NUTRITIONAL CARE IN CHRONIC CRITICAL ILLNESS SYNDROME (PART ONE OF TWO)

MEDICAL CARE IN PATIENTS WITH PROLONGED OR CHRONIC CRITICAL ILLNESS (CCI) FOCUSES ON SUPPORTIVE AND PREVENTATIVE MEASURES TO ENSURE THE BEST OUTCOMES. ADEQUATE NUTRITION IS A CENTRAL COMPONENT IN THE CARE OF CCI PATIENTS.

Patients with CCI are hypercatabolic: they experience significant loss of lean body mass mediated by the immune-neuroendocrine response to acute critical illness. Both elevations in inflammatory cytokines and suppression of hypothalamic-pituitary signaling persist as a patient progresses to the chronic phase of critical illness. Liver synthetic function has been shifted away from anabolic activities such as the production of albumin and other proteins. Muscle wasting is observed. Levels of anabolic hormones are low. Exogenous administration of these hormones, including treatment with human growth hormone or testosterone, is unsuccessful in curtailing the characteristic hypercatabolism of CCI. In the case of human growth hormone treatment in CCI, higher rates of mortality are observed.

Adequate nutritional support may prevent aspects of hypercatabolism and is associated with improved outcomes in ICU patients. Nutritional support is becoming widely recognized as critical in the treatment of CCI patients.

ASSESSMENT OF NUTRITIONAL STATUS

Every hospitalized patient should undergo nutritional screening upon admission. Unintentional weight loss is an important predictor of the severity of malnutrition. The unintentional loss of 30% of usual body weight over six months, 15% of usual body weight over three months, 10% over one month or 5% over one week are considered markers of severe malnutrition. Due to fluid accumulation and third-spacing of fluids, critically ill patients often maintain their weight despite loss of lean body mass. In this case, careful examination of muscle wasting at the temporal musculature or at the thenar and hypothenar eminences may be helpful. For patients with prolonged hospitalization, nursing records of nutritional intake and flow sheets can also be used to assess nutritional status.

Several other factors may contribute to a patient's risk of malnutrition. Many CCI patients have compromised gastrointestinal tract function due to ischemia or intestinal edema that can lead to malabsorption and thus malnutrition.

The severity and duration of the underlying medical condition prior to admission will also influence a patient's nutritional status. Prolonged and severe illnesses often trigger decreases in dietary intake. The presence of chronic underlying conditions can also lead to poor nutrition.

Blood tests can be used, although they are not as reliable. Blood levels of albumin, pre-albumin and other proteins are typically low in CCI due to the activated inflammatory response in CCI rather than nutritional status. Nevertheless, severely low albumin (typically less than 2 mg/dL) is associated with poor outcome in CCI. In these individuals, care should be taken to ensure adequate protein and calorie administration. In some cases, assessment of nitrogen balance by measurement of 24-hour urine urea nitrogen may be required.

(CONTINUED)

Severe malnutrition is associated with poor outcome, prolonged hospitalization and increased cost. The diagnosis of severe malnutrition in CCI patients allows for nutritional support to be addressed as a significant part of the medical care plan for these individuals. The most important predictors of malnutrition are the degree of unintentional weight loss, gastrointestinal tract function and severity of underlying illness. Together, these factors can predict the presence and severity of malnutrition.

ADEQUATE NUTRITION

The main purpose of nutritional support is to provide sufficient calories, protein and micronutrients so that patients may have the best outcomes. A patient's daily nutritional needs are based on energy and protein utilization. In general, a patient's calorie requirements should match his or her energy expenditure. Patients with CCI are usually bed-bound and non-mobile. Daily energy requirements are derived from the metabolic needs of major organs including the brain, kidneys, liver and the energy required for digestion—known as the thermic effect of food. Other aspects of a patient's medical condition such as sepsis or tachycardia may increase his or her calorie requirements. Mechanical ventilation and paralysis decrease calorie requirements. A number of methods have been developed to estimate the amount of each nutrient that is necessary for individual patients.

Indirect calorimetry is the gold standard for the determination of a patient's calorie requirement using rates of oxygen consumption and carbon dioxide production to determine the overall metabolic rate. This can be cumbersome and requires equipment that is not always available. In place of indirect calorimetry, calorie requirements may be estimated through one of several equations.

The Harris-Benedict equations were developed more than 100 years ago and estimate a patient's calorie requirements based on height, weight and gender. They are still in clinical use in some institutions. More modern equations—including the Ireton-Jones, Penn State or Swinamer equations—each modify the original Harris-Benedict equations to adjust for changes in body temperature, sepsis and the presence of burns or trauma.

A simple method for estimation of calorie requirements is to aim for the administration of 25 kcal per kg of body weight. This method is recommended by the American Society for Parenteral and Enteral Nutrition (ASPEN) and fares equally well to the above mentioned equations in direct comparison studies. Additional calories may be required in burn patients and in sepsis: 30-35 kcal/kg in burn patients and 30 kcal/kg in septic patients.

When employing this simple method in overweight or obese patients, the use of corrected body weight instead of actual body weight is preferred. This strategy of "permissive underfeeding" helps to avoid the potential for contribution to the patient's obesity and prevents overfeeding these patients. Corrected body weight is calculated by adding ¼ of the difference of actual body weight and their height-based ideal body weight. For example, in a patient who weighs 100 kg but has an ideal weight of 80 kg, calorie requirements should be based on a corrected body weight of 85 kg (80 kg + ¼ x (100 kg – 80 kg)).

Daily protein requirements are generally between 1 and 1.5 g per kg. Again the concept of corrected body weight should be used to avoid the development of uremia from excessive protein delivery in obese individuals. For these patients, the daily delivery of 1.5 g of protein per kg—the high end of the recommended range—has been shown to achieve optimal nitrogen balance when employing the permissive underfeeding

REFERENCES

Via MA, Mechanick JI. Inpatient enteral and parenteral nutrition for patients with diabetes. Curr Diab Rep 2011;11:99-105.

Mechanick JI, Brett EM. Nutrition and the chronically critically ill patient. Curr Opin Clin Nutr Metab Care 2005;8:33-9.

McClave SA, Martindale RG, Vanek VW, et al. Guidelines for the Provision and Assessment of Nutrition Support Therapy in the Adult Critically Ill Patient: Society of Critical Care Medicine (SCCM) and American Society for Parenteral and Enteral Nutrition (ASPEN). J Parenter Enteral Nutr 2009;33:277-316.

Casaer MP, Mesotten D, Hermans G, et al. Early versus late parenteral nutrition in critically ill adults. N Engl J Med 2011;365:506-17.