Author's response to reviews

Title: Developing an Electronic Health Record (EHR) for Methadone Treatment Recording and Decision Support

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Author's response to reviews: see over
Editor-In-Chief

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Dear Editor-In-Chief,

We are very happy that you liked our manuscript and we thank the Reviewers for their positive and constructive suggestions. As requested, we have now revised the paper accordingly and addressed all commentaries below, point by point. We also made amendments as highlighted (“track changes”) as in the Revised Version of the manuscript.

Please, find enclosed now the Revised Version of our paper entitled “Developing an Electronic Health Record (EHR) for Methadone Treatment Recording and Decision Support” by Xiao L and collaborators for publication in your Journal (MS: 4853068524475975).

We hope that you will find it now suitable for publication and we look forward to your further feedback.

Sincerely yours,

Dr Borislav D Dimitrov, MD MSc SMHM DM/PhD

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1) Replies to comments by Reviewer 1 (E Hovenga)

1. There are some HER acronyms that need to be changed to EHR
   
   Response: The ‘HER’ was found in the title of the document and on page 7 and in both instances it has been changed.

2) Replies to comments by Reviewer 2 (P Knaup)

1. The autocorrection function has sometimes changed ‘EHR’ to ‘HER’
   
   Response: The ‘HER’ was found in the title of the document and on page 7 and in both instances it has been changed.

2. Mention the problem-oriented approach in the abstract.
   
   Response: The abstract has been amended to mention the problem-oriented approach in the development of the EHR.

3. I did not understand why it is easier to integrate a knowledge-based function into a problem-oriented EHR.
   
   Response: The rational behind the problem-orientated approach was to develop an extensible model that could capture information based on logical areas within a clinical record. By organising problem parts separately this can improve the extensibility of a system enabling reuse and allowing the model to be adopted in different circumstances. As discussed in the paper, the opioid dependence is only one problem which arises in methadone maintenance treatment; the urine sampling is another issue to ensure the patient is not using heroine concurrently.

   In the the proposed problem-orientated EHR models the clinical encounter is presented in terms of Observation, Evaluation, Instruction and Action and all of them are entry subtypes of the main part of the openEHR reference model. The mapping between archetypes and the actual clinical encounter (History and symptoms, Diagnosis, Prescribing and Treatment Plan) enables the EHR to integrate with the clinical workflow by providing a good logical mapping between clinical workflow and archetype definitions. This flow can be seen in the example Chart 2 below, i.e., the knowledge-based functions can be integrated between the different nodes in the clinical workflow enabling the integration of either evidence-based or guideline-based knowledge to assist the clinician during the clinical encounter. In particular, the
main ease of integration is due to the EHR model’s structure being similar to the processes involved in a patient encounter.

4. **Why didn’t you work with the openEHR reference model?**

**Response:** This area needs further explanation and we have added some architectural information to the Revised Manuscript to ensure the concepts are more clear (please refer to section ‘Overview of the open standards’ on page 5). A key concept that is built into the openEHR architecture is the separation of computer “information” from real-world clinical “knowledge” by use of a paradigm known as “2-level modelling”. The first level of modelling is the “information” layer that is implemented in the reference model, and the second level of modelling is the “knowledge” layer implemented in the archetype model. The Reference Model consists of generic information system building blocks upon which the actual information system objects are entirely built. The clinical knowledge is implemented using the Archetype Model and is completely separate and not implemented at all in the actual information system software itself (see, for example, Chart 1 below).

![Chart 1: The OpenEHR Health Computing Platform](http://www.openehr.org/svn/specification/TAGS/Release-1.0.2/publishing/architecture/overview.pdf)

All information in the openEHR is expressed as an instance of a class in the entry package. An **ENTRY** instance is logically a single ‘clinical statement’ - these classes are one of the most important set of classes in the openEHR reference information model. The Chart 2 below gives
an overview of the mapping between observation, evaluation, instruction, action and the clinical equivalents.


5. Please explain in more detail how you handle information spanning several problem areas (mentioned in level 1).

Response: We agree that more information is needed to provide clarity on this point, and we have added a paragraph to that section (please refer to page 8 in the Revised Version of the manuscript).

6. The formula in the description of level 1 is not helpful and might be deleted. Is really for each ICPC2 chapter a section available in the EHR?

Response: The formula has been removed from the Revised Version of the manuscript.

The EHR is required to model the informational content for each ICPC2 chapter. As an example, the ICPC2 chapter “P” relates to “Psychological” and subsection “P19” relates to “Drug Abuse”; in this instance a potential archetype openEHR-EHR-OBSERVATION.substance_use could model the required information which would be part of the EHR.

7. Following interviews with a GP... – really just one?

Response: There were few interviews conducted with GPs who have significant experience in methadone treatment. It was intended to express not singular, but plural thus meaning the type
of the specialist as a “GP” but not their number. It has now been corrected to read in plural as “GPs” in the Revised Version of the manuscript.

8. I miss information about the state of the project. Is the EHR already in routine use? Who are the users? How many institutions participate?
Response: The project currently is still at the development stage.

9. Which tools were used for implementation?
Response: We have added now this information to the Revised Version of the manuscript (please refer to page 10 and page 12)

10. Please discuss the limitations of your approach and compare to alternative solutions.
Response: We have added this information to the Revised Version of the manuscript (please refer to page 16.