



## *Chapter 1*

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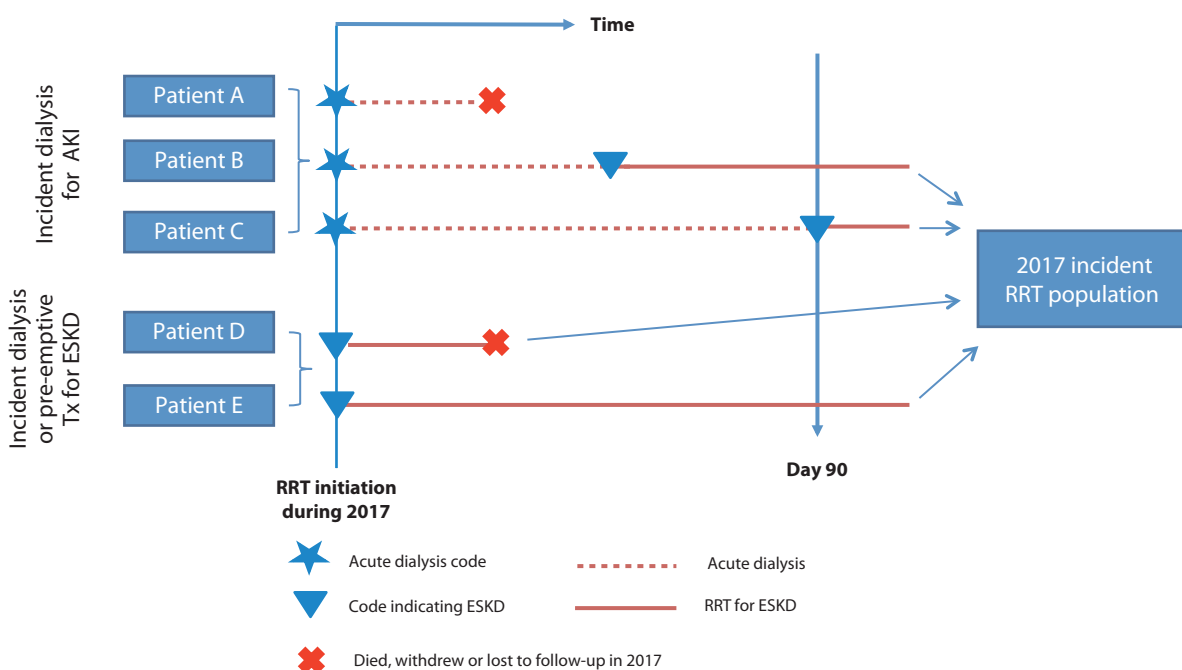
# **Adults starting renal replacement therapy (RRT) for end-stage kidney disease (ESKD) in the UK in 2017**

# 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<sup>2</sup> (HD 7.2 mL/min/1.73 m<sup>2</sup>, PD 7.5 mL/min/1.73 m<sup>2</sup> and pre-emptive Tx 9.9 mL/min/1.73 m<sup>2</sup>)
- 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

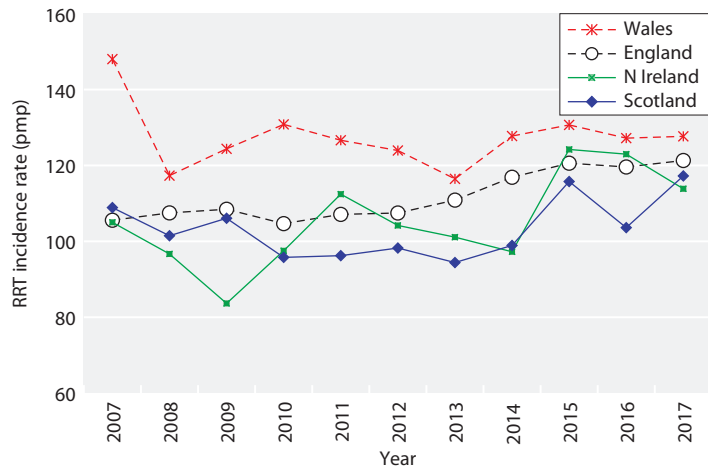
Centre	N on RRT					Estimated catchment population (millions)	2017 crude rate (pmp)
	2013	2014	2015	2016	2017		
<b>ENGLAND</b>							
B Heart	100	100	122	135	126	0.77	163
B QEH	200	248	245	243	259	1.78	146
Basldn	34	46	52	44	46	0.43	106
Bradfd	63	83	91	88	81	0.68	119
Brightn	139	148	143	149	154	1.36	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



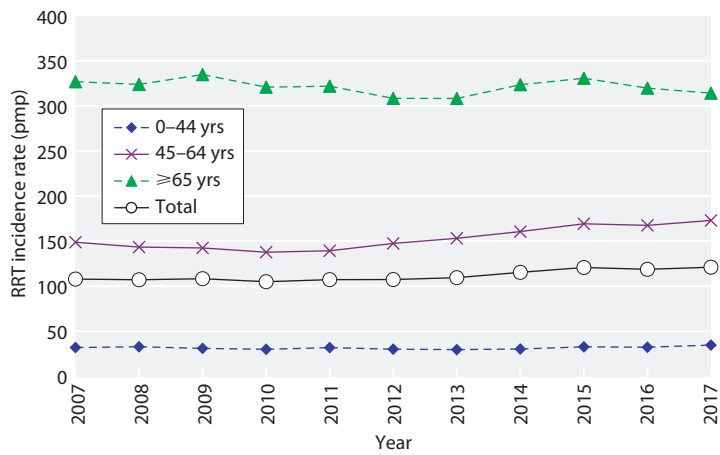
**Table 1.2** Continued

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
<b>N IRELAND</b>							
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
<b>SCOTLAND</b>							
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
Krkldy	38	36	44	32	42	0.32	130
<b>WALES</b>							
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
<b>TOTALS</b>							
<b>England</b>	<b>5,978</b>	<b>6,364</b>	<b>6,619</b>	<b>6,624</b>	<b>6,771</b>	<b>55.62</b>	<b>122</b>
<b>N Ireland</b>	<b>183</b>	<b>179</b>	<b>230</b>	<b>230</b>	<b>213</b>	<b>1.87</b>	<b>114</b>
<b>Scotland</b>	<b>503</b>	<b>530</b>	<b>623</b>	<b>561</b>	<b>635</b>	<b>5.42</b>	<b>117</b>
<b>Wales</b>	<b>356</b>	<b>384</b>	<b>397</b>	<b>382</b>	<b>382</b>	<b>3.13</b>	<b>122</b>
<b>UK</b>	<b>7,020</b>	<b>7,457</b>	<b>7,869</b>	<b>7,797</b>	<b>8,001</b>	<b>66.04</b>	<b>121</b>

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

Centre	N on RRT	% on ICHD	% on PD	% on HHD	% with Tx	Median age (yrs)	% male	Ethnicity				
								% White	% South Asian	% Black	% Other	% missing
<b>ENGLAND</b>												
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
<b>N IRELAND</b>												
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
<b>SCOTLAND</b>												
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
Krkldy	42	88.1	11.9	0.0	0.0	64.3	57.1					97.6
<b>WALES</b>												
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
<b>TOTALS</b>												
<b>England</b>	<b>6,771</b>	<b>71.0</b>	<b>19.9</b>	<b>0.4</b>	<b>8.8</b>	<b>63.8</b>	<b>64.2</b>	<b>74.8</b>	<b>13.0</b>	<b>7.5</b>	<b>4.7</b>	<b>5.4</b>
<b>N Ireland</b>	<b>213</b>	<b>65.7</b>	<b>15.0</b>	<b>0.0</b>	<b>19.3</b>	<b>67.3</b>	<b>64.3</b>	<b>97.9</b>	<b>0.5</b>	<b>0.5</b>	<b>1.0</b>	<b>8.9</b>
<b>Scotland</b>	<b>635</b>	<b>78.7</b>	<b>13.4</b>	<b>0.0</b>	<b>7.9</b>	<b>61.9</b>	<b>59.5</b>					<b>89.3</b>
<b>Wales</b>	<b>382</b>	<b>72.8</b>	<b>22.0</b>	<b>0.3</b>	<b>5.0</b>	<b>66.0</b>	<b>69.1</b>	<b>94.4</b>	<b>2.5</b>	<b>1.4</b>	<b>1.7</b>	<b>7.3</b>
<b>UK</b>	<b>8,001</b>	<b>71.5</b>	<b>19.3</b>	<b>0.4</b>	<b>8.8</b>	<b>63.7</b>	<b>64.1</b>	<b>76.7</b>	<b>12.0</b>	<b>7.0</b>	<b>4.4</b>	<b>12.3</b>

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

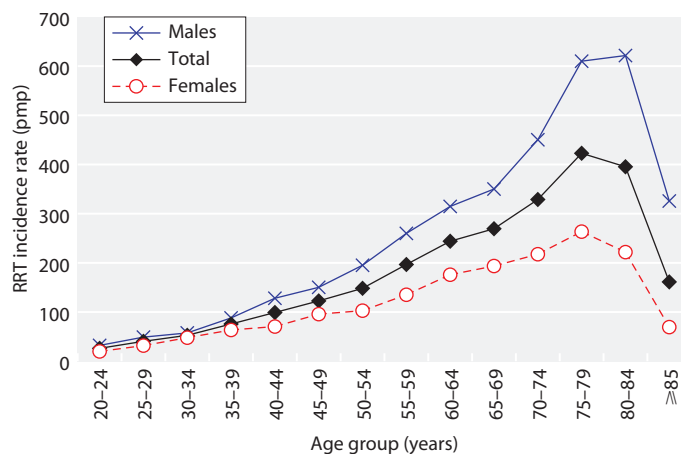
Breakdown by ethnicity not shown for centres with <70% data completeness, but these centres are included in national averages

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)							Total	Median age (yrs)
	18–34	35–44	45–54	55–64	65–74	75–84	≥85		
<b>Total</b>									
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		
<b>Sex (%)</b>									
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
<b>Ethnicity (%)</b>									
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
<b>PRD (%)</b>									
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
<b>Referral time (%)</b>									
<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
<b>Start modality (%)</b>									
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
<b>Day 0 modality</b>				
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
<b>Day 90 modality</b>				
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

Country	N	Patients who started RRT					Patients still on RRT at 90 days		
		% on HD*	% on PD	% with Tx	% discontinued <sup>a</sup>	% 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

<sup>a</sup>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

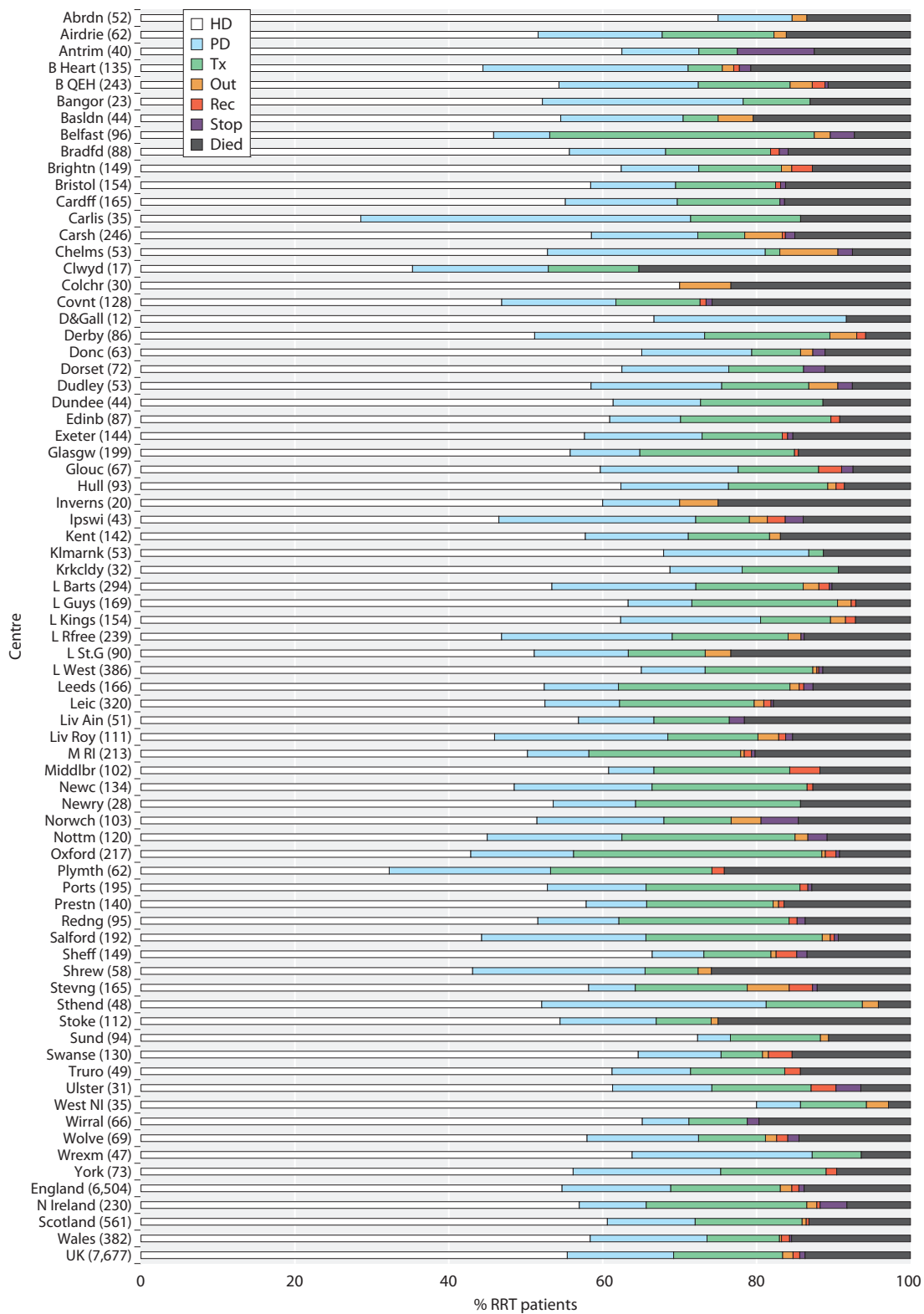
Start modality	N	Later modality	Time after start (%)			
			90 days	1 yr	3 yrs	5 yrs
HD	4,900	HD	89.8	73.0	46.1	28.3
		PD	2.0	3.0	1.4	0.5
		Tx	1.0	4.7	13.1	16.5
		Other*	0.5	1.8	2.2	3.2
		Died	6.7	17.6	37.3	51.4
PD	1,324	HD	6.3	16.1	21.4	16.5
		PD	88.7	62.2	24.2	7.5
		Tx	2.3	14.1	31.3	37.5
		Other	0.5	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)

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
<b>ENGLAND</b>								
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

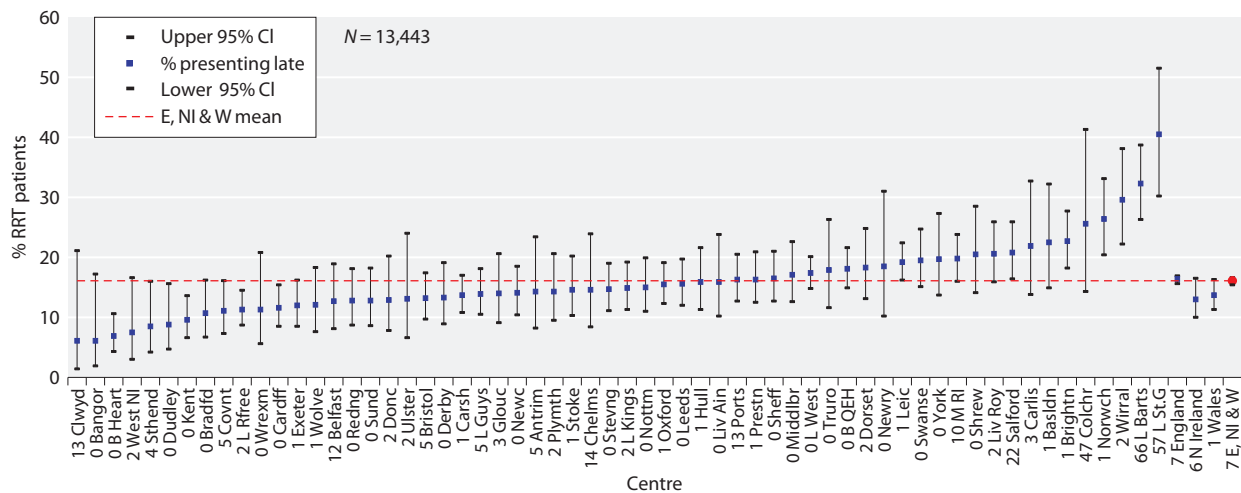
Centre	N on RRT		N with referral data	% data completeness		% presenting <90 days before RRT start		% presenting <1 yr before RRT start
	2016	2017		2016	2017	All PRDs	Non-diabetes	All PRDs
							PRDs	
Salford	192	172	283	72.4	83.7	20.8	22.9	35.7
Sheff	149	160	309	100.0	100.0	16.5	17.1	28.2
Shrew	58	64	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
<b>N IRELAND</b>								
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
<b>WALES</b>								
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
<b>TOTALS</b>								
<b>England</b>	<b>6,504</b>	<b>6,681</b>	<b>12,269</b>	<b>94.6</b>	<b>91.5</b>	<b>16.4</b>	<b>17.9</b>	<b>29.1</b>
<b>N Ireland</b>	<b>230</b>	<b>213</b>	<b>416</b>	<b>95.2</b>	<b>92.5</b>	<b>13.0</b>	<b>13.9</b>	<b>21.9</b>
<b>Wales</b>	<b>382</b>	<b>382</b>	<b>758</b>	<b>99.0</b>	<b>99.5</b>	<b>13.7</b>	<b>17.1</b>	<b>23.9</b>
<b>E, NI &amp; W</b>	<b>7,116</b>	<b>7,276</b>	<b>13,443</b>	<b>94.9</b>	<b>92.0</b>	<b>16.1</b>	<b>17.7</b>	<b>28.6</b>

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)

Characteristic	Referral time	
	<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 <sup>2</sup> )*	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)

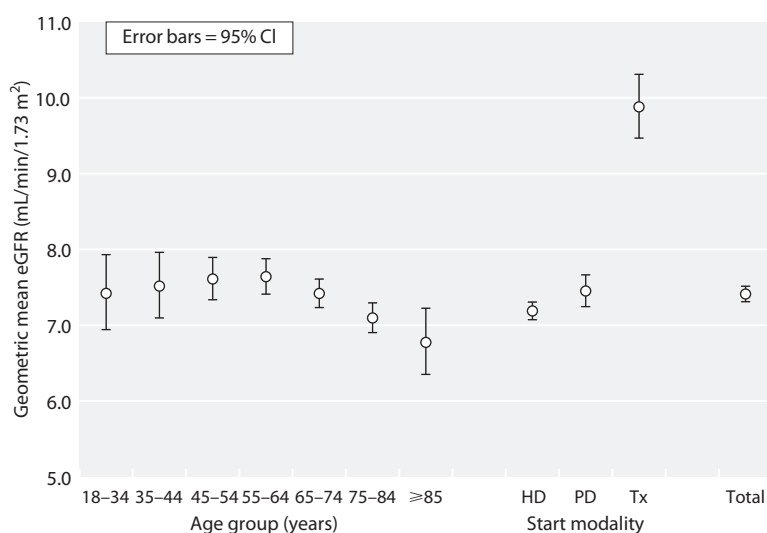
PRD	N with data	Referral time			
		<90 days		≥90 days	
		N	%	N	%
Diabetes	3,491	266	7.6	3,225	92.4
Glomerulonephritis	1,661	193	11.6	1,468	88.4
Hypertension	808	110	13.6	698	86.4
Polycystic kidney	830	22	2.7	808	97.3
Pyelonephritis	761	100	13.1	661	86.9
Renal vascular disease	731	94	12.9	637	87.1
Other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

Referral time	RRT start year (%)						
	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 $\geq 100$ g/L	Tx	PD	HD	$\geq 90$ days	<90 days	
<b>ENGLAND</b>								
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

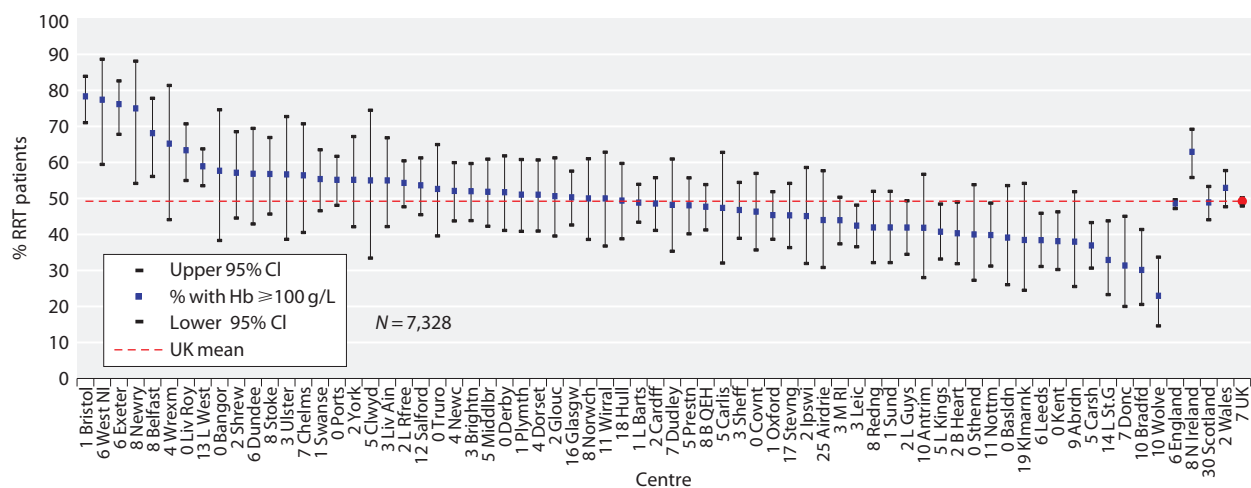
**Table 1.12** Continued

Centre	All RRT patients		Median Hb (g/L) by modality			Median Hb (g/L) by presentation time		% data completeness
	Median Hb (g/L)	% Hb $\geq 100$ g/L	Tx	PD	HD	$\geq 90$ days	<90 days	
<b>N IRELAND</b>								
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
<b>SCOTLAND</b>								
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
Krkldy								35.7
<b>WALES</b>								
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
<b>TOTALS</b>								
<b>England</b>	<b>99</b>	<b>48.6</b>	<b>107</b>	<b>106</b>	<b>96</b>	<b>100</b>	<b>92</b>	<b>94.4</b>
<b>N Ireland</b>	<b>104</b>	<b>62.9</b>	<b>113</b>	<b>119</b>	<b>97</b>	<b>107</b>	<b>101</b>	<b>92.5</b>
<b>Scotland</b>	<b>99</b>	<b>48.9</b>	<b>112</b>	<b>111</b>	<b>97</b>			<b>70.2</b>
<b>Wales</b>	<b>101</b>	<b>52.9</b>	<b>110</b>	<b>111</b>	<b>97</b>	<b>102</b>	<b>97</b>	<b>98.4</b>
<b>UK</b>	<b>99</b>	<b>49.2</b>	<b>107</b>	<b>106</b>	<b>96</b>	<b>100*</b>	<b>92*</b>	<b>92.6</b>

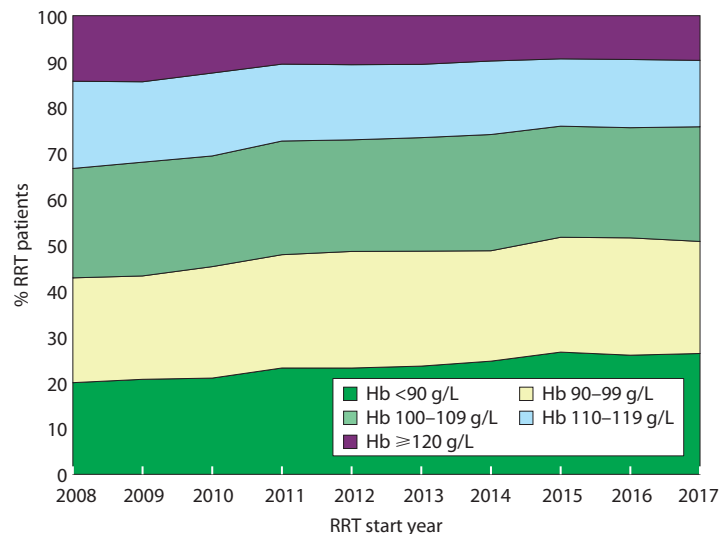
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\*Scotland does not submit referral time data to the UKRR and therefore presentation time for the UK is actually the median for E, NI & W

Hb – haemoglobin



**Figure 1.8** Percentage of adult patients incident to RRT in 2017 with haemoglobin  $\geq 100$  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
<b>ENGLAND</b>				
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				
Carlisle	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

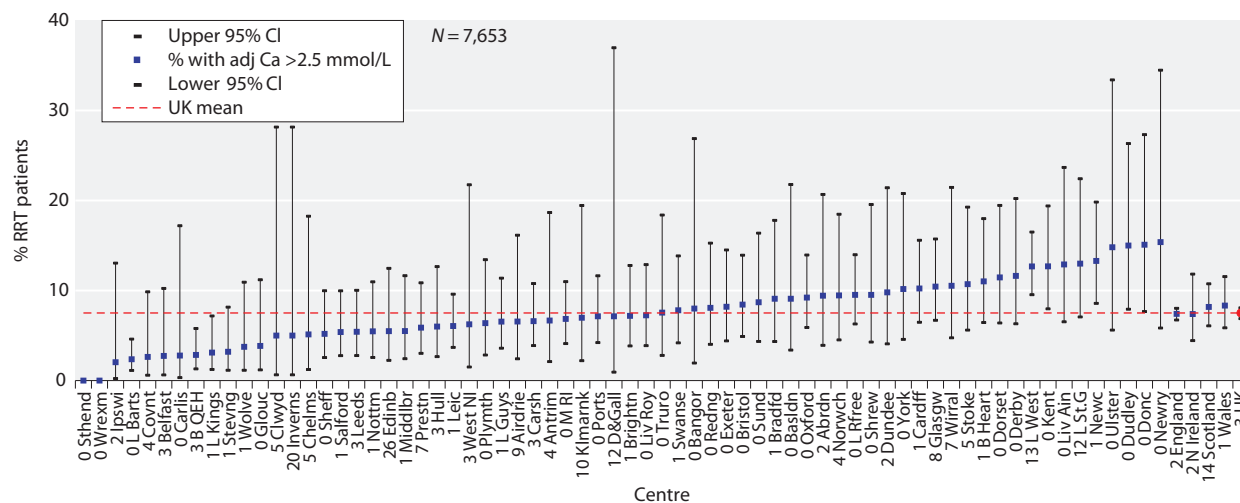
**Table 1.13** Continued

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
<b>N IRELAND</b>				
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
<b>SCOTLAND</b>				
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
Krkldy				54.8
<b>WALES</b>				
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
<b>TOTALS</b>				
<b>England</b>	<b>2.3</b>	<b>80.1</b>	<b>7.6</b>	<b>97.6</b>
<b>N Ireland</b>	<b>2.3</b>	<b>79.8</b>	<b>8.2</b>	<b>97.7</b>
<b>Scotland</b>	<b>2.3</b>	<b>78.4</b>	<b>8.0</b>	<b>86.1</b>
<b>Wales</b>	<b>2.3</b>	<b>81.3</b>	<b>8.2</b>	<b>99.2</b>
<b>UK</b>	<b>2.3</b>	<b>80.1</b>	<b>7.7</b>	<b>96.7</b>

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					Total
		N	AVF/ AVG	TL	NTL	N	Open surgery	Laparo- scopic	Peritoneo-scopi- c/ percutaneous	Missing PD technique	
<b>Total</b>											
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	
<b>Age (%)</b>	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
<b>Body mass index (%)</b>	<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
<b>PRD (%)</b>	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

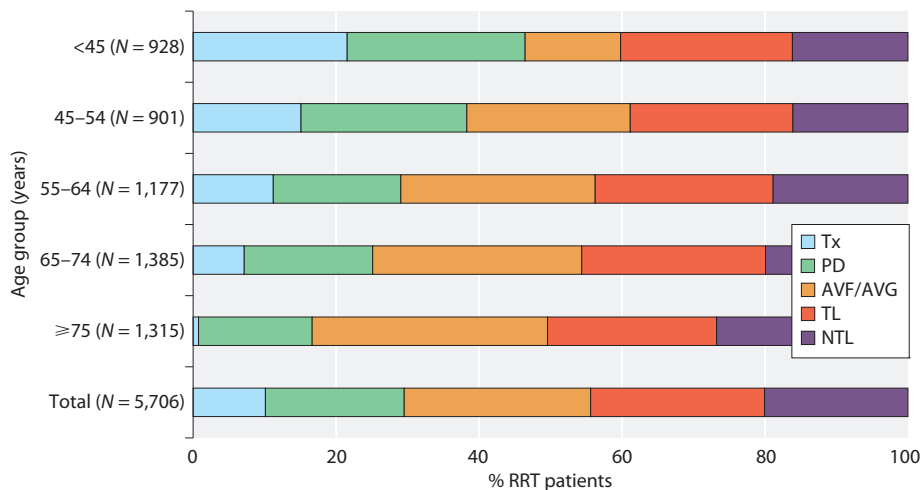
**Table 1.14** Continued

		HD – first dialysis access type				PD – first dialysis access type					Total
		N	AVF/ AVG	TL	NTL	N	Open surgery	Laparo- scopic	Peritoneo-scopi- c/ percutaneous	Missing PD technique	
<b>Referral time (%)</b>	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
	<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
<b>Assessed by surgeon (%)</b>	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
<b>Sex (%)</b>	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
<b>Ethnicity (%)</b>	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
<b>eGFR at start (mL/min/1.73m<sup>2</sup>)</b>	Median	7	7	7	7	8	8	8	8	7	7
	(IQR)	(6,9)	(6,9)	(6,9)	(5,10)	(6,9)	(6,9)	(5,10)	(6,9)	(6,9)	(6,9)
<b>Diabetes* (%)</b>	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

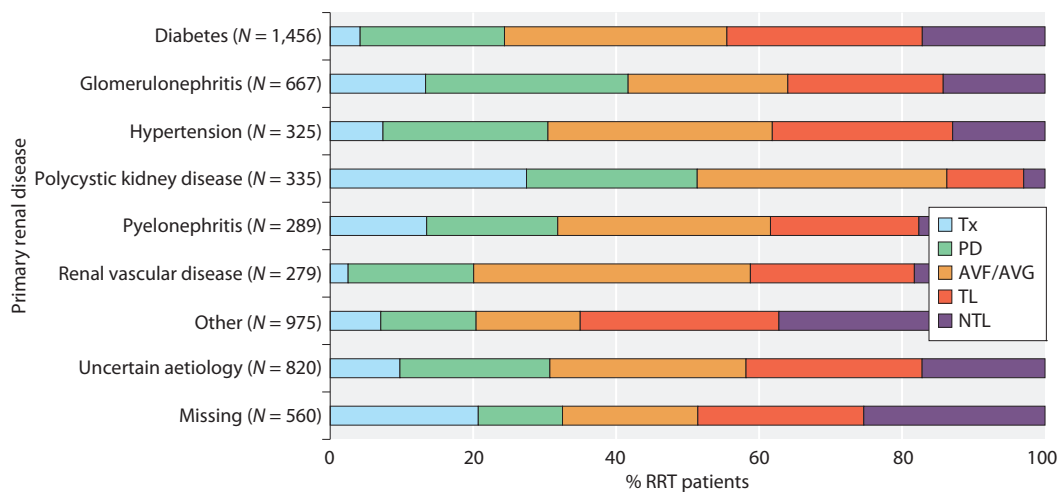
Dialysis access is best interpreted in the context of all patients starting RRT, so data were supplemented with pre-emptive Tx numbers.

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.



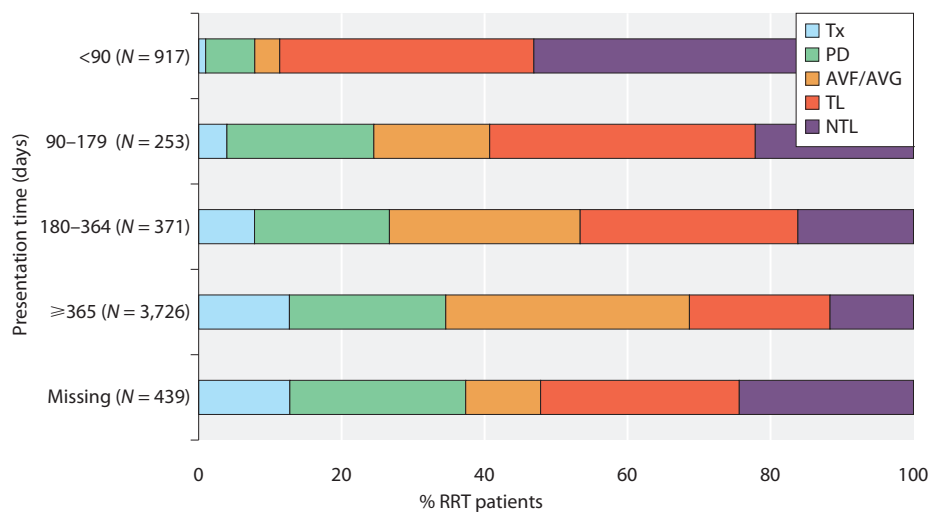
**Figure 1.11** Dialysis access used for adult patients incident to RRT in 2017 by age group (2017 Multisite Dialysis Access Audit)

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

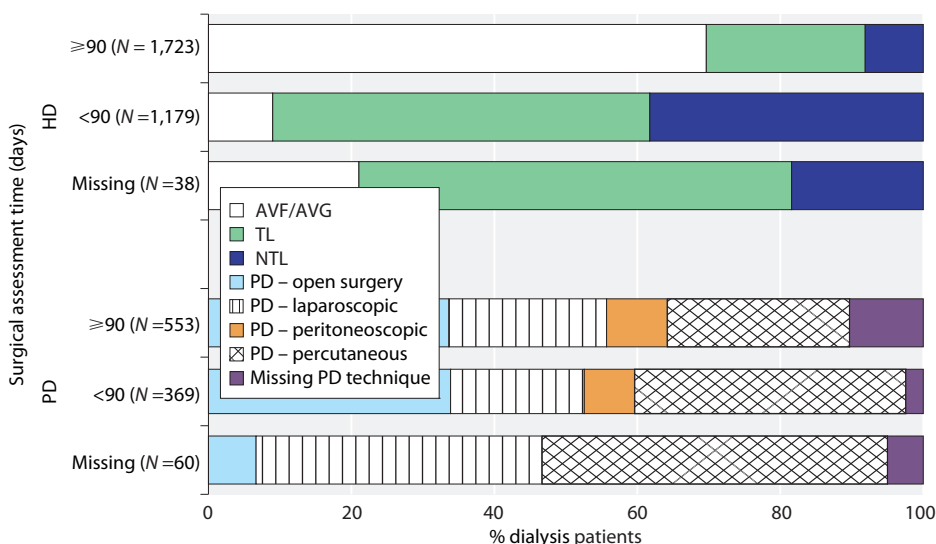


**Figure 1.12** Dialysis access used for adult patients incident to RRT in 2017 by primary renal disease (2017 Multisite Dialysis Access Audit)

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



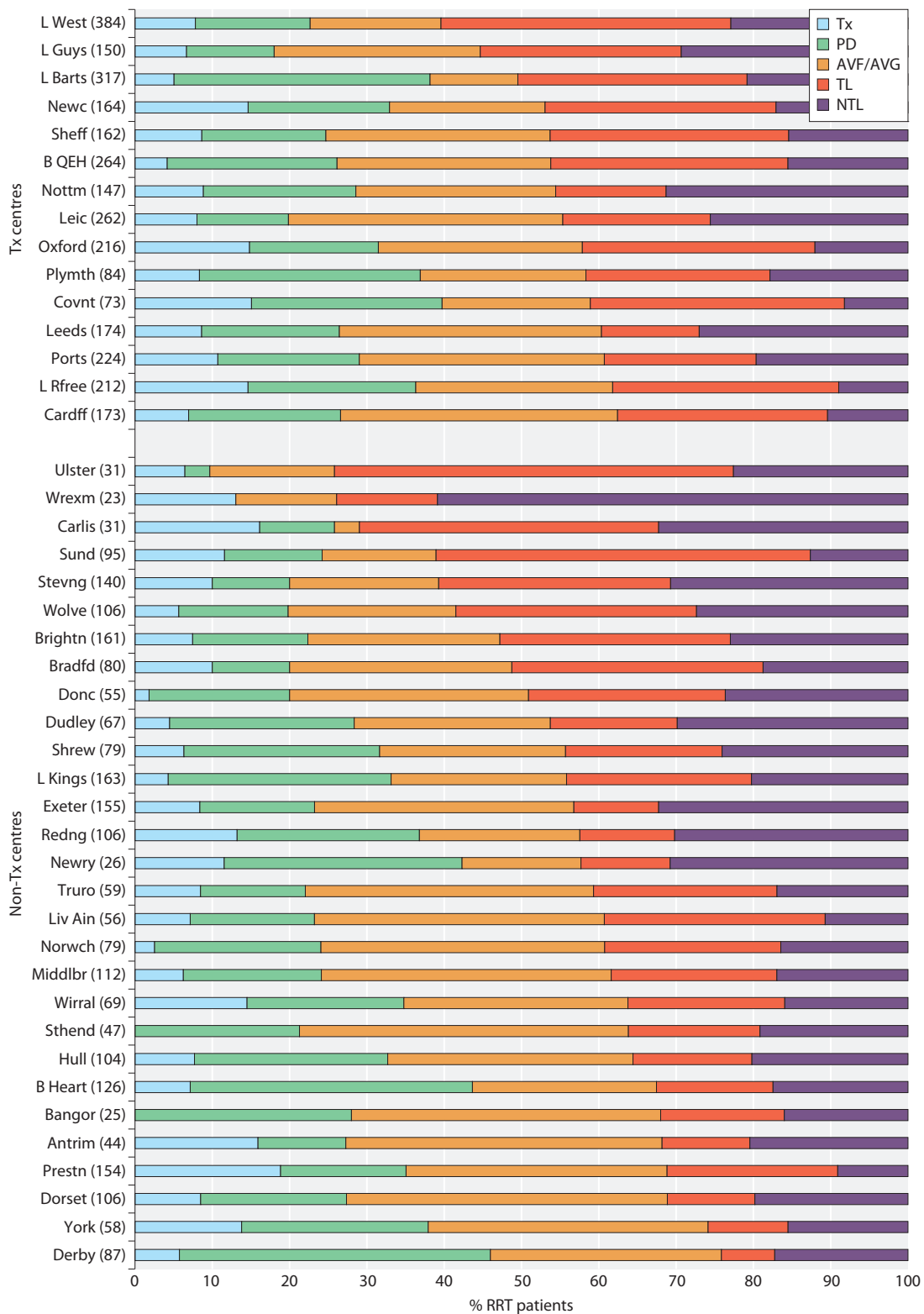
**Figure 1.13** Dialysis access used for adult patients incident to RRT in 2017 by presentation time (2017 Multisite Dialysis Access Audit)  
 AVF – arteriovenous fistula; AVG – arteriovenous graft; NTL – non-tunnelled line; TL – tunnelled line



**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)

Centre	Early presenters ( $\geq 90$ days) (%)					Late presenters ( $< 90$ days) (%)					Early surgical assessment ( $\geq 90$ days) (%)		Start modality (%)		
	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
<b>Total</b>	<b>3,929</b>	<b>24.4</b>	<b>36.7</b>	<b>24.5</b>	<b>14.4</b>	<b>958</b>	<b>6.8</b>	<b>3.5</b>	<b>36.7</b>	<b>53.0</b>	<b>49.7</b>	<b>50.3</b>	<b>71.9</b>	<b>18.8</b>	<b>9.3</b>

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

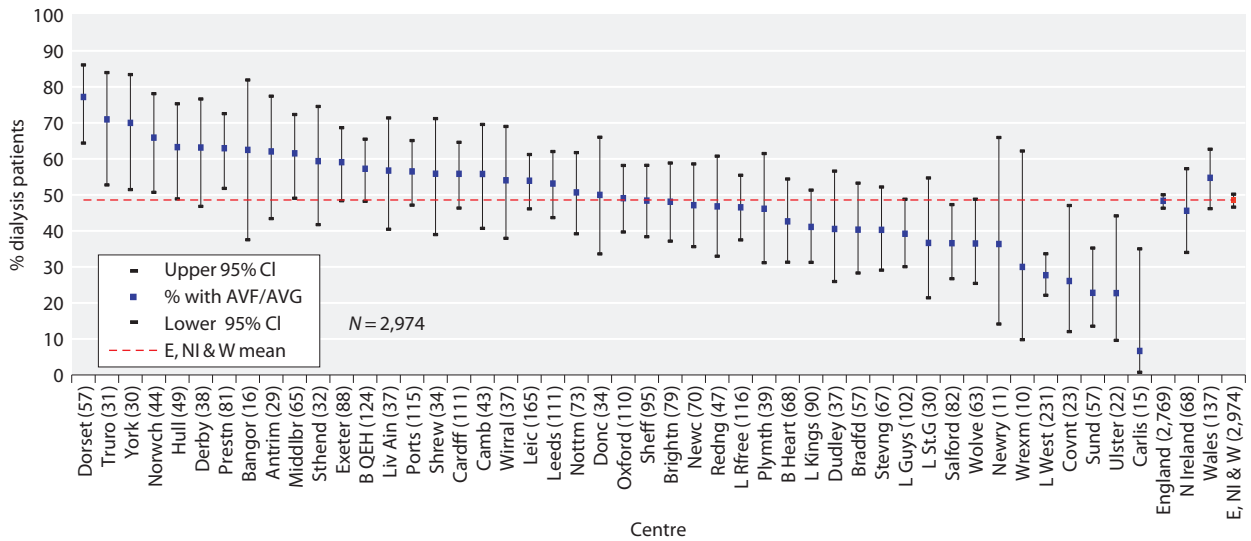
Centres with  $< 70\%$  access data, time of referral or assessment data for the incident RRT population are excluded

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)

Centre	Early presenters (≥90 days) (%)							Late presenters (<90 days) (%)							All patients 3 months after RRT start (%)								
	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	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	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	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	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	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	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	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	2.5	0.0
Carlisle	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	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	2.0	0.0
<b>Total</b>	<b>3,929</b>	<b>1.7</b>	<b>22.2</b>	<b>35.5</b>	<b>31.4</b>	<b>0.9</b>	<b>8.2</b>	<b>958</b>	<b>0.3</b>	<b>10.3</b>	<b>6.4</b>	<b>60.0</b>	<b>3.4</b>	<b>19.6</b>	<b>0.0</b>	<b>1.4</b>	<b>20.2</b>	<b>30.2</b>	<b>37.8</b>	<b>0.8</b>	<b>9.6</b>	<b>9.6</b>	<b>0.0</b>

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



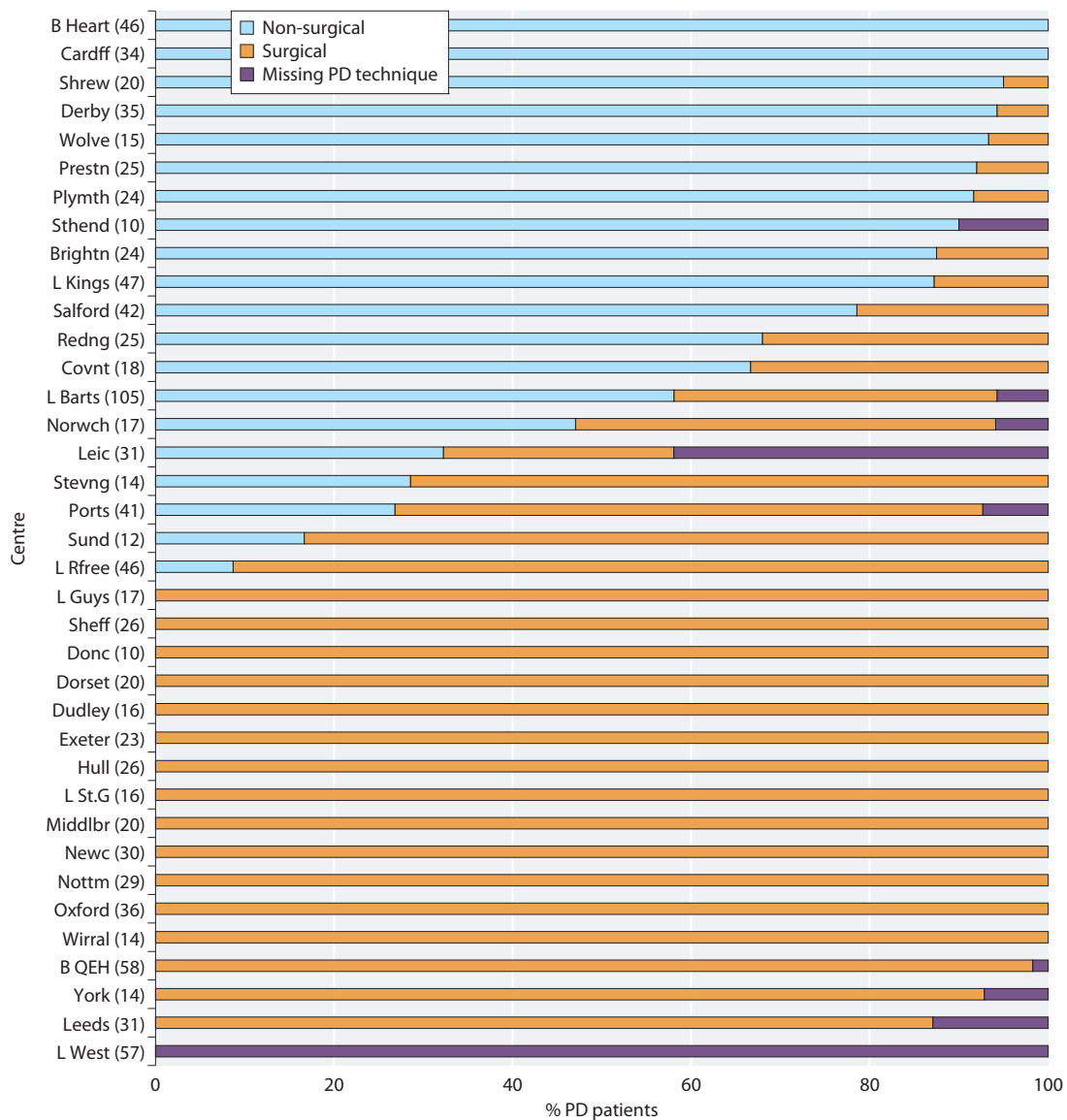
**Figure 1.16** Percentage of adult patients incident to dialysis in 2017 who started dialysis using either an arteriovenous fistula (AVF) or an arteriovenous graft (AVG) by centre\* (2017 Multisite Dialysis Access Audit)

\*Excluding late presentation

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

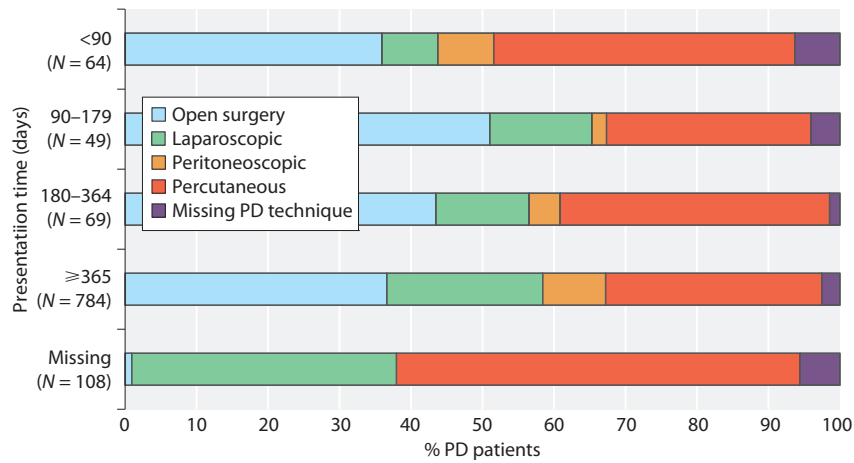
No centres in Northern Ireland submitted sufficiently complete data on PD catheter insertion techniques for the following analyses.



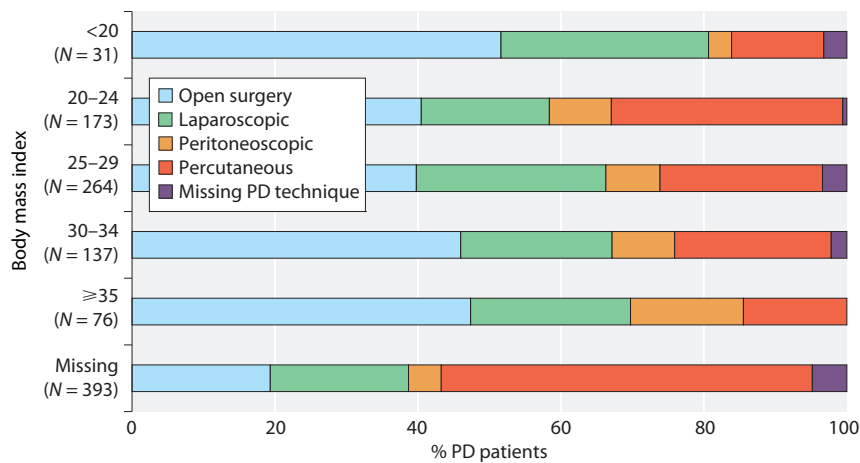


**Figure 1.17** PD catheter insertion technique for adult patients incident to PD in 2017 by centre (2017 Multisite Dialysis Access Audit)

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

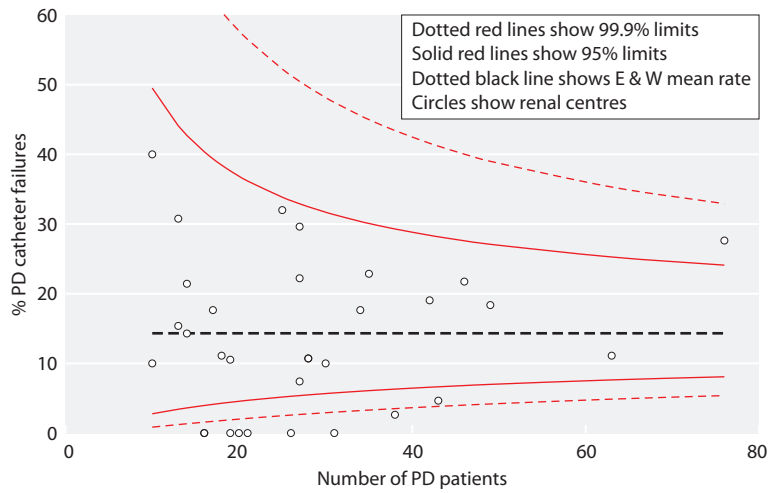


**Figure 1.18** PD catheter insertion technique for adult patients incident to PD in 2017 by presentation time (2017 Multisite Dialysis Access Audit)



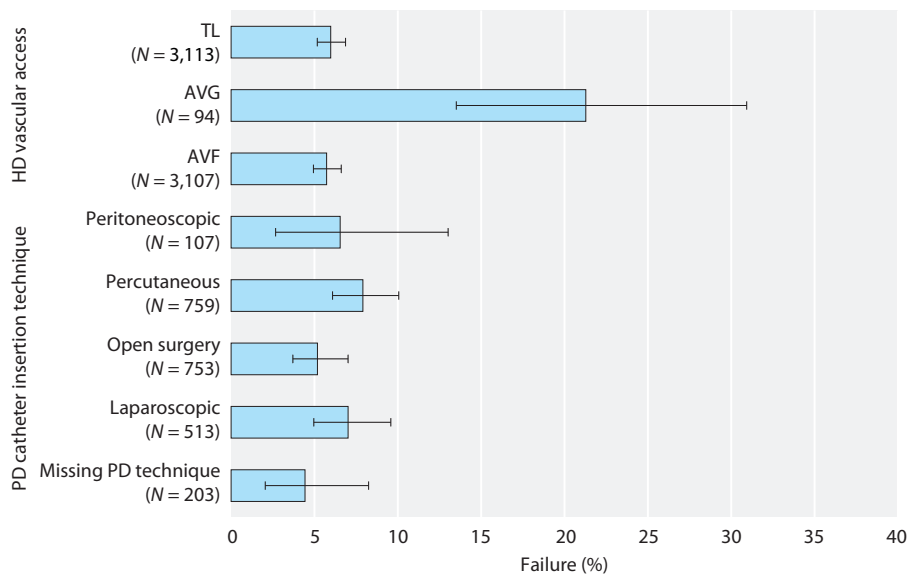
**Figure 1.19** PD catheter insertion technique for adult patients incident to PD in 2017 by body mass index (2017 Multisite Dialysis Access Audit)

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.



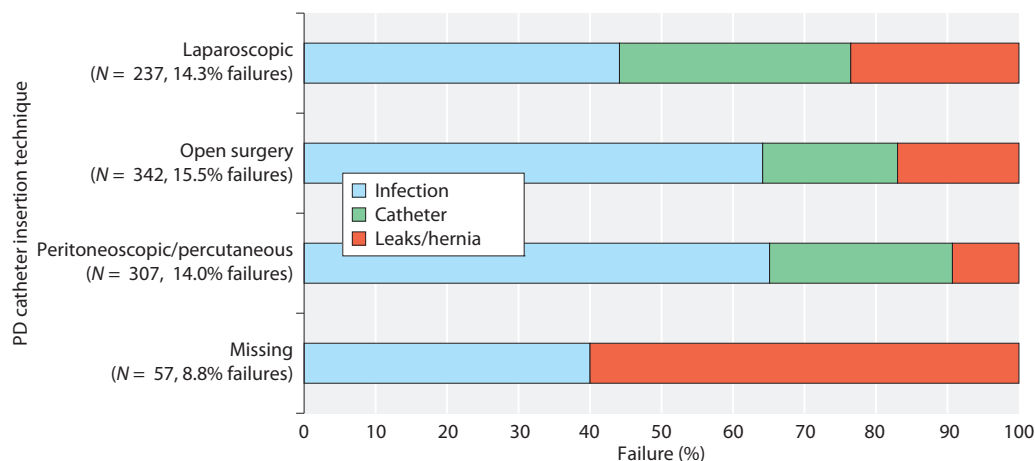
**Figure 1.20** Percentage of PD catheter failures within 1 year of first ever PD session for adult patients incident to PD in 2016 (2016 Multisite Dialysis Access Audit)

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

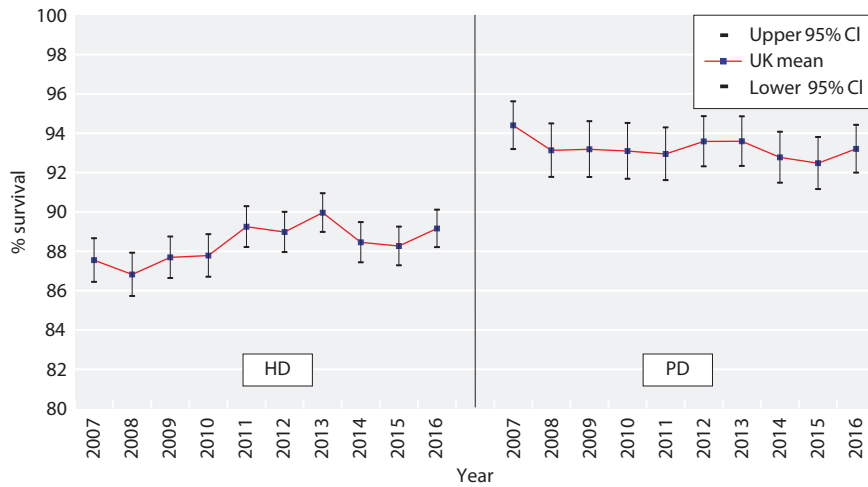
The survival of patients who started RRT for ESKD is described with primary focus on the one year incident to RRT in 2016 cohort, followed up for a year. Some analyses use rolling incident cohorts over several years (two years or more as stated) to increase cohort patient numbers and more reliably identify 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).

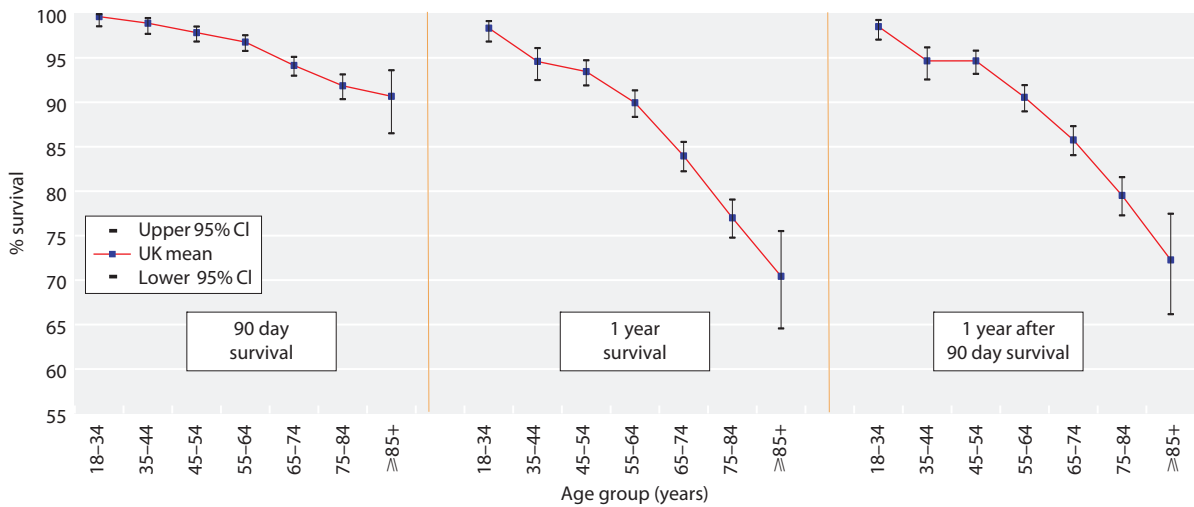
**Table 1.17** 90 days and 1 year after 90 days survival (adjusted to age 60 years) of incident adult RRT patients (2015–2016 2 year cohort) by country

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

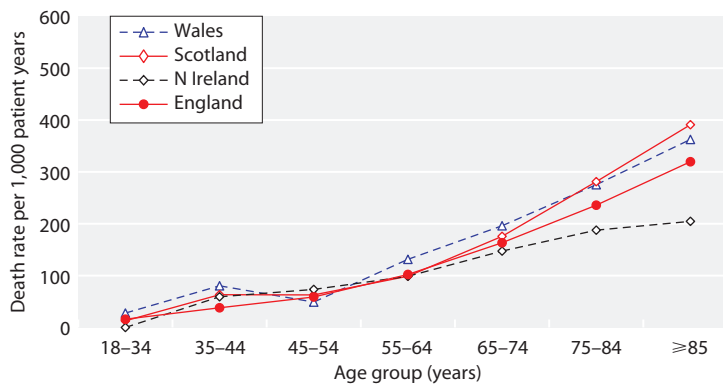
CI – confidence interval



**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

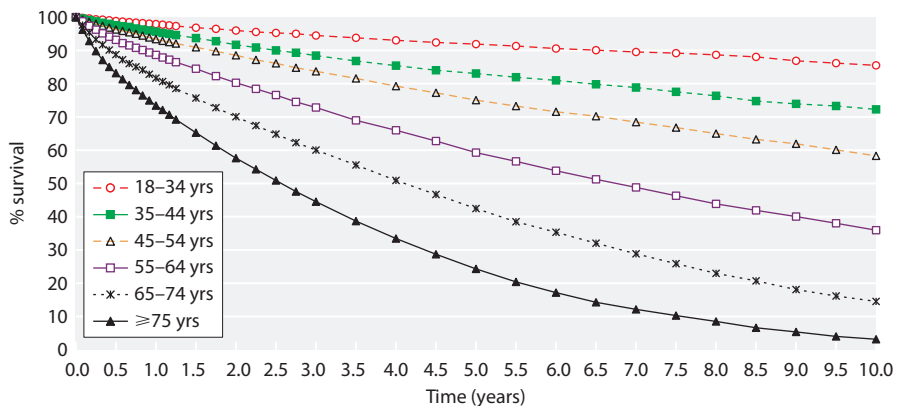


**Figure 1.24** 90 days, 1 year and 1 year after 90 days survival of incident adult RRT patients by age group (2016 cohort)  
 CI - confidence interval

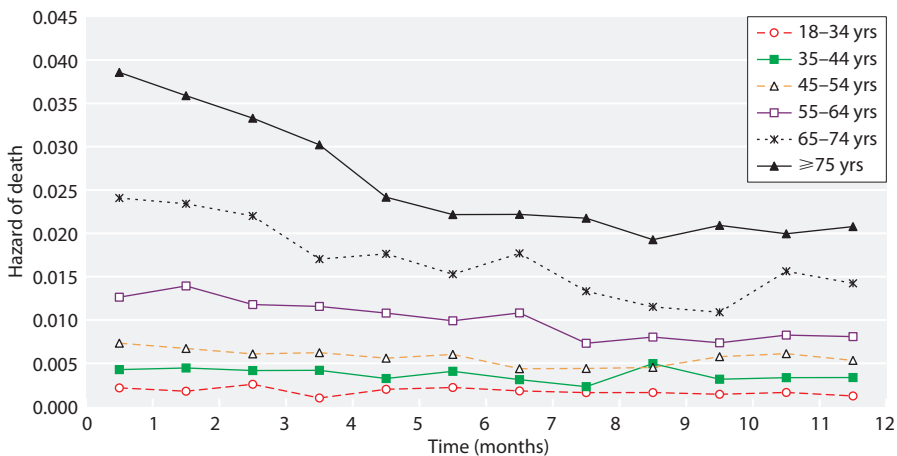


**Figure 1.25** 1 year after 90 days death rate per 1,000 incident RRT adult patient years by age group and country (2013-2016 4 year cohort)

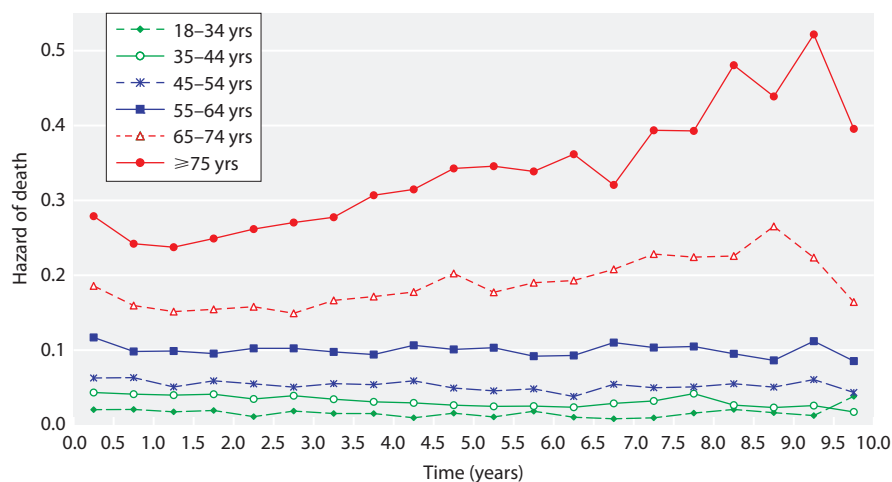
A ten year rolling cohort was used to analyse the long term survival of incident patients from start of RRT (day 0), according to age at RRT start (figure 1.26), with median survival identifiable from the y-axis. The same cohort was used in analyses of the monthly and six monthly hazard of death on RRT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

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			
<b>2016</b>	<b>92.9</b>											<b>92.1–93.7</b>	<b>3,971</b>
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  $\geq 65$  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			
<b>2016</b>	<b>80.1</b>											<b>78.8–81.4</b>	<b>3,685</b>
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.

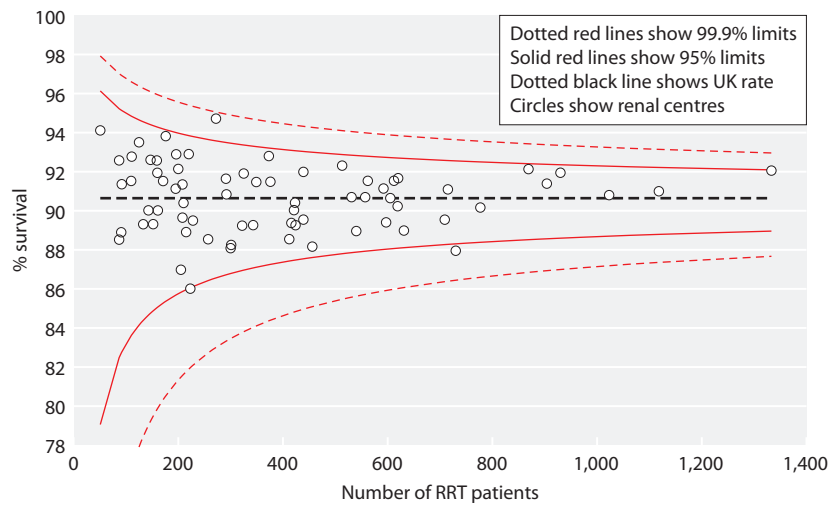
**Table 1.20** 1 year after 90 days survival (adjusted to age 60 years) of incident adult RRT patients by centre (2013–2016 4 year cohort)

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
Krkldy	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  $\geq 85\%$  of patients, one year survival for the same four year cohort is shown sequentially adjusted for age, PRD and comorbidity (table 1.21).

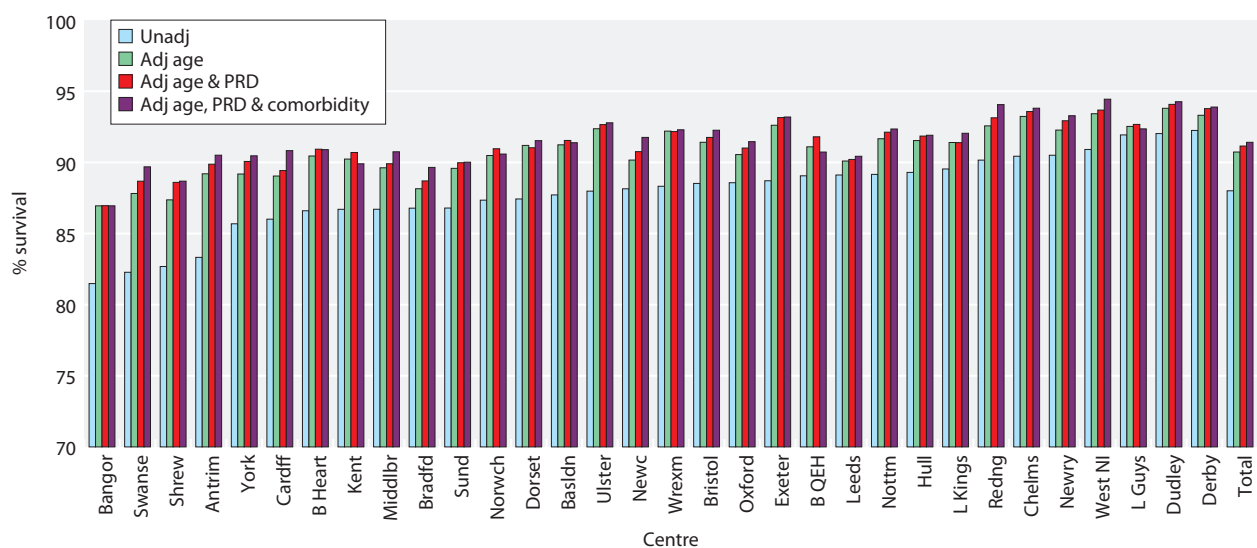
**Table 1.21** 1 year after 90 days survival (adjusted to age 60 years, primary renal disease (PRD) and comorbidity) of incident adult RRT patients by centre (2013–2016 4 year cohort)

Centre*	1 yr after 90 days survival (%)			
	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
<b>Total</b>	<b>88.0</b>	<b>90.7</b>	<b>91.1</b>	<b>91.4</b>

\*Only centres with  $\geq 85\%$  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\*)

Cause of death	First 90 days				1 year after 90 days			
	All ages		<65 yrs (%)	≥65 yrs (%)	All ages		<65 yrs (%)	≥65 yrs (%)
	N	%			N	%		
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
<b>Total (with data)</b>	<b>1,023</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>	<b>2,738</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>
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