

# Reduced Use of Erythropoiesis-Stimulating Agents and Intravenous Iron with Ferric Citrate: A Medicare Bundle Cost-Offset Model

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

#### Introduction

- According to an analysis of the United States Renal Data Systems, the management of end-stage renal disease (ESRD) cost Medicare \$29 billion in 2009 with the annual cost per patient receiving hemodialysis calculated at \$82,285.¹ Of the \$2.8 billion spent annually on injectables for patients with ESRD, epoetin alfa (an erythropoiesis-stimulating agent [ESA]) accounted for 68% and IV iron for 10%.¹
- Medicare reimbursement for these injectable anemia medications are bundled with that of dialysis care for ESRD patients.
- In clinical trials, ferric citrate (FC), a phosphate binder (PB) for the treatment of hyperphosphatemia, improved patients' serum phosphorus levels. With hemoglobin levels remaining constant, FC also increased serum ferritin and saturated transferrin (TSAT) levels, presumably through gastrointestinal absorption of the oral drug.<sup>2,3</sup>
- Such increases in ferritin and TSAT levels have been linked to reductions in IV iron and ESA dosing,<sup>4</sup> which could help minimize Medicare costs for ESRD patient treatment.

### Methods

- A Medicare bundle cost-offset model was created from the perspective of the dialysis provider considering annual treatment costs of ESRD for patients treated with FC versus other PB medications. The model used estimated, public, and published costs for dialysis treatment, PBs, epoetin alfa, and IV iron.<sup>5,6</sup>
- Based on a prior observational study, the expected reduction in epoetin alfa and IV iron with FC use is 500 units/session and 5.79 mg/session, respectively.<sup>4</sup>
- The impact of FC to dialysis providers was assessed under the bundle payment system by comparing margin for patients on FC versus those taking other PBs.

## Table 1. Input Parameters for the Cost-Offset Model with Default Inputs

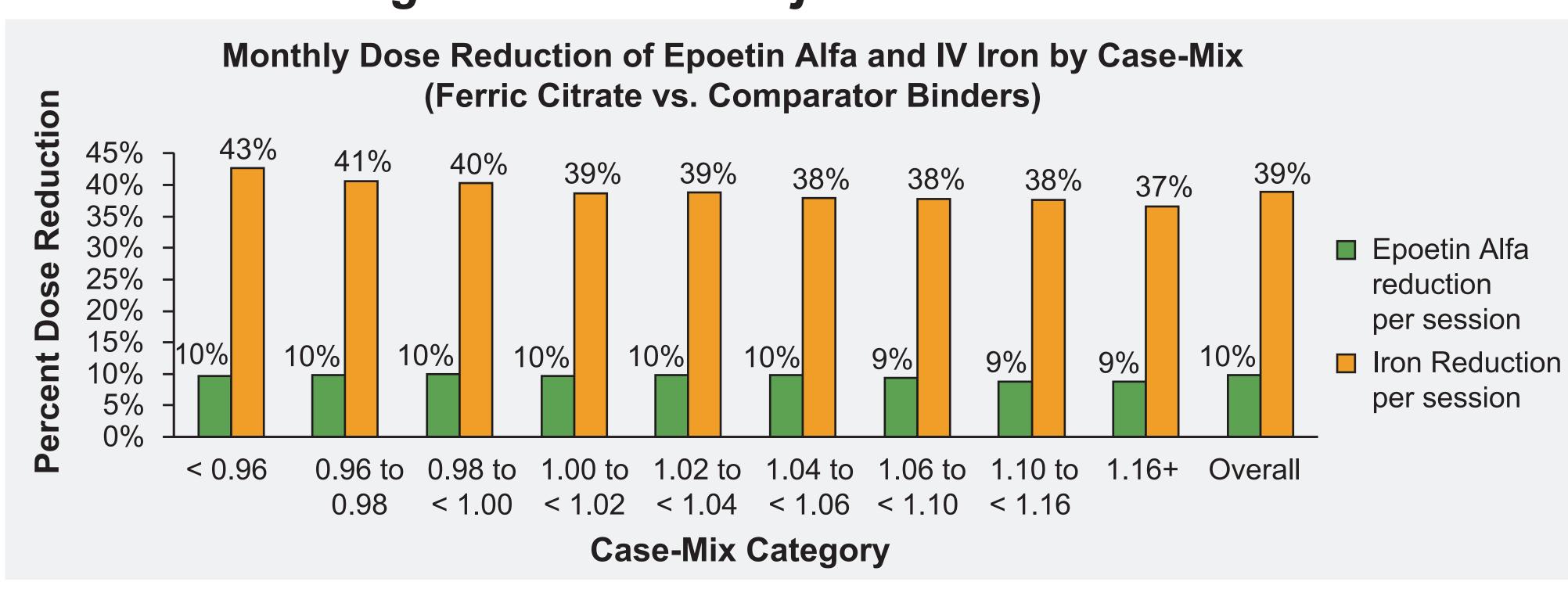
Input	Default
Population Inputs  Number of ESRD patients  Percentage on Medicare  Percentage on Medicare and phosphate binders  Percentage of Medicare patients at facility	100 100% 100% 100%
Utilization Inputs <sup>a</sup> Reduction in epoetin alfa dose per session Reduction in IV iron dose per session	500 units 5.79 mg
Cost Inputs <sup>b</sup> Dialysis cost per session Epoetin alfa cost per 1000 units IV iron cost per mg Total Medicare reimbursement	\$200 \$9.76 \$0.36 \$232

<sup>a</sup>Expected reductions in epoetin alfa and IV iron dosing per session are based on observed changes in dosing associated with rises in TSAT and ferritin levels in an ESRD patient database of a large dialysis provider (June 1, 2008 and May 31, 2010).⁴

<sup>b</sup>The calculations are based on population inputs and The Red Book™.⁵

#### Results

Figure 1. Average Monthly Dose Reduction of Epoetin Alfa and IV Iron According to Case-Mix Adjuster

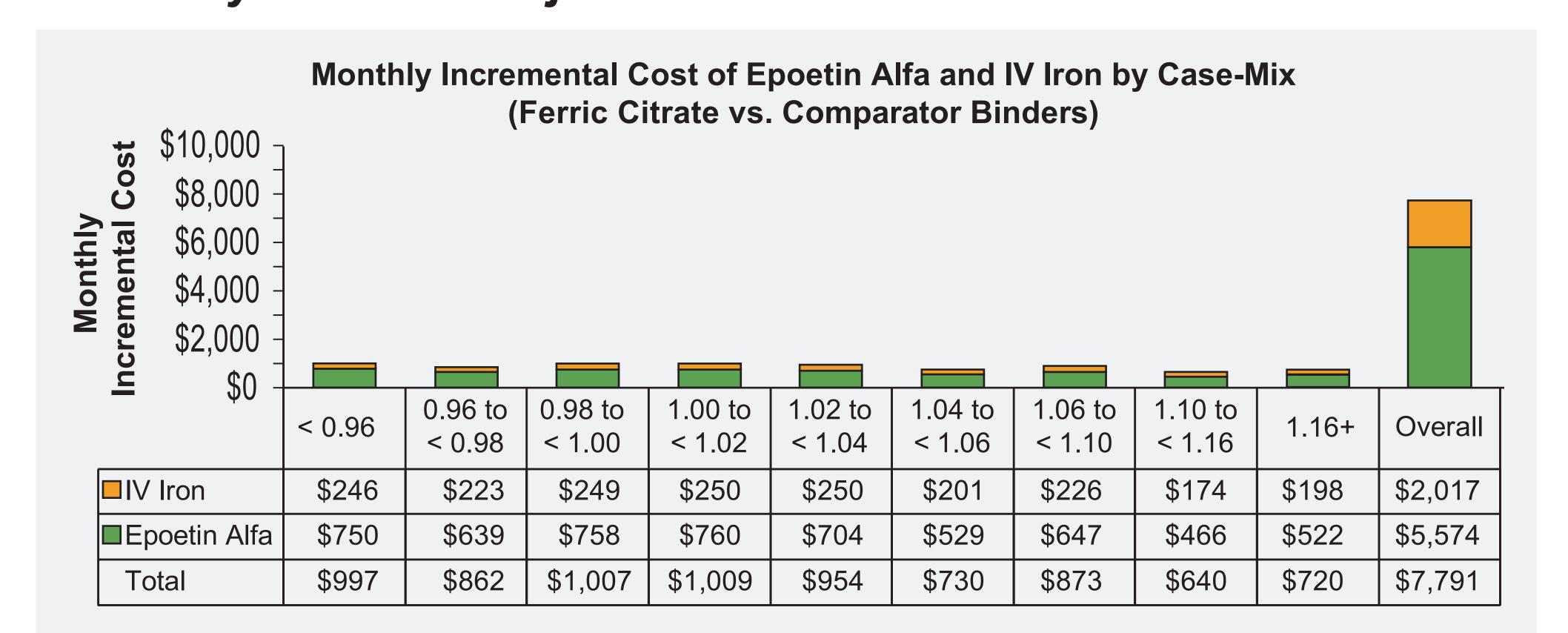


- The model also considered case-mix adjusters, which modify Medicare bundled payments to dialysis facilities according to patient comorbid disease, medications and other factors.
- The model assumed equivalence in price and phosphorus-lowering efficacy between FC and other PBs. (Inputs Tables 1 and 2) Margin to the facility was calculated as the difference between reimbursement and cost.
- Reductions in epoetin alfa and IV iron use; the average monthly incremental cost-offset for epoetin alfa and IV iron; and the total cost-offset for dialysis facilities when ESRD patients are treated with FC compared to other PBs were measured.
- Sensitivity analysis (SA) was conducted using default parameters and setting the standard deviation at 10% of the mean value for each model input.

Table 2. Population Input and Resource Utilization Input by Case-Mix Category in Study Population

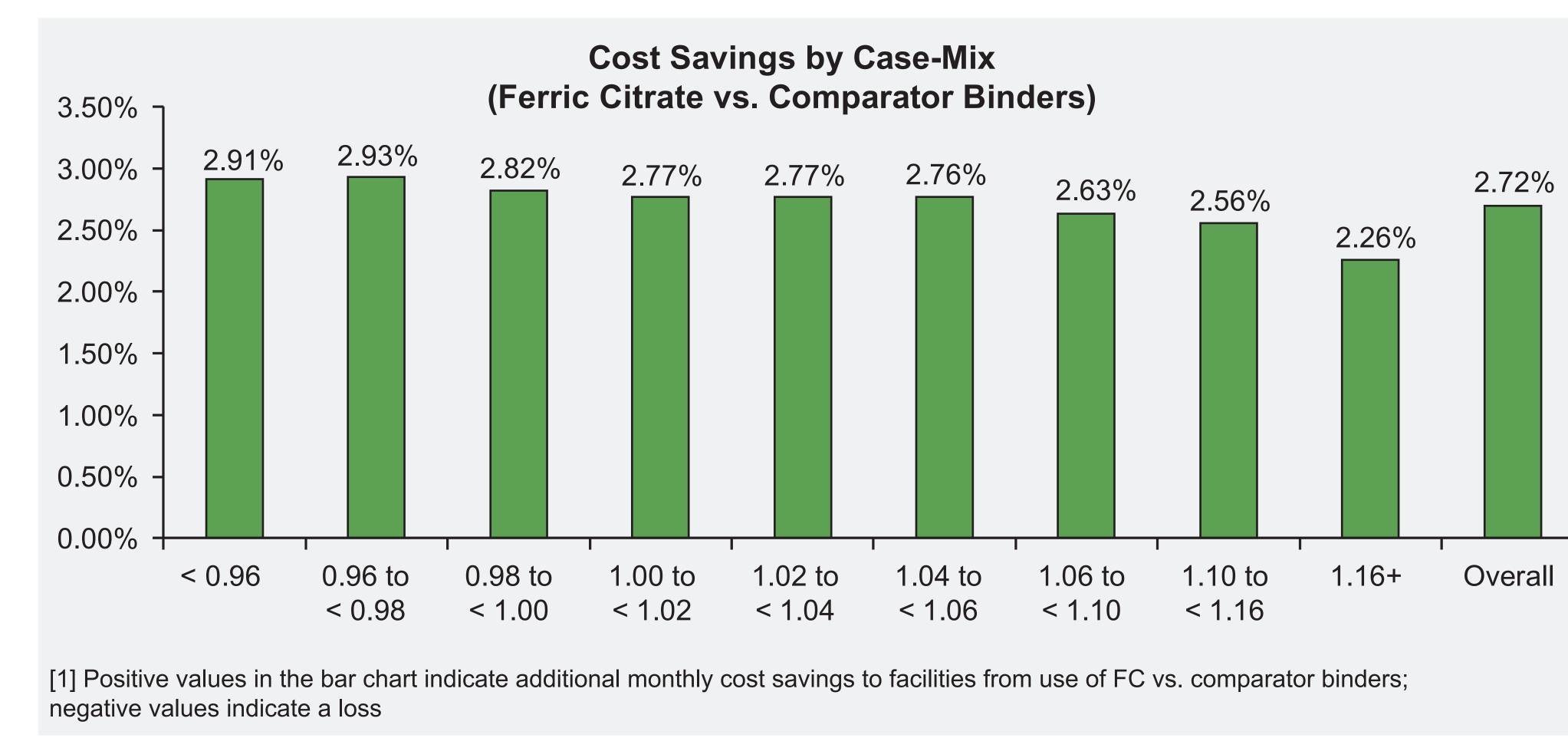
Case-Mix Category	Study Population Distribution	Dialysis Utilization	Epoetin alfa Utilization		IV Iron Utilization	
		Mean Number of Dialysis Sessions per Patient per Month	Epoetin Alfa Users (%)	Mean Monthly Epoetin Alfa Dose (U/patient)	IV Iron Users (%)	Mean Monthly IV Iron Dose (mg/patient)
< 0.96	13%	11.82	96%	61103.87	72%	160.43
0.96 to < 0.98	11%	11.89	96%	60661.43	74%	169.37
0.98 to < 1.00	13%	11.94	95%	59499.15	75%	171.66
1.00 to < 1.02	13%	11.97	94%	61849.14	76%	179.24
1.02 to < 1.04	12%	12.01	93%	60727.87	77%	179.25
1.04 to < 1.06	9%	12.05	92%	61596.22	78%	184.17
1.06 to < 1.10	11%	12.05	92%	63901.12	78%	184.87
1.10 to < 1.16	8%	11.93	91%	67675.12	77%	183.46
≥ 1.16	10%	11.88	90%	67253.19	78%	187.94

# Figure 2. Average Monthly Incremental Cost of Epoetin Alfa and IV Iron by Case-Mix Adjuster



[1] A positive incremental cost difference in the figure indicates cost savings in monthly epoetin alfa and IV iron cost associated with use of FC vs. comparator binder, negative difference indicates loss
[2] We assume equivalence in the cost and utilization of comparator binder and FC
[3] Total incremental cost = Incremental cost of epoetin alfa + incremental cost of IV Iron

#### Figure 3. Monthly Cost Savings by Case-Mix Adjuster



• SA demonstrated the inputs with the greatest effect on the model are Medicare reimbursement amount, the % patients on binder therapy, epoetin alfa cost and its associated dosing reduction, IV iron cost and its associated dosing reduction, population size and % patients on Medicare.

#### Special Considerations

- This analysis describes potential savings for a 100-patient facility using the default model settings; smaller clinics would experience less savings than described here.
- Approximately 17% of incident patients with ESRD are covered by private insurance. Thus, this analysis, using 100% of Medicare patients at a facility, may underestimate the potential cost savings to dialysis facilities.
- 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.<sup>7</sup>

#### Conclusions

- According to the cost-offset model, the following represent possible facility-level dosing reductions and the potential cost savings with FC use:
- For each of the case-mix adjuster categories, average monthly ESA dose reductions ranged between 9% and 10%; average monthly IV iron dose reducations ranged between 39% and 43%.
- The potential mean monthly incremental cost savings would vary between \$466 and \$760 for epoetin alfa and between \$174 and \$250 for IV iron.
- The potential monthly reductions in the usage of ESA and IV iron would result in a decrease in the cost of dialysis care from \$304,286 per month with competitive PBs to \$296,495 per month with FC.
- FC use has a potential to create an average overall cost benefit of 2.7% (varying between 2.3% and 2.9% based on case-mix adjuster) when considering the annual bundled reimbursement totals.
- SA showed that Medicare reimbursement amount, the % patients on PBs, epoetin alfa cost and its associated dosing reduction, IV iron cost and its associated dosing reduction, population size and % patients on Medicare (in that order), most greatly influenced the estimated model savings.

#### References

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\*Contact: Rich Mutell, MA, MBA; Rich.Mutell@DaVita.com

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