Nutrition Considerations in Acute Kidney Injury and Continuous Renal Replacement Therapy in Pediatric Critical Care

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Overview

Critically ill children with acute kidney injury (AKI) requiring continuous renal replacement therapy (CRRT) are catabolic and in need of appropriate nutrition to support recovery and prevent complications related to malnutrition. Little is known about energy, macronutrient, and micronutrient requirements in this population. In critically ill children without AKI, energy expenditure varies widely and protein needs are accelerated. Children admitted to the intensive care unit may have preexisting malnutrition, obesity, micronutrient deficiency, or other chronic conditions that alter nutrition requirements. There are many challenges to optimal nutrition therapy in critically ill infants and children; some are more common in those with AKI. Critically ill children with AKI may be prescribed suboptimal nutrition for a variety of reasons. Prior to the initiation of CRRT, fluids and electrolytes may be restricted, significantly limiting the amount and quality of nutrition provided. CRRT can remove fluid, electrolytes, and urea, but also induces loss of amino acids, trace elements, and water soluble vitamins. Indirect calorimetry is the only method to accurately assess energy expenditure in critically ill children, but measurements may be unreliable during dialysis. Enteral nutrition is the preferred route of nutrition support in critically ill children, although some observations suggest children with AKI are at higher risk for gastrointestinal complications. Parenteral nutrition may be indicated when initiation of enteral nutrition is delayed, or inadequate to meet requirements. Research is needed to determine the optimal energy, protein, and micronutrient intake to improve outcomes in children.

Learning Objectives

1. Illustrate the effects of AKI and CRRT on the nutrition status of critically ill children.  
2. Discuss challenges to optimal nutrition in this population.  
3. Identify micronutrients requiring modification for children with AKI receiving CRRT.

Learning Assessment Questions and Answers

1. Which of the following are consequences of AKI and CRRT in critically children?  
   A) A catabolic state with increased protein requirements  
   B) Altered micronutrient requirements  
   C) Increased loss of amino acids  
   D) All of the above  
   (the correct answer is D)
2. Which of the following is NOT a barrier to optimal nutrition in critically ill children with AKI requiring CRRT?
   A) Fluid and electrolyte restriction
   B) Difficulty in measuring energy expenditure
   C) Inadequate nutrition prescription
   D) Increased losses of amino acids and certain micronutrients
   (the correct answer is A)

3. Critically ill children with AKI receiving CRRT have been shown to have altered requirements for all of the following micronutrients listed below except one.
   A) Folate
   B) Selenium
   C) Manganese
   D) Vitamin A
   (the correct answer is C)

References