

Usability Challenges and Barriers in EHR Training of Primary Care Resident Physicians

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Abstract. Current EHRs require a large investment of resources for a user to reach a certain level of proficiency, which is a significant obstacle for new physicians who are not sufficiently trained by their medical schools. Beginning residents in primary care cope with a steep learning curve on EHR use due to EHRs with poor usability, which may lead to medical errors, and decreased quality of patient care. Identifying and addressing early barriers in the learning environment of residents while using an EHR can help improve overall capacity of the new physicians, and save costs for the organization. The goal of this study is to assess current usability challenges and barriers in EHR education and training program at the University of Missouri Health Care (UMHC).

1 Introduction

Primary care physicians (limited to family medicine and internal medicine in this paper) account for a majority of patient visits in a highly interruptive, time-pressured environment [1]. According to the Centers for Disease Control and Prevention, National Center for Health Statistics (CDC NCHS), in 2012, 72% of office-based physicians had use of an electronic health record (EHR) system in their practices [2]. An EHR is defined as a systematic digital record system that gathers a range of patient care data with the potential to enhance quality of health care. Recent research highlights the challenges of EHR implementation [3], which results in lower effectiveness [4], decreased efficiency [5], medical errors [6], and decreased quality of patient care [7]. These issues can be related to “usability”, “effectiveness, efficiency and satisfaction” [8]. Although training as a part of the EHR implementation process is critical, a survey shows that nearly 62% of clinicians were not satisfied with many of the best-known EHR systems, with support and training in EHR having the lowest satisfaction [9]. Current EHRs require a large investment of resources for a user to reach a certain level of proficiency (learnability), which is a significant obstacle for new physicians who are not sufficiently trained by their medical schools [10]. In this paper, we define “learnability” as “usability over time,” in that how usability improves after repeated use of the system [11].

Many institutions now offer exhaustive EHR trainings for their residents. However, finding sufficient time to train busy physicians, target training to users’ needs, and

provide hands-on, on-site support is a challenge [12]. Even though there exists minimal evidence based guidance for effective strategies to train residents on how to use EHRs for patient care [13], Kushniruk et al. examined the association between usability tests and EHR training at an urban medical center, and suggested potentially improving EHR training with usability evaluation [14]. The goal of this study is to assess current usability challenges and barriers in EHR education and training program at the University of Missouri Health Care (UMHC).

2 Method

In order to evaluate the current EHR education and training program, we employed three steps of evaluation strategy: (1) critical discussion with physician champion and EHR training specialists, (2) structural analysis of current EHR education and training program that are offered to resident physicians, and (3) measure of user perceptions on EHR education and training through post training survey from residents.

2.1 Setting

The University of Missouri Health Care (UMHC) is a tertiary care academic medical center located in Columbia, Missouri, with a total of 564 beds. With 626 medical staff at clinics throughout mid-Missouri, UMHc had an estimated 553,300 visits in 2012 [15]. The Department of Family and Community Medicine (FCM) is one of the largest clinical units of UMHc, with more than 70 primary care physicians and manages six clinics, while the Department of Internal Medicine (IM) manages two clinics [16]. In total, both departments admit an average of 30 residents each year into their residential program.

2.2 Electronic Health Record

UMHC's currently uses PowerChart® (Cerner Corporation, Kansas City, MO) and in 2012, HIMSS awarded UMHc with Stage 7 of the Electronic Medical Record (EMR) Adoption Model [17], which translates to complete transition from all-paper to all electronic patient records, use of Continuity of Care Documents (CCD) to share data, and data warehousing is used to analyze clinical data [18]. Less than 2% of hospitals nationwide have reached this advanced stage of EHR implementation [19]. Essentially all data at UMHc is captured in the UMHc database. Evaluating EHR learnability using the fully implemented EHR system within one of the most wired health care setting makes this study ideal to achieve the goal we desire.

3 Results

This section divulges the results from the critical discussion with both the physician champion and EHR training specialists then gives a structural analysis of current EHR

education and training program that are offered to resident physicians at the University of Missouri Health Care. There are five EHR training specialists employed as the EHR training team under the Center for Education and Development (CED). The EHR training team develops and administers Web-based training, manages a training database to permit class registration, and provides training to all new staff and clinicians who will be utilizing the EHR at UMHC. There are two parts of EHR training that 1st year primary care residents are required to complete when they start their residency. The first are eighteen inpatient and thirteen outpatient online lecture modules that introduce the basic functionalities of the EHR (e.g., adding diagnosis, document patient summary, entering orders, medication reconciliation) which takes approximately three hours to complete. The second are two sets of instructor-led, in-class, competency training sessions, where the residents get hands-on practice by performing short, scenario-based tasks, designed to use EHR core functionalities in outpatient (4hrs) and inpatient (4hrs) settings, and using the interactive training mode of the EHR. These training sessions take 8 hours for a resident to complete.

According to a recent post-training survey by the CED of 123 residents, they recognized the benefits of EHR training to increase competency when using the EHR, however some potential areas for improvements were identified. First, the length of training time was found to be a massive burden for busy specialist residents. Therefore, residents suggested compact, continuous training and retraining to ensure proficiency. Second, the current EHR training program does not satisfy the needs of specialist physicians but is designed for a general physician audience. Therefore, the training program does not represent unique EHR functionality and features that are frequently used by physicians in specific specialties. As a result, some residency programs plan to include extra 4-12 hours sessions to meet their own specialty needs. Third, there lacks a systematic way to gauge the residents' learning experience as they undergo the training sessions or after the training ends, which may offer critical information that could improve the EHR training program on a continuous basis. Finally, there are very inadequate resources, such as, sufficient experienced staff and time for retraining, available in supporting EHR training, which is a common barrier across health care organizations [20].

4 Discussion

4.1 EHR Usability Issues

EHR adoption across the US is being driven by a significant inflow of capital, with a goal of improved patient care and a reduction in health care costs [21, 22]. Although many studies highlight the potential of a successfully implemented EHR, to enhance quality of medical care [23-32], many negative effects have also been documented, which include: lower effectiveness [4, 33], decreased efficiency [5], decreased team collaboration [34], increased cognitive load [35], medical errors [6], and decreased quality of patient care [7]. This highlights why an effective EHR training is so important.

Primary care physicians account for a majority of patient visits, and because medical advances and socio-demographic changes demand greater primary care performance, the demand for the efficient use of an EHR by primary care physicians may also increase [36, 37]. Residents are medical professionals holding a medical degree who are still in training under supervision by senior residents and attending physicians. Primary care residencies usually enter a three-year program and in each year of training, the residents levels of responsibility increases. Based on their training level and field of concentration, residents participate in diagnostic and treatment procedures.

During the implementation process, the importance of training have been repeatedly stressed in multiple studies on successful EHR implementation [10, 12, 20, 38-46]. For instance, Aaronson et al. [44], surveyed 219 family practice residency programs about the use of EHR systems in the residency program, and found that training changed the residents views on the usability and capabilities of the EHR, such as time management and accuracy of the patient records. Training may have increased the likelihood of residents using EHRs in their practice after their residency. For a user to obtain a certain level of proficiency (learning curve), EHRs now require a large investment of resources for training and beginning physicians who are not sufficiently trained in medical school begin to struggle with competent EHR use [10, 47, 48]. However, according to the “2012 EHR User Satisfaction Survey from 3,088 family physicians,” nearly 62% of the respondents were not satisfied with many of the best-known EHR systems, with the area of lowest satisfaction being EHR vendor support and training [9]. Many hospital are now trying to reduce learning curve issues by offering comprehensive EHR trainings for incoming residents, however, finding adequate time to train busy primary care physicians [12, 42, 49, 50], target training to users’ needs [42, 50], and provide hands-on, on-site support [12, 38, 41] is another challenge.

4.2 Improving EHR Learnability through EHR Training of Residents

There are limited effective strategies available on EHR training for patient care [13, 51, 52]. Stephens et al. proposed a potential EHR training model, “Reporter–Interpreter–Manager–Educator (RIME)/EHR” for systematic education and assessment of EHR-specific competency [53]. At the Reporter stage, students are expected to have a basic competence to correctly complete a medical history and physical examination [54]. At The Interpreter stage students should be able to analyze and articulate their findings using enhanced clinical reasoning skills. Managers develop patient management skills and are actively involved in developing diagnostic and therapeutic plans based on patient preferences. The Educator stage requires students to be able to the include patient in decision making, search medical literature and integrate evidence based medicine in their practice by sharing this information with the patient and colleagues [55].

Kushniruk et al. examined the association between usability testing and EHR training at an urban medical center in NYC. Five physician users were a part of the study and none had any EHR experience except for the EHR under observation. Physicians participated in a four hour in class training session and then a lab-based usability test

was conducted for approximately a month after the training session. The 40 minutes usability test employed think aloud strategy where 2 sets of scenario-based tasks were completed by the participants. The study found areas where physician users struggled to complete their tasks, areas for improvement regarding learnability and usability, and proposed possible improvements to the present training physicians were receiving. Based on the results of this study, usability evaluation may be beneficial in improving EHR training. [14]. Because this study conducted just a single usability test, it is necessary to examine the broader implications of iterative usability evaluations on EHR training.

5 Conclusion

Acknowledging the barriers in the current EHR training and discussions with stakeholders, we suggest mixed method approach usability evaluation methods to evaluate and improve measure varying degrees of physician-user learnability for an extended period to enhance EHR training to improve the learning process.

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