Effects of High Dose Epoetin Alfa Therapy on Blood Transfusion Requirements in Dialysis Patients at A Tertiary Hospital: A Retrospective Evaluation

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Background
Many patients with end stage renal disease (ESRD) develop anemia as a result of the loss of erythropoietin production due to the destruction of kidney function. In order to correct this form of anemia or prevent severe anemia in this group of patients, treatment with erythropoietin stimulating agents (ESAs) is required. ESA agents are utilized as studies have demonstrated that chronic kidney disease (CKD) patients benefit from having a goal hemoglobin level between 11 and 12 g/dL. ESAs are powerful tools for the management of anemia and their use can also lead to a reduction in a patient’s blood transfusion requirements. Studies have also demonstrated that targeting hemoglobin levels higher than this or using higher ESA doses can put patients at increased risk for thrombosis, hypertension, myocardial infarction, and stroke. It remains to be seen if a subset of dialysis patients, those who are admitted in the hospital, receiving high doses of epoetin alfa have reduced blood transfusion requirements compared to those patients receiving lower doses of epoetin alfa.

Methods: A single center, retrospective cohort study was conducted for hemodialysis patients receiving epoetin alfa. Patients were included if they were between the ages of 18-89 years, diagnosed with end stage renal disease and on hemodialysis as an outpatient, admitted to Sentara Norfolk General Hospital, and received at least one dose of epoetin alfa. Patients were excluded if they were on continuous renal replacement therapy while admitted, were peritoneal dialysis patients, had active cancer, or those patients who were not on chronic hemodialysis as an outpatient. The primary objective was to compare the number of blood transfusions required after the use of high and standard doses of epoetin alfa therapy. Standard doses were defined as < 10,000 units/day, while high doses were defined as > 11,000 units/day of epoetin alfa therapy. A third group, the escalating therapy group, was also included in the analysis. In this group, patients received standard doses at the beginning of their admission but were then administered high doses of therapy during the same admission. Secondary objectives include the evaluation of target hemoglobin levels, the appropriate monitoring of labs, the frequency of subcutaneous vs intravenous epoetin alfa administration, and all-cause hospital mortality.

Results: A total of 171 patients were included in the analysis. Of the 171 patients evaluated, 127 (74.3%) were in the standard dose group, 24 (14.0%) were in the high dose group, and 20 (11.7%) were in the escalating dose group. The mean dose of epoetin alfa in the standard group was $8962.2 \pm 2243.9$ units while the mean dose of epoetin alfa in the high dose group was $18,333 \pm 2407.7$ units. Although most orders for epoetin alfa were ordered to be
administered subcutaneously, 35% in the standard dose group, 29% in the high dose group, and 22% in the escalating dose group were administered intravenously. There were 57 transfusions in the standard dose group, 21 transfusions in the high dose group, and 37 transfusions in the escalating dose group. There were no statistically significant differences between the three groups for all secondary outcomes, however patients in the standard dose group 7 (5.5%) and escalating dose group 4 (7.8%) did experience thrombotic events.

**Conclusion:** While it is difficult to draw comparisons between the three treatment groups due to the differences in baseline characteristics, based on this study population, the use of higher doses of epoetin alfa may not result in fewer blood transfusions. Due to lack of efficacy, doses of epoetin alfa therapy may be limited in the future in order to reduce a patient’s risk of adverse events.