Author’s response to reviews

Title: A mobile health monitoring-and-treatment system based on integration of the SSN sensor ontology and the HL7 FHIR standard

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Author’s response to reviews:

REVIEWER 1

Recommendation: Accept (minor revision)

Reviewer comment

1. In Section 3, the authors claimed that the framework has four main modules: the patient module, the services module, the cloud-based CDSS module, and the healthcare provider module. Then these modules were detailed in Section 4-6. However, the last module (healthcare provider module) was called EHR backend systems in Section 6. It is easy to figure out that they mean the same thing after read the section, but maybe keeping the module name consistent can improve the readability.

Authors’ response

Thank you for the encouraging and positive comment.

The paper has been thoroughly revised, and all module names have been updated in a consistent way. The last module is called “backend EHR systems module.”
Reviewer comment

2. (Discretionary) Section 5.1 provided lots of details about the concrete classes and rules. It is difficult for the reader to absorb at a first reading. Maybe the details can be described in a more elegant and concise way.

Authors’ response

Thank you for the constructive suggestion.

You are right; there are a lot of details regarding classes and rules. The main aim of the provided details is to fully understand the paper’s idea. We only showed a small part of the proposed knowledge. If we remove any details, I think the idea will be incomplete. In addition, for each part, we provided an associated figure to show the sequence of steps. As a result, I prefer to leave this section as it is to make the paper self-contained.

Reviewer comment

3. Table 7 should be placed in Section 7.3, not in 7.4.2.

Authors’ response

Done. Table 7 has been moved to Section 7.3.

Reviewer comment

4. Figure 10: Resolution of the ontology part (FASTO + Pellet) should be improved.

Authors’ response

Thank you for your comment.

Done. The resolution of the ontology part has been improved. In addition, the resolution of all figures has been totally improved.
REVIEWER 2

Recommendation: Accept (minor revision)

Reviewer comments

Introduction

1. Page 2 line 50, reference is needed to support the statement 'Patients with T1D do not produce any insulin, and must exogenously inject this hormone four to six times per day to keep blood glucose levels under control'

2. Page 2 line 101, the sentence 'We reviewed the current state of MH for diabetes management (14)' does not fit in the logic here. Suggest to remove it.

3. Page 4 line 115, 'backend HER systems' should be EHR.

Authors’ responses

Thank you so much for your valuable comments and suggestions.

1. A reference has been added.
2. The sentence has been removed.
3. The abbreviation has been changed.

Reviewer comments

Literature review

4. Page 4 line 145, 'Cappon et al. …' what is the findings of their study?

5. Page 4 line 140 to page 5 line 170, this long paragraph described a number of studies one by one. Comparison between these studies is needed to identify similarities, differences and gaps in the literature.

6. Page 6 line 206, what is the relevance of the study by Kan et al. to ontology?
7. Page 6 line 207, the authors mentioned the two ontologies they chose to use, but did not describe the existing relevant ontologies and the rationale of choosing these two.

8. Page 6 line 212 states there are considerable challenges facing the implementation of ontology-based CDSS. What are these challenges?

9. Page 8 line 279, please spell out 'ML technique' so readers can understand what it is.

Authors’ responses

Thank you so much for your comments.

4. This study surveys the wearable CGM sensor technologies including commercial devices and research prototypes. They discussed the role of CGM to improve CDSS systems and big data analytics for personalized medicine. This paragraph has been revised in the manuscript to reflect the findings.

5. Section “2.1 Diabetes and mobile health” has been revised to highlight the limitations of the current MH studies, especially for diabetes management. In addition, the flow of ideas in this section has been enhanced.

6. The study of Kan et al. is only related to the importance of personalized service in disease management. The paper has a great interoperability limitation as the authors asserted in their paper in Section 4.2. Our manuscript has been changed to assert this limitation. This reference has been added as a step towards ontology importance. The manuscript has been revised to add the limitation of this study.

7. We used these ontologies because they are the most complete ontologies in the diabetes literature. Actually, these are our proposed ontologies for diabetes diagnosis and type 2 diabetes treatment. They are designed with interoperability and medical intuition in mind. As it is well-known, reusability is popular ontology construction practice. As a result, we decided to extend their functionality in the current study. The manuscript has been updated to assert this facts.

8. This paragraph has been changed to include the following challenges: “These challenges include how to extract medical knowledge from CPGs, how to formalize this knowledge as OWL2 axioms and rules, how to integrate sensor data standards with EHR data modeling
standards, how to collect patient profile from distributed hospitals in a standard form, and how to build complete TPs that can provide real-time and long-term assistance.”

9. The abbreviation for machine learning (ML) has been removed to reduce the number of abbreviations as suggested by you in a next comment.

Reviewer comments

Methods

Very detailed description of the development process. Well done.

Authors’ responses

Thank you for your positive comment.

Reviewer comments

Results

10. What are the results of evaluation by OOPS?

11. Table 6, how are the dimensions used to compare the existing ontologies developed?

Authors’ responses

Thank you so much for your comments.

10. After careful design of FASTO and checking its consistency by multiple ontology reasoners, we submitted the ontology to the OOPS to check for any pitfalls defined by this tool. The OOPS did not suggested any pitfalls to handle.

11. We checked if the ontology author has handled each of the suggested metrics or not. We used Yes/No to encodeHandled/Not-handled metric, respectively. We counted the number of handled point, and compared the ontologies accordingly. As it can be seen in Table 6, FASTO achieved the highest coverage of all of the compared ontologies. This paragraph has been updated to include the comparison methodology.
Reviewer comments

Discussion

Discussed the implications of the findings in context of existing research and highlighted limitations of the study.

Authors’ responses

Thank you for your positive comment.

Reviewer comments

Conclusion

The whole study is well summarised and future research directions are identified.

Authors’ responses

Thank you for your positive comment.

Reviewer comments

The abbreviation issue:

12. Page 4 line 118-128, the abbreviations SSN, BFO, FHIR and CPG are used for the first time and should be provided with full names.

13. Many abbreviations that have been used before were spelled out in the Discussion section as if they were used for the first time.

14. There are many abbreviations used throughout the manuscript. Please consider to use full names for abbreviations used less than four times.

Also, please provide a list of abbreviations at the end of the manuscript.
Please conform with the reference style of BMC Medical Informatics and Decision Making

Please improve the resolution of figures.

Authors’ responses

Thank you so much for your comments.

Full names for all abbreviations have been added.

Repeated abbreviations in Discussion Section have been deleted.

We have removed some abbreviations as suggested including ML, ICT, KaaS, OGMS, DL, VSO, STO, SBAN, CDB, FTE, CQs, and FMA. For these abbreviations, we used the full names.

The reference format of the manuscript is now according to the Vancouver reference style used by BMC Medical Informatics and Decision Making Journal. We used Mendeley Software to automatically manage our references format.

The resolution of all figures has been improved.