Reviewer’s report

**Title:** Overweight or obese BMI is associated with earlier, but not later survival after common acute illnesses

**Version:** 0  **Date:** 17 Aug 2017

**Reviewer:** Will Johnson

**Reviewer’s report:**

This is a really nice paper, which will be a great addition to the literature. In particular, the numerous sensitivity analyses are well thought-through and add robustness to the results. The discussion is also very strong.

The second paragraph of the introduction could be developed a bit better I think to provide a better explanation of the reasons for bias, confounding, reverse causation (obesity paradox) in epidemiological studies… and then explain how the present study address some of these issues. Also, this paragraph doesn't seem to make the distinction between epidemiological studies of mortality and those of mortality following hospitalisation. Is this distinction relevant?

**Abstract**

* Could use "overweight or obesity" instead of "excess body mass". What was the referent group (normal weight)? Did you exclude thinness (i.e., BMI < 18.5)?

* Could indicate how far prior rto hospitalisation BMI was measured (e.g., mean = 0.5 years, SD = X)

* Why "mortality to 5 years after hospital admission" rather than hospital discharge?

* I assume all confounders were measured at the same time as BMI?

* Would be nice to include an indication of the age range of the participants

* Is there a way to very briefly explain what "fee-for-service Medicare coverage" means for those readers not familiar with the US system?

**Introduction**

* Would be nice to include some estimates on the rates in the US of obesity, heart failure, myocardial infarction, pneumonia to set the scene.
In the first paragraph it would be good to give the reader an idea of what constitutes short vs long term survival? I.e., how long was follow up in the short-term survival studies?

I am not sure it is obvious what you mean by "conditional on surviving the shorter-term".

There doesn't appear to be any evidence/ rationale presented to support your hypothesis at the end of the first paragraph.

You mention a limitation in existing RCTs of not adjusting for confounders - but CONSORT recommends not adjusting for covariates in primary analyses of RCT data (as it biases estimates).

Methods

The study population section assumes a basic understanding of the US healthcare system (Medicare) and could perhaps be tweaked to be more accessible. It would nice to understand why you limited to 1996-2012, and a bit more about how your sample relates to the total N (37,000). I.e., how many hospitalisations for the 3 diseases did you miss and why?

In addition to the median time lag between baseline and hospitalisation could you include some measure of range (e.g., IQR).

It is hard to understand when/ how the covariates were measured. I assume most of these were from the same HRS survey as when BMI was measured?

More detail on the RAND imputation is needed.

"All other covariates in the primary analyses were missing in fewer than 2\% of each cohort." What is meant by "each cohort" here?

Clustering - you use robust standard errors for multiple hospitalisations within people. But what about family? Is there a rationale for using a multilevel approach here?

Results

"Compared to patients with normal BMI, Patients with overweight or obese BMI were younger". This surprised me at first… but then maybe by 70-80 years of age BMI is declining on average

The ordering of information in the results section was a bit hard to follow. And I wonder if more sub-headings could be used to present results unadjusted for covariates, adjusted for covariates, conditional on previous mortality, and then sensitivity analyses 1-6
Discussion

"Data on longer-term mortality is of central importance to the evaluation of clinical guidelines for weight management. For example, obesity may be protective against in-hospital mortality but, conditional on surviving the short term, still be hazardous for longer-term mortality." So what do you recommended? Surely it is better to be normal weight and reduce risk having the disease in the first place, than to be overweight/obese and having better 1-yr survival?

Are the methods appropriate and well described?
If not, please specify what is required in your comments to the authors.

Yes

Does the work include the necessary controls?
If not, please specify which controls are required in your comments to the authors.

Yes

Are the conclusions drawn adequately supported by the data shown?
If not, please explain in your comments to the authors.

Yes

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