Reviewer's report

Title: Functional mapping of hospitals by diagnosis-dominant case-mix analysis

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Reviewer: Francesc Cots

Reviewer's report:

General
The manuscript tries to approach the financial needs of Japanese hospitals system of Japan through case mix techniques. Diagnosis Procedure Combination are used in front of DRG or case mix techniques from the same family (APR-DRG, IR-DRG, HRG, ANDRG…) are used. DPC only is based in one of dimension of the previously cited DRG, the diagnostics. Procedures, secondary diagnostics, age, gender or other characteristics aren't used to construct a risk adjustment system.

Using only the first diagnostic of ICD-10 for a survey of Japanese hospitals system, the authors define three index Ri, Ci, Di, and build an original graphic approach, but any information about characteristics of Japanese hospital system, the survey used, the distribution and structural characteristics of hospitals, the mission of each of type of hospital, the paper of primary care and the relation ship with outpatient activity of hospitals, etc.

Paper is interesting and original using several indexes like the Shannon diversity index or the rarity index that currently aren’t related with case mix analyses in the literature. But the authors don’t explain enough each of the data sources that use and the context of this information.

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

1.- Authors explain the Japanese system have been a social insurance system based on relatively low-cost universal health insurance. Please explain if the Japanese system is a National Health System like Great Britain or is of social insurance like the German system.

2.- Authors must describe the organisational and functional structure of the health system: who play the role of financing, if there are private sector and which is the relation of the property with the financing agents and their paper in relation to the needs of the population.

3.- DPC. The authors define DPC as a case-mix system but reading the annex with all the DPCs, DPC is only a mapping of ICD-10 diseases classification system. Then, DPC is only a ‘grupper’ of the main diagnosis but, the rest of variables that often are used to define a patient classification system, aren’t used in the DPC tool?. If DPC don’t use procedure codes, or comorbidity and complications codes, age and sex, outliers, or admission or discharge circumstances, is difficult that the DPC would be able to adjust risk and to let to compare information between different hospitals. Authors must discuss this problem and introduce specific literature of the patient classification systems and of the risk adjustment.

4.- The Patient Survey of 2002. What does this survey include? does include the 100% of the discharges of all hospitals? or only is a sample?. The private sector data is also recorded in this survey?. How do you define outpatient?: It includes major ambulatory surgery, day cases, visits, follow-up visits, radiology tests, and/or other contacts with hospitals?. And how the hospitals are related with primary care, primary care is public or is there private primary care in Japan?. These characteristics of the data that authors use are necessary to understand for the discussion.

5.- The Rarity index as the rest of indexes aren’t enough explained. If we know how the indexes are calculated, we will be able to understand the information that the index is able of to give us.

6.- A figure (Figure 1) is a good tool for the interpretation of results but must be some tables with the number of hospitals, their characteristics, the structure, the average of inpatients and outpatients, etc... Global amount per group, the mean and standard deviation; they are a necessary information context.

7.- From the results we can understand that there is a relation between rarity and complexity, but how strong is this relation, why don't the authors build a regression model to achieve a coefficient to value the gradient between groups of hospitals and translate this gradient in financing needs?
8.- That the outpatient's cost share is very high is not a problem in itself. All the politics in health systems where the inpatient cost is very high tend to encourage the use of ambulatory facilities for the reduction of the cost, and increase the appropriateness and effectiveness of the health care.

9.- Table 1 is not appropriate for to illustrate the capability of the rarity and complexity index. The table reflects the most common diseases and all the hospitals attend these diseases; thus, the rarity and complexity indexes don't show differences between hospitals.

Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

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

Quality of written English: Acceptable

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