

# **CHAPTER 7**

## **Management of Anaemia in Dialysis Patients**

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**SECTION 7.1: TREATMENT FOR ANAEMIA IN DIALYSIS**

Over the last 10 years, 1998 – 2007, the percentage of dialysis patients, both HD and PD on EPO has steadily increased; HD 86% compared with PD 74%. The percentage of patients receiving blood transfusion in both HD and PD were approximately 15%. There is a trend towards a decreasing use of oral iron supplements with the corresponding increase in the use of parenteral iron. (Tables and Figures 7.1.1 to 7.1.2)

**Table 7.1.1:** Treatment for Anaemia, HD patients 1998 to 2007

Year	No of subjects	% on Erythropoietin	% received blood transfusion	% on oral iron	% received parenteral iron
1998	2141	46	13	92	4
1999	2996	51	15	90	5
2000	4392	56	15	88	5
2001	5194	62	13	88	5
2002	6108	67	10	85	7
2003	7016	71	12	83	8
2004	8063	74	11	80	10
2005	9344	81	14	74	11
2006	11679	84	18	76	16
2007	12889	86	15	74	17

**Table 7.1.2:** Treatment for Anaemia, CAPD patients 1998 to 2007

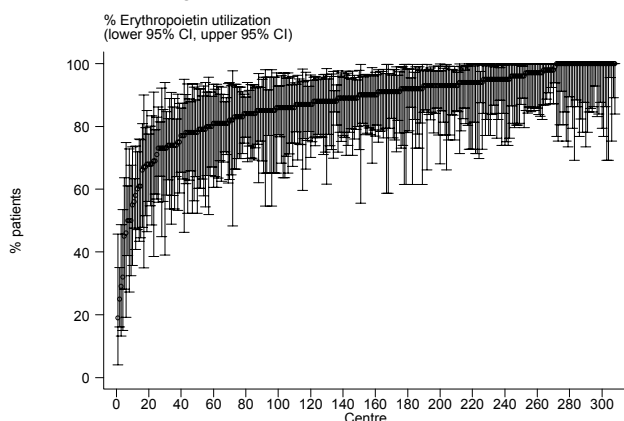
Year	No of subjects	% on Erythropoietin	% received blood transfusion	% on oral iron	% received parenteral iron
1998	541	44	16	96	3
1999	610	44	14	94	0
2000	662	46	11	92	4
2001	781	45	11	91	2
2002	891	49	11	93	2
2003	1230	53	14	87	4
2004	1312	63	15	85	7
2005	1390	72	12	87	8
2006	1552	74	16	83	13
2007	1806	74	16	80	12

In 2007, the percentage of patients on EPO among HD centres varied significantly from the 19% to 100%. The median usage of EPO was 90% compared to 48.5 % 10 years ago. In PD centres, surprisingly the variation in EPO utilization was even more from 0 to 97 %. The median usage of EPO was 78.5%. (Tables and Figures 7.1.3 to 7.1.4)

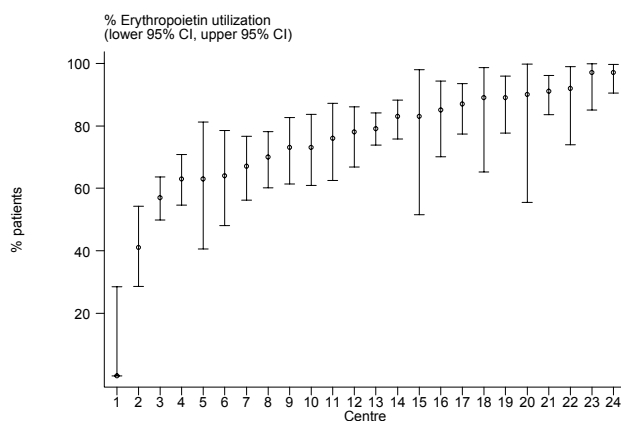
**Table 7.1.3:** Variation in Erythropoietin utilization (% patients) among HD centres, 2007

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	50	0	4	35	48.5	57	78	86
1999	75	6	15	42	51	68	82	90
2000	108	0	20	44.5	56	69	83	100
2001	125	0	19	49	61	74	88	100
2002	157	14	25	56	69	79	92	100
2003	181	17	36	60	73	83	95	100
2004	210	8	37	66	76	85	96	100
2005	238	8	55	74	82.5	91	100	100
2006	294	3	59	80	88	93	100	100
2007	308	19	66	83	90	95	100	100

**Figure 7.1.3:** Variation in Erythropoietin utilization (% patients) among HD centres, 2007



**Figure 7.1.4:** Variation in Erythropoietin utilization (% patients) among CAPD centres, 2007



**Table 7.1.4:** Variation in Erythropoietin utilization (% patients) among CAPD centres, 2007

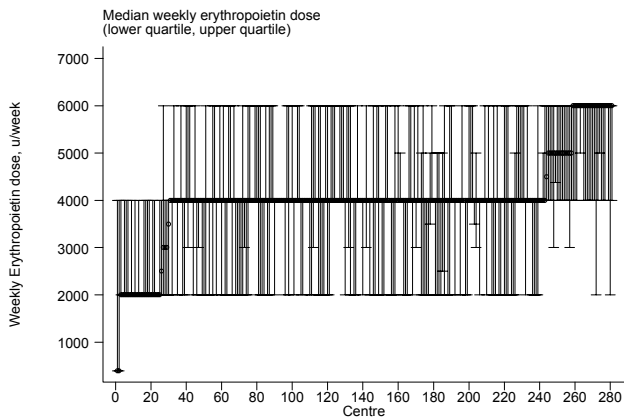
Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	9	15	15	30	46	57	64	64
1999	10	22	22	32	40.5	54	79	79
2000	11	26	26	33	47	56	67	67
2001	12	25	25	33	47	57	88	88
2002	15	26	26	43	53	60	68	68
2003	19	25	25	40	51	71	92	92
2004	19	5	5	54	64	76	97	97
2005	20	42	49.5	60.5	68	83.5	97	97
2006	22	38	52	65	73.5	86	97	97
2007	24	0	41	65.5	78.5	89	97	97

The median weekly EPO dose has remained static at 4000 units per week for both HD and PD patients. In HD centres, at the 5th and 95th centiles, 5% of centres have their weekly dose at 2000 units and 6000 units respectively. (Tables and Figures 7.1.5 to 7.1.6)

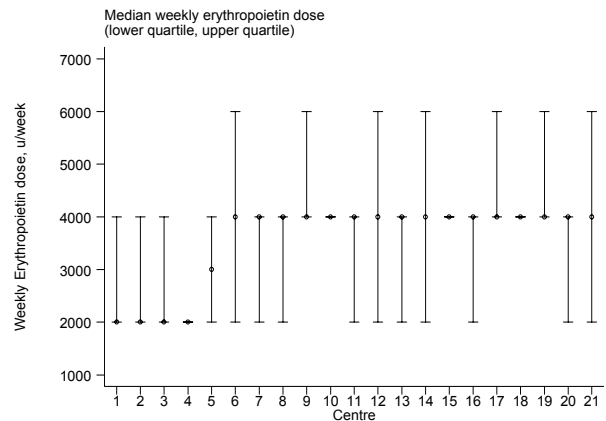
**Table 7.1.5:** Variation in median weekly Erythropoietin dose (u/week) among HD centres, 2007

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	34	2000	2000	4000	4000	4000	4000	4000
1999	52	2000	2000	2000	4000	4000	4000	5000
2000	78	2000	2000	2000	4000	4000	4000	6000
2001	93	2000	2000	2000	4000	4000	4000	8000
2002	117	2000	2000	4000	4000	4000	5000	6000
2003	137	2000	2000	4000	4000	4000	6000	8000
2004	169	2000	2000	4000	4000	4000	6000	8000
2005	195	2000	2000	4000	4000	8000	8000	18000
2006	250	2000	2000	4000	4000	4000	6000	6000
2007	281	4000	2000	4000	4000	4000	6000	6000

**Figure 7.1.5:** Variation in median weekly Erythropoietin dose (u/week) among HD centres, 2007



**Figure 7.1.6:** Variation in median weekly Erythropoietin dose (u/week) among CAPD centres, 2007



**Table 7.1.6:** Variation in median weekly Erythropoietin dose (u/week) among CAPD centres 2007

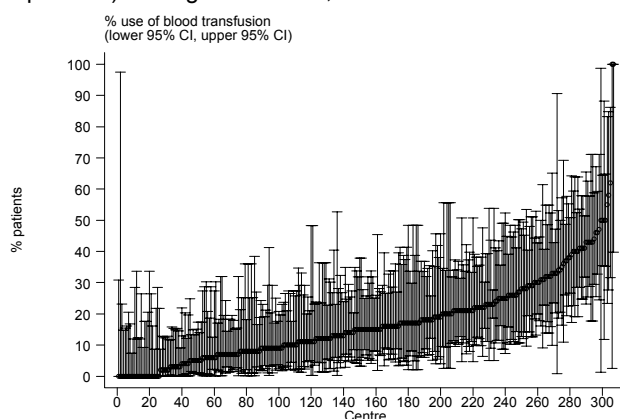
Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	6	3000	3000	4000	4000	4000	4000	4000
1999	7	2000	2000	2000	4000	4000	4000	4000
2000	8	2000	2000	3000	4000	4000	4000	4000
2001	11	2000	2000	4000	4000	4000	4000	4000
2002	12	2000	2000	3000	4000	4000	4000	4000
2003	14	2000	2000	4000	4000	4000	6000	6000
2004	13	2000	2000	4000	4000	4000	4000	4000
2005	18	2000	2000	4000	4000	4000	8000	8000
2006	21	2000	2000	2000	4000	4000	4000	6000
2007	21	2000	2000	4000	4000	4000	4000	4000

In HD, the median requirement of blood transfusion over the years has been at 10 – 18%, with similar trend in the PD patients. There was a great variation in the use of blood transfusion among centres, ranging from 0 to 100 % in HD centres and 6 to 38% in PD centres. (Tables and Figures 7.1.7 to 7.1.8 )

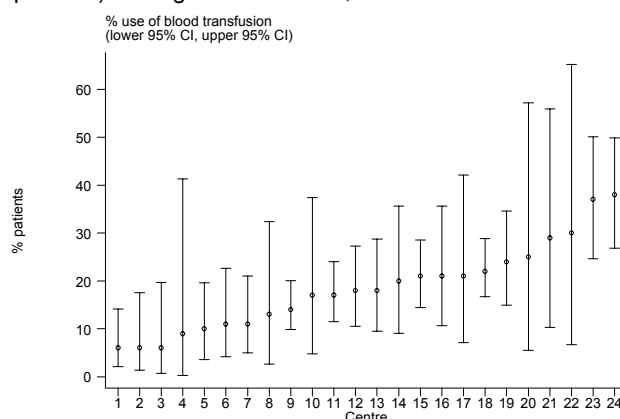
**Table 7.1.7:** Variation in use of blood transfusion (% patients) among HD centres, 2007

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	50	0	0	4	9.5	16	36	48
1999	75	0	0	4	10	21	41	56
2000	108	0	0	4.5	11.5	21.5	49	77
2001	125	0	0	5	12	20	38	50
2002	157	0	0	2	8	14	29	67
2003	181	0	0	3	9	19	36	63
2004	210	0	0	2	8	16	36	50
2005	238	0	0	5	11	20	43	77
2006	294	0	2	10	18	29	48	89
2007	307	0	0	8	15	23	43	100

**Figure 7.1.7:** Variation in use of blood transfusion (% patients) among HD centres, 2007



**Figure 7.1.8:** Variation in use of blood transfusion (% patients) among CAPD centres, 2007



**Table 7.1.8:** Variation in use of blood transfusion (% patients) among CAPD centres, 2007

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	9	0	0	7	11	17	47	47
1999	10	0	0	0	6.5	23	47	47
2000	11	0	0	0	8	17	42	42
2001	12	0	0	0	3.5	15.5	37	37
2002	15	0	0	5	8	20	42	42
2003	19	0	0	3	13	21	59	59
2004	19	0	0	5	15	20	37	37
2005	20	0	0	3.5	10.5	17	43	45
2006	22	3	4	9	16	27	36	50
2007	24	6	6	11	18	23	37	38

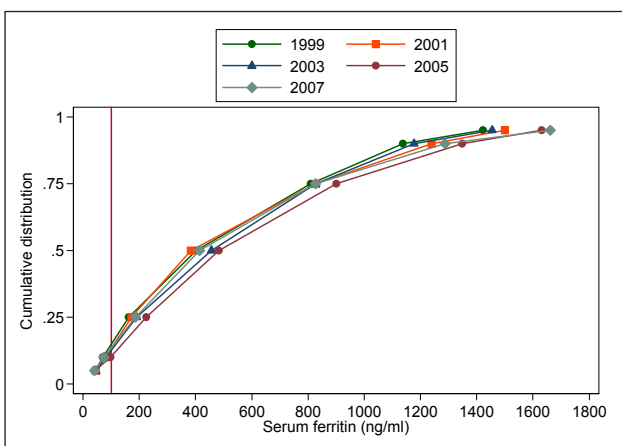
**SECTION 7.2: IRON STATUS ON DIALYSIS**

Generally, in HD and PD patients with or without the EPO, the mean and median serum ferritin has steadily increased over the years. Up to 98% of patients had serum ferritin of  $\geq 100$  ng/ml. (Table and Figures 7.2.1 to 7.2.4)

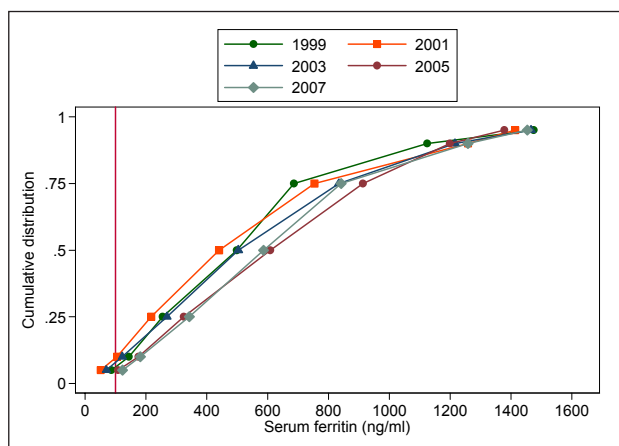
**Table 7.2.1:** Distribution of serum Ferritin without Erythropoietin, HD patients 1998- 2007

Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 100$ ng/ml
1998	224	430.8	383.2	297.5	128.4	636.5	80
1999	337	517.9	424.3	402.8	162.8	809.5	86
2000	571	487.5	416.8	363.2	152.5	741	83
2001	758	537.6	453.9	383.5	172	828	87
2002	803	519.5	447.3	373	168.5	781	85
2003	916	551.6	434.2	456.7	190	827.7	87
2004	1044	590.1	463.4	473	218	908.5	89
2005	1012	616.5	498.4	482.5	224.5	901	90
2006	1134	564.2	488.1	408.5	190	819.9	87
2007	1115	566.5	495.1	414.2	186.1	827	86

**Figure 7.2.1:** Cumulative distribution of Serum Ferritin without Erythropoietin, HD patients 1998-2007



**Figure 7.2.2:** Distribution of Serum Ferritin without Erythropoietin, CAPD patients 1998-2007



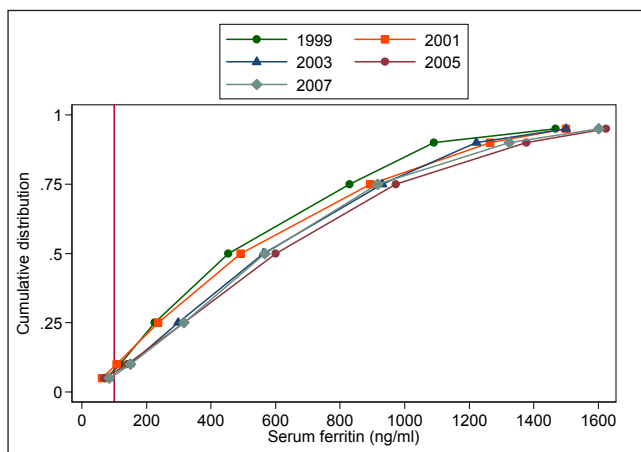
**Table 7.2.2:** Distribution of serum Ferritin without Erythropoietin, CAPD patients 1998- 2007

Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 100$ ng/ml
1998	92	492.4	368.3	405	208.2	687.5	87
1999	124	553.7	400.1	499.3	255.3	686.8	94
2000	144	505.9	433.8	420	152.3	675.5	88
2001	223	543.8	417.5	440	216.9	754	91
2002	236	634.8	491.2	514.9	226	924.6	93
2003	329	602.5	429.2	503.7	269	834	93
2004	303	608.4	385.7	522.7	330	882	94
2005	225	651.4	397.8	609	324	913.3	96
2006	262	582.4	407.1	471.7	279.1	801	95
2007	302	639.5	396.7	586.8	342.8	841.9	96

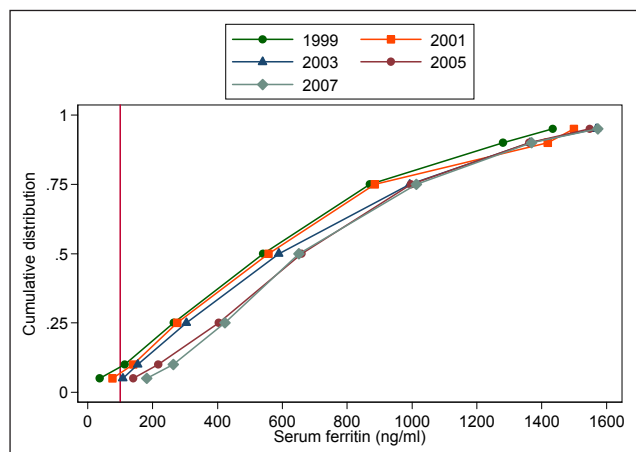
**Table 7.2.3:** Distribution of Serum Ferritin on Erythropoietin, HD patients 1998-2007

Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 100$ ng/ml
1998	328	549.9	382.4	476.5	248	809.8	91
1999	586	560.4	418.6	453	225	829	93
2000	1174	588.3	456.6	475.5	219	860	91
2001	1637	597.5	444.2	491	236	894.2	91
2002	2224	593.1	459.3	464.8	231.3	878.2	91
2003	3133	640.7	428.2	562.5	298	931	94
2004	3901	669.9	460.5	571	306	977	94
2005	5114	683.2	471	599.8	316	972.5	93
2006	6800	639.6	458.8	542.7	291	880.8	93
2007	8083	660.7	453.1	566.8	316.5	916.1	94

**Figure 7.2.3:** Cumulative distribution of Serum Ferritin on Erythropoietin, HD patients 1998-2007



**Figure 7.2.4:** Cumulative distribution of Serum Ferritin on Erythropoietin, CAPD patients 1998-2007



**Table 7.2.4:** Distribution of Serum Ferritin on Erythropoietin, CAPD patients 1998-2007

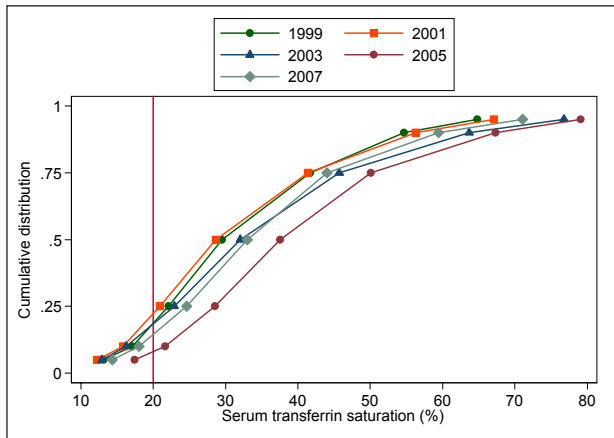
Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 100$ ng/ml
1998	135	611.2	438.3	524.7	257	839.5	93
1999	136	604.8	436.3	540.6	264.6	870.1	93
2000	180	608.2	416.7	560	295.2	846.3	92
2001	261	645.9	449.2	557.5	275.7	885.4	93
2002	345	666.8	462.4	538.5	284	999.5	94
2003	517	689.9	459.9	589	304	993.2	96
2004	540	728.8	427.2	655.6	406.3	986.7	98
2005	767	732.9	433.6	659	403.6	997.5	97
2006	889	731.9	436.1	639.8	401.7	986.9	98
2007	1094	740.3	426.2	651.1	423	1014	98

The median transferrin saturation has essentially remained the same over the last 10 years, with the mean and median  $\geq 30\%$ . Up to 92 % of all patients have transferrin saturation  $\geq 20\%$  (Tables and Figures 7.2.5 to 7.2.8)

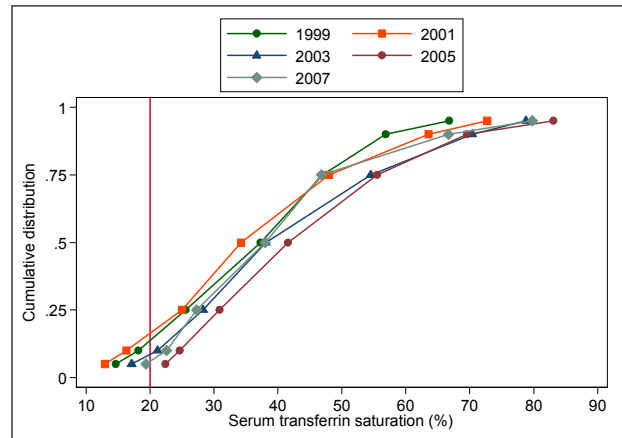
**Table 7.2.5:** Distribution of Transferrin saturation without Erythropoietin, HD patients, 1998-2007

Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 20\%$
1998	599	33.3	16.2	29.5	22.1	41.7	82
1999	654	32.9	16.3	29.9	20.9	42.4	78
2000	800	32.7	16.9	28.6	20.9	41.4	78
2001	836	36.9	18.5	32.5	23.9	45.8	84
2002	811	36.5	18.9	32	22.9	45.7	83
2003	921	40.3	18.6	36	27.2	51.1	91
2004	1031	41.2	18.1	37.5	28.5	50.1	92
2005	1110	37.7	17.7	34.4	25.6	46.2	87
2006	1117	36.2	16.8	33	24.6	44	87
2007	1156	36.1	16.4	32.5	24.9	43.7	87

**Figure 7.2.5:** Cumulative distribution of transferrin saturation without Erythropoietin, HD patients 1998-2007



**Figure 7.2.6:** Cumulative distribution of transferrin saturation without Erythropoietin, CAPD patients 1998-2007



**Table 7.2.6:** Distribution of Transferrin saturation without Erythropoietin, CAPD patients 1998-2007

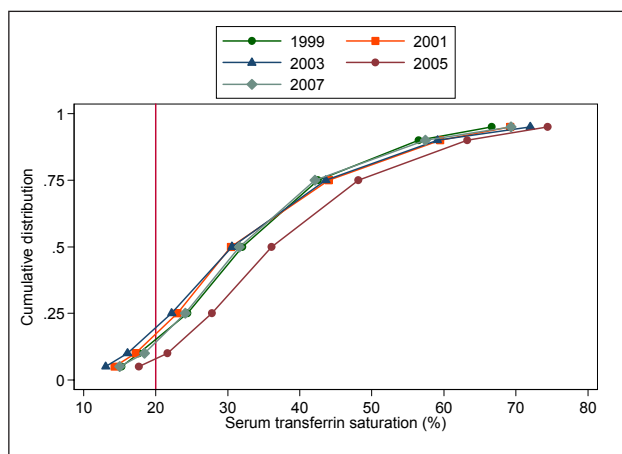
Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 20\%$
1998	184	37.7	15.7	37.3	25.6	47	85
1999	194	37.7	16.2	36.6	25.9	47	88
2000	237	37.9	18.5	34.2	25	48	86
2001	279	43.2	20.8	40	27.8	56.7	89
2002	332	42.7	19.1	38.1	28.3	54.5	92
2003	397	45.2	19.7	41.2	31.4	58.1	93
2004	379	44.5	18.2	41.6	30.9	55.5	98
2005	287	40.6	16.2	37.8	29.4	48.2	95
2006	298	40.5	17.3	38	27.3	46.8	95
2007	344	40.2	17.9	36.3	27.5	48.1	92



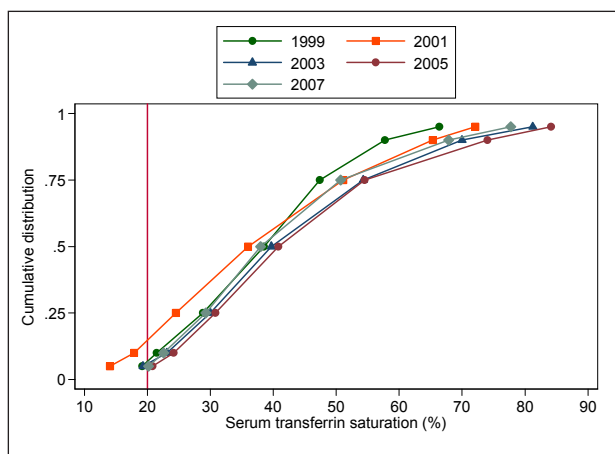
**Table 7.2.7:** Distribution of Transferrin saturation on Erythropoietin, HD patients, 1998-2007

Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 20\%$
1998	549	34.9	15.5	32	24.4	42.5	86
1999	703	34.5	16	31.6	23.2	42	85
2000	1247	34.9	16.7	30.4	23	44	84
2001	1634	36.2	17.9	32.3	23.6	45	84
2002	1995	34.6	17.6	30.6	22.2	43.6	81
2003	2642	39.6	18.4	35.9	26.6	48.9	90
2004	3269	39.6	17	36.1	27.8	48.1	93
2005	4804	36.6	17.3	32.8	24.6	45	87
2006	6416	35.2	16.4	31.6	24.1	42.1	87
2007	7640	34.7	15.5	31.6	24.4	41.6	88

**Figure 7.2.7:** Cumulative distribution of transferrin saturation on Erythropoietin, HD patients 1998-2007



**Figure 7.2.8:** Cumulative distribution of transferrin saturation on Erythropoietin, CAPD patients 1998-2007



**Table 7.2.8:** Distribution of Transferrin saturation on Erythropoietin, CAPD patients, 1998-2007

Year	No of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\geq 20\%$
1998	111	39.4	13.8	38.5	28.8	47.4	94
1999	137	38.9	17	37	26.1	48.3	86
2000	238	38.9	18.7	36	24.5	51.1	86
2001	292	44.1	19.6	40.7	29.2	55.8	94
2002	363	43.6	18.6	39.7	30	54.3	94
2003	460	44.6	17.8	40.4	31.7	55.7	96
2004	697	44.7	18.7	40.8	30.8	54.5	96
2005	820	43.5	19.3	39.1	29.4	53.7	95
2006	917	41.7	17.5	38	29.3	50.7	95
2007	1084	39.3	17.6	35.3	26.9	47.5	92

Over the last 10 years, the median serum ferritin has increased; the transferrin saturation however has remained the same. There was a wide variation in median ferritin between HD centres in 2007 ranging from 85 to 1400 ng/ml. (Tables and Figures 7.2.9)

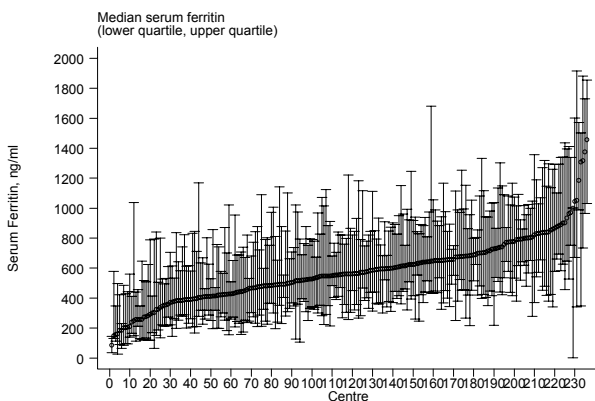
A similar trend, but with higher level of Ferritin and transferrin saturation were observed in PD patients (Tables and Figures 7.2.10)

**Table 7.2.9:** Variation in iron status outcomes among HD centres 2007

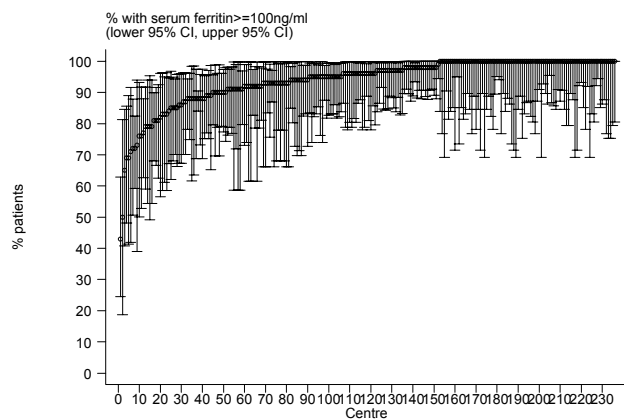
a) Median serum ferritin among patients on erythropoietin

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	13	205	205	432	468.5	560.3	722.8	722.8
1999	22	169	189.5	354.5	419	524.5	890.1	949.5
2000	42	143	229	370	537.9	683.8	813.5	1159.8
2001	52	199	238.3	389.7	512.2	678.5	886.5	1191.3
2002	70	106.6	192	364.5	454.9	604	836.5	1070.8
2003	101	152.5	311.5	459.2	543.5	690.3	950.1	1742.8
2004	125	99.5	328.5	465.8	573	722.8	1032	2000
2005	163	126.8	258.5	460.4	616.3	732.5	990.5	2000
2006	211	28	232.7	414.3	550	675.5	897	2000
2007	236	85.5	247	427.3	560.8	681.8	901.9	1457

**Figure 7.2.9(a):** Variation in median serum ferritin among patients on erythropoietin, HD centres 2007



**Figure 7.2.9(b):** Variation in proportion of patients on erythropoietin with serum ferritin ≥ 100 ng/ml, HD centres 2007



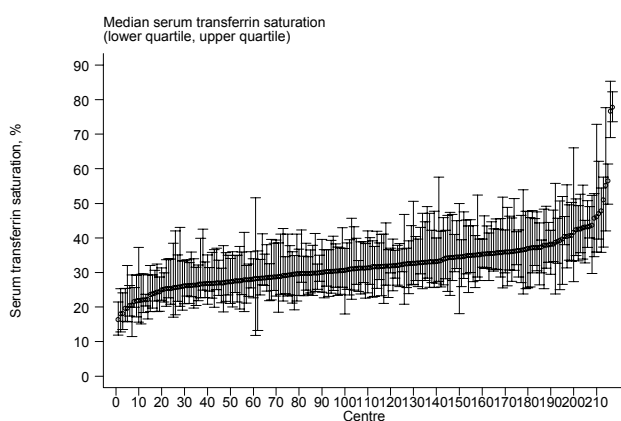
(b) Proportion of patients on erythropoietin with serum ferritin ≥ 100 ng/ml, HD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	13	75	75	90	91	95	100	100
1999	22	70	76	92	96	100	100	100
2000	42	68	73	85	93	97	100	100
2001	52	67	73	87	93	97	100	100
2002	70	55	73	88	93	96	100	100
2003	101	57	76	91	96	100	100	100
2004	125	50	84	91	96	100	100	100
2005	164	5	77	90	95	100	100	100
2006	212	0	70	91	94	100	100	100
2007	236	43	77	91.5	96	100	100	100

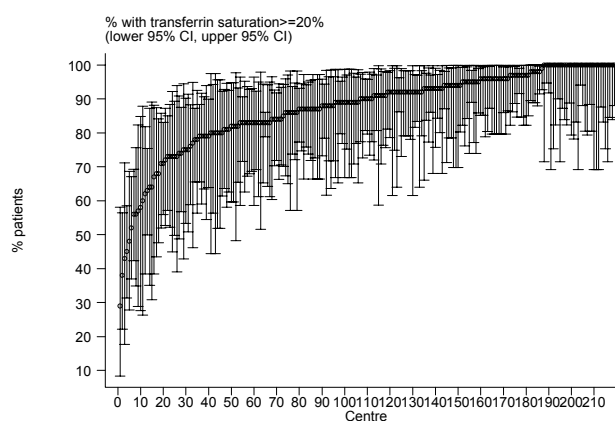
(c) Median transferrin saturation among patients on erythropoietin, HD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	22	22.8	24.1	27.8	32.3	35.6	44.4	51.9
1999	26	16.4	20.7	26.9	31.7	34	41.8	44.8
2000	42	16	23.2	27.7	31.4	37.2	44.1	57.5
2001	55	21	22.5	27.2	31	37.7	48.1	76.6
2002	61	14.7	21	26	29.7	36.5	50.8	60.2
2003	91	19.2	24.2	30.7	34.2	41	57.3	70.7
2004	112	22.7	26.8	32.6	36.1	40.7	52	67.6
2005	150	15.2	23.3	29.1	32.4	37.9	47.9	69.7
2006	191	14.1	23	27.7	31.3	35.6	46.2	78.7
2007	217	16.3	22	27.6	31.3	35.4	43.3	77.8

**Figure 7.2.9(c):** Variation in median transferrin saturation among patients on erythropoietin HD centres, 2007



**Figure 7.2.9(d):** Variation in proportion of patients on erythropoietin with transferrin saturation  $\geq 20\%$ , HD centres 2007



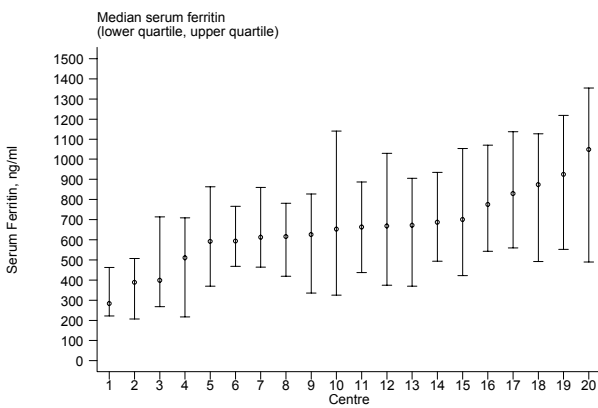
(d) Proportion of patients on erythropoietin with transferrin saturation  $\geq 20\%$ , HD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	22	57	64	78	88	97	100	100
1999	26	30	57	83	87.5	94	100	100
2000	42	20	60	77	86	94	100	100
2001	55	53	59	74	88	95	100	100
2002	61	33	56	70	82	91	100	100
2003	91	47	69	86	92	100	100	100
2004	112	57	71	91	94	100	100	100
2005	152	29	70	83	91	95	100	100
2006	191	20	61	81	90	95	100	100
2007	219	29	60	83	90	96	100	100

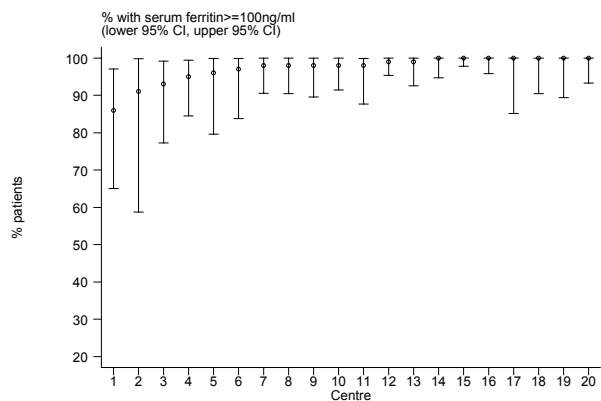
**Table 7.2.10:** Variation in iron status outcomes among CAPD centres 2007  
a) Median serum ferritin among patients on erythropoietin

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	4	418.4	418.4	468.7	534.3	606.3	663	663
1999	5	302.8	302.8	320.4	470	495.6	719.5	719.5
2000	6	335	335	437.3	632.6	770	773	773
2001	9	275.7	275.7	532.8	550.7	623	908	908
2002	10	372.2	372.2	437.4	477	606.5	826.5	826.5
2003	13	304	304	455	520.5	716	963.6	963.6
2004	14	317	317	527.8	606.8	701.3	860.3	860.3
2005	17	338.5	338.5	555.5	708	809.9	843	843
2006	19	410	410	535.3	634.6	794.7	925.8	925.8
2007	20	283.3	336	592.6	657.9	737.1	986.6	1048.6

**Figure 7.2.10(a):** Variation in median serum ferritin among patients on erythropoietin, CAPD centres 2007



**Figure 7.2.10(b):** Variation in proportion of patients on erythropoietin with serum ferritin  $\geq 100$  ng/ml, CAPD centres 2007



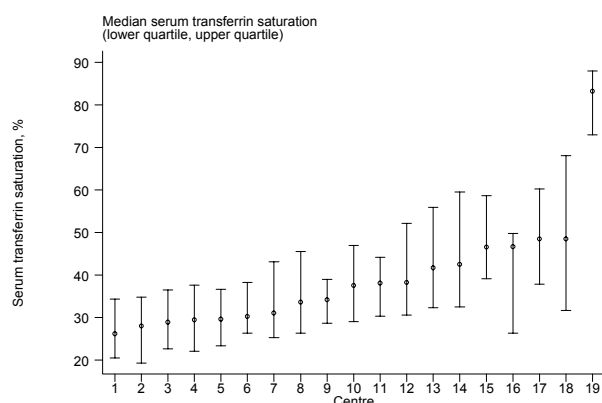
(b) Proportion of patients on erythropoietin with serum ferritin  $\geq 100$  ng/ml, CAPD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	4	83	83	89	97.5	100	100	100
1999	5	84	84	92	95	100	100	100
2000	6	87	87	88	93	100	100	100
2001	9	80	80	85	95	100	100	100
2002	10	91	91	92	94.5	100	100	100
2003	13	85	85	96	96	98	100	100
2004	14	90	90	94	99.5	100	100	100
2005	17	85	85	96	97	100	100	100
2006	19	95	95	97	100	100	100	100
2007	20	86	88.5	96.5	98	100	100	100

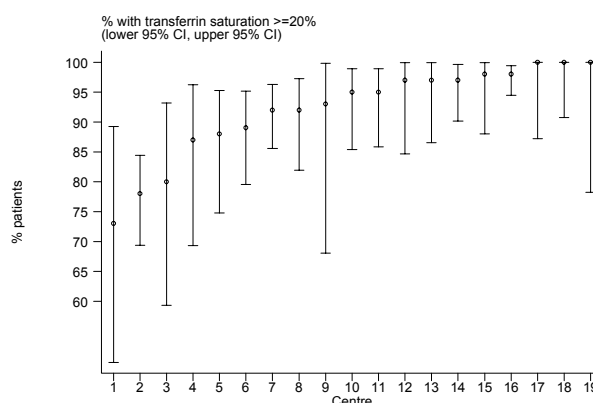
(c) Median transferrin saturation among patients on erythropoietin, CAPD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	4	34.2	34.2	35.5	37	41.6	46.2	46.2
1999	6	24	24	27.2	33.6	39.4	42.4	42.4
2000	6	23.1	23.1	26.5	36.3	37.6	52.5	52.5
2001	8	28.4	28.4	31.3	35.9	47.5	79.8	79.8
2002	9	30.5	30.5	36.5	38.6	40.3	60.4	60.4
2003	13	31.9	31.9	35.8	41.5	47.5	64	64
2004	17	29.1	29.1	36.1	40.9	42.7	82.3	82.3
2005	17	30.3	30.3	35.7	38.5	43	76.4	76.4
2006	18	32.4	32.4	35.2	37.7	40.5	75.8	75.8
2007	19	26.1	26.1	29.6	37.5	46.5	83.2	83.2

**Figure 7.2.10(c):** Variation in median transferrin saturation among patients on erythropoietin, CAPD centres 2007



**Figure 7.2.10(d):** Variation in proportion of patients on erythropoietin with transferrin saturation  $\geq 20\%$ , CAPD centres 2007



(d) Proportion of patients on erythropoietin with transferrin saturation  $\geq 20\%$ , CAPD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	4	81	81	88	95.5	96.5	97	97
1999	6	53	53	84	87.5	94	100	100
2000	6	68	68	74	90	100	100	100
2001	8	85	85	92	93.5	95.5	97	97
2002	9	78	78	92	93	98	100	100
2003	13	90	90	95	96	100	100	100
2004	17	88	88	95	97	100	100	100
2005	17	89	89	94	97	100	100	100
2006	19	90	90	94	95	98	100	100
2007	19	73	73	88	95	98	100	100

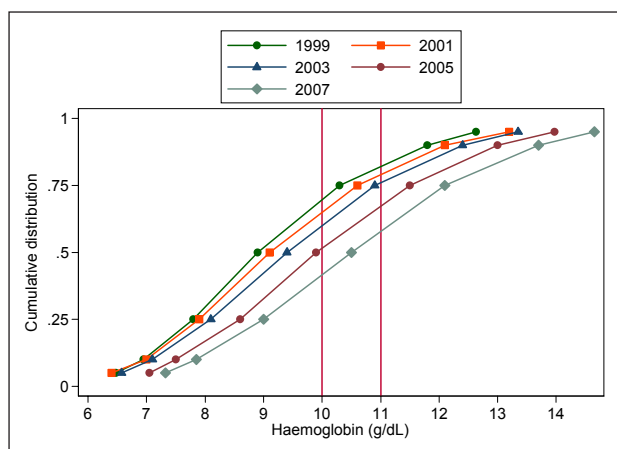
**SECTION 7.3: HAEMOGLOBIN OUTCOMES ON DIALYSIS**

The mean and median haemoglobin in all dialysis patients, with or without EPO steadily increased over the years. In 2007 the mean and median haemoglobin ranged from 10.2 to 11.1 g/dL. The proportion of patients with haemoglobin  $\geq 10$  or  $\geq 11$  g/dL has increased in all dialysis patients irrespective of the use of EPO. (Tables and Figures 7.3.1 to 7.3.4)

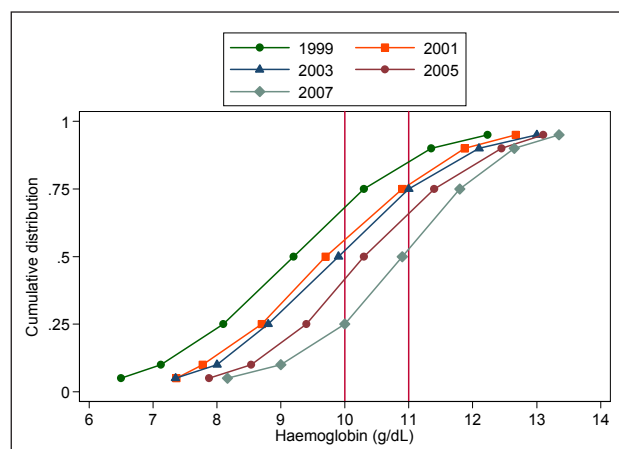
**Table 7.3.1:** Distribution of Haemoglobin Concentration without Erythropoietin, HD patients 1998 – 2007

Year	No. of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\leq 10$ g/dL	% Patients $>10$ g/dL	% Patients $\leq 11$ g/dL	% Patients $>11$ g/dL
1998	1119	9.1	1.9	8.9	7.8	10.3	71	29	83	17
1999	1400	9.1	1.9	8.9	7.8	10.3	70	30	85	15
2000	1754	9.4	2.1	9.1	7.9	10.6	67	33	80	20
2001	1809	9.4	1.9	9.3	8	10.6	64	36	81	19
2002	1795	9.6	2.1	9.4	8.1	10.9	62	38	76	24
2003	1802	9.7	2.1	9.5	8.3	11	60	40	75	25
2004	1927	10.1	2.2	9.9	8.6	11.5	53	47	68	32
2005	1672	10.5	2.3	10.3	8.9	12.1	46	54	62	38
2006	1716	10.6	2.2	10.5	9	12.1	42	58	59	41
2007	1664	10.8	2.3	10.8	9.1	12.5	40	60	53	47

**Figure 7.3.1:** Cumulative distribution of haemoglobin concentration without Erythropoietin, HD patients 1998-2007



**Figure 7.3.2:** Cumulative distribution of haemoglobin concentration without Erythropoietin, CAPD patients 1998-2007



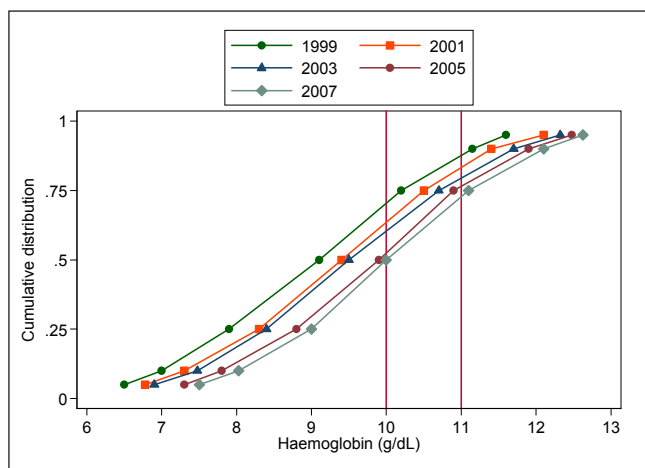
**Table 7.3.2:** Distribution of Haemoglobin Concentration without Erythropoietin, CAPD patients 1998– 2007

Year	No. of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients $\leq 10$ g/dL	% Patients $>10$ g/dL	% Patients $\leq 11$ g/dL	% Patients $>11$ g/dL
1998	301	9.3	1.8	9.2	8.1	10.3	68	32	84	16
1999	336	9.5	1.6	9.5	8.4	10.5	66	34	84	16
2000	342	9.8	1.7	9.7	8.7	10.9	58	42	79	21
2001	405	9.8	1.8	9.7	8.6	10.7	59	41	78	22
2002	434	10	1.8	9.9	8.8	11	54	46	76	24
2003	542	10	1.7	9.9	8.9	11	52	48	76	24
2004	481	10.4	1.6	10.3	9.4	11.4	42	58	67	33
2005	375	10.8	1.6	10.8	9.9	11.8	28	72	60	40
2006	385	10.9	1.6	10.9	10	11.8	25	75	54	46
2007	433	11.1	1.6	11	10.2	12.1	22	78	51	49

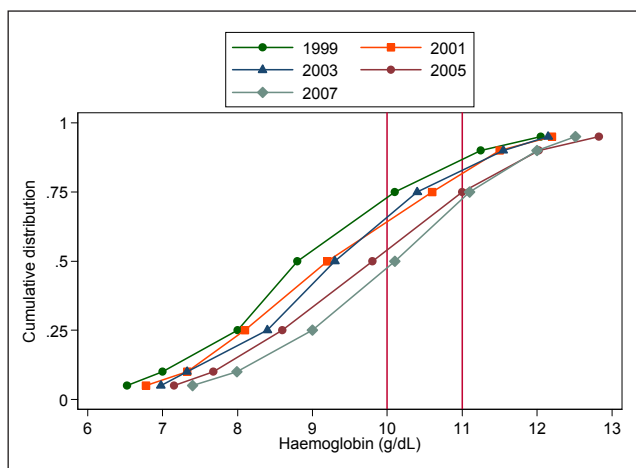
**Table 7.3.3** Distribution of Haemoglobin Concentration on Erythropoietin, HD patients 1998– 2007

Year	No. of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients ≤10 g/dL	% Patients >10 g/dL	% Patients ≤11 g/dL	% Patients >11 g/dL
1998	971	9.1	1.6	9.1	7.9	10.2	71	29	88	12
1999	1503	9.2	1.5	9.1	8.1	10.2	71	29	89	11
2000	2332	9.4	1.7	9.4	8.3	10.5	65	35	85	15
2001	3049	9.4	1.6	9.4	8.3	10.5	65	35	85	15
2002	3859	9.5	1.7	9.5	8.4	10.7	62	38	81	19
2003	4781	9.6	1.6	9.6	8.5	10.7	61	39	81	19
2004	5803	9.8	1.6	9.9	8.8	10.9	54	46	77	23
2005	7213	10	1.6	10	8.9	11.1	50	50	73	27
2006	9459	10.1	1.6	10	9	11.1	50	50	73	27
2007	10771	10.2	1.5	10.3	9.1	11.3	44	56	69	31

**Figure 7.3.3** Cumulative distribution of Haemoglobin Concentration on Erythropoietin, HD patients 1998-2007



**Figure 7.3.4:** Cumulative distribution of Haemoglobin Concentration on Erythropoietin, CAPD patients 1998-2007



**Table 7.3.4:** Distribution of Haemoglobin Concentration on Erythropoietin, CAPD patients 1998– 2007

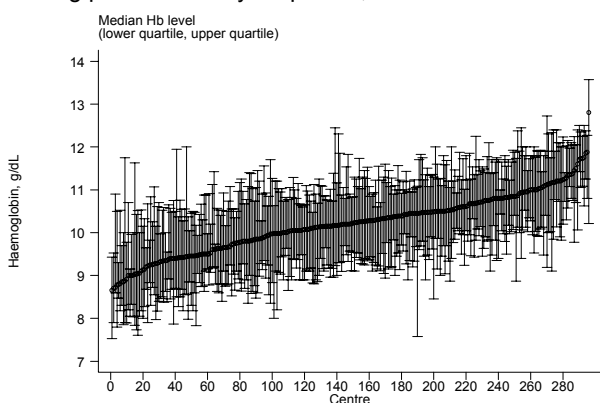
Year	No. of subjects	Mean	Std Dev	Median	LQ	UQ	% Patients ≤10 g/dL	% Patients >10 g/dL	% Patients ≤11 g/dL	% Patients >11 g/dL
1998	238	9	1.6	8.8	8	10.1	74	26	88	12
1999	262	9	1.6	8.9	7.9	10.2	73	27	89	11
2000	299	9.4	1.7	9.2	8.1	10.6	65	35	82	18
2001	345	9.3	1.6	9.4	8.2	10.5	65	35	86	14
2002	432	9.4	1.6	9.3	8.4	10.4	69	31	83	17
2003	639	9.7	1.7	9.6	8.6	10.8	59	41	78	22
2004	798	9.8	1.7	9.8	8.6	11	54	46	76	24
2005	970	9.9	1.7	9.9	8.8	11.1	53	47	73	27
2006	1120	10	1.6	10.1	9	11.1	50	50	74	26
2007	1322	10.3	1.6	10.4	9.3	11.4	42	58	66	34

In 2007, there was a wide variation in haemoglobin achieved among the HD centres ranging from 8.7 to 12.8 g/dl with the median at 10.2 g/dL. Similar trend was observed in PD centres with a lesser variation. For HD patients on EPO, the proportion of patients with haemoglobin  $\geq 10$  g/dL varied between 10 to 100 % with median at 55%. Similarly for haemoglobin  $\geq 11$ g/dL, the range was from 0 to 85%. Similar trend with a lesser variation was noted in the PD centres. (Tables and Figures 7.3.5 to 7.3.6)

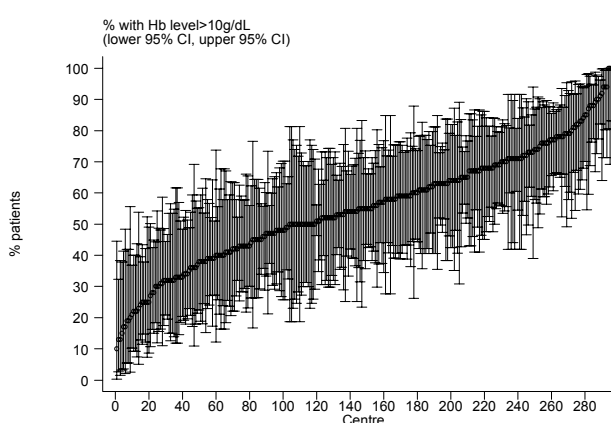
**Table 7.3.5:** Variation in Haemoglobin outcomes among HD centres 2007  
(a) Median haemoglobin level among patients on erythropoietin

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	34	7.6	7.6	8.5	9	9.4	10.2	10.5
1999	53	7.9	8	8.6	9	9.6	10.2	10.4
2000	76	8.1	8.2	8.8	9.3	9.8	10.5	14.6
2001	93	8.1	8.3	8.9	9.5	9.9	10.6	12.2
2002	112	8.2	8.5	9	9.5	10	10.8	11.3
2003	143	7.8	8.5	9	9.6	10	10.7	11.5
2004	174	7.8	8.6	9.2	9.7	10.3	10.9	11.2
2005	212	8.4	8.8	9.5	10	10.5	11.2	12.2
2006	270	8.1	8.9	9.5	10	10.5	11.3	12.9
2007	296	8.7	9	9.7	10.2	10.7	11.3	12.8

**Figure 7.3.5(a)** Variation in median haemoglobin level among patients on Erythropoietin, HD centres 2007



**Figure 7.3.5(b)** Variation in proportion of patients on erythropoietin with haemoglobin level > 10 g/dL, HD centres 2007



(b) Proportion of patients on erythropoietin with haemoglobin level > 10 g/dl, HD centres

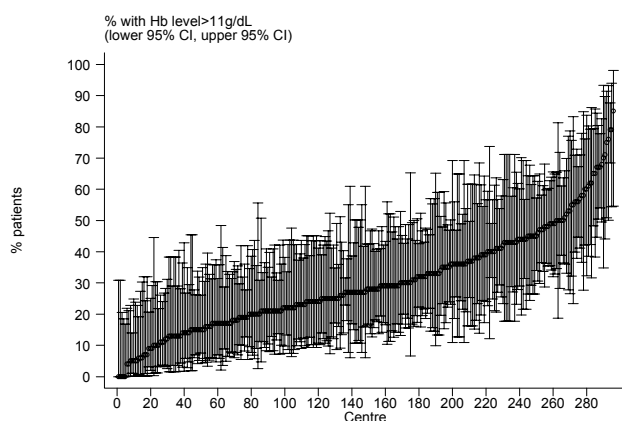
Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	34	0	0	14	27.5	38	57	71
1999	53	0	4	15	28	38	58	61
2000	76	0	5	20	31.5	43.5	64	97
2001	93	5	10	22	33	47	68	100
2002	112	8	15	28	36	50.5	68	86
2003	143	0	14	27	36	50	69	100
2004	174	10	17	31	41	57	73	83
2005	212	0	20	34.5	49.5	63	82	100
2006	270	0	19	36	48	63	81	93
2007	296	10	24	43	55	68	87	100



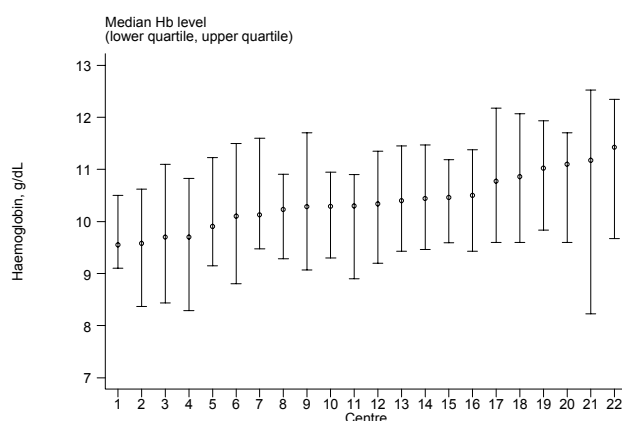
(c) Proportion of patients on erythropoietin with haemoglobin level > 11 g/dL, HD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	34	0	0	0	7	17	27	38
1999	53	0	0	3	8	14	29	39
2000	76	0	0	6.5	12.5	20	31	92
2001	93	0	0	8	13	24	38	60
2002	112	0	5	12	18	27	47	71
2003	143	0	0	7	15	27	42	59
2004	174	0	4	11	19	29	48	58
2005	212	0	4	13	25	36	55	75
2006	270	0	5	16	24.5	37	57	80
2007	296	0	6	19	27.5	40	62	85

**Figure 7.3.5(c):** Variation in proportion of patients on erythropoietin with haemoglobin level > 11 g/dL, HD centres 2007



**Figure 7.3.6(a):** Variation in median haemoglobin level among patients on Erythropoietin, CAPD centres 2007



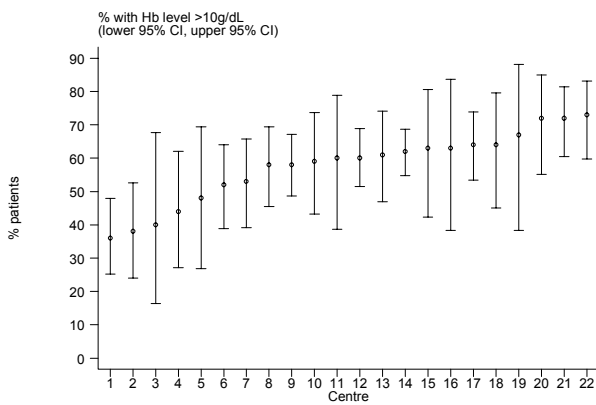
**Table 7.3.6:** Variation in Haemoglobin outcomes among CAPD centres 2007  
**(a) Median haemoglobin level among patients on erythropoietin**

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	6	7.9	7.9	8.4	8.9	9.3	9.5	9.5
1999	7	8.1	8.1	8.4	8.7	9.3	9.5	9.5
2000	9	8.2	8.2	8.9	9	9.3	10.1	10.1
2001	11	8.9	8.9	9.2	9.4	9.6	9.7	9.7
2002	12	8.6	8.6	9.1	9.3	9.5	9.9	9.9
2003	16	8.4	8.4	9.2	9.5	10	11.2	11.2
2004	17	8.4	8.4	9.2	9.7	10.1	11.2	11.2
2005	18	8.9	8.9	9.5	9.9	10.4	11	11
2006	22	8.8	8.9	9.6	9.9	10.3	10.6	11
2007	22	9.5	9.6	10.1	10.3	10.8	11.2	11.4

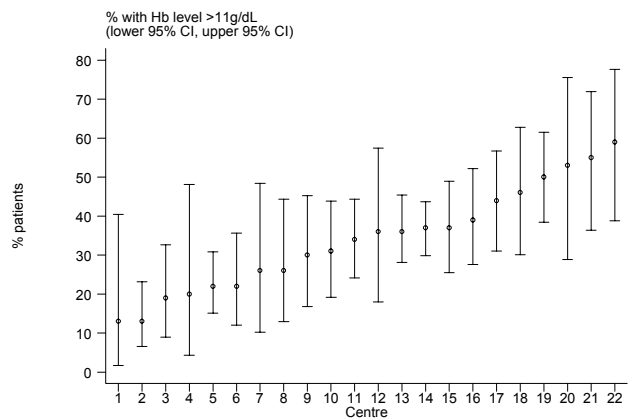
(b) Proportion of patients on erythropoietin with haemoglobin level > 10 g/dL, CAPD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	6	19	19	19	25.5	29	40	40
1999	7	13	13	20	25	36	40	40
2000	9	19	19	30	36	38	50	50
2001	11	24	24	31	38	42	47	47
2002	12	11	11	25	32	37.5	48	48
2003	16	0	0	27	36.5	50	75	75
2004	17	10	10	38	43	52	72	72
2005	18	21	21	34	46.5	57	76	76
2006	22	17	18	44	48.5	58	70	79
2007	22	36	38	52	60	64	72	73

**Figure 7.3.6(b):** Variation in proportion of patients on erythropoietin with haemoglobin level > 10 g/dL, CAPD centres, 2007



**Figure 7.3.6(c):** Variation in proportion of patients on erythropoietin with haemoglobin level > 11 g/dL, CAPD centres 2007



(c) Proportion of patients on erythropoietin with haemoglobin level > 11 g/dL, CAPD centres

Year	No of centers	Min	5th centile	LQ	Median	UQ	95th centile	Max
1998	6	8	8	8	11	13	16	16
1999	7	0	0	8	9	13	16	16
2000	9	10	10	16	18	21	24	24
2001	11	8	8	10	16	20	23	23
2002	12	7	7	13	17.5	22	27	27
2003	16	0	0	11	16	22.5	52	52
2004	17	0	0	13	20	29	54	54
2005	18	7	7	20	29.5	34	51	51
2006	22	5	7	16	26	32	39	49
2007	22	13	13	22	35	44	55	59