



HAL
open science

Obesity and mortality in critically ill patients: another case of the simpson paradox?

Audrey de Jong, Boris Jung, Gerald Chanques, Samir Jaber, Nicolas Molinari

► To cite this version:

Audrey de Jong, Boris Jung, Gerald Chanques, Samir Jaber, Nicolas Molinari. Obesity and mortality in critically ill patients: another case of the simpson paradox?. *Chest*, 2012, 10.1378/chest.11-3302 . hal-02549544

HAL Id: hal-02549544

<https://hal.umontpellier.fr/hal-02549544>

Submitted on 21 Apr 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Obesity and Mortality in Critically Ill Patients

Another Case of the Simpson Paradox?

To the Editor:

We read with interest the article of Martino et al¹ in a recent issue of *CHEST* (November 2011) reporting that obese critically ill patients survive at least as often as patients who are of normal weight. However, we believe this conclusion could send a misleading message. Although mortality rate has been adjusted on the APACHE (the Acute Physiology and Chronic Health Evaluation) II score in a multivariate analysis, a strong limit of this study

is the assessment of illness severity at ICU admission in obese patients. To our knowledge, no severity score in the ICU adapted to obese patients has been validated in the literature. Indeed, BMI is not used in the severity scores designed for patients in the ICU, such as the APACHE II or III, Sequential Organ Failure Assessment, and Simplified Acute Physiology Score II.² In fact, these scores may not be adapted to patients who are obese. For instance, alveolar arterial gradient is often decreased in the basal state in obese patients, with a high prevalence of obese hypoventilation syndrome and apnea syndrome. A minor pulmonary infection could lead to a very low alveolar arterial gradient, increasing artificially the APACHE II score. In the same way, APACHE II could be increased by an overestimation of renal dysfunction due to a low urine output in some obese patients.³

As a consequence, real severity of obese patients at admission could be a confounding factor on their real outcome. An extreme example of confounding is the Simpson paradox,⁴ in which a factor reverses the effect first observed. For example, in a study⁵ comparing mortality between closed and opened ICU systems, taking into account overall patients for analysis, mortality was increased in closed ICU, but, paradoxically, mortality was decreased for intubated patients and, likewise, for nonintubated patients. If the authors had not taken into account the confounding factor "intubation status," the conclusion would have been wrong. In this study,¹ in order to better control the severity despite the lack of a severity score validated on obese patients, would it be possible to match a posteriori the cause of admission in addition to the multivariate analysis?

In summary, the conclusion reported by Martino et al¹ is another example of the Simpson paradox, whereby the confounding factor "severity of disease" would reverse the link between obesity and mortality. The development of a severity score more adapted to obese patients would be welcome before concluding that there is an equal or lower mortality of obese patients in ICU.

Audrey De Jong, MD
Boris Jung, MD, PhD
Gérald Chanques, MD, PhD
Samir Jaber, MD, PhD
Nicolas Molinari, PhD
Montpellier, France

Affiliations: From the Anesthesiology and Critical Care Department (Drs De Jong, Jung, Chanques, and Jaber), Saint Eloi Hospital, University Hospital of Montpellier-INSERM; and the Medical and Informatic Department (Dr Molinari), Lapeyronie University Hospital of Montpellier.

Financial/nonfinancial disclosures: The authors have reported to *CHEST* that no potential conflicts of interest exist with any companies/organizations whose products or services may be discussed in this article.

Correspondence to: Samir Jaber, MD, PhD, Anesthesiology and Critical Care Department, Saint Eloi Hospital, University Hospital of Montpellier-INSERM U1046, 80 Ave Augustin Fliche, 34295 Montpellier cedex 5, France; e-mail: s-jaber@chu-montpellier.fr

© 2012 American College of Chest Physicians. Reproduction of this article is prohibited without written permission from the American College of Chest Physicians. See online for more details.

DOI: 10.1378/chest.11-3302

REFERENCES

1. Martino JL, Stapleton RD, Wang M, et al. Extreme obesity and outcomes in critically ill patients. *Chest*. 2011;140(5):1198-1206.
2. Garrouste-Orgeas M, Troché G, Azoulay E, et al. Body mass index. An additional prognostic factor in ICU patients. *Intensive Care Med*. 2004;30(3):437-443.
3. Rutkowski P, Klassen A, Sebekova K, Bahner U, Heidland A. Renal disease in obesity: the need for greater attention. *J Ren Nutr*. 2006;16(3):216-223.
4. Hernán MA, Clayton D, Keiding N. The Simpson's paradox unraveled. *Int J Epidemiol*. 2011;40(3):780-785.
5. Topeli A, Laghi F, Tobin MJ. Effect of closed unit policy and appointing an intensivist in a developing country. *Crit Care Med*. 2005;33(2):299-306.