

PATIENT WITH COVID LEADING TO MULTISYSTEM ORGAN FAILURE INCLUDING ESRD WITH CRRT



Trey Hill

Preceptor: Natalia T. Bailey Groat, MS, RD, CD

Background

Patients with End-Stage Renal Disease (ESRD) while on Continuous Renal Replacement Therapy (CRRT) require special nutrition considerations in order to achieve optimal outcomes.

- Water soluble nutrients may be lost with CRRT.
- Specific recommendations vary between guidelines, but overall, protein needs are higher due to losses from CRRT.
- Energy needs are not increased in ESRD patients with CRRT. Instead, base energy needs off of other conditions that the patient may have.

Patients should receive a formal nutrition assessment that considers all factors of their condition into their care.

- Nutritional interventions should be adjusted based on other aspects of the patients care. Switching to enteral nutrition if there is a swallowing issue or inadequate oral intake, or switching to parenteral nutrition if there is an inability to meet needs through the gastrointestinal tract, are necessary to ensure adequate nutrition.
- Electrolyte imbalances need to be considered when selecting an enteral formula.

Further research is needed to clarify more specific information about what nutritional interventions lead to the best outcomes for patients with ESRD on CRRT.

Nutrient Recommendations

- **Energy Needs:** Estimate using indirect calorimetry when possible. Energy should reflect other conditions, as CRRT does not increase energy needs.
- **Protein:** ASPEN: 1.8-2.5g/kg/day
EPSEN: 1.5-1.7g/kg/day
- **Micronutrients of concern:** Vitamin C, copper, thiamine, selenium, folic acid.

Case Report

A 35-year-old male with no known past medical history presents with a COVID-19 infection with acute respiratory distress syndrome who was transferred from an outside hospital.

- The patient required a ventilator and had an orogastric feeding tube, and later PEG, to provide nutrition.
- Initial Nutrition Assessment:
Energy: 2350-2745kcal (BEE x 1.2-1.4)
Protein: 135-185g (1.5-2.0 g /kg BW)
- Initial Enteral Nutrition:
Osmolite 1.5 at 70mL/hr + 4 Packets Prosource Providing 2760kcal, 165g Protein
- The patient's condition eventually worsened to an acute kidney injury and eventually ESRD, which required CRRT for treatment.
- The patient lost significant weight (18% BW) during their admission and was diagnosed with malnutrition.

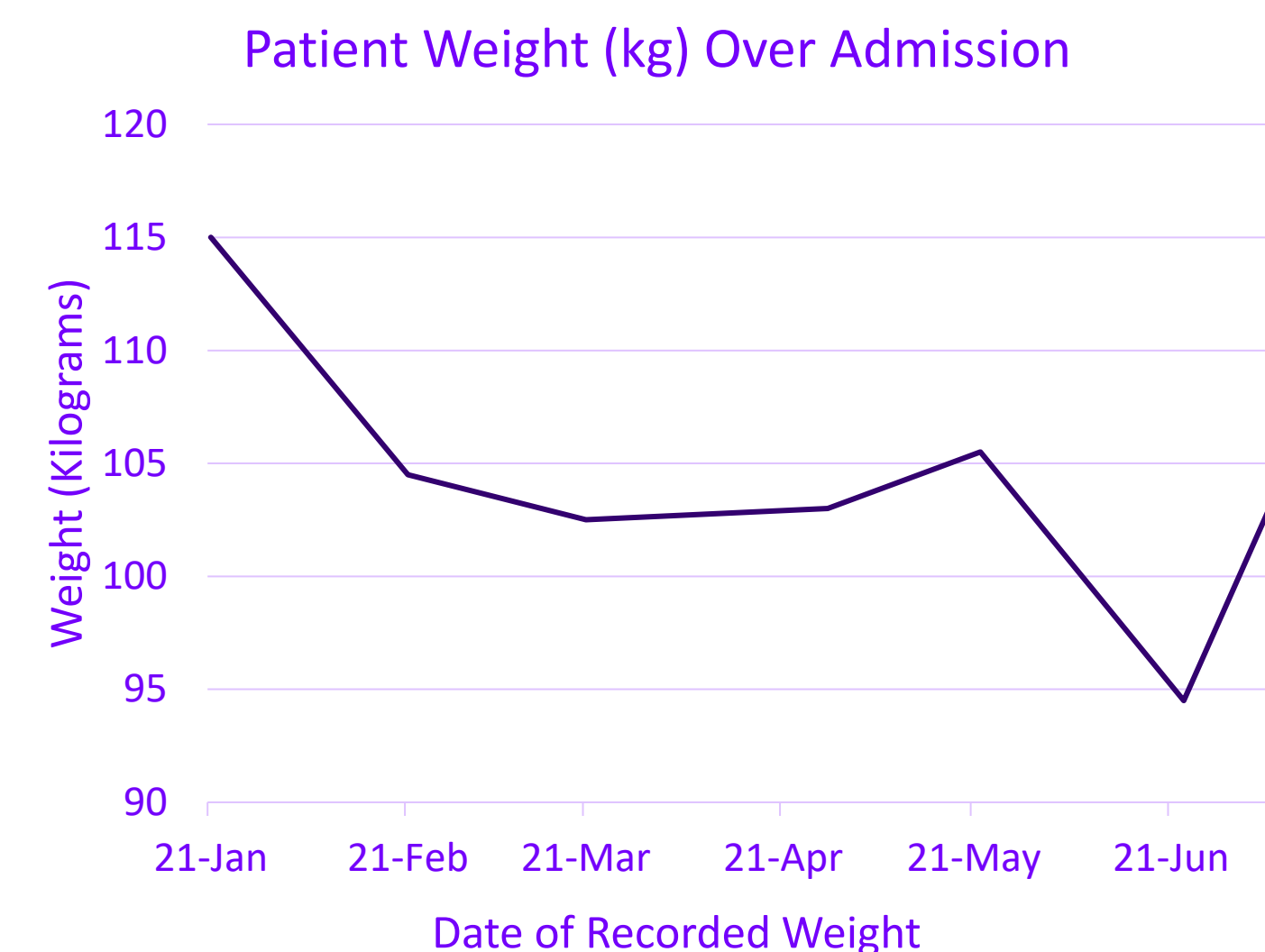


Figure 1. Patient weight in kilograms over the course of admission.

Interventions

- As the patient's condition worsened, tube feeding adjustments were made based on the patient's status and other needs such as electrolytes, stooling, or fluid status.
- Supplement orders were recommended, bowel regimen changes were suggested, and adjusted tube-feeding rates were based on propofol infusions.
- Five different Enteral Formulas were used over the admission (Osmolite 1.5, Jevity 1.5, Jevity 1.2, Nepro, TwoCal)
- The patient experienced varying periods of electrolyte imbalances. When phosphorus and potassium levels were above the normal range, Nepro was considered in order to help promote bringing them back to normal limits.

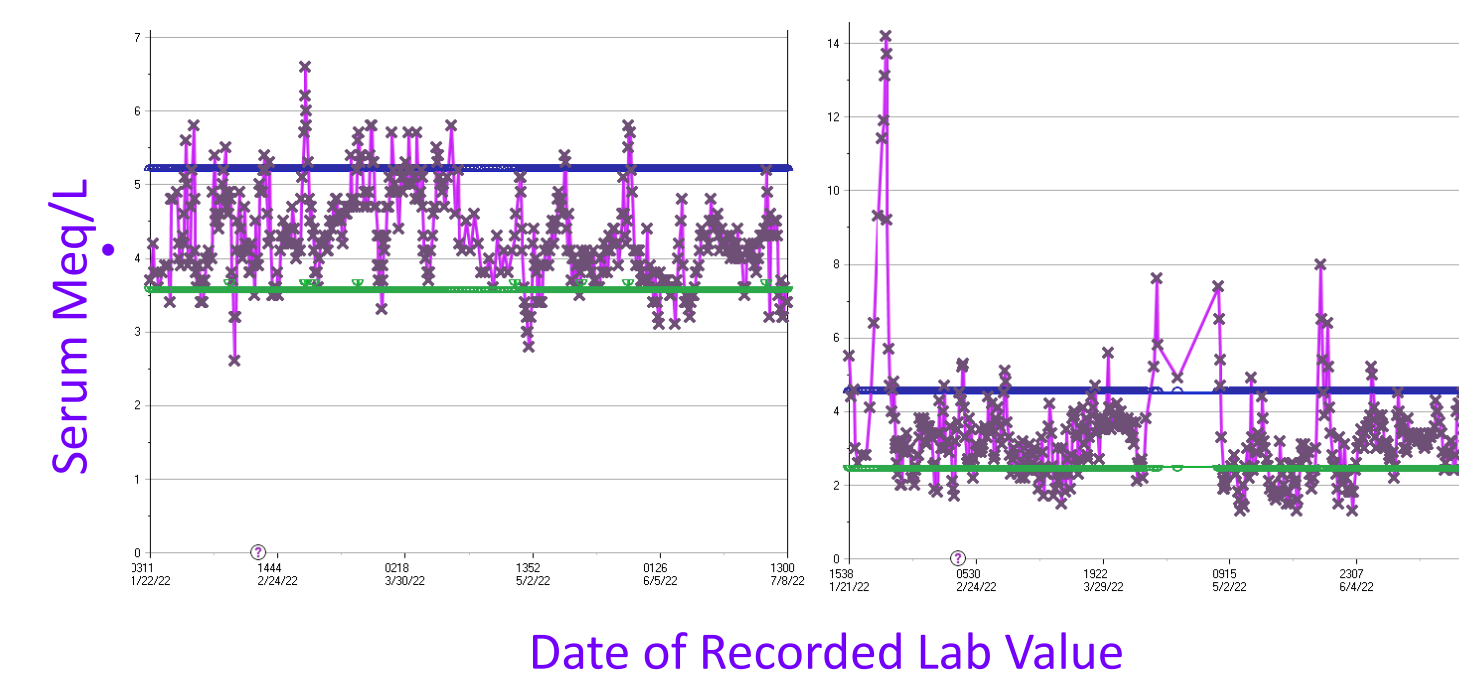


Figure 2. Patient potassium (left) and phosphorus (right) levels over the course of admission. Values above the blue lines indicate hyperkalemia or phosphatemia, respectively.

- At one point, the patient's diet progressed to an oral diet, although oral intake was low. Then, the patient's condition worsened again and enteral nutrition resumed.
- Late in the admission the team noticed that the stool looked very similar to the tube feeding formula and was concerned that the patient may not be absorbing the formula in their gut.
- The patient began total parenteral nutrition, although the patient's condition had worsened further and the patient died three days later.

Discussion

This case was one that involved a complex patient scenario and highlighted the importance of the dietitian's ability to consider many facets of the patient's case when determining appropriate nutrition recommendations. Key takeaways from this case include:

- Guidelines support the high protein intake that this patient received, as well as increased energy needs related to the comorbidities that the patient was experiencing.
- Weight can be a flawed indicator of nutrition status due to fluid shifts in ESRD on CRRT patients.
- Ensuring that the patient is receiving adequate intake, either enterally or parenterally, is necessary to promote healing.
- Dietitians need to be efficient in determining patient needs and adjusting recommendations, such as changing formulas in situations where concentrated formulas are more necessary or a renal formula is needed when electrolyte abnormalities are detected.
- Electrolyte imbalances pose challenges for patients with ESRD receiving CRRT.

Further research is needed to determine the best course of action for nutritional interventions for ESRD patients on CRRT. Research Priorities include:

- Does frequently switching enteral formulas impact patient outcomes?
- How soon after electrolyte abnormalities are detected should the enteral formula be adjusted? Should dietitians be consulted for expedited care?

References

1. Brown RO, Compher C. A.S.P.E.N. clinical guidelines. *Journal of Parenteral and Enteral Nutrition*. 2010;34(4):366-377. doi:10.1177/0148607110374577
2. Fiaccadori E, Sabatino A, Barazzoni R, et al. Espen guideline on Clinical Nutrition in hospitalized patients with acute or chronic kidney disease. *Clinical Nutrition*. 2021;40(4):1644-1668. doi:10.1016/j.clnu.2021.01.028
3. Berger MM, Broman M, Forni L, Ostermann M, De Waele E, Wischmeyer PE. Nutrients and micronutrients at risk during renal replacement therapy: a scoping review. *Curr Opin Crit Care*. 2021;27(4):367-377. doi:10.1097/MCC.0000000000000851
4. Picard K, Mager DR, Richard C. The Impact of Protein Type on Phosphorus Intake, Serum Phosphate Concentrations, and Nutrition Status in Adults with Chronic Kidney Disease: A Critical Review. *Adv Nutr*. 2021;12(6):2099-2111. doi:10.1093/advances/nmab062