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Strengthening our Collaborations: Building an Electronic Health Record Educational Module

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ABSTRACT. This article addresses the planning, creation, content, and implementation of an online educational module on electronic health records. Development of this module required close collaboration among multiple departments and the module was immediately integrated into the second year medical student curriculum upon completion.

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BACKGROUND

Since the American Association of Medical Colleges Medical School Objectives Project in 1998, medical informatics has been recognized as an important educational component for future physicians. With the enactment of the Health Information Technology for Economic and Clinical Health (HITECH) Act in 2009 urging the adoption of Electronic Health Record systems and the increasing reliance on information technology in healthcare, it has become crucial that physicians and future physicians become informed regarding health informatics.

There have been few studies on teaching medical students how to use electronic health records effectively as they move from their preclinical education in the classroom to their clinical educational years in patient care settings.[1] Mintz et al reported on student use of electronic health records in the ambulatory care setting, stressing that medical educators should teach proper use of the electronic medical record, but ended by noting that "…how and where to best incorporate information regarding the proper use of EMRs into the curriculum of medical and other health professional students is not known."[2] A report in the journal *Academic Psychiatry* discussed using the electronic medical record to track student experiences with patients to create customized curricula but concluded that "Further research is needed to clarify the impact of EMRs on education and the optimal methods of using them as a teaching tool."[3] Several authors have expressed fear that student documentation in the electronic health record, with its access to templates and ability to cut-and-paste, has led to a decline in clinical reasoning skills, thereby

necessitating a need to examine more fully the clinical educational experience as it relates to the electronic health record. [4, 5] A recent debate in *PLOS Medicine* raised the question "Do electronic health records help or hinder medical education?"[6] Silverman et al call for the creation of a training lab equipped with an educational electronic health record to allow students to learn about online documentation, data review, and order entry.[7] Medical students themselves have indicated decreased satisfaction in patient-doctor communications when using an electronic health record and Morrow et al conducted a pilot study to see if first year medical students could be taught "EHR-specific communication skills."[8]

Nursing educators have tried several different approaches to teaching undergraduate nursing students how to use electronic health records effectively. Kennedy et al report on a Simulated e-hEalth Delivery System (SEEDS) project which used case studies and small group processes to teach undergraduate nursing students how to enter data, navigate screens and create a care plan in a mock electronic health record.[9] Nokes et al created a module on wound care in the home care environment to teach online documentation skills to undergraduate nursing students.[10] Melo et al worked with the school of nursing and its partner hospital to provide access to its electronic health record in the school's Learning Resource Center in order to teach online documentation/charting.[11] The EHR Committee at the University of Arkansas for Medical Sciences created an interprofessional curriculum for all first-year students in the health sciences on the electronic health record and its role in the evolving health care environment delivered through a series of seminars and a mock database.[12] The Cleveland Clinic and the Deans' Roundtable of local educators created a Student Nurse Portal through which 3 online courses are delivered to undergraduate nursing students. They cover an introduction to the electronic medical record (EMR), applications of the EMR, and impact on nursing practice.[13] The College

of St. Scholastica used a case study approach to build its Academic Electronic Health Record (AEHR) which is used to teach nursing students how to navigate and use an EHR.[14] All authors report that students responded favorably to these projects.

Spring 2009 saw a growing number of Electronic Health Record (EHR) system implementations onsite at George Washington University and in affiliated clinics. The time seemed right to develop a class on EHRs in order to provide students with basic information about the history, challenges, and use of electronic health records. Several librarians met with the library director to brainstorm topics for inclusion, organize the material, and create an outline of the course. Health sciences librarians were ready to step up to the plate because they had been teaching an introductory course on informatics to health science students. In addition to the historical and legal perspective, a key component of the course would be the hands-on experience with an EHR system in the second half of the course. However, after multiple calls and emails to all of the major EHR vendors, none of the course creators had been able to persuade a vendor to provide access to a training bed so that students could see an actual system. In some cases, vendors were able to offer access to a subset of their system, but the administrative overhead involved in creating and removing individual accounts, plus the cost of this access proved unworkable. The librarians felt it was crucial to include the practical first-hand experience in the class, and as a result of the logistical difficulties the project was shelved.
In August 2010, the Practice of Medicine course director mentioned the need to train rising third year medical students in the EHR system that many would be using in their rotations. Practice of Medicine is a longitudinal course that "integrate[s] basic science and clinical knowledge while developing...skills in scientific and clinical reasoning."[15] The library director shared the previously-developed course outline and offered the time and assistance of the original librarian

developers. The offer was eagerly accepted. The project was quickly revived with an added

challenge; the course director wanted to use the new module in instruction in October so only a

few months existed to update and finalize the materials.

MODULE DEVELOPMENT

Initial Challenges

Because the development window was extremely short and it was the busiest time of the

academic year for the reference department, the development team divided up the various

components. The library's webmaster who had a background in nursing and IT, along with a

recent MBA focusing on EHRs, took the lead in developing the original course. She was

responsible for updating the background material. She started creating a PowerPoint slide show

based on the original course content but began family leave earlier than anticipated. While the

content had been moved into PowerPoint, only minimal updates and revisions had occurred. As a

result, updating the original course content and completing the module were left to the other

members of the original team.

The library's director joined forces with the Practice of Medicine course director to tackle

the hands-on component of the course. After some discussion, it became evident that while the

affiliated faculty practice group had a set of training records in their EHR system, they had no

mechanism to limit access to just these records in the live system. Recognizing that it would not

be possible to include student exercises in the live system, the developers decided to settle for

screen shots of the training records. However, it still took several weeks to convince the

information technology department that librarians needed access to their EHR system to learn the

system and then capture screen shots. The IT department had a standard consent form that all

EHR system users submit to get accounts, but the form (and the department) had no method for handling applications from individuals who did not see patients. With intervention from the course director, the IT department was persuaded to create accounts for three librarians, all of whom signed the standard consent and confidentiality form.

OVERVIEW

With only a few weeks of development time left, the remaining development team members met to review the content in the PowerPoint presentation and discuss next steps. The course director had asked for a self-paced module that could be completed within an hour's time. It would be an introduction to the topic of electronic health records, as well as an introduction to the AllScripts Touchworks EHR in use by the faculty practice group. The team pared down the topic outline and decided to focus on the basics of EHR systems including definition and importance, what they are, how they differ from Personal Health Records (PHRs), advantages and disadvantages, and related ethical and practical issues. After this base knowledge, the module would switch to specific, practical information on navigating, querying, and editing records in Touchworks.

[insert Figure 1: EHR tutorial image]

The library director had the strongest background in health information technology and rewrote the PowerPoint slides to reflect the new set of topics. In addition to putting bulleted information on the slides, she also added speaker notes to each slide providing more details on the specific topic. The Associate Director completed an introductory tutorial on Touchworks from the IT department and then began creating slides orienting the viewer to the standard record view using screenshots. Viewers were given information on logging in, viewing task lists and

schedules of patients, pulling up a specific patient's chart, and locating specific sections of the chart including problem list, medications, vital signs, immunizations, orders, labs, and notes. Viewers were also shown how to create a "medical student" note in the patient record. The entire presentation comprised thirty-one slides.

[insert Figure 2: Touchworks tutorial image]

NAVIGATION

As additional topics and details were added, it became clear that it would be impossible to convey all the information necessary via PowerPoint slides. The bulleted information filled the slides, but the additional details in the notes section were not visible to students. Similarly, the TouchWorks screenshots had to be large enough to view the details, but that left no room for explanatory text on the slide. As a result, the team decided it would be necessary to change the delivery method. Due to development time constraints, the group opted to continue using PowerPoint but to add an audio narrative in order to present all of the desired information without overcrowding the slides.

The Associate Director wrote the audio narrative based on the PowerPoint slides and the speaker notes, and then once finalized, recorded the audio track. Once the narrative was written and recorded, the PowerPoint slides and audio track were combined using Camtasia to create the video. Camtasia allowed the creator to tweak timing of the advancing slides to fit the audio track, as well as edit out any gaffes or retakes. A link to the final Camtasia video was then added to the Blackboard Practice of Medicine course for the second year medical students. Inserting the link into Blackboard meant that access would be limited to those students in the class, and would also permit tracking completion of the module by students via the quiz scores in the gradebook.

ASSESSMENT

The course director had expressed interest in assessing student knowledge acquired via the module, as well as student attitudes toward the module. While the content for the module was developed, the librarians began constructing quiz questions. The final set of questions consisted of 1) five multiple choice and matching questions assessing knowledge of EHRs and Touchworks navigation, 2) three true/false questions assessing knowledge of EHRs and Touchworks navigation, and 3) two open-ended questions to learn more about the students' attitudes toward the module and its value. Only the EHR/Touchworks questions were given point values and graded. However, responses to all the questions and all comments were compiled.

Getting the questions into a Blackboard quiz should have been the easy part of the project, but that also become more complicated than expected. Due to the short development time frame, the librarian finalizing the quiz questions and overseeing the Camtasia development had to turn over the various components to a colleague to put into Blackboard in order to leave for a long-scheduled vacation. Linking the Camtasia video in Blackboard was straight forward; however adding the quiz questions proved more problematic. Issues arose regarding implementing the various question types as well as problems inserting a picture. A screenshot of the Touchworks screen that was overlaid with the letters A through E for students to select specific portions of the Touchworks EHR record in the matching question required multiple revisions before it displayed correctly in the Blackboard quiz. However, after several attempts all the quiz questions were added just in time for the announcement to students of the module's availability and requirement for completion.

[insert Figure 3: EHR Tutorial Quiz]

EVALUATION

The module was introduced to the students in late October 2010 by the Practice of Medicine course director during an in-class instructional session. Students were told to view the module on their own time and to complete the quiz by the end of December. In January 2011, one of the librarians checked the Blackboard gradebook to compile the comments entered by students regarding the value of the module, as well as note the names of any students who had not taken the quiz. The list of students who had not completed the module was passed on to the course director, along with the student feedback derived from the assessment instrument.

Most students scored highly on the quiz and the general student feedback was overwhelmingly positive. However, there were diverse opinions on the most useful part of the module. Students with prior exposure to the TouchWorks electronic health record system described the historical and background information about EHRs as the most useful section. However, those students who had no experience with TouchWorks rated the practical navigation information as the most valuable. Many students appreciated learning about the pros and cons of EHRs.

For me, the most useful part of the presentation was:
"Seeing the actual images from the EMR screen as the narrator explained the functions."
"The discussion of laws and legal issues pertaining to EHRs and EMR."
"The tutorial on TouchWorks directly, now I feel that I can access the system and pull up basic information."
"The video helped cement things because I am a visual learner."

"The fact that you could do it at your pace."
"I thought the introduction was helping [sic] in putting this into context and explaining the importance of this system."
"Already have been using Touchworks for a year for CAP [preceptor] program. Practice EHR questions on blackboard were useful as was the beginning lecture of the presentation noting the history and future of EHR, its pros and cons."

Figure 4: Representative Student Comments

On the technical side, some students commented on the value of the self-paced module and the ability to rewind the video to review a particular section. Others appreciated the audio narration and felt it added much to the PowerPoint presentation. However, there is always room for improvement. Some students noted they would have preferred a true video where they could watch the mouse move and the text being typed into the EHR, rather than a series of PowerPoint slides. This had been the original plan, but development time constraints prohibited this approach. A few students also wanted a printed copy of the audio transcript for later reference.

The Practice of Medicine course director was delighted with the final module, and its quick development, given the time frame and the various obstacles encountered. He also expressed his appreciation for the strong collaboration between the librarians, the web services department who assisted with the video, and the faculty practice group's IT division who arranged for librarian access to TouchWorks.

The module has now been completed by a second group of second year medical students. Based on the comments entered for the open ended questions, most of these students felt the

TouchWorks navigation information with the accompanying screenshots was the most useful part of the tutorial.

CONCLUSION

Developing this module on electronic health records was an exercise in collaboration and time management, and the development team learned several lessons in the process. The project required participation from the course director, the faculty practice IT department, and multiple librarians, with everyone contributing their expertise, time and influence in order to meet the instructional deadline.

The team also had to recognize that outside constraints will influence the final product. The original plan to have students work with fictitious patient cases in TouchWorks in real time evolved into screenshots of TouchWorks in PowerPoint due to time and access limitations.

The importance of documentation was underscored by the early arrival of the webmaster's baby and her subsequent leave. Due to her detailed notes of planning meetings, the initial course outline, and her PowerPoint slides, the remaining members of the team were able to take over the project's leadership in a seamless manner.

Finally, the importance of building relationships was evident in this project. The project was successfully completed only by working through previously established relationships between the course director and IT, between the web services department and the librarians, and among the librarians themselves to accomplish the various tasks. These relationships allowed account rules to be renegotiated, project lists to be reprioritized, and tasks to be redistributed among the librarians as real life intervened.

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