

# Hemoglobin Recovery Following Hospitalization in ESRD Patients

TC Bond, PhD;\*1 J Rubin, MA;1 S Wang, MS;1 A Yang, MD;2 M Krishnan, MD, MPH, MBA, FASN1

<sup>1</sup>DaVita Clinical Research, Minneapolis, MN, USA; <sup>2</sup>Affymax, Inc, Palo Alto, CA, USA

#### Introduction

- Hemodialysis patients are frequently hospitalized, with a national mean of 1.9 hospitalizations per patient-year in 2009 according to the United States Renal Data System (USRDS) 2011 Annual Data Report.<sup>1</sup>
- In 2009, 36% of hemodialysis patients were re-hospitalized within 30 days of discharge. Post-hospitalization anemia control has been shown to reduce re-hospitalization rates.
- A combination of the reason for hospitalization and an interruption of normal dialysis treatment leads to lowered hemoglobin levels and increased utilization of erythropoiesis stimulating agents (ESAs) in the post-hospitalization period.
- Solid *et al*. found that Hb levels take 2 months to recover to pre-hospitalization levels and that optimum ESA usage over this time period has yet to be determined.<sup>3</sup> Brophy *et al*. confirmed that < 20% of dialysis patients receive any ESA dose while hospitalized.<sup>4</sup>

## Objective

• We have carried out a retrospective database analysis to determine time from discharge to Hb recovery using pre- and post-hospitalization Hb test results.

### Methods

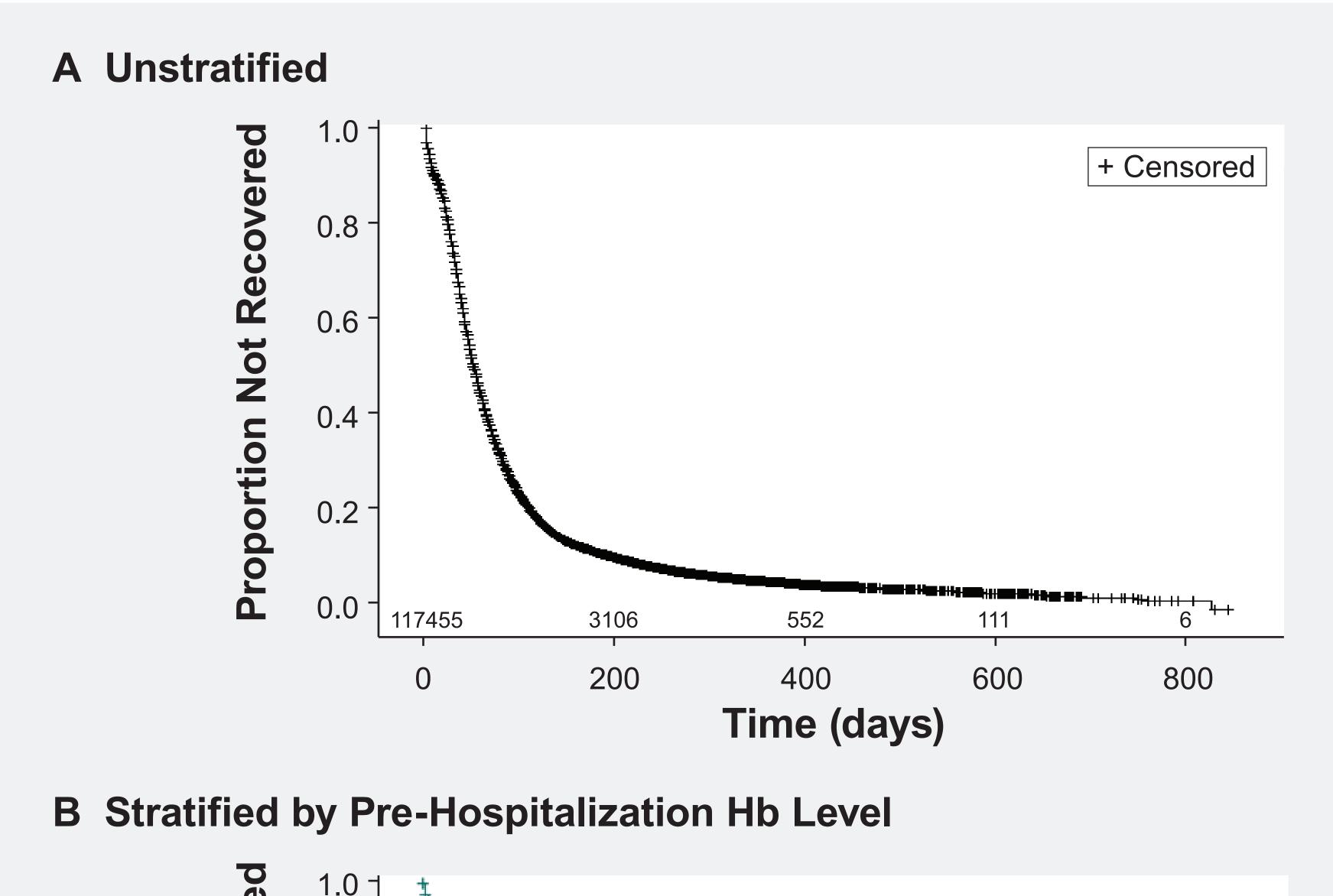
- Data from adult (> 18 years old) hemodialysis (HD) patients between January 1, 2010 and December 31, 2010 were assessed.
- Inclusion criteria:
- Receiving in-center dialysis ≥ 3 times/week.
- Hospitalizations that were preceded by > 30 hospital-free days.
- For patients experiencing a drop in Hb in the 30 days after hospitalization compared to the 30 days before hospitalization, a time-to-event analysis assessed time (in days) to reach ≥ pre-hospitalization Hb levels.
- Data were evaluated for all patients and also for patients stratified by mean Hb level in the 30 days before hospitalization: below range (< 10 g/dL), in range (10–12 g/dL), or above range (> 12 g/dL).

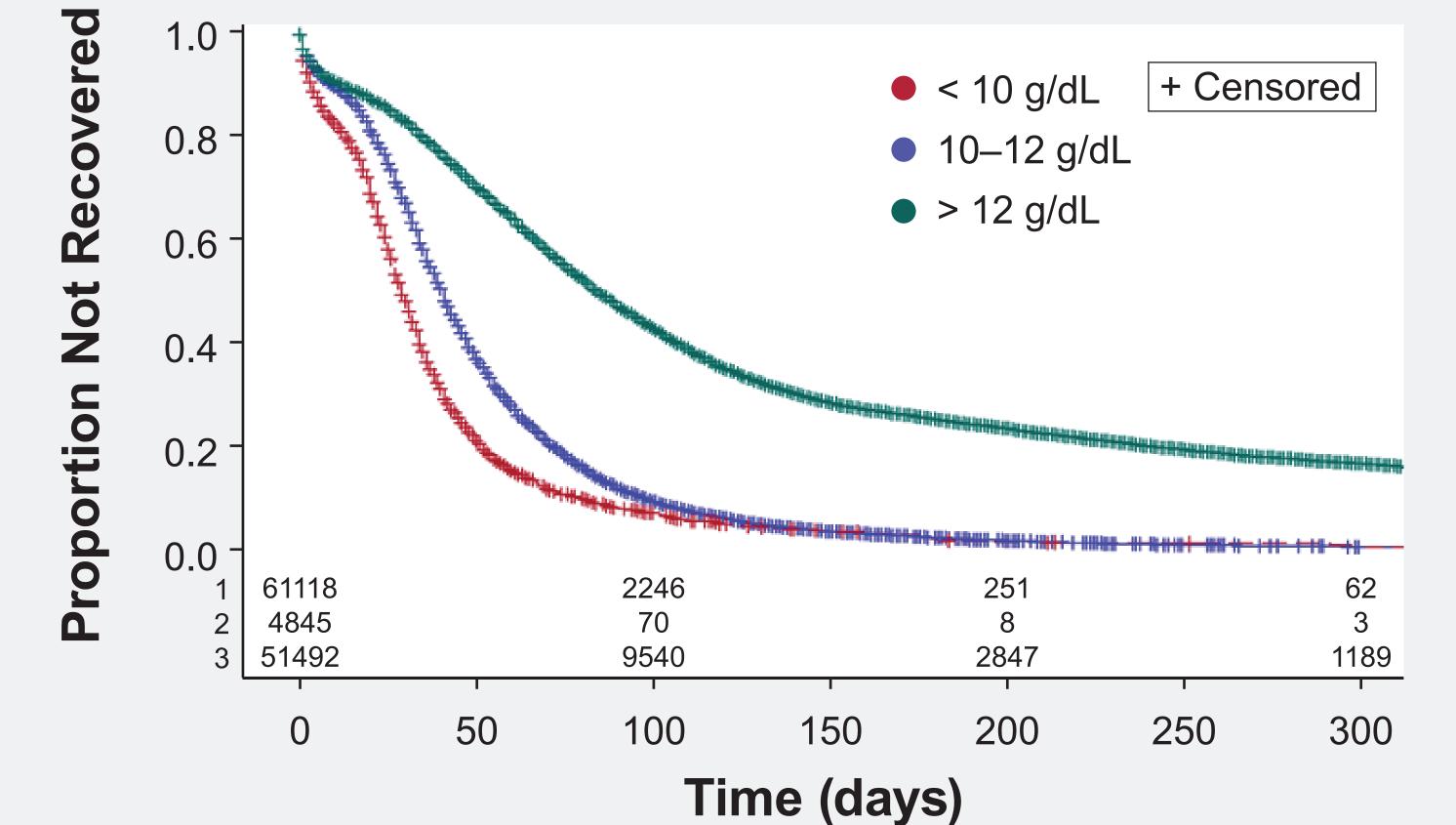
#### Results

Table 1. Summary Statistics: Hospitalizations

Data Analyzed				
Patients (N)	138,762			
Hospitalizations (> 30 days since last hospitalization)	176,199			
Length of stay (days)				
Mean ± SD	$7.8 \pm 10.4$			
Median	5			
Time between hospitalizations (days) for selected events				
Mean ± SD	74.1 ± 96.7			
Median	37			

Figure 1. Time to Hemoglobin Recovery





- Overall, 176,199 hospitalizations met inclusion criteria and were available for analysis with a median length of stay of 5 days (Table 1).
- For hospitalizations where Hb test results for the pre- and post-hospitalization period were available (N = 156,353), 66.7% of events were associated with drop in hemoglobin (mean of 11.87 g/dL pre-hospitalization to 10.55 g/dL post-hospitalization) (Table 2).

Table 2. Hemoglobin Levels Pre- and Post-Hospitalization

	Number of Hospitalizations	Mean Pre- Hospitalization Hb Level	Mean Post- Hospitalization Hb Level	Mean Change in Hb Level
AII	156,353 (100%)	11.48 g/dL	10.88 g/dL	-0.59 g/dL
Hb drop	117,455 (66.7%)	11.87 g/dL	10.55 g/dL	-1.32 g/dL
Hb unchanged	1,149 (0.7%)	11.25 g/dL	11.25 g/dL	
Hb rise	57,595 (32.7%)	10.67 g/dL	11.56 g/dL	+0.88 g/dL

- For all patients experiencing a drop in Hb levels in the 30 days following hospitalization compared to the 30 days before hospitalization, 46.3% were re-hospitalized before Hb levels recovered to pre-hospitalization levels (Table 3). Median recovery time was 53.0 days, with a mean of 112.4 days.
- Time to Hb recovery depended on starting Hb level (Figure 1 and Table 3):
- Patients within the target Hb range of 10–12 g/dL prior to hospitalization recovered to pre-hospitalization levels in a median 41.0 days, with a mean of 54.3 days.
- Patients with pre-hospitalization Hb levels below target range (< 10g/dL) recovered more quickly (median = 29.0 days, mean = 41.7 days)</li>
- Patients with elevated pre-hospitalization Hb levels > 12g/dL recovered more slowly (median = 85.0 days, mean = 180.5 days)

Table 3. Time to Recovery by Pre-Hospitalization Hb Level

Pre-Hospitalization Hb Levels	Re-Hospitalization Before Hb Recovery (%)	Recovery (mean days)	Recovery (median days)
Overall	46.3%	112.4	53.0
< 10 g/dL	45.0%	41.7	29.0
10-12 g/dL	39.4%	54.3	41.0
> 12 g/dL	54.5%	180.5	85.0

#### Conclusions

- Approximately 2 out of 3 patients (66.7%) experience a drop in Hb levels after hospitalization (mean = 1.32 g/dL).
- 46.3% of HD patients who experienced a drop in Hb levels post-hospitalization were re-hospitalized before Hb recovery.
- Median Hb recovery time post-hospitalization was 53 days.
- Mean recovery time was 112.4 days and was skewed by patients who
  recovered late or not at all. In the case of patients with pre-hospitalization levels
  >12 g/dL, achievement of pre-hospitalization levels would not necessarily be
  expected.
- Given the frequency of hospitalizations in the ESRD population and the length of time for Hb recovery, hospitalizations are significant contributing factors to Hb variability in the ESRD population.
- These data, and evidence that a low proportion of hospitalized patients receive ESAs, point to a need for new strategies to control anemia in these patients.

#### References

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\*Correspondence: t.christopher.bond@davita.com

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