**Author’s response to reviews**

**Title:** Burden of morbidity in an individual perspective - the case of sick-listed patients in primary care

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**Version:** 4  **Date:** 10 November 2008

**Author’s response to reviews:** see over
Ref.: 2957258732196766_comment

We appreciate having our manuscript reviewed by a professional in the area of sickness leave issues. We have made every effort to revise our text and figures in line with your comments.

First, a few comments on the overall revisions suggested by Nils Fleten:

"Results
Mental disorders were more frequent reasons for sickness certificates than reasons for consultation. In one year substantial more diagnoses were identified in the medical records than in cross sectional sickness certificates. Mental disorders seem to be relatively more often the reason for sickness absence than for consultation, and, as expected, vice versa for diagnose chapter XVIII. Probably would stratification on initial certificates and certificates prolonging an absence period show different diagnose distribution.\textsuperscript{a).}

We are not given any validation of certificate diagnoses to the corresponding record\textsuperscript{b).}

The excellence of using ACGs to describe the burden of morbidity in sick-listed persons compared to distribution of diagnoses in ICD\textsuperscript{c)} and/or functional classification in ICF\textsuperscript{d)} is not easily accessible in the text.

Conclusion: The authors describes limitation in using sickness certificates and medical records to describe the burden of morbidity in a sick-listed population, and a limitation in recommendation according to the actual use of the diagnoses in medical records might be appropriate.\textsuperscript{e)}"

a) All certificates were included in order to get a cross-sectional picture of the reasons for sick-leave and no effort was made to differentiate between initial certificates and certificates prolonging sick leave.

b) This validation was not the focus of the present article. For your information, however, a comparison was made on the patient level between the two sources, and a mismatch was found in three cases where the diagnosis in the certificate could not be found in the patient record.

c) This has been addressed by commenting on Figure 2 in the results section.

d) ICF is also patient oriented but the codes are not combined at the patient level as is done in the ACG grouping method. However, we have coded the information in the patient records into ICF codes and an article on this is being considered.

e) This has been commented on below.

Comments on need for major compulsory revisions:

"1. The number and exclusions in Table 1 and Figure 2 and 3 are confusing, probably would introduction of an "other" group clarify. In table 1 I guess it is diagnose groups (diagnosis chapter) with less than 3 diagnoses that is excluded - but is that what is stated?"

Table 1 has been revised as you propose. The two figures have been somewhat revised and have been explained in more detail in the results section.
"2. The ethical approval or consideration should be mentioned in the method chapter."

A comment on ethical approval has been added in the methods section.

"3. Introducing 95% Confidence Intervals for the diagnose frequencies in table 1, would make comparisons more readily."

Perhaps this could be done, but we consider this to be a full scale material[JW1], and not a sample, and thus no statistical methods are applied.

"4. In the discussion of representativeness of diagnoses in medical records, a discussion of representativeness regarding primary care (health care) seeking behaviour versus burden of morbidity in the population might be appropriate."

We are grateful for this valuable comment and have considered including a separate section in the discussion section in this regard. However, we believe that this might draw attention away from the main aim of this article, and thus we have not done so.

"5. If the unrestricted recommendation of labelling every health related problem in the conclusion is kept, any potential side-effects like undesirable medicalisation should be enlightened in the discussion."

We are quite aware of this problem, but we do not consider that the text in our manuscript will result in a drive of "undesirable medicalisation". Nevertheless, we have added a sentence in the coding section in the discussion section as follows: 'On the other hand there is no reason to register every single health problem noticed as a diagnosis as this might lead to undesirable medicalisation of the patient.'
Our sincere thanks for your efforts in reviewing our manuscript. We find your comments most relevant and have tried to revise the manuscript accordingly.

Comments on need for major compulsory revisions expressed by Christos Lionis:

"1. The introduction section locks quite long and the part referring to the Adjusted Clinical Groups case mix system could be placed in the Methods section."

We have shortened the introductory section somewhat. We have also moved the description of the ACG system to the methods section in accordance with your comment and it is now somewhat shorter. Figure 1 has been removed.

"2. This introduction section also is very descriptive and research questions are lacking."

The research question has now been formulated and is added at the end of the Background section as follows: "The research question of interest was to study the possibilities of describing the burden of morbidity in a population based on the combined data on diagnoses at the patient level."

"3. Although the authors discuss certain methodological concerns, there is still a question whether a sampling bias has been introduced. The authors are invited to offer further explanations on the selection of particular months in the Swedish calendar."

The idea was to get a representative sample of the sick leave certificates during periods of "ordinary workload". For practical reasons we chose four different weeks and avoided periods including major holidays. In the Method section we have added: 'spread throughout the year to avoid major Swedish holidays.'

"4. There is no section on data analysis. Concerns are also raised from the use of ICD-IO classification system that is not suitable in giving sufficient information about the episode of care, as ICPC-2R."

We realize that the manuscript would benefit from a data analysis section. Therefore we have added such a section and moved the first sentence in the ACG description to this section. This new section reads as follows:

'Data analysis in a diagnosis and a patient perspective
All diagnosis data were first analysed in a diagnosis perspective by comparing all diagnoses retrieved from the two different sources on a diagnosis group level according to the ICD-10 chapters. Then same data were analysed in a patient perspective by applying the Adjusted Clinical Groups® case-mix system (ACG), version 7.1, showing numbers of patients with combined diagnoses and their distribution in terms of patient categories – the ACGs. [10]' The ICPC classification is not used anywhere in Stockholm county.

"5. The discussion section is poor and very descriptive and the authors should
make some efforts in making it more constructive and exploratory. The authors could discuss challenging issues raised from their assumptions with a focus on the most interesting and core question, which to my view, is to what extent patient medical records are correct or complete”

We agree that the core question concerns coding diagnoses and registering them in the medical records. We believe that we have already emphasized the need for correctness and completeness of the contents in the medical records, both in comments about coding in the discussion section as well as in a sentence in the conclusion.
We are most grateful that our manuscript has been reviewed by someone who is so familiar with the subject! We have thoroughly considered your comments and have done our best to revise the manuscript in accordance with your ideas.

Comments on overall need for revisions expressed by Barbara Starfield:

"The paper needs to be entirely re-written and reviewed by some one with English expertise."

We understand that the version we submitted had not been properly reviewed by our language expert. We apologize for this, and the language in the text has now undergone language revision.

Comments on need for major compulsory revisions:

"1. What is meant by 'epidemiologic follow-up'? this term is used several times but with unclear meaning. Moreover, I do not detect anything related to 'follow-up' in this paper."

The 'follow-up' aspect has to do with the overall lack of using primary care data in Sweden to analyse health status in defined populations. The expression 'epidemiologic follow-up' refers to our focusing on the need for registering people with diseases as well as just the diseases themselves. However, as this has led to confusion, the follow-up concept has been omitted in the revised manuscript.

"2. Delete the second paragraph under Adjusted Clinical Groups, as the third paragraph repeats the same material."

This section has been shortened accordingly.

"3. The word 'Allott' is used but the correct word is 'allocate'."

The word 'allott' has been used in the manual of the Johns Hopkins Case-mix System to describe the procedure when every patient is placed into just one ACG category. We have changed the sentence to avoid the word. Also, we think that figure 1, where the word appears in the title of the figure, is not needed in this article, so it is deleted.

"4. What is meant by 'sick listed'?"

The expression 'sick listed' has been excluded in the new version – it refers to a list of individuals with a doctor’s certificate indicating that they are entitled to social insurance benefits due to illness. We have changed this to 'sick-leave certified' throughout the manuscript as well as in the title of our article.

"5. Regarding reporting from every episode. Who defines an episode? How is it identifiable in the public reporting? To what extent by limiting the reporting to the results of an 'episode' might signs and symptoms be underestimated because
they are assigned to a diagnosis later on?"

It is our experience that the word 'episode' has been understood in various ways by various people. Thus the translation of the Swedish word 'episod' is troublesome. In this context, the episode of work disability is defined by the certificate in terms of the duration, scope and extension of work disability. In order not to confuse readers, we have changed the sentence as follows: 'In several county councils in Sweden including Stockholm county it is mandatory for at least one diagnosis to be registered for every patient-physician contact.'

“6. The Results section needs much better exposition. Each and every table and Figure have to be explained so that the reader knows what are the findings being reported. Table 2 is unintelligible as it is and the graphs need to be interpreted.”

We agree, and are now aware of the vagueness of the table and figures showing our findings. Accordingly, they have been thoroughly revised.

We agree regarding Table 2, and it has been removed.

Table 1 has been shortened to highlight the differences, and it is now also commented on in the results section as follows: ‘The comparison on diagnosis level between the two sources of data is shown in terms of ICD-10 chapters in Table 1. The first obvious difference could be seen comparing diagnoses in chapter XVIII regarding signs and symptoms, where the proportion of diagnosis was much higher in the patient records than in the certificates. Among the organ system oriented chapters the two most frequent chapters V (‘Mental and behavioural disorders’) and XIII (‘Musculoskeletal system and connective tissue’) together were more dominant in the sick-leave certificates – 69.5% versus 59.6%.’

Figure 1 has been slightly revised, and more comments are added in the results section: ‘The pattern of morbidity resulting from the ACG grouping, based on the patient medical records, is shown in Fig. 1. About 90% of all patients were represented in 18 out of a possible 83 different ACGs. About 70% of all patients belonged to ACGs with a combination of two or more different types of morbidity. That means that some of the patients with a psychosocial diagnosis had a combination of other categories of diagnoses and thus were represented in the more complex ACG groups #4310, #4410 and #4910 in addition to the more homogeneous groups #1300 and #2500 with diagnoses only from chapter V in the ICD-10.’

Figure 2 has also been slightly revised, and is commented on in the results section: ‘An analysis was carried out to emphasize the difference between the originally registered diagnoses in the medical record and the results when the secondary coding from the free-text part of the record was added. An ACG grouping was performed to compare the difference in the morbidity pattern due to the secondary coding. The two ACG distributions are compared in Fig. 2, where an obvious shift to more complex groups of patients can be seen when adding more diagnoses to each patient. When grouped only by the originally registered diagnoses just over 50% of all patients had a combination of two or more different types of morbidity, and the proportion increased to just over 70% when the secondary coded diagnoses were added.’

"7. I believe the word 'panorama' should be 'pattern'.”

This has been changed.

"8. I am not sure that 'individual perspective' is a correct description of what is observed, because the morbidity categorization can be used for subpopulations and populations as well. I think what is meant is 'patient, not disease,
The focus is on the patient, not on the disease, and it is not unique to 'individuals', as it can apply to morbidity burden in populations just as well.

We have chosen the word 'individual' to mean the 'person' and not just the relational term 'patient', in order to focus on all people – both those who are sick and those who are well. In this study, of course, the 'material' is a number of patients, termed 'sick-listed' persons and patients in primary care. We are well aware that this article describes a study of morbidity burden in populations. Nevertheless, we understand that most readers are used to thinking in terms of patients and, as you point out, the focus is on distinguishing between the patient and the disease perspectives. We have consequently revised the text and now use “patient” instead of “individual” throughout the manuscript, as well as in the title.

"9. The section on Main findings seems to be in the wrong place---it should be part of Results. The authors need to clearly shown that there is a 'dissimilar pattern of morbidity...' The Discussion section should present the ramifications of these and other results."

We have moved the first part of Main findings to the results section and shortened the discussion part.

"10. The authors indicate that there are differences between certificate and patient record with regard to musculoskeletal system and connective tissue, but Table 1 shows very little difference, and surely not a significant one. On the other hand, category XVIII seems quite different. Please better describe the findings and their implications for understanding illness."

We have revised the manuscript regarding the comments on table 1 as shown above:

'The first obvious difference could be seen comparing diagnoses in chapter XVIII regarding signs and symptoms, where the proportion of diagnosis was much higher in the patient records than in the certificates. Chapters V …'