Published in final edited form as:

Crit Care Med. 2017 August ; 45(8): e872. doi:10.1097/CCM.0000000000002474.

Obesity Survival Paradox in the Critically Ill

Dominique J. Pepper, MD

Critical Care Medicine Department, National Institutes of Health Bethesda, MD, USA

March 16, 2017

The Editor-In-Chief

Timothy G. Buchman

Critical Care Medicine

Sir,

In the March 2017 issue of *Critical Care Medicine*, Harris *et al.* report their retrospective analysis of 1,042,710 adult patient stays from 409 ICUs recorded in the Philips eICU Research Institute database.¹ Using multivariable modified Poisson regression models, they found a survival advantage for overweight and obese patients.¹ The authors need to address several important issues.

First, did the authors perform any sensitivity analyses to confirm that their admission diagnoses are accurate? Based on information in the supplementary table and reference 28, the admission diagnoses are based on ICD-9 codes. These sensitivity analyses are important: The accuracy of admission diagnoses based on clinical criteria differs from that of claims (ICD-9 codes) data, with direct effects on estimation of disease incidence and mortality. In a prior study of septic shock, investigators found that accurate identification of septic shock was higher with clinical criteria for septic shock compared to claims (ICD-9 codes) data.² The accurate identification of septic shock hospitalizations had a significant impact on the subsequent estimation of disease incidence and mortality rates.²

Second, what were the admission diagnoses and co-morbid illnesses across the different BMI categories? In Tables 1 and 2, the authors report only trauma, surgery and diabetes across the different BMI categories. Although data was collected about diagnosis groups (supplementary table), it is unclear whether these diagnosis groups differed across BMI categories. Similarly, do the authors have any data on interventions performed in patients on ICU admission, such as vasopressors or renal replacement therapy and whether these interventions differed across BMI categories?

Contact information: dominiquepepper@gmail.com, Telephone: (601) 209-7474, Critical Care Medicine Department, National Institutes of Health, Bethesda, MD 20892-1662.

Copyright form disclosure: Dr. Pepper received support for article research from the National Institutes of Health, and she disclosed government work.

Third, did the authors perform a sensitivity analysis using a model without APACHE IV? APACHE IV includes variables collected within 24 hours following ICU admission. These downstream variables can reflect interventions performed during ICU resuscitation and may attenuate the true effect of BMI status on mortality.

Finally, how did the authors deal with missing data? The authors report that APACHE IV scores were available for 882,819 of 1,042,710 patients (~15% missing). Was this data missing at random or missing completely at random or missing not at random? Depending on the pattern of 'missingness,' bias can be introduced. Also, the APACHE IV score requires data input for 142 variables. Was complete data available for each of these 142 variables for each of the 882,819 patients for whom an APACHE IV score was calculated? If not, how did the authors deal with this missing data? Failure to address missing data with appropriate statistical methods can bias study results.³

Yours,

Dominique J. Pepper M.D.

National Institutes of Health, Bethesda MD

Email: dominiquepepper@gmail.com

References

1. Harris K, Zhou J, Liu X, et al. The Obesity Paradox Is Not Observed in Critically Ill Patients on Early Enteral Nutrition. *Crit Care Med*. 2017 Mar 10. Epub ahead of print.
2. Kadri SS, Rhee C, Strich JR, et al. Estimating Ten-Year Trends in Septic Shock Incidence and Mortality in United States Academic Medical Centers Using Clinical Data. *Chest*. 2017 Feb; 151(2):278–285. [PubMed: 27452768]
3. Donders AR, van der Heijden GJ, Stijnen T, Moons KG. Review: a gentle introduction to imputation of missing values. *J Clin Epidemiol*. 2006 Oct; 59(10):1087–91. [PubMed: 16980149]