Author's response to reviews

**Title:** Hospitalization rates and cost in severe or complicated obesity: An Italian cohort study.

**Authors:**

- Enrica Migliore (enrica.migliore@cpo.it)
- Eva Pagano (eva.pagano@cpo.it)
- Dario Mirabelli (dario.mirabelli@cpo.it)
- Ileana Baldi (ileana.baldi@unipd.it)
- Dario Gregori (dario.gregori@unipd.it)
- Carlo Zocchetti (carlo_zocchetti@regione.lombardia.it)
- Cristina Tuzzi (c.tuzzi@auxologico.it)
- Franco Balzola (franco.balzola@libero.it)
- Maria Letizia Petroni (marialetizia.petroni@gmail.com)
- Franco Merletti (franco.merletti@unito.it)

**Version:** 3 **Date:** 29 March 2013

**Author's response to reviews:** see over
Turin, 29 March 2013

MS ID : 2122120313800571

Dear Editor,

Please find attached a revised version of the manuscript entitled “Hospitalization rates and cost in severe or complicated obesity: An Italian cohort study”.

We would like to thank the reviewers for their valuable comments and constructive criticisms. We have revised the manuscript in the light of their suggestions. A response to the reviewers’ comments with a point-by-point description of the changes made is also attached.

Thank you for your attention and your consideration.

Best regards,

Enrica Migliore, Eva Pagano and co-authors

Unit of Cancer Epidemiology
University of Turin and San Giovanni Battista Hospital
Via Santena 7, 10126, Torino, Italy
Tel +39/011/6336855 Fax +39/011/6334664
e-mail: enrica.migliore@cpo.it
**Reviewer's report**

**Title:** Hospitalization rates and cost in severe or complicated obesity: An Italian cohort study.

**Version:** 2  **Date:** 29 January 2013

**Reviewer:** Marjory Moodie

**Reviewer's report:**

MS ID: 2122120313800571

Title: Hospitalization rates and cost in severe or complicated obesity: An Italian cohort study.

Authors: Enrica Migliore, Eva Pagano, Dario Mirabelli, Ileana Baldi, Dario Gregori, Carlo Zocchetti, Cristina Tuzzi, Franco Balzola, Maria Letizia Petroni and Franco Merletti

Overall, this is an interesting article which will contribute to the literature around the hospitalisation costs and their determinants associated with severe obesity. Whilst the study has some limitations, these are acknowledged by the authors. There are a number of minor issues with the paper which should be addressed.

Overall

1. The writing tends to jump around between the use of the third and first person. We have engaged the services of a professional editing service, which has performed editing and English language revision. We hope that you will find the manuscript improved.

**Abstract**

2. Background: abstract makes no mention of country of study. Line 3 – change to ‘… in an Italian cohort’

The Abstract has been revised, and mention of the study country has been added.

3. Line 4 – in the case of patients with complications, can their BMI be in the 30-40 range?

The reviewer is correct, and we have now specified this in the Abstract.

4. Methods: no mention is made of size of cohort

The cohort size has been added.

5. How long were patients followed for?

The mean follow-up duration has been specified.


The Abstract has been extensively revised, and most all sentences reworded.

7. Results: First sentence – remove word ‘were’.

Done.

8. Results: First sentence – is this relative to the general population?

We have clarified by adding “… of the study cohort versus the general population”.

9. Results, line 3 – not clear whether these are absolute costs or incremental differences over and above the comparator.

“Absolute” has been added.

10. Conclusion, sentence 2 - reword to read – ‘Co-morbidity control among obese people …’

Done.
Background

11. Paragraph 2, 1st sentence – change risk to singular. Should specify the types of cancer and reference this sentence.
Cancer sites have been specified and three references have been added.

12. Paragraph 6 – define NHS the first time that the acronym is used
Done.

13. Paragraph 6 – Perhaps should comment on the importance of the NHS system for the reader. Do NHS hospitals account for all hospitalisations in Italy? Is there a private hospital system in Italy which is important in terms of health care delivery?
The Italian National Health Service (NHS) covers the entire population and private funding is residual, particularly for life-threatening diseases like cancer. Public and private healthcare providers that receive reimbursement from the NHS need to deliver a Hospital Discharge Record database, which includes all inpatient and day-care activity for administrative purposes.
Our research group has vast experience in the use of routinely-collected data, as proven by several publications on this topic:

14. Paragraph 7 – the wording of the study aim is clumsy, and requires reworking. It makes no mention of the comparator. The research question needs to be more clearly defined.
Study aim has been reworded in order to clarify that hospitalization rates of the study cohort are being compared to those of the general population, and that costs are absolute estimates.

Methods

15. Paragraph 2, sentence 3 – should be ‘guaranteed'
Done.

16. Under data, is absolutely no mention of comparator population.
The general population of the Piedmont and Lombardy regions was used as the reference population, but only to estimate the expected hospitalization rate in the study cohort. We added a reference to the demographic data for the Piedmont and Lombardy Regions.

17. Be careful re use of acronyms. For example, NHS been used several times previously, then in Methods, paragraph 6, it is spelt out in full. LDL, HDL – should be spelt out first time used.
We thank the reviewer for the suggestion.

18. Paragraph 6 – were hospitalisation costs based on DRG daily tariffs or whole-of-episode tariffs? Are the authors confident that tariffs in this instance represent the true costs of hospital care?
The Italian DRGs tariffs are fixed at Regional level and are calculated based on the standard cost of care in order to reimburse NHS providers. On average, DRGs tariffs in Italy are assumed to be a reasonable proxy for real costs.

19. Last paragraph – is referencing of software complete?
Details on SAS Company have been added.

Results
20. The results section needs to be more tightly written with less duplication of results which are in the tables.
   As suggested by both the reviewers, we removed the numeric results already presented in the tables from the text, and restricted our comments to major findings only.

21. Paragraph 2 – mean follow-up time was 7.3 years. Were the general population hospitalisation rates and costs calculated as averages over the same time period?
   Hospitalization rates for the general population were calculated each year (from 1996 to 2002) and than applied to the study cohort (by gender and age) to calculate the expected hospitalizations.
   Costs were calculated for the study cohort only, during the follow-up of each subject (on average 7.3 years). Costs were not analyzed relative to the general population.

22. Paragraph 3 – Sentence reads ‘In women, the highest SHR was in an older age group (50-59 age group) and was less pronounced.’ Less pronounced than what?
   We have added “…than among men”.

23. Define IQR first time used.
   We left it extended as it is used only once.

24. Last paragraph – WC was positively associated with an 8% increase for every 10cm. This statement requires clarification. Do the authors mean ‘for every 10cm’ above the median?
   Among females, hospitalization costs increased 8% per 10 cm increase in WC.
   We have modified the sentence accordingly.

Discussion
25. How would the comparison of rates and costs to the general population been different if the comparison had been of high BMI patients to a general hospital?
   The use of general population as a reference population provided a measure that was independent from the level of morbidity that might be found in a specific sub-population, such as a hospital-based one. The use of hospital-based population as reference population would have biased the SHR estimates towards the null. Costs were not analyzed relative to the general population.

26. Late in the discussion (page 12) – refers to WC being a significant predictor of costs – here says a 7% increase for every increase of 10cm, whereas previously in methods was 8%.
   8% is the right value. We have corrected accordingly.

27. Second last paragraph – lack of representativeness of sample to the overall obese population – this needs to be expanded, and given this point, what is the value of the results of the study?
   The Piancavallo Hospital offers a residential nutritional rehabilitation program, but not active treatment of obesity (such as bariatric surgery) or complications. Therefore, we believe that the impact on subsequent hospitalization patterns due to complications is likely to be limited.
   Nevertheless, we prefer to acknowledge this aspect, as it characterizes the cohort selection. We have added a comment to the effect in the discussion.
Conclusion
28. Not sure that the conclusion re cost-effectiveness of secondary prevention naturally follows from the results. The authors were comparing very dissimilar target populations.

Reference to cost-effectiveness has been removed to avoid the idea of a comparison of strategies, which was not part of our study aim. We have substituted the concept of cost containment.

References
29. A recent paper which the authors should consider including:

Done.

Tables
30. All acronyms used in tables should be defined in table notes.

Done.

31. Table 2 – LH column – BMI30-39.9 – probably should say ….. (plus complications)

Done.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:
I declare that I have no competing interests.
Reviewer's report
Title: Hospitalization rates and cost in severe or complicated obesity: An Italian cohort study.
Version: 2 Date: 28 November 2012
Reviewer: Catherine Keating

Reviewer's report:

Major Compulsory Revisions
1. Overall, this is an interesting paper, although perhaps the authors are trying to cover too much in a single paper. The results section is very dense. At a minimum, I recommend that the authors shorten the results section and illuminate key results only. It is not necessary to repeat results which can be interpreted from the tables provided.

As suggested by both the reviewers, we have removed the numeric results from the text that are already presented in the tables. We restricted our comments to major findings only.

2. The methods describe that “The cohort included patients admitted to the Medical Ward or the Obesity Rehabilitation Unit of the Italian Auxologic Institute in Piancavallo (IAI), a centre specialized in the treatment of obesity and its complications”. Can the author clarify what treatment was provided in this ward? ie treatment of obesity related complications only, or, treatment of obesity via methods including bariatric surgery? The therapies provided in the index admission will have a large effect on the profile of the cohort.

The Piancavallo Hospital offers a residential nutritional rehabilitation program, but not active treatment of obesity (such as bariatric surgery) or complications. Therefore, we believe that the impact on subsequent hospitalization patterns due to complications is likely to be limited.
Nevertheless, we prefer to acknowledge this aspect, as it characterizes the cohort selection. We have added a comment to the effect in the discussion.

3. There is currently no description of how the general population comparator group was identified within the methods section. Nor is there a description of the profile of this group within the tables. Addition of this information is essential for interpreting results (eg what was mean BMI?).

The general population of two regions of North-West Italy (Piedmont and Lombardy) served as the reference population when calculating SHRs. We have erroneously not provided a description of this reference overall population. We thank the reviewer for observing this inaccuracy. We have added information on data sources, dimension, and BMI.

4. The discussion describes that “the severity of obesity, as described by BMI, did not affect the hospitalization costs”. However the cohort includes subjects who are either BMI #40 kg/m2 or a BMI #30 kg/m2 with obesity complications. Therefore, comparing these groups by BMI does not seem valid because we would expect difference in morbidity.

As the model used to analyse the determinants of annual costs is multivariate, including all the most relevant comorbidities, the effect of an increase in one unit of BMI is estimated independently from the presence of comorbidities.

5. Abstract should ideally describe results for both severely obese and comparator general population (currently only describes cost results for obese). This issue is also observed throughout the paper.

In line with the previous point 3, details on the general population have been added in the abstract too. Costs were calculated for the cohort only, and were not analyzed relatively to the general population.

6. The paper reports “the absolute number of hospitalizations due to obesity”. Are there potential
confounders in this analysis? I.e. differences that exist between the severely obese and general population other than weight (e.g., socioeconomic status)? This potential limitation requires discussion / acknowledgement.

Information on socio-economic status is not available in the Hospital Discharge Records database, therefore we did not have this information for the general population, and could not to adjust the analysis for this variable. As suggested by the reviewer we have acknowledged this limitation in the Discussion.

Minor Essential Revisions
8. Abstract – “all-causes hospitalizations” should read “all-causes hospitalizations”
We kindly request the reviewer to clarify the comment.

9. Background – “twofold” should read “two-fold”
Done.

Methods/data – “guarantee” should read “guaranteed”
Done.

10. Discussion - “As consequence” should read “Consequently”
Done.

Discretionary Revisions
11. The statistical analysis section describes that standardized hospitalization rates (SHR) were not calculated for diabetes or rehabilitation procedures because these conditions are specific to, or very closely associated with obesity. It is recommended that the authors consider including SHR for diabetes as it will be interesting to explore what proportion of hospitalisation for diabetes are attributable to obesity. Furthermore, the argument that rehabilitation procedures are closely related to obesity requires justification / elaboration.

SHRs for diabetes were 7.98 and 6.69, respectively for men and women, 343.00 and 121.20 for obesity and 127.5 and 59.02 for rehabilitation. We still prefer not to add these results in the tables for several reasons. First, as we declared in the Methods, a strong association is expected, as these diagnoses are very common in severe obesity. Second, diabetes is considered by the NHS as an inappropriate cause of admission. Conversely, severe obesity can justify diabetes as first diagnosis. As a consequence, the SHRs for diabetes in the study cohort versus the general population could be over-estimated due to a differential attitude of the personnel completing the discharge records. Third, admissions due to rehabilitation procedures are likely to be partially inducted by the first admission at Piancavallo (a rehabilitation centre). This comment has been added in the Discussion.

12. It appears that cost data is analysed in raw form years 1996 to 2001. It is recommended that the authors inflate cost data to a common reference year using health sector inflators as is common practice. Within results section, consider removing decimal points from large values (e.g., 35,393.2) and ensure consistent formatting (comma or space to separate 1,000s).

For each year, costs were actualized to 2007 values using the general Consumer Price Index. We have added a statement in the Methods.
Decimal places have been removed and consistent formatting has been provided.

13. The comparator population was a general population which includes persons spanning the entire body mass index range. It would be useful to describe the implications on results due to selection of a general population rather than healthy weight comparator.

The use of healthy weight comparator would bias the estimates towards higher SHRs. Our opinion is that healthcare decision-makers and medical doctors need to assess the burden of disease due to
severe obesity in relation to the average healthcare consumption of the population.

**Level of interest:** An article whose findings are important to those with closely related research interests

**Quality of written English:** Needs some language corrections before being published

**Statistical review:** Yes, but I do not feel adequately qualified to assess the statistics.

**Declaration of competing interests:**
Catherine Keating received an unrestricted research grant for research relating to the "cost and utility associated with severe obesity".

*We would like to thank both reviewers for their helpful comments that have improved the manuscript substantially.*