202	13.4	167	11.8
<16 yrs	**530**	**9.1**	**572**	**9.7**	**605**	**9.9**

pmarp – per million age-related population

Table 7.6 Paediatric patients (<16 years old) incident to RRT by ethnicity* and 5 year time period

	2003–2007		2008–2012		2013–2017	
Ethnicity	*N*	%	*N*	%	*N*	%
White	404	76.7	408	72.2	409	68.5
South Asian	83	15.7	97	17.2	105	17.6
Black	20	3.8	23	4.1	32	5.4
Other	20	3.8	37	6.5	51	8.5
<16 yrs	**527**	**100.0**	**565**	**100.0**	**597**	**100.0**

*3 children in 2003–2007, 7 in 2008–2012 and 8 in 2013–2017 with no ethnicity recorded are excluded from this table

Table 7.7 Paediatric patients (<16 years old) incident to RRT by centre and 5 year time period

	2003–2007		2008–2012		2013–2017	
Centre	*N*	%	*N*	%	*N*	%
Blfst_P	15	2.8	24	4.2	12	2.0
Bham_P	55	10.4	66	11.5	79	13.1
Brstl_P	38	7.2	29	5.1	36	6.0
Cardf_P	25	4.7	16	2.8	19	3.1
Glasg_P	36	6.8	42	7.3	45	7.4
L Eve_P	45	8.5	64	11.2	68	11.2
L GOSH_P	102	19.2	120	21.0	102	16.9
Leeds_P	55	10.4	45	7.9	49	8.1
Livpl_P	27	5.1	19	3.3	32	5.3
Manch_P	44	8.3	48	8.4	64	10.6
Newc_P	26	4.9	21	3.7	31	5.1
Nottm_P	50	9.4	57	10.0	50	8.3
Soton_P	12	2.3	21	3.7	18	3.0
<16 yrs	**530**	**100.0**	**572**	**100.0**	**605**	**100.0**

PRDs are grouped according to the European Renal Association–European Dialysis and Transplant Association (see appendix A).

Table 7.8 Paediatric patients (<16 years old) incident to RRT by primary renal disease (PRD)* and 5 year time period

	2003–2007		2008–2012		2013–2017	
PRD	*N*	%	*N*	%	*N*	%
Tubulointerstitial disease:	262	50.1	294	51.5	296	49.2
– CAKUT	240	45.9	277	48.5	285	47.3
– Non-CAKUT	22	4.2	17	3.0	11	1.8
Glomerular disease	114	21.8	106	18.6	109	18.1
Familial/hereditary nephropathies	81	15.5	93	16.3	98	16.3
Systemic diseases affecting the kidney	17	3.3	34	6.0	19	3.2
Miscellaneous renal disorders	49	9.4	44	7.7	80	13.3

*7 children in 2003–2007, 1 in 2008–2012 and 3 in 2013–2017 with no PRD recorded are excluded from this table
CAKUT – congenital anomalies of the kidneys and urinary tract

Start modality of incident paediatric RRT patients

Start modality used by patients <16 years old starting RRT between 2003 and 2017 was grouped by five year time period.

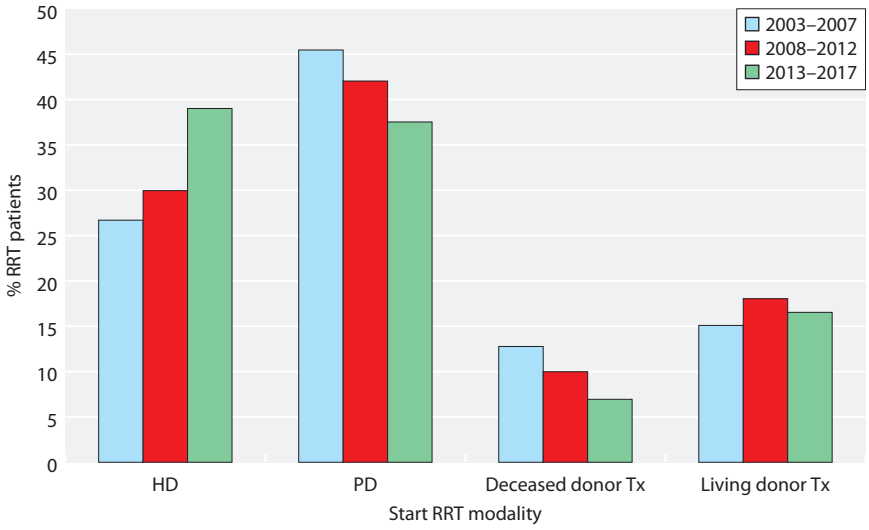


Figure 7.2 Start RRT modality for paediatric patients (<16 years old) incident to RRT by 5 year time period

Pre-emptive transplantation in incident paediatric RRT patients

The analysis of pre-emptive transplantation excluded patients presenting aged <3 months and patients presenting late (i.e. first seen by a nephrologist within 90 days of RRT start).

Table 7.9 Pre-emptive transplantation in the incident paediatric RRT population aged 3 months to 16 years by 5 year time period, sex, ethnicity, age at start of RRT and primary renal disease (PRD)

	N on RRT	*N* (%) with pre-emptive Tx
Total cohort analysed (2003–2017)	1,241	420 (33.8)
Time period		
2003–2007	386	136 (35.2)
2008–2012	404	151 (37.4)
2013–2017	451	133 (29.5)
Sex		
Male	793	290 (36.6)
Female	448	130 (29.0)
Ethnicity		
White	886	335 (37.8)
South Asian	212	49 (23.1)
Black	54	6 (11.1)
Other	74	23 (31.1)
Age at start of RRT (yrs)		
3 mths–<2	137	6 (4.4)
2–<4	148	42 (28.4)
4–<8	236	101 (42.8)
8–<12	284	105 (37.0)
12–<16	436	166 (38.1)
PRD		
Tubulointerstitial disease	679	295 (43.4)
Glomerular disease	233	17 (7.3)
Familial/hereditary nephropathies	190	65 (34.2)
Miscellaneous renal disorders	93	26 (28.0)
Systemic diseases affecting the kidney	38	15 (39.5)

97 patients were excluded because aged <3 months; 369 patients were excluded because late presenters

Demographics of prevalent paediatric RRT patients

The number of prevalent patients on RRT <16 years old was calculated as an estimated age-related rate per million population (calculated as detailed in appendix A) and grouped by age, sex and ethnicity.

Table 7.10 Age and sex breakdown of paediatric patients (<16 years old) prevalent to RRT on 31/12/2017

	All patients		Male		Female		M : F
Age group (yrs)	*N*	pmarp	*N*	pmarp	*N*	pmarp	ratio
0–<2	26	16.7	17	21.3	9	11.9	1.8
2–<4	50	31.5	36	44.2	14	18.1	2.4
4–<8	173	52.2	124	73.2	49	30.3	2.4
8–<12	245	77.1	140	86.0	105	67.8	1.3
12–<16	316	109.9	205	139.2	111	79.2	1.8
<16 yrs	**810**	**64.8**	**522**	**81.5**	**288**	**47.2**	**1.7**

pmarp – per million age related population

Table 7.11 Age and ethnicity* breakdown of paediatric patients (<16 years old) prevalent to RRT on 31/12/2017

	N			
Age group (yrs)	White	South Asian	Black	Other
0–<4	52	8	4	9
4–<8	125	26	4	16
8–<12	160	49	13	21
12–<16	218	62	19	17
<16 yrs	**555**	**145**	**40**	**63**
pmarp <16 yrs	**55.0**	**135.4**	**73.2**	**78.9**

The 2011 Office for National Statistics census was used to estimate the proportion of White, South Asian, Black and Other ethnicity which was then applied to the population estimate for 2017
*7 children with no ethnicity recorded are excluded from this table
pmarp – per million age related population

Treatment modality in prevalent paediatric RRT patients

RRT modality for prevalent paediatric RRT patients is shown separately for those aged <18 years and <16 years. Also shown is the modality used at the start of RRT for prevalent RRT patients aged <16 years.

Table 7.12 RRT modality used by paediatric patients (<18 years old) prevalent to RRT on 31/12/2017 by age group

		HD		PD		Living donor Tx		Deceased donor Tx	
Age group (yrs)	Total *N*	*N*	%	*N*	%	*N*	%	*N*	%
0–<2	26	9	34.6	17	65.4	0	0.0	0	0.0
2–<4	50	15	30.0	20	40.0	11	22.0	4	8.0
4–<8	173	26	15.0	20	11.6	83	48.0	44	25.4
8–<12	245	20	8.2	12	4.9	133	54.3	80	32.7
12–<16	316	36	11.4	17	5.4	138	43.7	125	39.6
16–<18	156	14	9.0	11	7.1	62	39.7	69	44.2
<16 yrs	**810**	**106**	**13.1**	**86**	**10.6**	**365**	**45.1**	**253**	**31.2**
<18 yrs	**966**	**120**	**12.4**	**97**	**10.0**	**427**	**44.2**	**322**	**33.3**

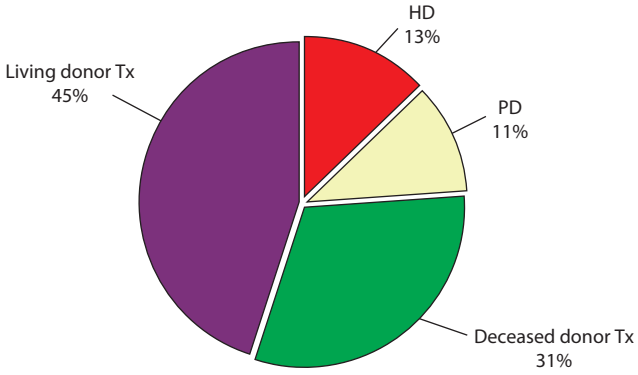


Figure 7.3 RRT modality used by paediatric patients (<16 years old) prevalent to RRT on 31/12/2017

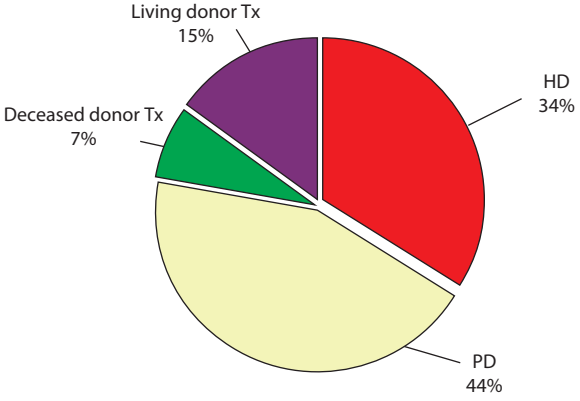


Figure 7.4 RRT modality used at the start of RRT by paediatric patients (<16 years old) prevalent to RRT on 31/12/2017

Causes of ESKD in prevalent paediatric RRT patients

PRDs were grouped into categories as shown in table 7.13, with the mapping of disease codes into groups explained in more detail in appendix A.

Table 7.13 Primary renal diseases (PRDs) of paediatric patients (<16 years old) prevalent to RRT on 31/12/2017 by sex and ethnicity

PRD	*N*	%	*N* male	*N* female	% non-White patients
Tubulointerstitial disease:	435	53.8	335	100	28.9
– CAKUT	425	52.6	329	96	28.6
– Non-CAKUT	10	1.2	6	4	40.0
Glomerular disease	146	18.1	72	74	32.6
Familial/hereditary nephropathies	118	14.6	52	66	43.1
Systemic diseases affecting the kidney	32	4.0	16	16	18.8
Miscellaneous renal disorders	77	9.5	46	31	26.3
Missing	2	0.2	1	1	0.0
Total	**810**	**100.0**	**522**	**288**	**30.9**

CAKUT – congenital anomalies of the kidneys and urinary tract

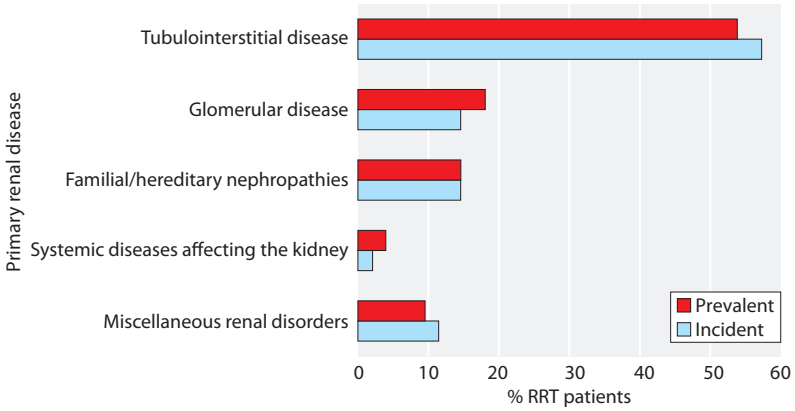


Figure 7.5 Comparison of primary renal diseases for paediatric patients (<16 years old) incident and prevalent to RRT in 2017 with no missing data

Growth of prevalent paediatric RRT patients

The height and weight of children receiving RRT were compared to the age and sex matched general childhood population. The UK median score for each measure is represented by a red dotted line.

Height of paediatric RRT patients

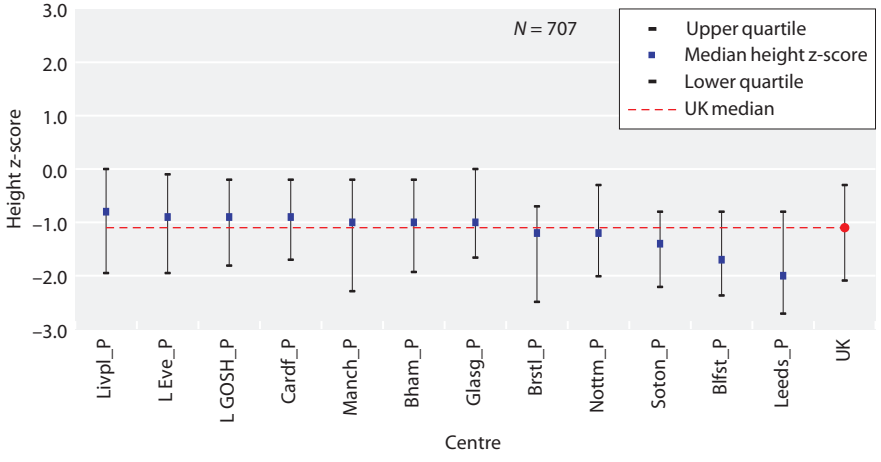


Figure 7.6 Median height z-scores for paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by centre

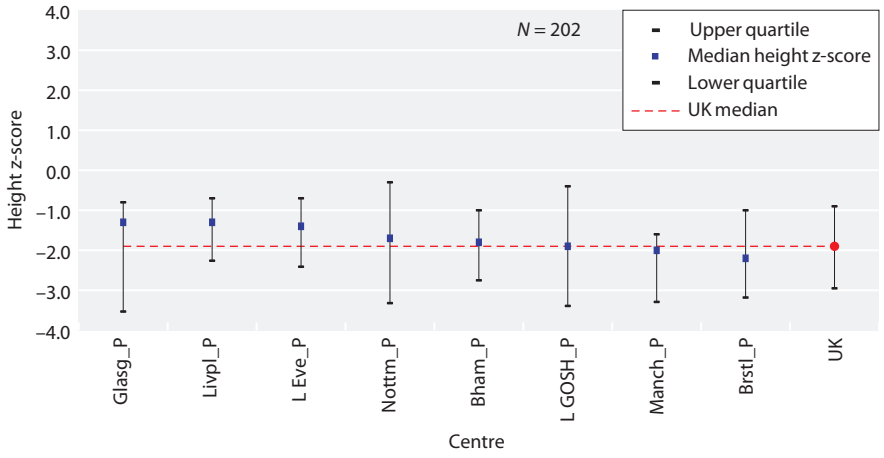


Figure 7.7 Median height z-scores for paediatric patients (<18 years old) prevalent to dialysis on 31/12/2017 by centre

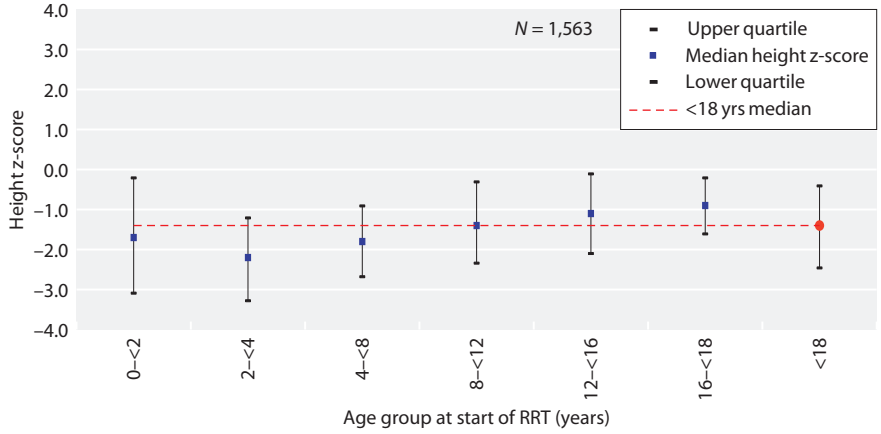


Figure 7.8 Median height z-scores at start of RRT for incident paediatric RRT patients (<18 years old) between 2003 and 2017 by age group at start of RRT

Weight of paediatric RRT patients

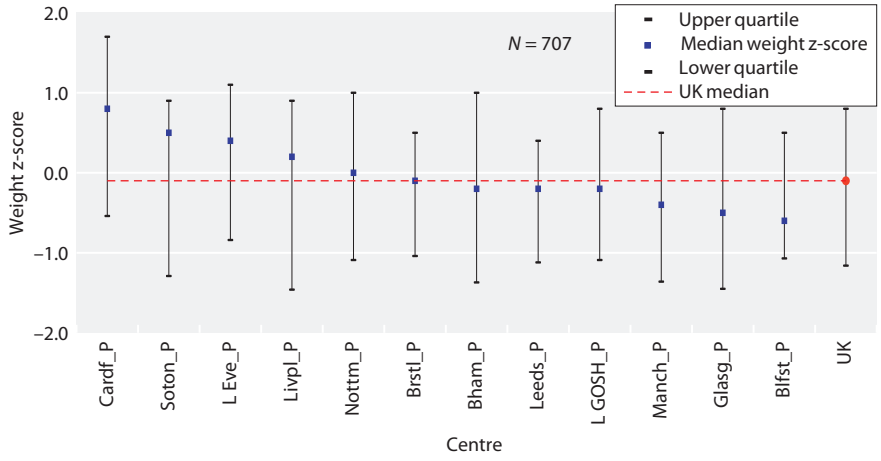


Figure 7.9 Median weight z-scores for paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by centre

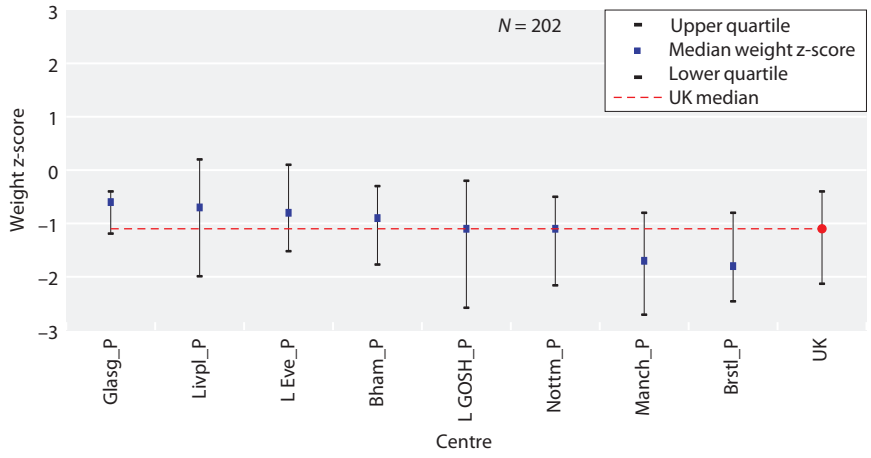


Figure 7.10 Median weight z-scores for paediatric patients (<18 years old) prevalent to dialysis on 31/12/2017 by centre

Cardiovascular risk factor evaluation in prevalent paediatric RRT patients

Obesity in paediatric RRT patients

BMI was calculated using the formula BMI = weight (kg)/height^2 (m). Height and weight were adjusted for age. To account for discrepancies in linear growth secondary to renal disease, BMI was expressed according to height-age, rather than chronological age.

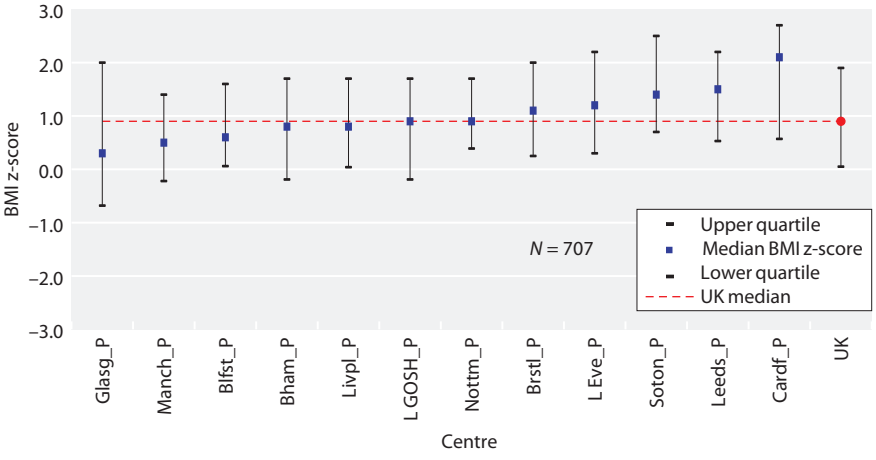


Figure 7.11 Median body mass index (BMI) z-scores for paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by centre

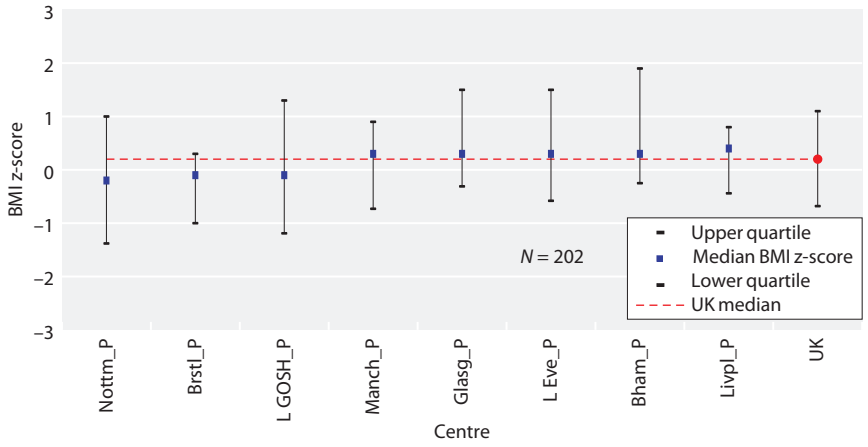


Figure 7.12 Median body mass index (BMI) z-scores for paediatric patients (<18 years old) prevalent to dialysis on 31/12/2017 by centre

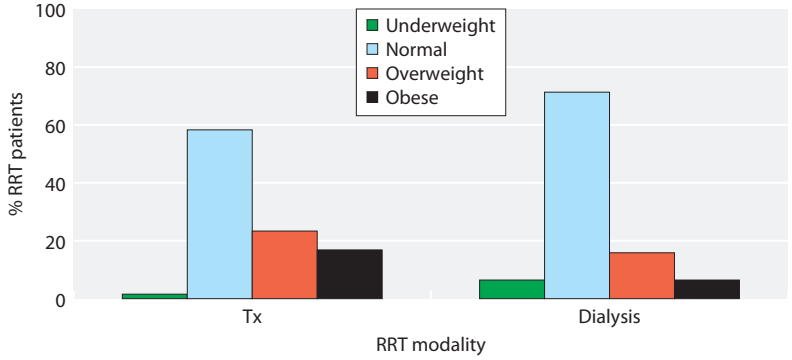


Figure 7.13 Body mass index categorisation of paediatric patients (<18 years old) prevalent to RRT on 31/12/2017 by RRT modality

Hypertension in paediatric RRT patients

In paediatric RRT patients, systolic blood pressure should be maintained at <90th percentile for age, sex and height.

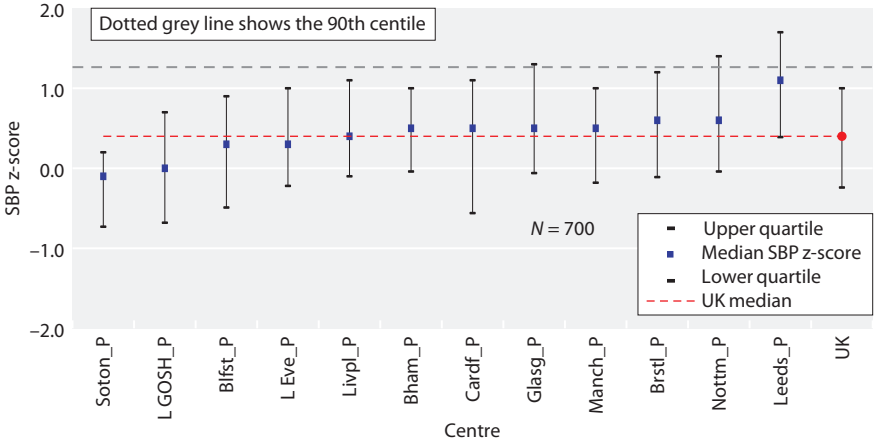


Figure 7.14 Median systolic blood pressure (SBP) z-scores for paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by centre

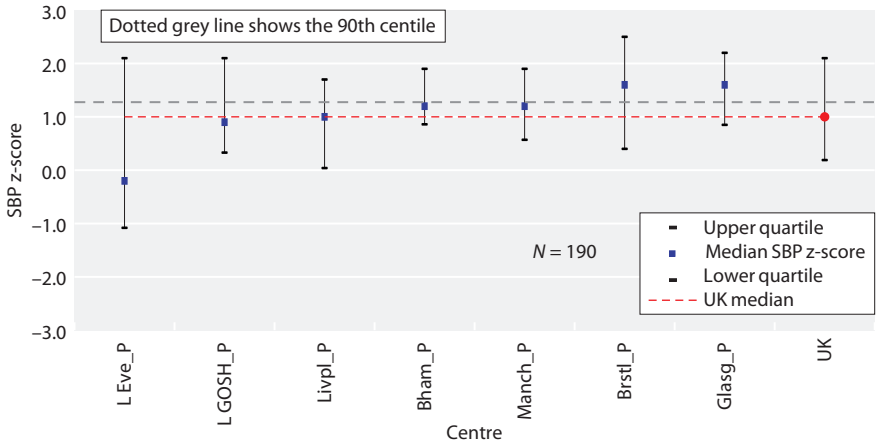


Figure 7.15 Median systolic blood pressure (SBP) z-scores for paediatric patients (<18 years old) prevalent to dialysis on 31/12/2017 by centre

Table 7.14 Percentage of paediatric patients (<18 years old) prevalent to RRT on 31/12/2017 achieving the standards for blood pressure

	SBP		DBP	
	N	% <90th percentile	*N*	% <90th percentile
Total	890	77.2	607	74.1
Age group (yrs)				
0–<5	107	57.0	57	57.9
5–<12	350	76.0	232	77.6
12–<16	295	82.7	216	73.2
16–<18	138	84.1	102	77.5
Sex				
Male	578	79.4	407	73.0
Female	312	73.1	200	76.5
Ethnicity				
White	613	78.6	431	77.3
South Asian	157	72.6	109	64.2
Black	43	76.7	24	66.7
Other	69	79.7	41	73.2
Modality				
HD	105	53.3	45	55.6
PD	85	60.0	51	66.7
Tx	700	82.9	511	76.5

DBP – diastolic blood pressure; SBP – systolic blood pressure

Cardiovascular risk factors in paediatric RRT patients

The analysis of the proportion of prevalent RRT patients with identified cardiovascular risk factors was restricted to the 553 of the 966 patients (57.2%) with data for all three risk factors.

Table 7.15 Frequency of number of cardiovascular risk factors in paediatric patients (<18 years old) prevalent to RRT on 31/12/2017

N cardiovascular risk factors	Hypertensive	Overweight/obese	Hypercholesterolaemic	*N*	%	Total %
0	No	No	No	186	28.6	28.6
1	Yes	No	No	77	11.8	
	No	Yes	No	83	12.8	37.2
	No	No	Yes	82	12.6	
2	Yes	Yes	No	58	8.9	
	Yes	No	Yes	61	9.4	28.2
	No	Yes	Yes	64	9.8	
3	Yes	Yes	Yes	39	6.0	6.0
Total *N*	**235**	**244**	**246**	**650**		
Total %	**36.2**	**37.5**	**37.8**			**100.0**

Biochemistry parameters in prevalent paediatric RRT patients

The median values for eGFR and the proportion with eGFR <30 mL/min/1.73 m^2 for prevalent 2017 paediatric Tx patients are presented.

Table 7.16 Median estimated glomerular filtration rate (eGFR) and percentage with eGFR <30 mL/min/1.73 m^2 in paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by centre

Centre	*N* with Tx	Median eGFR (mL/min/1.73 m^2)	% eGFR <30 mL/min/1.73 m^2	% data completeness
Bham_P	82	56	6.3	97.6
Blfst_P	24	75	4.6	91.7
Brstl_P	47	69	7.1	89.4
Cardf_P	25	82	0.0	96.0
Glasg_P	43	74	0.0	95.3
L Eve_P	87	51	8.8	92.0
L GOSH_P	144	57	9.9	97.9
Leeds_P	57	62	7.3	96.5
Livpl_P	38	71	2.7	97.4
Manch_P	67	63	1.5	98.5
Newc_P	28			64.3
Nottm_P	73	58	13.9	89.0
Soton_P	34	64	3.0	97.1
UK	**749**	**60**	**6.5**	**94.0**

Blank cells – centres with <70% data completeness or <10 patients

Table 7.17 Attainment of targets for haemoglobin, calcium, phosphate, parathyroid hormone and bicarbonate in paediatric patients (<18 years old) (a) prevalent to dialysis on 31/12/2017 by centre and (b) prevalent to Tx on 31/12/2017 with eGFR <30 mL/min/1.73 m^2 in the UK

Centre	*N*	% Hb below target	% Hb within target	% Ca below target	% Ca within target	% phos below target	% phos within target	% PTH within target	% bicarb below target	% bicarb within target
DIALYSIS PATIENTS										
Bham_P	35	23.5	52.9	0.0	58.8	2.9	73.5		0.0	85.3
Blfst_P	5									
Brstl_P	16	31.3	62.5	0.0	87.5	0.0	50.0	43.8	12.5	81.3
Cardf_P	6									
Glasg_P	17	35.3	47.1	5.9	88.2	29.4	58.8	41.2	0.0	70.6
L Eve_P	24	54.2	25.0	4.2	91.7	12.5	54.2	20.8	37.5	62.5
L GOSH_P	41	24.4	34.2	17.1	70.7	14.6	41.5	30.0	9.8	78.1
Leeds_P	9									
Livpl_P	13	30.8	53.9	0.0	76.9	38.5	38.5	41.7	0.0	92.3
Manch_P	23	34.8	43.5	13.0	73.9	17.4	39.1	39.1	4.4	73.9
Newc_P	10	44.4	33.3	0.0	66.7	55.6	33.3	77.8	0.0	77.8
Nottm_P	18	27.8	61.1	0.0	83.3	5.6	44.4	44.4	0.0	66.7
Soton_P	0									
UK	**217**	**32.2**	**43.9**	**5.6**	**75.2**	**15.0**	**49.1**	**36.3**	**8.4**	**75.2**
TX PATIENTS with eGFR <30 mL/min/1.73 m²										
UK	**46**	**30.4**	**47.8**	**2.2**	**95.7**	**8.9**	**77.8**	**70.6**	**26.1**	**73.9**

See appendix A for biochemical target ranges
Blank cells – centres with <10 patients or <70% data completeness
Bicarb – bicarbonate; Ca – calcium; Hb – haemoglobin; Phos – phosphate; PTH – parathyroid hormone

Table 7.18 Median estimated glomerular filtration rate (eGFR) in paediatric patients (<18 years old) prevalent to Tx on 31/12/2017 by time since transplantation and age group

	Age group (years)							
	0–<5		5–<12		12–<16		16–<18	
Time since transplantation	*N*	Median eGFR (mL/min/ 1.73 m^2)	*N*	Median eGFR (mL/min/ 1.73 m^2)	*N*	Median eGFR (mL/min/ 1.73 m^2)	*N*	Median eGFR (mL/min/ 1.73 m^2)
3 mths	13	98	24	63	20	63	9	48
1 yr	12	84	34	69	26	63	7	53
3 yrs	8	66	99	65	51	59	28	54
5 yrs	0		98	61	60	59	21	54
⩾7 yrs	0		46	56	92	57	55	51
Overall median	**33**	**85**	**301**	**64**	**249**	**58**	**120**	**52**
IQR		**62–105**		**51–78**		**46–73**		**39–66**

IQR – interquartile range

The proportion of patients with haemoglobin above target range on ESA is shown by renal centre.

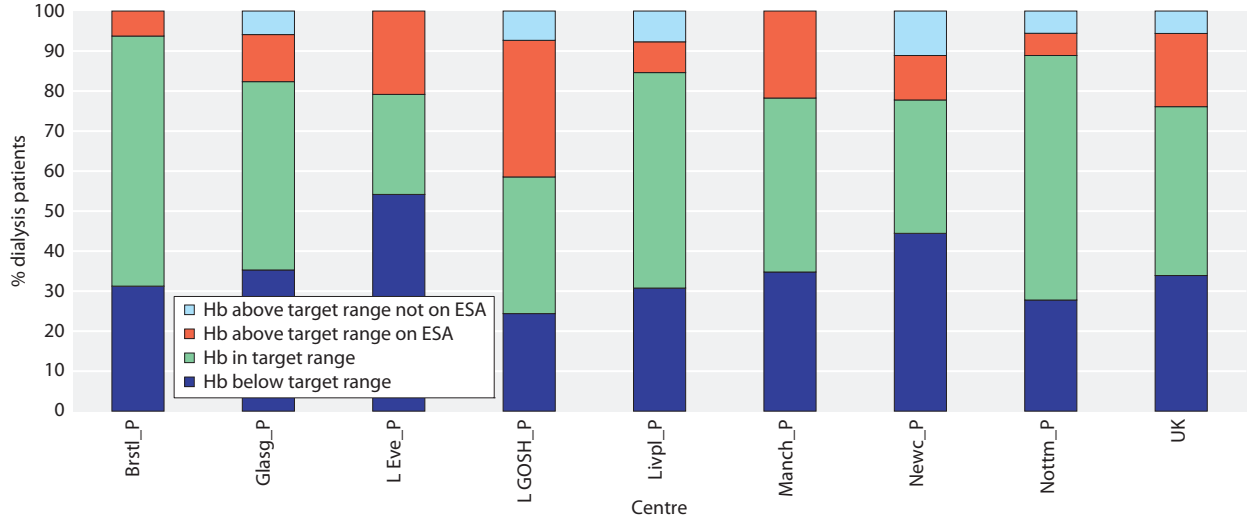


Figure 7.16 Proportion of paediatric patients (<16 years old) prevalent to dialysis on 31/12/2017 with haemoglobin below, within and above target by centre; for those above target the proportion on erythropoiesis stimulating agent (ESA) therapy is shown

Hb – haemoglobin

Transfer to adult renal services for prevalent paediatric RRT patients

Ninety-six paediatric patients transitioned to adult renal centres in 2017. The median age of patients at transfer was 17.9 years with an IQR of 17.3–18.1 years. Overall, the demographics of this population reflected those of the prevalent paediatric RRT population, but with a higher proportion having a functioning Tx (84.4% versus 77.5%).

Survival in paediatric RRT patients

Of patients <16 years of age, 1,575 started RRT between 2003 and 2016 at paediatric renal centres and were included in survival analyses, to allow at least one year follow-up. At the end of the year (31/12/2017) 84 deaths had been reported in children aged <16 years. Patients included in the analysis must have been alive on RRT for 90 days. The median follow-up time (beyond day 90) was 3.4 years (range three days to 14.5 years).

Table 7.19 Survival of incident paediatric RRT patients (<16 years old) at 1 year intervals of RRT by age at start of RRT

	Age group (yrs)				
Survival	0–<2	2–<4	4–<8	8–<12	12–<16
Survival at 1 year after 90 days	92.7	98.1	98.9	99.7	99.0
95% CI	88.9–95.2	94.1–99.4	96.6–99.6	98–100	97.3–99.6
Survival at 2 years after 90 days	91.5	96.0	96.2	99.1	97.5
95% CI	87.6–94.3	91.3–98.2	93–97.9	97.3–99.7	94.9–98.8
Survival at 3 years after 90 days	88.5	95.2	95.8	98.4	97.5
95% CI	84–91.9	90.1–97.7	92.5–97.6	96.2–99.3	94.9–98.8
Survival at 4 years after 90 days	87.6	94.3	95.8	97.7	
95% CI	82.9–91.1	88.8–97.1	92.5–97.6	95.2–98.9	
Survival at 5 years after 90 days	86.0	93.2	94.6	97.2	
95% CI	80.9–89.8	87.3–96.5	90.8–96.9	94.4–98.6	

CI – confidence interval

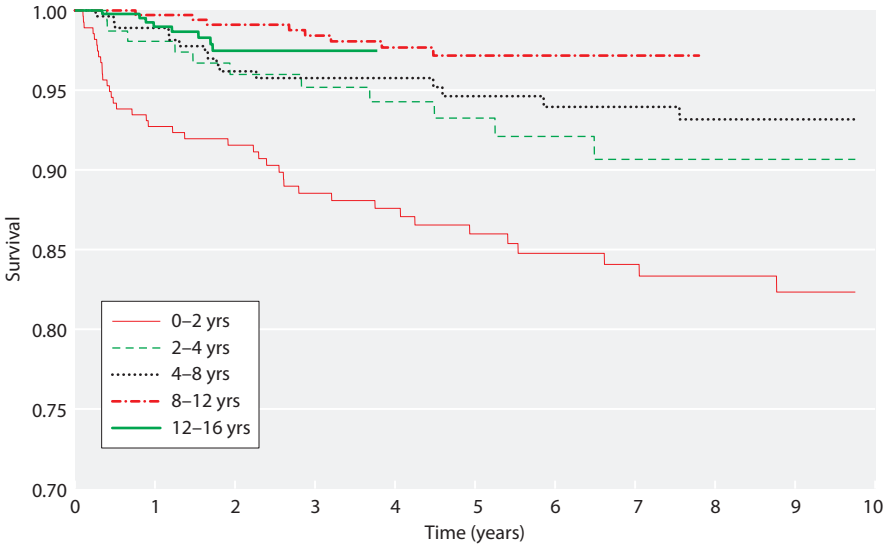


Figure 7.17 Unadjusted Kaplan-Meier survival (from day 90) of incident paediatric RRT patients (<16 years old) between 2003 and 2016 by age group at start of RRT

Abbreviations

UK renal centre abbreviations and other shortened forms used in the 21st Annual Report

Contents

UK renal centre abbreviations 185
Adult renal centres 185
Paediatric renal centres 186
Other shortened forms 187

UK renal centre abbreviations

Adult renal centres

Abbreviation	City	Hospital
		ENGLAND
Basldn	Basildon	Basildon Hospital
B Heart	Birmingham	Heartlands Hospital
B QEH	Birmingham	Queen Elizabeth Hospital
Bradfd	Bradford	St Luke's Hospital
Brightn	Brighton	Royal Sussex County Hospital
Bristol	Bristol	Southmead Hospital
Camb	Cambridge	Addenbrooke's Hospital
Carlis	Carlisle	Cumberland Infirmary
Carsh	Carshalton	St Helier Hospital
Chelms	Chelmsford	Broomfield Hospital
Colchr	Colchester	Colchester General Hospital
Covnt	Coventry	University Hospital Coventry and Warwick
Derby	Derby	Royal Derby Hospital
Donc	Doncaster	Doncaster Royal Infirmary
Dorset	Dorset	Dorset County Hospital
Dudley	Dudley	Russells Hall Hospital
Exeter	Exeter	Royal Devon and Exeter Hospital
Glouc	Gloucester	Gloucestershire Royal Hospital
Hull	Hull	Hull Royal Infirmary
Ipswi	Ipswich	Ipswich Hospital
Kent	Kent	Kent and Canterbury Hospital
Leeds	Leeds	St James's University Hospital and Leeds General Infirmary
Leic	Leicester	Leicester General Hospital
Liv Ain	Liverpool	Aintree University Hospital
Liv Roy	Liverpool	Royal Liverpool University Hospital
L Barts	London	St. Bartholomew's Hospital and The Royal London Hospital
L St. G	London	St George's Hospital and Queen Mary's Hospital
L Guys	London	Guy's Hospital and St Thomas' Hospital
L West	London	Hammersmith, Charing Cross and St Mary's Hospitals
L Kings	London	King's College Hospital
L Rfree	London	Royal Free, Middlesex and UCL Hospitals
M RI	Manchester	Manchester Royal Infirmary
Middlbr	Middlesbrough	The James Cook University Hospital
Newc	Newcastle	Freeman Hospital and Royal Victoria Infirmary
Norwch	Norwich	Norfolk and Norwich University Hospital
Nottm	Nottingham	Nottingham City Hospital
Oxford	Oxford	Oxford Radcliffe Hospital
Plymth	Plymouth	Derriford Hospital
Ports	Portsmouth	Queen Alexandra Hospital
Prestn	Preston	Royal Preston Hospital
Redng	Reading	Royal Berkshire Hospital
Salford	Salford	Salford Royal Hospital
Sheff	Sheffield	Northern General Hospital
Shrew	Shrewsbury	Royal Shrewsbury Hospital
Sthend	Southend	Southend Hospital
Stevng	Stevenage	Lister Hospital
Stoke	Stoke	University Hospital of North Staffordshire
Sund	Sunderland	Sunderland Royal Hospital
Truro	Truro	Royal Cornwall Hospital
Wirral	Wirral	Arrowe Park Hospital
Wolve	Wolverhampton	New Cross Hospital
York	York	York District General Hospital

Abbreviation	City	Hospital
		NORTHERN IRELAND
Antrim	Antrim	Antrim Hospital (Northern Trust)
Belfast	Belfast	Belfast City Hospital
West NI	Londonderry and Omagh	Tyrone County Hospital (Western Trust)
Newry	Newry	Daisy Hill Hospital (Southern Trust)
Ulster	Ulster, Belfast	Ulster Hospital
		SCOTLAND
Abrdn	Aberdeen	Aberdeen Royal Infirmary
Airdrie	Airdrie	Monklands Hospital
D&Gall	Dumfries	Dumfries and Galloway Royal Infirmary
Dundee	Dundee	Ninewells Hospital
Edinb	Edinburgh	Royal Infirmary of Edinburgh
Glasgw	Glasgow	Queen Elizabeth University, Glasgow Royal Infirmary and Stobhill Hospitals
Inverns	Inverness	Raigmore Hospital
Klmarnk	Kilmarnock	University Hospital Crosshouse
Krkcldy	Kirkcaldy	Victoria Hospital
		WALES
Bangor	Bangor	Ysbyty Gwynedd
Cardff	Cardiff	University Hospital of Wales
Clwyd	Clwyd	Ysbyty Glan Clwyd Hospital
Swanse	Swansea	Morriston Hospital
Wrexm	Wrexham	Wrexham Maelor Hospital

Paediatric renal centres

Abbreviation	City	Hospital
		ENGLAND
Bham_P	Birmingham	Birmingham Children's Hospital
Brstl_P	Bristol	Bristol Royal Hospital for Children
Leeds_P	Leeds	Leeds Children's Hospital
Livpl_P	Liverpool	Alder Hey Children's Hospital
L Eve_P	London	Evelina London Children's Hospital
L GOSH_P	London	Great Ormond Street Hospital for Children
Manch_P	Manchester	Royal Manchester Children's Hospital
Newc_P	Newcastle	Great North Children's Hospital
Nottm_P	Nottingham	Nottingham Children's Hospital
Soton_P	Southampton	Southampton Children's Hospital
		NORTHERN IRELAND
Blfst_P	Belfast	Royal Belfast Hospital for Sick Children
		SCOTLAND
Glasg_P	Glasgow	Royal Hospital for Children Glasgow
		WALES
Cardf_P	Cardiff	Children's Kidney Centre University Hospital Wales

Other shortened forms

AKI	acute kidney injury
APD	automated peritoneal dialysis
AVF	arteriovenous fistula
AVG	arteriovenous graft
Bicarb	bicarbonate
BMI	body mass index
Ca	calcium
CAKUT	congenital abnormalities of the kidneys and urinary tract
CAPD	continuous ambulatory peritoneal dialysis
C. difficile	*Clostridium difficile*
CI	confidence interval
CKD	chronic kidney disease
CVC	central venous catheter
DBD	donor after brain death
DBP	diastolic blood pressure
DCD	donor after circulatory death
E	England
E. coli	*Escherichia coli*
eGFR	estimated glomerular filtration rate
ESA	erythropoiesis stimulating agent
ESKD	end-stage kidney disease
Hb	haemoglobin
HD	haemodialysis
HES	Hospital Episode Statistics
HHD	home haemodialysis
ICHD	in-centre haemodialysis
IQR	interquartile range
K	potassium
LKD	living kidney donor
MRSA	methicillin-resistant *Staphylococcus aureus*
MSSA	methicillin-sensitive *Staphylococcus aureus*
NHSBT	NHS Blood and Transplant
NI	Northern Ireland
NTL	non-tunnelled line
OR	odds ratio
PD	peritoneal dialysis
PEDW	Patient Episode Database for Wales
PHE	Public Health England
pmarp	per million age-related population
pmp	per million population
PRD	primary renal disease
PTH	parathyroid hormone
RRT	renal replacement therapy
SBP	systolic blood pressure

SD	standard deviation
TL	tunnelled line
Tx	transplant
UKRDC	UK Renal Data Collaboration
UKRR	UK Renal Registry
URR	urea reduction ratio
W	Wales

UK Renal Registry 21st Annual Report

Data to 31/12/2017

Prepared by UKRR staff

Management team

Ron Cullen (chief executive officer)

Dr James Medcalf (medical director)

Dr Retha Steenkamp (head of operations)

Dr Fergus Caskey (former medical director)

Biostatisticians

Dr Anna Casula

Winnie Magadi

Esther Wong

Research

Dr Katharine Evans

Dr Barnaby Hole

Dr Lucy Plumb

Dr Rhodri Pyart

Business support

Jennifer Barwell

Sharece Charles

Stephanie Lock

Data managers

Fran Benoy-Deeney

Sarika Dahiya

Sarah Evans

Nathan Harding

Jacqueline Stokes

Jo Wilson

Informatics and operations

Fiona Braddon

Melanie Dillon

Tom Gray

Rapolas Kaselis

Shaun Mannings

George Swinnerton

Dr Tim Whitlock

UK Renal Registry 21st Annual Report

Data to 31/12/2017

The UK Renal Registry

The UKRR was established by The Renal Association in 1995 to collate data centrally from all adult UK renal centres to improve the care of patients with end-stage kidney disease. Although originally limited to patients on renal replacement therapies (RRT) – dialysis treatments and kidney transplant recipients – the UKRR now collects cases of acute kidney injury in primary and secondary care and cases of advanced chronic kidney disease in secondary care not on dialysis. Data on children on RRT have been collated by the UKRR since 2009. The UKRR team manages data collection, analysis and reporting on approximately 8,000 new patients and 65,000 existing patients on RRT each year.
The UKRR has an active and involved patient council. Each year the UKRR publishes an annual report comprising centre comparisons, attainment of The Renal Association audit standards, national averages and long term trends.



© The Renal Association 2019

The UK Renal Registry is part of The Renal Association, a registered charity (company registration 2229663, charity number 800733)