Title: Construction and Application of Service Quality Evaluation System in the Preclinical Research on Cardiovascular Implant Device

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Author’s response to reviews:

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Yue Tang MD.

Dear Editors and reviewers,

I am sending here with revised manuscript, which I would like to submit to BMC medical informatics and decision making. The paper is entitled: Construction and Application of Service Quality Evaluation System in the Preclinical Research on Cardiovascular Implant Devices (submission number.MIDM-D-18-00398) by Yongchun Cui, Fuliang Luo, Boqing Yang, et al.
We will fully address reviewers’ comments point-by-point as followings.

(Reviewer 1) Abnane Ibtissam:  
This paper presents service quality evaluation system for the preclinical research and development of CVIDs based on Fuzzy Analytical Hierarchy Process (FAHP). The paper is well structured and well written. However, I have some comments that the authors should address:

Background section  
* Paragraph 2: "With the increasing morbidity and mortality of cardiovascular disease, there is an increasing market demand for high-quality cardiovascular implant devices (CVIDs), such as coronary artery stent, heart valves and artificial assistant equipment.". This sentence lacks references that strengthen this statement.  
R: Thank you very much for the valuable advice. Accordingly, we have added several recent industry reports as references.


https://www.grandviewresearch.com/industry-analysis/hi-tech-medical-devices-market

* Paragraph 3, line 8: the acronym FAHP has not been defined before  
R: Corrected and labeled red in the text.

* Section 2.2: "Indicators that could most effectively reflect the service quality in the preclinical development of cardiovascular implant devices were selected for constructing the two- index-hierarchies indicator system". What are these indicators?  
R: Added. The primary dimensions included professionalism, security, functionality and stability. The secondary dimensions included personnel’s technical ability, hardware attractiveness, professional service procedures, permission suitability, confidentiality capability of information and resources, etc.

* Section 2.2.3: Determination of the indicators' weights (Lai, 2015; Feng, 2014; Yu, 2011; Azzopardi, 2013; Sever, 2015) : avoid inserting references in section's titles  
R: Thank you very much for your valuable advice, we have corrected.
* Linguistic variables are used in the questionnaire to convert the measured qualitative factors to fuzzy numbers: This transformation is not clear, please provide more details.
R: Yes, it is really not described clearly. To score the importance of indicators influencing the service quality for preclinical research on cardiovascular implant devices, 1/9-9 scaling method was used as the scoring principle which showed the relative importance of the former indicator (A) compared with the latter indicator (B).

All of the primary indicators and the secondary indicators were paired and compared respectively. The results were shown in Appendix B.

* Section 3.1: A total of 10 experts with a senior professional title. The choice of 10 experts is not justified, is it sufficient?
R: Thank you very much for your valuable comments. We have also carefully considered this issue. To ensure the validity of expert scoring, we first adopted a strict standard to screen out the experts: We selected those who have been engaged in research and development of cardiovascular implant devices for 5 years or more, familiar with the entire development process, and willing to answer the expert consultation form as shown in “Methods”.
To further test the authority and coordination of expert opinions, we used expert consultation method and SPSS17.0 software to perform statistical analysis. Expert opinion authority level is expressed by the authoritative coefficient (Cr), which is equal to the arithmetic mean of the judgment coefficient (Ca) and the familiarity degree coefficient (Cs): i.e. Cr=(Ca+Cs)/2.
Ca is quantified from scoring basis: practical experience, theoretical analysis, reference to domestic and foreign data, and intuition. The corresponding scores respectively were 1.00, 0.75, 0.50, and 0.25. Cs is divided into 5 grades: very familiar, familiar, general, less familiar, unfamiliar, the corresponding coefficients are 1.0, 0.8, 0.6, 0.4, and 0.2.
The degree of coordination of expert opinions is expressed by the Kendall coordination coefficient (W), which reflects the degree of coordination of all experts on the evaluation opinions of all indicators. The closer the W value is to 1, the more consistent the expert agrees with the indicator structure. When statistical test P value is less than 0.05, we consider the results reliable.
Results showed that experts had carefully analyzed and filled out the expert consultation form. The effective recovery rate of expert consultation form was 100%. The Cr of consulting experts was 0.86, indicating that the experts participating in this research had high authority. The expert opinion coordination coefficient W value is 0.58 ($\chi^2=205.6, P<0.01$), indicating that the expert opinions had high coordination, and the consistency degree test is credible.
We intend to put the above data in another article, so this article does not show.

* Section 3.2: With respect to the DMG expertise. Consider illustrating the secondary indicators with a figure.
R: the

* Appendix is referenced as Appendice many times.
R: corrected.

(Reviewer 2) Georgy Kopanitsa:
The Authors used the Fuzzy Analytical Hierarchy Process method to construct a service quality evaluation indicator system, which will provide a method for the service demanders to select ideal
suppliers, and for the service suppliers to improve their service quality.
The study is well structured and clearly written. The statistical processing of the results are correct and
the conclusions that the authors made are based on the valid data.
* I recommend to accept the paper after a small improvement of the language. There are several typos
and word misuses.
R: Thank you very much for your supportive comments and valuable advice. Yes we have invited two
English-speaking professor to read through the paper, and they have labeled out the misused typos and
words. please see the red words in text.

I hope your favorable consideration for publication to BMC medical informatics and decision making.
Thank you very much for your attention and consideration. I'm looking forward to hearing from you
soon.

Sincerely

Yue Tang