Measured Metabolic Requirement for Septic Shock Patients Before and After Liberation from Mechanical Ventilation

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Keywords:
mechanical ventilation
indirect calorimetry
septic shock
nutrition support
intensive care

Introduction
Nutritional status is an important factor in health maintenance and disease recovery, particularly in critically ill patients during mechanical ventilation. Under-nutrition can impair regeneration of respiratory epithelium, limit functionality of respiratory muscles, and thus, prolong mechanical ventilation (Kan et al, 2003). Conversely, sustained overfeeding can cause liver dysfunction, hyperglycemia and excess carbon dioxide production that can collectively delay weaning from mechanical ventilation. Reid (2006) reported that critically ill patients on mechanical ventilation were underfed on 50 % of days and overfed on 19 % of days. The comparison of metabolic requirements between patients on mechanical ventilation and self-breathing healthy controls also demonstrated significantly higher metabolic needs in mechanically ventilated individuals (Ireton-Jones et al, 1992). It is of clinical interest to examine whether a similar metabolic pattern will be apparent among the critically ill population during and upon liberation from mechanical ventilation. Reliable metabolic data obtained from the very ill and mechanical ventilator-dependent patients may lead to better nutrition care through meeting their energy needs. Therefore, positive clinical outcomes including shorter duration on assisted ventilation and successful weaning might be achieved.

Objectives
The present study sought to quantify and compare energy requirement of patients with septic shock during and upon liberation from mechanical ventilation.

Methodology
Patients in the intensive care unit with initial diagnosis of septic shock and on mechanical ventilation were recruited. Their metabolic requirements before and after liberation from mechanical ventilation were measured. Paired t-test was used to examine the mean variance. Results could be used to develop nutrition algorithm and guide clinicians in provision of nutrition for this population.
Result
Twenty-four patients, 16 males and 8 females had mean Acute Physiology and Chronic Health Evaluation II (APACHE II) scores of 24, length of stay (LOS) 33 days and duration of ventilation was 28 days were recruited. Pre-measured energy expenditure (MEE) was 2164 ±549 kcal·d⁻¹, post-MEE 1883 ±583 kcal·d⁻¹ and actual caloric intake was 1243 ±447 kcal·d⁻¹. There significant difference between mean pre- and post-MEE (p=0.039). Actual caloric intake (KCAL) was also significantly different with pre-MEE (p=0.000) and post-MEE (p=0.002). The results provide insight regarding the metabolic requirements of septic shock patients during and liberation from mechanical ventilation. The significant decrease in MEE before and after liberation from mechanical ventilation might be due to the higher work and stress imposed by the ventilator. This greater metabolic requirement associated with assisted breathing is not typically met by existing nutritional support regimens. Further study on whether close metabolic monitoring and appropriate nutritional support to avoid over/under feeding may have benefit on this patients group is warranted.