Author's response to reviews

Title: Place of death and health care utilization for people in the last 6 months of life in Switzerland: a retrospective analysis using administrative data

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Author's response to reviews: see over
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Dear Dr. Christine Urquhart

Associate Editor, BMC Health Services Research

We thank you kindly for the review of MS: 4075171138476932, “Place of death and health care utilization for people in the last 6 months of life in Switzerland: a retrospective analysis using administrative data”.

We believe the referee’s suggestions have contributed significantly to the enhancement of our manuscript, so we deeply appreciate their time and effort. We have made extensive revisions based on the comments made. Our responses to their comments are enumerated below.

We hope that we have addressed each of the comments adequately. We look forward to your response.

Yours sincerely,

Oliver Reich
Reviewer: Steffen T Simon

Discretionary Revisions
- It would be helpful to know the functional status of the patients (e.g. KPS), if available.

Our analysis is based on administrative claims data from the largest health insurer in Switzerland. However, by law, Swiss claims data do not include medical information (e.g. functional status, diagnosis, laboratory values). For this reason, we used pharmaceutical cost groups (PCG) described on page 5 in order to assess morbidity of the population.

Minor Essential Revisions
- Colours need to be explained in the Figure and it would be helpful to place each abbreviation of the region within the map.

We thank the reviewer for this suggestion and have added the specific details to the Figure.
- Results, population charac, 3rd line: number after dot is missing for "(median 83)"

This has been corrected to “median 83.0” on page 6.
- Tables: please provide the translation for the abbreviations within a footnote of the table, esp. for table 4

We have now detailed the abbreviations in all tables.

Major Compulsory Revisions
- Within “population characteristics”, I miss the leading diagnosis of the patient - it could be the main reason for death. This must be available drawing data from a health care insurance. This is relevant regarding PoD.

We agree with the reviewer that this information is potentially relevant. Unfortunately, data on diagnosis of patients are not available in Swiss claims
data. Current Swiss laws do not allow health insurers to access and keep diagnostic data.

- The last limitation is a major limitation and needs to be explained in detail within the method section. If I understand it correctly, the place of death was drawn indirectly by the origin of the last claim and there are no data how accurate they are. As PoD is the main topic, this needs more information and discussion of pros and cons (and risk of bias).

**The reviewer makes an important point. We must however point out that our definition of the place of death is highly accurate since claims data include the specific treatment dates. Therefore, we have decided not to follow the reviewer’s suggestion.**

**Reviewer: Marylou Cardenas-Turanzas**

**Major Compulsory Revisions:**

1. Set inclusion and exclusion criteria to make the sample uniform. If the authors conceive the place of death is responding to patients preferences, unexpected deaths had to be excluded from the sample i.e. deaths due to accidents and trauma. In theory, these deaths were not responding to an explicit preference of the patient. In the same line, the sample had to include only adults due to issue of capacity to make autonomous health decisions related to end-of-life preferences.

**The aim of our study was to describe and evaluate the place of death and health care utilization of decedents in the last six months of their life in general and not initially according to patients preferences. However, the reviewer makes an important point on unexpected deaths which have already indirectly been excluded from the sample since accident claims are not fully covered by Swiss health insurers, and therefore the relevant data is unavailable. In order to cover this comment, we have added a further sentence in the methods section (p. 4): “It is reasonable to assume that this sample is highly reliable as administrative claims**
Children don’t have a significant role within the utilized sample. The number of young decedents (> 18 years) is merely 261 patients or 0.44% of our sample. For this reason and in order to be able to compare our results with previous research (which included children), we have decided not to follow the suggestion of reviewer 2 and not exclude these patients from the analysis.

2. Include more clinical information on the deceased’s’ end-of-life i.e. underlying cause of death. It is well known that in cancer, patients dying of acute myeloid leukemia tend to receive medical care of curative intent toward the end and usually die in hospitals, while patients diagnosed with chronic myeloid leukemia live longer and likely die of other causes not related to the leukemia itself. Broad categories of causes of death could inform health planners on the types of patients who would die at home, nursing home or hospitals.

We agree that the cause of death is important and is of great interest. Unfortunately, clinical data of patients and cause of death are not available in Swiss claims data (see comments for reviewer 1). We have added this detail in the methods section in order to clarify the situation found in Switzerland (p. 4):

“It is reasonable to assume that this sample is highly reliable as administrative claims data collected by insurers cover nearly all health care invoices. Deaths due to accidents and suicides are not included in our sample. Unfortunately this information as well as clinical data (e.g. diagnosis or cause of death) is not available in the Swiss health insurer database.“.

3. When comparing the three sites of death, if you are interested in characterizing patients dying at home or in nursing homes, then use hospital deaths as the reference category.

Our objective is to describe the distribution of site of death in the country, given the absence of this information in Switzerland. We are interested in all three sites of death and not only for patients dying at home or in nursing
homes. Naturally, when using multinomial logistic regression a reference value has to be defined. In our case we preferred to use dying at home as the reference value, since we claim this place to be the “natural” site of death in Switzerland.

4. Regardless of claims data. These data usually is a list of charges from the provider to the insurer and not a list of the costs of the services rendered. Costs and charges are well defined in the health care services literature. If you converted charges to costs, you need to declare this in the Methods Section including information on the formula or ratio used for the adjustment.

We did not perform any conversions to this variable. The stated costs are the total of patients’ health care costs, which were derived from claims by the providers and covered by the compulsory health insurance.

5. In relation to the economic conceptual frame, please declare the perspective of the analysis (i.e. insurer, provider, government, societal). In addition, if your interest is on home as a preferred place of death and wish to influence policies to facilitate this preference, then patient costs need to be considered. These costs are also known as time costs or indirect costs of care. If it is not possible to measure these, as most researchers would recognize, at least acknowledge the limitation and the consequences of not knowing the magnitude of these costs in relation to the place of death.

The objective of our study did not have an economic focus. We sought to deliver insight on the patterns of health care utilization at the end-of-life and place of death in Switzerland. Nonetheless, we thank the reviewer for this very interesting point which is certainly also of high scientific interest. Hence, we plan to address this additional research question which will be a subject for study in a future project.
Minor Essential Revisions:

1. be consistent with the use of acronyms and abbreviations along the manuscript, i.e. ACT in the Methods Section, page 5, line 12 is not spelled. In the Methods Section, page 5, in the definition of the covariate DED: the acronym CHF was not defined anywhere in the previous text.

   We thank the reviewer for noticing this unclear point. The mentioned ATC-code on page 5 is referenced with Endnote iii and means Anatomical Therapeutic Chemical code. CHF is the international currency abbreviation for Swiss francs. We apologize for our omission.

   We have now included these two definitions as suggested in the manuscript: “These variables describe health care utilization in the last six months of life per decedent: number of consultations with a general practitioner, number of consultations with a specialist physician, number of days in hospital, length of stay in days in nursing home, number of different ATC (Anatomical Therapeutic Chemical) codes\textsuperscript{iii} prescribed (outpatient only) and home care costs.”.

   “Deductible class: dummy variable equals 1 if insured person chose a deductible higher than Swiss francs (CHF) 500 and 0 in all other cases“

2. be consistent with the names of the variables of study, i.e. Methods Section, page 5, first paragraph, in PCG’s. The description of the coding of this dummy variable is not consistent with the text explaining this variable in the formula (I agree that the meaning is equal but to facilitate reading please use same wording along the manuscript).

   The dummy variable MMORB utilized in our analysis and described on page 6 is defined as multiple chronic conditions. Since we do not possess any clinical data, we used 13 pharmaceutical cost groups (PCG) described on page 5 in order to assess the availability of specific chronic conditions for each individual patient. MMORB bases on the number of chronic conditions derived from the PCGs per patient and finally leads to our variable “multiple chronic condition” if the patient has more than 2 chronic conditions. Against this background we believe that we have been consistent with this variable.
3. Results, page 7, under subheading of Population Characteristics, second paragraph starting with words “The difference in age is...”: seems to me you are trying to say that the association of age with the place of death disappears when adjusted for gender, if this is true please reword the sentence.

The results described at this point are descriptive and are not adjusted for gender. In order to clarify the meaning of the sentence, we have changed the wording: “The difference in age between patient gender remains clear. “.

4. Results, page 7, last paragraph at the end of subheading of Population Characteristics: the use of the Cramer’s V is not mentioned in the Methods Section, please explain in which step of the analysis was used.

We thank the reviewer for noticing this unclear point. We have now added this in the methods section accordingly (p. 4): “Furthermore, differences between the three groups with respect to place of death in terms of demographics, insurance coverage, morbidity and health care utilization were analyzed with a nonparametric analysis of variance (Kruskal-Wallis test for continuous variables and chi-square tests for categorical variables). Cramer’s V was applied in order to measure the association of the variables. “

5. Results, page 7, last paragraph in sentence starting “A total of 60.8%...last six months of life.” The next two sentences are contradictory, please reorganize or reword to make them clear. Maybe you just need to explain which group is the denominator of each of the proportions reported.

We thank the reviewer for noticing this unclear point. We have now better clarified this point (p. 8): “A total of 60.8% of all insured had a hospital stay during their last six months of life. The mean duration of stay for all decedents in our sample was 16.9 days. When only considering patients who actually had a stay in hospital, the mean duration was 27.7 days. “
6. Discussion Section. Page 8. The section needs to start describing the main findings without consideration of who was first in reporting what. The sentence about the appropriateness of care rendered to these patients at the end of their life (first paragraph of Discussion Section) is irrelevant because the main objective of this study was to find independent predictors of the place of death and not predictors of quality of care at the end of life. I would start the Discussion Section with the words of the second paragraph: “We found death occurred…”

We agree with the reviewer’s suggestion and have amended the start of the discussion section accordingly.

7. Conclusions. Page 11. The main message of the section is about the need to increase the availability of community end-of-life care and non-acute care inpatient facilities in Switzerland. However, this article was about evaluation of patterns of health care use at the end of life and determinants of the place of death and not about trends of utilization along the years of the study. A link is missing between the conclusions and the information presented in the article. Maybe adding how knowing determinants of place of death and patterns of health care utilization can help decision makers on the allocation of these needed services would make the conclusions strong.

We thank the reviewer for this suggestion. In the discussion section (p. 9) we do however elaborate on the place of death findings in comparison to prior research performed in Switzerland (Fischer et al.). In this area we did indeed find a shift over time towards dying at home and nursing homes and therefore feel comfortable with the conclusion. We have decided to follow the suggestion and have added the stated valuable sentence to the conclusion: “The importance of nursing homes and patients’ own homes as the place of death will continue to grow in the future. Various international studies confirm this shift, especially towards people’s homes [18,41,42]. In order to cope with the growing needs for end-of-life care for ageing populations, the availability of community end-of-life care and non-acute care inpatient
facilities must be substantially increased in Switzerland. Knowing the determinants of place of death and patterns of health care utilization of decedents can help decision makers on the allocation of these needed health care services. The study will provide useful data to guide further research and development in this area. “.

8. Tables 1, 2, and 3. The titles have to sustain by themselves, please add more information to them in order to understand where this sample comes from, i.e. which country represents, the period of study or maybe the step of the analysis presented. Also at the bottom of each table spell out all abbreviations used i.e. CHF

We thank the reviewer for this suggestion and have provided additional information to all tables in order to improve the readability.

9. Table 3. Row of “different medication mean”. The term was described in the Methods Section as WHO Anatomical Therapeutic Chemical (ATC) then please be consistent with the use of terms.

We thank the reviewer for noticing this inconsistent point. We have now changed the term in the table 3.

10. Table 4. In this table I would prefer to see the complete analysis output with the betas, standard errors, Wald statistics, odds ratios with 95% confidence intervals, and the actual p-values. To make easier the interpretation of the analysis to the reader, for dichotomous variables, include the name of value that equals 1 i.e. in the row of sex write female; in the row of PRIV write additional private hospital insurance, etc.

We thank the reviewer for this suggestion and have provided additional information to the econometric results in this table.
11. Figure 1. The figure title has also to sustain by itself, maybe add data on the period of the study and on the health care insurance company represented. The color coding for the cantons was not included in the file.

We thank the reviewer for this remark and have provided additional information to the figure.

Reviewer: Joanna Broad

Major Compulsory Revisions

For the benefit of readers not familiar with the insurance industry or health insurance, please explain ‘higher health deductible’ or ‘deductible class’ when first used.

We thank the reviewer for this suggestion and have added the following information to the methods section (p. 5): “Deductibles are obligatory for all Swiss residents and range from 300 to 2500 Swiss francs per year. The standard deductible is 300 Swiss francs, but insured persons can choose a higher deductible (500, 1500, 2000, 2500 Swiss francs) in exchange for reduced premiums. “

The Conclusion as stated in the Abstract may well be true, but is not necessarily justified by the paper, and should be revised.

We thank the reviewer for this point. We have now changed the abstract and the conclusion section accordingly.

Figure 1 (in the version I have at least) is not readily understood by people not familiar with the geography of Switzerland, e.g. the text talks of Latin cantons, but these are not identifiable from the figure. There is a need for a key to indicate the meaning of the colours. More importantly perhaps, why do we need to know the mean age at death of the cantons, as much of the difference will relate to the age
and gender mix of the population? I am unsure that in its current form it adds much to the discussion, & needs either revising or dropping. Perhaps a map showing the proportion who die at home in each canton would be more meaningful?

**We apologize for being unclear with this figure. To address the reviewer’s comments, we have now revised the figure by illustrating the proportion of population who die at home per canton as well of by adding the indication of the colours. Results section, page 7:**

“With regard to place of death, individuals who died in hospitals accounted for 38.4%, in nursing homes for 35.1%, and those at home for 26.6% of the total. Considerable and significant variation of site of death was observed between cantons (Figure 1). The proportion of people dying at home for example varies between cantons from 22.1% in Ticino TI to 33.3% in Aargau AG (p< 0.001). “

Table 4 seems mislabelled and is not comprehensible. In general, tables should be self-evident to readers of disciplines other than health economists. The abbreviations should either be removed or explained in a footnote. We thank the reviewer for this suggestion and have provided additional information to the econometric results in this table. We hope that the table is comprehensible now.

**Minor Essential Revisions**

On page 2, mention is made of ‘terminally ill patients’ although this takes no or little part subsequently in the paper. I think it distracts the reader, which from the question the paper addresses, is expenditure at end of life (regardless of type of death – sudden or gradual). We agree with the reviewer’s suggestion and have altered the sentence accordingly.

Table 2 would be improved if it were flipped – so the column headings match the
other tables.

We thank the reviewer for this remark and have altered the table 2 accordingly.

Use of the term ‘Latin canton’ is unclear – with Romans long gone and the Latin language no longer in use, I imagine the authors refer to the French- and Italian-speaking regions of Switzerland. It would be helpful if that were clarified.

We have added the relevant cantons regarding the term Latin cantons to the manuscript. As a matter of fact the reviewer is correct that reference is made to the French- and Italian-speaking cantons (p. 5): “To take into account differences between Latin i.e. French or Italian speaking cantons (Fribourg, Geneva, Jura, Neuchatel, Ticino, Vaud and Valais) and German speaking cantons, we included a dummy variable (1 if Latin canton, 0 if otherwise).“

Discretionary Revisions

I would be most interested to see the hospital group divided into those who also had nursing home care costs and those who did not. That would widen the scope to place of care, as well as place of death. There is interest in understanding more about those who are transferred to hospital from a nursing home, and die there. This group may well be shown to be the group with highest costs. Others who die in hospital could reasonably be regarded as living at home, and might be expected to be more similar to the home group.

The reviewer raises an excellent point. We are aware of this interesting question and are planning on investigating these referral patterns in detail in our future research.

I note that the authors have not used our recent paper that is available online (not yet in print) – an international comparison of place of death – and may be useful for providing context. I do not suggest that the authors should use it, but

We thank the reviewer for pointing out to this very interesting publication. We have added the paper to our manuscript: Reference no. 44.