Author's response to reviews

**Title:** Use and Satisfaction with Key Functions of a Common Commercial Electronic Health Record: a Survey of Primary Care Providers

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**Author's response to reviews:** see over
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BMC Medical Informatics & Decision Making

Dear Editor(s),

Re: MS: 9417634639065545

Title: Use and satisfaction with key functions of a common commercial electronic health
record: a survey of primary care providers

Authors: Anil N Makam, Holly J Lanham, Kim Batchelor, Lipika Samal, Brett Moran,
Temple Howell-Stampley, Lynne Kirk, Manjula Cherukuri, Noel Santini, Luci K Leykum
and Ethan A Halm

We appreciate the opportunity to revise and resubmit our manuscript for consideration
as an original research article. Attached please find an amended version of the
manuscript with changes highlighted in yellow and a point-by-point response to the
referees’ comments below. We are pleased that the referees agree that this manuscript
will be a valuable contribution to the literature in this field.

We are grateful to the referees for their thoughtful and insightful suggestions. We feel
that the manuscript has been strengthened by their comments. Please let us know if
there are any further questions or clarifications about this paper. Thank you for your
willingness to consider our manuscript for your journal.

Sincerely,

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Comment 1 (Introduction): The background section is rather thin; consequently, it is difficult to determine the contribution of this paper given existing research. For example, research already exists documenting physician satisfaction with various components of EHRs (see, for example, Menachemi et al., 2009, Elder et al., 2007). Similarly, research exists that documents time spent using EHRs, and that information overload due to EHR exists (see for example, Murphy et al., 2012). What gaps in the existing literature does the current paper seek to address?

The introduction section has been amended as suggested. The gap in the literature we sought to address was examining providers’ use and satisfaction with a broad range of key functions of the EHR among clinicians in three different health systems and two primary care specialties experienced in the use of the most commonly used commercial EHR. In the interest of space, we felt we could not include in the introduction the issue of time spent documenting in the EHR since this was not the primary focus of the paper. We do however address the relevant prior literature on this topic in our discussion (page 14, paragraph 2). The study by Murphy et al. answers an important question on time providers spent processing EHR notifications and alerts, but does not examine time spent completing out-of-visit documentation. For this reason we chose not to include this reference.

Comment 2 (Introduction): Along similar lines, the study needs a conceptual model. A theoretical model, such as Venkatesh’s Unified Theory of User Acceptance of Technology could have killed two important birds with one stone: (a) it could have helped place the contribution of this paper in the existing literature more effectively, and (b) it would have helped guide methodological decisions about appropriate predictors of being a structured documenter (one of their major analyses in the paper) – see my comment below on this analysis.

We thank the referee for her suggestions of how to better contextualize our contributions. Our analysis of structured documentation was secondary to our primary goal of simply describing PCPs’ use and satisfaction with key functions in the EHR. We agree that better framing of our conceptualization will help illustrate our methodological decisions. We addressed these appropriate concerns in our methods section (see below).

Comment 3 (Methods): More detail is needed on the development of the survey, as this is their singular means of data collection. How were items developed? Was it pilot tested before deployment? What psychometric analyses were performed to ensure reliability? See for example, Singh et al. 2012 for a nice example of the amount of detail required when reporting results of a study using a custom developed survey as the primary means of data collection.
The methods section concerning survey development has been amended to include more detail. Because items in the survey were very straightforward patterns of use and simple opinions (satisfied/dissatisfied) about the EHR, we did not undertake formal psychometric analyses.

Comment 4 (Methods): The authors state they used a stepwise backward elimination algorithm to select the appropriate predictors of EHR patterns of being a structured documenter. Stepwise approaches to regression are known to capitalize on chance, especially on small sample sizes such as this one (Tabachnick & Fidell, 1996). As mentioned earlier in my comments, a more theory-based approach to selecting predictors would have addressed this concern.

We agree that selecting predictors a priori based on prior literature or a conceptual framework can minimize type I errors. The candidate predictors we selected were largely based on existing literature, including the Unified Theory of User Acceptance of Technology. We included this information in the methods section.

Comment 5 (Results): A summary table of results of the logistic regression is needed. Figure 2 nicely depicts the probability of being a structured documenter based on the results of the logistic regression; however, a table is needed showing the initial variables entered in the model, the final set of predictors, and the parameter estimates and significance, in order to evaluate the robustness of the model.

As requested, we have included as appendix table 1 the results of univariate logistic regression models and the final set of parameters for the multivariate model.

Comment 6 (Results): This is more of a presentation issue; however, it bears mentioning as it impacts the substance of the manuscript. The results described in the text (pp. 8-11) could have easily been reported on a single table, and referred to in the text, rather than described one by one in the body of the manuscript.

We tried presenting our descriptive findings in a table in an earlier version of the manuscript, but it came across as disjointed and awkward when combing multiple functions of the EHR where certain questions were satisfied/dissatisfied and others were agree/disagree. We feel it flows better (and with less redundancy) to just describe them in text form.

Comment 7 (Results): The authors report on satisfaction on all EHR functions except the encounter note. Was this by design?

In retrospect, given the varied documentation styles, it would have been interesting to ask whether providers were satisfied with EHR documentation capabilities. However we did not include this item in the survey, so unfortunately
we do not have any data to report on respondents’ satisfaction with the encounter note.

Comment 8 (Discussion): Because the stage was not set in the introduction, it difficult to gauge the impact of the results and the validity of the authors’ conclusions. For example, the authors state in the discussion that they “identified important variability in providers' use” with many core EHR functions. Why is this finding important? Many software programs deliberately have multiple ways of accomplishing a task, precisely because manufacturers know user preferences and proficiencies vary. In reaching this conclusion, are they implying that there is one best way to use the functions of an EHR? In general, the discussion in this paper needs to make the link between their results and implications more explicit.

As suggested, we have added to the discussion section more consideration of the variability in EHR documentation styles (page 12, paragraphs 2-3). We agree with the referee that our findings do not imply that there is a single best way to use the EHR. The contribution that our manuscript adds is the identification and awareness of the variability in providers’ use and satisfaction of specific EHR functions. In our discussion, we explained why such variability may be potentially ineffective and inefficient with respect to documentation of notes, health prevention, and the problem list.

REFEREE 2

Comment 1: This is a well written article and provides a solid example of how clinicians are using EHRs for documenting key primary care processes. The manuscript highlights in detail the challenges that prevent the optimal use of information systems that will eventually be necessary for advanced models of primary care, e.g., documentation to be shared across health settings or clinicians for health information exchange and continuity of care. Though the study population is limited to one specific EHR software solution, the depth of information of how clinicians are using specific documentation features is helpful for practice managers in anticipating potential practice needs for effectively using the EHR, such as additional training or workflow redesign, and for policy makers or stakeholders to structure payment or align incentives for further progress.

The authors are pleased that this referee finds that our manuscript highlights important findings.

Comment 2: I would suggest publishing the survey instrument as an appendix (assuming the instrument is not proprietary or copyrighted) so that others could potentially use the same instrument and adapt the items to their EHR solution. Results
from the surveys could allow for additional comparison between Epic with other software with regards to specific documentation habits and the time it takes to do so.

We would be happy to include our survey instrument as an electronic appendix or having it available upon request. Of note, our survey was designed solely for specific functions of the Epic EHR. Items in the survey would need to be modified or completely rewritten to be pertinent to other EHR software.

**Discretionary comments:** If the authors are also targeting the ONC/REC audience, it would be helpful to provide additional information from this study’s respondents and their achievement, or lack thereof, of the meaningful use objectives. Below are some suggested areas the authors could address to boost the study’s relevance to this audience if data are available or easily accessible. Is there motivation for these clinicians to be entering patient information in structured fields? Were the respondents in this study eligible for meaningful use? Epic users tend to be part of larger integrated health systems that may not be eligible for MU incentives – is this group less likely to focus on documentation as they may not be motivated by the incentives?

If this group of providers is eligible for MU incentives, have any of the respondents successfully achieved Meaningful Use Stage 1? Despite the challenges outlined in the manuscript, have some of the providers in the setting met the meaningful use objectives? For those that haven’t met MU stage 1, is there a correlation with the challenges the authors observe in documenting in structural fields? As the ONC continues to work with EHR vendors to identify standards around usability, functionality, and other software utility to drive improvements in health care, it would be helpful if the authors could comment on whether the challenges observed could eventually be resolved with more training/time on the EHR/new incentive structure, or if there are barriers in which only changes in EHR technology will resolve.

The referee raises important questions about providers’ motivations with regards to meaningful use incentives. This survey was conducted early in the institutions’ process of achieving institutional meaningful use certification and providers were unaware of and insulated from the specifics of this institutional process. Additionally, there was no talk about financial incentives to individual providers in the respective health systems related to meaningful use certification. For these reasons, we do not believe that federal meaningful use initiatives influenced the use of the EHR by our primary care provider respondents or their attitudes about as ascertained by our survey at the time we administered it.