

India's First Darbepoetin Alfa



in the management of Anemia in CKD





Dr.Reddy's



For the use of only a Registered Medical Practitioner or a Hospital or a Laboratory.

Proceedings from



## Evolving & Redefining - Anemia Management



### Prof. Simon Roger

Director of Renal Medicine and  
Professor of Clinical Medicine  
University of Newcastle, Australia

Darbepoetin alfa is safe and effective for the treatment of anaemia in CKD with special features such as three-fold longer serum half-life, reduced dose frequency & time-tested safety profile...

Prof. Simon Roger is presently Director of Renal Medicine and Professor of Clinical Medicine, University of Newcastle, Australia. He has over 25 year's of experience in anemia research and the role of iron in patients with CKD.

Professor Roger has contributed to a number of clinical trials (as a principle investigator and active steering committee member) national and international congresses and meetings (as an invited lecturer) and also several advisory boards (as a member).

He is also a global advisory board member of KDIGO and several associations, including the Australian and New Zealand Society of Nephrology and the International Society of Nephrology.

He has authored over 100 journal articles and has contributed to the development of national and international guidelines including CARI and KDIGO guidelines.

He was awarded with Health Commission Prize for Dux in Community Medicine, Australia; as well as from the New Zealand Society of Nephrology & International Society of Nephrology.



## Why darbepoetin alfa?

- ★ All ESAs work.
- ★ But.... darbepoetin alfa has unique profile such as...
  - ★ Dose frequency: weekly, second weekly or monthly
  - ★ Less Hb cycling
  - ★ Very rare PRCA
  - ★ Safety profile equivalence: The security of an established safety record: over 7.5 million patients and over 4.7 million patient-years experience (darbepoetin alfa)
  - ★ Confidence in the manufacturer
  - ★ A flexible choice with proven results





## Evolving & Redefining of Anemia Management – 2015

### Background:

The comparative statistics of India and Australia shows that India had population of over 1000 million while Australia had 22 million. Number of dialysis patients in India are 60000 compared to only 9000 in Australia. There are about more than 1200 nephrologists in India compared to 450 in Australia.<sup>1</sup>

### Achieving and maintaining Hb targets - assessing the benefits for all CKD patients in daily practice

Erythropoiesis-stimulating agents (ESAs) are the mainstay of anaemia therapy in patients with chronic kidney disease (CKD), and the use of longer-acting agents has provided significant benefits to patients and clinicians alike. As the management of renal anaemia continues to evolve so should our understanding of the evidence base in order to ensure that appropriate prescribing decisions are made.

### Erythropoietin stimulating agent (ESA) use in CKD: K-DIGO<sup>2</sup>

KDIGO Clinical practice guideline for anaemia in chronic kidney disease (CKD)

**Table 1: Recommendation for erythropoietin stimulating agent (ESA)**

CKD stage	Haemoglobin level	Recommendation for ESA use
CKD-Non dialysis	>10g/dL	No ESA
CKD- Non dialysis	<10g/dL	Decision based on rate of fall of Hb, need for blood transfusion, risk of ESA therapy and anemic symptoms
CKD-5 D	avoid Hb, <9.0g/dL	start treatment at between 9-10g/dL, maybe some patients >10g/dL

In general, we suggest that ESAs not be used to maintain Hb concentration above 11.5 g/dl (115 g/l) in patients with CKD. In particular, ESAs not be used to intentionally increase Hb above 13.0 g/dL(table 1).

### Safety of ESAs:

#### Cardiovascular toxicity of epoetin-alfa in patients with CKD: CHOIR

Epoetin alfa when given in the dose of 20,000 units/week to patients with pre-dialysis patients of CKD, the probability of composite event was significantly higher in patients with high haemoglobin (13-13.5 gm/dl) compared to low haemoglobin (11-11.5 gm/dl) ( $p<0.03$ ).<sup>3</sup>

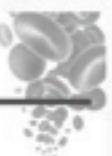
The post hoc analysis of The Correction of Hemoglobin and Outcomes in Renal Insufficiency (CHOIR) trial showed if EPO is given in the low dose (<10095 units/week) the end point of death, heart failure, stroke and myocardial infarction was significantly less ( $p=0.0085$ ) than when given in higher dose (>10095). This shows that higher dose of the EPO causes harm.<sup>4</sup>

The trend to reduce haemoglobin levels following guideline updates are evidenced in The Australian and New Zealand Dialysis and Transplantation Registry (ANZDATA). The recommendations from guidelines to reduce target haemoglobin level are clearly seen in the practice in Australia as seen in the graph below. The use of erythropoietic agent is more in patients on haemodialysis compared to peritoneal dialysis (figure 1).<sup>5</sup>



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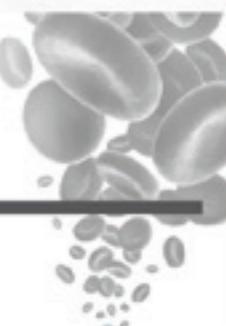
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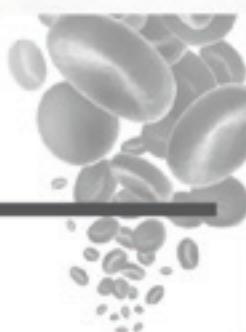
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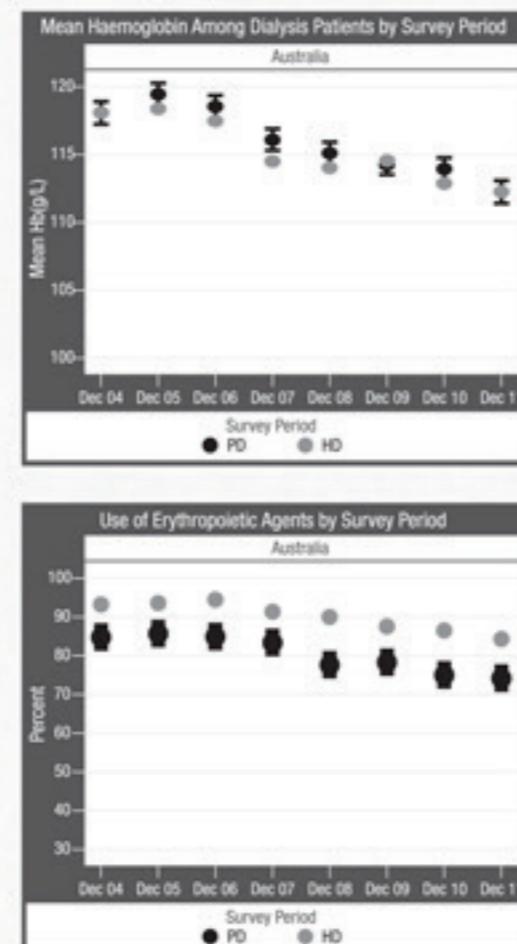
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## Evolving &amp; Redefining of Anemia Management – 2015

**Figure 1:** Trend to reduce haemoglobin levels:  
ANZDATA registry

**Dosing frequency: History repeats itself**

The first generation ACE inhibitor captopril was to be given four times a day and then second generation ACE inhibitor Enalapril was introduced which has to be given twice a day. Ramipril was given once a day. Extending the dosing range has been applied to different

medications.

Darbepoetin alfa has been referred as novel erythropoiesis stimulating protein in a paper published in 1999. The product is available since over 15 years now.<sup>6</sup>

Early development work with r-HuEPO led to the concept of darbepoetin alfa. It is metabolized via de-sialylation of EPO in the liver. There is a correlation between serum half-life and sialic acid residues and carbohydrate content.<sup>7</sup>

**Serum clearance is the primary determinant of in vivo activity of EPO**

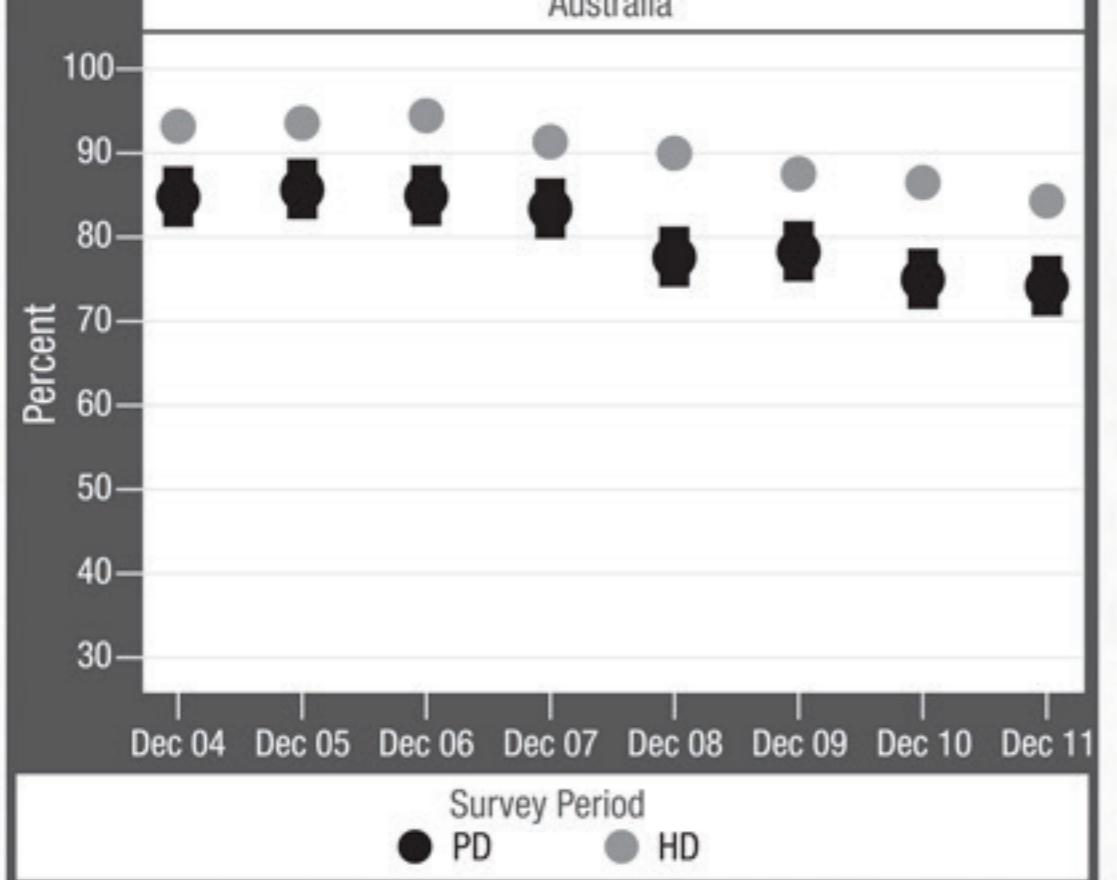
EPO has several isoforms of which isoforms 9-14 (rHuEPO 9-14) had increased half-life and change in receptor activity. It was hypothesized that adding carbohydrate, in order to increase sialic acid content beyond 14 would enhance in vivo activity.<sup>7,8</sup>

Darbepoetin alfa is a novel hyperglycosylated analogue of epoetin alfa. The difference between r-HuEPO and darbepoetin alfa is given in table 2.

**Table 2: Difference between r-HuEPO and Darbepoetin alfa<sup>9</sup>**

	r-HuEPO	Darbepoetin alfa
CHO chains	3 N-Linked CHO chains	5 N-linked CHO chains
Sialic acid residues	Up to 14 Sialic acid residues	Up to 22 Sialic acid residues (8 additional)
Molecular weight	30,400 Daltons	38,500 Daltons
Carbohydrate	Approx 40%	Approx 52%

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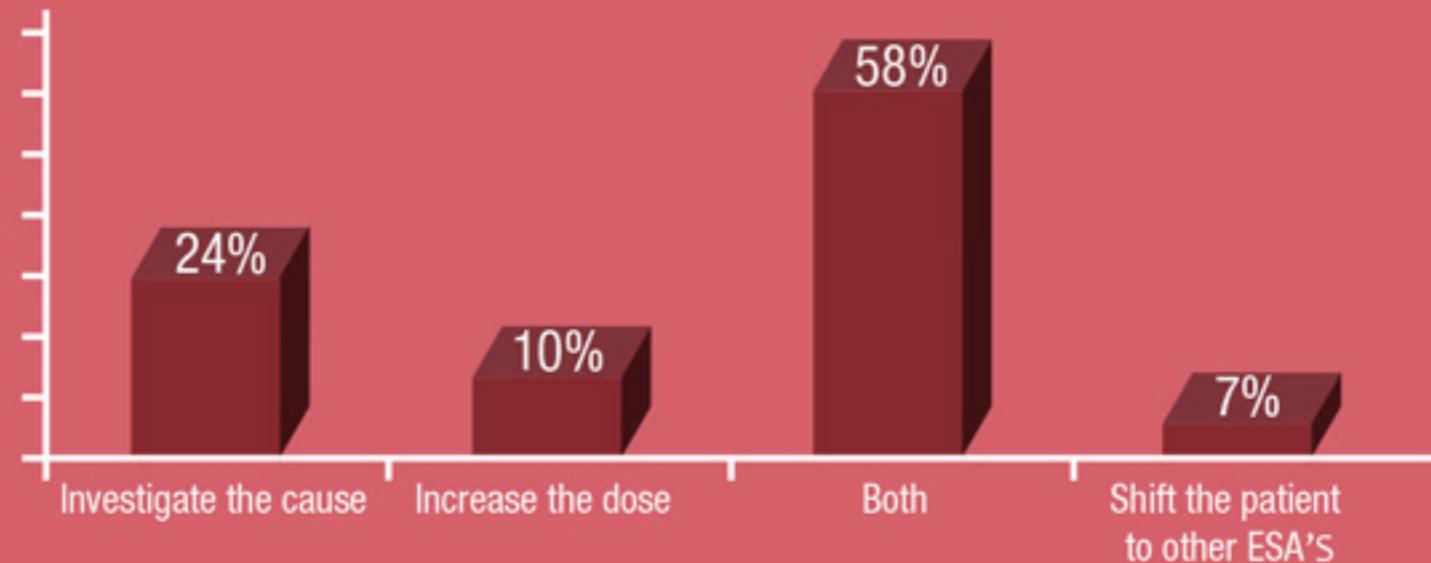
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Dose increment and root cause identification are vital in patients with an inadequate initial response to darbepoetin alfa therapy according to 58% participants (figure 7).

Figure 7: Approach in patients with inadequate response to darbepoetin alfa





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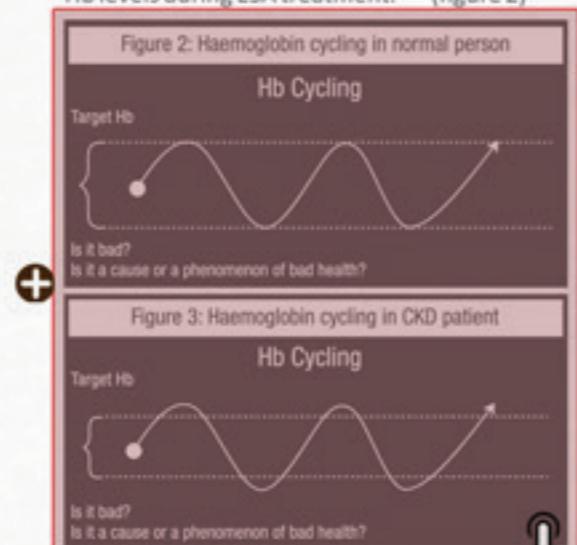


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**+** Darbepoetin alfa has higher *in vivo* bioactivity compared to r-HuEPO. Darbepoetin stimulates erythropoiesis by the same mechanism as endogenous erythropoietin. Darbepoetin has a longer serum half-life than epoetin alfa allowing the benefits of less frequent dosing for both patients and health care staff.<sup>9</sup>

**Haemoglobin cycling:**

Treatment with erythropoietic-stimulating agents (ESA) has been a major advance for improving the lives of patients with chronic kidney disease (CKD). Treatment, however, differs greatly from normal erythropoietic biology. The ESA drugs are administered episodically, resulting in great fluxes in serum erythropoietin levels. While the erythropoietic efficacy of treatment is clear, there are aspects of pharmacological response that are important to consider if we are to optimize treatment. One such phenomenon recently described, haemoglobin (Hb) cycling, is the repeated, cyclical, up and down movement of Hb levels during ESA treatment.<sup>10,11</sup> (figure 2)



**+** Hb fluctuations and subsequent ESA dosage adjustments increase the workload required to maintain Hb levels within target ranges. Hb cycling is common in patients treated with currently available ESAs and several anaemia treatment practices may contribute towards the phenomenon.<sup>12</sup> (figure 3).

In a large study involving 152,846 patients on haemodialysis around 90% of dialysis patients experienced haemoglobin fluctuation over a six-month period.<sup>13</sup> Another study showed that CKD patients not on dialysis also show fluctuations in the haemoglobin level. The study involved patients without ESA (n=3143), on ESA throughout (n=1823) and those who were started on ESA (n=1199). The patients were divided according the haemoglobin variability of 0-1 gm/dl, 1.1-2 gm/dl and >2gm/dl. The results showed that haemoglobin variability of >2 gm/dl was higher in patients receiving ESAs.<sup>14</sup> Results of another study showed that the risk of mortality is lowest in dialysis patients with stable haemoglobin level of 11-12.5 g/dL.<sup>15</sup> A study has shown that haemoglobin variability in CKD patients not on dialysis is associated with increased risk of death.<sup>14</sup>

Figure 4: Factors impacting on Hb variability

Patient-related factors	Intercurrent events	Practice pattern-related
<ul style="list-style-type: none"> <li>• Vascular access mobility</li> <li>• RBC Survival</li> <li>• Secondary hyperthyroidism</li> <li>• Cancer</li> <li>• Hematology disorders</li> <li>• Diabetes</li> </ul>	<ul style="list-style-type: none"> <li>• Hospitalisation</li> <li>• Infection</li> <li>• Inflammation</li> <li>• Bleeding/ haemolysis</li> <li>• Nutritional deficiencies</li> <li>• PRCA</li> <li>• Medications</li> <li>• Interdialytic weight gain</li> </ul>	<ul style="list-style-type: none"> <li>• ESA dose changes</li> <li>• Protocol design and lab monitoring</li> <li>• Narrow target Hb range</li> <li>• Iron management</li> <li>• Dialysis adequacy</li> <li>• Payment restrictions</li> <li>• Water purity</li> </ul>

↓                            ↓

Limited capacity for physician influence

RBC, red blood cell;  
PRCA, pure red cell aplasia



**Haemoglobin cycling is common in patients treated with currently available ESAs and is less common with darbepoetin alfa therapy.**





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Figure 2: Haemoglobin cycling in normal person

Hb Cycling

Target Hb

Hb fluctuations and subsequent ESA dosage adjustments increase the workload required to maintain Hb levels within target ranges. Hb cycling is common in patients treated with currently available ESAs and several anaemia treatment practices may contribute towards the phenomenon.<sup>12</sup> (figure 3).

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#### Haemoglobin cycling:

Treatment with erythropoiesis stimulating agents (ESA) has been shown to improve the quality of life in patients with kidney disease. The mechanism of action differs greatly from that of endogenous biology. The response to ESAs is often episodically, rather than continuously. Erythropoietin is a key factor in the efficacy of treatment. The variability of pharmacological response that are important to consider if we are to optimize treatment. One such phenomenon recently described, haemoglobin (Hb) cycling, is the repeated, cyclical, up and down movement of Hb levels during ESA treatment.<sup>10,11</sup> (figure 2)

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dialysis patients receiving ESA over a 10-year period, it was shown that patients receiving darbepoetin also showed greater variability in Hb level. The patients receiving darbepoetin (n=3143), compared to those who received epoetin (n=12143), had those who received darbepoetin showed greater variability in Hb level. The patients receiving darbepoetin had a mean haemoglobin level of 12.5 gm/dl and a standard deviation of 2.5 gm/dl.

>2gm/dl. The results showed that haemoglobin variability of >2 gm/dl was higher in patients receiving ESAs.<sup>14</sup> Results of another study showed that the risk of mortality is lowest in dialysis patients with stable haemoglobin level of 11-12.5 g/dL.<sup>15</sup> A study has shown that haemoglobin variability in CKD patients not on dialysis is associated with increased risk of death.<sup>14</sup>



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Treatment with erythropoiesis stimulating agents (ESA) has revolutionized the management of anaemia in chronic kidney disease (CKD). The response to treatment differs greatly between patients due to pharmacokinetic and pharmacodynamic biology. The response to ESA is often episodically, rather than continuously, as the erythropoietin receptor is downregulated by the efficacy of treatment. This leads to periods of pharmacological response that are important to consider if we are to optimize treatment. One such phenomenon recently described, haemoglobin (Hb) cycling, is the repeated, cyclical, up and down movement of Hb levels during ESA treatment.<sup>10,11</sup> (figure 2)

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**Figure 2: Haemoglobin cycling in normal person**



Is it bad?  
Is it a cause or a phenomenon of bad health?

**Figure 3: Haemoglobin cycling in CKD patient**



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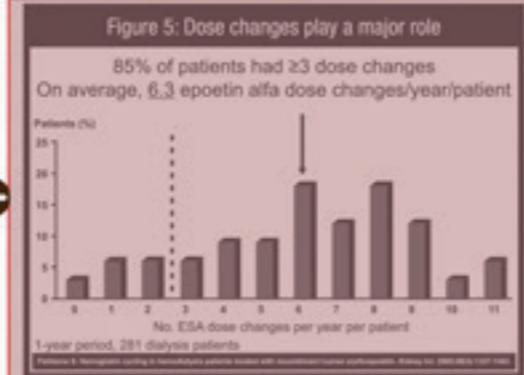


## Evolving & Redefining of Anemia Management – 2015

Different factors including patient related factors, intercurrent events and practice pattern related factors can impact haemoglobin variability. One of the practice pattern related factors is change in dosages of ESA. Dose changes in ESA can cause haemoglobin variability (figure 4); on the other hand, optimal ESA usage may improve haemoglobin stability.<sup>16,17</sup>

**+ Dose changes of ESA play a major role in haemoglobin variability (figure 5).** Fishbane<sup>18</sup> in a study evaluated the haemoglobin cycling in hemodialysis patients treated with recombinant human erythropoietin. This study included 281 patients on dialysis. In this study large number i.e. 85% of patients had  $\geq 3$  dose changes. On average, 6.3 epoetin alfa dose changes per year per patient were seen.<sup>13</sup>

Bernieh B<sup>19</sup> compared short- and long-acting erythropoiesis-stimulating agents in hemodialysis patients. The patients on hemodialysis who were treated with epoetin alfa 2-3 times per week or darbepoetin weekly and epoetin alfa weekly or darbepoetin second weekly were changed to darbepoetin or remained on epoetin alfa. The dose changes were less in long acting ESA i.e. darbepoetin alfa (1.26) compared to short acting ESA (1.99).



### Route of epoetin administration and costings

Initial studies with epoetin alfa in haemodialysis patients have shown that it has lower bioavailability and longer half-life. Subcutaneous use might also result in dose reduction compared to intravenous use. A study compared subcutaneous epoetin versus intravenous epoetin in 208 patients. The dose of subcutaneous injection was 95+75 U/kg/wk while that of intravenous injection was 140+88 U/kg/wk. Use of subcutaneous injection resulted in early rise in haemoglobin and there was no difference in the percentage of patients showing response with two routes. Subcutaneous route is less painful and results in cost savings compared to intravenous route.<sup>19</sup>

In case of darbepoetin alfa the dose of intravenous use is same as that of subcutaneous route for the treatment of anemia.<sup>20</sup>

**+ Switching to fortnightly darbepoetin maintains Hb control with no dose penalty - Peritoneal dialysis**

A randomized study among patients on peritoneal dialysis evaluated effect of switching to fortnightly darbepoetin by evaluating haemoglobin level six months before, during conversion and 12 months after conversion.

According to the results of this study switching to fortnightly darbepoetin maintains haemoglobin control without dose penalty. After 12 months of switching to second weekly darbepoetin alfa 73% patients had mean haemoglobin of  $>110$  g/dl without increase in dose and 70% patients remained on fortnightly dosing indicating most patients were successfully maintained on extended dosing.<sup>21</sup>

**+ With long half-life of darbepoetin alfa a question arises that would it take long time for**

**Darbepoetin alfa therapy offers equivalent efficacy on Hb stability without the need for dosage increment.**

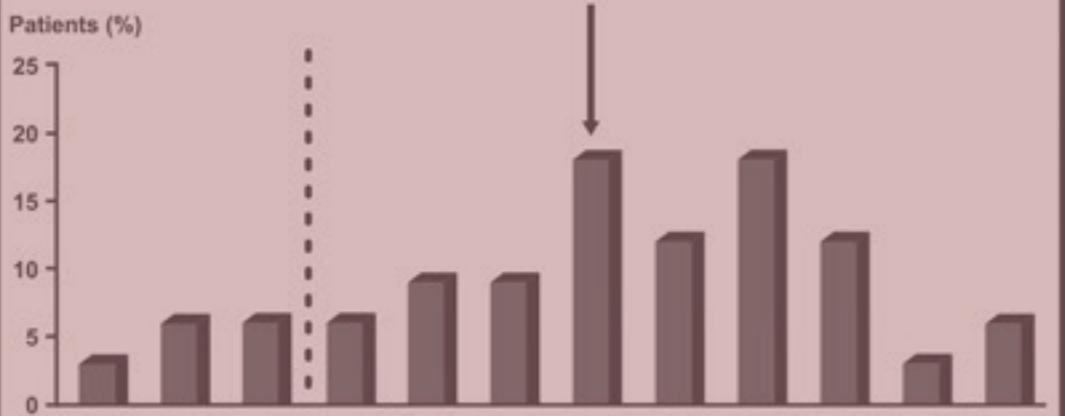


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Figure 5: Dose changes play a major role

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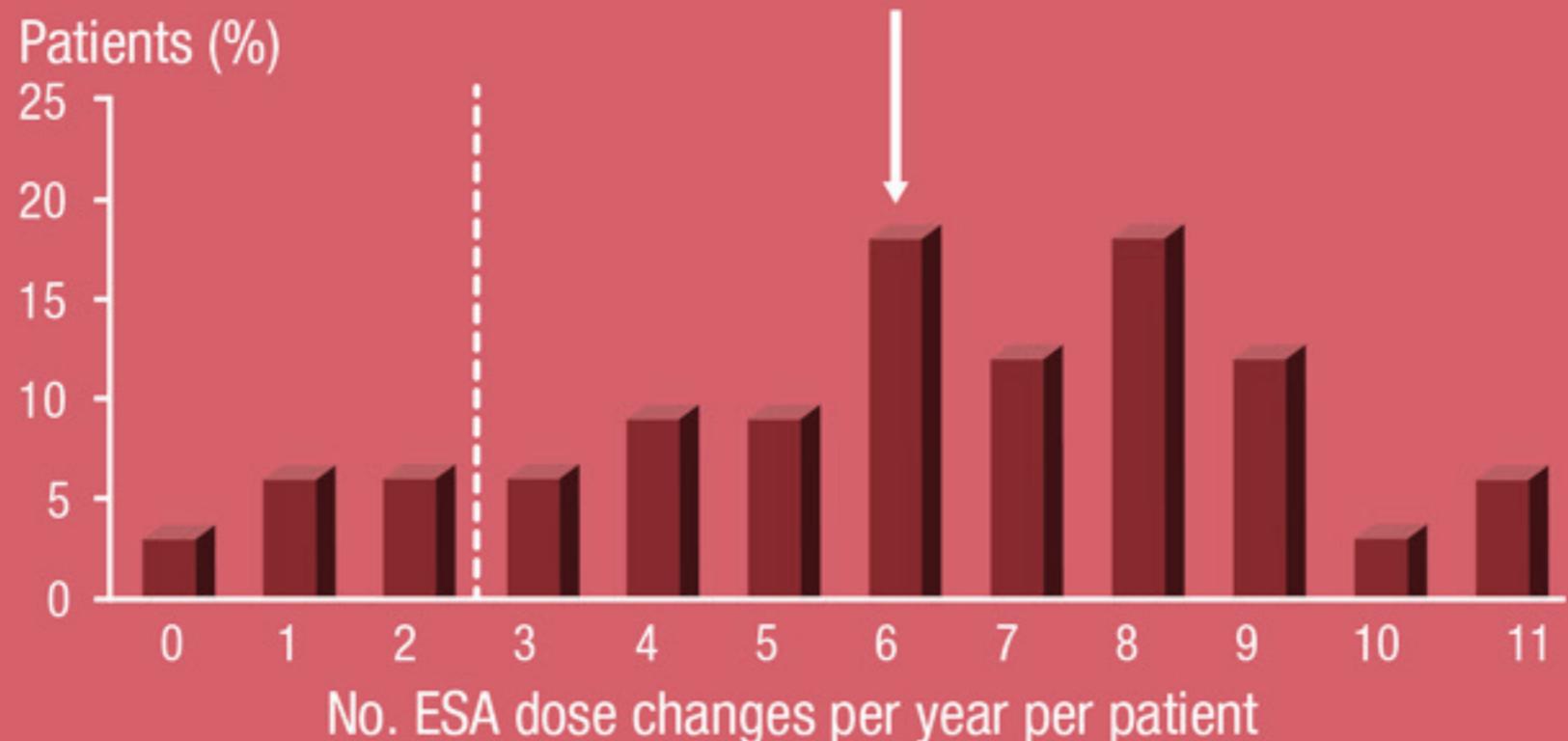
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1-year period, 281 dialysis patients

Fishbane S. Hemoglobin cycling in hemodialysis patients treated with recombinant human erythropoietin. Kidney Int. 2005;68(3):1337-1343.



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ESA usage may improve haemoglobin stability.<sup>16,17</sup>

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Figure 5: Dose changes per year, %, 1998

85% of patients had  $\geq 3$  dose changes

On average, 6.3 epoetin alfa dose changes/year/patient



intravenous epoetin in 208 patients. The dose of subcutaneous injection was 95+75 U/kg/wk while that of intravenous injection was 140+88 U/kg/wk. Use of subcutaneous injection resulted in early rise in haemoglobin and there was no difference in the percentage of patients

two routes. and results inous route.<sup>19</sup>

the dose of as that of treatment of

darbepoetin dose penalty -

patients on t of switching / evaluating before, during r conversion.

According to the results of this study switching to fortnightly darbepoetin maintains haemoglobin control without dose penalty. After 12 months of switching to second weekly darbepoetin alfa 73% patients had mean haemoglobin of  $>110$  g/dl without increase in dose and 70% patients remained on fortnightly

Dose changes of ESA play a major role in haemoglobin variability(figure 5). Fishbane<sup>16</sup> in a study evaluated the haemoglobin cycling in hemodialysis patients treated with recombinant human erythropoietin. This study included 281 patients on dialysis.In this study

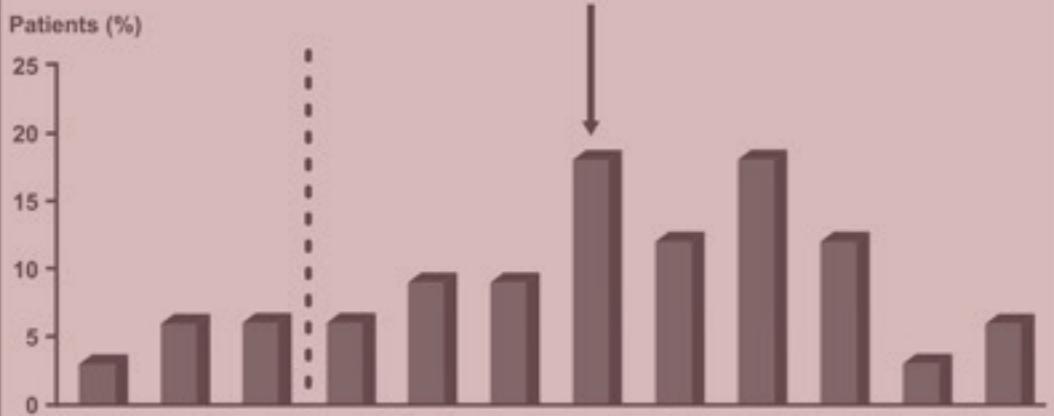
while that of intravenous injection was 140+88 U/kg/wk. Use of subcutaneous injection resulted in early rise in haemoglobin and there was no difference in the percentage of patients showing response with two routes. Subcutaneous route is less painful and results in

## Switching to fortnightly darbepoetin maintains Hb control with no dose penalty - Peritoneal dialysis

According to the results of this study switching to fortnightly darbepoetin maintains haemoglobin control without dose penalty.

After 12 months of switching to second weekly darbepoetin alfa 73% patients had mean haemoglobin of >110 g/dl without increase in dose and 70% patients remained on fortnightly dosing indicating most patients were successfully maintained on extended dosing.<sup>21</sup>

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Dose changes of ESA play a major role in haemoglobin variability(figure 5). Fishbane<sup>16</sup> in a study evaluated the haemoglobin cycling in hemodialysis patients treated with recombinant human erythropoietin. This study included 281 patients on dialysis. In this study large number of dose changes. On average changes per month were 1.6.

Bernieh B<sup>18</sup> studied 100 hemodialysis patients on darbopoetin alfa 2-3 times weekly. Weekly doses were increased or decreased by 10% if Hb levels remained outside target range. Doses were less in 10% of patients (1.26) compared to baseline.

Figure

85%

On average, 6

Patients (%)

25

20

15

10

5

0

With long half-life of darbopoetin alfa a question arises that would it take long time for haemoglobin level to come down to target range in case patient achieves higher than target level of haemoglobin. Time required for haemoglobin concentrations to return to  $\leq 12.0$  g/dL after withholding doses for Hb concentrations for more than 14.0 g/dL was similar for epoetin alfa and darbopoetin alfa.<sup>22</sup>

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the dose of darbopoetin alfa as that of epoetin alfa for treatment of anaemia in hemodialysis patients.

darbopoetin alfa dose penalty -

patients on darbopoetin alfa switch to epoetin alfa evaluating Hb before, during and after conversion.

Study switching from epoetin alfa to darbopoetin alfa maintains similar dose penalty.

After 12 months of switching to second weekly darbopoetin alfa 73% patients had mean haemoglobin of  $>110$  g/dl without increase in dose and 70% patients remained on fortnightly dosing indicating most patients were successfully maintained on extended dosing.<sup>21</sup>



## Evolving &amp; Redefining of Anemia Management – 2015

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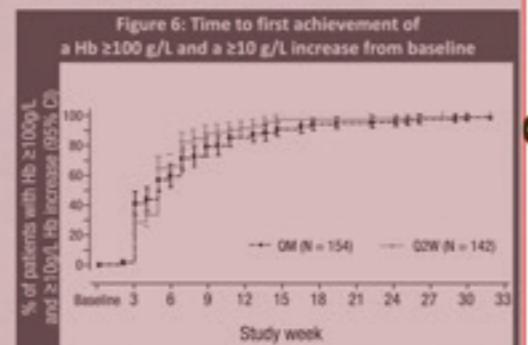
A single-item questionnaire based study asking each patient which therapy they preferred between QW/Q2W epoetin alfa or QM darbepoetin alfa showed that large number of patients preferred darbepoetin alfa over epoetin alfa.<sup>23</sup>

**Recommended conversion rate for epoetin alfa to darbepoetin alfa:**

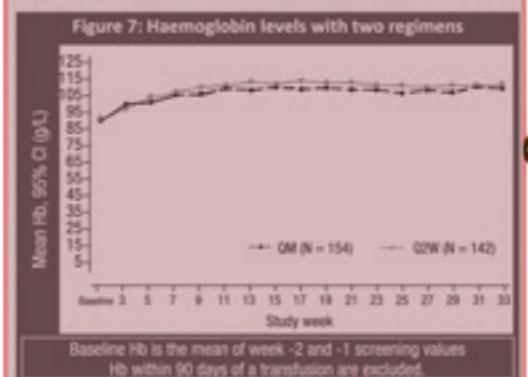
Epoetin alfa 200 units is equal to 1 mcg of darbepoetin alfa.<sup>24</sup>

+ A study published in Nephrology 2014 authored by Roger SD et al<sup>25</sup> evaluated monthly injection of darbepoetin alfa for correction of anaemia in patients with chronic renal disease. The primary objective of this study was to determine whether the efficacy of once monthly (QM) dosing of darbepoetin alfa is non-inferior to that of once every 2 week (Q2W) dosing for the correction of anaemia in subjects with CKD not receiving dialysis. In this study 355 CKD patients not on dialysis, with no recent ESA use (12 weeks), eGFR 15-59 mL/min/1.73m<sup>2</sup> and Hb <10 gm/dl were randomized to receive either darbepoetin alfa once every two week or once a month. The target haemoglobin level was 10-12 gm/dl and >1 gm/dl above baseline. The initiation dose was 0.75 mcg/kg every two weeks of 1.5 mcg/kg every month. The primary endpoint of the study was haemoglobin change between baseline and the evaluation period (weeks 29-33). The result showed that time to first achievement of a haemoglobin  $\geq 10$  gm/dL

and a  $\geq 1$  gm/dL increase from baseline do not differ in the once a month and every two week regimen (figure 6).



Haemoglobin achieved over time is also similar in the once a month and every two week regimen (figure 7).



The study concluded that monthly (QM) dosing of darbepoetin alfa is non-inferior to every two week dosing for the correction of anaemia in subjects not on dialysis. The safety profile for monthly dosing is generally similar to every two week dosing.

The landscape of anaemia management has significantly evolved over the years with introduction of newer molecules and

**Darbepoetin alfa has a wide range of dosing regimens & established safety profile.**



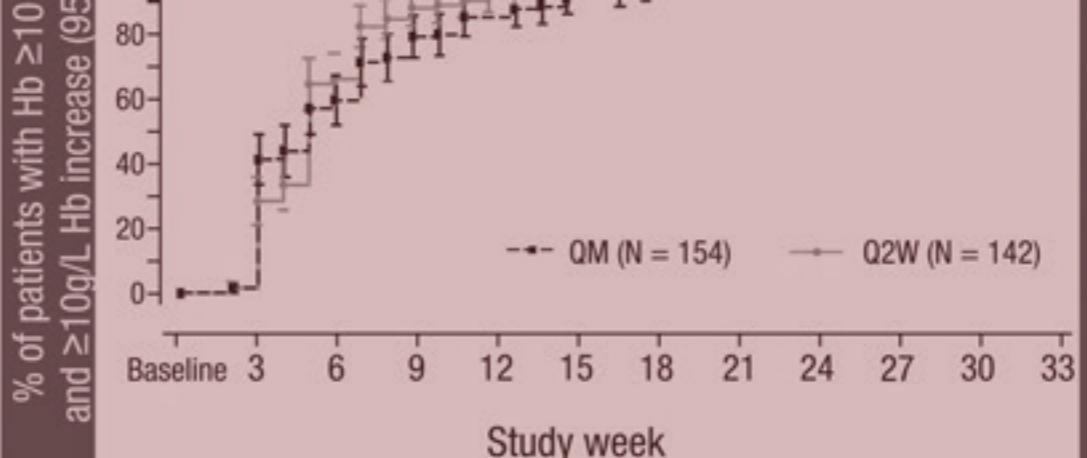
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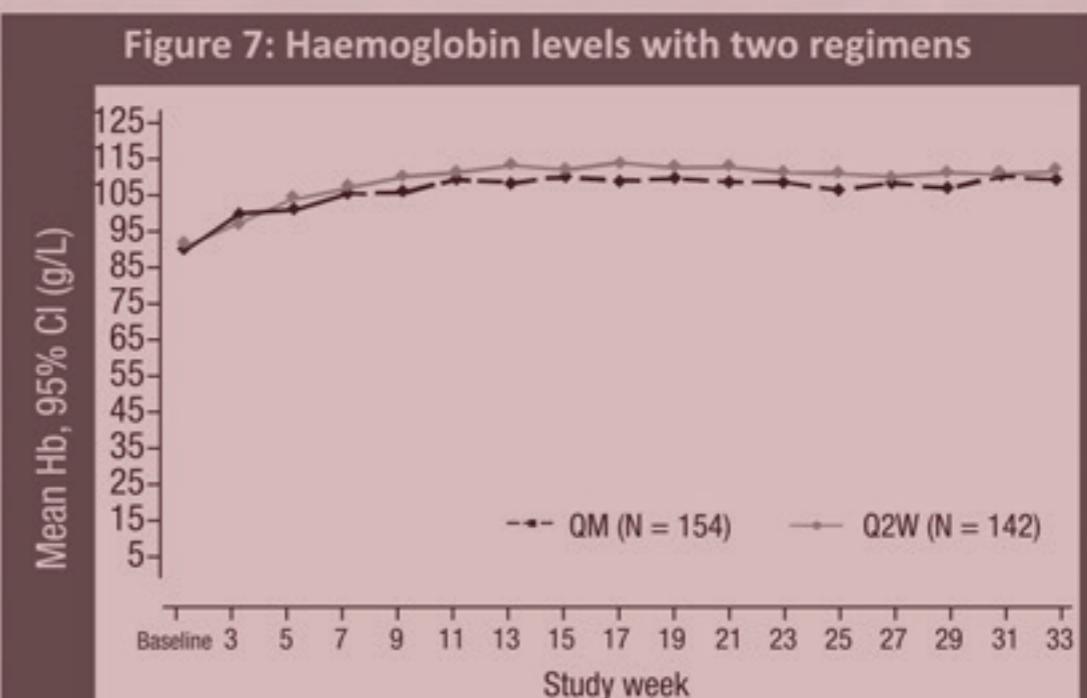
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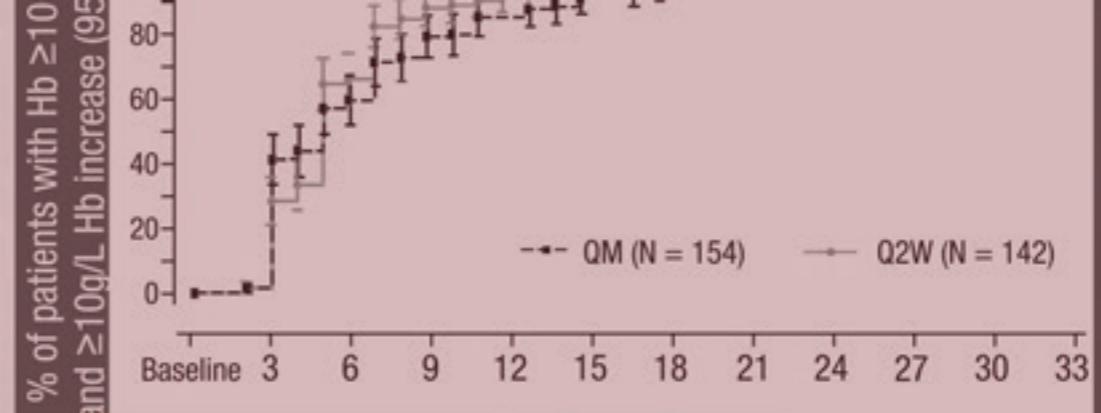
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Recommended  
alfa to darbepoetin alfa

Epoetin alfa  
darbepoetin alfa

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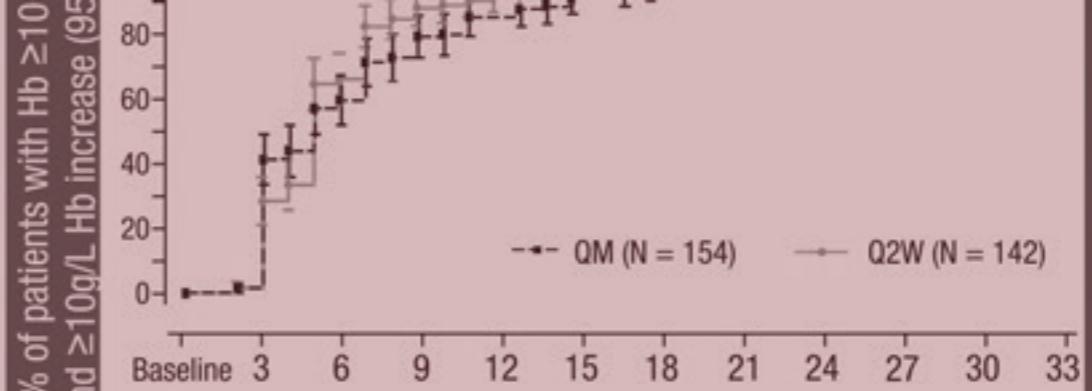
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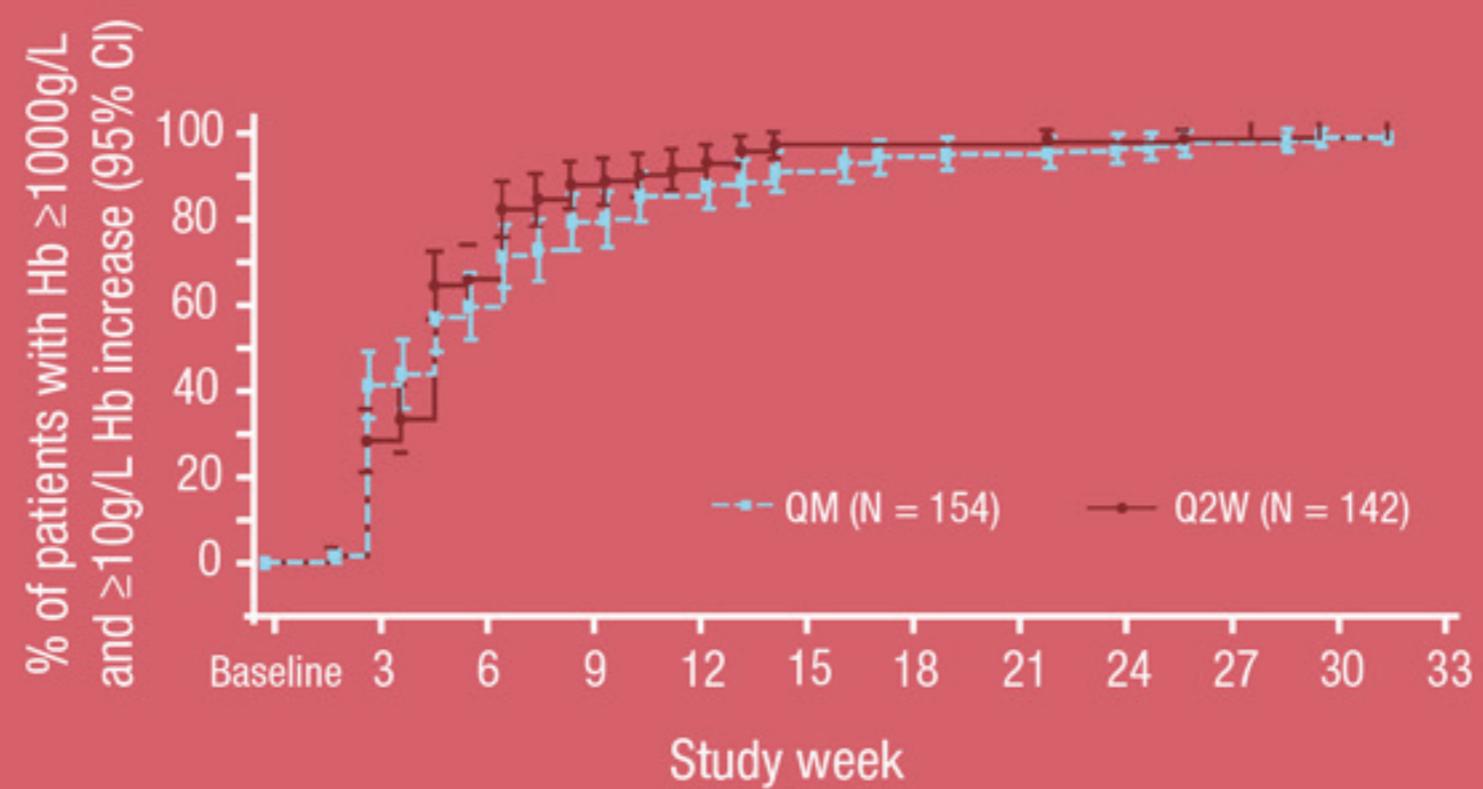
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The result showed that time to first achievement of a haemoglobin  $\geq 10$  gm/dL and a  $\geq 1$  gm/dL increase from baseline do not differ in the once a month and every two week regimen (figure 6).

Figure 6: Time to first achievement of a Hb  $\geq 100$  g/L and a  $\geq 10$  g/L increase from baseline

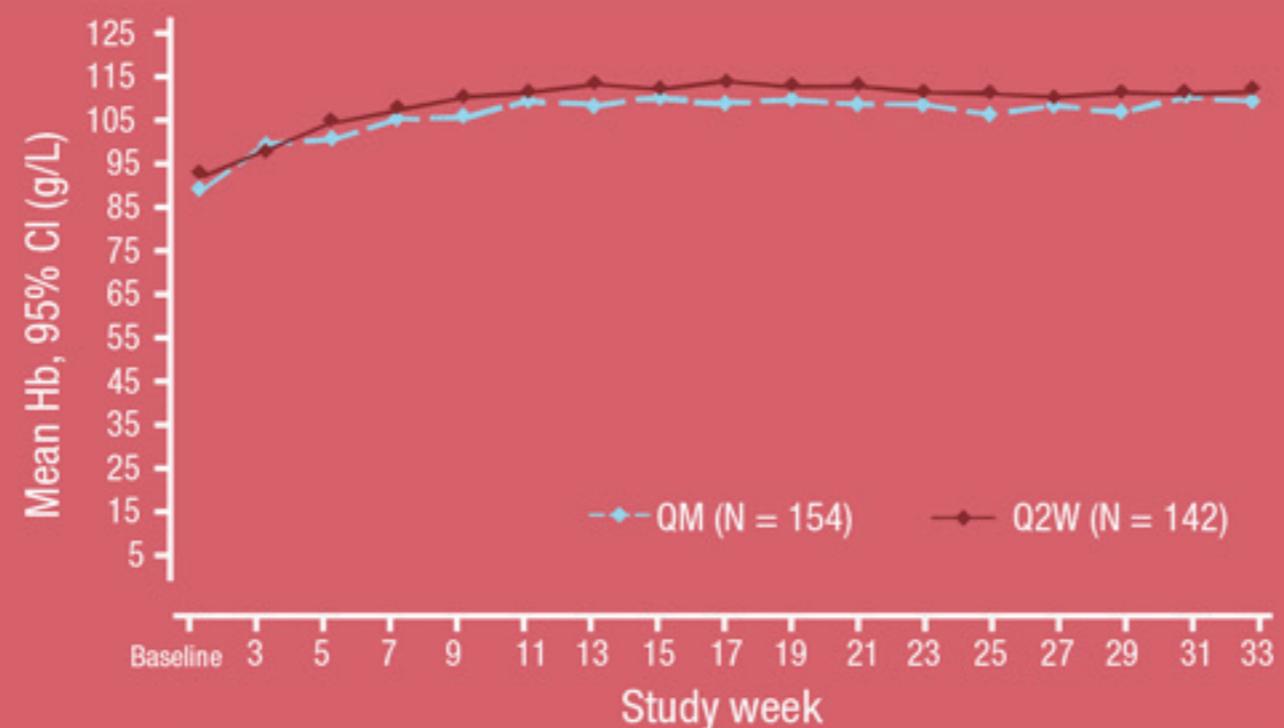


The initiation dose was 0.75 mcg/kg every two weeks or 1.5 mcg/kg every month. The primary

monthly dosing is generally similar to every two week dosing.

Haemoglobin achieved over time is also similar in the once a month and every two week regimen (figure 7).

Figure 7: Haemoglobin levels with two regimens



Baseline Hb is the mean of week -2 and -1 screening values  
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The initiation dose was 0.75 mcg/kg every two weeks of 1.5 mcg/kg every month. The primary

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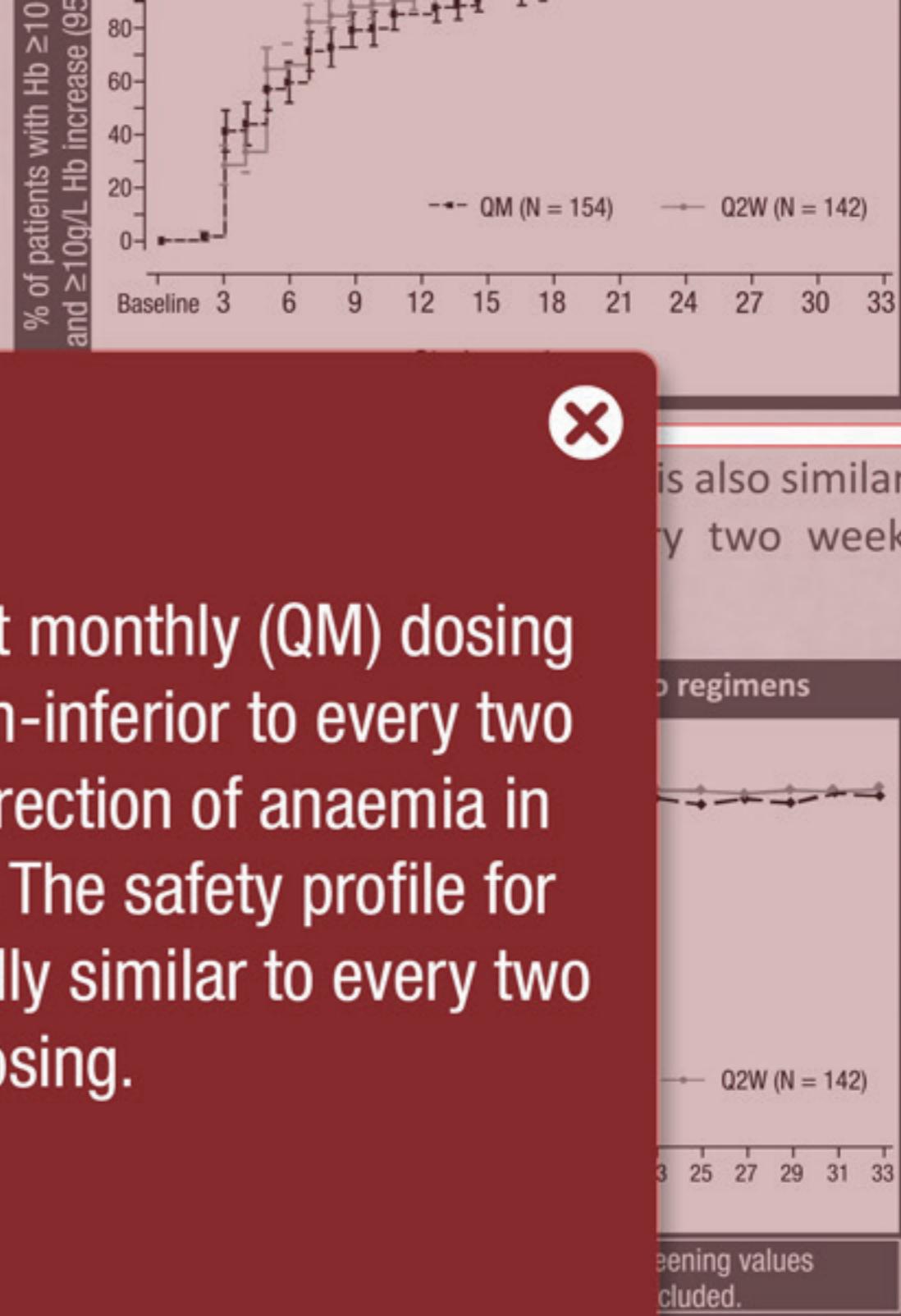
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## Evolving & Redefining of Anemia Management – 2015

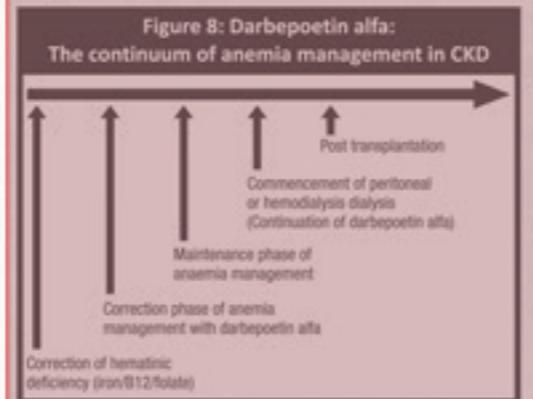
recommendations of lower target haemoglobin. Introduction of ESA was a significant landmark in the management of anaemia in CKD patients.

### Known benefits of ESAs

ESAs are effective in correction of anaemia, lowering of blood transfusion requirements, improvement in quality of life, reduction in left ventricular hypertrophy, enhanced cognitive function, increased exercise tolerance and finally making patient feeling good.<sup>26,27</sup>

### Why darbepoetin alfa?

All ESAs work, but darbepoetin offers advantages for dosing as it can be given weekly, second weekly or monthly. It results in less haemoglobin cycling and very rare pure red cell aplasia (PRCA). Darbepoetin alfa has the security of an established safety record with over 7.5 million patients and over 4.7 million patient-years experience (darbepoetin alfa). Confidence in the manufacturer and flexible choice with proven results are other benefits of using darbepoetin alfa.



Darbepoetin alfa can be used in different phases of CKD for anemia management and even post transplantation (figure 8).

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The use of darbepoetin alfa may yield greater convenience & significant increase in cost efficiency.

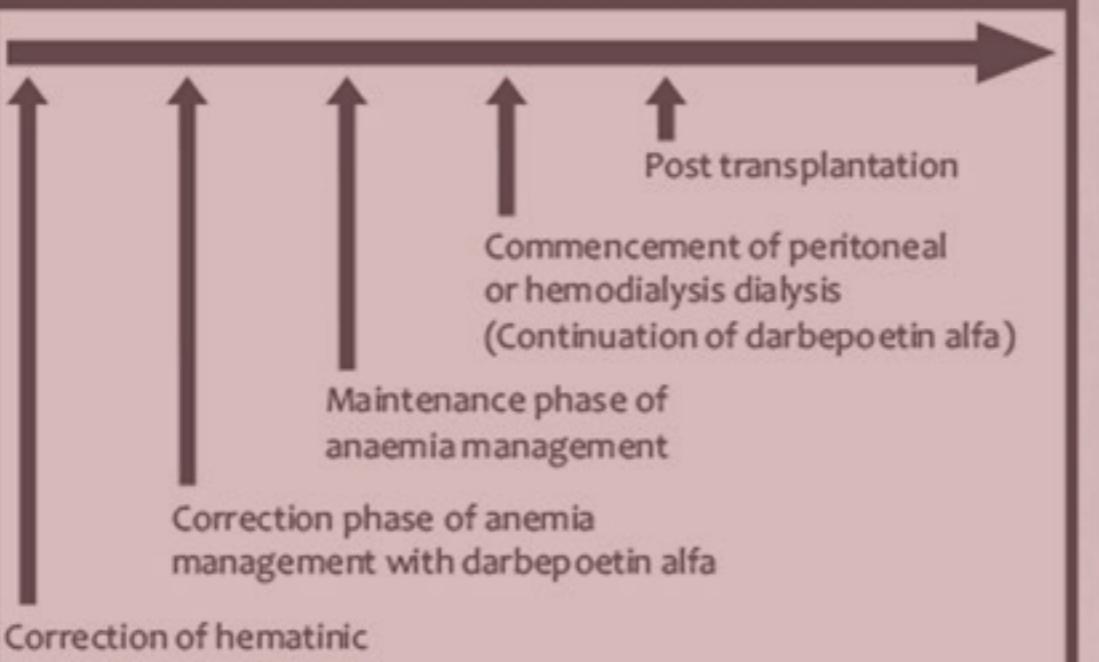


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**Figure 8: Darbepoetin alfa:  
The continuum of anemia management in CKD**



6. Macdougall IC et al. Pharmacokinetics of Novel Erythropoiesis stimulating protein compared with Epoetin alfa in dialysis patients. *J Am Soc Nephrol* 1999;10:2392-2395
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lowering of blood transfusion requirements,  
improvement in quality of life, reduction in left

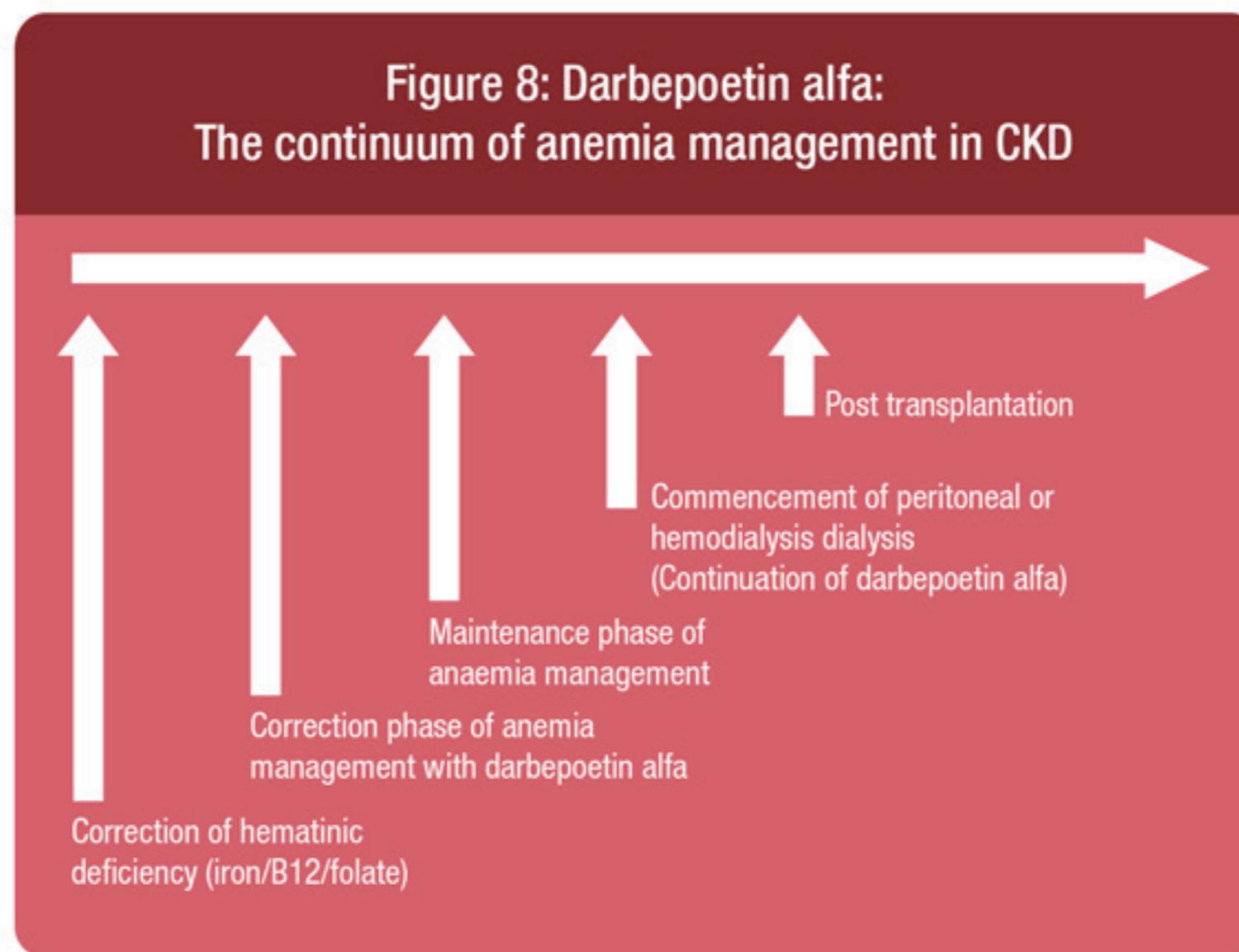
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## Management of anaemia in CKD patients with EPA: Survey Results

### Objective:

The objective of this survey was to understand the approach towards management of anaemia and selecting EPA for the management of anaemia in CKD patients.

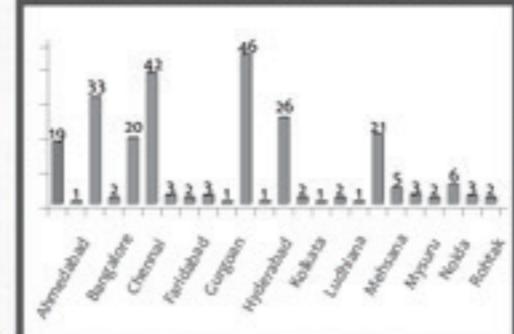
### Material and methods:

A questionnaire based cross sectional survey was conducted among Indian physicians engaged in the management of chronic renal failure patients. A total of 247 physicians were contacted with the paper based questionnaire regarding management practices of anaemia in CKD patients. Only two participants did not respond the survey completely. Remaining 245 survey participants completed the survey. Overall responder rate for survey was 99%.

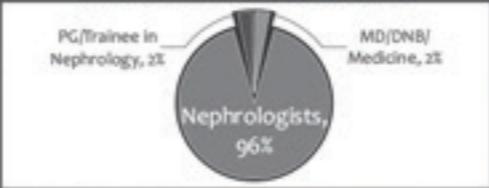
### Results:

A total of 84% of respondents were from 7 major cities (Ahmedabad 7.7%; Bangalore 13.4%; Chennai 8.1%; Delhi 17%; Hyderabad 18.6%; Kolkata 10.5% and Mumbai 8.5%) in India (figure 1). A total of 96% of respondents were nephrologists by profession while 2% were PG/Trainee in Nephrology or MD/DNB Medicine. (figure 2).

**Figure 1: Respondents by location**

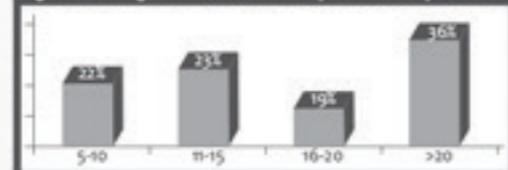


**Figure 2: Respondents by Speciality**



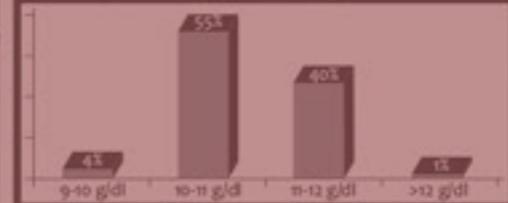
More than 15 new CKD patients per month are seen by 55% nephrologist's in India (figure 3).

**Figure 3: Average number of new CKD patients seen per month**



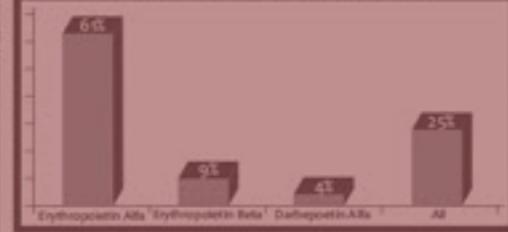
A total of 95% surveyed nephrologists reported that the most appropriate target Hb in CKD should be in the range of 10-12 g/dl (figure 4).

**Figure 4: Most appropriate target Hb in CKD**



According to 61% surveyed participants Hb fluctuations occur more frequently in erythropoietin alpha-treated CKD patients with anaemia (figure 5).

**Figure 5: ESA with high Hb variability / Hb cycling**

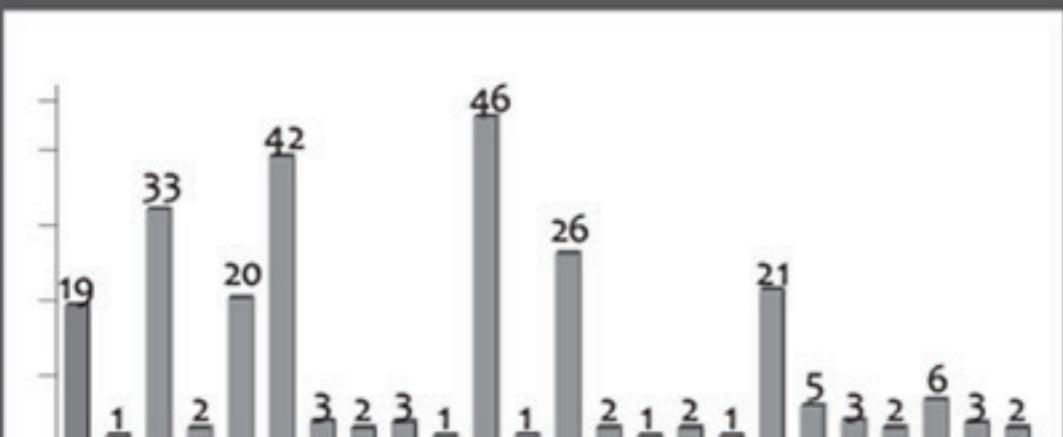


A questionnaire based cross sectional survey was conducted among Indian physicians engaged in the management of chronic renal failure patients. A total of 247 physicians were contacted with the paper based questionnaire regarding management practices of anaemia in CKD patients. Only two participants did not respond the survey completely. Remaining 245 survey participants completed the survey. Overall responder rate for survey was 99%.

### Results:

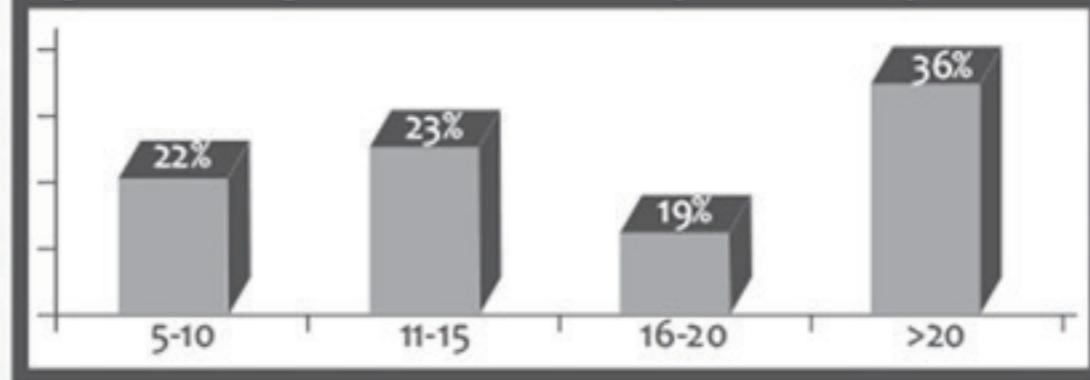
A total of 84% of respondents were from 7 major cities (Ahmedabad 7.7%; Bangalore 13.4%; Chennai 8.1%; Delhi 17%; Hyderabad 18.6%; Kolkata 10.5% and Mumbai 8.5%) in India (figure 1). A total of 96% of respondents were nephrologists by profession while 2% were PG/Trainee in Nephrology or MD/DNB Medicine. (figure 2).

**Figure 1: Respondents by location**



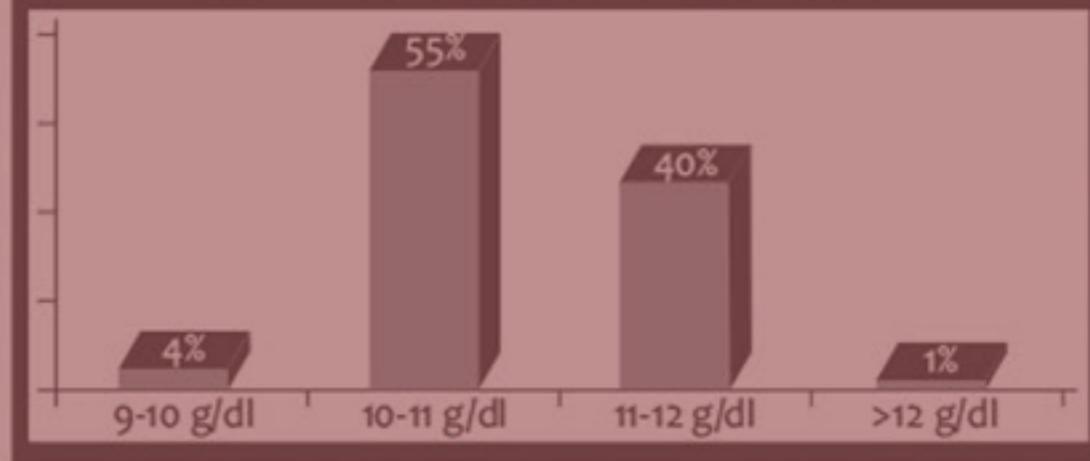
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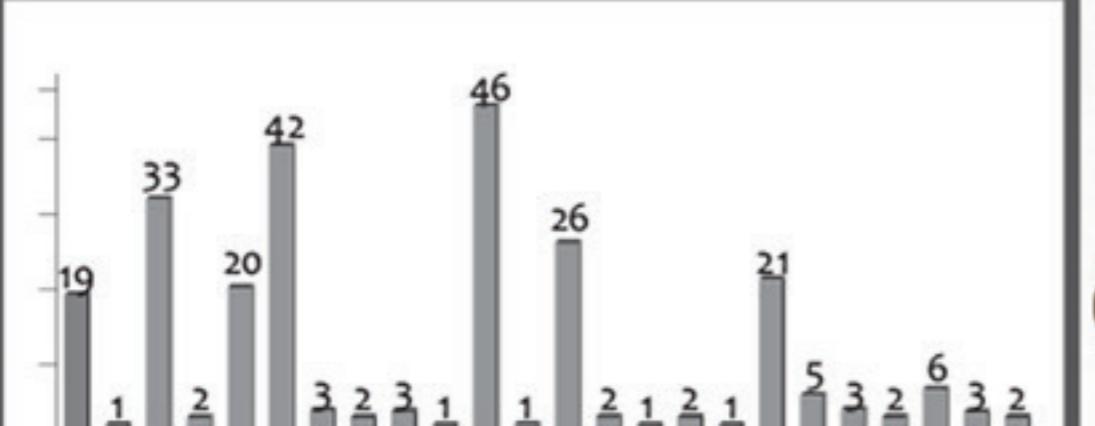


A questionnaire based cross sectional survey was conducted among Indian physicians engaged in the management of chronic renal failure patients. A total of 247 physicians were contacted with the paper based questionnaire regarding management practices of anaemia in CKD patients. Only two participants did not respond the survey completely. Remaining 245 survey participants completed the survey. Overall response rate was 97.5%.

#### Results:

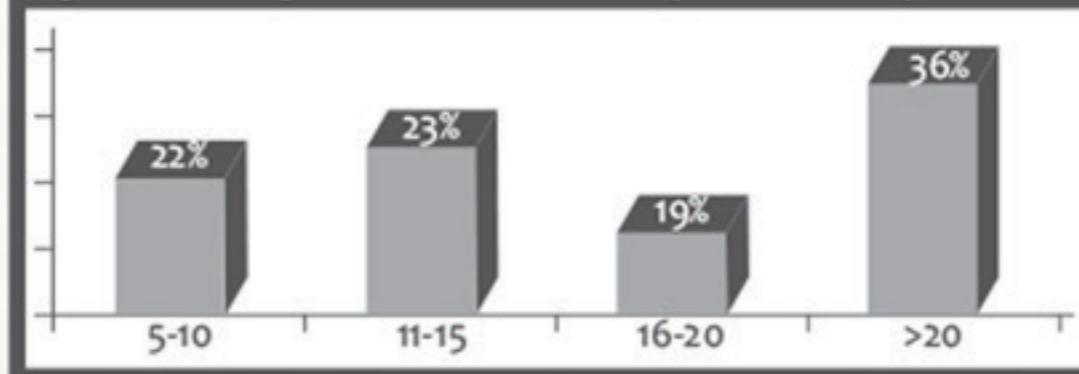
A total of 84.2% respondents were from major cities (Delhi 13.4%; Mumbai 18.6%; Kolkata 13.4%; Bangalore 13.4%; Hyderabad 13.4%; Chennai 13.4%; Pune 13.4%; Jaipur 13.4%; Lucknow 13.4%; and other cities 13.4%; Chhattisgarh 13.4%; Bihar 13.4%; Jharkhand 13.4%; and Jammu & Kashmir 13.4%;) and 15.8% were from rural areas. Of the total respondents 13.4% were nephrologists, 66.7% were PG/Trainee in Nephrology or MD/DMB Medicine. (figure 1).

**Figure 1: Respondents by location**



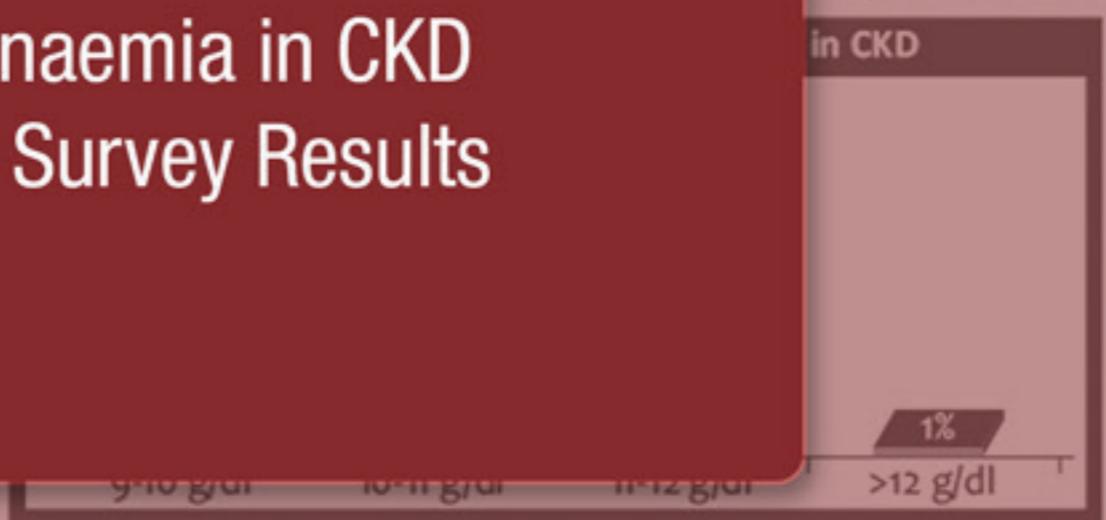
More than 15 new CKD patients per month are seen by 55% nephrologist's in India (figure 3).

**Figure 3: Average number of new CKD patients seen per month**



Nephrologists reported that Hb in CKD patients fluctuates (figure 4).

**in CKD**



According to 61% surveyed participants Hb fluctuations occur more frequently in erythropoietin alpha-treated CKD patients with anaemia (figure 5).

**Figure 5: ESA with high Hb variability / Hb cycling**

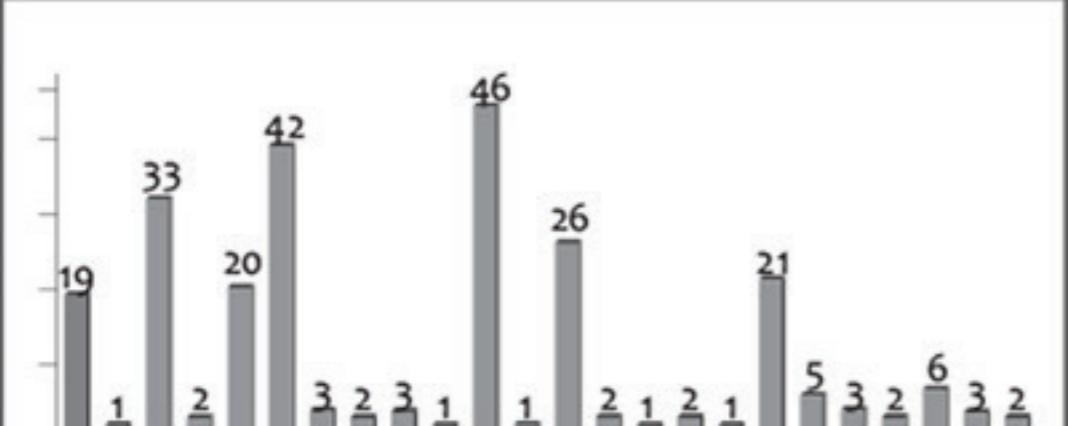


A questionnaire based cross sectional survey was conducted among Indian physicians engaged in the management of chronic renal failure patients. A total of 247 physicians were contacted with the paper based questionnaire regarding management practices of anaemia in CKD patients. Only two participants did not respond the survey completely. Remaining 245 survey participants completed the survey. Overall response rate was 98%.

#### Results:

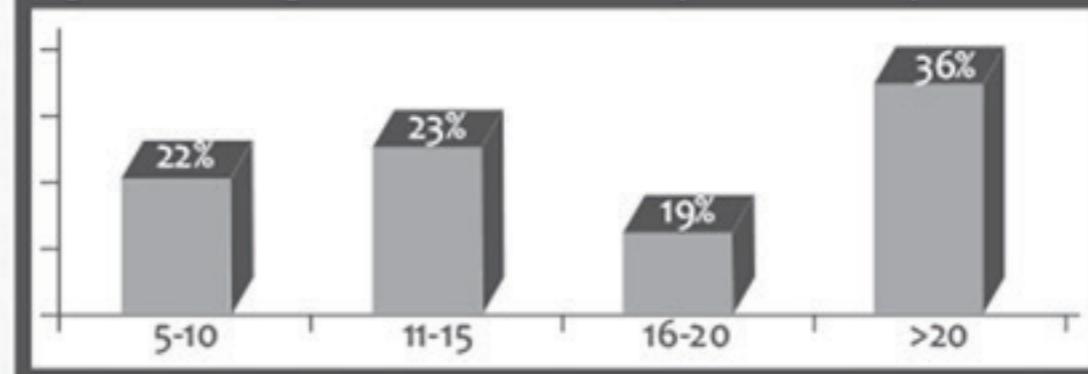
A total of 84.2% respondents were from major cities (Delhi 13.4%; Mumbai 18.6%; Kolkata 13.4%; Bangalore 13.4%; Chennai 13.4%; Hyderabad 13.4%; Jaipur 13.4%; Lucknow 13.4%; and other 13.4%) and 15.8% were from smaller towns and rural areas. Of the total 247 respondents, 180 (73%) were nephrologists, 67 (27%) were PG/Trainee in Nephrology or MD/DMB Medicine. (figure 1).

**Figure 1: Respondents by location**



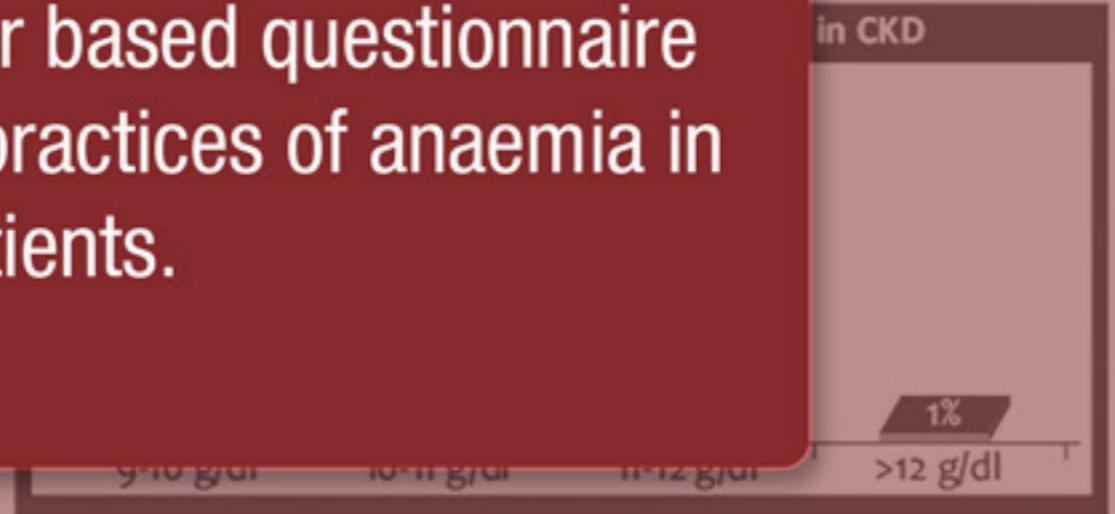
More than 15 new CKD patients per month are seen by 55% nephrologist's in India (figure 3).

**Figure 3: Average number of new CKD patients seen per month**



Physicians reported that Hb in CKD patients (figure 4).

**in CKD**



According to 61% surveyed participants Hb fluctuations occur more frequently in erythropoietin alpha-treated CKD patients with anaemia (figure 5).

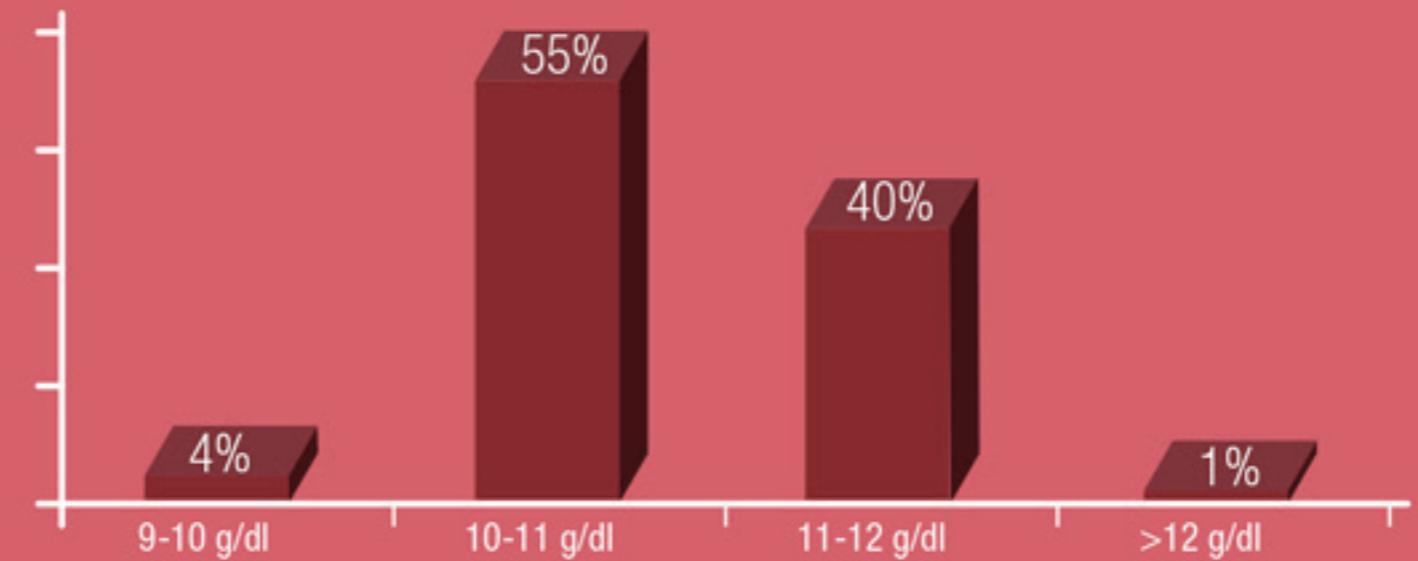
**Figure 5: ESA with high Hb variability / Hb cycling**





A total of 95% surveyed nephrologists reported that the most appropriate target Hb in CKD should be in the range of 10-12 g/dl (figure 4).

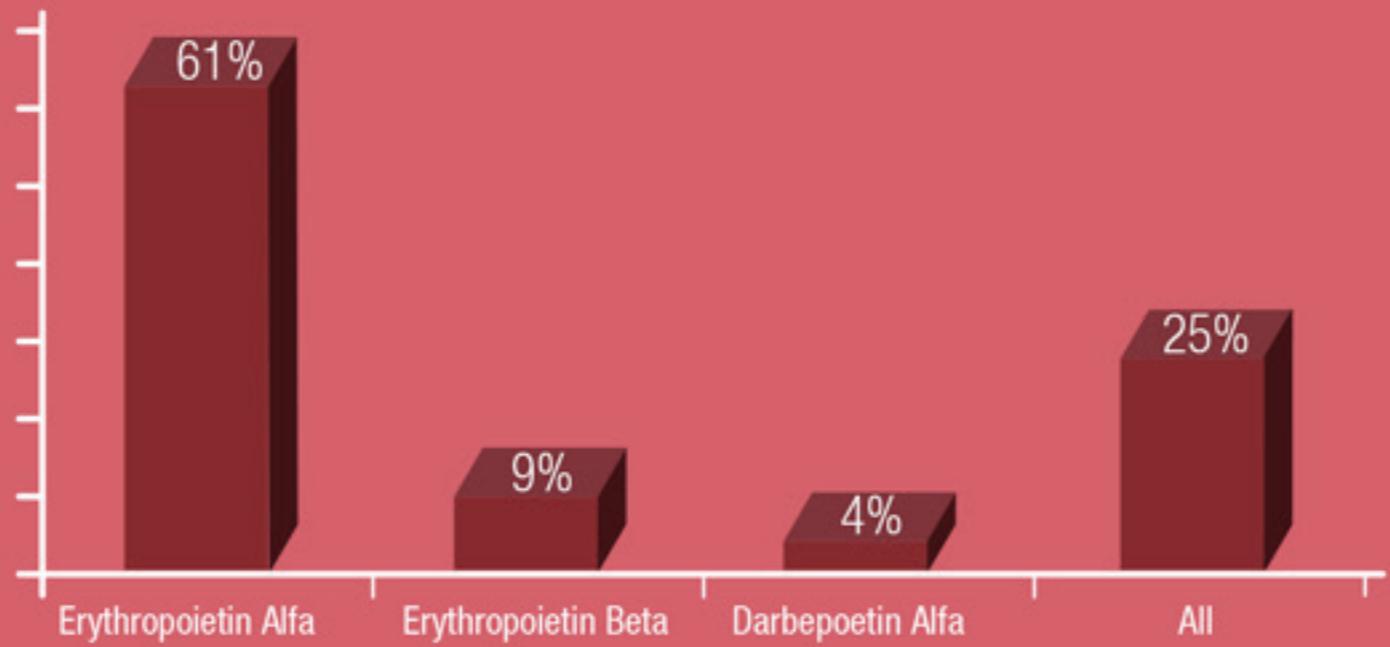
Figure 4: Most appropriate target Hb in CKD





According to 61% surveyed participants Hb fluctuations occur more frequently in erythropoietin alpha-treated CKD patients with anaemia (figure 5).

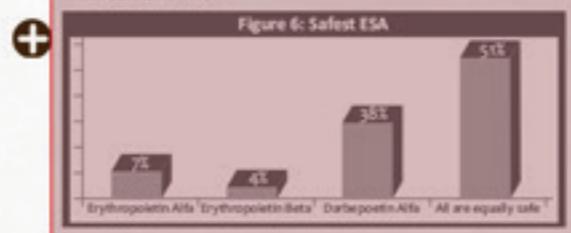
Figure 5: ESA with high Hb variability / Hb cycling



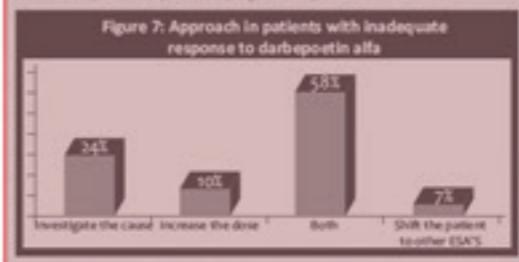


## Management of anaemia in CKD patients with EPA: Survey Results

Only 7% survey participants mentioned that erythropoietin alfa is safest ESA while according to 38% nephrologists darbepoetin alfa was much safer and more suitable for CKD patients with anaemia.



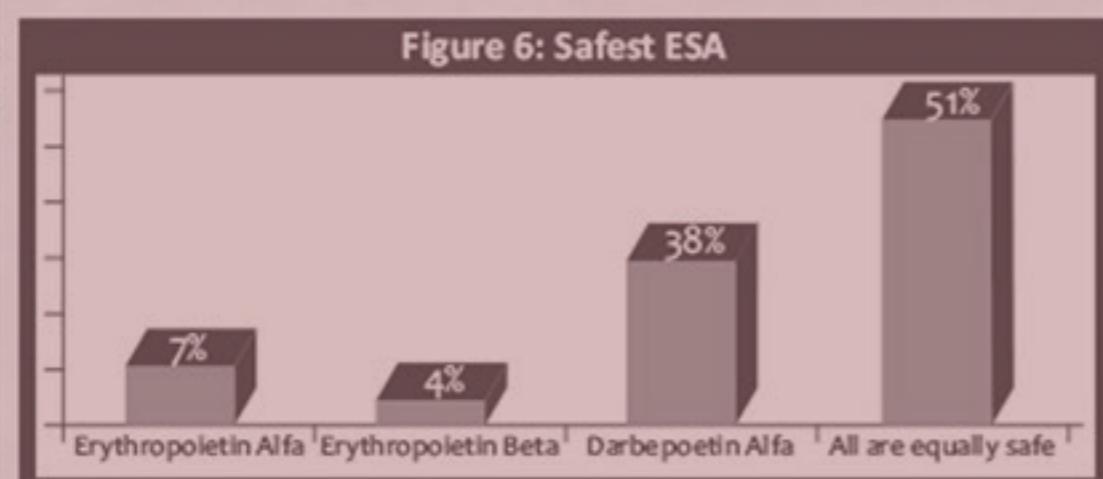
Dose increment and root cause identification are vital in patients with an inadequate initial response to darbepoetin alfa therapy according to 58% participants (figure 7).



## Management of anaemia in CKD patients with EPA: Survey Results

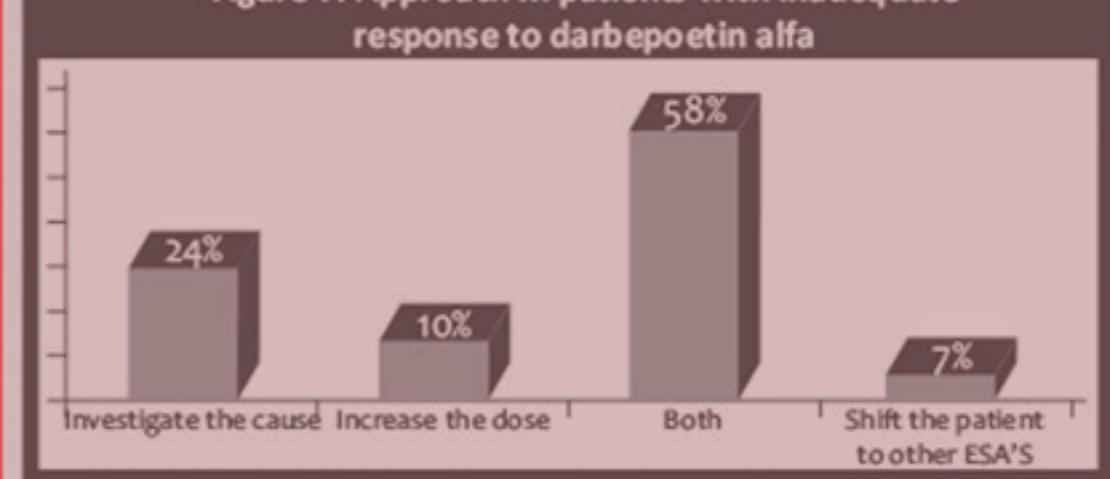
Only 7% survey participants mentioned that erythropoietin alfa is safest ESA while according to 38% nephrologists darbepoetin alfa was much safer and more suitable for CKD patients with anaemia.

Figure 6: Safest ESA



Dose increment and root cause identification are vital in patients with an inadequate initial response to darbepoetin alfa therapy according to 58% participants (figure 7).

Figure 7: Approach in patients with inadequate response to darbepoetin alfa





Only 7% survey participants mentioned that erythropoietin alfa is safest ESA while according to 38% nephrologists darbepoetin alfa was much safer and more suitable for CKD patients with anaemia .

Figure 6: Safest ESA

