Association Between Blood Pressure and ESA Dose in Pediatric Patients on Dialysis

Heather A. Morgans

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Submitting/Presenting Author: Heather Morgans, D.O.
Primary Email Address: hamorgans@cmh.edu

☐ **Medical Student**
☐ **Resident/Psychology Intern (≤ 1 month of dedicated research time)**
☐ **Resident/Ph.D/post graduate (> 1 month of dedicated research time)**
X Fellow

Primary Mentor: Dr. Judith Sebestyen VanSickle
Other authors/contributors involved in project: Dr. Bradley Warady, Dr. Monica Gaddis, Dr. Franz Schaeffer

Describe role of Submitting/Presenting Trainee in this project (limit 150 words): I have completed the literature review and study design. I have completed a preliminary descriptive analysis. Multivariate analysis is ongoing. I will complete the manuscript with plans for publication and will be presenting the study for CMH research days.

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background: Hypertension is a reported side effect of Erythropoiesis Stimulating Agents (ESAs), with a mechanism of action related to elevated hematocrit levels and direct vasopressor effects. Limited information exists on the relationship between ESA dosage and hypertension in children receiving maintenance dialysis.

Objectives/Goal: The primary aim of this study was to determine whether there is a significant association between ESA dose and blood pressure (BP) in pediatric patients on dialysis. The secondary aim was to determine covariates in relation to ESA dose.

Methods/Design: Data from the International Pediatric Dialysis Network (IPDN) database was used to retrospectively analyze the association between ESA dose and BP. Data collected from January 2007 to September 2019 was analyzed. Systolic and diastolic BP measurements obtained at clinic visits were averaged and standardized based on age, height, and sex. ESA dose was measured in units/kg/week with Darbepoetin and continuous erythropoietin receptor activator (CERA) converted to equivalent units of Epogen. The variables analyzed include hemoglobin level, BMI, dialysis modality, total fluid output (daily ultrafiltrate plus 24-hour urine output), number of antihypertensive medications, and use of growth hormone. Chi-Square testing was used to analyze ESA dosing groups (<100units/kg/week, >250units/kg/week) with standardized systolic blood pressure (50^{th}-90^{th} percentile, >90^{th} percentile).

Results: 3791 children were included in the analysis. Mean age was 11 years (± 5.87 SD) and 55.7% were male. The mean prescribed dose of ESA was 218 units/kg/week (± 982 SD). A significant association was found between ESA dose and standardized systolic blood pressure (X^2= 27.91, p<0.0001). Children receiving a higher dose of ESA (>250 units/kg/week) were 1.71 (95% CI 1.3989-2.0829) times more likely to have hypertension (systolic BP >90th percentile) than those children who received a lower dose of ESA (<100 units/kg/week).

Conclusions: The preliminary results from this study suggest that there is an association between higher doses of ESAs and higher systolic BP in children receiving maintenance dialysis. Multivariate analysis to assess for the influence of covariates on this relationship is on-going.