Author’s response to reviews

Title: Staff expectations for the implementation of an electronic health record system: A qualitative study using Normalisation Process Theory

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Dear Editor,

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Thank you for your response and the opportunity to revise our paper on ‘Staff expectations for the implementation of an electronic patient record system: A qualitative study’. The suggestions offered by the reviewers have been immensely helpful for revising the different aspects of the paper.

Please find below our response to reviewer’s individual comments, which are cross-referenced to alterations that have been made to the manuscript file with tracked changes, identified by line and page number. We have also added a number of minor changes to the text to improve clarity. The revisions have been approved by all four authors. The changes that have been made to the manuscript are shown in tracked changes in the manuscript attached, and a clean revised manuscript has been submitted online. Please note that in response to reviewer comments we have changed the title of the manuscript to ‘Staff expectations for the implementation of an electronic health record system: A qualitative study using Normalisation Process Theory’.

We believe that the changes that have made to the manuscript have produced a stronger, more robust paper and hope the revised manuscript will better suit the BMC Medical Informatics and Decision-making Journal but are happy to consider further revisions, and we thank you for your continued interest in our research.

Yours Sincerely,

Carolyn McCrorie
(On behalf of the authors)
Reviewer Comments, Author Responses and Manuscript Changes

Reviewer 1

Comment 1: This paper is about expectations of an EPR, not about how it turned out. It is always more useful to see how well things worked, not just how well they are expected to work. For example, there is quite a lot about potential adaptation, but what really matters is what needs to be adapted and what is adapted. Adaptation often creates problems as well as benefits. This adaptation may include changes to the EPR or to supporting arrangements or job roles.

Response: We thank the reviewer for their summary of the purpose of this paper and for highlighting that the focus is on potential adaptation. Our measurement framework was developed from the theoretically informed Normalisation Measure Development Questionnaire (NoMAD) instrument, which has a wide range of purposes, including how an intervention impacts work and also expectations about whether it could become a routine part of their work, and we have changed the cited references to show more clearly how this and the NPT implementation toolkit informed an exploration of staff expectations prior to hospital-wide EHR roll-out [Methods section, line 179-180, page 8]. We have also ensured that the focus on expectations of an EHR is made clearer in the abstract through changes to the text [Abstract, line 31, page 2]. We agree with the reviewers’ comments that a further contribution can be made by exploring how well the implementation of the EHR worked and have made changes to the recommendations section to show more clearly how our findings can inform implementation strategies [Recommendations section, line 615, page 27], and the need for further site study to explore success criteria for implementation from a wider sociotechnical perspective [Recommendations section, line 622-626, page 27].

Comment 2: The site and system are deliberately anonymous, but it would be more interesting if both were specified, especially in an open access journal. Can this be reconsidered? There is little if anything here that is potentially sensitive.

Response: We are grateful for this comment as it points to the importance of context in EHR implementation, which concerns the limits of generalisation in study findings. The site and system are deliberately anonymous due to the nature of informed consent sought from study respondents and the approved process for participation. To further balance the implications of our findings with the potential limitations of single-site studies, we have changed some of the text in our description of preparing for EHR use [Methods section, line 148-160, page 7], made more clear how our study findings relate to the wider sociotechnical processes of implementation of digital technologies [Strengths and Limitations section, line 616-622, page 27], emphasised the requirement for longitudinal studies to investigate sustainability and scaling up [Recommendations section, line 634-635, page 28] and recognised the potential role of NPT to explore local contextual factors and compare implementation elements across different settings [Recommendations section, line 635-637, page 28].

Comment 3: Introduction. The NPfIT deserves no credit for the implementation of GP computing, which was achieved in the 1990s. See for example, Benson T. Why General Practitioners Use Computers and Hospital Doctors Do Not, https://doi.org/10.1136/bmj.325.7372.1086 and https://www.bmj.com/content/325/7372/1090.1. These papers were originally written as advice to NPfIT. Given that NPfIT spent £12Bn or more, describing expenditure of for example £0.5Bn as being costly seems to be out of context. This paragraph needs to be re-written.

Response: We are grateful to the reviewer for clarification of facts and apologise for not making clear
the remit of NPfIT. We have changed the text in this paragraph to more accurately describe implementation success in GP practices as compared to secondary care [Background section, line 54-57, page 3].

Comment 4: I would not describe a report written before 2014 as being recent. It is not clear which reference is the review.

Response: Thank you for catching this confusing error, which we have now corrected. We have adjusted the text and made changes to relevant references [Background section, line 71-72, page 4].

Comment 5: I am a fan of Greenhalgh's NASSS framework which encompasses much of NPT (ref 43). I would like it to have been explored more. There is no reference to Greenhalgh's contention that complexity (at multiple levels) is the core problem. This paper is focused on the concerns of clinical users, which is only one level (users) of Greenhalgh's seven.

Response: We agree that Greenhalgh’s NASSS framework should be explored more and have taken the reviewer’s advice to show more clearly how our use of NPT to explore the expectations of clinical users of EHR sensitises to one level of complexity. We have corrected the reference to the NoMAD framework and the NPT implementation toolkit [Methods section, line 179-180, page 8]. We have revised our discussion on the limitations of our work to emphasise the complexity of the broader processes of sociotechnical change, and improved our focus on the usefulness of the generative mechanisms of NPT for exploring the dynamics of human agency [Strengths and Limitations section, line 605-611, page 27]. We have also improved our recommendations for future work which encompasses the NASSS framework to explore success criteria for implementation [Recommendations section, line 622-626, page 27].

Comment 6: I would have expected NPT to be referenced at first mention. NPT focuses on the work that people do, but this paper focuses on what people think they will need to do. This distinction needs to be discussed.

Response: Thank you for highlighting that the distinction between work that people do and what people think they will need to do has not been made clear in the paper. As well as the changes to the abstract in our response to an earlier comment from the reviewer [Abstract, line 31, page 2], we have taken the reviewer’s advice and added to the Strengths and Limitations section to clearly reflect this distinction [Strengths and Limitations section, line 597-598, page 26].

Comment 7: This paper is heavily focused on the NHS. International audiences need to be considered.

Response: We agree that international audiences need to be considered and your suggestion is similar to the second reviewer. We have changed the title of the manuscript and have revised the text throughout to reflect an international readership.

Comment 8: To what extent is the measurement framework based on NoMAD or the NPT implementation toolkit?

Response: Thank you for questioning the extent to which the measurement framework was evidence-based, which was not made clear in the original manuscript. We have changed the cited references in the Methods section to more accurately reflect references that informed the development of the topic guide [Methods section, line 179-180, page 8].
Comment 9: NPT is a useful tool, but it covers only some aspects of innovation. It might be helpful to mention digital confidence, innovativeness, user experience, behaviour change and so on. See for example https://informatics.bmj.com/content/26/1/e000018.

Response: Thank you for reminding us about the usefulness and limitations of NPT as an evaluative tool. We agree that it would be helpful to mention the broader complexity in EPR implementation and have discussed this as a limitation of our work, with recommendations for future study using the NASSS framework [Strengths and Limitations section, line 605-611, page 27].

Reviewer 2

Comment 1: Thank you for allowing me to review this manuscript. This work utilized the Normalization process Theory (NPT) framework to assess readiness and expectations prior to an EPR implementation.

Response: We thank the reviewer for summarising our manuscript. We agree that it is important to emphasise that a novel contribution of our work is the use of NPT to assess expectations prior to EHR implementation and so we have strengthened this aspect by adding NPT into the title of the manuscript. Similar comments were made by the first reviewer and in response to this we have added to the cited references to NPT [Methods section, line 179-180, page 8], and strengthened the abstract [Abstract, line 31, page 2] and discussion through making more clear the distinction between work that people do and what people think they will need to do, and more carefully considered the limitations of our work within the broader complexity of sociotechnical change [Strengths and Limitations section, line 597-598, page 26].

Comment 2: Background: In general, the background provided adequate support for this work. I struggled a bit with the term "electronic patient record (EPR)" which is not commonly used outside the UK.

Response: Thank you for pointing out that the term EPR is not commonly used outside of the UK. We have changed the title of the manuscript and have revised the text accordingly to describe the system as EHR.

Comment 3: Methods: The primary methods used were face-to-face structure interviews which many studies have done previously. This cohort was only 14 clinicians and staff which seems a bit small to generalize the results. The novel part of the methods we using the NPT framework. Methods mention "snowball sampling" which will cause bias in the cohort by reducing randomization in the cohort.

Response: Thank you for noting that the small sample size limits the ability to generalise the results and the recruitment method may have introduced bias in the cohort. We have changed the text in the Strengths and Limitations section to more accurately describe this limitation in response to this comment [Strengths and Limitations section, line 587, page 26].

Comment 4: Results: Themes were obtained from the interview recordings and categorized under the NPT framework. Results were described in detail and well organized. May be beneficial to include a table or graphic for an overview of the themes rather than text.

Response: Thank you for your assessment and for reminding us how important it is to present material in a concise and readily accessible way. We agree that a table would be better if it is included as an
overview of the themes and have adapted additional file 2 for use within the manuscript [Results section, line 204, page 10].

Comment 5: Discussion: The discussion summarized the themes and discussed the impact of using the NPT framework.

Response: Thank you for this observation. We aimed to summarise the themes in relation to existing literature and add to this body of knowledge through discussing the strengths and limitations of using the NPT framework. In response to this comment and similar comments from the first reviewer, we have strengthened our discussion on the merits of NPT [Strengths and Limitations section, line 605-611, page 27].

Comment 6: Overall: The format of doing interviews or focus groups prior to a technology implementation is not new. Much work has been done assessing the impact on users of EHR/EMR/EPR implementations. The novel part of this work is using the NPT framework. I'd like to see more emphasis on that part of the study overall.

Response: We are grateful to the reviewer, and similar comments from the first reviewer, for highlighting the novel part of our work in using the NPT framework. We agree that more emphasis is required and have made changes to the following sections in response to these comments [Strengths and Limitations section, line 597-598, page 26], [Strengths and Limitations section, line 605-611, page 27], [Recommendations section, line 622-626, page 27].

Reviewer 3

Comment 1: The manuscript reports a study which explores the contextual and human factors that account for the high failure rates of implementation of Electronic Patient Records (EPR) system in hospitals globally. Based on experience of EPR system implementation of an NHS teaching hospital trust in Northern England as a case study, a Normalisation Process Theory framework is employed to identify the key factors that tend to account for the failure. The strength of this manuscript lies in the methodology employed and qualitative approach used to analysing the data collected, which provided a lot of insight into the issues related to EPR system implementation in hospitals.

Response: Thank you for your careful reading of our manuscript. We are grateful to the reviewer for summarising the strength of the methodology employed as a useful approach to gaining insights into human factors associated with EHR implementation.

Comment 2: Findings were backed by relevant quotes from the interviewees, which make it a very well written manuscript and interesting to read.

Response: Thank you for your assessment. We were keen to ensure that our reported findings were embedded within participant accounts and the reviewer’s comments are extremely useful. We have improved the presentation of our findings through adding a table summarising themes, as was suggested by the second reviewer [Results section, line 204, page 10].

Comment 3: Given that about 5000 users are estimated to use the EPR system at the hospital where the study was carried out, a sample of 14 respondents may not be representative. This has however been acknowledged by the authors.
Response: We thank the reviewer for their comments about representing views from a larger sample of users. Sampling was theoretically informed in accordance with qualitative research practices, to maximise variation in stakeholder perspectives. We have strengthened our acknowledgement of this limitation in response to this comment, and a similar comment made by the second reviewer to more accurately describe this limitation [Strengths and Limitations section, line 587, page 26].