Reviewer's report

Title: Factors affecting hospital resource utilization associated with road traffic-related injuries in Iran

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Reviewer: Ricardo Pérez-Núñez

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Major Compulsory Revisions:
1. The paper addresses the hospital resource utilization associated with RTI in Iran. The problem is that the dependent variables and the approach employed do not allow us to achieve the objective of assessing “hospital resource utilization associated with RTIs...”. Length of stay per se does not account for resource utilization since great differences could be observed inside a hospital -between different services- and amongst different hospitals. The other variable employed (total hospital charges) as studied, does not measure hospital resource utilization but expenditures made by individuals/households/insurance companies (all but the hospital per se).

2. In this sense, as recognized by authors in the last paragraph of page 11 and first paragraph of page 12, the study does not estimate costs but individual (or household) expenditures. The use of the word “cost” however is used as synonym of out of pocket expenditures (direct cost from the household’s/insurance companies’ perspective) and thus should be corrected. Hospital resource burden is not the same as out of pocket expenditures: the first takes the hospital perspective whereas the second the household/individual/insurance companies’ perspective.

3. Since authors are using direct costs (expenditures) from the individual/household/insurance perspective, title would be imprecise, since this will not represent hospital resource utilization (which refers more to the resources employed by the hospital to attend injured patients). This is especially true if we consider that many patients were exempt from their payments... in this case, could we really say hospital resources were not used?

4. The construction of the expenditure variable is not absolutely clear for me. It seems that patients were surveyed after the first 24hours of their admission to the hospital. Hospital charges are commonly estimated immediately before discharging patients. Would it be possible to have surveyed injured patients before they were actually charged/billed by the hospital? How would the field work team managed this situation? In addition, in the discussion section (last paragraph of page 11), authors say that “total hospital charges are billed charges and do not reflect actual payments nor true hospital costs”. I do not understand the difference between billed and actual payments. Since authors state that they obtained expenditure information from a patient’s survey, I assumed actual payments were analyzed. This should be further clarified.
5. In the case of insured people it is not clear for me whether expenditures refers to what the insurance companies directly spent or what individuals/households paid from premiums, co-payments, etc. or both. This is something important to clarify. If it refers to individuals/households payments and if authors have information on individual/household’s income, the estimation of catastrophic expenditures would be desirable… By using this measure, authors could analyze whether payment exceptions are based on equity criteria or not. Since lower level of education is associated to higher expenses, it seems that no equity criterion was used.

6. Another problem is that we do not have any information about the criteria used to subsidize or waive hospital charges. Only in table 2 authors say that because of their short LOS or poverty status, however it is not clear whether this is the authors assumption or if is a clear normal criteria employed by all hospitals. We also do not have information on what exactly do the hospital charges include and what does not.

7. It would be great if authors specify the non-participation rate.

8. From the text it was not clear for me whether all patients attending hospital based ER services and discharged <24 hours were included in the study or not. Please clarify and explain the reasons of not including them (in case this is true).

9. International readers could be interested in the differences in terms of coverage / quality / any other? of public insurance systems in Iran in order to better understand the results. For example, it is not obvious the difference (if any) of the Social Security Organization and the Medical Service Insurance Organization since they seem to cover similar type of populations.

10. Authors say at the end of the discussion section: “Finally we had no possibility to adjust total hospital charges based on the consumer price index for healthcare due to substantial (monthly and annually) fluctuations in the index in Iran.” I personally do not understand why, if such important fluctuations of the CPI exist, authors do not adjusted figures using the CPI (that would be exactly the reason to adjust figures). One IRR from 2000 does not value the same as one IRR from 2004. Since patients from all this period are analyzed, not considering the inflation could potentially bias their findings of the regression analysis performed and thus expenditures should be comparable from one year to another.

11. Since dependent variables were analyzed in categories, authors should clarify what categories of expenditures and LOS were used in the regression analysis.

12. Page 7 second paragraph of “Total hospital charges and LOS” reads: “Patients with insurance stayed longer and were charged more per hospitalization compared to patients without any type of insurance.” Authors should discussed potential reasons of this (is demand induced?, or do insured people received better services or of higher quality?).

13. Patients who used seat-belt had higher hospital charges compared to patients who did not use seat-belt. This conclusion could be misleading. Since
use of seat-belt is widely reported to be associated with socio-economic status, higher income could be the reason of the higher hospital charges and not the use of this dispositive per se.

14. In the footnotes of tables 3 and 4 authors say that they did not included the “others” category group in occupation and road user type due to the heterogeneity of these groups. I do not think excluding these individuals from the full model analysis is the best way to approach this situation (analyze data). Authors could leave pedestrians as the comparison category (as they did with the final model) and include “others” as another category.

Minor Essential Revisions:

1. More details on how authors evaluated the goodness of fit of final models should be provided in the data analysis section.

2. I recommend not using the plus/minus sign when referring to standard deviation. Instead, I suggest the use of “SD=X”.

3. I recommend the use of collision instead of the word “accident” (page 8, first paragraph of “Use of safety equipment (seat-belt/helmet).”

4. The examples for the “other” categories of occupation provided in parenthesis seem not to be mutually exclusive. For example, children vs students, housewives vs unemployed. I think this could be rephrased in a way that it is clearer for potential readers.

5. Add a comma after “unemployed persons” and a point after “etc” (first paragraph of results, page 6).

6. In text authors say that 29% of patients had elementary and intermediate education, but in Table 1 this percentage corresponds to 49.6%.

7. In the fourth line of second paragraph of page 9, there is an extra point that should be eliminated.

8. Abbreviation “HI” of first paragraph of page 10 should be defined in the text and included in the list of Abbreviations.

9. A point is missing at the end of first paragraph in page 11.

10. In the footnote of table 2, the second sentence has an extra “were” that could be eliminated.

11. I suggest eliminating the following sentence (page 9, in the last but one paragraph): “Men had longer LOS and higher hospitalization charges, but after adjusting for other variables, men had lower hospital charges than women”. This clarification seems to be not relevant. The following sentence: “this might be explained by a larger number of women in the lower socio-economic groups” actually contradicts the last part of the previous sentence. Authors need to clarify this.

12. Why would authors expect higher ISS in the blue-collar and farmer groups? This finding should be discussed deeper.

13. Given that different hospitals were included in the sample, authors should
acknowledge that one day of hospitalization might not necessarily be the same for two different hospitals (depending on the level of each hospital).

Discretionary Revisions:
1. Since authors report a skewed distribution of total hospital charges and LOS (page 6, first paragraph), another approach authors could have used is to analyze the probability of having any expenditure at all first and then using this probability to explain the total expenditure. This could be due in two steps or simultaneously (such as using a Heckman’s approach). This could also provide information on the variables associated to having any payment.
2. Although short-term and long-term disabilities were captured in the questionnaire, only death was analyzed as health outcome in the paper. Information on disabilities should be presented, for example, when comparing the protective effect of safety equipment (seat-belt/helmet). This will add value to the analysis.
3. I think authors have different alternatives of improving the paper. One of them is to estimate the direct costs of RTI from the health system perspective… and even an analysis of indirect cost due to length of hospital stay would provide relevant information. Additionally, variables associated to total economic cost could be then explored. This information could be of better use in terms of policy and decision making. Another option could be to estimate out of pocket expenditures associated to RTI’s medical attention and the prevalence of catastrophic expenditures. This could represent a nice baseline to evaluate the impact of the new law implemented in terms of protecting households from impoverishment due to RTI.

**Level of interest:** An article of importance in its field

**Quality of written English:** Acceptable

**Statistical review:** Yes, and I have assessed the statistics in my report.

**Declaration of competing interests:**
I declare that I have no competing interests.