### Introduction

In order to treat the underlying causes of anemia in patients with end-stage renal disease (ESRD)—moderate endogenous erythropoietin production and iron deficiency—patients receive both epoetin alfa (EPO) and intravenous (IV) iron during hemodialysis sessions. Because iron repletion is needed for optimal response to erythropoiesis-stimulating agents (ESAs), dosing of both IV iron and ESAs is coordinated. Since the introduction of ESAs in 1989, anemia management in patients with ESRD has evolved in response to many factors, including most recently the March 2010 revision of the Centers for Medicare and Medicaid Services (CMS) Erythropoiesis Monitoring Policy (EMP); the October 2010 Cardiovascular and Renal Drugs Advisory Committee (CARDAC) recommendation; the June 2011 label revisions modifying the target hemoglobin (Hb) used for EPO dosing; and bundling of CMS reimbursement for dialysis services with that of injectable anemia medications. The United States Renal Data System reported that in 2011, EPO dosing and Hb levels decreased significantly in dialysis patients. To better understand how anemia treatment has changed, the current analysis sought to identify dosing patterns of IV anemia medications and ESA reimbursement bundled.

### Methods

This retrospective analysis studied the electronic medical records of patients aged ≥ 18 years receiving in-center dialysis between 1 January 2009 and 30 April 2012. The sample was limited to patients aged ≥ 18 years receiving in-center dialysis between 1 January 2009 and 30 April 2012. Mean IV iron dose fell. However, since 2011, more patients are receiving iron. Mean EPO dose fell over the study period. Since 2009, considerable changes in the dosing of anemia medications have been measured, and these changes affected the mean Hb, ferritin, and TSAT among dialysis patients. The monthly mean Hb for patients in April 2012 was 10.79 g/dL, versus 11.72 g/dL, in January 2009; there was a precipitous fall in Hb in the last 6 months of 2011. The mean EPO dose fell over the study period. Since 2009, considerable changes in the dosing of anemia medications have been measured, and these changes affected the mean Hb, ferritin, and TSAT among dialysis patients.

### Results

**Figure 1. Mean Hb Concentrations**

- **Figure 2. Mean Serum Ferritin and TSAT**
- **Figure 3. Mean Proportion of Patients Receiving IV Iron and EPO**
- **Figure 4. Mean Dose of IV Iron and EPO**

### Objectives

Understand the temporal inter-relationships between the following variables among hemodialysis patients:

- Proportion of patients receiving IV iron and EPO each month
- Mean monthly IV iron doses and IV iron dose
- Mean Hb
- Mean serum ferritin
- Mean TSAT

### Patients

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### Acknowledgments

This study was funded by DaVita Clinical Research, Inc. and specifically acknowledge DaVita Clinical Research, Inc. and specifically acknowledge

### References


### Summary

- Over the period of observation, mean serum ferritin and TSAT increased. A dramatic change in mid-2011 likely reflected a decrease in mean Hb associated with the FDA ESA label change.
- Since 2009, considerable changes in the dosing of anemia medications have been measured, and these changes affected the mean Hb, ferritin, and TSAT among dialysis patients.

### Table 1. Patient Demographics

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<tr>
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<th>2009</th>
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<th>2011</th>
<th>2012</th>
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</thead>
<tbody>
<tr>
<td>Mean Monthly IV iron dose (mg)</td>
<td>8.0</td>
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<td>7.0</td>
<td>6.0</td>
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<tr>
<td>Mean Hb (g/dL)</td>
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<td>10.5</td>
<td>12.0</td>
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<tr>
<td>Mean Serum Ferritin (mg/dL)</td>
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<tr>
<td>Mean TSAT (%)</td>
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### Conclusions

- Over the period of observation, mean serum ferritin and TSAT increased. A dramatic change in mid-2011 likely reflected a decrease in mean Hb associated with the FDA ESA label change.
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