

An abstract graphic on the left side of the slide, consisting of several overlapping, curved, triangular shapes in shades of blue and teal. The shapes are layered, with some appearing in front of others, creating a sense of depth. The colors range from a deep navy blue to a lighter teal.

Anaemia Management Case Study – Haemodialysis patient.

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Patient PA

- Age 28 years. Male. Casual work. Lives at home with parents.
- History of non-compliance with medication.
- Chronic Kidney disease secondary to Reflux Nephropathy in 1996.
- Haemodialysis for six months in 1996.
- Cadaveric transplant 1996-2001.
- Failed graft – restarted on Haemodialysis.

Current treatment.

- Haemodialysis for 4 hours, three times per week.
- Dialyses via Right Radial A-F Fistula.
- Dialysis prescription: Fresenius® F6 HPS. Blood flow rate 250mls/min.

Concomitant Medication.

- Atenolol 50mg daily
- Aspirin 75mg daily
- Calcichew 2 tablets three times a day.
- Alfacalcidol 2mcg, three times a week on dialysis days
- Nifedipine LA 90mg daily

Anaemia – history and treatment.

- Commenced on Epoetin beta s/c 2000iu x3/week April 2001
- Received 100mg iron sucrose (VENOFER®) either fortnightly, weekly or twice weekly to ensure ferritin between 100-500mcg/l and %hypochromic red blood cells (HRC) <2.5%
- Erythropoietin increased to 21,000iu per week by November 2001 with little change in Haemoglobin. (see Haematology bloods)
- NB: All haemodialysis patients have their EPO and iron dosage adjusted according to a computer based algorithm (Richardson *et al*, 2001)

Anaemia – history and treatment.

- Haemodialysis inadequate – Urea Reduction Ratio (URR) 61%
- Dialysis prescription adjusted – blood flow rate increased to 350mls /minute and dialyser increased to Fresenius®F8 HPS
- URR% increased to 73%

Haematology 1.

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HAEMATOTOLOGY

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Date	Time	Sts	Com	Hb	PCV	RBC	MCV	MCH	MCHC	WBC	Plts	%HRC
05.03.2002	1504	F		13.8	0.43	4.56	94	30.4	32.4	4.3	204	1.40
25.02.2002	2209			17.2	0.54	5.59	97	31.0	32.0	13.1	246	
11.02.2002	2014			12.9	0.39	4.11	94	31.0	34.0	5.1	173	
05.02.2002	1635	F		13.3	0.40	4.16	96	31.9	33.1	5.0	218	2.20
27.01.2002	1002	F		15.6	0.47	4.91	95	31.7	33.4	7.7	208	3.20
26.01.2002	0740	F		15.2	0.46	4.87	94	31.3	33.5	5.3	200	1.50
25.01.2002	1845			13.8	0.41	4.50	92	31.0	33.0	6.8	187	
08.01.2002	1659	F		11.0	0.33	3.57	94	30.8	32.9	7.1	246	4.30
04.12.2001	1451	F		9.3	0.29	3.13	92	29.9	32.5	9.3	354	1.70
21.11.2001	0237	F		8.8	0.27	3.11	88	28.4	32.2	6.7	187	4.70
09.11.2001	1814			8.6		3.12	89	28.0	31.0	6.3	239	
06.11.2001	1440	F		8.4	0.26	2.87	90	29.3	32.4	9.1	327	5.70
03.10.2001	2305			8.1		2.79	93	29.0	31.0	8.8	403	
02.10.2001	1442	F		8.7	0.26	2.89	90	30.2	33.5	9.9	421	4.20
29.09.2001	0727	F		8.4	0.25	2.91	87	29.1	33.4	10.6	305	2.00
28.09.2001	0951	F		9.2	0.28	3.25	87	28.5	32.6	13.0	311	3.20

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Sub-optimal
response
to epoetin
beta,
dialysis
prescription
adjusted



PEAK
PROMOTING EXCELLENCE FOR ANAEMIA & THE KIDNEY
FOR NURSES

Anaemia – history and treatment.

- EPO gradually reduced to 12000iu per week by April 2002 following increase in dialysis adequacy.
- EPO increased again to 24,000iu per week by December 2002, why?

Haematology 2.

Epoetin beta dose reduced to April 2002, but then fall in Hb observed and EPO increased. Despite increased dose up to 24,000iu/wk Hb continues to be sub-optimal

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HAEMATOLOGY												33/ 259
Date	Time	Sts	Com	Hb	PCV	RBC	MCV	MCH	MCHC	WBC	Plts	%HRC
24.07.2002	1643			9.4	0.29	3.19	91	30.0	32.0	4.8	187	
10.07.2002	2052			9.4	0.29	3.13	92	30.0	33.0	5.5	225	
02.07.2002	1432	F		9.0	0.27	2.93	93	30.8	33.0	5.5	236	6.30
19.06.2002	2001			10.3	0.32	3.36	95	31.0	32.0	12.3	223	
06.06.2002	1516	F		11.8	0.36	3.80	94	30.9	33.0	7.3	282	
31.05.2002	1905			8.4	0.26	2.74	93	31.0	33.0	5.8	205	
29.05.2002	1402			7.3	0.23	2.43	94	30.0	32.0	3.7	159	
27.05.2002	1214			8.4	0.26	2.73	94	31.0	33.0	6.2	176	
20.05.2002	1551	F	C	9.4	0.29	3.04	95	30.8	32.4	5.0	270	5.20
15.05.2002	1256			8.9	0.28	2.95	93	30.0	32.0	5.8	206	
13.05.2002	1253			8.8	0.26	2.86	92	31.0	34.0	6.7	228	
10.05.2002	1602			9.2	0.27	2.96	93	31.0	34.0	5.9	250	
08.05.2002	1253			9.4	0.29	3.12	92	30.0	33.0	2.0	219	
01.05.2002	1233			9.4	0.28	3.07	92	31.0	33.0	3.9	153	
04.04.2002	1509	F		12.8	0.38	4.03	95	31.7	33.4	6.3	178	1.10
01.04.2002	1559			14.4	0.45	4.70	95	31.0	32.0	12.3	208	

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Further investigations

- Vitamin B₁₂ AND Serum red cell folate within range.
- CRP slightly raised at 14mcg/l (normal range <10mcg/l).
- Iron replete (Serum ferritin 331, %HRC 4.1%, MCV >90)
- However Parathyroid hormone 1250ng/l (normal range 14-72ng/l)

Parathyroidectomy booked

Biochemistry 1.

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Date	Time	K	P/F	C?	Alb	Ca	P	Ca x P	PTH	Fe	CRP	Urate
13.09.2002	1333			C	26	2.15	2.1	4.51				
12.09.2002	1435				30	2.53	2.2	5.57			8.0	
03.09.2002										372		
28.08.2002	1016											
05.08.2002	2330K											
05.08.2002	1901K				32	2.52	1.6	4.03				
05.08.2002	K									373	10.0	
24.07.2002	1643K											
24.07.2002	K										14.0	
19.07.2002	1651K											
19.07.2002	K											
01.07.2002									1250.0	331		
19.06.2002	2001K				34	2.80	2.0	5.60				

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Note PTH
value

Haemoglobin response and Erythropoietin dosage post parathyroidectomy.

- Parathyroidectomy performed in September 2002. At this point Epoetin beta dose was 24,000iu per week.
- Post operatively Haemoglobin began to increase, despite reduction in Epoetin beta dosage.
- By July 2003 Haemoglobin was 13.9g/dl and epoetin beta dose was 8,000iu per week.

Haematology 3.

Epoetin beta
now reduced
to 8,000iu per
week.

renal - Reflection for ReGIS Graphics

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HAEMATOLOGY												1/ 259
Date	Time	Sts	Com	Hb	PCV	RBC	MCV	MCH	MCHC	WBC	Plts	%HRC
10.07.2003	1049	F		16.4	0.47	4.51	103	36.3	35.2	5.7	149	0.60
03.07.2003	1358	F		13.9	0.41	3.97	102	34.9	34.2	5.3	169	0.60
03.06.2003	1412	F	C	13.8	0.40	3.81	105	36.1	34.4	6.1	169	0.80
08.05.2003	1345	F		14.6	0.43	4.06	105	35.9	34.2	5.3	198	0.70
08.04.2003	1413	F		12.7	0.40	3.82	106	33.3	31.5	4.7	163	2.20
05.03.2003	1428	F		13.9	0.42	3.97	105	34.9	33.2	8.3	193	2.00
04.02.2003	1457	F		12.2	0.37	3.65	103	33.4	32.5	6.4	183	3.20
07.01.2003	0207	F		13.4	0.40	3.93	101	34.1	33.6	6.2	197	4.20
06.01.2003	2122	F		13.6	0.41	4.03	102	33.8	33.2	5.7	187	4.20
06.01.2003	1436	F		13.5	0.40	3.89	102	34.7	34.1	6.4	185	3.00
03.12.2002	1418	F		10.8	0.33	3.32	99	32.5	32.9	5.0	266	0.80
05.11.2002	1435	F		9.4	0.28	2.94	95	32.0	33.8	6.6	269	4.70
13.10.2002	0925	F		8.7	0.26	2.78	93	31.1	33.5	5.6	254	4.60
11.10.2002	2110			9.0	0.29	3.05	94	30.0	31.0	6.1	284	
10.10.2002	1433	F		7.9	0.24	2.56	92	30.8	33.4	4.7	273	4.10
25.09.2002	1014	F		9.2	0.28	3.16	90	29.2	32.6	5.8	366	3.00

Tabular Retrieval 15.03.2004

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Parathyroidectomy

Effects of under-dialysis on erythropoiesis

- Inadequate dialysis may blunt EPO responsiveness.
- Important that **adequate delivered dialysis dose** is achieved $Kt/V > 1.2$. Therefore the patient's prescribed dose of haemodialysis should be Kt/V 1.3 (equivalent to URR 70%) (K/DOQI, 2001).
- Factors to be considered include: dialysis time (including frequency of dialysis); Blood flow rate; dialysate flow rate; dialyser size; access (recirculation); needle size;
- No evidence however to suggest that an even higher dialysis dose would lead to incremental increases in Hb.

Effects of Parathyroid hormone on erythropoiesis.

- Possible pathogenic links between anaemia and parathyroid hormone (PTH) include:
 - Include reduced erythropoiesis due to calcitriol deficiency, and direct or indirect effects of PTH on erythropoietin release, red blood cell production, survival, and loss. (Drueke *et al*, 2002)
 - Excessive PTH may lead to marrow fibrosis (Norris K, 2001).
- It still remains unclear as to the exact mechanism by which hyperparathyroidism worsens and parathyroidectomy improves renal anaemia.

Conclusions.

- No clear definition of poor response to erythropoietin. MacDougall (1995) suggests that in patients with renal anaemia, a rise in haemoglobin of $<1\text{g/l/month}$ despite an EPO dose of $<200\text{iu/kg/week}$ may be classed as 'poor responders'.
- Several factors may be responsible:
 - Iron deficiency* (this occurs in 90% of 'poor responders')
 - Blood loss
 - Infection*, and inflammatory conditions, including malignancy.
 - Hyperparathyroidism
 - Aluminium toxicity
 - Vitamin B-12 or folate deficiency
 - Haemolysis
 - Marrow dysfunction
 - Red cell enzyme defects
 - haemoglobinopathies