Public Abstract
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Title:Determining the Impact of Usability Issues of Primary Care Physicians by Expertise When Using an Electronic Health Record

Background: EHRs with poor usability present steep learning curves for new resident physicians, who are already overwhelmed in learning a new specialty. This may lead to error prone use of EHR in medical practice by new resident physicians. The goal of this study is to identify usability-related and performance-related differences that arise between primary care physicians by expertise when using an EHR.
Methods: We compared usability measures after three rounds of usability tests Lab-based usability tests using video analyses were conducted to analyze learnability gaps between novice and expert physicians. Physicians completed nineteen tasks, based on an artificial but typical patient visit note. We used a mixed methods approach including quantitative performance measures (percent task success, time on task, mouse activities), a survey instrument: system usability scale (SUS), qualitative narrative feedback during the debriefing session, subtask analysis, and debriefing session with physicians.
Results: Geometric mean values of percent task success rates, time on task, and mouse activities were compared between the two physician groups across three rounds. Our findings show that there were mixed changes in performance measures and expert physicians were more proficient than novice physicians on some performance measures.

Thirty-one common and four unique usability issues were identified between the two physician groups across three rounds. Five themes emerged during analysis: six usability issues were related to inconsistencies, nine issues concerning user interface issues, six issues in relation to structured data issues, seven ambiguous terminology issues, and six issues in regards to workarounds.
Discussion and Conclusion: This study found differences in novice and expert physicians' performance, demonstrating that physicians' proficiency did increase with EHR experience. Future directions include identifying usability issues faced by physicians when using the EHR through a more granular task analysis to recognize subtle usability issues that would have otherwise been unnoticed. Also, exploring associations between performance measures and usability issues will also be studied. Training physicians to use the EHR may decrease difficulty of completing tasks in the EHR. Improving physician training may reduce the amount of workarounds created that may lead to workflow problems. These results highlight the areas of difficulty resident physicians with different experience levels are currently facing, which may potentially

improve the EHR training program and increase physicians' performance when using an EHR.