Reduced Use of Erythropoiesis-Stimulating Agents and Intravenous Iron With Ferric Citrate: A Managed Care Cost-Offset Model

R Mutell, MBA; J Rubin, MA; TC Bond, PhD; T Mayne, PhD
DaVita Clinical Research, Minneapolis, MN, USA

Introduction

According to the 2011 US Renal Data System report for 2009, 17% of all patients with kidney disease received their first dialysis using private insurance coverage,1 while a 2008 Medicare beneficiary survey found that 7% of new dialysis patients begin treatment under an employer-provided health plan.2

In 2009, $2.8 billion were spent on injectable drugs for patients with end-stage renal disease (ESRD). Of that, epoetin alfa (an erythropoiesis-stimulating agent [ESA]) accounted for 68% and intravenous (IV) iron for 10%.3

Ferric citrate is an oral phosphate binder currently in clinical development for the treatment of hyperphosphatemia in patients with ESRD.4

In clinical trials, patients treated with ferric citrate showed improvements in serum phosphorus levels, as well as increases in serum ferritin and saturated transferrin (TSAT) levels.5,6

Physicians respond to increases in serum ferritin and TSAT levels by reducing IV iron and ESA doses.7 Decreased use of these medicines, which are associated with ferric citrate administration, could help minimize costs of ESRD treatment to managed care payers.

Objective

To develop a cost-offset model from a managed care perspective that estimates the monthly cost savings associated with dialysis care when ferric citrate is compared to other phosphate binder medications for the treatment of ESRD patients with hyperphosphatemia.

Methods

A cost-offset model was created from the managed care payer perspective that compared the monthly treatment costs of ESRD for patients given ferric citrate versus other currently available phosphate binders.

The model cost estimates considered the number of dialysis sessions per month, number of ESRD patients enrolled in the health plan, and cost of ESA, and proportion of patients on phosphate binder therapy.

The model assumed equivalent efficacy and cost neutrality between ferric citrate and other phosphate binders. Model input values were derived from published sources8 as well as a database analysis from a large national dialysis provider.

Monte Carlo simulations were used to address the high uncertainty of model parameter estimates using @Risk Software. Version 5.0 (Ithaca NY). This method pulls random values along a pre-specified distribution. The model was run over 10,000 iterations for this analysis.

Sensitivity analysis was performed with Monte Carlo simulations by randomly selecting values based on a predetermined distribution or range of possible values.

Conclusions

The Monte Carlo simulations show at (90% probability) that for each patient with ESRD, a managed care organization could save between $107.30 and $206.61 per ESRD patient per month with ferric citrate, translating into monthly savings of between $53,650 and $103,306 per dialysis patient for a plan serving 500 dialysis patients.

Simulations demonstrate (at 90% probability) that a provider serving 500 dialysis patients could save between $644,000 and $1,240,000 annually, primarily with the use of ferric citrate.

According to the model sensitivity analysis, the factors contributing most to the cost of dialysis for insurers are: the number of dialysis sessions per month, cost of ESA, proportion of patients on binders, and cost of IV iron.

Results

Figure 1. Monte Carlo Simulations of Cost Savings Per Patient Per Month

Table 1: Input Parameters for the Managed Care Cost-Offset Model With Default Inputs

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Value (Default)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population Inputs</td>
<td>500</td>
</tr>
<tr>
<td>Number of ESRD patients</td>
<td>500</td>
</tr>
<tr>
<td>Percentage on phosphate binders</td>
<td>100%</td>
</tr>
<tr>
<td>Utilization and Cost Inputs*</td>
<td>11.95</td>
</tr>
<tr>
<td>Average number of dialysis sessions per month</td>
<td>5.217</td>
</tr>
<tr>
<td>Expected Dose Reduction in Epoetin alfa and IV iron with Ferric Citrate</td>
<td>5.79 mg</td>
</tr>
</tbody>
</table>

Figure 2. Total Monthly Savings With Ferric Citrate Versus Other Phosphate Binders

Figure 3. Sensitivity Analysis

Considerations

• The data described here were generated using specific settings for the cost-offset model. Potential managed care plan savings could be more or less, depending on these assumptions.

• Potential ESA-sparing dosing trends have not been measured since the June 2011 change to FDA-approved ESA labels, which suggest dosing to a target hemoglobin level of <11 g/dL.9

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Contact: Rich Mutell, MBA, Rich.Mutell@DaVita.com

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References


