

# Once Monthly Erythropoiesis-Stimulating Agent (ESA) Dosing May Reduce ESA Utilization Compared to Thrice-Weekly ESA Dosing

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### Introduction

- For the past 20 years, management of hemoglobin (Hb) level via erythropoiesis-stimulating agents (ESAs), such as epoetin alfa (EPO) has been standard in the treatment of anemia in end-stage renal disease (ESRD) patients.<sup>1</sup>
- US dialysis centers typically dose ESAs at every session (three times per week), enabling frequent dose titrations. However, a once-monthly ESA has recently been approved by the US Food and Drug Administration for use in adult ESRD patients.<sup>2</sup>
- We have recently demonstrated that more frequent Hb measurements and ESA dose titrations by physicians are not associated with improved patient-time in target Hb range, but are associated with increased ESA
- Frequent Hb measurements and dose titrations associated with administration of ESA three times per week may not best serve patients, and reducing the frequency of dose titrations through use of an ESA dosed once-monthly may result in cost savings due to reduced ESA use.

# Objective

 We have developed an economic model to quantify the financial impact of switching from an ESA dosed three times per week, to one dosed monthly, based on reductions in total ESA use.

### Methods

- A cost-offset model estimated total ESA utilization and cost for monthly versus 3x/week dosing.
- Utilization inputs for 3x/week dosing were derived from a retrospective study of prevalent (≥ 120 days), adult (> 18 years old) hemodialysis patients dialyzing at clinics within a large dialysis organization ≥ 3x/week between 1/1/2009 and 12/31/2010 (Table 1).
- A dose titration was defined as a change in ESA dose of ≥ 20%. Dose holds (postponements) were not counted as titrations/alterations.
- Only physicians with at least 100 patient-months of data were included in the analysis (N = 2,249).
- Assessments of associations used Pearson product-moment correlation and were adjusted for race, vascular access, mean BMI, mean age, mean vintage and case mix of comorbidities.
- Based on once monthly ESA data, it was projected that patients on a once-monthly ESA would experience 0.29 titrations per patient-month.5
- Price (\$0.01/unit, based on epoetin alfa cost derived from published sources), dose and clinical equivalence were assumed across ESAs. Model outcomes included incremental utilization and costs.

### Results

- For the 2,249 physicians assessed, the mean number of ESA dose titrations was 0.79 per patient-month (SD = 30.19) and the mean number of Hb measurements was 3.0 per patient-month (median = 2.9, 25<sup>th</sup> - 75<sup>th</sup> percentile = 2.5 - 3.6) (Table 2 and Figure 1).
- There was a statistically significant and moderately large correlation between monthly mean titrations per patient-month and ESA use on the physician level. The unadjusted correlation is shown in Figure 2.

Table 1. Demographics

Mean ± SD	
N	84,126
Mean age ± SD (yr)	63.2 ± 14.7
Mean vintage ± SD (yr)	$2.9 \pm 3.6$
Female	43.0%
Race/Ethnicity Asian Black Hispanic Native American Pacific Islander White Other/Unknown	3.3% 36.7% 16.0% 1.3% 0.8% 39.0% 2.8%
Vascular Access Fistula Graft Catheter	60.0% 23.6% 16.3%
Diabetes	64.0%
Primary Insurance Medicare Private/Other Medicaid Veterans Administration No Insurance	79.0% 11.9% 6.5% 1.9% 0.5%

#### Table 2. Physician-Level Results

Physicians (N = 2,249)	Mean ± SD	Median
ESA Dose Titrations per Patient-Month	0.79 ± 0.19	0.80
ESA Dose Titrations per Patient-Year	9.5 ± 2.28	9.6
Hb Measurements per Patient-Year	35.7 ± 7.69	34.3
Monthly ESA (Units)	66,111 ± 16,928	64,774

- In the adjusted model of the association between titrations/month and ESA use on the physician level, each additional titration per patient per month was associated with an increase of 23,640 units of EPO (95% CI: 20,500, 26,781).
- Under this model, moving from 0.79 titrations/month to 0.29 titrations/month, which potentially could be achieved by switching to a once monthly ESA, would generate savings of 11,820 units (95% CI: 10,250,13,390) of ESA, or \$118.20 (95% CI: \$102.50, \$133.90), per patient-month, assuming price, dose and clinical equivalence.

Figure 1. Physicians' Average Monthly ESA Dose Titrations per Patient

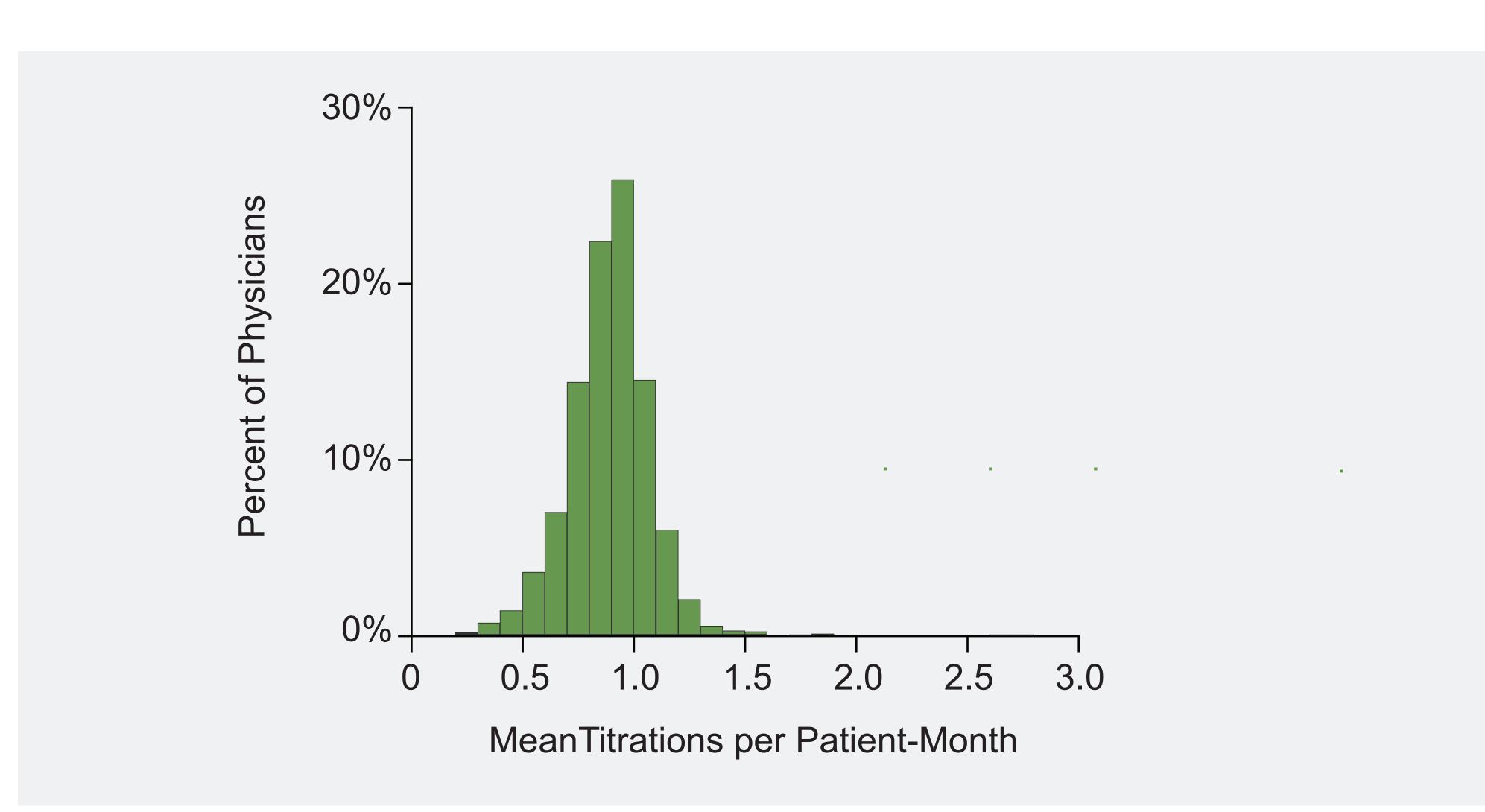
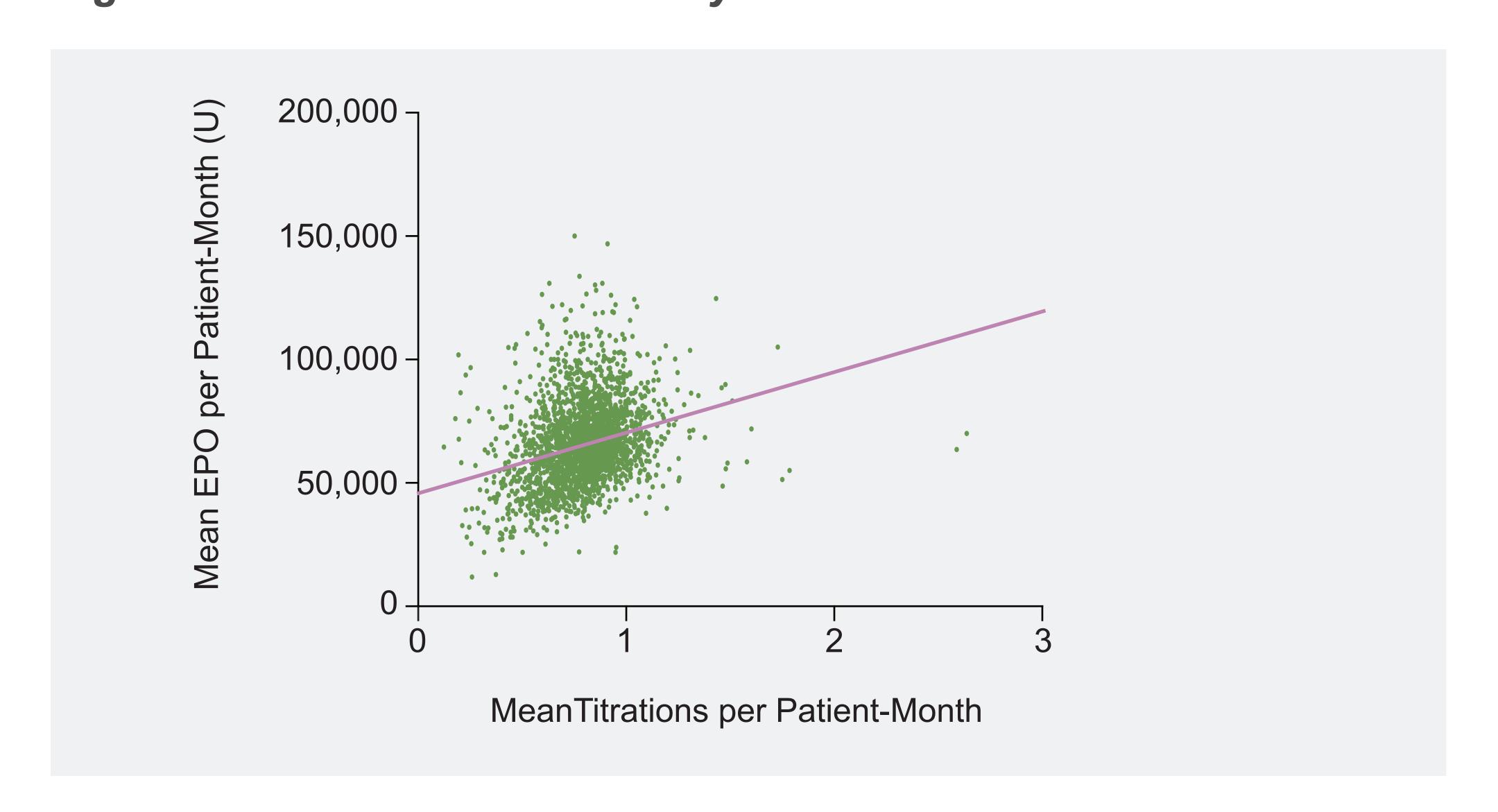


Figure 2. Scatter Plot of Monthly ESA Dose Titrations vs. ESA Use



# Summary/Conclusions

- More frequent ESA dose titrations are associated with increased ESA use.
- Each additional monthly dose titration was associated with an increase of 23,640 units of ESA.
- The cost-offset model predicts that decreasing the titration frequency from 0.79 titrations/month to 0.29 titrations/month could decrease ESA utilization and reduce costs:
- Projected decreases in utilization and costs from switching to a once-monthly ESA are 11,820 units/month and \$118.20/month, respectively.
- For an average facility with 96 patients, we estimated ESA savings of 1,134,720 U/month and cost savings of \$11,347/month.
- Limitations of the analysis:
  - ESA price was based on epoetin alfa costs. The model assumed price, dose and clinical equivalence across ESAs.
  - Similar results to those obtained using this model may not be achieved in the real world dialysis setting because target hemoglobin levels and titration guidelines may be different to those in place during the clinical trials from which estimates of the titration frequency using once-monthly ESA were derived.

## References

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