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Effect of anemia on neurocognitive outcome in children with chronic kidney disease

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Research Abstract Title

Effect of anemia on neurocognitive outcome in children with chronic kidney disease

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Resident/Psychology Intern (\leq 1 month of dedicated research time)

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Describe role of Submitting/Presenting Trainee in this project (limit 150 words):

Formulation of the hypothesis and aim of study, study design and

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

Background: Children with chronic kidney disease (CKD) are at risk for neurocognitive dysfunction. Few studies in children have evaluated the effect of anemia on executive function in CKD.

Objective: Aim 1- Longitudinally evaluate the effect of anemia on the neurocognitive function in children with CKD, Aim 2- to determine the effect of the severity of anemia on neurocognition.

Design/Methods: Data from the Chronic Kidney Disease in Children study (CKiD), a multicenter longitudinal cohort, was studied. Subjects included were \geq 6 years old and underwent any of the following executive function assessment: Behavior Rating of Executive Function, Second Edition (BRIEF-2); Delis-Kaplan Executive Function System (D-KEFS); Conners' Continuous Performance Test (CPT-II) Errors of Omission and Errors of Commission; or Digit Span. Anemia was defined as hemoglobin (Hgb) $<$ 5th percentile for age, sex or the use of an erythropoietic stimulating agent (ESA). For Aim 1, the longitudinal analysis was conducted using consecutive-visit pairs, with anemia status defined as acquired, resolved or persistent over the pair. For Aim 2, severity of anemia was classified into two groups, very low Hgb $<$ 1st percentile) and low Hgb, between the 1st-5th percentile, with concurrent measurements of EF, Hgb and ESA use considered rather than visit pairs. Linear mixed models with random intercept were used and models were adjusted for sociodemographic and disease related covariates.

Results: Data included 704 subjects, median age 13 years, 61% male, median baseline eGFR 51 ml/min/1.73m². Anemia was present in 33% of children, 11% of whom were on an ESA; median Hgb percentile was 25. Whereas acquired anemia was significantly associated with lower Digit Span total scores ($\beta = -0.74$, 95% CI -1.35, - 0.12, $p = 0.02$), the same relationship was not evident when the anemia was persistent. In contrast, persistent anemia was associated with lower scores for color-word inhibition/switching ($\beta = -0.87$, 95% CI -1.65, 0.09, $p = 0.03$). In terms of severity, very low Hgb levels were also significantly associated with lower color-word inhibition/switching score ($\beta = -1.40$, 95% CI -2.24, -0.56, $p = 0.001$)

Conclusion(s): Anemia was not associated with parent ratings of executive function. Presence of anemia in children with mild to moderate CKD was independently associated with their performance on several standardized measures of executive function. The severity of anemia was also associated with worse performance on a cognitively demanding measure of inhibition/switching.

