

Energy Expenditure Of Intensive Care Patients With Covid-19 – The Difference Between Indirect Calorimetry And Rapid Estimating Prediction Formula

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Rationale: Nutrition therapy guidelines recommend [indirect calorimetry](#) (IC) as the gold standard to measure patients' energy expenditure (EE), because the estimated EE is often inaccurate in critically ill patients, even more so with COVID-19. We aimed to compare the difference between measured and estimated EE in [intensive care unit](#) (ICU) patients with COVID-19 and to determine the [predictive factors](#) of the difference.

Methods: All [ICU](#) patients with COVID-19 who had an [IC](#) measurement during their stay were included. We estimated EE at ICU admission using the prediction formula of 25 kcal/kg body weight (BW). The [ideal BW](#) (body mass index (BMI) = 22.5 kg/m²) was used if the BMI was > 25 kg/m². After stabilization of the patient, IC measurement was performed in the post-acute phase, from day 7 of admission if possible. The measured and estimated EE were compared by a paired t-test. A multivariate [linear regression](#) model tested whether the difference between measured and estimated EE was influenced by body temperature (°C), obesity status, age in decades and sex.

Results: EE was measured with IC in 46 patients. The mean age was 67 (± SD 10) years, 82% were male, and 40% were obese. The mean temperature (°C) during measurement was 37 (± SD 0.7) °C. The mean measured EE was significantly different from mean estimated EE (1893 ± 383 kcal vs. 1687 ± 213 kcal; p < 0.001). The multivariate [linear regression](#) model (Table 1) shows that obesity increases the difference between measured and estimated EE further by 215.2 kcal (p-value = 0.032). For each additional degree Celsius, this difference also increases by 187.6 kcal (p-value = 0.007). Age and sex had no significant influence on the difference between estimated and measured EE in the model.

Table 1:

Difference between measured and estimated EE	Coefficient (95% confidence interval)	p-value
Temperature (°C)	187.6 (54.2 ; 321.0)	0.007
Obesity (BMI>30 kg/m ²)	215.2 (19.0 ; 411.4)	0.032
Age (in decades)	-25.4 (-120.2 ; 69.3)	0.591
Sex (women)	96.9 (-153.4 ; 347.3)	0.439

Conclusion: Energy expenditure measured with indirect calorimetry in COVID-19 ICU patients is significantly higher than that estimated by the prediction formula. Temperature elevation and obesity increase the differences between measured and estimated EE. These results confirm the recommendation that nutritional therapy in the intensive care should be guided by indirect calorimetry, especially in obese patients.

Disclosure of Interest: None declared