Author's response to reviews

Title: Avoidable hospitalizations in Switzerland; A small area analysis on regional variation, density of physicians, hospital supply and rurality

Authors:

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Author's response to reviews: see over
Reviewer K. Matter-Walstra

Reviewer’s report:

General comment
Reviewer: This is an interesting study on avoidable hospitalizations in Switzerland. In general a clear link to international comparison is missing.

Authors: All discussed changes in the manuscript are highlighted in yellow.

Authors: We extended the first paragraph (page 10) of the discussion with comparative data from the OECD. Data of other major diseases suitable for international comparison are currently lacking in the international literature, mainly due to inconsistent classification criteria.

1. Is the question posed by the authors well defined?
Reviewer: Yes

2. Are the methods appropriate and well described?
Reviewer: The methods have some limitations, which however cannot be overcome because of lack of data

3. Are the data sound?
Reviewer: Yes

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
Reviewer: No information on patient selection procedure (including numbers) is given. It is also unclear whether the date are patient or case (one patient might have several hospitalization episodes within the given period) based.

Authors: We added several sentences to paragraphs “Design of the study” and “Data” (page 4 and 5) that improve the description of the patient section procedure. It explains that we use cases instead of patients and provides the rehospitalisation rates. Additional information is provided in the appendix on the exact eligibility criteria on the basis of ICD10 codes for all included diseases.

5. Are the discussion and conclusions well balanced and adequately supported by the data?
Reviewer: Yes

6. Are limitations of the work clearly stated?
Reviewer: Can be improved (see below)

Authors: Limitations section (page 14) are revised

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished?
Reviewer: Some is missing (see below)
Authors: we included more references (page 3 and 10).

8. Do the title and abstract accurately convey what has been found?
Reviewer: Title does not convey what has been found
Authors: We changed the title.

9. Is the writing acceptable?
Reviewer: Yes

Major Compulsory Revisions

In Design of the Study
Reviewer: Page 4: These indicators, including hospitalizations with a principal diagnoses of asthma, chronic obstructive pulmonary disease (COPD), diabetes complications, congestive heart failure (CHF), and hypertension[10], are used to define AH for this Study.

1. Please provide a better explanation why these indicators define AH.
   - Are all hospitalizations (based on ICD10 and DRGs information) for such indications looked upon as AH?
Authors: Yes, AH included all hospitalizations that fulfilled the specific ICD10 codes and also selection criteria (e.g. aged 15 and up (15+) and patients not transferred from other hospitals) listed in the table provided in the appendix.

   - If a so called AH leads to an in-hospital death, is it still to be called an AH?
Authors: In hospital mortality is considered as a quality indicator of hospital care. In hospital deaths are therefore (at least theoretically) not related to unnecessary hospital admissions. But we nevertheless agree with the reviewer that hospital admission leading to death may not be classified as avoidable. For reasons of consistency with the OECD definitions we did not exclude these cases.

   - Can database information on hospitalization really discriminate between AH and necessary hospitalizations?
Authors: Database information is not helpful to directly discriminate between AH and necessary hospitalizations. The concept of avoidable hospitalizations is based on specific diagnoses that should theoretically not be treated in hospitals. However, in the medical care practice, patients with these specific diagnoses sometimes need to be hospitalized. AH measured in this way are used as health service indicators of the quality and access of health care systems. Database information allows therefore only indirect identification of avoidable hospitalizations. We incorporated more information on these subjects on page 4 and the limitations section (page 14).

In Results
2. Please provide a patients selection flow chart with numbers for in- and exclusion of patients

Authors: We included total number of hospitalizations and hospitalizations after applying the OECD selection criteria in the result section (page 10). A flow chart might not be helpful in the setting of this study as the process of patient selection was performed in one single step.

In Discussion
3. Page 10: Our study highlights up to 12-fold regional differences of AH over a period of three years that are unlikely to be explained by regional variation in the incidence of the underlying disease categories.

   o Can the statement that “are unlikely to be explained by regional variation in the incidence of the underlying disease categories” be documented by the literature? Especially in Switzerland with very different geographic areas one might expect differences in disease incidences like higher incidences for asthma in dense populated industrial areas and low incidences in mountain areas?

Authors: The literature provides only indirect support for this statement (see various atlas projects ongoing in multiple countries). We added the respective references and reformulated the first paragraph of the discussion (page 10). Based on long term research mainly performed by the Dartmouth Atlas group, two digit variations in health care utilization are always related to characteristics of the health systems rather to the health status of patient populations. However, the definition of “the right rate” is almost impossible as valid regional estimates of effective medical needs e.g. for asthma are unfortunately lacking in almost all countries.

Minor Essential Revisions
4. Page 3: AH are indicators of access and quality of ambulatory care and have been used to monitor health system performance in several countries, including the United States, Canada, Brazil, several European countries, New Zealand and Australia.

   o Please provide references for this statement

Authors: We added references documenting the use of AH as a quality indicator in various countries (page 3).

5. Page 12: Our findings suggest that primary care physicians and specialists have different priorities when they refer patients to hospitals.

   o As over 70% of the admissions are emergency admission, how many of these are admissions without the reference of the primary care or specialist physicians? Is there information on this? Please discuss.

Authors: Our data provide no information on type of physicians referring patients to a hospital. Unfortunately, no further analysis is possible in this context. A sentence documenting this problem was added to the second paragraph of the discussion (page 11).

6. Page 14: The concept of AH does not take into account the potential benefits for patients of a theoretically avoidable hospital stay. But as long as valid data
regarding the outcome of hospitalizations on patient health remain unavailable, AH is currently the best approach for estimating the appropriateness of care. If AH is only defined by a diagnostic (ICD10 /DRG) code, without knowledge on the underlying reason for hospitalization and provided treatment (which might only be given in a hospital), the suitability of estimating appropriateness of care might/should be highly questioned?

Authors: We agree with the reviewer about the problem of limited validity of AH as indicator of quality and appropriateness of care and we acknowledged this in the limitations of our study. AH based on main diagnoses has its limitations, however these limitations do not outweigh the practical advantages of using avoidable hospitalizations for health service planning. Therefore, the OECD and many countries included this measure based on main diagnoses into their respective frameworks of measuring health systems performance.

Reviewer R. Forero

Major Compulsory Revisions

1. Is the question posed by the authors well defined?

Reviewer: The major issue I have with this manuscript is the conditional definition of avoidable hospitalizations (AH): “AH are those that could have been prevented by better ambulatory care”. In that context, the question should be what is the proportion of conditions that received good ambulatory care which ones were admitted to hospital?

As indicated by Caminal et al, proper ambulatory care should address one or more of the following conditions: 1) Is the condition preventable?; 2) Has been diagnosed and treated early?; 3) Is the condition under good control or management?; and 4) is hospitalization necessary when the condition occurs? My concern is that by using only principal diagnosis codes, the authors assume that the selected conditions are by definition not been treated properly if they were admitted, which does not take into consideration the criteria described in the literature.

Authors: All discussed changes in the manuscript are highlighted in yellow.

Authors: We agree with the reviewer that avoidable hospitalizations have limited validity as an indicator of quality of care in the ambulatory setting and we acknowledged this in the limitations of our study (page 11, second paragraph).

Authors: The reviewer suggests a redefinition i.e. a reversion of the research question in our paper. He suggests that the proportion of conditions that received good ambulatory care should be analyzed instead of the proportion of hospitalizations that could have been prevented by better ambulatory care. This approach would imply a complete new study with a different data source. In contrast to our current procedure, data should be collected in the
ambulatory setting and a definition of good ambulatory care would be required to
disentangle hospitalizations warranted by effective medical needs from unwarranted
hospitalizations in this setting. Although such study would provide very valuable information
on number of AH, there are currently no comprehensive data for the ambulatory sector
available in Switzerland (and elsewhere), unfortunately therefore such a study cannot be
performed.

Authors: AH based on main diagnoses has its limitations, however these limitations do not
outweigh the practical advantages of using avoidable hospitalizations for health service
planning. Therefore, the OECD and many countries included this measure based on main
diagnoses into their respective frameworks of measuring health systems performance.

Authors: References documenting the use of AH in various countries were added (page 3,
background section). We also extended the description of AH as a component of the Health
Care Quality Indicator Project established by the OECD (page 4 and 5 , design of the study
section).

2. Are the methods appropriate and well described? And 3. Are the data sound?

Reviewer: 2. A major issue with this study is that this is a retrospective study where one
of the outcome variables (admission) is subject to major confounders. 3 In this context
this data is subject to major confounders which have not been addressed, therefore is
not sound at this stage.

Authors: The reviewer mentions major confounders of the outcome variable without
specifically list such factors. Confounders in our study relate most likely to unmeasured (or
immeasurable) variables that can distort the relationships between the explanatory factors
of our model and the incidence of avoidable hospitalizations as the outcome variable. Such
problems of confounding are inherent to studies using administrative data and cannot be
resolved as the respective data are usually missing for this type of data. We were aware of
these problems and decided to use mixed models with random effects for two geographic
levels involved in the analysis. This approach allows some control for unmeasured factors
related to geographic characteristics but there are still limitations that we acknowledged in
the first paragraph of the section “Strengths and Limitations”(page 14).

4. Does the manuscript adhere to the relevant standards for reporting and data
deposition?

Reviewer: No information is given about ambulatory care given, and there is alos no
information about the number of hospitalization per patient and re-admissions.

Authors: The reviewer suggests to add readmission data to the results. Readmission rates
are seen as an indicator of quality of the inpatient sector and the information may not be
helpful to measure the performance of the Swiss outpatient sector. We nevertheless added
overall and disease specific 3-month rehospitalization rates to the characteristics of
avoidable hospitalization given in table 1 (page 21). We also added the average number of
hospitalizations for patients that were hospitalized more than once (page 9). It is however,
impossible to discriminate between rehospitalizations that are caused by poor ambulatory
care and rehospitalizations that are associated to poor inpatient care.

5. Are the discussion and conclusions well balanced and adequately supported
by the data?

Reviewer: It can be improved

Authors: We extended the first paragraph of the discussion and the limitations section.

6. Are limitations of the work clearly stated?

Reviewer: This need to be revised

Authors: We revised the limitations section.

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished?

Reviewer: No

Authors: We included more references (page 3 and 10).

8. Do the title and abstract accurately convey what has been found?

Reviewer: No

Authors: We changed the title.

9. Is the writing acceptable?

Reviewer: Yes

Specific comments

• Page 3, Background, 1st paragraph, lines 5-9: The statement needs to be supported by the respective references.

References were added.

• Page 5, second paragraph, line 2: How many hospitalization per patient?

Number of hospitalizations for patients that were hospitalized more than once were added (page 9).

• Page 6, last paragraph: How do you decide what is a AH admittance versus a non-AH admittance?

Authors: Our data provide no information that would allow a direct discrimination between AH and necessary hospitalizations. The concept of avoidable hospitalizations is based on
specific diagnoses that should theoretically not be treated in hospitals. However, in the medical care practice, patients with these specific diagnoses sometimes need to be hospitalized. AH measured in this way are used as health service indicators of the quality and access of health care systems. Database information allows therefore only indirect identification of avoidable hospitalizations. We incorporated more information on these subjects on page 4 and the limitations section (page 14).