Author’s response to reviews

Title: Electronic Health Records in Outpatient Clinics: Perspectives of Third-Year Medical Students

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Author’s response to reviews: see over
Reviewer #1 – Robert Wu

General comments:
“The authors created a survey on the impact of an EHR on learning. They surveyed third-year medical students and obtained 33/53 completed questionnaires. Survey results are given.”

“Other notes: Single site, single system, small sample size.”

- We have acknowledged these as limitations in the revised manuscript (page 12).

1. Is the question posed by the authors new and well defined?
   Yes, appears new.

2. Are the methods appropriate and well described, and are sufficient details provided to replicate the work?
   Yes

3. Are the data sound and well controlled?
   The sample size is small. Response rate was 62%.

- These have been acknowledged as limitations in the revised manuscript (page 12).

4. Does the manuscript adhere to the relevant standards for reporting and data deposition?
   “The manuscript (Table 1) should show more information than the aggregate of Strongly Agree, Agree. Would be interesting to see negative effects of EHR? For example, 69% responded to either neutral, disagree, strongly disagree to the last question. Was it mostly neutral or strongly disagree?”

- As suggested by the reviewer, we have expanded the Table 1 by including neutral, disagree, and strongly disagree responses in a separate column.

Minor Essential Revisions

1. “As mentioned in question 4 above, putting in more details on the results of the survey would be useful.”

2. Although there is limited information on ambulatory medical student experiences with EHRs, it would make sense to incorporate the recent review article on EMRs and impact on resident and medical student education – Acad Psych Nov-Dec 2006. Of note, the manuscript could include info on previous research conducted on inpatients. While this review was not published until after this study, some of the primary studies may have helped with questionnaire generation.
   - We have included the findings of the review article in the background section of the article (page 4, reference #10)

3. Was accessing guidelines usable – (for a patient with heart failure, here are the recent AHA guidelines or was it a IIE link to guideline clearinghouse of all thousands of guidelines)
- We have added a paragraph outlining features of Centricity, including how students accessed guidelines (page 5).

Reviewer #2: Nancy H Tannery

General Comments:
“This paper looks at third year medical students attitudes towards using an electronic health record. Studies about perceptions and use of EHR are timely. Although this is a small study, it does provide some interesting information about medical students use of an EHR as part of their clinical rotations. The abstract accurately reflects the content of the paper. The survey instrument is not validated but was well constructed. The authors do a good job of addressing the limitations of the study.”

- We acknowledged that we did not use an existing survey instrument, although, we believe it had reasonable face and construct validity.

Major Compulsory Revisions:
“Although table-1 is useful in the paper it could be better organized. I would suggest that within each construct the items are listed in descending order by %. The first 3 constructs are organized this way. However the last three constructs are not, requiring the reader to do the sorting themselves.”

- We have reorganized the items in Table 1 as suggested by the reviewer.

Reviewer #3: Richard Hillestad

General Comments:
“The authors correctly surmise that there is a paucity of information about the impact of the EHR on medical education. This paper attempts, through a survey of 3rd year medical students who have had some limited experience with an EHR, to help to fill that gap.

The results of the survey are not surprising and reinforce some of the literature about issues and benefits of an EHR in clinical care. Nevertheless, it is probably useful to add these results to the general literature about EHRs.

The primary concerns I have about the survey and conclusions is that it is a relatively limited sample and pertains to one specific EHR at a certain stage of implementation and with limited training of the students. So, we do not know how much the design of the specific EHR has affected the results, how much the limited training has affected the results, and how much the setting and process around the EHR has affected the results. For example, one of the more important observations is the potentially negative impact that working with the EHR in the presence of the patient has on physician-patient communication. Others have made this observation, but it also seems to depend on the communication ability
of the physician—good communicators seem to do just fine with an EHR in hand, but poor communicators tend to use the EHR as a crutch and it inhibits direct communication. I would want to find out what there was about the use of the specific EHR that inhibited communication. Some follow-up questions in a second survey would be useful. In fact, one useful output of the paper would be suggestions on how the survey might be improved. My suggestion would be to ask questions that get to a finer level of detail—Why was it easier to find essential information in the EHR? How did the prompts lead you to ask more history questions or order more preventive services, etc.?

The papers authors indicated a desire to show the effect of the EHR on the clinical education process, but most of the questions and results focus on the EHR and usefulness in clinical practice. What did the students learn about working with an EHR relative to not having an EHR? What changes in the clinical process were necessary with an EHR? What things were easier with an EHR? What features of an EHR would you want in your own clinical practice? What kind of training is necessary to use the full capabilities of an EHR?, etc.

The ease of use and incentives for use of an EHR depend heavily on the design and features embedded in it. A little more commentary about the specific EHR and implementation would provide the readers of this article additional, useful perspectives.

In general, the article should be publishable with some revisions and additions as suggested above.”

- We agree with the reviewer that the design of and training with an EHR may influence how learners perceive the utility and benefits of an EHR. Clearly, there is a learning curve to it, and EHR-related clinical work-flows may impact clinical behaviors and work processes in an office setting, all of which have the potential to influence learner satisfaction and perceptions about EHR. As the reviewer pointed out, an EHR has the potential to impact doctor-patient communication among physicians. We were interested to explore the extent to which medical students, who are typically expected to do detailed history and examination, view EHR-related tools as facilitating to learning and patient care. Our data from the survey, drawn from a small sample of students in a single institution, can not be conclusive; we hope that this should stimulate further research. We have acknowledged these points as limitations (page 12).

Reviewer #4: Peter Embi
General comments:
‘The authors have performed a survey of medical students at one institution that highlights students’ perceptions of EHR-use and its impact on certain educational activities. As the authors point out, this is an area that has received relatively little attention in the literature and they do a good job of positioning their contribution in this context. Their findings add to the limited literature in this arena and should
be of interest to those involved in educating medical students in the EHR-era.
Having said that, there are some adjustments and additions that I feel would
strengthen the manuscript and would help to clarify the meaning of the findings
described; I have outlined these in the sections that follow.”

Major Compulsory Revisions:
“Under survey design, the authors indicate that they conducted a focus group to
inform survey development and present the thematic findings that emerged. Has
this thematic analysis been presented elsewhere? If so, a citation should be
added. If not, then a bit more description of what underlies these themes,
including categories and representative comments as well as a bit more about
how the focus group was conducted/analyzed should be added. A table could
suffice for much of this.

- We conducted the focus group to help generate themes for our survey. We did not
intend to publish the findings of the focus group either. We have refined the survey
design section of the manuscript by providing additional information about the focus
group (page 7).

If available, please include more detail about how many/which respondents used
tablet or desktop as this may have significant impact on their responses and
reporting this and/or breaking out results according to this parameter would be
informative.

- All students attending Family Medicine clinics (half of the study participants) used
Tablet PCs while students attending Ambulatory Medicine clinics worked with desktop
computers. As the reviewer suggested, students’ perceptions of EHR and their
interactions with the EHR and patients could have varied, whether or not they were
using a Tablet PC or desktop computer. We did not observe the students in our study.
Given we included a small number of students, we likely could not have found
significant differences between the two groups had we presented such data. ( added as
a limitation on page 13)

Need more detail as to the EHRs capabilities, the use of particular clinical
decision support features, etc. As I’m sure the authors recognize, one EHR
implementation doesn’t equal another EHR implementation, even using the
exactly the same EHR software. So, in order to put the findings into the
appropriate context and draw appropriate conclusions about these students
impressions of how EHR vs. Paper-based records impacted their questioning of
patients, thought processes, etc. we must know more about both the
paper-based and EHR-based interventions/procedures. There seems to be a
disconnect in the manuscript with regard to this point. In the methods section,
there is the suggestion is that there were no alerts/tools used given the mention
of “limited” data being presented at the time of the study. However, in the
discussion, mention of “prompts” and “alerts” are included. It would strengthen
the report to mention, in particular, did the system deliver/students experience
prompts/alerts? What were they? How were they used? Did they appear for the physician and the student or just the student? What about the Paper charts? Did they use any paper-based decision support tools in the environments where these students practiced?

- We added a new paragraph in the methods section (page 5, 2nd paragraph under Settings and Subjects). In it, we have included and addressed key points identified by the reviewer.

Did the questionnaire explicitly ask the students to compare EHR to paper? Presenting the full questionnaire as a figure/table would be helpful. If the questions are exactly as written in current Table 1, then state so and refer to the table under the study design section.

- Yes, the questionnaire had 2 open-ended questions at the end, and one of which specifically asked students to comment on learning in an EHR-enabled setting, compared to an office with paper charts. We have added the two questions and select responses (Table 2) in the manuscript.

Results:
As the authors note, the response rate, though good for such a population, leaves open the possibility that responders and non-responders differed somewhat. To address such concerns by readers, please indicate what if anything was different about those who responded vs. those who did not. Important factors might include ultimate specialty preference if known, gender, reported experience with computers at time of survey if known, etc. If possible, a typical “Table 1” describing the demographics, etc. of the student-subjects would be useful.

- We did not analyze any demographic data for responders and non-responders. While we agree that such analyses could reveal interesting findings, we believe our sample size was too small to run meaningful sub-analyses of demographic data. Furthermore, this type of analysis (gender, ethnicity) would have violated students’ privacy, and would have not been compliant with our IRB procedures.

Regarding “feedback received” question, was this specified as feedback from supervisors? Having the full survey questions included would cover this and other questions related to the meaning of questions/answers.

- The “feedback received” question in the instrument refers to whether or not students received more feedback on their electronic notes than notes done in paper charts. In our practice setting, faculty would take over the electronic notes of the students, make necessary changes and then sign them. They could also forward the completed notes to students’ inboxes for their review, hence providing some feedback on note writing. This point has been added when we described patient care processes with Centricity (page 6, 2nd paragraph).
Although narrative comments were reported as being “too few” to perform thematic analysis, the proportion of respondents submitting them should be reported. Also, the comments should be presented, even if paraphrased, perhaps in a table.

- **We have added another table in the manuscript (Table 2) including select narrative comments from the students.**

Discussion:
“In the discussion, it is important to re-phrase comments as “reportedly”. For instance, the authors state that, “Our EHR interface contains icons for Internet and patient education materials, yet our students mostly ignored them in the midst of other activities.” This would be better stated as the students reported not using them more often. The question did not ask if they “ignored” these tools and they may have not used them despite attending to them. Perhaps they found them unnecessary or likely to be unuseful. Moreover, it is possible they did use them and just reported they did not. Direct observation or query of the EHR system for access events would be the “gold standard” for determining whether they were actually used. “Thus, the low reported use of such resources may simply reflect a developmental learning process. If the students had used the EHR for longer than 12 weeks, they may have learned to incorporate more online resources into point of care encounters.” Of course, this may not be true. It would be useful to cite any knowledge the authors have that physicians who have been in practice longer and have been using the EMR in fact do use such resources more often. Specifically, did the students’ mentors use such resources? Students often follow their teachers’ lead in this regard. Is anything known about attending physicians’ use of such features at the authors’ institution? In addition, any literature regarding the usage level of such resources by physicians who have been in practice for a while would be of interest. Also, the authors should indicate if the educational intervention specifically addressed the use of these features? If so, that should be included in the description of the orientation session, including how their use was mentioned/encouraged.

- **We have edited the discussion section to address the style of language as suggested by the reviewer. We have also included a number of points (Attendings’ EHR use, training on how to use features), as limitations (page 13). However, based on current literature, we believe that there is no correlation between length of EHR experience and use of EHR features.**

In addition to the comments above about clarifying the use of alerts, discussion around the impact of alerts on student “ordering” would also benefit from some clarification. In certain schools third year medical students are not able to enter orders using EHRs at all, while at others they can enter them and then have them co-signed. I assume based on the report that the case in this medical school is the latter. However, clarification of whether students can place actual “orders” in this environment or whether they suggest to the precepting physician which orders they “would” order, but leave the ordering to the preceptor is worth including. If the latter is the case, then the question about the impact of EHRs on
student “ordering” activity may underreport the actual impact of such alerts as some may have not reported a change to their ordering habits even if it did cause them to consider changes should they have that authority. Here again, having the actual survey question presented is important, although the results may still be difficult to fully interpret. That’s okay, but more discussion about the other possible meanings and limitations may be warranted.

- We have described how students interacted with the EHR in details in the methods section (page 6). The EMR did not have the order-entry mechanism built in it. Most of the times, our students would discuss pertinent laboratory tests with their attendings who then would order laboratory tests using paper requisition forms. We do agree that having a direct order-entry capability likely would have impacted student learning in an EHR-enabled environment. We have acknowledged that as a potential limitation (page 13).

Limitations section:
“While the content and face validity may be good, content of questions and how they are written/interpreted requires a different level of expertise than does coming up with what are the important topics.

The authors should probably also mention here the fact that these findings are simply reported findings from a survey, and that as with any self-reported findings, actual usage/experience data as could be obtained through other methods like direct observation or querying of the system may result in different findings.”

- We believe we developed the survey that has good content and face validity, and served our purposes well. This needs to be used in a larger sample of students for rigorous validation. As the reviewer pointed out, just like any other survey, our data are subject to self-report bias. We have included these points as limitations. (page 12)