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Nutrition Support in Patients With Acute Respiratory Distress Syndrome COVID-19

The mortality of critically ill patients with severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) pneumonia is considerable, with 5%–10% of infected patients requiring admission to the intensive care unit (ICU) and ≥2 weeks of stay after admission.[1] In the absence of specific treatments for the acute respiratory distress syndrome (ARDS) coronavirus disease 2019 (COVID-19), general intensive care support comprehensive of nutrition support should be used. Guidelines provide recommendations on the type of enteral formula to be prescribed.[2,3,4] Regarding the protein requirements, the recommendations are similar.[2–5] We conducted a retrospective study, which was accomplished in the ICU of a university-affiliated hospital dedicated to the care of patients with a confirmed diagnosis of COVID-19. The study was approved by the institutional review board (Comitato Etico Interaziendale Milano Area 1, 2020/ST/178). We collected data in 60 consecutive patients between February and April 2020 at ICU admission (T0) and after 3 (T3) and 7 (T7) days. The caloric and protein intake were provided according to the European recommendations.[6] According to the ICU nutrition protocol, enteral nutrition was started at an initial rate of 10 mL/h and increased by 20 mL/h every 12 hours in the absence of significant gastric residuals (<250 mL). If caloric goals were not reached through enteral feeding because of gut intolerance (especially during prone position), parenteral nutrition was administered between the third and seventh days. A standard formula was used for nitrogen balance calculation.[7] Protein supplementation was achieved by intravenous administration. Nutrition support was started through a nasogastric tube in 57% of patients at ICU admission, whereas 39% received parenteral nutrition and 4% a mixed administration. These routes were changed over the first week, with a slight reduction in parenteral nutrition and an increase in enteral nutrition. The daily carbohydrate calories intake (kilocalories per kilogram per day) was significantly increased over the first week of ICU stay (T0: 13 [6 to 21], T3: 22 [18 to 25], and T7: 24 [22 to 27]; $P < .001$), as was protein intake (kcal/kg/d) (T0: 0.2 [0.1 to 0.8], T3: 1.0 [0.7 to 1.2], and T7: 1.3 [1.0 to 1.6]; $P < .001$). Conversely, fat calories intake (kcal/kg/d) was significantly reduced (T0: 3.5 [0.9 to 8.0], T3: 0.1 [0.0 to 0.3], and T7: 0.1 [0.0 to 0.3]; $P < .001$). Nitrogen balance did not change over the first week of critical illness (T0: −9.5 [−12.1 to −6.0], T3: −7.1 [−11.1 to −4.4], and T7: −8.7 [−12.2 to −3.6]; $P = .786$) (Figure 1). Our results showed that even achieving the supposed nutrition targets, the nitrogen balance remained negative. These data suggest how the application of clinical nutrition guidelines available at the time of the first epidemic outbreak were not likely to fit the needs of patients with ARDS COVID-19. A destructive proinflammatory immune response leading to an increase in glucocorticoid and catecholamine production, an increased insulin sensitivity, a poor glycemic control, and protein catabolism are probably the main factors associated with hypermetabolism. The negative nitrogen balance still remains a challenge in these patients, as we could not avoid protein deficiency during the first week of ICU stay despite a delivered energy close to the target. Considering an increased inflammatory response on hospital admission, the nutrition protocol probably needs adjustments to target inflammation. Whether the nutrition and metabolic needs of ventilated patients with ARDS COVID-19 are similar to those of patients with ARDS remains to be proven.

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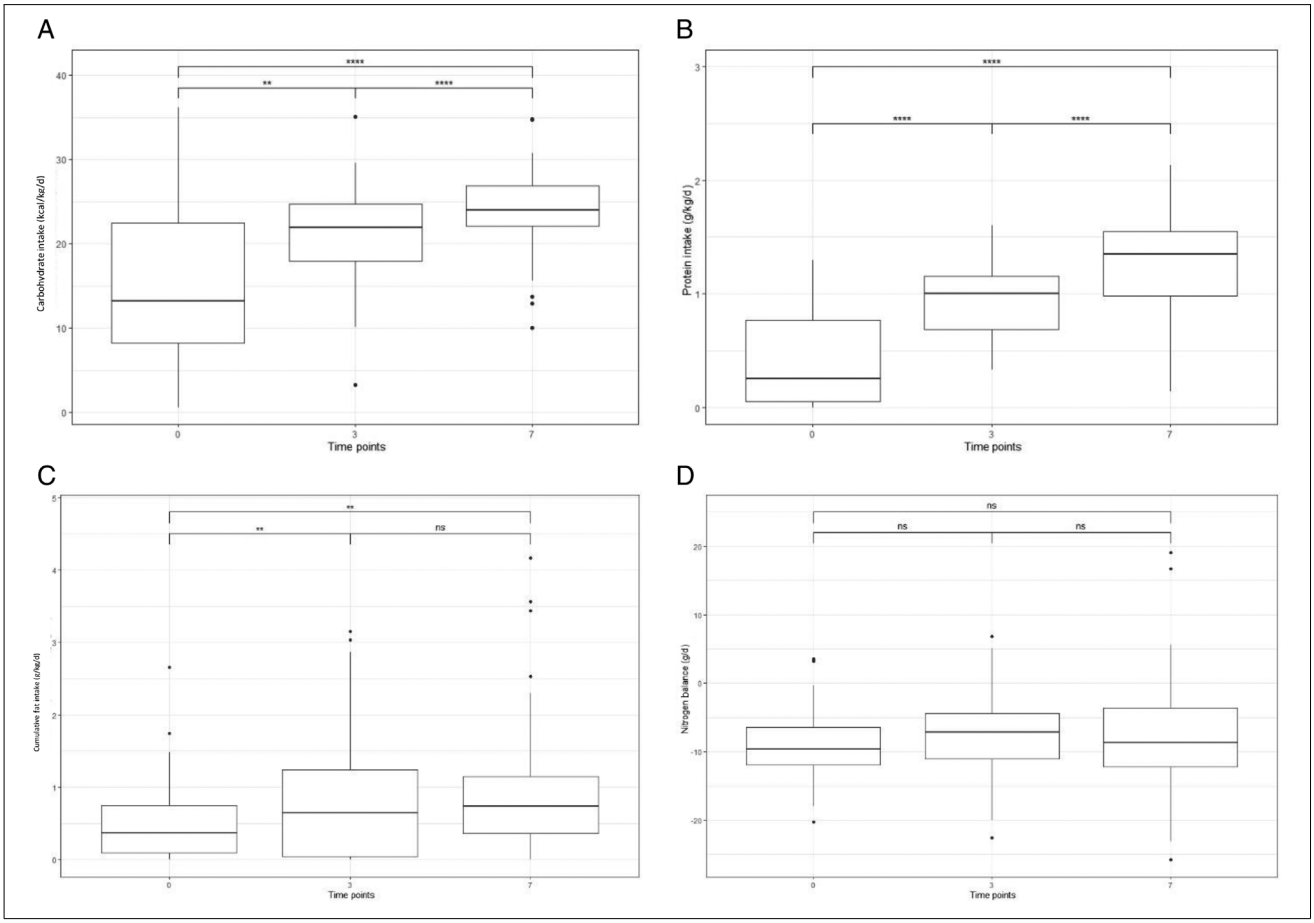

FIGURE 1. The figure depicts the nutrition variables intake provided at 3 different time points (T0 at admission in the intensive care unit; T3 after 3 days; T7 after 7 days). The comparison was performed by Friedman test for nonnormally distributed data; a *P*-value of <.05 was considered significant. (A) Carbohydrate caloric intake provided over the time. (B) Protein intake provided over the time. (C) Fat intake provided over the time. (D) Nitrogen balance calculated over the time.

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