
UK Renal Registry 14th Annual Report: Chapter 10 Blood Pressure Profile of Prevalent Patients receiving Renal Replacement Therapy in England, Wales and Northern Ireland in 2010: national and centre-specific analyses

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Key Words

Diastolic blood pressure · Epidemiology · Established renal failure · Haemodialysis · Peritoneal dialysis · Pulse pressure · Systolic blood pressure · Transplant

Summary

- Data completeness was better for HD patients (64% for pre-HD measurements) than for PD patients (44%) or transplant recipients (36%).
- In 2010, the median pre- and post-HD SBP were 140 mmHg and 128 mmHg respectively. The

median SBP of patients on PD was 138 mmHg. Transplant recipients had a median SBP of 134 mmHg. Median DBP were 71 mmHg (pre-HD), 67 mmHg (post-HD), 80 mmHg (PD) and 79 mmHg (transplant).

- In England, Wales and Northern Ireland, only 25.6% of PD patients achieved the Renal Association guideline of SBP <130 mmHg **and** DBP <80 mmHg.
- In England, Wales and Northern Ireland, only 27.7% of transplant patients achieved the Renal Association guideline of SBP <130 mmHg **and** DBP <80 mmHg.

Introduction

For patients on dialysis, low blood pressure (BP) appears paradoxically to be associated with lower survival – reverse epidemiology – or the relationship is at least non-linear [1]. Original descriptions at the individual patient level were confounded by unmeasured case-mix, with comorbidity associated with both lower BP and lower survival, but similar patterns have now been reported at the centre level [2]. There are reports however, that raise the possibility that the association can be overcome by long dialysis and careful attention to dry-weight [3]. Further, BP in dialysis patients varies as much within individuals as it does between individuals [4]. The extent of this variability appears to be as important as the absolute value in predicting cardiovascular mortality in haemodialysis patients [5]. The optimal measure of BP therefore remains the subject of considerable controversy, with ambulatory BP predicting mortality better than pre- or post-dialysis BP [6].

The Renal Association does not currently set an audit standard for BP in HD patients. The guideline in operation during the period during which the audit data in this chapter were collected [7] stated:

Guideline 1.8 C-CVD: Hypertension in dialysis patients

Pre- and post-dialysis blood pressure (measured after completion of dialysis, including washback) should be recorded and intra-dialytic blood pressure measured to enable management of the haemodialysis session.

Measurement of inter-dialytic blood pressure should be encouraged as a routine aid to management in haemodialysis patients (Good Practice).

Blood pressure in peritoneal dialysis patients should be <130/80 mmHg (Good Practice).

Hypertension on dialysis should be managed by ultrafiltration in the first instance (Good Practice).

Guideline 1.9 C-CVD: Hypertension in renal transplant patients

The target blood pressure for renal transplant patients is <130/80 mmHg (Good practice).

These guidelines are consistent with international guidelines [1, 8].

This chapter reports UK Renal Registry (UKRR) data completeness for BP for adult renal centres in England,

Northern Ireland and Wales and presents centre-level average blood pressure attainment for patients on haemodialysis (HD), peritoneal dialysis (PD) and with a functioning kidney transplant at the end of December 2010.

Methods

All adult patients in England, Wales and Northern Ireland receiving RRT (HD, PD and transplant recipients) on 31st December 2010 were considered for inclusion in the analyses.

The method of data extraction employed is described in chapter 15 of the 11th UKRR Annual Report [9]. The UKRR extracts quarterly laboratory, clinical and demographic data for all patients receiving RRT in the 63 renal centres in England, Northern Ireland and Wales. Data on some variables from the nine Scottish renal centres are sent annually to the Scottish Renal Registry. However, BP measurements were not collected from the Scottish Registry and therefore Scottish renal centres are excluded from all BP analyses.

Patients who had been on the same modality and at the same renal centre for 3 months and with a valid BP reading in either the fourth or the third quarter of 2010 were included. This included incident patients starting RRT during 2010 who were still alive on 31st December 2010. Analyses used the last recorded BP from quarter 4, however, if this was missing, the last recorded BP from quarter 3 was used instead.

Analyses were performed on each RRT modality (HD, PD and transplant). Most UK renal centres manage HD, PD and transplant patients. However, Colchester had no PD patients and four centres (Bangor, Colchester, Liverpool Aintree, Wirral) had no transplant patients under their care.

All patients meeting the criteria above were included in the overall national analyses, but renal centres with less than 50% data completeness for any modality, or fewer than 20 patients with results, were excluded from the centre-level analysis for that modality. The number preceding the centre name in each figure corresponds to the percentage of missing data in each centre.

Patients on HD were analysed both by pre-dialysis and post-dialysis BP. The BP components analysed included systolic blood pressure (SBP), diastolic blood pressure (DBP) and pulse pressure (PP). The data were analysed to produce summary statistics (mean, median, maximum, minimum). Standard deviation and quartile ranges were also calculated. Median BP and inter-quartile ranges (IQRs) are presented for each analysis as caterpillar plots. In addition to this, the percentage of PD and transplant patients attaining Renal Association standards for BP (<130/80 mmHg) in individual renal centres and each nation were calculated and are presented with 95% confidence intervals in caterpillar plots.

Chi-squared tests were used in the analyses of the 2010 BP data to test for statistically significant differences between renal centres and between nations. All statistical analyses were performed using SAS version 9.2.

Results

Data completeness

Data extracts were received from all 63 centres in England, Wales and Northern Ireland. Data completeness is summarised in table 10.1. Overall, completeness is very similar to that in the previous UKRR report.

BP on each modality

Figure 10.1 gives the median and IQR for SBP, DBP and PP in prevalent HD patients (pre- and post-dialysis), PD and transplant patients.

In 2010, the median pre- and post-HD SBP were 140 mmHg and 128 mmHg respectively. The median

SBP of patients on PD was 138 mmHg. Transplant recipients had a median SBP of 134 mmHg. Median DBP were 71 mmHg (pre-HD), 67 mmHg (post-HD), 80 mmHg (PD) and 79 mmHg (Transplant).

Relationship between the centre mean and the proportion above a threshold BP in that centre

As the distribution of BP in each centre approximates a normal distribution (data not shown), the population mean of each BP variable should predict the number of individuals above (or below) a predefined threshold or standard (Rose and Day 1990). As these assumptions were confirmed in the 13th UKRR Annual Report [10] only mean (or median) BP data by centre are presented below.

Table 10.1. Percentage of patients in each renal centre for whom BP readings were extracted by the UKRR, by modality

Centre	% completed data				Centre	% completed data			
	Pre-HD	Post-HD	PD	Transplant		Pre-HD	Post-HD	PD	Transplant
Antrim	98	84	91	87	Leic	99	98	70	41
B Heart	92	92	0	0	Liv Ain	66	65	0	n/a
B QEH	0	0	0	2	Liv RI	89	89	12	61
Bangor	96	96	100	n/a	M Hope	78	78	0	0
Basldn	98	73	92	48	M RI	22	33	0	0
Belfast	94	69	12	64	Middlbr	98	96	39	52
Bradfd	1	1	100	77	Newc	96	95	0	1
Brightn	0	0	0	0	Newry	97	76	75	93
Bristol	100	100	95	71	Norwch	96	74	2	55
Camb	99	99	97	97	Nottm	100	100	99	92
Cardff	8	25	60	97	Oxford	97	97	47	12
Carlis	98	98	0	0	Plymth	0	0	0	0
Carsh	78	78	2	0	Ports	100	100	65	12
Chelms	100	71	81	81	Prestn	19	0	0	0
Clwyd	92	92	60	80	Redng	98	0	99	95
Colchr	96	96	n/a	n/a	Sheff	100	97	98	97
Covnt	100	98	93	77	Shrew	97	96	0	0
Derby	100	97	99	98	Stevng	98	96	4	0
Derry	98	87	100	89	Sthend	97	97	28	55
Donc	100	80	78	98	Stoke	96	96	2	0
Dorset	99	79	82	75	Sund	98	97	7	94
Dudley	78	60	57	16	Swanse	100	100	100	99
Exeter	100	100	100	81	Truro	100	100	65	98
Glouc	100	100	100	100	Tyrone	97	72	86	88
Hull	96	97	95	0	Ulster	98	78	50	94
Ipswi	99	99	100	87	Wirral	80	28	11	n/a
Kent	96	95	0	0	Wolve	100	99	100	95
L Barts	0	0	0	0	Wrexm	99	96	0	0
L Guys	0	0	0	0	York	91	89	100	48
L Kings	0	0	0	0					
L Rfree	0	0	0	0	England	63	59	42	32
L St.G	48	48	0	0	N Ireland	96	76	51	73
L West	0	0	0	0	Wales	57	64	68	87
Leeds	100	100	99	94	E, W & NI	64	60	44	36

Centre-specific analyses of BP in haemodialysis patients

Figures 10.2 and 10.3 illustrate the median and IQR pre-dialysis SBP and DBP in each centre supplying data on >50% of patients. Figures 10.4 and 10.5 illustrate the equivalent analyses for post-dialysis BP. Figures for the proportion of patients with pre-dialysis BP <140/90 and for post-dialysis BP <130/80 are not included in this chapter since these audit measures were dropped from the Renal Association standards several years ago.

There remained marked centre variation: the difference between the centres with the lowest and highest median SBP was >25 mmHg. Comparison with previous UKRR reports showed that in general, the same centres can be found at roughly the same place in the distribution from year to year.

Centre-specific analyses of BP in peritoneal dialysis patients

Figures 10.6 and 10.7 illustrate the median and IQR SBP and DBP in each centre supplying data on >50%

of eligible patients. Figure 10.8 gives the proportion of patients meeting the audit standard of BP <130/80 mmHg.

The possibility of information bias in these analyses cannot be excluded, since BP data are extracted from the routine clinical record. For instance, BP might only be recorded during acute illness or unscheduled clinic visits. However, it is unlikely that the high rates of completeness of return, which were documented in the centres included in this analysis, would have been achieved if this were the case.

Centre-specific analysis of BP in transplant patients

Figures 10.9 and 10.10 illustrate the median and IQR SBP and DBP in each centre supplying data on >50% of eligible patients and figure 10.11 illustrates the proportion of patients meeting the audit standard of BP <130/80 mmHg.

As with PD patients, the possibility of information bias in these analyses cannot be excluded.

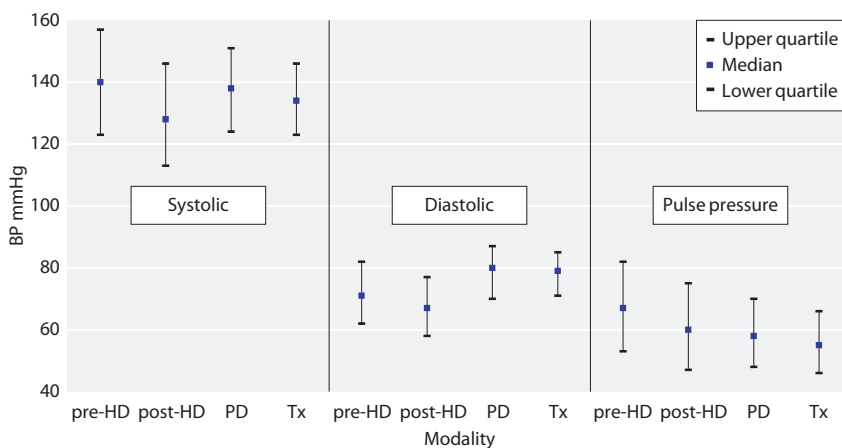


Fig. 10.1. Summary of BP achievements

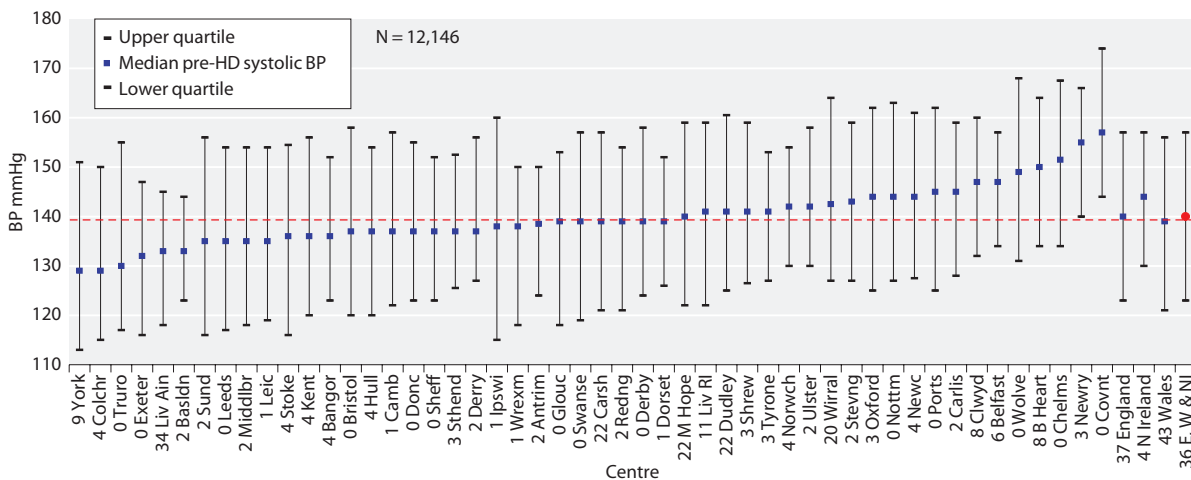


Fig. 10.2. Median systolic BP: pre-HD

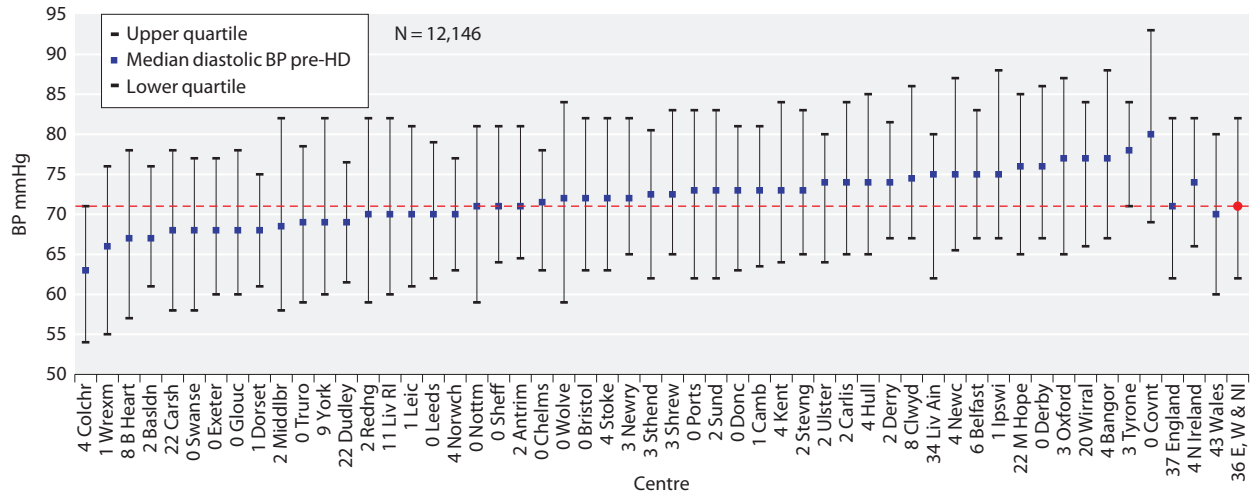


Fig. 10.3. Median diastolic BP: pre-HD

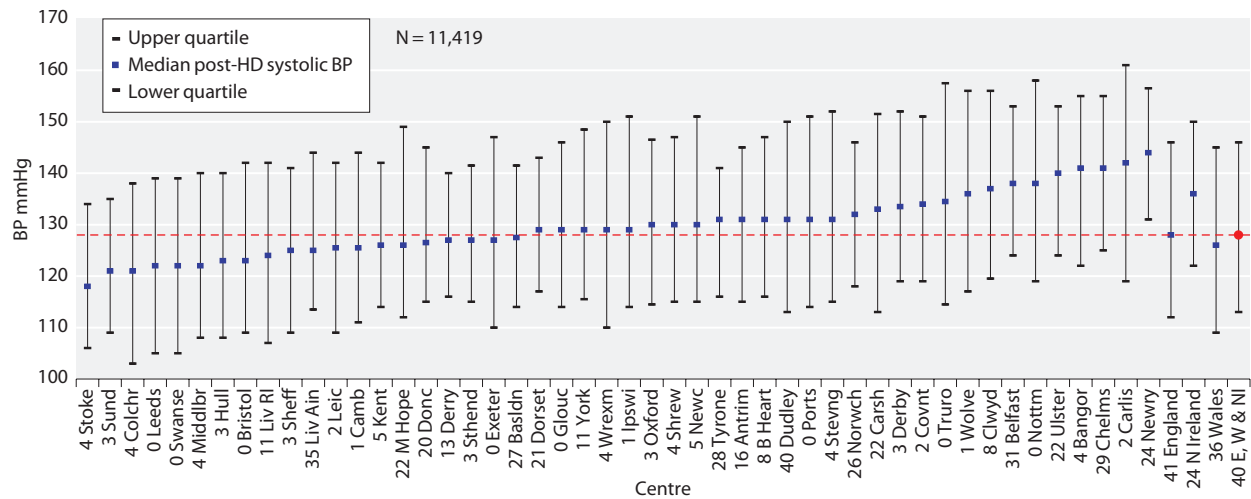


Fig. 10.4. Median systolic BP: post-HD

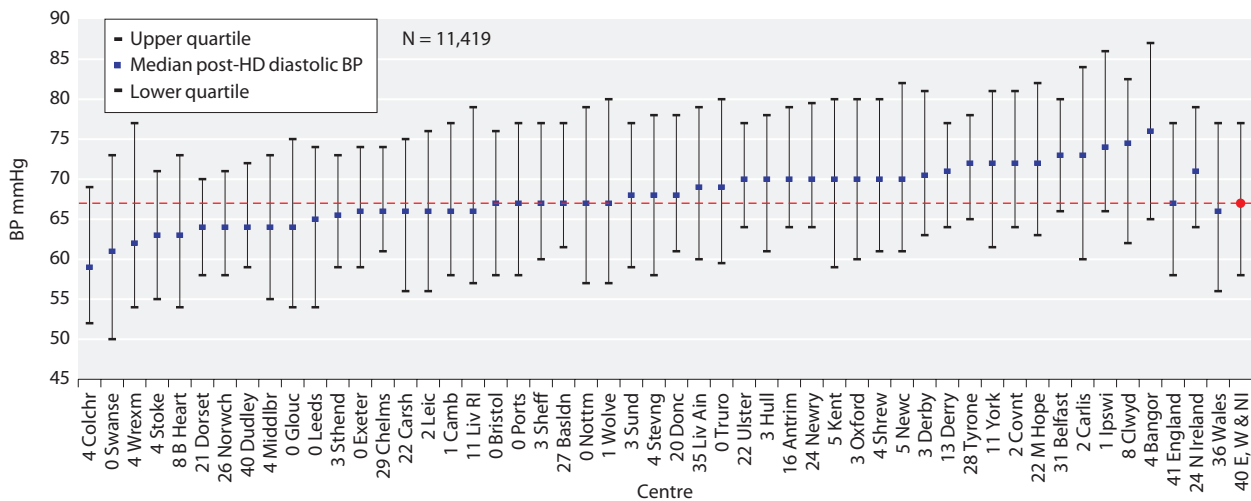


Fig. 10.5. Median diastolic BP: post-HD

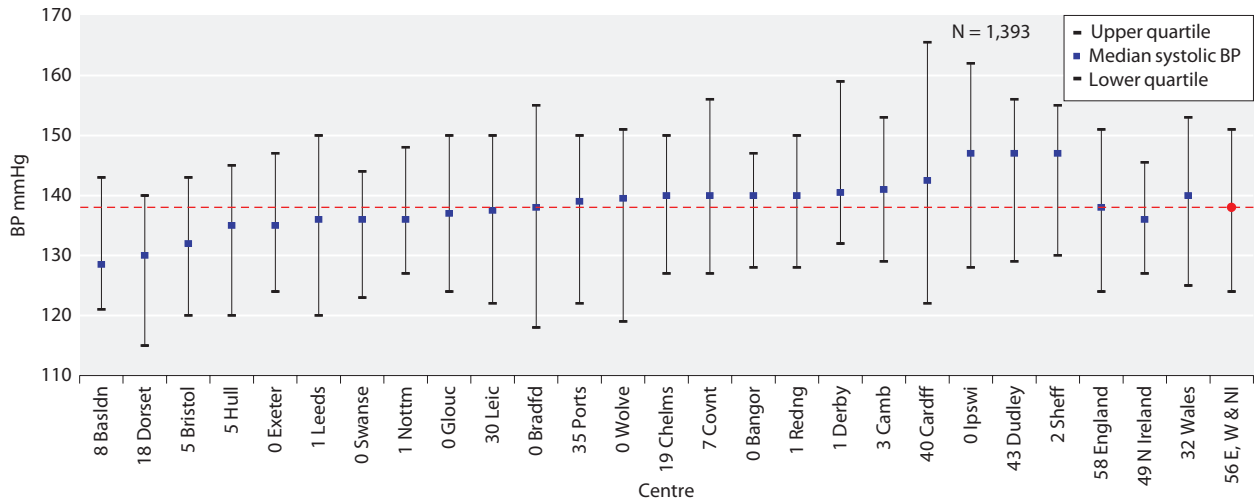


Fig. 10.6. Median systolic BP: PD

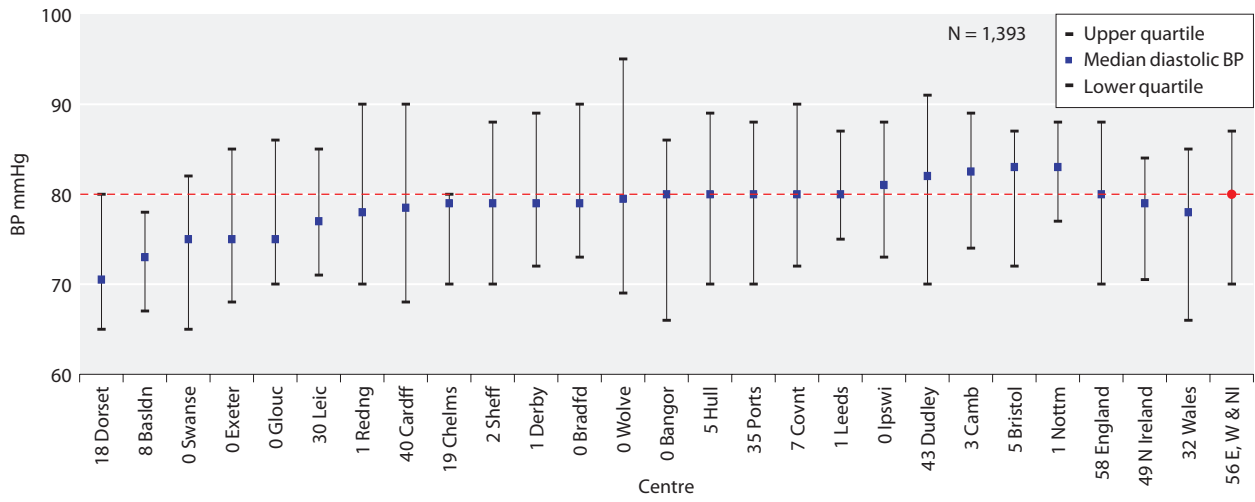


Fig. 10.7. Median diastolic BP: PD

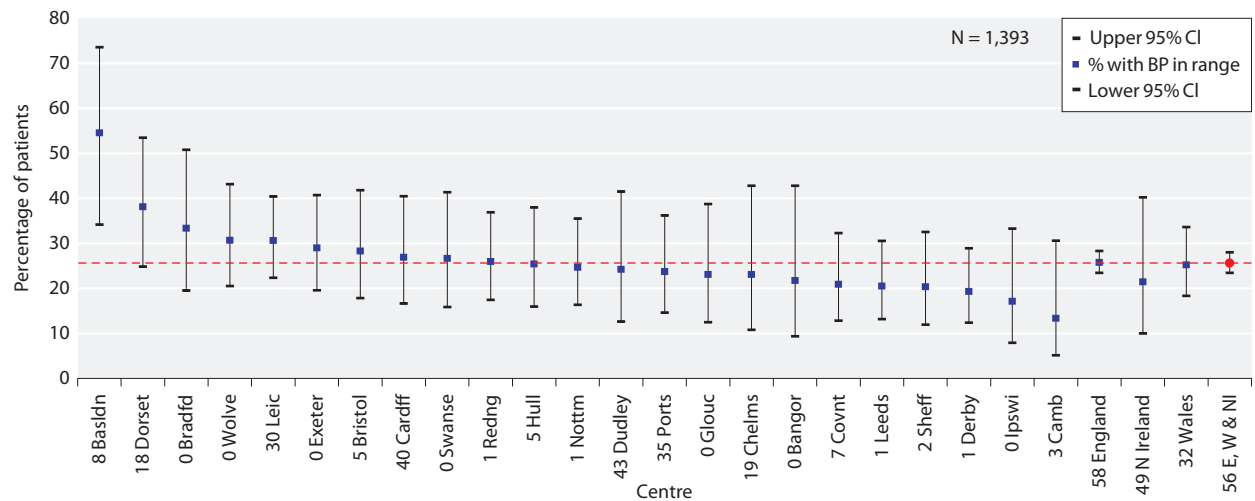


Fig. 10.8. Percentage of patients with BP <130 mmHg systolic and <80 mmHg diastolic: PD

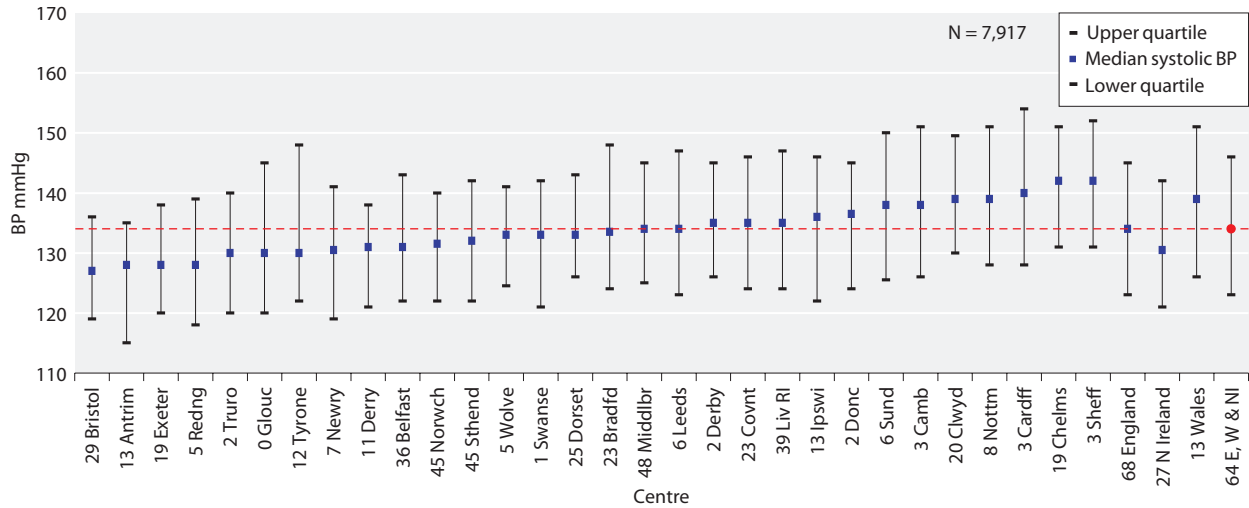


Fig. 10.9. Median systolic BP: Transplant

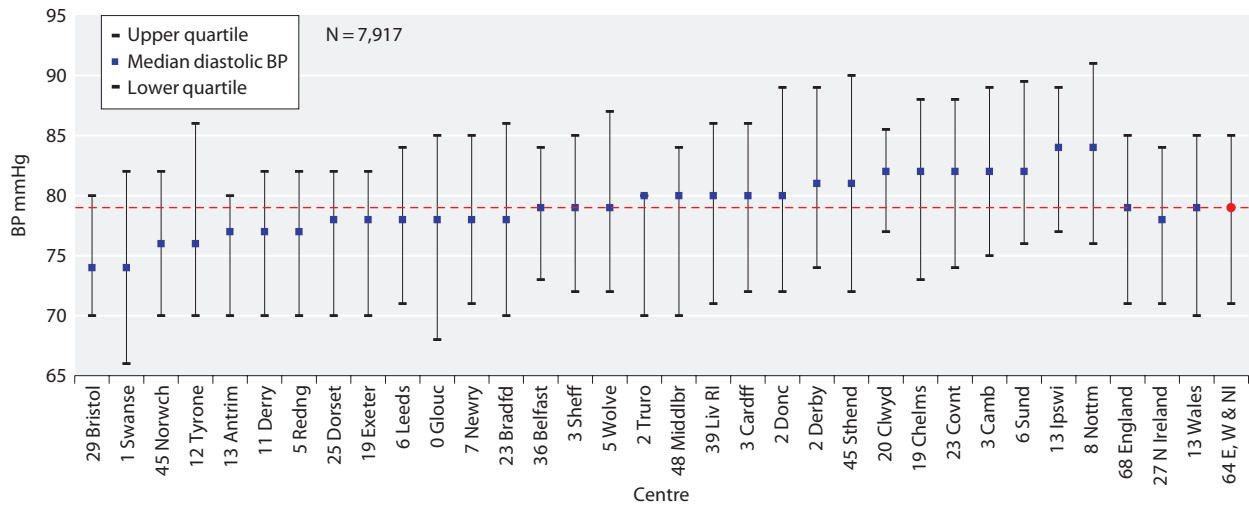


Fig. 10.10. Median diastolic BP: Transplant

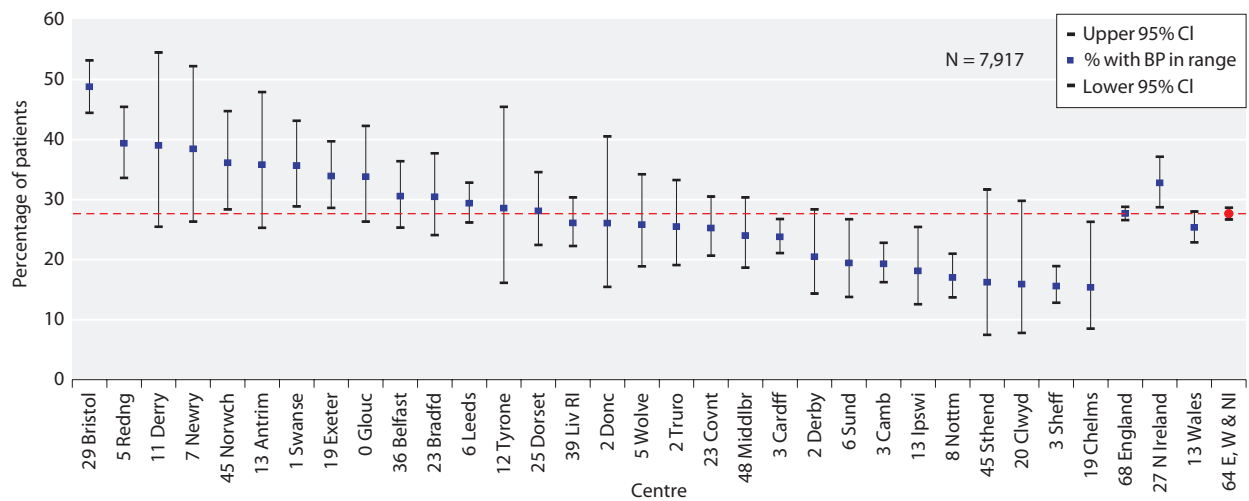


Fig. 10.11. Percentage of patients with BP <130 mmHg systolic and <80 mmHg diastolic: Transplant

Discussion

The utility of UKRR data to inform practice in the area blood pressure control is limited by the absence of reliable and complete information on the use of BP lowering drugs and in HD patients, on intra-dialytic weight gain and the frequency of intra-dialytic hypotension. Analyses are therefore limited to systolic and diastolic BP (measured pre-dialysis and post-dialysis in HD patients).

Bearing in mind these limitations, blood pressure control in 2010 amongst RRT patients in England,

Northern Ireland and Wales remained poor. In patients on HD, this can be explained partly by uncertainty relating to the optimum blood pressure target for patients [11]. However, for those on PD and those with functioning kidney transplants, there remains evidence of marked variation between centres in attainment of nationally agreed blood pressure standards.

Conflicts of interest: none

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