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Response to: “Effect of prior weight loss on mortality in the critically ill obese?”

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We appreciate the thoughtful comments by Dr. Bistrian¹. Indeed, weight trajectory has been identified as an important predictor of mortality^{2,3}, and the biennial Health & Retirement Study (HRS) surveys allow us to calculate weight trajectories for our cohort. Of the 1,404 subjects in our study, 1,052 (74.9%) had weight assessed during each of the 2 HRS surveys preceding severe sepsis hospitalization. Of these, 401 (38.1%) had 3% weight loss between surveys, 276 (26.2%) had 3% weight gain, and 375 (35.6%) had stable weight trajectories (<3% absolute change in weight).

In its strongest form, some argue that the apparent effects of weight are really confounded by weight change – that is, that the apparent increased mortality of normal weight patients relative to obese patients is because the “normal weight” patients in fact contain many recently obese patients who have developed severe illness leading to weight loss. To test this hypothesis regarding 1-year mortality in patients hospitalized with severe sepsis, we added percentile weight change as a predictor our logistic regression, as well as an interaction term between percentile weight change and body mass index (BMI) category³.

We then calculated adjusted probabilities of 1-year mortality by BMI category from this regression; we also calculated probabilities of 1-year mortality by BMI category at given percentile changes in weight. In the Table below, we show adjusted probability of 1-year mortality by BMI category from the initial analysis of 1,404 subjects (left column)⁴, the adjusted probability of 1-year mortality by BMI category in all patients with 2 pre-sepsis

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weight recordings (middle column), and adjusted mortality for patients by BMI category at 0% change in weight between the 2 preceding surveys (right column).

Our results are consistent with our initial analysis and not statistically distinguishable from the original report. Reduced mortality with greater BMI categories persists in patients with stable weight trajectories (right column), as well as in patients with declining and rising weight trajectories, respectively (data not shown). Overall, we conclude that the association of BMI with improved mortality after severe persists after considering weight trajectory.

We do note, of course, that in this smaller population, the differences between BMI categories are no longer statistical significance. This is a result of lack of precision in the estimates resulting from the smaller sample size, not from any change in the best-estimated difference in effects between the groups in this smaller population. Even within this nationally representative, decade-long longitudinal survey, the study population is too small to precisely define the impact of weight trajectory on mortality after severe sepsis to rule in or rule out clinically meaningful effect sizes.

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Table

Adjusted probability of mortality (mean, 95% CI) at one year after severe sepsis hospitalization, by BMI category.

	Original Analysis (N=1,404)	Updated Analysis (N=1,052)	
	All weight trajectories	All weight trajectories	Stable weight trajectory
Normal	61.7% (57.6–65.7%)	59.2% (54.1–64.4%)	59.1% (53.7–64.3%)
Overweight	53.3% (48.6–58.0%)	54.9% (49.2–60.5%)	54.3% (48.5–60.1%)
Obese	50.6% (43.5–57.7%)	52.0% (42.8–61.2%)	52.7% (44.1–61.4%)
Severely Obese	45.8% (35.4–56.4%)	40.6% (28.4–52.8%)	41.3% (29.3–53.2%)

* Bolded values are significantly different than Normal BMI category, $p < 0.05$.