

Introduction

- The Crit-Line monitoring system (CLM) uses optics to monitor percent change in intravascular blood volume, hematocrit, and oxygen saturation in end-stage renal disease (ESRD) patients undergoing dialysis.
- There is no validated objective method for monitoring volume removal or establishing optimal dry weight, although studies have evaluated the use of assistive technologies like the CLM.¹⁻³
- Incident dialysis patients, for whom dry weight has not been previously established, may particularly benefit from such technologies.

Objectives

- To evaluate real-world use of the CLM by dialysis clinics in the treatment of incident patients over the first 180 days of dialysis.
- To examine the effects of CLM use on a number of clinical outcomes including post-dialysis weight change from baseline, dialysis adequacy and probability of hospitalization, as well as hemoglobin, serum ferritin and percent transferrin saturation (TSAT) levels.
- To assess utilization of intravenous iron and erythropoiesis stimulating agents (epoetin alfa) in the study populations over the study period.

Methods

- In this longitudinal retrospective database analysis, 210 incident ESRD patients treated in facilities using CLM were compared to 609 propensity score matched (PSM) incident ESRD patients treated at facilities that did not use the CLM.
- A survey of facility administrators identified dialysis facilities using CLM in incident patients; propensity score matching was used to identify PSM control facilities (no CLM use).
- Incident patients were \geq 18 years of age receiving in-center hemodialysis, and first received dialysis between June 1, 2008 and January 1, 2011. Incident patients were dialysis-naïve patients with ESRD, whose outcomes were examined for their first 180 days of dialysis.
- Despite propensity score matching, statistical differences were found in demographic information (gender and vascular access) between the study populations, and thus, covariate adjusted generalized linear models were used at each time point for continuous variables.
- Cox proportional hazard models, both with and without covariate adjustment for gender and vascular access, were used to model hospitalizations.
- All data were analyzed in SAS 9.2.

Crit-Line[®] Monitor Use in Incident Hemodialysis Patients Improves Dry Weight and Adequacy While Reducing Epoetin Alfa Dose: A Propensity Score Matched Study S Sibbel;¹ LH Ficociello;² M Black;² M Thakuria;² C Mullon;² J Diaz-Buxo;² T Alfieri¹

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Results

Table 1. Facility Demographics

	CLM Facilities	PSM Controls	P values
Number of facilities	8	24	
Sample size (n)	210	609	
Facility size (n, ± SD)	42.2 ± 25.7	32.2 ± 10.2	< .001
Facility Region (%)			
North	17.6	18.1	
South	48.1	47.0	0.960
West	34.3	35.0	

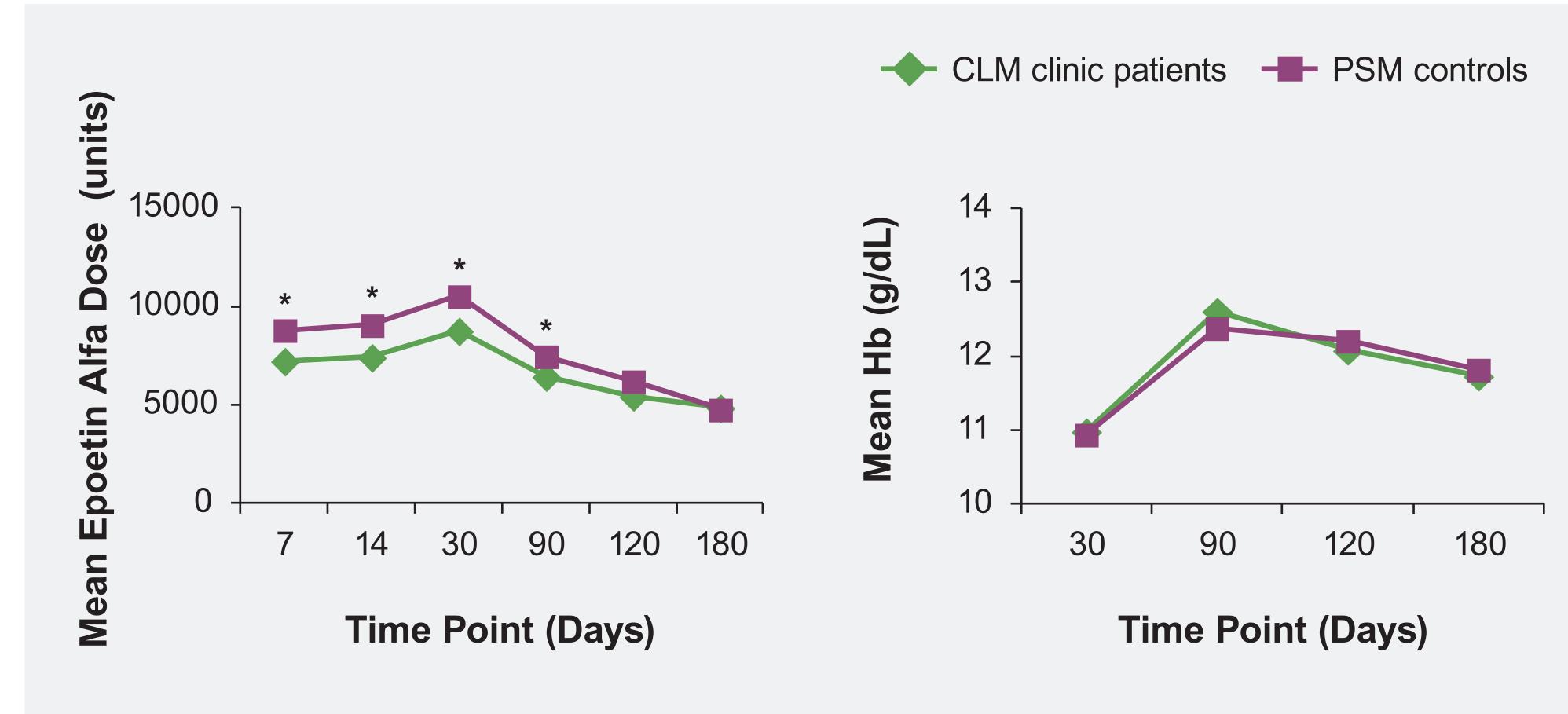
Table 2. Patient Demographics

	CLM Facility Patients	PSM Controls	P values
Age (years)	62.2 ± 14.9	61.9 ± 15.5	0.754
Gender female (%)	51.9	42.5	0.019
BMI (kg/m2)	29.0 ± 7.9	30.1 ± 8.9	0.101
Race (%) Black White Other	34.9 53.6 11.5	28.4 54.2 17.4	0.062
Primary insurer (%) Medicaid Medicare No Insurance Veteran's Admin Other/Unknown	18.2 56.7 2.4 3.3 19.5	14.9 54.2 3.5 2.1 25.3	0.305
Vascular access (% Fistula Graft Catheter) 30.0 5.2 64.8	20.0 6.6 73.2	0.026
Charlson index (SE)) 5.67 ± 2.2	5.55 ± 2.1	0.467

Table 3. Hospitalization

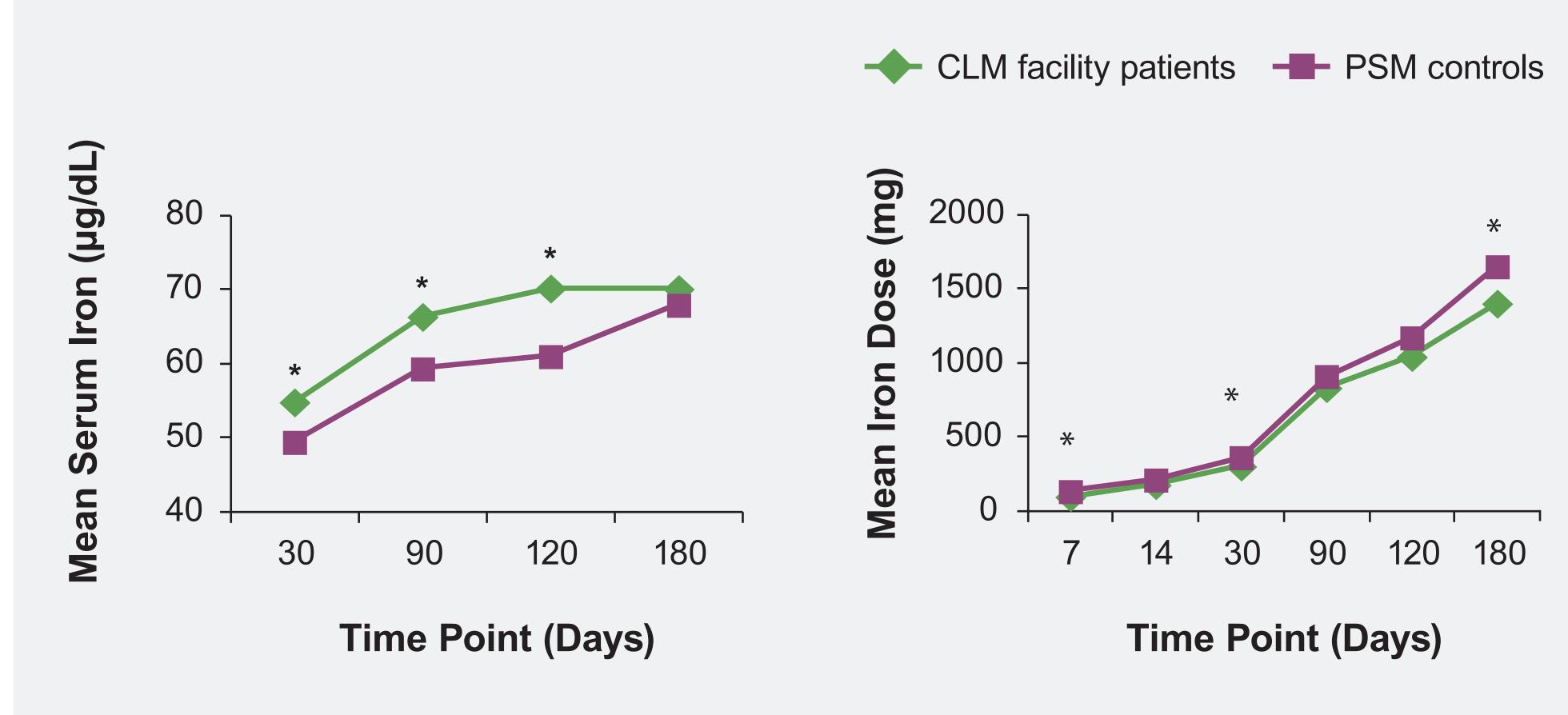
Model	
Unadjusted Cox Proportional Hazards Model	
Hazard Ratio	0.761
P value	0.047
Adjusted Cox Proportional Hazards Model	
Hazard Ratio	0.807
P value	0.128





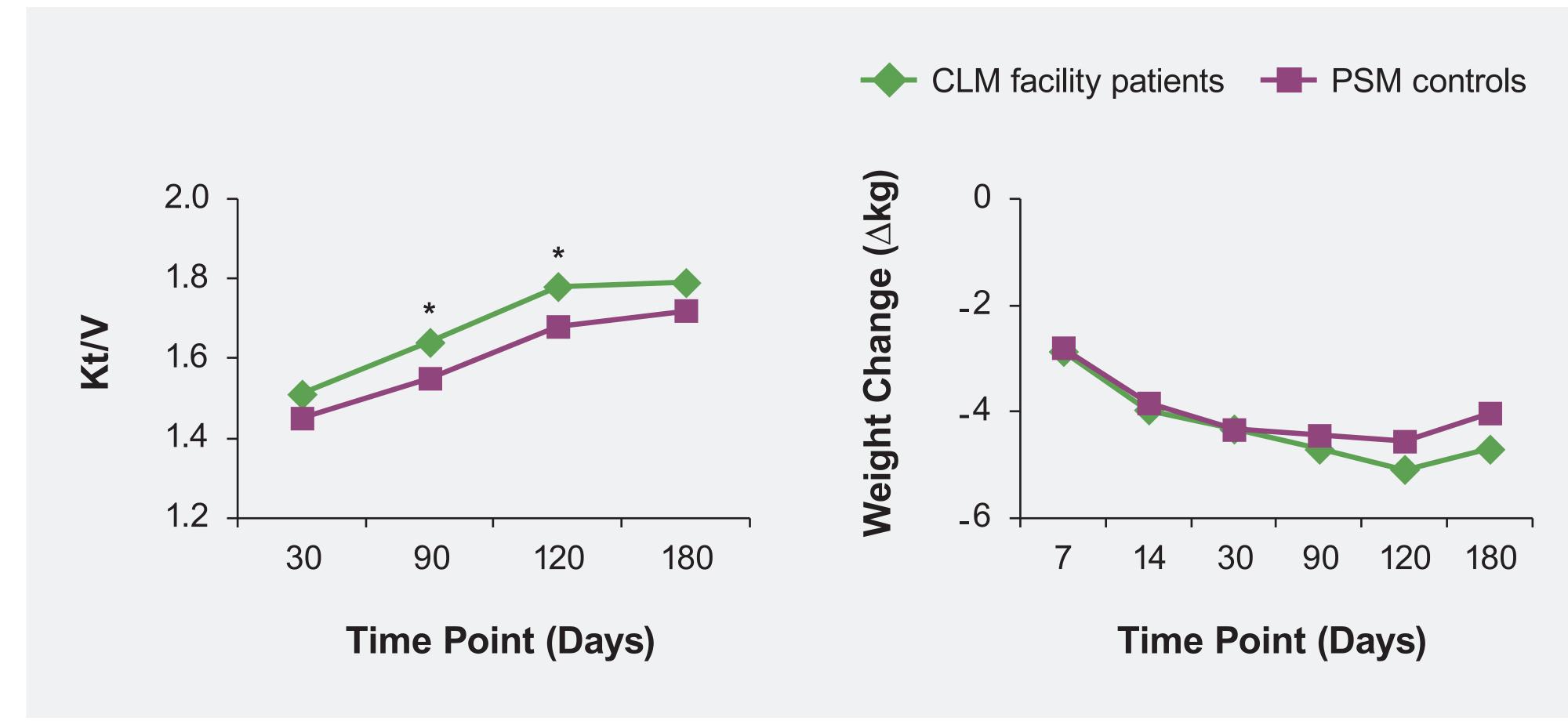
*P < 0.05





*P < 0.05

Figure 3. Adequacy and Dry Weight



*P < 0.05

Conclusions

- Despite similar hemoglobin levels between groups, significant reductions in epoetin alfa use were observed in CLM facility patients compared to PSM control patients.
- Compared to PSM controls, serum iron levels significantly increased in CLM facility patients, despite reductions in cumulative iron sucrose utilization.
- Improved dialysis adequacy were observed in CLM use facility patients versus PSM controls.
- A trend toward greater reductions in post-dialysis weight in CLM use facility patients compared to PSM controls was observed.
- When adjusted for covariates, no meaningful difference in the odds of hospitalization were seen between groups.

References

- 1. Rodriguez HJ, Domenici R, Diroll A, et al. Assessment of dry weight by monitoring changes in blood volume during hemodialysis using Crit-Line. *Kidney Int.* 2005;68(2):854–61.
- 2. Sinha AD. Why assistive technology is needed for probing of dry weight. Blood Purif. 2011;31(1–3):197–202.
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