Nutrition Support of a Traumatic Brain Injury Patient with Atlanto-Occipital Dislocation Complicated by Mental Illness

Kelly Peterson, Coordinated Program in Dietetics, Nutritional Sciences

Introduction

Determination of energy requirements in the traumatic brain injury (TBI) patient can be challenging. Although energy needs are typically increased in these patients, other factors such as sedation, mechanical ventilation, spinal cord injury, and obesity may complicate the use of predictive equations.

Calculating Energy Requirements

**AND Guidelines for use of Predictive Equations**: 2
- Critically Ill, mechanically ventilated patients
  - Non-obese – Penn State [2003b] Equation
  - Obese, < 60 yrs – Penn State [2003b] Equation
  - Obese, ≥ 60 yrs – Penn State [2010] Equation

**Traumatic Brain Injury**: 2
- Increased calorie needs
- Basal Energy Expenditure (BEE) x 1.4-1.7
- Sedation decreases energy needs: BEE x 1.2-1.4

**Spinal Cord Injury**: 2
- Decreased calorie needs
- BEE x 1.1 – 1.2

**Obesity**: 2
- Typically requires use of an adjusted body weight
- Practices vary by institution

Case Description

**22 year old male**

Unwitnessed pedestrian vs. motor vehicle

- Height: 178 cm
- Admit Weight: 109 kg
- BMI: 34.4
- Ideal Body Weight: 70 kg
- Adjusted Body Weight: 90 kg
- PMH: Bipolar schizophrenia (dx 2005)

**Injuries**: R ear amputation, R scalp degloving, L rib fx, Possible AOD, L subarachnoid hemorrhage

**Medical Course**: 2
- Day 0: Halo with manual reduction
- Day 1: Surgery: occipital to C2 PSIF
- Day 4: Residuals noted, Reglan and psych meds started
- Day 5: Extubated, psyhc meds stopped
- Day 7: Transfer to psych floor
- Day 12: Continued psych issues
- Day 20: Discharged

**Nutritional Course**: 2
- Needs assessed using HBEx1.2-1.4 and ABW
- Energy: 2450-2860kcal, Protein: 135-180g
- TF: Osmolite1.5 @ 75 ml/hr = 2700 kcal, 113 g protein
- Adjust TF to 60 ml/hr for Propofol ≥ 20 ml/hr
- Metabolic card ordered
- Metabolic cart: AMEE 2339 kcal

**Discussion**: 2

Assessing energy requirements in an obese, critically ill patient can be challenging. When possible, indirect calorimetry should be used to determine energy needs, otherwise predictive equations can be used. However, these equations can sometimes be misleading and the clinician must use his or her best judgment. In this case, indirect calorimetry confirmed that this patient's needs were overestimated using predictive equations, likely due to the patient's obesity status. Furthermore, spinal cord injuries and sedation can further reduce energy needs. Although traumatic brain injury is usually associated with the hyper-metabolic state, energy and protein needs should be determined in the context of the complete patient picture.

Special thanks to Natalia Bailey, MS, RD for the great learning opportunity with the Neuroscience ICU team at Harborview Medical Center.