

Chapter 8: Haemoglobin

Summary

- Improvement in haemoglobin concentrations of patients receiving dialysis treatment continued in 2004.
- At the end of 2004, 85% of haemodialysis patients (HD) and 90% of peritoneal dialysis (PD) patients had a haemoglobin concentration above the Renal Association target of 10 g/dl. This compares with 84% of HD and 88% of PD patients in 2003. In total, 86% of all dialysis achieved an Hb \geq 10 g/dl.
- Only 5% of prevalent HD patients and 4% of PD patients had an Hb $<$ 9 g/dl compared with 6% and 4% respectively in 2003.
- Haemoglobin in the first 3 months of starting dialysis treatment has also continued to rise although 40% of individuals new to dialysis still had an Hb $<$ 10 g/dl in 2004 (cf 41%, 43% and 45% in 2003, 2002 and 2001 respectively). 19% had an Hb $<$ 9 g/dl in 2004 which was unchanged from 2003.
- 68% of haemodialysis patients and 75% of peritoneal dialysis patients achieve a haemoglobin above the European guidelines of 11 g/dl. This compares with 65% and 72% respectively in 2003. 70% of the 11,796 dialysis patients with a haemoglobin returned for the last quarter of 2004 achieved an Hb \geq 11 g/dl.

Introduction

This Chapter describes data reported to the Renal Registry relating to management of renal anaemia at the end of 2004. Correction of anaemia with ESAs (erythropoiesis stimulating agents) is the intervention with the greatest potential for improving quality of life of individuals with chronic renal failure. There are well established guidelines governing management of renal anaemia. In the United Kingdom, the

Department of Health (DOH) Renal National Service Framework part 1 states that centres should follow the target level recommended by the Renal Association Standards Document 3rd edition. This standard advises that:

Individuals with CRF should achieve a haemoglobin of 10 g/dl within 6 months of being seen by a nephrologist unless there is a specific reason why it could not be achieved.

The European (EBPG) guidelines set a minimum target of 11 g/dl for all patients and United States (KDOQI) guidelines set a target haemoglobin range of 11–12 g/dl.

Although the Renal Registry has a record of the date of starting renal replacement therapy and the date of first consultation with a nephrologist, it does not collect a specific six month value for haemoglobin from this date, so it is not possible to assess how frequently the target of 10 g/dl is being reached within 6 months of referral in chronic kidney disease (CKD) patients. Although little data is collected on patients *before* they start renal replacement therapy some indication of the quality of pre-dialysis management can be inferred from data of patients who have recently started dialysis. The Registry is planning to expand its dataset to include extraction of haemoglobin, ferritin and other biochemical data for the 6 months prior to starting renal replacement therapy.

In all the figures where data are shown by the individual centre, the number adjacent to the name of the renal unit indicates the percentage of missing data at that time point.

Inclusion criteria

Patients treated by dialysis during the last quarter of 2004 were included in the analysis if they had been on the same modality of dialysis in the same centre for 3 months. The last available haemoglobin from each patient in the last quarter of 2004 was used.

Haemoglobin of patients with chronic renal failure in England and Wales

Every year since 1997 data reported to the Registry has demonstrated improvement in anaemia management in renal centres and it is remarkable to note further improvement in the 2004 data (Figure 8.1). This year 85% of haemodialysis patients and 90% of peritoneal dialysis patients in England and Wales had a haemoglobin concentration of 10 g/dl or better (Tables 8.1 and 8.2).

Inevitably a higher proportion of incident patients are anaemic compared to prevalent patients, see Table 8.3 and Figure 8.2. This is partly because of late or acute presentation but some centres also experience difficulties with prescription of ESAs before dialysis starts. However haemoglobin concentrations in patients new to dialysis have been improving year on year (Figure 8.3). These improvements have been supported by the long standing Renal Association guidance and more recently

by the National Service Framework for renal disease.

Less anaemia amongst new dialysis patients reduces the total number of prevalent patients who are anaemic. In addition there appears to be better understanding in renal centres of the need to target a higher haemoglobin concentration for individuals to ensure that they are maintained at haemoglobin over 10 g/dl. At the end of 2004; 69% of dialysis patients in England and 75% of dialysis patients in Wales had haemoglobins greater than or equal to 11 g/dl. 45% in England and 51% in Wales had haemoglobin concentrations greater than 12 g/dl.

Despite the overall increase in haemoglobin concentration for new and prevalent patients there is no evidence that final haemoglobin is being achieved any more quickly than in previous years. Haemoglobin concentration against time on dialysis is shown in Figures 8.4 and 8.5 indicating a similar rate of increase of haemoglobin in haemodialysis patients since 1999. Haemoglobin falls over the first few years on peritoneal dialysis are likely to be due to loss of residual renal function.

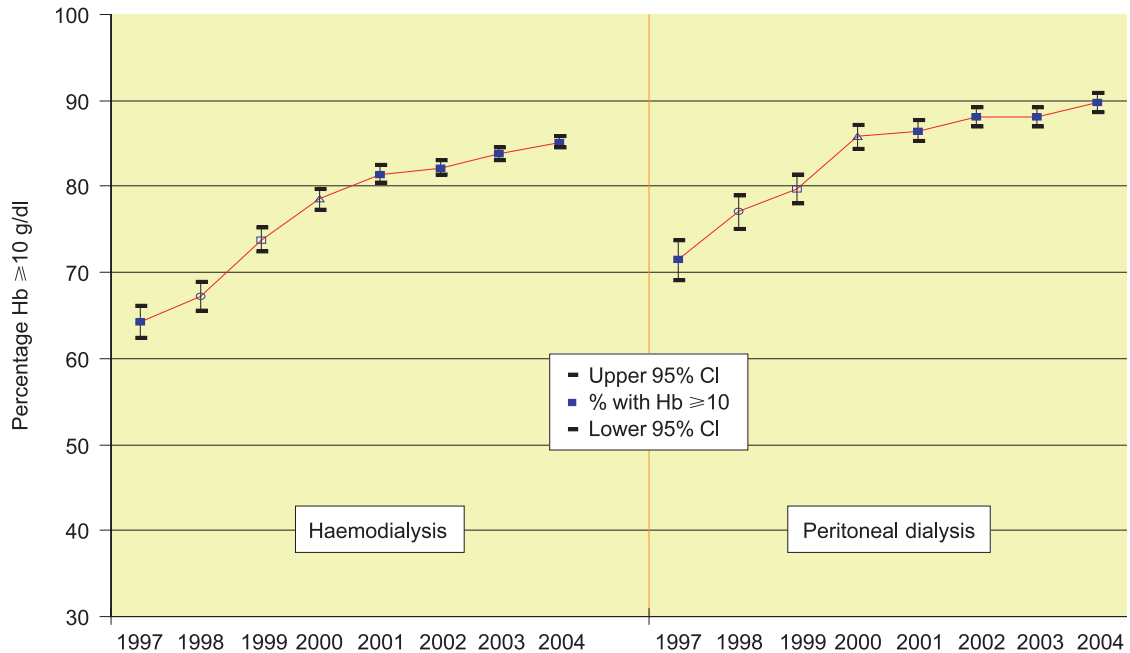


Figure 8.1: Percentage of dialysis patients with Hb ≥ 10 g/dl 1997–2004

Table 8.1: Haemoglobin data for patients on haemodialysis

Centre	% data return	Median Hb g/dl	90% range	Quartile range	Mean Hb g/dl	Standard deviation	% with Hb ≥ 10	% with Hb ≥ 11
Bangor	87	12.1	10.2–14.1	11.4–13.0	12.1	1.3	97	78
Barts	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Basildon	97	11.5	8.8–13.9	10.9–12.7	11.5	1.5	87	69
Bradford	100	12.7	9.7–14.9	11.3–13.5	12.4	1.7	94	81
Brighton	71	10.5	8.1–13.5	9.6–11.8	10.6	1.7	63	42
Bristol	100	11.6	9.4–13.8	10.7–12.5	11.6	1.4	88	68
Cambridge	61	11.5	8.9–13.9	10.4–12.5	11.4	1.6	82	63
Carlisle	93	11.4	8.9–13.9	10.1–12.4	11.4	1.5	78	66
Carshalton	86	11.6	8.7–14.7	10.3–12.6	11.5	1.7	80	64
Chelmsford	97	11.7	8.5–14.6	10.6–12.9	11.7	1.9	84	67
Clwyd	89	12.6	9.2–15.5	11.3–14.4	12.7	2.0	90	84
Coventry	99	11.4	8.8–13.9	10.6–12.4	11.4	1.5	86	64
Cardiff	96	12.1	9.3–14.5	11.1–13.0	12.0	1.5	88	78
Derby	91	11.6	8.7–13.8	10.5–12.5	11.5	1.6	87	68
Dorset	100	12.0	8.6–13.9	10.5–12.9	11.7	1.6	85	67
Dudley	84	11.2	8.4–13.3	10.0–12.3	11.1	1.6	76	59
Exeter	98	11.5	8.9–13.7	10.5–12.5	11.5	1.5	85	66
Gloucester	98	11.4	8.8–14.4	10.2–12.4	11.4	1.6	80	59
Guys	92	11.3	9.1–13.9	10.2–12.6	11.4	1.7	81	59
H&CX	99	11.8	9.0–14.1	10.6–12.7	11.6	1.5	85	69
Heartlands	89	11.3	8.6–13.8	10.1–12.5	11.2	1.6	78	62
Hull	96	11.5	8.9–13.7	10.6–12.3	11.4	1.5	86	68
Ipswich	100	11.5	9.8–12.9	10.8–12.1	11.4	1.0	87	70
Kings	95	11.6	9.2–14.2	10.5–12.7	11.6	1.6	86	65
Leeds	99	12.4	9.5–14.8	11.4–13.4	12.4	1.6	94	83
Leicester	98	11.6	8.6–13.9	10.6–12.7	11.5	1.6	83	66
Liverpool	95	12.4	9.2–15.2	11.1–13.4	12.3	1.8	90	78
ManWst	66	11.1	8.5–13.7	9.9–12.4	11.1	1.8	75	55
Middlbrough	95	11.9	8.8–14.5	10.4–13.0	11.7	1.8	86	65
Newcastle	100	11.9	8.0–14.3	10.6–13.1	11.7	1.9	80	70
Norwich	99	11.8	9.9–14.0	11.0–12.7	11.8	1.2	94	75
Nottingham	97	11.5	8.9–13.8	10.7–12.5	11.5	1.5	85	69
Oxford	99	11.5	8.7–14.0	10.4–12.4	11.4	1.6	85	62
Plymouth	55	11.3	8.8–14.0	10.4–12.7	11.5	1.8	86	63
Portsmouth	100	12.0	8.9–14.4	10.6–13.0	11.8	1.7	84	70
Preston	92	11.8	9.0–14.2	10.5–12.9	11.7	1.6	83	64
QEH	96	11.6	8.5–14.0	10.4–12.6	11.5	1.7	82	66
Reading	97	11.8	9.1–14.1	10.6–12.4	11.6	1.5	86	69
Sheffield	100	11.6	8.7–14.0	10.6–12.8	11.6	1.6	86	67
Shrewsbury	100	12.0	9.3–13.7	10.5–12.8	11.7	1.4	90	68
Stevenage	97	12.0	9.4–13.6	11.0–12.6	11.8	1.3	90	75
Southend	99	11.4	9.1–13.1	10.5–11.9	11.2	1.2	86	64
Sunderland	98	12.0	8.9–14.2	10.7–13.1	11.8	1.7	84	71
Swansea	97	11.9	8.6–14.0	10.7–12.8	11.7	1.6	86	71
Truro	100	11.6	9.6–13.4	10.8–12.1	11.5	1.1	90	69
Wirral	6	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wolverhampton	100	12.6	9.1–14.9	11.3–13.5	12.3	1.8	90	80
Wrexham	84	11.5	8.5–13.8	10.6–12.6	11.5	1.7	84	69
York	94	12.8	8.3–15.1	11.5–13.7	12.4	2.0	89	81
England	89	11.7	8.9–14.2	10.6–12.7	11.6	1.6	85	68
Wales	88	12.0	9.1–14.5	11.0–13.0	11.9	1.6	87	75
E&W	89	11.7	8.9–14.2	10.6–12.8	11.7	1.6	85	68

Table 8.2: Haemoglobin data for patients on peritoneal dialysis

Centre	% data return	Median Hb g/dl	90% range	Quartile range	Mean Hb g/dl	Standard deviation	% with Hb \geq 10 g/dl	% with Hb \geq 11 g/dl
Bangor	96	12.8	10.6–15.1	12.0–13.8	12.9	1.4	96	91
Barts	0	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Basildon	100	12.5	9.9–14.3	11.6–13.6	12.3	1.5	91	82
Bradford	100	12.6	10.3–15.4	11.9–13.3	12.7	1.7	95	86
Brighton	99	11.9	8.5–14.4	11.2–13.0	11.9	1.8	86	78
Bristol	100	12.1	10.0–15.0	11.3–13.0	12.2	1.5	96	85
Cambridge	96	11.9	9.3–15.0	10.9–12.8	11.9	1.7	88	71
Carlisle	93	12.8	9.9–15.7	10.8–14.2	12.7	2.0	92	69
Carsharltton	97	12.1	9.7–14.9	11.2–13.2	12.2	1.6	91	82
Chelmsford	97	12.4	8.3–14.3	10.7–13.1	11.9	1.7	88	72
Clwyd	100	12.1	10.4–16.2	10.9–14.9	12.8	2.3	100	67
Coventry	96	11.8	8.8–14.6	10.7–12.7	11.8	1.7	90	70
Cardiff	97	12.3	9.3–14.2	11.0–13.1	12.0	1.5	92	76
Derby	95	11.9	8.7–14.1	11.3–12.7	11.8	1.5	90	79
Dorset	100	12.2	10.0–15.1	11.2–13.3	12.4	1.6	96	79
Dudley	100	12.0	9.8–15.2	11.3–13.6	12.3	1.6	92	86
Exeter	100	11.7	9.5–13.7	11.0–12.5	11.8	1.3	92	77
Gloucester	96	11.8	9.0–13.1	10.9–12.7	11.6	1.3	88	68
Guys	99	12.0	9.2–14.4	10.8–12.8	11.8	1.7	89	72
H&CX	99	12.0	10.0–14.4	11.1–13.0	12.1	1.4	97	79
Heartlands	100	12.2	10.1–14.5	10.9–12.7	12.0	1.4	96	71
Hull	98	11.9	9.9–14.2	11.0–12.7	12.0	1.5	93	79
Ipswich	100	11.7	9.7–14.1	10.7–12.7	11.7	1.5	90	64
Kings	90	12.4	9.9–14.2	11.5–13.0	12.2	1.5	94	85
Leeds	98	12.4	9.7–16.4	11.3–13.2	12.4	1.9	92	80
Leicester	97	11.8	8.5–15.0	10.5–12.9	11.7	1.9	82	71
Liverpool	93	12.4	9.8–14.7	11.2–13.6	12.4	1.5	91	80
ManWst	98	11.6	7.6–14.2	10.3–12.4	11.3	2.0	77	64
Middlbrough	100	12.7	9.9–14.4	11.4–13.2	12.4	1.2	94	94
Newcastle	100	11.7	8.9–14.3	10.4–13.5	11.8	1.8	80	69
Norwich	100	12.4	10.9–15.8	11.8–13.4	12.7	1.4	100	93
Nottingham	100	11.6	9.2–13.9	10.5–12.7	11.7	1.5	90	68
Oxford	99	12.0	9.0–14.4	10.9–13.0	11.9	1.7	88	74
Plymouth	92	12.1	10.5–14.7	11.8–13.4	12.5	1.3	100	91
Portsmouth	96	12.6	9.6–15.1	11.5–13.9	12.6	1.6	95	81
Preston	100	11.2	9.4–13.3	10.4–12.1	11.3	1.3	87	57
QEH	98	11.5	8.5–15.3	10.5–12.5	11.5	1.8	83	70
Reading	99	12.0	8.9–15.3	11.3–12.6	11.9	1.7	89	77
Sheffield	99	11.6	8.8–14.2	10.8–12.6	11.6	1.6	87	68
Shrewsbury	100	12.7	10.0–15.4	11.4–13.5	12.6	1.6	97	84
Stevenage	98	11.3	9.2–13.5	10.8–12.1	11.3	1.5	87	69
Southend	95	12.1	9.7–16.6	11.1–13.1	12.4	1.8	95	79
Sunderland	100	11.8	10.1–13.2	10.8–12.5	11.7	1.0	100	75
Swansea	99	11.5	8.4–13.6	10.3–12.6	11.3	1.7	79	59
Truro	98	11.8	9.2–14.0	10.7–12.9	11.8	1.6	86	68
Wirral	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Wolverhampton	100	12.9	11.0–14.8	12.0–13.8	12.9	1.4	98	98
Wrexham	95	12.4	10.9–14.4	11.8–13.3	12.4	1.3	98	95
York	100	12.7	11.1–15.4	12.1–13.6	12.9	1.4	100	95
England	91	12.0	9.2–14.6	11.0–13.0	12.0	1.7	90	75
Wales	91	12.0	8.8–14.2	10.9–12.9	11.9	1.6	89	74
E&W	91	12.0	9.2–14.6	11.0–13.0	12.0	1.7	90	75

Table 8.3: Haemoglobin levels for new patients starting dialysis

Centre	% data return	Median Hb g/dl	90% range	Quartile range	% Hb \geq 10 g/dl
Bangor	100	10.9	8.7–13.8	9.9–12.6	72
Barts	0	n/a	n/a	n/a	n/a
Basildon	91	10.2	8.0–12.4	9.3–11.2	65
Bradford	98	10.8	8.4–13.2	9.5–12.1	65
Brighton	78	9.8	8.0–12.3	9.1–10.8	44
Bristol	100	10.1	7.8–12.7	9.0–10.9	52
Cambridge	93	10.7	8.0–14.3	9.6–12.1	65
Carlisle	100	10.2	8.2–13.3	9.3–12.7	57
Carshalton	98	10.6	8.3–13.5	9.7–11.7	71
Chelmsford	81	11.1	6.8–13.7	9.7–11.9	72
Clwyd	90	8.9	7.1–11.6	7.8–9.3	22
Coventry	99	10.5	7.6–13.2	9.4–11.2	61
Cardiff	98	10.8	8.1–13.1	9.6–11.8	69
Derby	84	10.0	7.8–12.2	9.1–10.8	53
Dorset	98	10.5	7.8–13.9	9.6–12.0	62
Dudley	100	10.6	8.0–12.9	9.8–11.4	71
Exeter	98	10.3	8.2–12.5	9.5–11.3	60
Gloucester	100	9.9	7.7–12.8	9.0–11.4	50
Guys	94	10.9	8.4–13.7	9.9–12.0	71
H&CX	100	10.0	7.5–13.2	8.9–11.3	51
Heartlands	98	10.1	7.4–12.8	8.7–10.9	51
Hull	100	9.4	6.9–12.5	8.5–10.7	38
Ipswich	90	10.8	8.4–13.2	9.8–11.5	68
Kings	98	10.0	8.2–13.5	9.2–11.0	51
Leeds	97	10.6	7.9–13.8	9.6–11.8	64
Leicester	99	10.1	7.8–13.4	8.9–11.1	56
Liverpool	98	11.1	8.2–14.5	9.9–12.0	74
ManWst	96	10.2	7.6–13.6	9.1–11.9	55
Middlbrough	99	9.9	7.7–13.4	8.9–10.7	48
Newcastle	94	10.1	6.6–13.6	8.7–11.6	51
Norwich	95	10.0	7.8–12.9	8.8–11.1	50
Nottingham	99	10.3	8.4–13.2	9.3–11.4	61
Oxford	99	10.5	8.0–13.4	9.5–11.5	67
Plymouth	71	10.4	8.4–12.8	9.6–11.3	62
Portsmouth	100	10.6	7.8–13.7	9.5–11.6	64
Preston	95	9.8	7.5–13.1	9.3–11.0	48
QEH	87	10.3	7.6–13.1	9.1–11.4	58
Reading	99	10.8	8.2–13.2	9.8–12.0	72
Sheffield	100	10.5	8.1–12.9	9.4–11.6	65
Shrewsbury	100	10.6	8.3–13.7	9.7–11.7	70
Stevenage	97	10.3	7.8–13.1	9.1–11.1	55
Southend	95	10.3	8.3–12.5	9.4–11.2	63
Sunderland	100	10.7	8.3–13.3	9.6–11.1	64
Swansea	96	10.1	8.0–12.5	9.1–11.4	54
Truro	100	10.9	8.8–14.4	9.9–11.6	72
Wirral	2	n/a	n/a	n/a	n/a
Wolverhampton	100	10.8	7.7–14.2	9.2–12.1	65
Wrexham	89	10.6	8.9–12.6	9.5–12.1	60
York	100	10.8	7.9–14.0	9.2–11.8	63
England	91	10.3	7.9–13.2	9.2–11.4	60
Wales	85	10.5	8.0–13.0	9.3–11.6	62
E&W	90	10.3	7.9–13.2	9.2–11.5	60

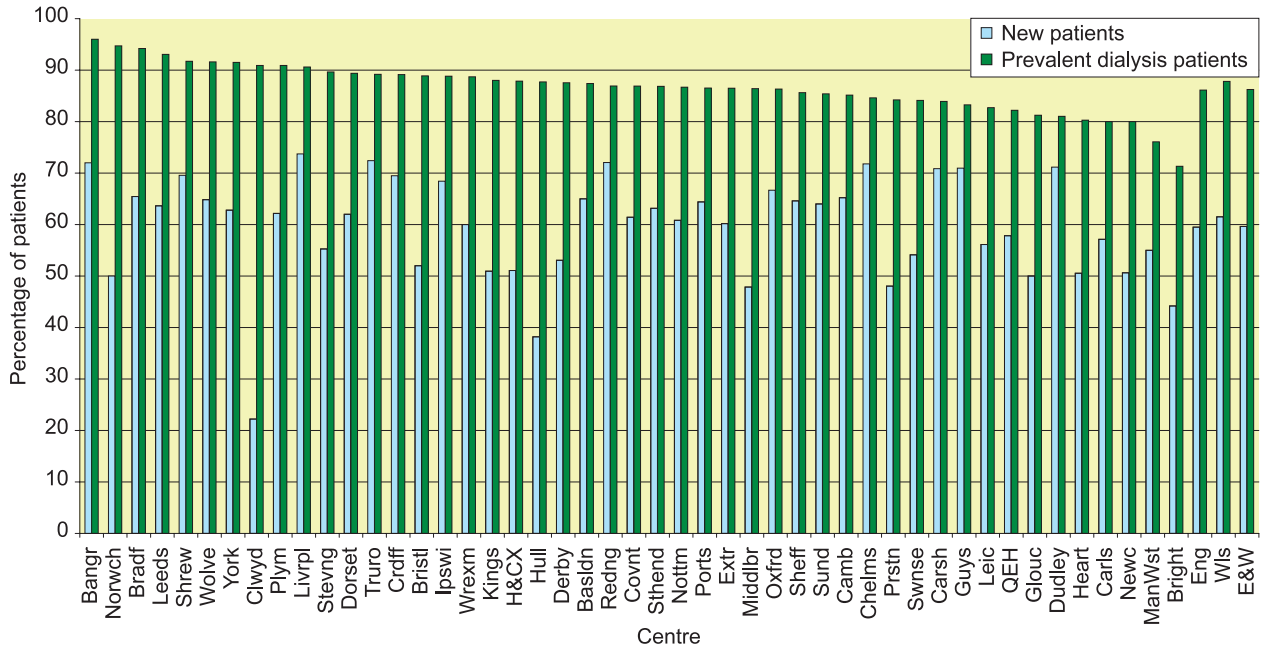


Figure 8.2: Percentage of new and prevalent patients with Hb ≥ 10 g/dl

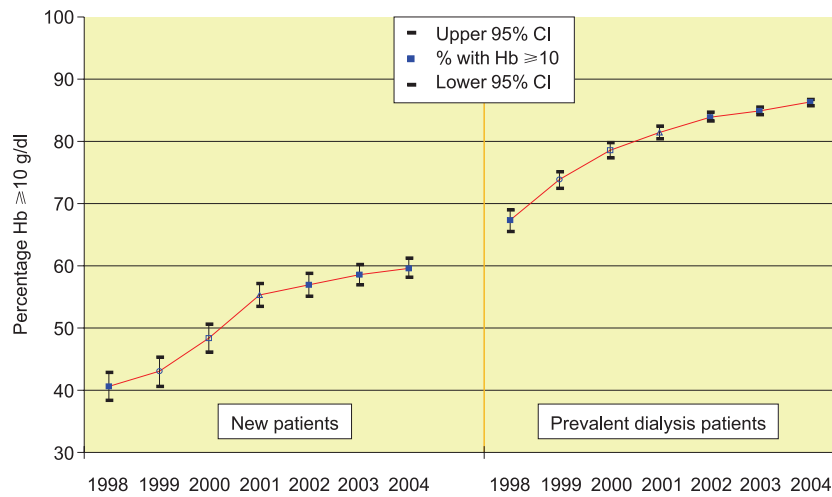


Figure 8.3: Change in % of patients starting RRT with Hb ≥ 10 g/dl in E&W 1998–2004

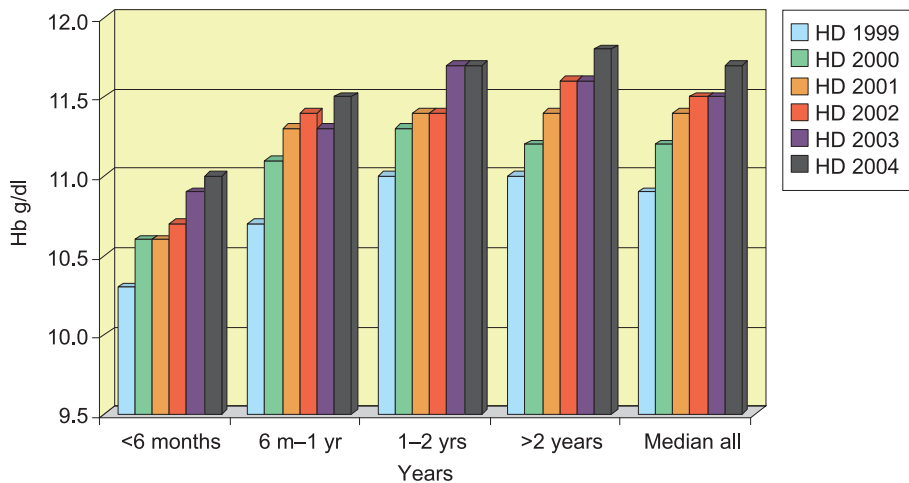


Figure 8.4: Median haemoglobin by length of time on RRT, HD patients

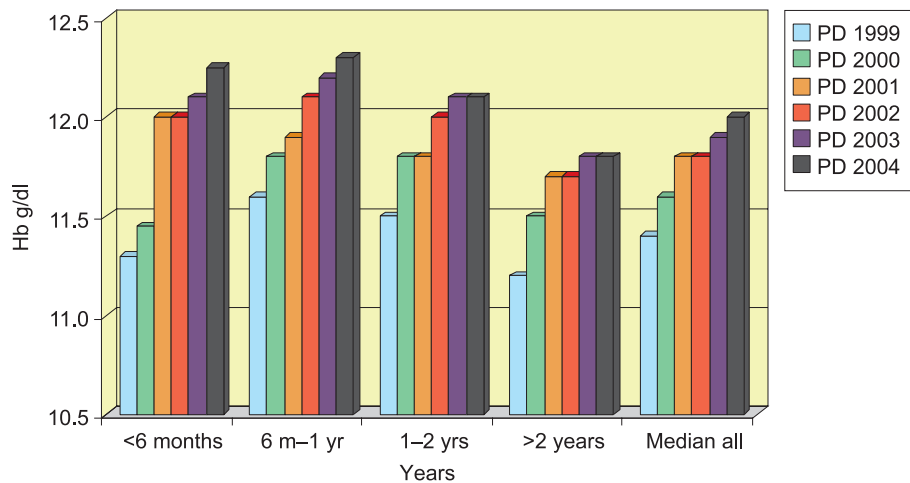


Figure 8.5: Median haemoglobin by length of time on RRT, PD patients

Haemoglobin in individual dialysis centres for prevalent patients

The data describing the haemoglobin distribution in each centre is tabulated in Table 8.1 for haemodialysis and Table 8.2 for peritoneal dialysis. Figures 8.6 and 8.7 show the distributions graphically. Median haemoglobin concentration, percentage with haemoglobin ≥ 10 g/dl and ≥ 11 g/dl for each centre are shown in Figures 8.8, 8.9 and 8.10 for haemodialysis and Figures 8.11, 8.12, 8.13 for peritoneal dialysis.

In 2004, 30 of 49 centres achieved the target of $\geq 85\%$ patients on haemodialysis with haemoglobin ≥ 10 g/dl compared to 18 of 40 centres in 2003. For peritoneal dialysis, 8 centres failed to achieve 85% of patients with Hb ≥ 10 g/dl in 2003 and this fell to 5 centres in 2004. Median haemoglobin greater than 12g/dl

for haemodialysis patients was found in 12 centres in 2004 compared to 4 centres in 2003.

Plotting median haemoglobin against percentage with haemoglobin ≥ 10 g/dl for each centre suggests a plateau once the median rises above a level of approximately 12.2 g/dl for both haemodialysis and peritoneal dialysis (Figures 8.14, 8.15, 8.16 and 8.17). A higher median than this does not significantly increase the proportion of patients achieving the Renal Association standard. A proportion of patients receiving dialysis will have non renal causes of anaemia, erythropoietin resistance or an acute fall in haemoglobin associated with illness. The position of the plateau in 2004 suggests that this is approximately 5–10% of haemodialysis patients and 0–10% of peritoneal dialysis patients. Within the range of haemoglobin concentrations reported by UK renal units in 2004 the percentage over 11 g/dl was not sufficient to reach a plateau.

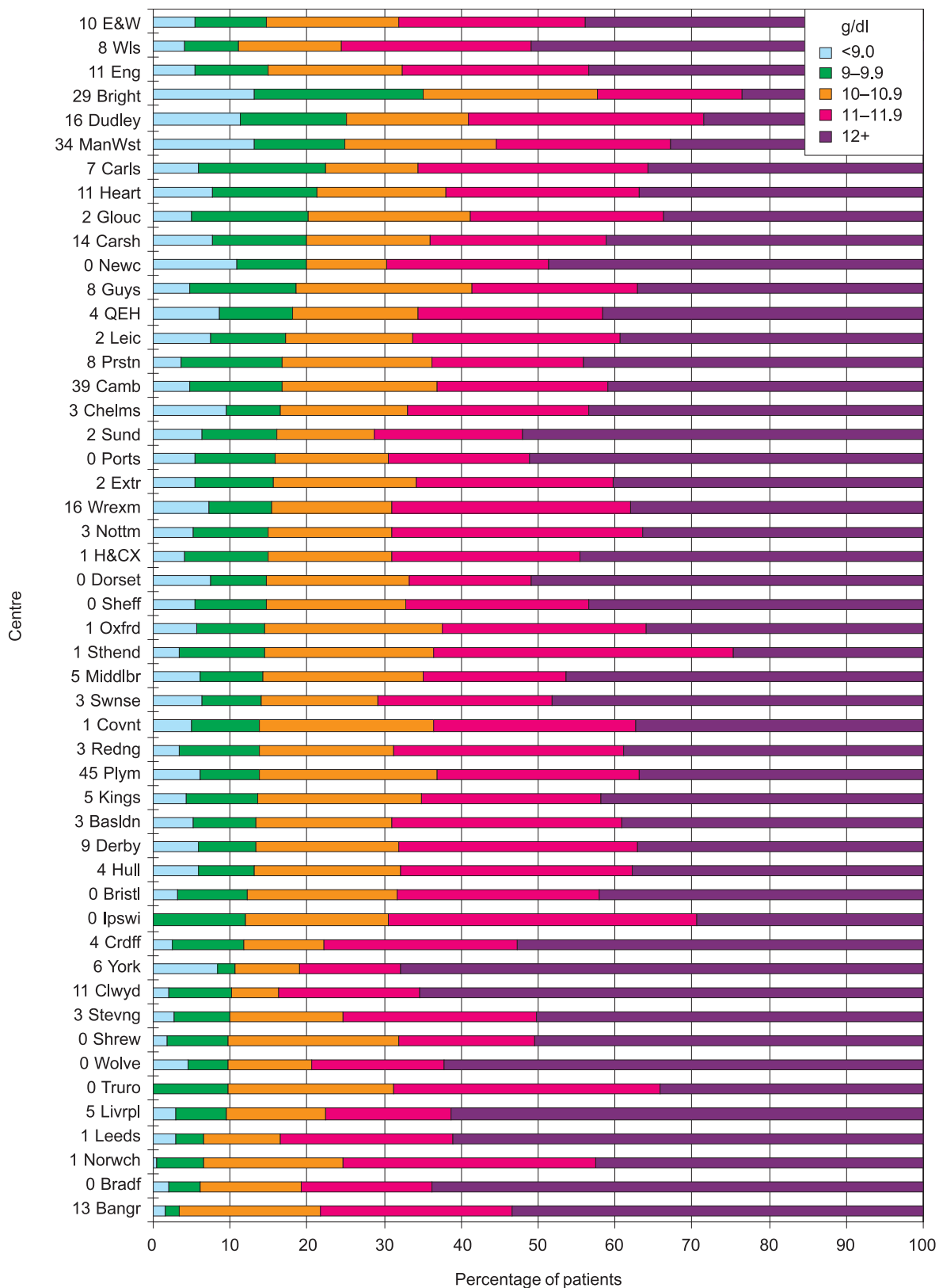


Figure 8.6: Distribution of haemoglobin in patients on HD

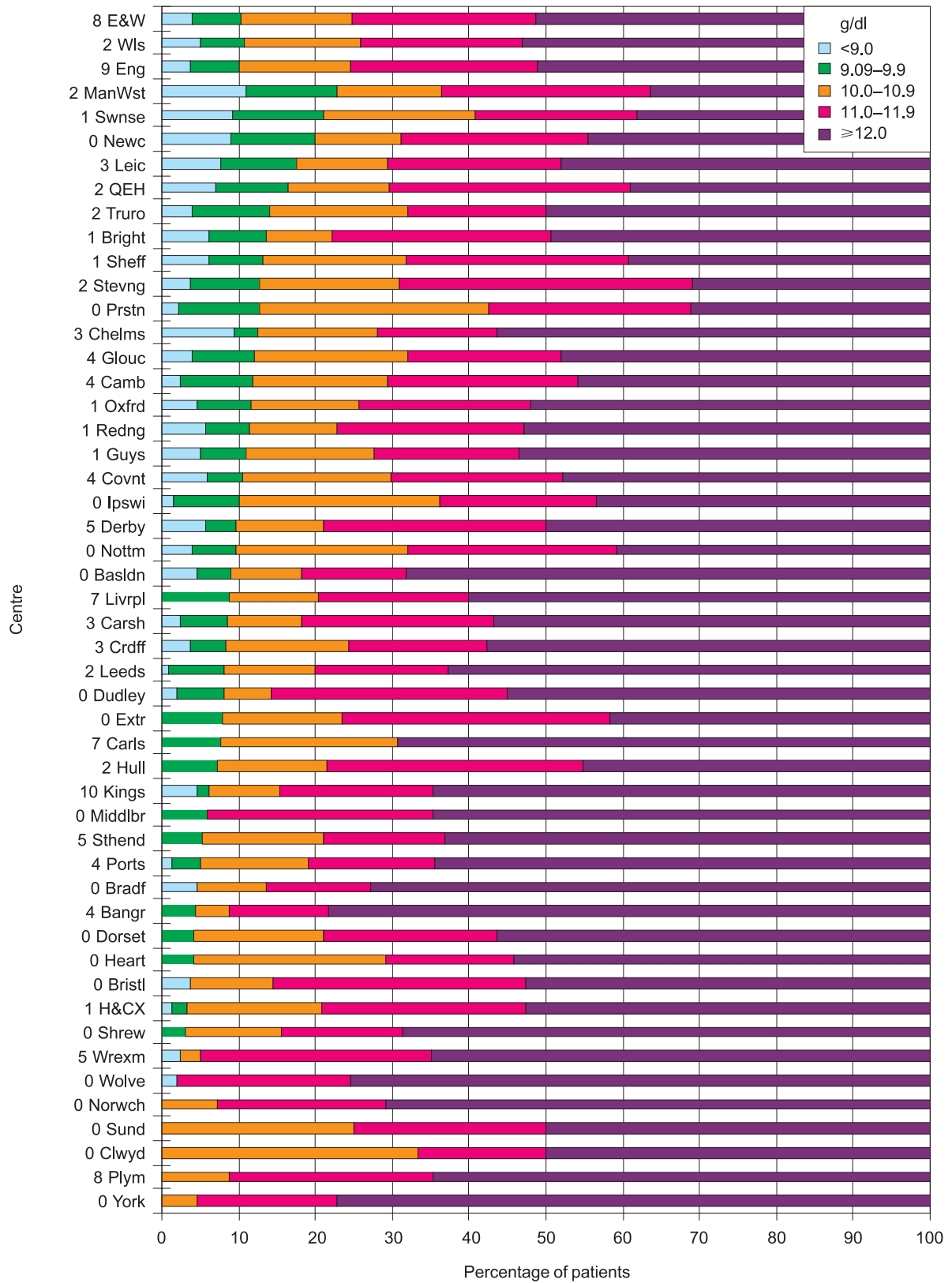


Figure 8.7: Distribution of haemoglobin in patients on PD

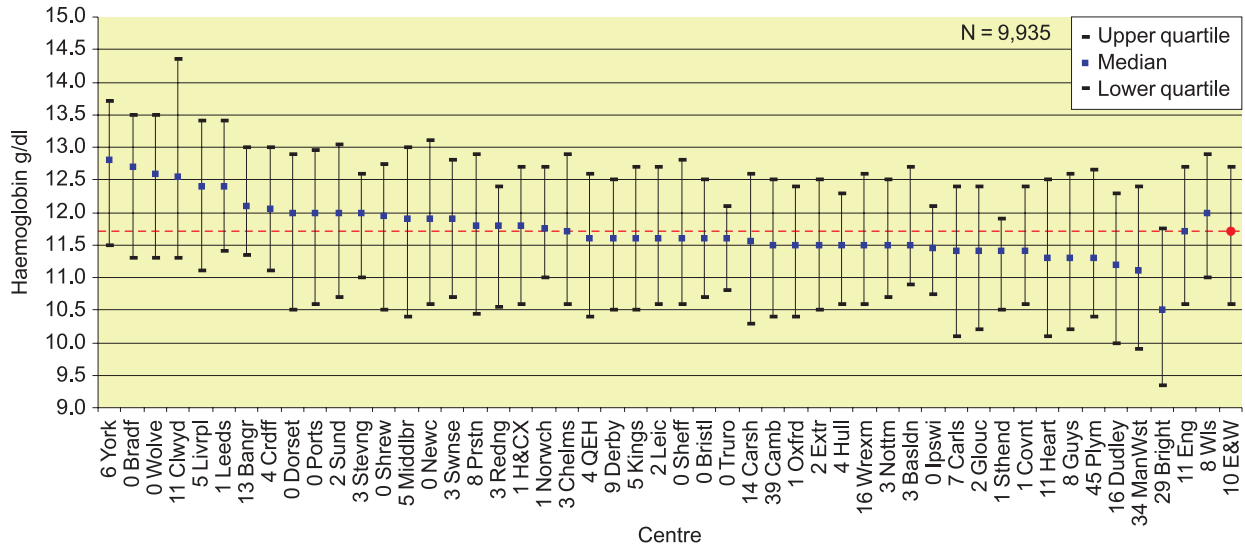


Figure 8.8: Median haemoglobin: HD

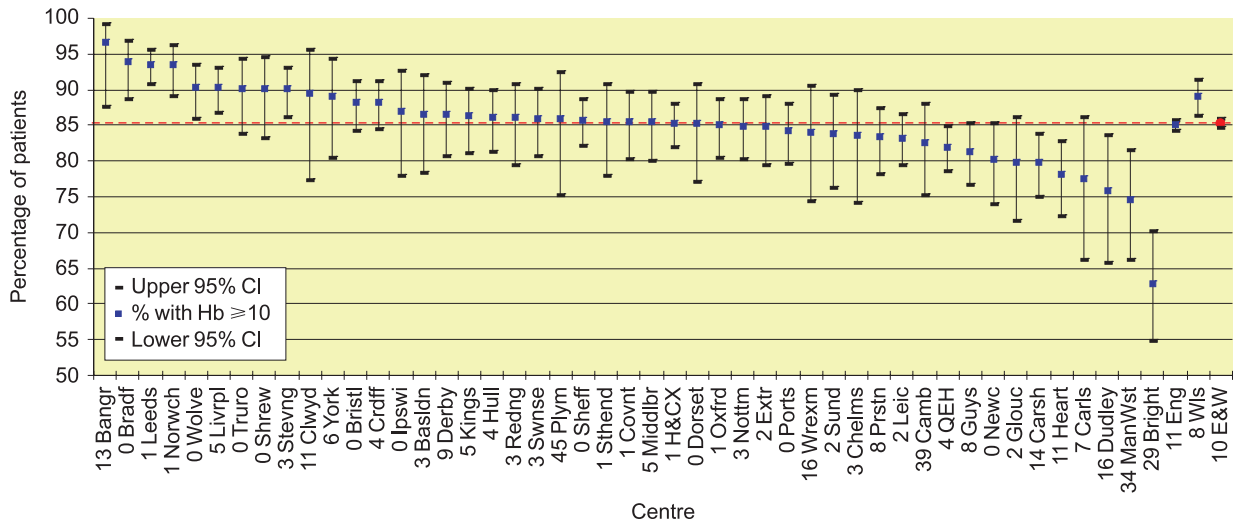


Figure 8.9: Percentage of HD patients with Hb ≥ 10 g/dl

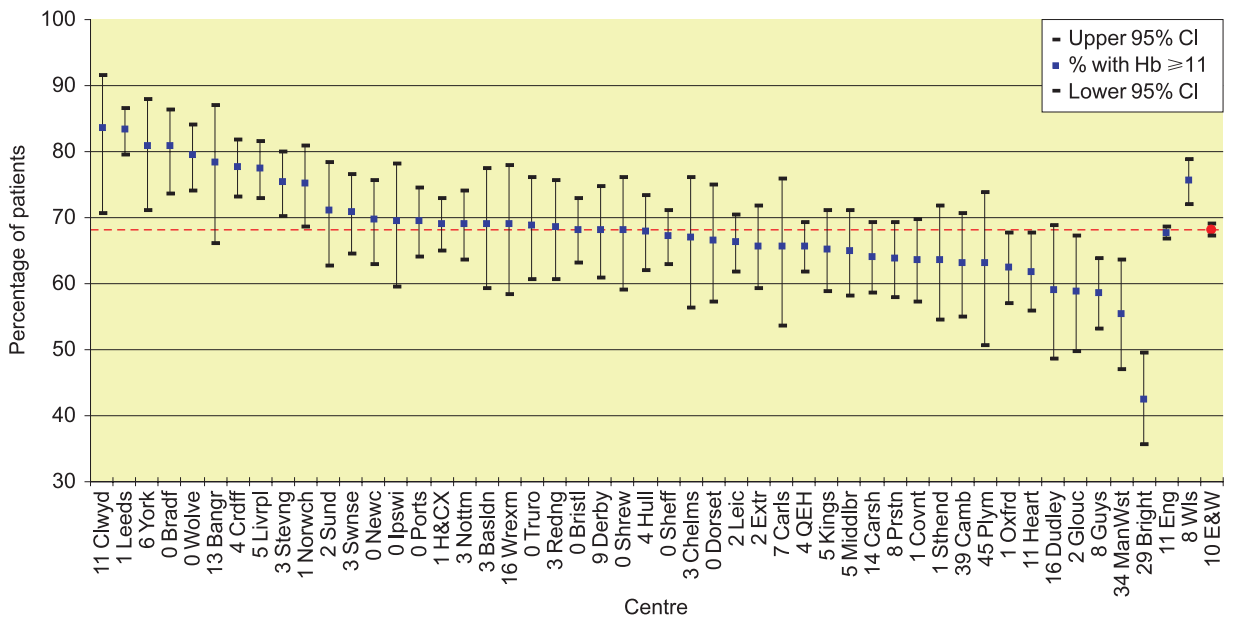


Figure 8.10: Percentage of HD patients with Hb ≥ 11 g/dl

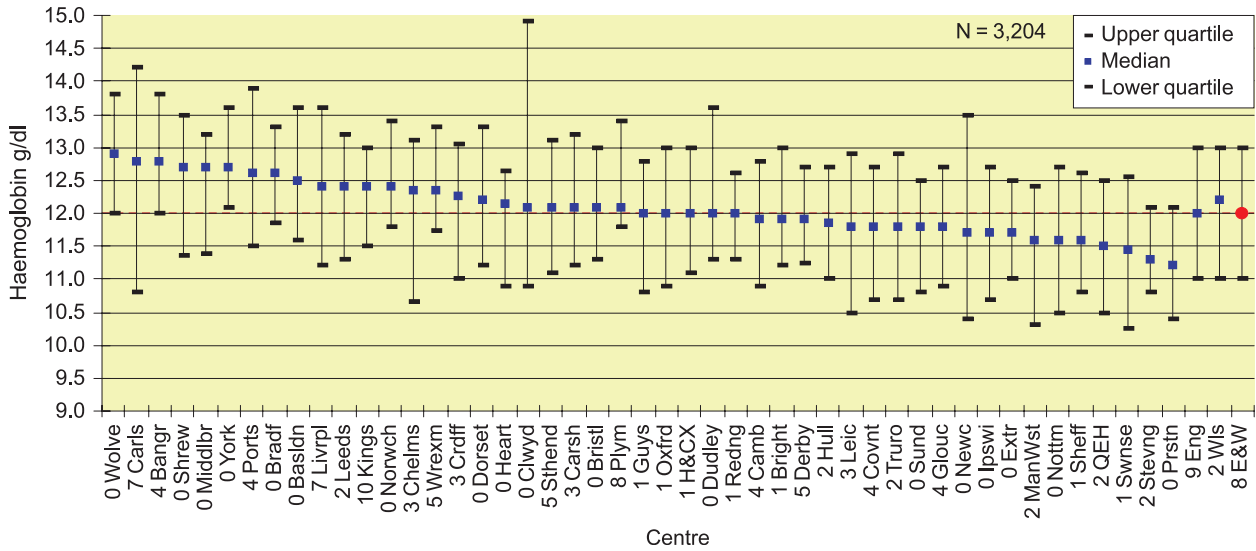


Figure 8.11: Median haemoglobin: PD

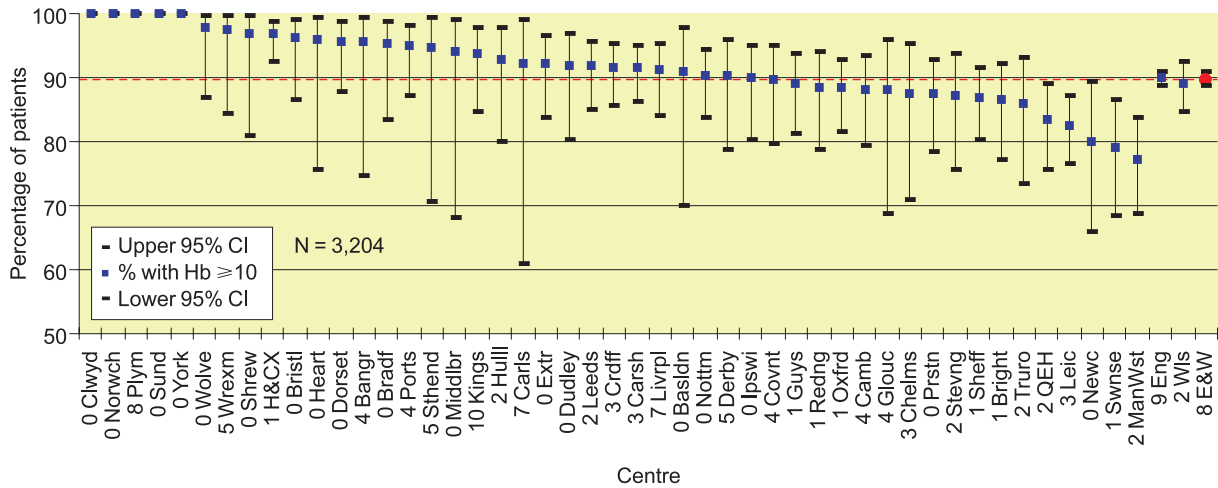


Figure 8.12: Percentage of PD patients with Hb ≥ 10 g/dl

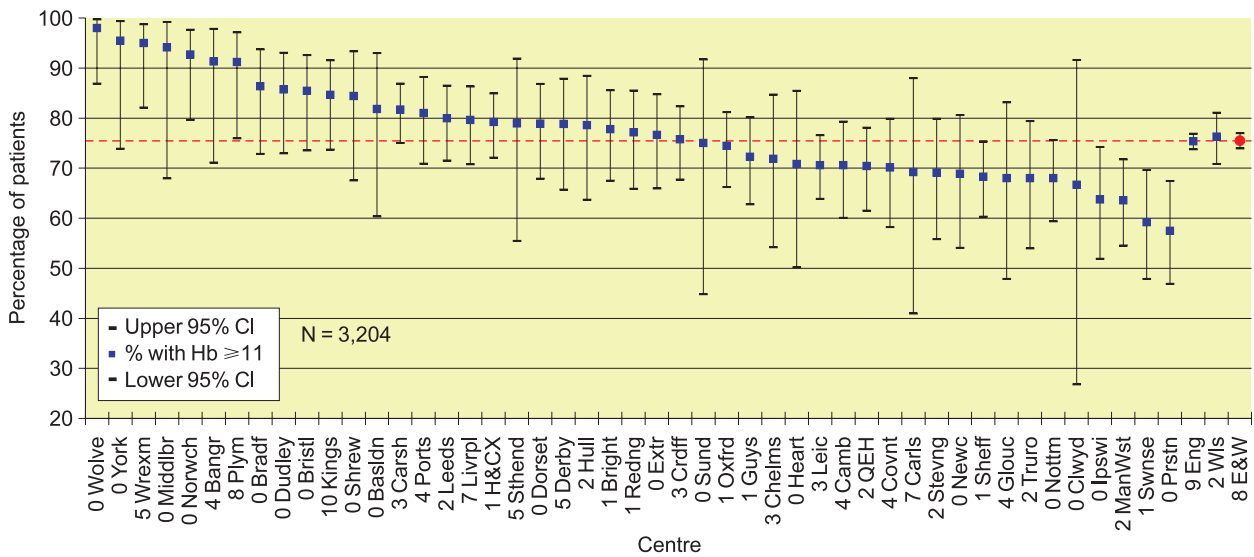


Figure 8.13: Percentage of PD patients with Hb ≥ 11 g/dl

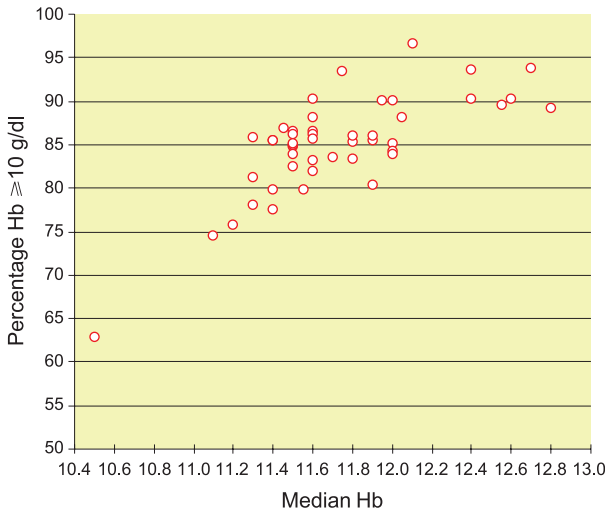


Figure 8.14: Percentage of patients with Hb ≥ 10 g/dl plotted against median Hb: HD

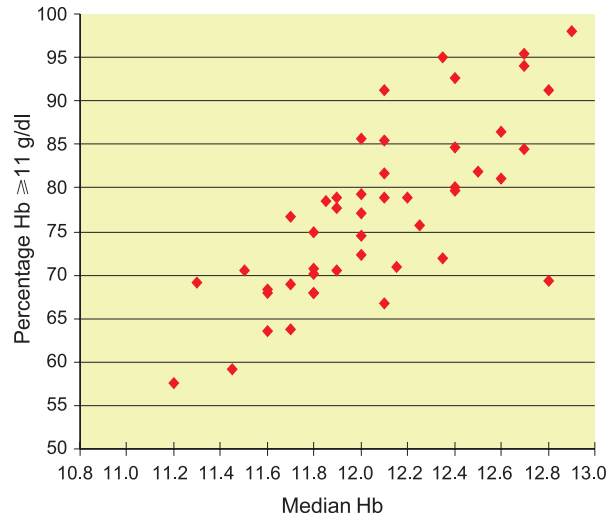


Figure 8.17: Percentage of patients with Hb ≥ 11 g/dl plotted against median Hb: PD

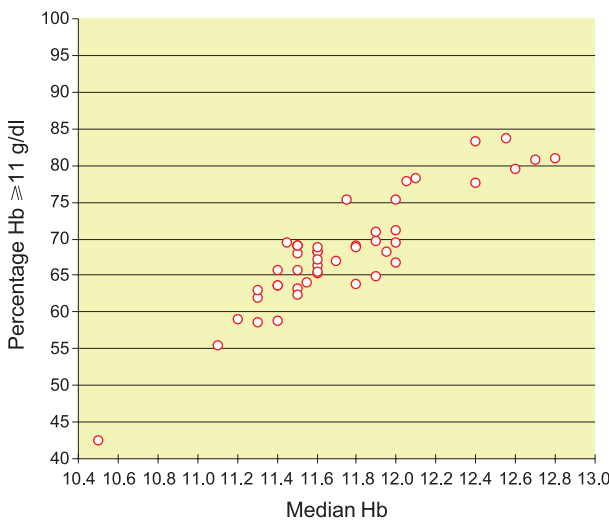


Figure 8.15: Percentage of patients with Hb ≥ 11 g/dl plotted against median Hb: HD

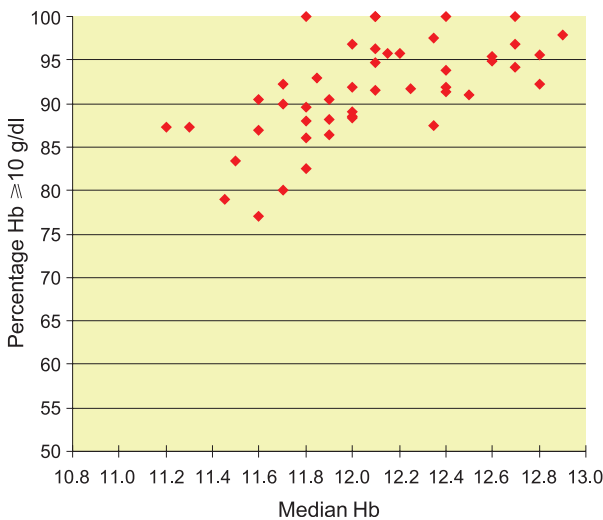


Figure 8.16: Percentage of patients with Hb ≥ 10 g/dl plotted against median Hb: PD

Changes in haemoglobin over time in individual centres

Within the general trend to improved anaemia management there is inevitably variation between individual centres. Each centre's data since their entry onto the registry is shown in Figures 8.18, 8.19, 8.20 and 8.21. Unsurprisingly centres with smaller patient numbers have more variable data year to year. The general trend to improvement is shown by the fact that whilst between 1999 and 2003 12 centres recorded less than 75% of patients with Hb ≥ 10 g/dl on at least one occasion, in 2004 only one centre was below 75%.

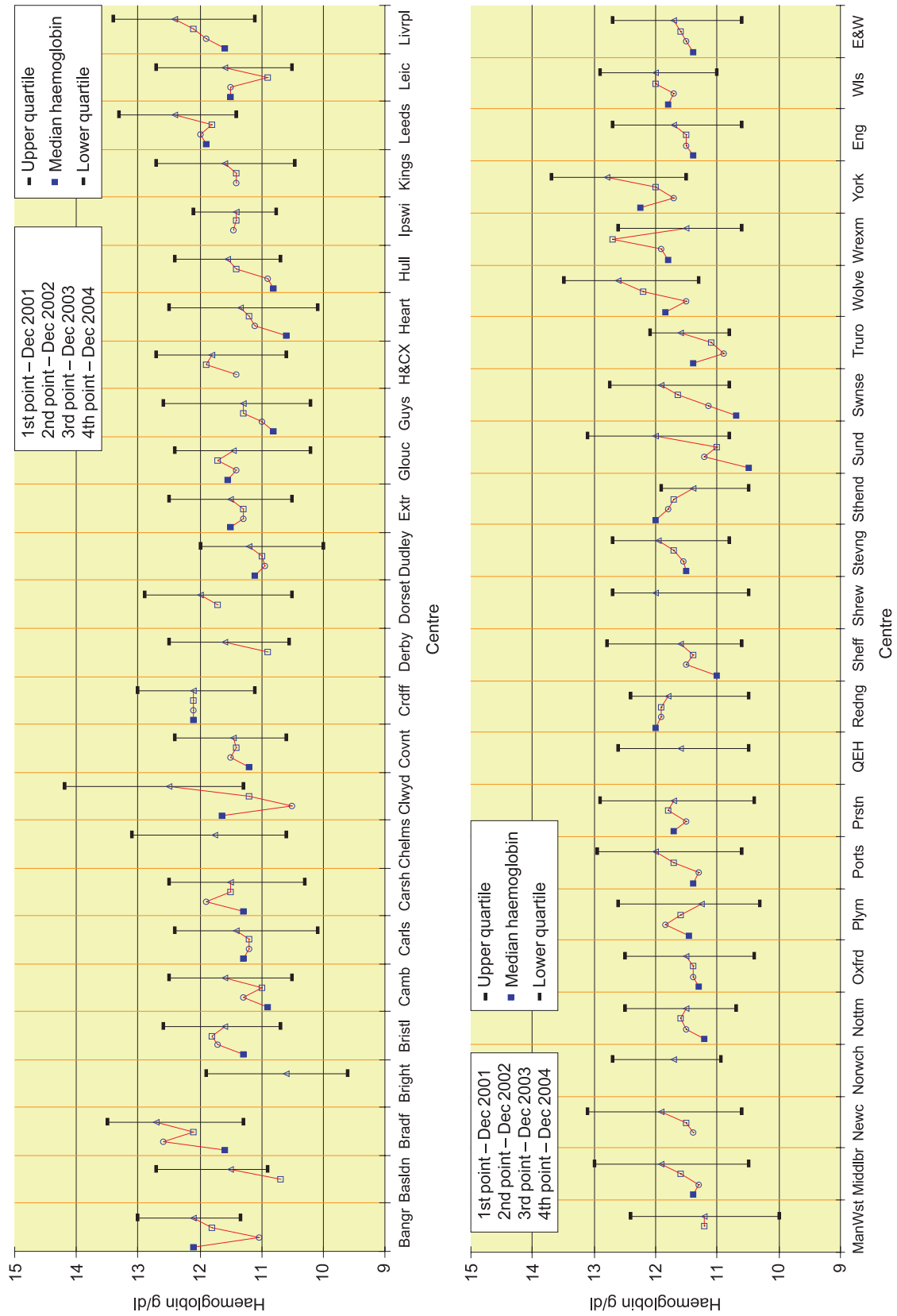


Figure 8.18: Median Hb from end of 2001 to end of 2004 by centre: HD

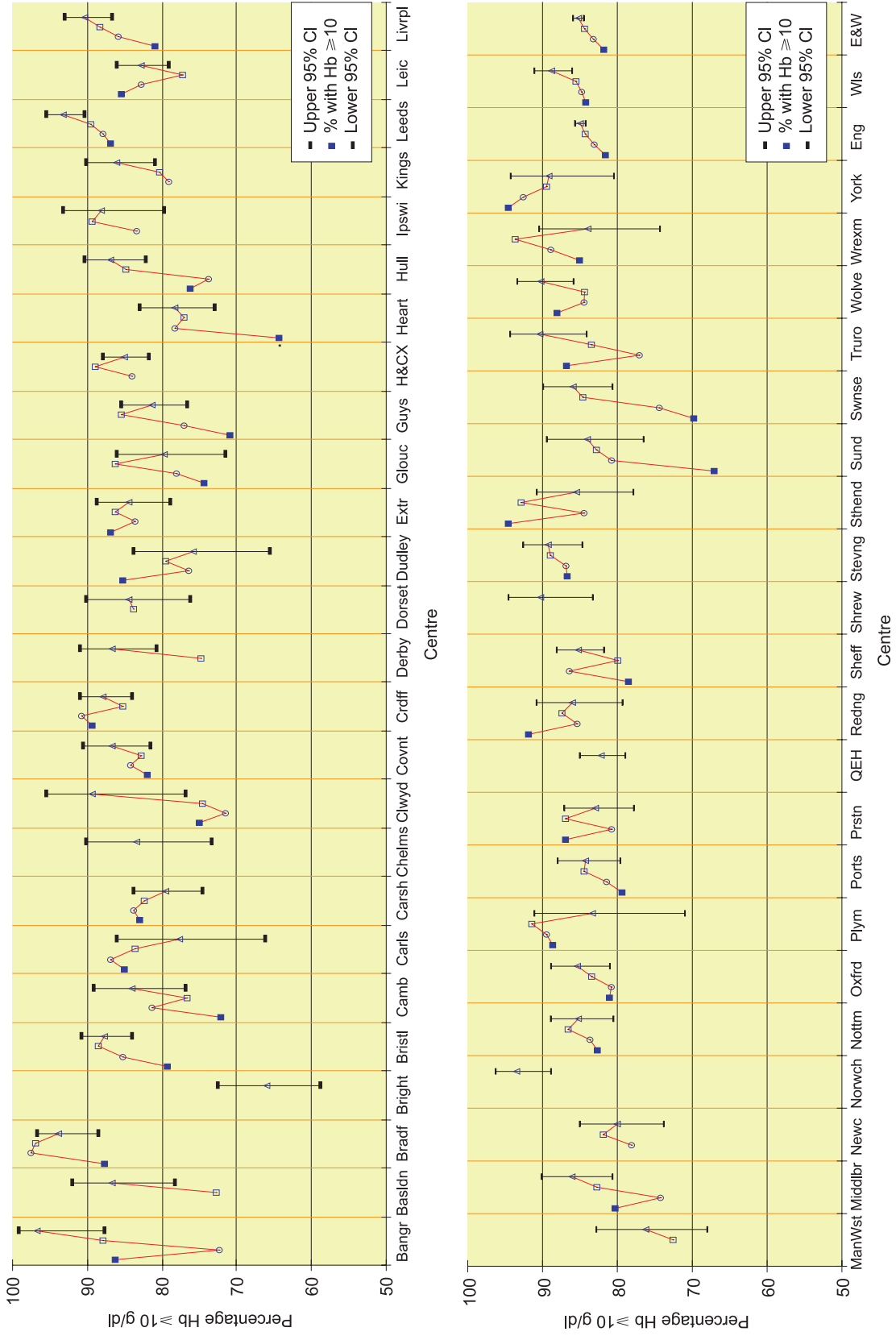


Figure 8.19: Hb ≥ 10 g/dl at end of 2001 to end of 2004 by centre: HD

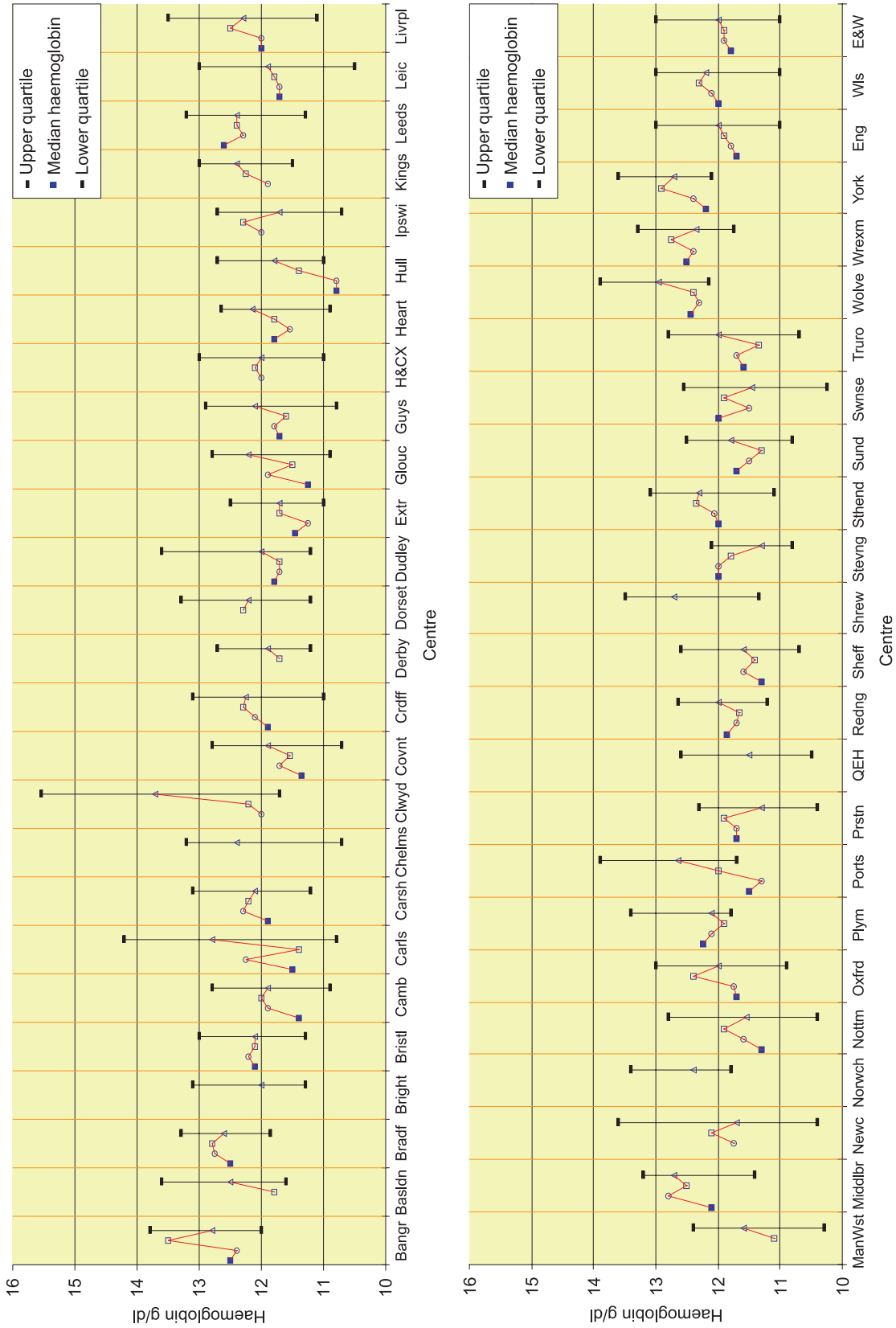


Figure 8.20: Median Hb from end of 2001 to end of 2004 by centre: PD



Figure 8.21: Hb ≥ 10 g/dl at end of 2001 to end of 2004 by centre: PD

Haemoglobin data for patients new to RRT

The Registry records a haemoglobin concentration at the end of the quarter that each individual starts dialysis. This is referred to as haemoglobin of ‘new’ patients and could have been taken between 1 and 90 days from starting treatment. The data for new patients gives an insight into pre-dialysis management and is not separated between those who started on haemodialysis and peritoneal dialysis. There will be some effect of early treatment on dialysis for

those patients whose treatment started at the beginning of the quarter.

Data for new patients is shown in Table 8.3 and Figures 8.22 and 8.23. There has been a further small increase in percentage of new patients with haemoglobin ≥ 10 g/dl in 2004 (59.6% in 2004, 58.5% in 2003) continuing the trend of previous years (Figure 8.3). The rate of increase in haemoglobin over the first 12 months of dialysis is shown in Figures 8.24 and 8.25. This rate of increase is not significantly different from that reported for 2003 (Figures 8.26 and

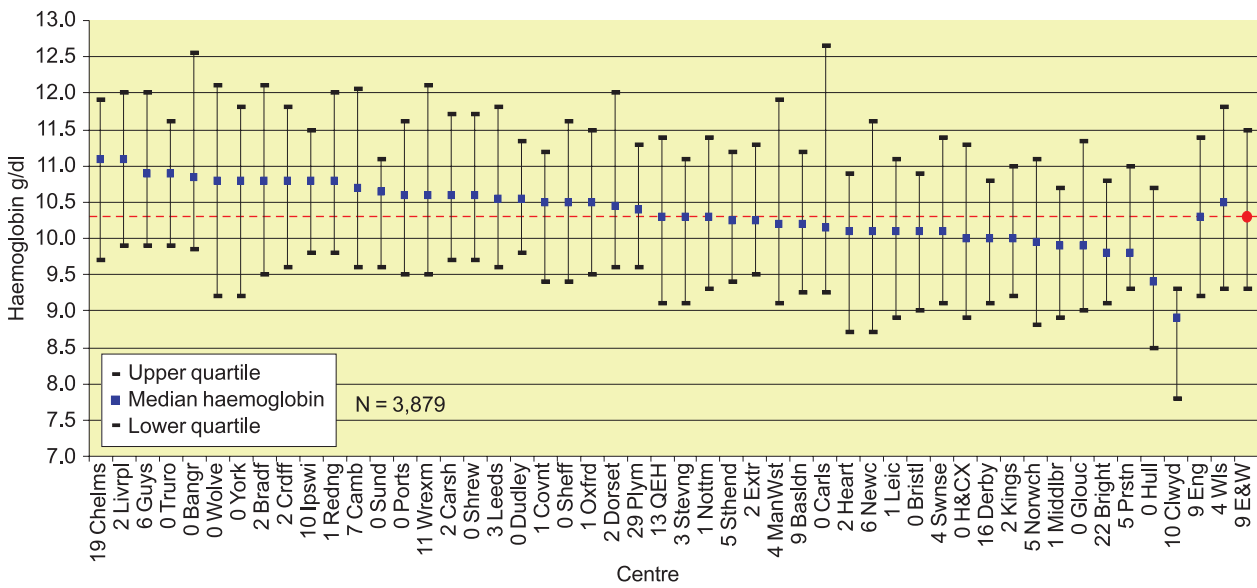


Figure 8.22: Haemoglobin median and quartile range for new patients

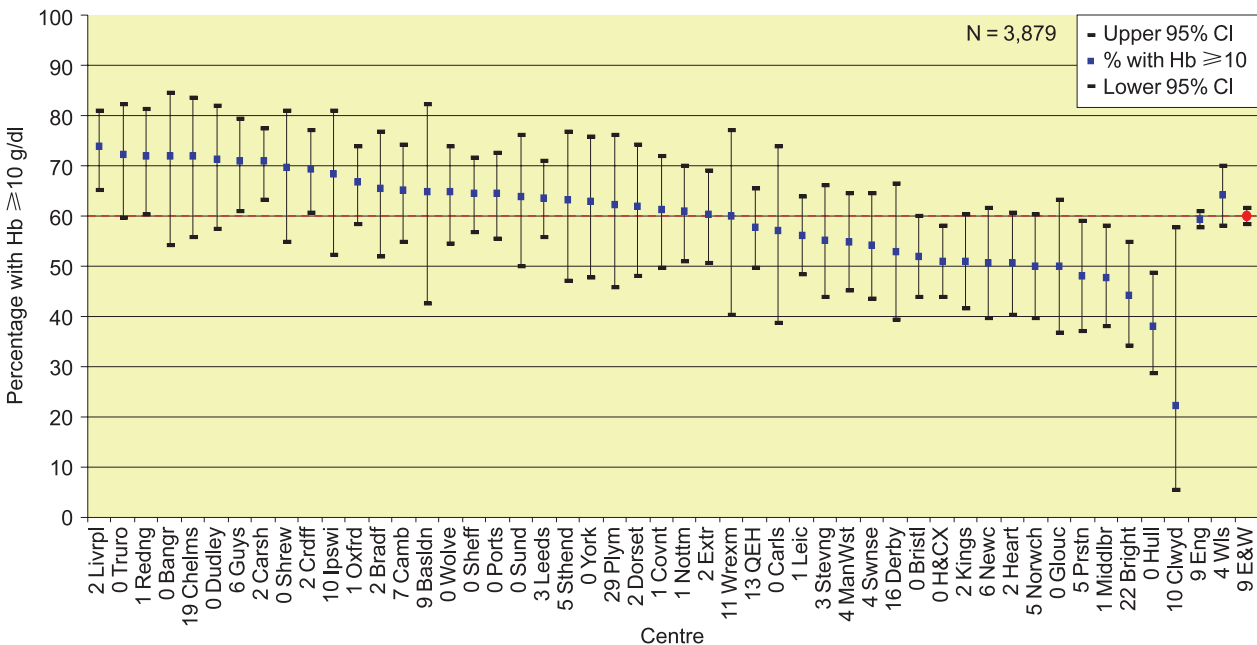


Figure 8.23: Percentage of new patients, by centre, achieving the RA target

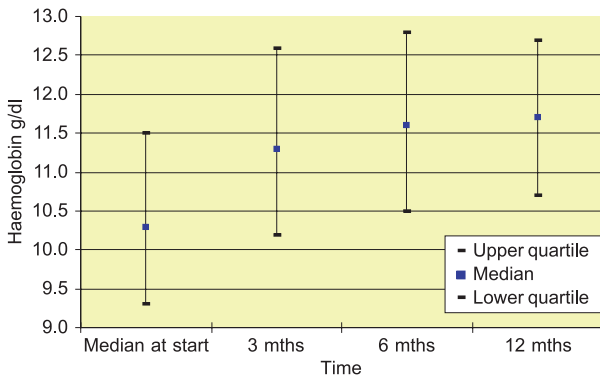


Figure 8.24: Serial median Hb for new patients in 2004

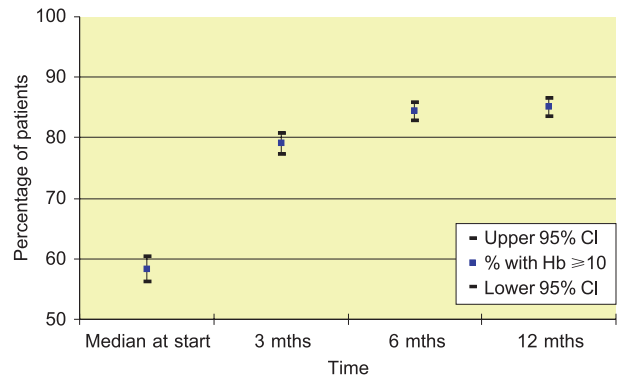


Figure 8.25: Serial percentage of new patients in 2004 with Hb ≥ 10 g/dl

8.27). As with prevalent patients there is a broad range of new patient haemoglobins across England and Wales renal centres. Figure 8.2 compares percentage with haemoglobin ≥ 10 g/dl between new and prevalent patients. The distribution across the centres is different for new and

prevalent patients. The availability of pre-dialysis erythropoietin may have a significant influence. The data needs to be interpreted with some caution however, as some centres have small numbers of new patients. For example there are only 10 new patients included in the Clwyd data.

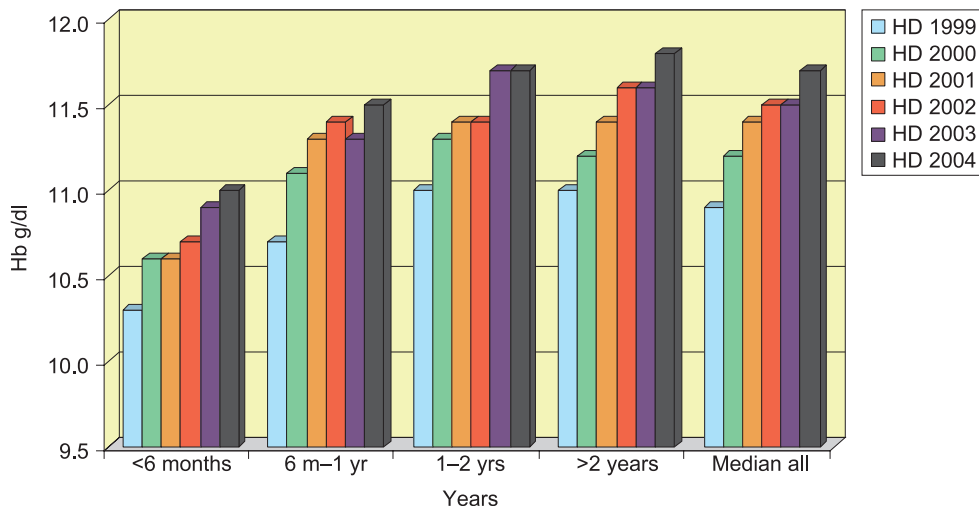


Figure 8.26: Median haemoglobin by length of time on RRT HD

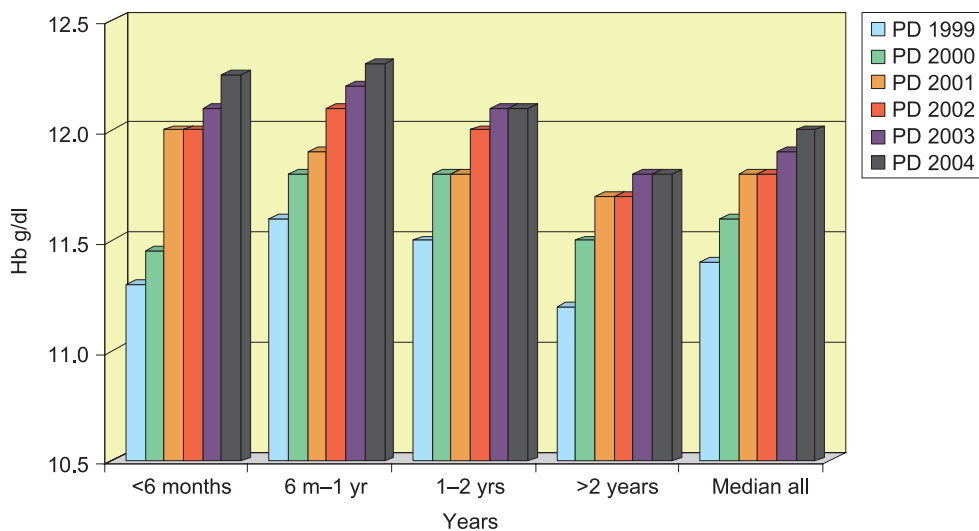


Figure 8.27: Median haemoglobin by length of time on RRT PD

Haemoglobin prior to starting renal replacement therapy

The Registry retrospectively collects haemoglobin prior to starting renal replacement therapy and the date this was collected on. Patients were only included if a haemoglobin value was available within the 2 weeks prior to starting RRT. Patients whose first presentation

Table 8.4 Haemoglobin prior to starting RRT and presence of co-morbidity

	Mean Hb g/dl	95% CI
Without co-morbidities	10.1	10.1–10.2
Angina	10.1	10.1–10.2
MI in past 3 months	10.1	9.8–10.3
MI >3 months ago	10.4	10.2–10.5
CABG/angioplasty	10.4	10.2–10.5
Cerebrovascular disease	10.1	10.0–10.2
Diabetes (not cause of ERF)	10.1	10.0–10.3
Diabetes as primary disease	10.0	9.9–10.1
Diabetes of either category	10.1	10.0–10.1
COPD	10.0	9.8–10.1
Liver disease	9.6	9.4–9.9
Malignancy	10.0	9.9–10.1
Claudication	10.1	10.0–10.2
Ischaemic/neuropathic ulcers	9.8	9.6–10.0
Angioplasty/vascular graft	10.3	10.1–10.5
Amputation	9.9	9.6–10.2
Smoking	10.0	9.9–10.1

to a nephrology service was at the time of requiring dialysis (ie an Hb value was not available prior to starting RRT) were excluded.

The mean Hb was 10.1 g/dl and the median time of this result was 3 days prior to the start of RRT.

Table 8.4 shows the mean haemoglobin in patients without any co-morbidity and those with different co-morbidities. Only patients with a previous MI >3 months previously and those with liver disease had a significantly different haemoglobin from patients without comorbidity ($p < 0.001$).

Conclusion

Management of anaemia in England and Wales renal centres continues to improve. There is recognition that to ensure that individuals maintain a minimum haemoglobin level of 10 g/dl much higher levels of haemoglobin concentration must be targeted. Several centres have over 90% of haemodialysis patients with haemoglobin over 10 g/dl but this requires that the median haemoglobin be over 12 g/dl. There is evidence that once the median is significantly over 12 g/dl the percentage with Hb ≥ 10 g/dl reaches a plateau. This is explained by the irreducible minimum of patients with anaemia caused by inter-current illness and resistance to ESAs.

