Implementing an Open Source EMR in a Nursing Informatics Course

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Abstract

Electronic medical record (EMR) systems are being implemented widely in hospital and office based settings. This technology is becoming a standard documentation modality for inpatient and outpatient clinical settings. While practicing clinicians have learned to use these systems with the benefit of institutional or practice based training, the educational benefit of providing EMR training to students prior to their exposure to the clinical environment has not been widely explored. This preliminary research evaluated multiple EMR systems for educational use in a nursing school curriculum. EMR training including classroom lectures, computer based training sessions and practice with interdisciplinary medical simulation are incorporated in this educational program, providing students access to an EMR system before using one with actual patients. The ADDIE model of systemic instructional design was utilized for this study. Additionally, deliberate practice, an evidence-based construct grounded in information processing and behavioral theories of skill acquisition and maintenance guided the design of this study. Preliminary results reveal a high level of learner interest and satisfaction with the training methodology. Further exploration of EMR systems and the impact this component has on nursing education and practice are planned.

Keywords: education, EMR, simulation, documentation

Introduction

The Institute of Medicine Committee on Data Standards for Patient Safety reports evidence that improved clinical efficiencies, patient safety, and quality care outcomes can be promoted by having an effectively structured and implemented EMR1. Medical practices and hospitals are discovering the importance of adequate training and best methods for bringing everyone up to speed to ensure a successful transition to EMR's1. Electronic health record systems have four core functions which include: health information and data, results management, order entry and support, and clinical decision support. Other functions of the electronic health record system include patient support, electronic communication, administrative support, reporting and population management2. Information provided by health information technology (HIT) to clinicians, will assist them with patient support decisions, where accuracy and speed are vital to patient outcomes. The EMR can identify the quality and quantity of care rendered, and serves as a communication tool to aide multidisciplinary healthcare team members. Exposure to electronic health technologies will help providers increase their comfort level, accuracy and speed using these systems. Electronic health technologies such as the electronic medical record can be used to train student clinicians effectively in the management of patients. While many institutions and physician practices have implemented EMR systems, there is only a scant amount of literature about training clinicians in electronic documentation.

Expectations for EMR's suggest that it will improve patient safety. In institutions with well-developed, longstanding HIT, evidence suggests that improvements have been made3. Electronic clinical documentation systems providing electronic capture of clinical notes and data exchange. The majority of certified EMR's allow for customized templates, permitting practices to gather relevant information for their work on a single screen, while populating the information into the patients' medical record. EMR's

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require careful organization for ease of data input and content retrieval. This preliminary study evaluates an educational training program which provides student clinicians an opportunity to record, store, retrieve and modify information in an EMR in a simulated clinical environment.

Materials and Methods

Healthcare students in an east coast university in the United States were initially introduced to documentation skills in a lecture format. An emphasis of the lecture was the importance of good documentation as the primary means of chronologically recording patient care to facilitate communication among professionals involved in a patient's care. Legal considerations of medical documentation were also provided. Practice opportunities were provided through an Excel based EMR which was designed and implemented into the classroom and implemented into established medical simulation cases using standardized patients and high fidelity mannequin simulators. The case scenarios involved healthcare provider students from various disciplines. The EMR was substituted for a traditional paper based chart.

Individualized interviews were completed with 12 healthcare students - six students interviewed were receiving clinical training in an inpatient setting and six students interviewed were receiving training in outpatient settings. Students supported or strongly supported the addition of hands-on training in the curriculum. Feedback from students suggested that utilization of a more realistic EMR system would enhance their ability to use this training in an effective manner. To achieve this end, we have done a survey among EMR solutions. Enterprise EMR solutions are very expensive to implement. Given the exploratory nature of this project, we focused on open source solutions for three main reasons: Lower initial cost of implementation, flexibility to modify the solution to best serve educational goals of the project, and opportunity to receive support from a wider development community as opposed to just one vendor.

Since there is little information available on the evaluation of the existing open source EMR solutions for educational settings, we collected information about existing open source EMRs and evaluated them to find the best candidates. Table 1, summarizes the result of this survey completed in February 2012. Finally, we consider the important factors such as acceptance of the solution in the healthcare community, existence of documentation, inpatient and outpatient support, frequency of updates, and community support. Finally, Open Vista was selected as the platform for the educational EMR. Open Vista is developed by Medsphere based on the widely used VistA EMR developed by the Department of Veteran Affairs over past two decades. There are a family of VistA based solutions but among them Open Vista provides a redesigned user interface and the possibility to use both community support and commercial support. VistA has been used for a long time in many venues and it is known as a reliable solutions. In addition, it supports both inpatient and outpatient features as well as wide variety of procedures required for the educational purposes.

Preliminary Results

During four terms of teaching a nursing informatics course, it was found that students asked for hands-on experience with a real world enterprise EMR. Even the use of an Excel-based EMR did not satisfy their desire to experience an EMR they may be exposed to in their future practice. The first experience of students interacting with OpenVista both via client side application and hand-held devices was very promising. Students were able to experience a rule-based alarm system and documentation using standard terminologies.

Faculty observation during the simulation sessions revealed a 1.25-4.5 minute interval from the time of clinician introduction to the patient to the onset of documentation (n=34). Duration of documentation varied due to details of simulation cases. Interviews with student health care providers revealed a strong interest (100%) in receiving additional training in EMR documentation and 88% supported the application of EMR documentation with medical simulation scenarios.

Table 1. Survey Summary for Educational Open Source EMR Solutions

Software	Type	Programming Language	Database	Platform	Access	Website	License	Latest Version	Last Release Date	Documentation
OpenVistA	Inpatient/ Outpatient	MUMPS/GT.M	MUMPS/ GT.M	Unix/Linux	Server/Client	Link	AGPL/LGPL	1.5 SP6	05/24/11	Yes+Online Demo +Appliance
World VistA	Inpatient/ Outpatient	MUMPS	GT.M/Cache	Cross-platform	Server/Client	Link	GPL v2	1.0	03/26/11	Yes+Online Demo +Appliance
Astronaut	Inpatient/ Outpatient	MUMPS	MUMPS/ GT.M	Unix/Linux	Server/Client	Link	GPL v3	0.9 Beta	09/30/09	Some
ClearHealth	Inpatient/ Outpatient	PHP	MySQL	Cross-platform	Server/Client	Link	GPL	3 Beta	Aug 2011	Yes
WebVista	Inpatient	PHP	NA	Cross-platform	Web-based	Link	LGPL/GPL2/AGPL	Beta	NA	NA
vxVistA	Inpatient/ Outpatient	MUMPS	MUMPS/ GT.M	Cross-platform	Server/Client	Link	EPL	-	-	Yes
OpenMRS	Ambulatory	Java	MySQL	Cross-platform	Web-based	Link	-	1.8.3 stable 1.9 Beta	12/13/11 12/22/11	Yes+Online Demo +Appliance
OpenEMR	Ambulatory	PHP	MySQL	Cross-platform	Web-based	Link	GPL	4.1.0	09/23/11	Yes+Online Demo +Appliance
OSCAR	Inpatient/ Outpatient	Java/JSP	MySQL	Cross-platform	Web-based	Link	GPL	10.12-1.2 final 11-1.1alpha	09/17/11 01/1512	Yes+Online Demo
Patient OS	Ambulatory / Inpatient	Java	PostgreSQL	Cross-platform	Server/Client	Link	GPL	1.3	08/03/11	Some
GNU Health	Ambulatory / Inpatient	Python	PostgreSQL	Cross-platform	-	Link	GPL	1.4.3	01/30/12	Some
GNUmed	Ambulatory	Python	PostgreSQL	Cross-platform	Server/Client	Link	GPL	Client 1.1.0 Server 16.0	10/27/11	Yes
THIRRA	Ambulatory	PHP	PostgreSQL	Cross-platform	Web-based	Link	MPL	0.9.12	11/23/11	Yes+Online Demo
FreeMED	Ambulatory	PHP	MySQL	Cross-platform	Web-based	Link	GPL	0.8.5	11/04/11	Some+ Online Demo
Care2x	Inpatient	Java/PHP	MySQL/ PostgreSQL	Cross-platform	Web-based	Link	GPL/LGPL	2.6.27	01/03/2012	Yes+Online Demo

Conclusion

Training nursing and allied healthcare students to document in EMR's before practicing clinically and assessing these individuals for competency will likely contribute to reduction of documentation based errors. Exploration of the implementation of EMR training using the Open Vista system is currently being explored with current Nursing Informatics courses at this institution. This educational program which incorporates reflection in action to teach critical thinking and clinical judgment can be used as a new learning analytic for the measurement, collection and reporting of information about these learners and their progress

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