
بسم الله الرحمن الرحيم

NUTRITIONAL SUPPORT IN PATIENT WITH RENAL FAILURE

Dr.S.H.Saghaleini
Intensivist

- Acute kidney injury (AKI) is common in intensive care unit patients, with an incidence ranging from 20 to 50%, but with relatively lower incidence in postsurgical patients and higher incidence in those with sepsis and shock

- Loss of kidney function affects the metabolism of all macronutrients in this hypermetabolic state where hypertriglyceridemia and hyperglycemia are common.
- Malnutrition in AKI may increase complications and impact outcome including hospital length of stay (LOS) and mortality.
- Nutritional status assessment is, therefore, essential in AKI patients to prevent further nutritional depletion

Goals of nutritional therapy in acute kidney injury (AKI)

- To reduce negative protein balance and prevent protein-energy malnutrition
- To retain lean body mass and maintain normal body composition
- To avoid metabolic derangements and improve biochemical parameters
- To improve respiratory function capacity and healing
- To improve kidney function
- To improve overall outcomes and reduce mortality

- When EN is prescribed to the ICU patient, the underlying disease process, preexisting comorbidities, and current complications should be taken into account

- Experts agree on using usual body weight for normal weight patients and ideal body weight for obese and critically ill patients

- Energy needs …..(25–30 kcal/kg/d)

- Based on expert consensus, we suggest that ICU patients with ARF or AKI be placed on a standard enteral formulation and that standard ICU recommendations for protein (1.2–2 g/kg actual body weight per day) and energy (25–30 kcal/kg/d) provision should be followed.
- If significant electrolyte abnormalities develop, a specialty formulation designed for renal failure (with appropriate electrolyte profile) may be considered

- In ARF patients and acutely ill CRF patients on renal replacement therapy, substrate requirements depend on disease severity, type and extent/frequency of extracorporeal renal replacement therapy, nutritional status, underlying disease and complications occurring during the course of the disease

Aims of PN in patients with renal failure

- Reduction of the hypercatabolic state, and the prevention or elimination of malnutrition and related functions, such as immunology, wound healing, antioxidative potential, inflammation.
- While delaying the progress of CRF through protein or phosphate restriction is the aim of chronic dietary therapy, this is not the goal of short-term PN, which is usually administered only in acute situations

Parenteral nutrition substrates for patients with renal failure

- Special amino acid solutions for patients with renal failure (so-called “nephro-solutions”) show beneficial effects on some surrogate parameters
- Patients with renal failure should receive lipid emulsions with a triglyceride dose of up to 1 g/kg body weight/day in PN with regular monitoring of plasma triglycerides
- Parenteral carbohydrates should be provided by glucose in patients with renal failure

- Normo-glycaemia should be the goal during PN
- Administration of L-carnitine (500 mg/day) is justified in malnourished and critically-ill patients on renal replacement therapy
- Patients with chronic renal failure require an individually dosed pharmacological therapy with vitamin D3 or its analogues in addition to the standard intake with fat-soluble vitamins in PN
- Patients with CRF and acute concomitant diseases as well as patients with ARF have an increased requirement of vitamin E

- Patients on renal replacement therapy and malnourished patients without renal replacement therapy should receive approximately double the normal daily quirements of water-soluble vitamins with PN.
- An increased intake of vitamin C (>250 mg/day) can be disadvantageous and result in increased oxalate formation

- Patients on renal replacement therapy and malnourished patients without renal replacement therapy should receive the recommended daily intake of trace elements in PN.

- Selenium intake should be >200 µg/day in patients on renal replacement therapy

- Electrolyte intake should be individually determined in patients with renal failure
- Glutamine intake should be avoided in non-dialysis patients due to its high nitrogen content.
- In patients with ARF on renal replacement therapy , glutamine intake may be considered

Recommended parenteral nutrient intakes in ARF/CRF without RRT

Energy	20–25 kcal/kg body weight/day
Amino acids	0.6–1.0* g/kg body weight/day
Carbohydrates	3–5 g/kg body weight/day
Lipids	0.8–1.2** g/kg body weight/day
L-carnitine	0.5*** g/day
Water-soluble vitamins	Normal PN dosage
Fat-soluble vitamins	Normal PN dosage
Trace elements	Normal PN dosage
Electrolytes****	Phosphate/potassium restriction often necessary
Fluid ****	

* Depending on degree of catabolism and tolerance
** Monitoring of plasma triglycerides necessary
*** Optional
**** The individual requirements vary a great deal

RENALCAL

- A specialized interim nutrition formula for renal failure.
- This high calorie, low protein, minimized electrolyte formula is designed for the nutritional support of patients with AKI.
- Intended for use as a short-term tube feeding. Not intended for long-term feeding.

Key Benefits

- Calorically-dense, protein-restricted, minimized electrolyte formula
- A unique formula including 67% indispensable amino acids and 33% dispensable amino acids
- Includes histidine, considered indispensable in renal failure
- 70:30 MCT:LCT ratio to decrease potential for fat malabsorption
- Not intended for sole source feeding

- A number of studies in both diabetic and nondiabetic patients with CKD have demonstrated that modest protein restriction reduces the progression of renal disease.
- Reducing daily protein intake to approximately 0.7 mg/kg is advised

- Dietary sodium restriction has been shown to lower urinary protein excretion, especially in patients who are being treated with ACE inhibitors.
- Salt intake is typically limited to approximately 2 to 3 g sodium daily

- The International Society of Renal and Nutrition Metabolism (ISRNM) recommends that serum albumin less than 3.8 g/dL can be used as a diagnostic parameter of protein-energy wasting (PEW) in acute as well as chronic kidney disease
- IGF-1 is a peptide analogous to insulin whose production is affected by nutritional status, and its reduction was associated with a lower survival in patients with AKI

- Specialty formulations lower in certain electrolytes (eg, phosphate and potassium) than standard products may be beneficial in ICU patients with AKI

- We recommend that patients receiving frequent hemodialysis or CRRT receive increased protein, up to a maximum of 2.5 g/kg/d.
- Protein should not be restricted in patients with renal insufficiency as a means to avoid or delay initiating dialysis therapy.

- A significant amino acid loss (10–15 g/d) is associated with CRRT.

- Thus, patients on this therapy may require at least an additional 0.2 g/kg/d totaling up to 2.5 g/kg/d.

- No major advantages have been demonstrated with very high protein intakes (>2.5 g/kg/d), as excessively high nitrogen intakes may simply increase the rate of urea production.
- At least 1 RCT has suggested that an intake of 2.5 g/kg/d is necessary to achieve positive nitrogen balance in this patient population.

NUTRITION ASSESSMENT

- In adults with CKD, it is reasonable to consider routine nutrition screening at least biannually with the intent of identifying those at risk of protein-energy wasting
- In adults with CKD, there is limited evidence to suggest the use of one tool over others for identifying those at risk of protein-energy wasting

- In adults with CKD who are metabolically stable, we recommend prescribing an energy intake of 25-35 kcal/kg ideal body weight per day based on age, gender, level of physical activity, body composition, weight status goals, CKD stage, and concurrent illness or presence of inflammation to maintain normal nutritional status.

- In adults with CKD who are metabolically stable, we recommend protein restriction with or without keto acid analogs, to reduce risk for ESRD/death and improve QoL.
  - a low protein diet providing 0.55 to 0.60 g dietary protein/kg ideal body weight/day, OR
  - a very-low protein diet providing 0.28 to 0.43 g dietary protein/kg ideal body weight/day with additional keto acid analogs to meet protein requirements (0.55 to 0.60 g /kg body weight/day)

- We recommend prescribing a dietary protein intake of 1.0 -1.2 g /kg ideal body weight per day to maintain a stable nutritional status
- In the adult with CKD and who have diabetes, it is reasonable to prescribe a dietary protein intake of 0.8 – 0.9 g /kg ideal body weight per day to maintain a stable nutritional status and optimize glycemic control

- we suggest prescribing folate, Vit B12 and/or B-complex supplement to correct for folate or Vitamin B12 deficiency/insufficiency based on clinical signs and symptoms
- In adults with CKD who are at risk of Vitamin C deficiency it is reasonable to consider supplementation to meet the recommended intake of at least 90 mg/d for men and 75 mg/d for women

- we suggest prescribing vitamin D supplementation in the form of cholecalciferol or ergocalciferol to correct 25(OH)D deficiency/insufficiency
- we suggest to not routinely supplement selenium or zinc since there is little evidence that it improves nutritional, inflammatory or micronutrient status

- we recommend limiting sodium intake to less than 100 mmol/day (or <2.3 g/day) to reduce blood pressure and improve volume control.


خسته نباشید