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**Introduction:**
The critically ill polytrauma patient with sepsis presents with variable energetic necessities characterized by a pro-inflammatory, pro-oxidative and hypermetabolic status. One of the challenges the ICU doctor faces is adapting the nutritional therapy based on the individual needs of each patient. Through this paper we wish to highlight the trend of energy needs in the case of critically ill polytrauma patients with sepsis by using non-invasive monitoring of respiratory gases based on indirect calorimetry (GE Healthcare, Helsinki, Finland).

**Methods:**
This is a prospective observational study carried out in the Anesthesia and Intensive Care Unit “Casa Austria”, Emergency County Hospital “Pius Brinzeu”, Timisoara, Romania. We monitored VO2, VCO2, energy demand (ED), and specific clinical and paraclinical data. We measured energy demand values monitored by direct calorimetry with values calculated based on standard formulas.

**Results:**
21 values have been recorded in the study. The mean VO2 was $3.3 \pm 0.4$ ml/min/kg, the mean VCO2 was $2.3 \pm 0.3$ ml/min/kg. In regard with energy demand, the mean ED obtained through direct calorimetry was $2393.2 \pm 912.9$ kcal/day, and those obtained by using mathematic formulas were $1988.6 \pm 1100$ kcal/day ($p < 0.05$). Moreover, statistically significant differences have been observed regarding the mean difference between energy demand determined using indirect calorimetry and that determined mathematically, respectively between the enteral and parenteral administered ED.

**Conclusion:**
Continuous monitoring of the energy demand in critically ill patients with sepsis can bring important benefits in regard with the clinical prognosis of these patients through the individualization and adaption of intensive therapy for each patient.