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EDITORIAL

Andres Esteban
Fernando Frutos-Vivar
Antonio Anzueto

Impact of body weight on critically ill patients: a heavy load!!

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A. Esteban (✉) · F. Frutos-Vivar
CIBER de Enfermedades Respiratorias, Instituto de Salud Carlos III, Servicio de Cuidados Intensivos, Hospital Universitario de Getafe, Carretera de Toledo km 12,500,
28905 Getafe, Madrid, Spain
e-mail: aesteban@ucigetafe.com

A. Anzueto
Audie L. Murphy Memorial VA Hospital, University of Texas Health Science Center and South Texas Veterans Health Care System, San Antonio, TX, USA

It is ironic that today while obesity is a growing global problem, half of the world is dealing with starvation. In 1998, 97 million adults in the United States, 55% of the adult population was designated as being overweight or obese and these numbers continue to grow [1]. In the world, there are more than thousand million adults who are overweight, and at least 300 million can be considered to be obese. However, the global distribution is irregular, while obesity affects 5% of the populations in China, Japan and certain African countries, in urban areas of Samoa, 75% of the population is overweight [1]. In Great Britain, the prevalence of obesity in adults was at 6% in men and 8% in woman in 1980 and increased to 17% in men and 20% in woman in 1997 [2]. These worldwide changes in obesity are due to high carbohydrate foods intake and reduced physical activity.

Obesity is known to be associated with significant morbidity and mortality. Overweight patients are at higher risk for a variety of chronic medical conditions including cardiovascular disease, type II diabetes, hypertension, arthritis, chronic lung diseases, and certain types of cancer. The attribute mortality of obesity in USA adults is approximately 300,000 per year, the cost of taking care of these patients represent between 2 and 6% of the total healthcare cost [3]. The Framingham study showed that obese patients have a 3.9-fold increased mortality as compared to patients with normal weight [4].

Obese patients present unique challenges to critical care clinicians. Obese patients are more likely to have chronic diseases pulmonary conditions such as chronic obstructive pulmonary disease (COPD,) and sleep apnea [4]. In patient care, it is more difficult to insert vascular catheters in obese patients, and pharmacokinetics of medications are highly impacted. For example, lipophylic medications' half life will be prolonged due to increased volume of distributions. The implementation of mechanical ventilation in obese patients also has challenges; these patients have large neck, increased soft tissue making endotracheal intubation and airway management difficult. Passive ventilation breathing in obese patients is two to four times increased when compared with non-obese subjects. This increased work to move the thoracic wall is due to decreased compliance associated with the accumulation of fat around the intercostals muscles, diaphragm and abdominal wall [5]. In routine clinical practice, clinicians do not measure body mass index, (BMI), thus implementation of ventilator parameters, such as tidal volume, is based on actual body weight, exposing these patients to high tidal volumes that could results in ventilator-induced lung injury [6].

A major interest in the management of critically ill obese patients relates to outcome. The data is based on observational studies that have a limited number of subjects. These studies have shown that obese patients will have increased duration of mechanical ventilator support, prolonged intensive care unit (ICU) and hospital stay

[6–8]. However, there is controversia related to association of BMI and mortality. In a recent publication comparing normal weight patients (BMI 18–28), malnourish patient (BMI < 18) had increased mortality, while there was no increased mortality in obese patients (BMI > 35) [6–8]. Furthermore, weight is not an independent variable associated with increased mortality in ICU patients [7]. It is clear that we need further studies to help us to understand the impact of BMI in critical ill patients.

In this issue of the *Journal*, Sakr et al. [9] published the results of the impact of obesity on morbidity and mortality in ICU patients, which were included in the European observational sepsis occurrence in acute ill patients (SOAP) study. This is a large patient sample that was designed to evaluate the epidemiology of sepsis in selected European countries ($n = 2{,}878$). BMI was prospectively measured at admission to the study ICU; only patients with these data were included. Based on BMI distribution, 4.2% patients were malnourished, 58% had normal weight; 36% were overweight; 15% obese and 2.8% very obese. The weight distribution is similar to the data reported from general population, and more recently by the Ventila group in a cohort of mechanical ventilation patients [10]. The authors reported that obese patients (BMI > 30) developed more nosocomial infections, but there was no difference in the incidence of sepsis or patients' outcome. Very obese patients had a trend towards longer ICU and hospital length of stay. However, increased BMI was not associated with increased ICU, or hospital mortality, these data are similar to other publications [6–8, 10].

So this study further increased our understanding of the impact of body weight and outcome in critically ill patients. The data reported in this large cohort of septic patients are similar to that of the patients admitted to the ICU due to other conditions, including ARDS and those receiving mechanical ventilation. We need to point out the important limitations of this analysis. The primary end-point was not to evaluate the impact of body weight, so no data was collected to determine the impact of weight in assessing hospital and ICU admission. There could be unidentified bias that limits the ICU admission of patients who are under or overweight. Furthermore, in these sepsis patients it is very likely that the vascular volume was depleted, thus weight measured at admission may not reflect patients' real weights.

The impact of sepsis and body weight in mechanical ventilated patients can not be established. No data related to weaning and tracheostomies were collected. The lack of these data makes it difficult to understand the outcomes, such as duration of ventilator support and length of stay. The authors speculated that obesity is not associated with poor outcome, but they do not have sufficient data to support this conclusion.

We can conclude that as obesity continues to increase, critical care physicians need to be prepared to care for these patients. Available data suggest that the increased body weight does not result in increased mortality, but there is an increased use of critical care resources and cost.

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