

Introduction

For the past 20 years, management of hemoglobin (Hb) level via erythropoiesis-stimulating agents (ESAs), such as epoetin alfa (EPO) has been the norm in the care of end-stage renal disease (ESRD) patients. Recently, questions about patient safety and new economic bundling rules have brought renewed focus on appropriate Hb targets and how they relate to the use of EPO. Current physician practice aims to achieve greater control of Hb by more frequent measurement and finer EPO dose titrations. No studies have definitively shown that more frequent Hb measurements or dose titrations lead to better clinical outcomes or more efficient use of EPO. One large retrospective analysis found increasing Hb measurements and EPO dose titration frequency decreased patient variability around the facility-level Hb mean.¹ However, a second study found that frequent titrations were the most important driver of Hb cycling—potentially dangerous large fluctuations in Hb levels.² The issue remains controversial.

Methods

- We assessed data from prevalent (≥ 120 days), adult (> 18 years old) hemodialysis patients (pts) dialyzing at DaVita dialysis clinics ≥ 3 times/week between 1/1/2009 and 12/31/2010.
- Physician practice patterns for dose titration was defined as a difference of $> 10\%$ between any of:
 - the mean dose of 2 consecutive stable periods (≥ 3 doses during which the dose did not change more than 10%);
 - the mean dose of a stable period and next/previous dose in a transition period; or
 - 2 consecutive doses within a transition period.
- The last monthly Hb value/pt/month was averaged over a 2-year period for each patient to calculate the average annual value. Patients with an average annual Hb of 10-12 g/dL were considered in range (according to the proposed Medicare QIP definition).³
- Time in Hb target range was defined as total pt-time in range/total pt-time.
- Assessments of associations used Pearson product-moment correlation (adjusted for race, vascular access, comorbidities, age, vintage, and BMI).
- Facility level analyses were weighted by facility load (minimum of 300 patient-months).

Results

Table 1. Demographics

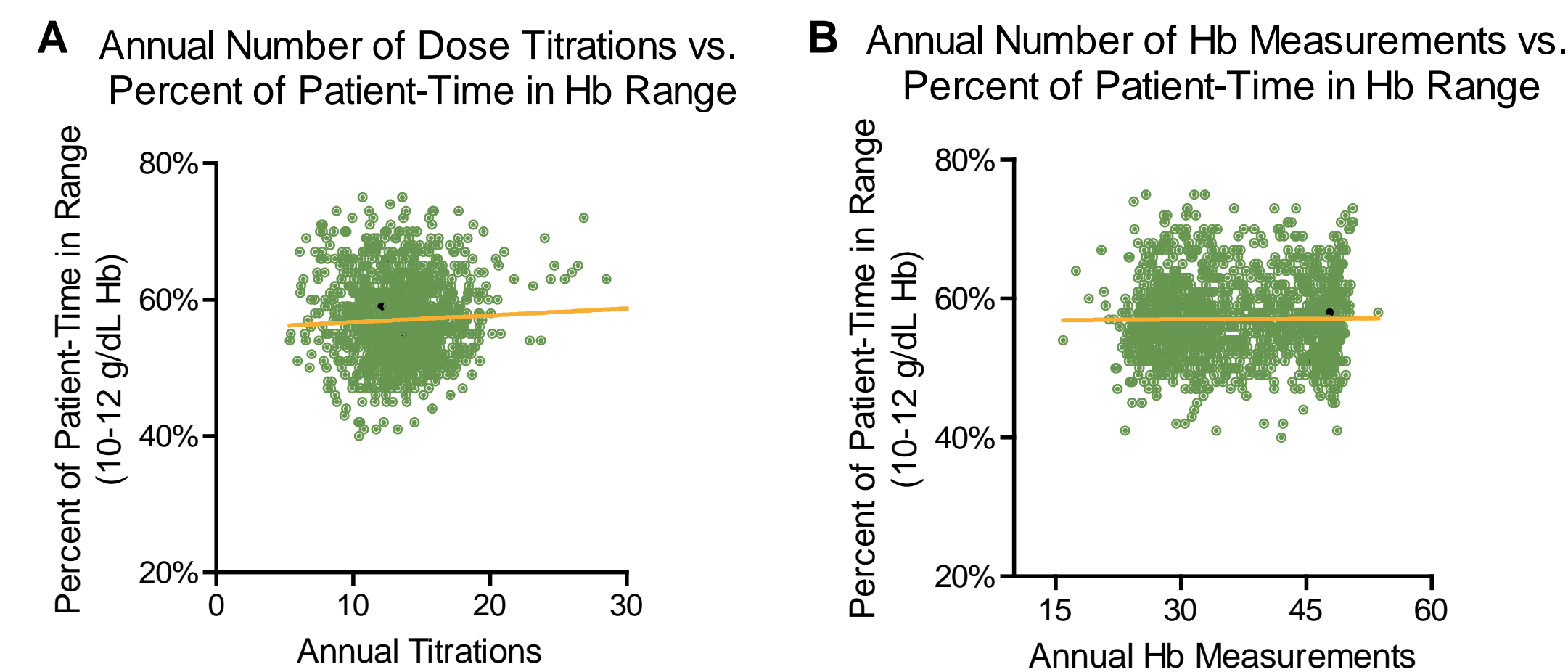
Mean \pm SD	Patients
N	81,464
Mean age \pm SD (yr)	63.2 \pm 14.7
% Female	43.0%
Race and Ethnicity	
% African American	36.7%
% Hispanic	16.0%
% Asian, Pacific Islander	3.3%
% Native American	1.3%
% Unknown	0.8%
% with Diabetes	64.0%
Mean vintage \pm SD (yr)	2.9 \pm 3.6
BMI \pm SD	28.0 \pm 7.2

Information from 81,464 patients at 1,336 facilities was assessed (Table 1).

Table 2. Annual Titrations, Hb Measurements and Patients in Range

	Mean \pm SD	Median
Facility (n=1,336)		
Annual Titrations	13.6 \pm 2.8	13.5
Annual Hb Measurements	36.3 \pm 8.2	34.4
Annual % of Patients in 10-12 g/dL range	79.0 \pm 9.7%	80.3%
Annual % of Patient-time in 10-12 g/dL range	57.1 \pm 5.8%	56.6%

Figure 1. Scatter Plot of Percent of Patient-Time in Hb Range vs. (A) Annual Number of Dose Titrations and (B) Hb Measurements



- The mean number of titrations was 13.6 \pm 2.8 (mean \pm SD) per patient per year and the mean number of Hb measurements was 36.3 \pm 8.2 per patient per year (Table 2).
- The mean percent of patient-time in range among these facilities was 57.1% \pm 5.8% (Table 2).
- At the facility level, after adjustment for case mix factors (mean age, vintage, and BMI at facility, access types, and racial composition), the annual number of dose titrations per patient and Hb measurements per patient were not associated with the percent of patient-months within a 10-12 g/dL Hb range ($p=0.12$ and $p=0.47$; respectively) (Figure 1A and 1B).
- An analysis of EPO utilization showed that an increase of 1 titration per patient at the facility level was associated with an extra 18,000 U ($p<0.001$) per patient per year.

Conclusions

- In this retrospective study of physician practice patterns of $>80,000$ US dialysis patients over 2 years, the practice of neither increased Hb measurements nor increased EPO titrations were associated with improving patient-time in Hb range.
- However, increased EPO titrations were associated with significantly increased EPO utilization.
- Although these associations do not demonstrate causality (or the direction of potential causality), they do underscore the need to assess titration practices.

References

- Khan I, Krishnan M, Kothawala A and Ashfaq A: Association of dialysis facility-level hemoglobin measurement and erythropoiesis-stimulating agent dose adjustment frequencies with dialysis facility-level hemoglobin variation: a retrospective analysis. BMC Nephrol 12: 22, 2011.
- Fishbane S and Berns JS: Hemoglobin cycling in hemodialysis patients treated with recombinant human erythropoietin. Kidney Int 68: 1337-1343, 2005.
- Summary of CMS Quality Incentive Program Propose rule: http://www.asn-online.org/policy_and_public_affairs/docs/CMS%20Proposes%20Quality%20Incentive%20Program.pdf. Accessed April 1, 2011.

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