Cochrane Nursing Care Corner: Nutritional Support for Acute Kidney Injury

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COCHRANE Nursing Care Field

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Review Question:

What are the effects and acceptability of nutritional support in hospitalised adults and children for the treatment of acute kidney injury (AKI)?

Relevance for Clinical Practice:

AKI has a persistently high mortality rate in critically ill hospitalised patients. The management of AKI relies on treating the underlying cause and maintaining the patient until kidney function has recovered. Nutritional management of the hypercatabolic AKI patient is vital. As the patient becomes nutritionally deficient in protein, energy requirements will exceed those that are conventionally prescribed. Besides uraemia, metabolic acidosis and fluid and electrolyte imbalances, patients also suffer from physiological stress e.g. infection which increases protein needs. Renal replacement therapies also result in the loss of vitamins and other essential nutrients. Nutritional therapies, including parenteral nutrition (delivered via injection) and enteric (oral) nutrition are widely used in treating acutely ill AKI patients. Nurses need to be aware of the benefits and risks from the use of these nutritional supports and the optimal time to initiate them. These considerations are the basis for this systematic review.

Characteristics of the Evidence:

The search focussed on randomised controlled trials and the first period of randomised cross-over studies investigating the use of nutritional support in hospitalised adults and children with AKI. All participants had to have moderate to severe AKI classified using standard criteria at the time of the study regardless of sex or age. Eight studies were included in the review with a total of 257 participants who were all given IV nutritional support. The patients' ages were not mentioned in some of the included studies. The youngest age of the participants in one study was 16 years. Four studies were performed in ICUs and the remaining four were performed in a general ward.

- Two studies compared three interventions: glucose (2,000 Kcal) and essential L amino acids (EAA) (4.38 g/d) with histidin, glucose and general amino acids (GAA), glucose and GAA and intralipid.

Individual studies compared:

- Eight EAA (13.1g/d) and vitamins with hypertonic glucose with vitamins for 15 days.
- A higher calorie - total parenteral nutrition (TPN) regimen (40 kcal/kg/d) with a lower calorie-TPN regimen (30 kcal/kg/d) each for three days with a nitrogen intake of 0.25 g/kg/d for both regimens.
- Glucose alone, 21.2 g EAA and 42.1 g GAA.
- High nitrogen intakes (11.3 g/d on average) containing ENAA with low nitrogen intakes (2.3 g/d in average) containing only EAA.
- EAA (17 g/L) with GAA (20 g/L) infusion.
- High-dose amino acids with normal dose amino acids (75g/d) infusion.

The studies were not combined because interventions and doses were different for each study. The studies analysed were of poor quality and the poor methodological qualities of the studies may have resulted in bias in the review process. Four studies mentioned complications but there were no data available for analysis.

Key Words
Acute kidney injury, systematic review, nutritional support

Results indicated:

- There was a significant increase in recovery rate for AKI (Relative Risk [RR] 1.70, 95% Confidence Interval [CI] 1.70 to 2.79) and survival in dialysis (RR 3.56, 95% CI 0.97 to 13.08) patients for IV EAA compared to hypertonic glucose alone (two studies).
- Compared to lower calorie-TPN, higher calorie-TPN did not improve estimated nitrogen balance, protein catabolic rate, or urea generation rate, but increased serum triglycerides, glucose, insulin need and nutritional fluid administration (one study).
- There was no difference between groups in estimated nitrogen balance, but there were differences between urea nitrogen appearance (MD 0.98, 95% CI 0.25 to 1.71) and net protein utilisation (MD 21.50%, 95% CI 0.39 to 42.61). Urea nitrogen appearance was lower in the low nitrogen intake group than in the high nitrogen intake group (one study).
- There was no significant difference in death between EAA and GAA (RR 1.52, 95% CI 0.63 to 3.68 (one study).

- High dose amino acids did not improve cumulative water excretion, furosemide requirement, nitrogen balance or death compared to normal dose amino acids (one study).
- Glucose+EAA+histidin had better nitrogen balance than glucose+GAA (three studies).
- Glucose+nitrogen+fat significantly increased serum creatinine compared with glucose+GAA (two studies).
- Glucose+EAA+histidin significantly improved nitrogen balance, U/P urea and serum creatinine, but increased plasma urea compared to glucose+nitrogen+fat (two studies).

Implications for Clinical Practice:

Parenteral administration of essential L-amino acids may shorten the overall duration of kidney dysfunction and improve survival from AKI in hospitalised adults and children. However the reviewers could not provide recommendations for the use of nutritional support in treating AKI in critically ill patients.

Implications for Research:

This review establishes the need for further high quality and comprehensive clinical studies assessing the effect and safety of different nutritional supplements in AKI management. Further studies should fully describe randomisation and methods of allocation concealment and report the withdrawal and drop-out rates. Adverse effect should be reported in detail including the severity and numbers in each group. It was not possible to combine the analysis from the eight studies and further studies should use accredited standard outcome measures allowing combined analyses.

Reference:

Li Y, Tang X, Zhang J, Wu T. Nutritional support for acute kidney injury. *Cochrane Database of Systematic Reviews* 2010, Issue 1. Art. No.: CD005426. DOI: 10.1002/14651858.CD005426.pub2.

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