

Chapter 5

Adults on peritoneal dialysis (PD) in the UK at the end of 2018

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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 2018 (figure 5.1). This population comprises patients who were on PD at the end of 2017 and remained on PD throughout 2018, as well as patients who commenced/re-commenced PD in 2018. This latter group includes both incident renal replacement therapy (RRT) patients who ended 2018 on PD and prevalent RRT patients who switched to PD from in-centre haemodialysis (ICHD), home haemodialysis (HHD) or a transplant (Tx) in 2018. 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.

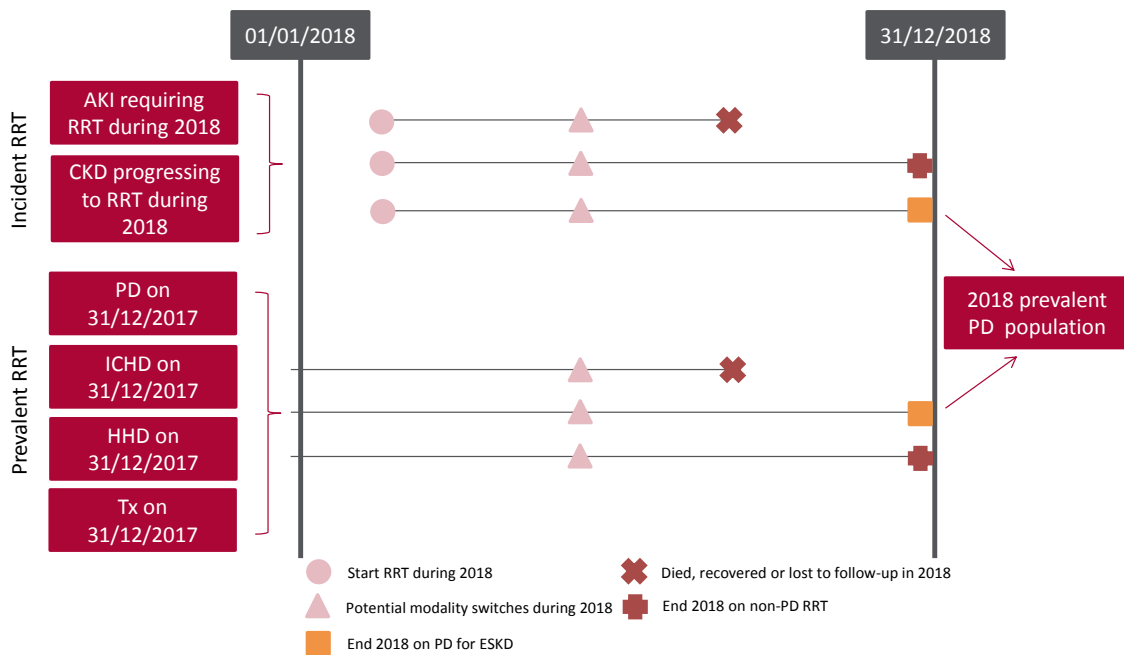


Figure 5.1 Pathways adult patients could follow to be included in the UK 2018 prevalent PD population

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 2018 or if they had been on RRT for ≥ 90 days and were on PD at the end of 2018.

CKD – chronic kidney disease

The infection analyses, except for peritonitis, used a rolling two year cohort to be consistent with the reporting of infections in chapter 4. 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 the care of patients on PD for which there are Renal Association guidelines (table 5.1):

- **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 2018 prevalent adult PD population, including the number on PD per million population (pmp).

The Renal Association guidelines (renal.org/health-professionals/guidelines/guidelines-commentaries) provide audit measures relevant to the care of patients on PD and, where data permit, their attainment by UK renal centres in 2018 is reported in this chapter (table 5.1). Audit measures in guidelines that have been archived are not included.

Some audit measures – for example, the target for glycated haemoglobin (HbA1c) in those on hypoglycaemia-inducing treatment – cannot be reported because the completeness of the required data items is too low. Detail about the completeness of data returned to the UK Renal Registry (UKRR) is available through the UKRR data completeness portal (renal.org/audit-research/data-portal/completeness) Audit measures that cannot be reported because the required data items were not collected by the UKRR are omitted.

Table 5.1 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 5.5, figure 5.2
PD (2017)	Plasma bicarbonate should be maintained in the normal reference range 22–30 mmol/L – 100%	Table 5.5, figure 5.4
Anaemia (2017)	Proportion of patients with serum ferritin <100 µg/L at start of treatment with erythropoiesis stimulating agent (ESA)	Table 5.6, figure 5.8 (the UKRR does not hold treatment with ESA start dates)
	Proportion of patients with haemoglobin <100 g/L not on ESA	Table 5.7
	Proportion of patients on ESA with haemoglobin >120 g/L	Table 5.7, figure 5.10
	Mean (median) ESA dose in patients maintained on ESA therapy	Table 5.7
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%	See chapter 1. For peritonitis in prevalent patients see table 5.9 and figure 5.12
Planning, initiating and withdrawing RRT (2014)	Number of patients withdrawing from PD as a proportion of all deaths on PD	Table 5.10, figure 5.13

ESA – erythropoiesis stimulating agent

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

As Colchester renal centre 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 2017–2018. 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, which should be completed for next year's report. Using aggregate numbers of patients on RRT by treatment modality, it was possible to report treatment rates for Cambridge, but no other quality assurance for the service provided. Coventry renal centre submitted patient level data for more than a third of their new patients only after the closing date for submission to the UKRR. In this report only the analyses on treatment rates could be corrected using the late submitted data.

Key findings

- 3,621 adult patients were receiving PD for ESKD in the UK on 31/12/2018, which represented 5.5% of the RRT population
- The median age of PD patients was 64.3 years and 60.3% were male
- The median adjusted calcium for PD patients was 2.4 mmol/L and 13.5% were above the target range of 2.2–2.5 mmol/L
- The median bicarbonate for PD patients was 25 mmol/L and 79.8% were within the target range of 22–30 mmol/L
- The median haemoglobin and ferritin for PD patients was 111 g/L and 324 µg/L, respectively, and 79.7% were on an ESA at a median dose of 5,000 IU/week
- The PD peritonitis rate in 2018 (England only) was 41.8/100 PD patient years (on average, one case in 29 months for a single patient)
- There was no cause of death data available for 26.6% of deaths. For those with data, the leading cause of death in younger patients (<65 years) was infection (23.3%) and in older patients (≥65 years) was cardiac disease (22.1%).

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 5.2 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

Centre	N on PD					% on PD					Estimated catchment population (millions)	2018 crude rate (pmp)
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018		
ENGLAND												
B Heart	34	51	88	87	95	5.4	7.8	13.5	13.3	14.0	0.61	155.3
B QEH	143	142	143	162	163	6.7	6.3	6.0	6.4	6.3	1.41	115.7
Basldn	28	35	34	28	28	10.1	12.8	12.4	9.3	8.9	0.34	81.4
Bradfd	21	18	25	20	26	3.8	3.1	3.9	3.0	3.8	0.54	48.1
Brightn	64	67	64	59	60	7.0	7.1	6.5	5.8	5.7	1.07	55.8
Bristol	67	57	53	58	56	4.6	3.9	3.6	3.9	3.8	1.19	46.9
Camb	31	31	22	31	44	2.5	2.4	1.7	2.2	3.1	0.96	45.8
Carlis	26	38	37	28	31	10.4	13.5	13.2	9.9	10.6	0.27	116.6
Carsh	136	113	113	96	98	8.8	7.1	6.9	5.7	5.6	1.59	61.8
Chelms	27	26	32	31	33	10.3	9.2	11.8	11.2	12.2	0.42	78.0
Colchr	0	0	0	0	0	0.0	0.0	0.0	0.0	0.0	0.25	0.0
Covnt	90	78	67	52	59	9.4	8.1	6.9	5.4	5.7	0.74	79.8
Derby	85	78	77	79	81	16.5	14.5	14.2	14.2	13.8	0.58	139.1
Donc	27	23	27	29	24	9.5	7.6	8.2	8.7	7.2	0.34	70.6
Dorset	51	42	36	35	38	7.7	6.2	5.2	4.8	5.0	0.71	53.2
Dudley	54	57	50	55	37	17.7	18.1	14.5	14.9	10.2	0.37	101.1
Exeter	94	82	84	75	78	9.9	8.5	8.3	7.1	7.2	0.90	86.4
Glouc	43	37	42	44	36	10.0	8.3	8.9	8.7	7.1	0.49	74.0
Hull	77	75	72	56	47	9.6	8.8	8.4	6.4	5.3	0.85	55.6
Ipswi	31	36	34	45	40	8.4	9.0	8.2	10.4	9.3	0.33	121.0
Kent	68	60	58	52	44	6.7	5.8	5.4	4.8	3.9	1.01	43.4
L Barts	223	207	202	236	237	10.1	9.1	8.5	9.5	9.1	1.52	156.2
L Guys	30	33	39	39	43	1.6	1.6	1.9	1.8	1.9	0.90	47.9
L Kings	91	90	91	97	90	8.9	8.3	8.2	8.4	7.6	0.97	92.7
L Rfree	143	154	159	145	166	7.1	7.4	7.3	6.6	7.4	1.26	131.9
L St.G	48	48	44	37	40	6.1	5.7	5.2	4.4	4.8	0.66	60.5
L West	64	70	100	120	135	2.0	2.1	2.9	3.5	3.8	1.99	67.9
Leeds	63	57	47	59	65	4.2	3.7	3.0	3.6	3.9	1.38	47.0
Leic	122	108	89	97	110	5.7	5.0	3.9	4.1	4.5	2.02	54.5
Liv Ain	39	38	27	21	26	18.0	17.1	11.9	10.0	11.9	0.40	64.8
Liv Roy	60	67	71	70	57	4.8	5.4	5.8	5.6	4.5	0.83	68.8
M RI	73	65	62	70	68	4.1	3.5	3.1	3.4	3.3	1.27	53.6
Middlbr	11	22	26	23	28	1.3	2.4	2.9	2.5	3.0	0.83	33.6
Newc	52	46	53	58	60	5.3	4.6	5.0	5.2	5.2	0.93	64.6
Norwch	35	38	48	43	36	5.1	5.3	6.2	5.5	4.6	0.65	55.2
Nottm	84	82	81	69	72	7.9	7.4	7.0	5.9	6.0	0.90	79.9
Oxford	82	95	95	67	69	5.0	5.6	5.4	3.6	3.6	1.40	49.2
Plymth	34	34	41	49	40	6.8	6.8	8.0	9.1	7.4	0.39	102.7
Ports	79	71	75	84	94	5.0	4.3	4.4	4.8	5.3	1.68	56.0
Prestn	58	53	40	34	38	5.0	4.4	3.3	2.7	2.9	1.24	30.7

Table 5.2 Continued

Centre	N on PD					% on PD					Estimated catchment population (millions)	2018 crude rate (pmp)
	2014	2015	2016	2017	2018	2014	2015	2016	2017	2018		
Redng	72	66	56	39	41	9.5	8.5	7.1	4.9	5.1	0.75	54.4
Salford	94	94	106	117	115	9.7	9.7	10.4	10.5	9.8	1.24	93.1
Sheff	62	64	55	55	61	4.6	4.6	3.9	3.8	4.1	1.14	53.7
Shrew	32	32	39	42	59	9.2	8.7	10.3	10.9	13.9	0.41	142.2
Stevng	27	15	21	23	28	3.4	1.8	2.4	2.6	2.9	1.00	28.1
Sthend	20	17	30	34	30	8.4	6.9	12.7	13.4	11.5	0.26	114.3
Stoke	83	75	79	72	81	10.7	9.5	9.6	8.9	10.0	0.74	109.8
Sund	18	18	17	16	17	4.0	3.9	3.4	3.0	3.1	0.51	33.2
Truro	21	22	18	15	17	5.5	5.3	4.2	3.5	3.9	0.34	49.7
Wirral	22	21	22	19	19	7.9	7.5	6.5	4.9	4.8	0.47	40.1
Wolve	79	79	69	54	55	13.7	13.6	12.1	9.3	9.1	0.55	99.2
York	29	29	33	35	29	6.3	5.9	6.2	6.3	5.1	0.41	71.1
N IRELAND												
Antrim	13	20	16	14	20	5.6	8.3	6.3	5.5	7.3	0.23	85.1
Belfast	15	24	24	17	23	2.0	3.1	3.0	2.0	2.6	0.51	45.3
Newry	16	22	21	23	16	7.7	9.8	8.9	9.5	6.4	0.21	76.8
Ulster	4	6	6	6	10	2.7	3.6	3.6	3.3	5.3	0.21	47.2
West NI	14	12	10	9	9	5.1	4.1	3.3	2.9	2.8	0.28	32.1
SCOTLAND												
Abrdn	27	26	21	22	26	5.4	4.9	3.8	3.9	4.5	0.50	52.1
Airdrie	9	16	24	16	21	2.3	3.8	5.5	3.4	4.3	0.46	45.7
D&Gall	15	11	10	6	6	11.5	8.5	7.6	4.4	4.1	0.12	48.6
Dundee	23	17	21	18	22	5.7	4.1	5.0	4.1	4.9	0.39	57.1
Edinb	21	26	36	33	36	2.8	3.4	4.6	4.0	4.2	0.80	44.9
Glasgw	39	55	54	48	53	2.4	3.2	3.1	2.7	2.9	1.35	39.2
Inverns	15	13	11	10	13	6.7	5.1	4.2	3.8	4.7	0.22	57.9
Klmarnk	36	37	33	24	22	12.0	11.9	10.4	7.1	6.4	0.30	73.2
Krkldy	15	21	18	10	11	5.4	7.1	6.1	3.3	3.7	0.26	41.7
WALES												
Bangor	17	15	16	17	20	15.9	8.2	8.9	8.7	9.9	0.19	107.9
Cardff	79	79	75	72	60	5.0	4.9	4.6	4.3	3.5	1.21	49.7
Clwyd	11	20	15	12	15	6.5	10.8	8.5	6.7	7.9	0.16	93.1
Swanse	53	62	67	74	70	7.5	8.1	8.7	9.3	8.5	0.75	93.1
Wrexm	30	37	32	27	24	10.6	12.6	10.3	8.4	7.6	0.20	117.6
TOTALS												
England	3,147	3,056	3,093	3,061	3,144	6.3	6.0	5.8	5.7	5.7	44.02	71.4
N Ireland	62	84	77	69	78	3.9	4.9	4.3	3.8	4.1	1.44	54.0
Scotland	200	222	228	187	210	4.4	4.6	4.6	3.7	4.0	4.41	47.6
Wales	190	213	205	202	189	6.6	7.0	6.7	6.4	5.8	2.51	75.3
UK	3,599	3,575	3,603	3,519	3,621	6.1	5.9	5.7	5.5	5.5	52.38	69.1

Country PD populations were calculated by summing the PD patients from centres in each country. Estimated country populations were derived from Office for National Statistics figures. See appendix A for details on estimated catchment population by renal centre. Rates appear higher than in previous reports because general population estimates now include only those aged ≥18 years (see appendix B).

Cambridge submitted only aggregate data for 2017 and 2018. Coventry submitted data for 7 prevalent PD patients after the closing date. Results shown here and in table 5.3 were corrected using the additional data.

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 patients in each centre with no ethnicity data is shown separately.

Table 5.3 Demographics of adult patients prevalent to PD on 31/12/2018 by centre

Centre	N on RRT	N on PD	% on PD	Median age (yrs)	% male	Ethnicity				% missing
						% White	% South Asian	% Black	% Other	
ENGLAND										
B Heart	679	95	14.0	63.0	60.0	58.9	25.3	13.7	2.1	0.0
B QEH	2,569	163	6.3	58.8	60.7	59.7	22.8	13.4	4.0	8.6
Basldn	314	28	8.9	64.3	71.4	85.2	3.7	3.7	7.4	3.6
Bradfd	686	26	3.8	53.8	42.3	52.0	40.0	4.0	4.0	3.8
Brightn	1,055	60	5.7	66.8	68.3	89.7	10.3	0.0	0.0	3.3
Bristol	1,469	56	3.8	61.3	76.8	94.6	1.8	1.8	1.8	0.0
Camb										
Carlis	293	31	10.6	65.5	64.5	100.0	0.0	0.0	0.0	3.2
Carsh	1,736	98	5.6	67.1	55.1	77.9	10.5	10.5	1.1	3.1
Chelms	270	33	12.2	67.2	72.7	93.9	3.0	0.0	3.0	0.0
Colchr	121	0	0.0							
Covnt	1,042	59	5.7	64.5	59.6	84.3	11.8	3.9	0.0	1.9
Derby	589	81	13.8	64.4	54.3	88.9	8.6	2.5	0.0	0.0
Donc	332	24	7.2	57.4	41.7	100.0	0.0	0.0	0.0	0.0
Dorset	765	38	5.0	73.0	60.5	97.2	0.0	0.0	2.8	5.3
Dudley	361	37	10.2	68.4	54.1	83.8	13.5	2.7	0.0	0.0
Exeter	1,088	78	7.2	74.4	57.7	85.9	1.3	0.0	12.8	0.0
Glouc	510	36	7.1	62.5	58.3	88.6	5.7	0.0	5.7	2.8
Hull	883	47	5.3	64.4	63.8	97.9	2.1	0.0	0.0	0.0
Ipswi	428	40	9.3	70.2	70.0	74.3	0.0	8.6	17.1	12.5
Kent	1,114	44	3.9	70.1	52.3	93.2	2.3	2.3	2.3	0.0
L Barts	2,610	237	9.1	61.1	59.5	26.2	37.6	17.7	18.6	0.0
L Guys	2,225	43	1.9	61.5	53.5	48.8	14.0	30.2	7.0	0.0
L Kings	1,186	90	7.6	56.8	60.0	37.8	13.3	40.0	8.9	0.0
L Rfree	2,234	166	7.4	65.6	58.4	37.6	26.8	25.5	10.2	5.4
L St.G	837	40	4.8	62.5	60.0	52.8	25.0	16.7	5.6	10.0
L West	3,566	135	3.8	66.0	54.1	45.9	28.9	21.5	3.7	0.0
Leeds	1,687	65	3.9	56.2	50.8	81.5	12.3	4.6	1.5	0.0
Leic	2,468	110	4.5	62.6	55.5	74.8	16.8	4.7	3.7	2.7
Liv Ain	218	26	11.9	59.8	46.2	100.0	0.0	0.0	0.0	0.0
Liv Roy	1,277	57	4.5	62.1	63.2	92.7	1.8	3.6	1.8	3.5
M RI	2,073	68	3.3	62.9	58.8	74.6	14.9	10.4	0.0	1.5
Middlbr	925	28	3.0	63.3	57.1	96.4	3.6	0.0	0.0	0.0
Newc	1,155	60	5.2	64.0	68.3	96.7	1.7	0.0	1.7	0.0
Norwch	786	36	4.6	69.2	66.7	94.4	2.8	2.8	0.0	0.0
Nottm	1,196	72	6.0	68.0	58.3	77.8	11.1	5.6	5.6	0.0
Oxford	1,940	69	3.6	68.4	65.2	79.2	9.4	7.5	3.8	23.2
Plymth	539	40	7.4	72.7	82.5	97.5	0.0	0.0	2.5	0.0
Ports	1,764	94	5.3	63.1	74.5	94.5	1.1	2.2	2.2	3.2
Prestn	1,322	38	2.9	66.8	63.2	89.5	10.5	0.0	0.0	0.0
Redng	810	41	5.1	71.8	61.0	73.7	15.8	5.3	5.3	7.3
Salford	1,173	115	9.8	63.3	65.2	87.8	9.6	0.9	1.7	0.0
Sheff	1,481	61	4.1	69.7	67.2	93.2	3.4	1.7	1.7	3.3
Shrew	424	59	13.9	72.7	67.8	96.6	0.0	1.7	1.7	1.7

Table 5.3 Continued

Centre	N on RRT	N on PD	% on PD	Median age (yrs)	% male	Ethnicity				
						% White	% South Asian	% Black	% Other	% missing
Stevng	957	28	2.9	69.0	64.3	87.0	4.3	4.3	4.3	17.9
Sthend	260	30	11.5	73.2	70.0	90.0	6.7	0.0	3.3	0.0
Stoke	808	81	10.0	63.6	56.8	92.4	5.1	1.3	1.3	2.5
Sund	557	17	3.1	48.9	41.2	88.2	5.9	0.0	5.9	0.0
Truro	437	17	3.9	72.3	82.4	100.0	0.0	0.0	0.0	0.0
Wirral	395	19	4.8	66.5	63.2	94.7	0.0	5.3	0.0	0.0
Wolve	602	55	9.1	57.5	60.0	50.9	30.9	14.5	3.6	0.0
York	568	29	5.1	68.4	75.9	100.0	0.0	0.0	0.0	6.9
N IRELAND										
Antrim	274	20	7.3	71.3	65.0	100.0	0.0	0.0	0.0	0.0
Belfast	877	23	2.6	72.8	52.2					39.1
Newry	249	16	6.4	77.1	56.3	100.0	0.0	0.0	0.0	0.0
Ulster	190	10	5.3	75.7	60.0	100.0	0.0	0.0	0.0	0.0
West NI	324	9	2.8	70.4	44.4	100.0	0.0	0.0	0.0	0.0
SCOTLAND										
Abrdn	573	26	4.5	61.3	61.5					88.5
Airdrie	487	21	4.3	60.3	47.6	100.0	0.0	0.0	0.0	9.5
D&Gall	145	6	4.1	67.0	33.3					83.3
Dundee	445	22	4.9	66.1	50.0					100.0
Edinb	862	36	4.2	66.5	50.0					88.9
Glasgw	1,812	53	2.9	58.8	39.6					90.6
Inverns	279	13	4.7	70.9	53.8					92.3
Klmarnk	342	22	6.4	57.0	68.2					77.3
Krkldy	300	11	3.7	57.5	81.8					100.0
WALES										
Bangor	202	20	9.9	67.5	60.0	100.0	0.0	0.0	0.0	0.0
Cardff	1,721	60	3.5	63.3	56.7	91.5	8.5	0.0	0.0	1.7
Clwyd	190	15	7.9	69.9	73.3	92.9	7.1	0.0	0.0	6.7
Swanse	824	70	8.5	64.3	60.0	97.1	2.9	0.0	0.0	2.9
Wrexm	315	24	7.6	63.1	62.5	91.7	0.0	8.3	0.0	0.0
TOTALS										
England	54,784	3,100	5.7	64.3	61.0	72.9	13.6	8.8	4.7	2.7
N Ireland	1,914	78	4.1	73.5	56.4	100.0	0.0	0.0	0.0	11.5
Scotland	5,245	210	4.0	61.1	51.9					81.9
Wales	3,252	189	5.8	64.2	60.3	94.6	4.3	1.1	0.0	2.1
UK	65,195	3,577	5.5	64.3	60.3	74.9	12.7	8.1	4.2	7.5

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

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

Coventry submitted data for 7 prevalent PD patients after the closing date; these patients were not included in the age, sex or ethnicity breakdown.

Primary renal diseases (PRDs) were grouped into categories as shown in table 5.4, 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 5.4 Primary renal diseases (PRDs) of adult patients prevalent to PD on 31/12/2018

PRD	N on PD	% PD population	Age <65 yrs		Age ≥65 yrs		M/F ratio
			N	%	N	%	
Diabetes	797	23.4	426	24.3	371	22.5	1.7
Glomerulonephritis	549	16.1	347	19.8	202	12.2	1.9
Hypertension	269	7.9	117	6.7	152	9.2	2.3
Polycystic kidney disease	252	7.4	168	9.6	84	5.1	1.0
Pyelonephritis	203	6.0	103	5.9	100	6.1	1.3
Renal vascular disease	197	5.8	41	2.3	156	9.5	2.1
Other	553	16.3	312	17.8	241	14.6	1.2
Uncertain aetiology	580	17.1	237	13.5	343	20.8	1.3
Total (with data)	3,400	100.0	1,751	100.0	1,649	100.0	
Missing	170	4.8	84	4.6	86	5.0	1.7

Biochemistry parameters in prevalent adult PD patients

The 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. For the first time the Scottish Renal Registry sent bicarbonate data to the UKRR.

Table 5.5 Median adjusted calcium (Ca) and percentage with adjusted Ca 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 31/12/2018 by centre

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	
ENGLAND										
B Heart	2.4	82.1	9.5	100.0	22	46.4	53.6	0.0	100.0	
B QEH	2.3	75.7	13.5	100.0	24	26.5	71.2	2.3	89.2	
Basldn	2.5	65.4	30.8	100.0	27	3.9	88.5	7.7	100.0	
Bradfd	2.4	69.6	21.7	100.0	25	22.7	77.3	0.0	95.7	
Brightn	2.4	77.1	16.7	98.0	26	6.3	93.8	0.0	98.0	
Bristol	2.4	84.6	12.8	100.0	24	12.8	87.2	0.0	100.0	
Camb										
Carlis	2.3	77.8	11.1	100.0	24	22.2	77.8	0.0	100.0	
Carsh	2.4	74.7	12.7	90.8					0.0	
Chelms	2.3	77.3	4.6	88.0	23	19.1	81.0	0.0	84.0	
Colchr										
Covnt	2.3	79.2	6.3	100.0	25	12.8	87.2	0.0	97.9	
Derby	2.4	75.7	24.3	100.0	23	25.7	72.9	1.4	100.0	
Donc	2.4	79.0	15.8	95.0	25	10.5	89.5	0.0	95.0	
Dorset	2.3	71.0	16.1	100.0	23	38.7	58.1	3.2	100.0	
Dudley	2.5	69.4	27.8	100.0	26	8.6	85.7	5.7	97.2	
Exeter	2.4	88.2	10.3	98.6	25	14.7	83.8	1.5	98.6	
Glouc	2.4	73.3	23.3	96.8	24	13.8	82.8	3.5	93.6	
Hull	2.4	80.0	20.0	100.0	26	17.5	75.0	7.5	100.0	
Ipswi	2.3	75.7	10.8	97.4	25	10.8	86.5	2.7	97.4	
Kent	2.5	63.9	36.1	92.3	25	21.6	78.4	0.0	94.9	
L Barts	2.3	76.2	6.9	99.0	24	20.3	78.7	1.0	99.0	
L Guys	2.4	81.3	9.4	100.0	26	9.4	90.6	0.0	100.0	

Table 5.5 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
L Kings	2.3	79.2	6.5	100.0	26	13.0	81.8	5.2	100.0
L Rfree	2.4	79.6	11.7	97.2	26	8.6	89.7	1.7	82.3
L St.G	2.5	73.5	23.5	94.4	22	35.3	64.7	0.0	94.4
L West				52.1					47.0
Leeds	2.4	82.5	14.0	98.3	26	14.0	70.2	15.8	98.3
Leic	2.4	82.1	11.6	99.0	25	14.3	83.5	2.2	94.8
Liv Ain	2.4	85.7	14.3	100.0	26	14.3	85.7	0.0	100.0
Liv Roy	2.4	86.0	10.0	100.0	25	6.0	94.0	0.0	100.0
M RI	2.4	79.3	10.3	98.3	25	15.5	84.5	0.0	98.3
Middlbr	2.2	72.2	5.6	94.7	26	11.1	88.9	0.0	94.7
Newc	2.4	86.0	8.0	100.0	24	14.0	80.0	6.0	100.0
Norwch	2.4	84.4	12.5	100.0	24	31.3	68.8	0.0	100.0
Nottm	2.3	80.4	3.6	98.3					45.6
Oxford	2.3	83.9	8.9	100.0	25	26.1	73.9	0.0	82.1
Plymth	2.4	88.2	8.8	97.1	25	11.8	88.2	0.0	97.1
Ports	2.4	75.0	13.8	100.0	26	12.0	80.0	8.0	93.8
Prestn	2.3	64.5	12.9	96.9	25	6.5	90.3	3.2	96.9
Redng	2.4	82.9	14.3	100.0	26	0.0	97.1	2.9	100.0
Salford	2.4	82.1	16.0	100.0					0.0
Sheff	2.3	86.8	5.7	98.2	24	19.6	80.4	0.0	94.4
Shrew	2.4	84.3	11.8	100.0	25	13.7	86.3	0.0	100.0
Stevng	2.3	73.1	15.4	100.0	26	11.5	80.8	7.7	100.0
Sthend	2.4	80.0	16.0	100.0	27	8.0	84.0	8.0	100.0
Stoke	2.4	81.2	11.6	97.2	26	7.0	93.0	0.0	100.0
Sund	2.3	84.6	7.7	100.0					7.7
Truro	2.5	60.0	40.0	100.0	25	7.7	92.3	0.0	86.7
Wirral	2.4	93.3	6.7	100.0	24	23.1	76.9	0.0	86.7
Wolve	2.4	75.6	19.5	91.1	23	26.8	73.2	0.0	91.1
York	2.4	82.6	17.4	100.0	28	4.4	69.6	26.1	100.0
N IRELAND									
Antrim	2.4	80.0	6.7	100.0	25	6.7	86.7	6.7	100.0
Belfast	2.4	88.9	5.6	100.0	26	22.2	77.8	0.0	100.0
Newry	2.4	86.7	13.3	100.0	26	20.0	80.0	0.0	100.0
Ulster				100.0					100.0
West NI				100.0					100.0
SCOTLAND									
Abrdn	2.4	76.5	23.5	89.5					15.8
Airdrie	2.4	76.5	17.7	100.0	26	11.8	82.4	5.9	100.0
D&Gall				100.0					100.0
Dundee	2.4	79.0	21.1	100.0	27	5.9	76.5	17.7	89.5
Edinb	2.4	89.3	7.1	96.6					58.6
Glasgw	2.4	82.1	18.0	100.0	24	22.2	77.8	0.0	92.3
Inverns	2.3	72.7	18.2	91.7	26	18.2	72.7	9.1	91.7
Klmarnk	2.5	84.2	15.8	100.0	25	29.4	52.9	17.7	89.5
Krkldy				100.0					100.0
WALES									
Bangor	2.4	94.4	5.6	100.0	28	5.6	72.2	22.2	100.0
Cardff	2.4	75.5	18.9	98.2					68.5
Clwyd	2.5	80.0	20.0	100.0	25	13.3	86.7	0.0	100.0
Swanse	2.4	85.7	8.9	100.0	26	3.7	83.3	13.0	96.4
Wrexm	2.3	90.0	10.0	100.0	28	0.0	85.0	15.0	100.0

PD

Table 5.5 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
TOTALS									
England	2.4	78.6	13.5	96.4	25	17.5	80.0	2.5	85.2
N Ireland	2.4	84.1	9.5	100.0	25	15.9	82.5	1.6	100.0
Scotland	2.4	82.7	15.4	97.6	25	16.2	77.7	6.2	78.3
Wales	2.4	83.3	13.0	99.4	26	11.8	78.5	9.7	88.3
UK	2.4	79.2	13.5	96.7	25	17.1	79.8	3.1	85.3

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

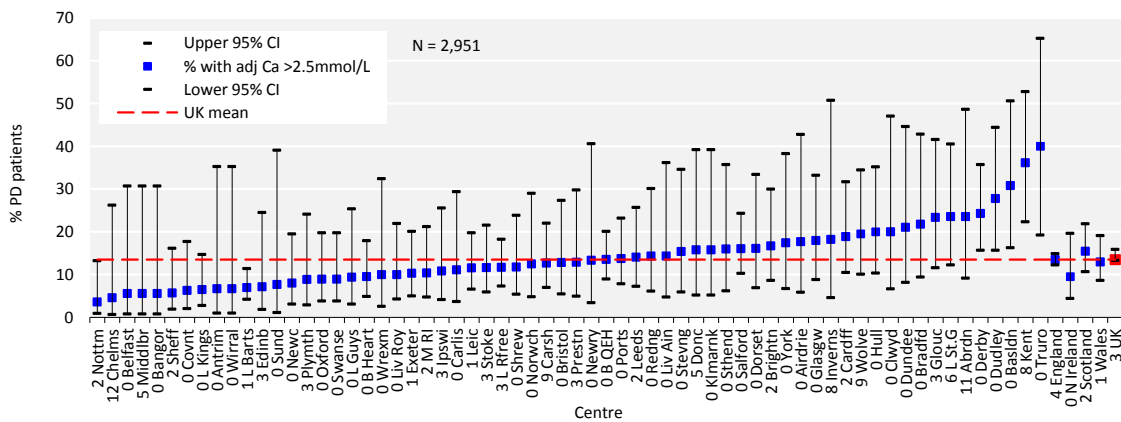


Figure 5.2 Percentage of adult patients prevalent to PD on 31/12/2018 with adjusted calcium (Ca) above the target range (>2.5 mmol/L) by centre
CI – confidence interval

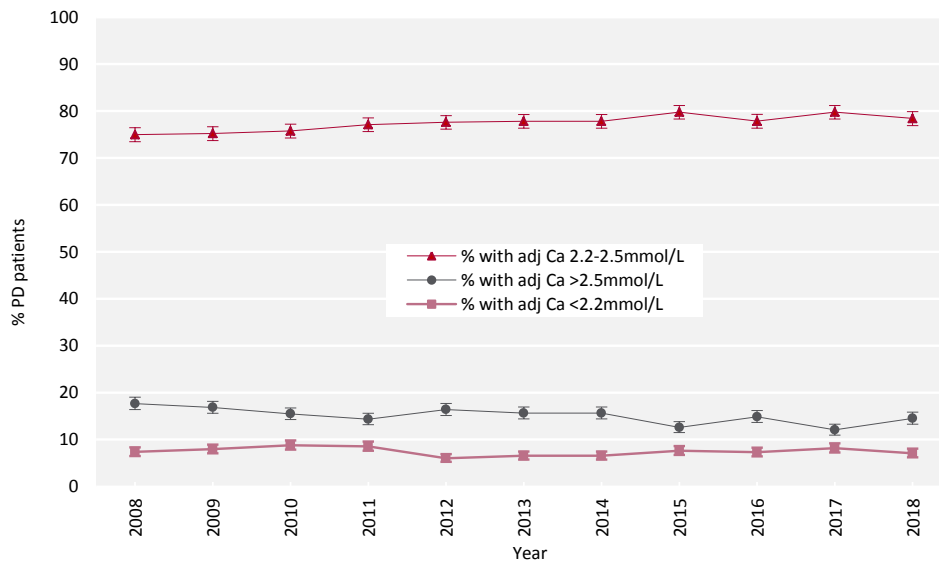


Figure 5.3 Change in percentage of prevalent adult PD patients within, above and below the target range for adjusted calcium (Ca 2.2–2.5 mmol/L) between 2008 and 2018

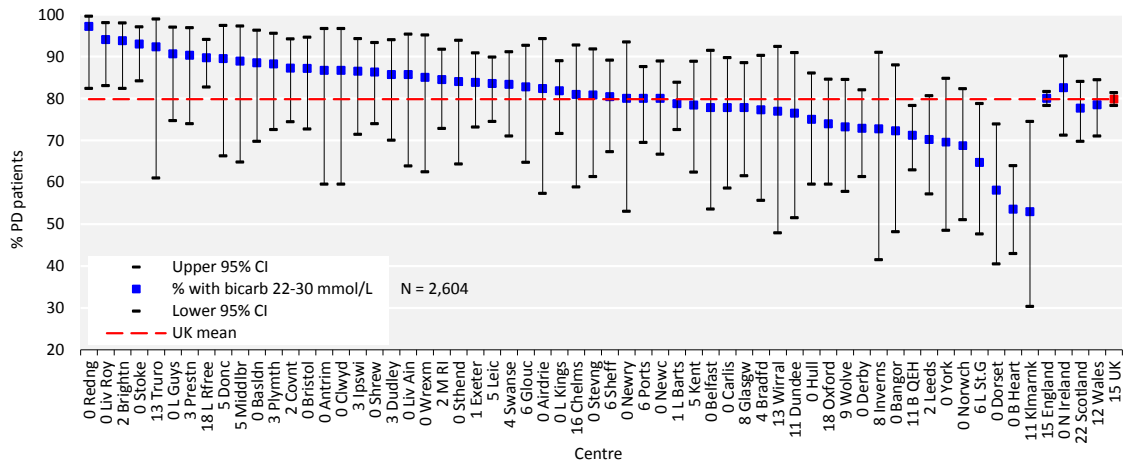


Figure 5.4 Percentage of adult patients prevalent to PD on 31/12/2018 with bicarbonate (bicarb) within the target range (22–30 mmol/L) by centre
 CI – confidence interval

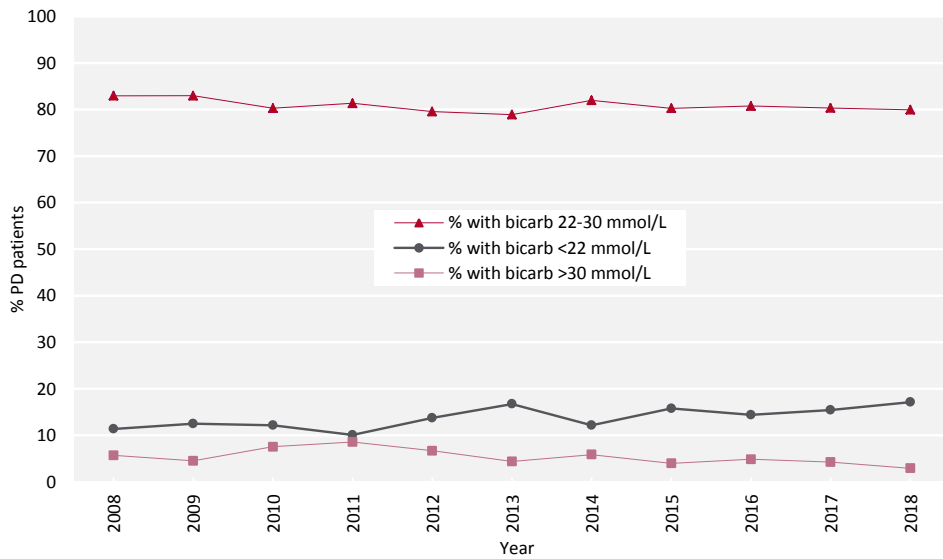


Figure 5.5 Percentage of prevalent adult PD patients within, above and below the target range for bicarbonate (bicarb) 22–30 mmol/L) between 2008 and 2018

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 weekly ESA dose is reported, but there are some uncertainties surrounding the accuracy of this measure (see appendix A). The Scottish Renal Registry does not submit ESA data for PD patients.

Table 5.6 Median haemoglobin and ferritin and percentage attaining target ranges in adult patients prevalent to PD on 31/12/2018 by centre

Centre	Haemoglobin			Ferritin			
	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (µg/L)	% <100 µg/L	% data completeness
ENGLAND							
B Heart	108	23.8	19.0	100.0	175	29.3	97.6
B QEH	108	26.4	16.9	100.0	333	7.5	99.3
Basldn	109	23.1	19.2	100.0	124	36.0	96.2
Bradfd	110	39.1	21.7	100.0	377	0.0	87.0
Brightn	113	12.5	27.1	98.0	327	6.4	95.9
Bristol	113	17.9	30.8	100.0	346	5.4	94.9
Camb							
Carlis	116	7.4	33.3	100.0	260	18.5	100.0
Carsh	108	19.8	12.3	93.1	196	25.0	87.4
Chelms	111	9.1	27.3	88.0	219	17.4	92.0
Colchr							
Covnt	106	35.4	16.7	100.0	204	14.9	97.9
Derby	111	24.3	27.1	100.0	429	1.4	98.6
Donc	117	10.5	31.6	95.0	277	22.2	90.0
Dorset	113	16.7	23.3	96.8	305	7.1	90.3
Dudley	111	11.4	28.6	97.2			0.0
Exeter	112	7.2	23.2	100.0	284	10.4	97.1
Glouc	110	19.4	22.6	100.0	193	25.8	100.0
Hull	112	10.0	17.5	100.0	546	0.0	100.0
Ipswi	110	24.3	27.0	97.4	411	16.7	94.7
Kent	109	26.3	23.7	97.4	421	5.3	97.4
L Barts	110	20.9	23.4	98.5	284	17.6	92.2
L Guys	102	43.8	9.4	100.0	143	25.0	100.0
L Kings	110	26.0	27.3	100.0	209	12.0	97.4
L Rfree	108	32.6	24.6	97.9	576	5.8	98.6
L St.G	108	26.5	17.6	94.4	275	2.9	97.2
L West				53.9			57.3
Leeds	114	12.3	22.8	98.3	361	10.5	98.3
Leic	111	18.9	25.3	99.0	290	22.3	97.9
Liv Ain	113	14.3	23.8	100.0	589	14.3	100.0
Liv Roy	112	22.0	24.0	100.0	376	6.0	100.0
M RI	106	36.2	20.7	98.3	302	10.7	94.9
Middlbr	115	21.1	21.1	100.0	518	5.6	94.7
Newc	110	22.0	24.0	100.0	421	4.2	96.0
Norwch	117	6.3	40.6	100.0	433	0.0	100.0
Nottm	108	28.1	26.3	100.0	433	0.0	98.3
Oxford	109	17.9	23.2	100.0	319	3.6	98.2
Plymth	115	0.0	41.2	97.1	322	17.6	97.1
Ports	113	13.8	22.5	100.0	359	1.3	98.8
Prestn	113	16.1	22.6	96.9	705	6.5	96.9
Redng	106	22.9	20.0	100.0	389	5.7	100.0
Salford	112	21.7	30.2	100.0	566	3.4	84.0
Sheff	115	9.3	24.1	100.0	513	3.8	98.2
Shrew	110	23.5	17.6	100.0	274	18.8	94.1
Stevng	112	23.1	30.8	100.0	265	20.8	92.3
Sthend	116	8.0	44.0	100.0	186	12.0	100.0
Stoke	115	18.3	26.8	100.0	433	4.3	97.2
Sund	120	30.8	46.2	100.0	369	16.7	92.3
Truro	109	13.3	26.7	100.0	129	15.4	86.7
Wirral	105	35.7	0.0	93.3	411	0.0	93.3
Wolve	107	31.0	16.7	93.3	87	53.8	86.7

Table 5.6 Continued

Centre	Haemoglobin				Ferritin		
	Median (g/L)	% <100 g/L	% >120 g/L	% data completeness	Median (µg/L)	% <100 µg/L	% data completeness
York	108	17.4	26.1	100.0	187	8.7	100.0
N IRELAND							
Antrim	111	6.7	33.3	100.0	352	0.0	100.0
Belfast	119	11.1	38.9	100.0	364	0.0	100.0
Newry	108	6.7	26.7	100.0	287	26.7	100.0
Ulster				100.0			100.0
West NI				100.0			100.0
SCOTLAND							
Abrdn	115	11.1	27.8	94.7	450	5.9	89.5
Airdrie	114	17.6	11.8	100.0	344	35.3	100.0
D&Gall				100.0			100.0
Dundee	120	10.5	47.4	100.0	355	5.3	100.0
Edinb	114	17.9	28.6	96.6	317	8.0	86.2
Glasgw	114	17.9	25.6	100.0	261	26.5	87.2
Inverns	112	27.3	36.4	91.7	373	18.2	91.7
Klmarnk	108	31.6	21.1	100.0	476	5.9	89.5
Krkldy				100.0			100.0
WALES							
Bangor	109	16.7	11.1	100.0	228	27.8	100.0
Cardff	113	16.7	24.1	100.0	169	21.6	94.4
Clwyd	113	13.3	33.3	100.0	220	6.7	100.0
Swanse	111	16.1	30.4	100.0	244	13.2	94.6
Wrexm	116	30.0	30.0	100.0	320	0.0	100.0
TOTALS							
England	110	21.2	23.6	96.8	328	11.4	92.8
N Ireland	114	7.9	36.5	100.0	352	6.3	100.0
Scotland	114	17.8	27.6	98.2	345	14.5	91.6
Wales	112	17.8	26.4	100.0	223	15.3	96.3
UK	111	20.5	24.3	97.1	324	11.7	93.1

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

Table 5.7 Distribution of haemoglobin and erythropoiesis stimulating agent (ESA) dose values in adult patients prevalent to PD on 31/12/2018 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	64.3			
B QEH	0.0			
Basldn	61.5			
Bradfd	87.0	6,000	0.0	13.0
Brightn	10.2			
Bristol	69.2			
Camb				
Carlis	55.6			
Carsh	0.0			
Chelms	76.0	4,000	0.0	18.2
Colchr				
Covnt	70.8	8,000	6.3	6.3
Derby	0.0			
Donc	55.0			

Table 5.7 Continued

Centre	ESA		Haemoglobin and ESA	
	% on ESA	Median dose (IU/week)	% <100g/L and not on ESA	% >120g/L and on ESA
Dorset	74.2	4,000	3.3	13.3
Dudley	77.8	4,000	2.9	17.1
Exeter	76.8	3,700	0.0	8.7
Glouc	51.6			
Hull	60.0			
Ipswi	0.0			
Kent	51.3			
L Barts	0.0			
L Guys	0.0			
L Kings	83.1	6,000	1.3	23.4
L Rfree	0.0			
L St.G	0.0			
L West	0.0			
Leeds	70.7	4,000	0.0	10.5
Leic	67.7			
Liv Ain	0.0			
Liv Roy	0.0			
M RI	0.0			
Middlbr	89.5	4,000	0.0	15.8
Newc	6.0			
Norwch	59.4			
Nottm	87.7	4,000	1.8	22.8
Oxford	82.1	6,000	0.0	14.3
Plymth	0.0			
Ports	3.8			
Prestn	81.3		0.0	16.1
Redng	5.7			
Salford	84.9	6,000	0.9	24.5
Sheff	72.2	4,100	0.0	20.4
Shrew	2.0			
Stevng	65.4			
Sthend	60.0			
Stoke	0.0			
Sund	84.6	3,800	0.0	46.2
Truro	0.0			
Wirral	93.3	8,000	7.1	0.0
Wolve	68.9			
York	60.9			
N IRELAND				
Antrim	73.3	3,000	0.0	20.0
Belfast	88.9	3,000	0.0	33.3
Newry	86.7	4,000	0.0	20.0
Ulster	85.7			
West NI	87.5			
WALES				
Bangor	33.3			
Cardff	33.3			
Clwyd	46.7			
Swanse	71.4	5,000	0.0	16.1
Wrexm	65.0			
TOTAL¹				
UK	79.7	5,000	1.1	18.0

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).

¹This is the total of only those centres with at least 70% of PD patients on an ESA.

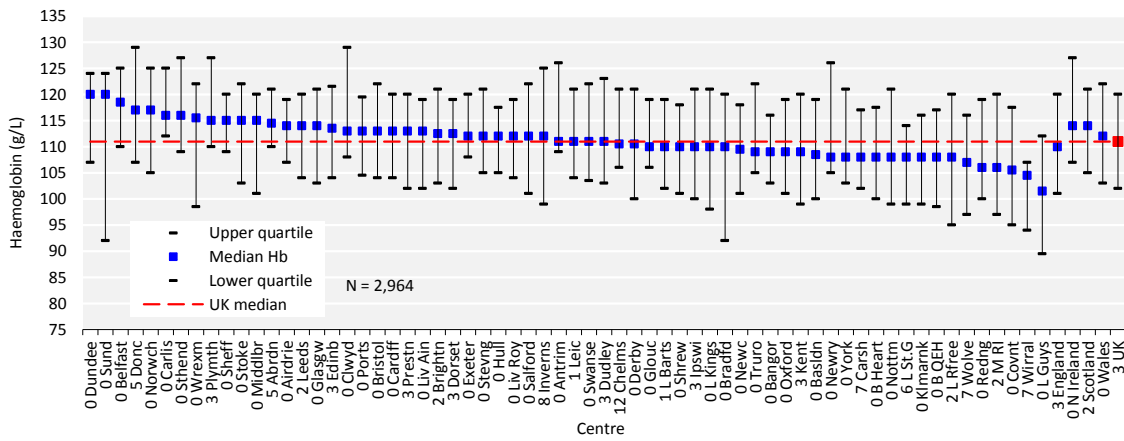


Figure 5.6 Median haemoglobin (Hb) in adult patients prevalent to PD on 31/12/2018 by centre

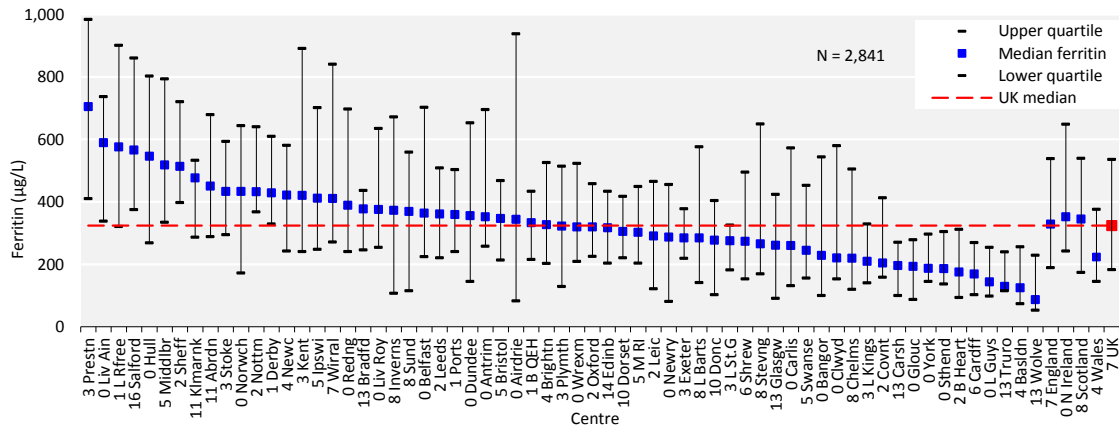


Figure 5.7 Median ferritin in adult patients prevalent to PD on 31/12/2018 by centre

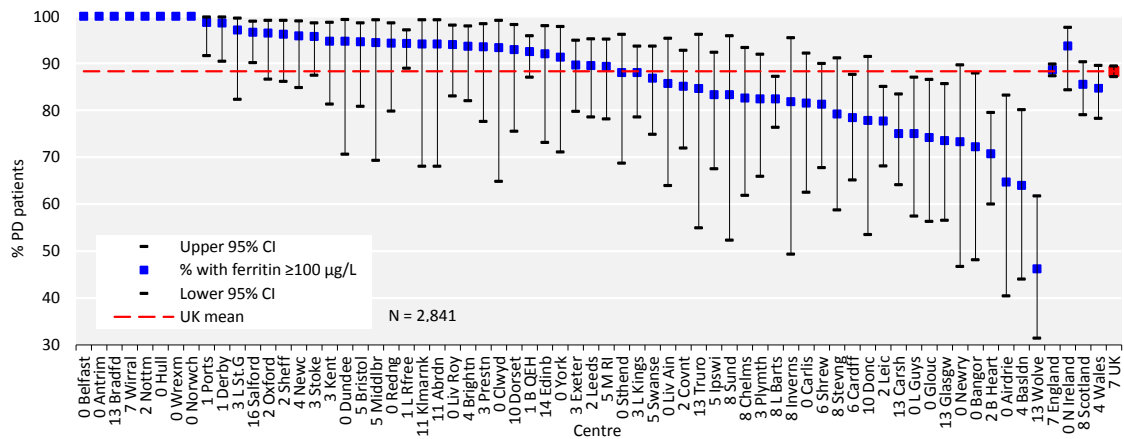


Figure 5.8 Percentage of adult patients prevalent to PD on 31/12/2018 with ferritin ≥ 100 $\mu\text{g/L}$ by centre
CI – confidence interval

PD

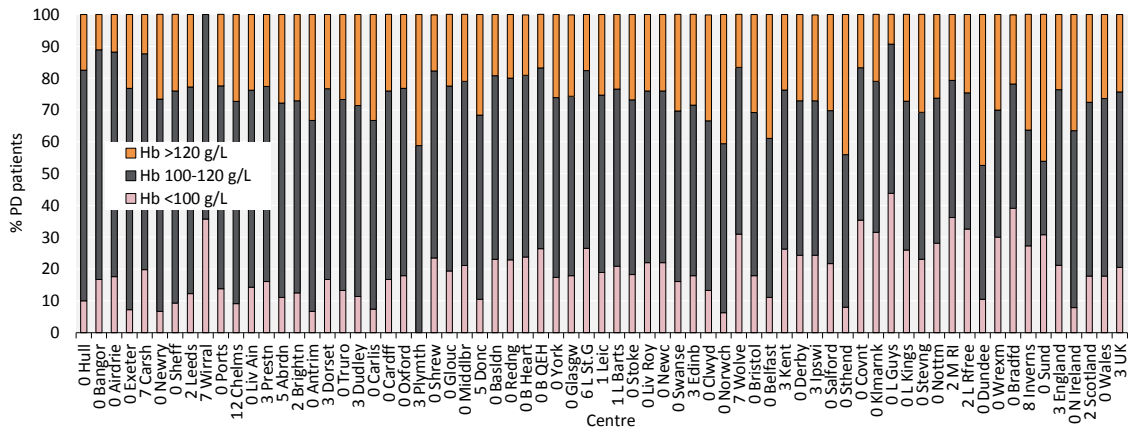


Figure 5.9 Distribution of haemoglobin (Hb) in adult patients prevalent to PD on 31/12/2018 by centre

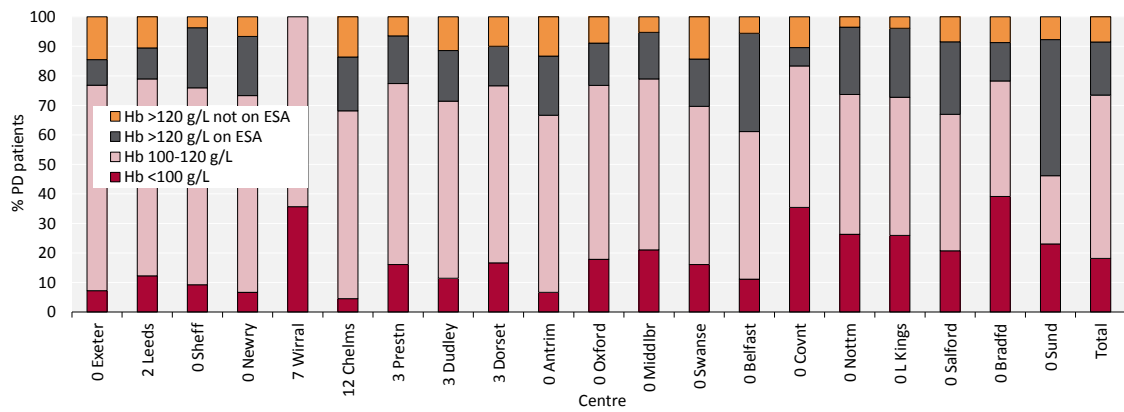


Figure 5.10 Distribution of haemoglobin (Hb) in adult patients prevalent to PD on 31/12/2018 and the proportion with haemoglobin >120 g/L receiving erythropoiesis stimulating agent (ESA) by centre
Figure (including total) does not include centres with <70% data completeness (or <70% ESA use).

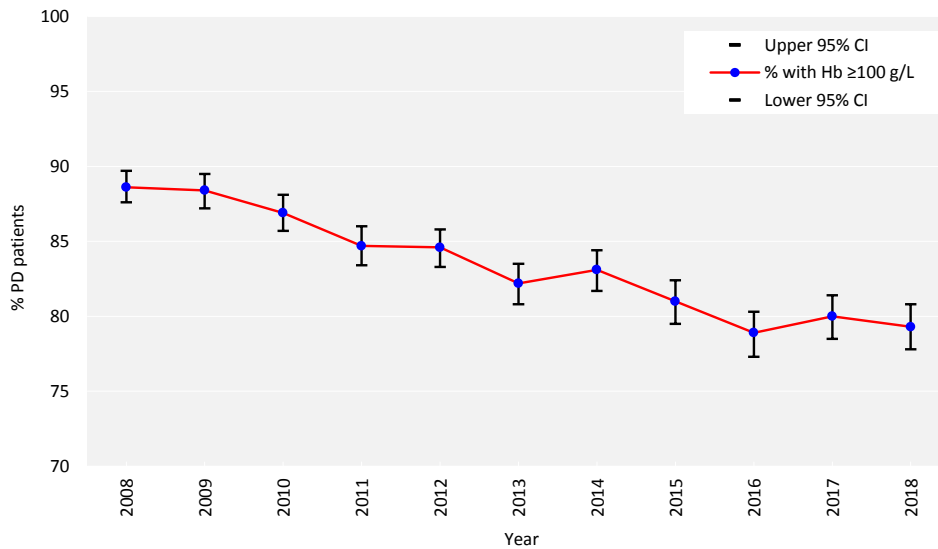


Figure 5.11 Percentage of prevalent adult PD patients with haemoglobin (Hb) ≥ 100 g/L between 2008 and 2018
CI – confidence interval

PD catheter insertion techniques and 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. Wales provides infection data extracted locally from the renal and hospital IT systems.

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 4. These analyses included all patients on HD, whether on HHD or ICHD.

Table 5.8 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 2017 to December 2018

	Infection			
	MRSA	MSSA	<i>C. difficile</i>	<i>E.coli</i>
Number of episodes				
HD	83	1,240	522	888
PD	2	31	60	65
Rate per 100 patient years (with range between centres)				
HD	0.19 (0.0-0.87)	2.88 (0.80-6.15)	1.21 (0.19-3.72)	2.06 (0.28-3.93)
PD	0.03 (0.0-1.28)	0.47 (0.0-3.73)	0.90 (0.0-8.42)	0.98 (0.0-6.30)

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 are listed in the table below. The funnel plot (figure 5.12) shows each centre's 2018 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.

Table 5.9 Number of patient years and peritonitis rate in adult patients receiving PD in 2018 by centre in England

Centre	PD patient years	Peritonitis rate per 100 PD patient years
B Heart	93	65.7
B QEH	172	35.5
Basldn	31	6.5
Bradfd	25	40.7
Brightn	52	17.3
Bristol	57	93.6
Camb	24	37.7
Carlisle	22	22.3
Carsh	100	40.8
Chelms	33	30.8
Covnt	82	55.0
Derby	78	51.6
Donc	26	41.8
Dorset	36	38.5
Dudley	50	32.0
Exeter	75	51.9
Glouc	48	50.1
Hull	48	68.9
Ipswi	34	32.4
Kent	47	44.3
L Barts	236	43.2
L Guys	40	44.8
L Kings	97	45.5
L Rfree	157	55.9
L St.G	44	34.1
L West	136	39.9
Leeds	66	41.0
Leic	105	29.6
Liv Ain	27	18.6
Liv Roy	58	46.6
M RI	68	38.5
Middlbr	19	32.3
Newc	62	54.9
Norwch	39	82.1
Nottm	101	32.7
Oxford	75	37.3
Plymth	34	11.8
Ports	88	12.5
Prestn	43	49.0
Redng	45	33.6
Salford	122	40.9
Sheff	57	29.9
Shrew	65	33.7
Stevng	28	42.3
Sthend	20	5.1
Stoke	80	41.2
Sund	19	15.8
Truro	17	29.9
Wirral	17	70.6
Wolve	57	38.8
York	33	54.6
TOTAL		
England	3,185	41.8

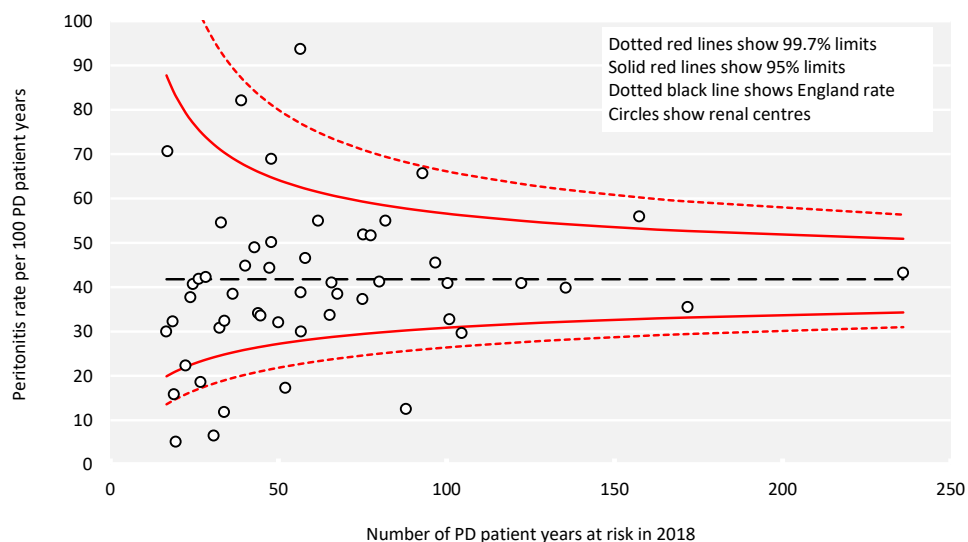


Figure 5.12 PD peritonitis rates in adult patients receiving PD in 2018 per 100 PD patient years by centre in England

Cause of death in adult PD patients

Cause of death was analysed in prevalent patients receiving PD on 31/12/2017 and followed-up for one year in 2018. 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 5.10 Cause of death in adult patients prevalent to PD on 31/12/2017 followed-up in 2018 by age group

Cause of death	PD all ages		PD <65 years		PD ≥65 years	
	N	%	N	%	N	%
Cardiac disease	75	22.1	19	22.1	56	22.1
Cerebrovascular disease	11	3.2	5	5.8	6	2.4
Infection	55	16.2	20	23.3	35	13.8
Malignancy	22	6.5	3	3.5	19	7.5
Treatment withdrawal	60	17.7	9	10.5	51	20.1
Other	79	23.2	22	25.6	57	22.4
Uncertain aetiology	38	11.2	8	9.3	30	11.8
Total (with data)	340	100.0	86	100.0	254	100.0
Missing	123	26.6	32	27.1	91	26.4

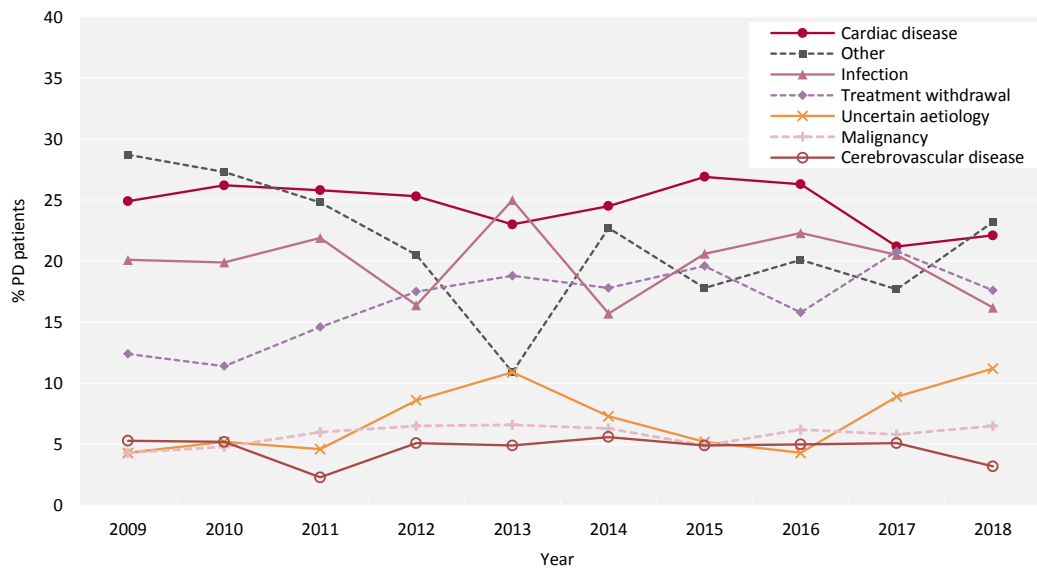


Figure 5.13 Cause of death between 2009 and 2018 for adult patients prevalent to PD at the beginning of the year