Reviewer's report

Title: Risk adjustment for inter-hospital comparison of cesarean section rates: need, validity and parsimony

Version: 1 Date: 24 May 2006

Reviewer: Chao-Hsiun Tang

Reviewer's report:

General

The aim of this study is to analyze if the absence of risk-adjustment in the comparison of C-Section rates in 29 hospitals of the Emilia-Romagna Region in Italy affect the evaluation of its performance, and to assess if a risk-adjustment model based on a limited number of variables could be identified and used. Regarding the first objective, the answer is well known (as shows the references cited by the authors) and the current work only contributes with local data (which are consistent with the previous studies). As for the second objective, the work, in spite of some problems, is probably of interest to health care planners within Italy, but also to other planners and researchers at the international level. It demonstrates that an efficient model that includes only actual confounders (the â€œparsimoniousâ€ model) increases precision of estimates without compromising validity, compared to risk adjustment model used in the previous studies (the â€œfullâ€ model).

The results are interpreted within the reality of the data used. However, the Discussion section is poorly written and not well organized.

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

1. Methods:
   1) Page 6, second paragraph of the methods section: In addition to the diagnosis of â€œdystociaâ€, the diagnosis of â€œfetal distressâ€ is also very subjective and is not risk factor in itself. Including it in the regression may mask important differences by â€œadjusting awayâ€ subjective practice differences between hospitals. Also, fetal distress may be related to various conditions (diabetes, hypertension, collagen vascular disease, etc.), again introducing possible redundancies into the regression.
   2) Statistical analyses, Methods section: process of conducting the analysis should be clearly stated. Unit of analysis - each single live birth, should be pointed out.
   3) Page 7, second paragraph of the methods section: The authors stated that â€œthe reference category included hospitals with the lowest adjusted c-section rates based on the full model.â€ Does this mean that the authors firstly rank the adjusted c-section rates based on the full model presented in Table 2, and choose 4 hospitals (K, Q, R, and Z) with the lowest adjusted c-section as the reference groups; and secondly adding 25 hospital dummies representing the rest of the 25 hospitals into the full model and into the parsimonious model presented in Table 2 and obtain the results of the adjusted ORs in Table 4. I would like these processes to be clearly stated in the Methods section.
   4) Page 8, second paragraph of the Methods section, the authors stated that they identified eight variables as confounders from the change-in-estimate procedure. Table 3 also provides the occurrence of their confounding effect on total comparisons. However, according to the results reported in Table 2, in addition to these 8 variables, there is another one-- intrauterine growth retardation, which is also a statistically significant risk factor in the parsimonious model. Please explain the inconsistency in reporting these results.

2. Results: Please provide descriptive statistics of the characteristics of women and newborns.

3. Discussion: This section needs to be re-structured and re-paragraphed.
   1) Statement of principal findings should be reported at the first place. Iâ€™d suggest part of the third paragraph in page 10 move to the second paragraph in page 9.
   2) I would consider re-paragraphing the third paragraph in page 10 and the second paragraph in page 11. There two paragraphs are long and awkward.
   3) Page 9, last two paragraphs: The authors mentioned that the impact of risk-adjustment on hospital comparisons and rankings is different among studies. Please provide references and explain how different their results are. Similarly, please provide references as to what important methodological differences between the relevant literatures.
   4) Page 10, second paragraph: The authors stated that â€œcontrolling for risk factors is a relatively new
issue in obstetrics. I disagree! Risk-adjustment has been undertaken almost a decade ago (e.g. reference #26) as far as I know. The authors also pointed out that various authors have studied the best way to compare c-section rates between hospitals. Please elaborate more about what are these various ways and what is the best way to compare c-section rates between hospitals. Again, please also further cite these references.

5) Page 10, last paragraph: The authors stated that they were not able to discuss the possible reasons that age (and civil status) is a risk factor of c-section and that age is possible to be related to selection factors at work in the health care system. I disagree! There are many studies that have examined the influence of maternal age on c-section. Aside for a psycho-social interpretation to the increased risk of age on c-section, there are also studies pertaining to biologic pathways that links advanced age and c-section. However, these issues do not need to be described in detail because it is not the main purpose of the present study.

6) Page 11, third paragraph: References 28-29 are not papers on risk adjustment of acute myocardial infarction.

7) Page 12, first paragraph: The authors stated that one of the limits of this study is the impossible of including several clinical factors in the model, such as gestational age. I disagree! The present study has included infant’s birth weight in the predicted model. Consider most low birth weight babies are preterm, using LBW and preterm delivery is redundant in most cases.

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

1. Title: Because the study subjects are women with no previous c-section, I suggest adding the word ‘primary’ before cesarean section rates in the title.

2. Methods:
   1) Page 5, first sentence in last paragraph: If the data are appropriate, age grouping should be decade to decade, mid-decade to mid-decade or in five-year age groups (e.g. 30-39, 35-44 or 30-34, 35-39).
   2) Page 6, first sentence in first paragraph: Married, divorced-separated, single, widow, not declared are referred as ‘civil status’. Should they be referred as ‘marital status’.
   3) Page 6, fifth paragraph: a special character is missing in the sentence: an if of 0.05 was chosen.

3. Tables:
   1) Table 2: It is not correct to report P value smaller than 0.0001 as 0.0000. Please use ‘<0.0001’ instead.
   2) Table 2: There is no indication of the units used in some variables (e.g. infant birth weight).
   3) Table 4: A type error occurs when the authors mistype ‘95% CI’ as ‘IC 95%’. Should they be referred as ‘95% CI’.
   4) Most of the grid lines in the tables are superfluous.

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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 of importance in its field

Quality of written English: Not suitable for publication unless extensively edited

Statistical review: No

Declaration of competing interests:

I declare that I have no competing interests.