A Patient-Driven Model of Electronic Medical Record for Homeless Patients in Puerto Rico

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ABSTRACT

Electronic Medical Records (EMRs) are promising to improve quality and efficiency in healthcare services. Several models for adopting EMRs in healthcare centers have been developed, these are complex models that follow a clinician driven workflow. However, to provide healthcare to homeless patients requires that some unique conditions be met. This ongoing work present a novel model for adopting EMR to meet the particular medical record needs of homeless-patients. The model is intended to be applied by non-profit organizations that reach out homeless, however delivering proper healthcare in a systematic and professional way could become cumbersome considering the difficult environment in which medical street outreach has to be done. The proposed model follows a patient-driven workflow in order to use light EMRs with homeless-patients. Grounded Theory techniques are used to analyze data from interviews with physicians that provide healthcare to homeless patients in the metropolitan area of San Juan, Puerto Rico. The model will lead to the implementation of a light EMR system which can be used to collect medical data on the streets. The EMR system follows a patient-driven workflow that can run on mobile devices and tablet computers and can be easily integrated to a more complex EMR system.

Keywords: Electronic Medical Records (EMR), e-health, medical records systems, patient-driven workflow.

RESUMEN

Los Expedientes Médicos Electrónicos (EME) prometen mejorar la calidad y eficiencia en los servicios de salud. Varios modelos para la adopción de EME se han desarrollado, estos son modelos complejos que siguen un flujo de trabajo orientado a procesos clínicos. Sin embargo, para proporcionar atención médica a los pacientes sin hogar se requiere cumplir algunas condiciones especiales. En este trabajo se presenta un nuevo modelo para la adopción de EME para satisfacer las necesidades particulares de historias clínicas de personas sin hogar. El modelo está diseñado para ser aplicado por organizaciones sin fines de lucro que atienden a pacientes sin hogar, dicho modelo se basa en un flujo de trabajo orientado al paciente y utiliza una version ligera de EME. Las técnicas de teoría fundamentada se utilizan para recolectar y analizar datos de médicos que atienden pacientes sin hogar en el área metropolitana de San Juan, Puerto Rico. El modelo dará lugar a la aplicación de un sistema de EME ligero que puede ser utilizado para atender pacientes en las calles, el EME se puede ejecutar sobre dispositivos móviles y tabletas PC y es facilmente integrable a un sistema de EME más complejo.

Palabras claves: Expediente Médico Electrónico (EME), e-Salud, sistema de expediente médico.

1. INTRODUCTION

Electronic Medical Records (EMRs) are promising to improve quality and efficiency in healthcare services. An EMR is a computerized record of a patient's clinical, demographic, and administrative data, the EMRs are typically created, gathered, managed, and consulted by licensed clinicians and staff from a single organization who are involved in the individual's health and care (MacKinnon and Wasserman, 2009). Several models for

adopting EMRs in healthcare centers have been developed (Venkatraman et al, 2008), these are complex models that follow a clinician driven workflow. This research is focused on a simple EMR model which relies on a patient-driven workflow, where the healthcare is provided on the streets to homeless patients. An EMR typically assist physicians in tasks such as (Mahata, 2007): (1) Access to patient data, (2) An increase in liability coverage, (3) Accurate and complete claims processing by insurance companies, (4) Building automated checks for drug and allergy interactions, (5) Standardization of care pathways and protocols, (6) Clinical notes, (7) Prescriptions, (8) Scheduling, (9) Sending to and viewing by labs

It is supposed that the operation of a typical EMR system rely on a technological platform which can be accessed by clinical staff at any equipped location. However, some unique conditions must be met in order to provide healthcare to homeless patients. For example, the medical interventions can take place in a variety of locations such as improvised shelters, vacant buildings, sidewalks, alleys, public parks, etc., and the provided services can range from providing information about homeless shelters, housing options, engaging with the patients by offering food, clothing and giving direct medical care. A traditional healthcare approach will not apply to the homeless because of the inadequate conditions in which traditional medical interventions had to be done. For example, it is difficult for the clinicians to use paper records during clinical interventions with homeless.

This work addresses the issue of adopting EMR to meet the particular medical record needs of homeless patients. We propose a model based on a simplified EMR, it follows a patient driven workflow to facilitate the use of light EMRs with homeless patients. The proposed model is intended to be applied by non-profit organizations that reach out homeless. Grounded Theory techniques are used to analyze data from interviews with physicians that provide healthcare to homeless patients in the metropolitan area of San Juan, Puerto Rico. The model will lead to the implementation of a light EMR system which can be used to collect medical data on the streets. The EMR system could run on mobile devices and tablet computers and could be easily integrated to a more complex EMR system.

2. ELECTRONIC MEDICAL RECORD (EMR)

Electronic Medical Record (EMR) systems have gained attention in recent times thanks to the debate established around the Healthcare Reform Program proposed by President Obama. In April 2004, President George W. Bush set an ambitious goal of universal electronic medical records (Casidy, 2004). He said: "Within 10 years, every American must have a personal electronic medical record." In 2005 the federal government stared to outline a detailed plan designed to increase the use of information technology (IT) in healthcare, and to create national standards that would enable medical information to be digitized, stored and shared electronically. In 2010, President Obama reinforced the federal government's commitment to that target, and announced that nearly $20 billion in stimulus money would be available during the next five years to help health-care providers implement digital record systems. In 2010, the US government will be releasing $1.2 billion in grants to help health care providers to implement and adopt Electronic Medical Records, as part of the American Recovery and Investment Act (ARRA) 2009.

An electronic health record (EHR) is a repository of electronically maintained information about an individual's lifetime health status and health care, stored such that it can serve the multiple legitimate users of the record (Hoffman, 2009). Our literature review found that different authors have used the term electronic medical record (EMR), and other terms such as electronic health record (EHR), and "computerized patient record" to describe a person's medical history in electronic form. EMR is more than a simple database of patient's records. In this work we are considering EMR as a technological suite of integrated functionalities built around a common database; these functionalities could include but are not limited to patient record management, prescription, and some decision support tools for diagnostics and practice management.

Currently, many commercial products are sold as EMR systems, but they do not necessarily satisfy the criteria that we defined above. Moreover, some technical standards for implementing EMR systems are still under development (Lobach and Detmer, 2007). Even beyond the definition and the technical issues, health care providers and practitioners are compelled to adopt EMRs in the next three years. Therefore, the expectation,

necessities and concerns of health care providers and practitioners have to become an important matter to be studied prior implementing standards and adopting EMRs.

According to (Medical Records Institute, 2010) five levels of an Electronic HealthCare Record (EHCR) can be distinguished: (1) The Automated Medical Record is a paper-based record with some computer generated documents; (2) The Computerized Medical Record (CMR) makes the documents of level 1 electronically available; (3) The Electronic Medical Record (EMR) restructures and optimizes the documents of the previous levels ensuring inter-operability of all documentation systems; (4) The Electronic Patient Record (EPR) is a patient-centered record with information from multiple institutions; (5) The Electronic Health Record (EHR) adds general health-related information to the EPR that is not necessarily related to a disease. This paper is focused on designing a level 3 EHCR model which can be extended to a level 4 or level 5 based on needs.

3. THE PATIENT-DRIVEN SELF-EFFICACY (PDSM) MODEL FOR DATA COLLECTION

In this research we are proposing a light weight Electronic Medical Record (EMR) in order to address the process of healthcare on the streets. This light EMR is created from a model which follows a patient-driven workflow based on the self-efficacy theory. The model is intended to be applied by non-profit organizations that reach out homeless, however delivering proper health care in a systematic and professional way could become cumbersome considering the difficult environment in which medical street outreach has to be done. This is the main reason because an EMR for homeless patients has to be portable and lightweight; in this case the weight of the EMR is reduced by removing some details such as health insurance information or patient bills.

The light EMR proposed rely on the self-efficacy theory, which is defined as a belief that one has the capabilities to execute the courses of actions required to manage prospective situations (Ormrod, 2006). In this work, the self-efficacy theory is applied in the medical practice context with the aim of attain the special necessities of homeless patients. This theory is part of the transtheoretical model of behavior change (Prochaska, 2001), which consists of four core constructs: stages of change, processes of change, decisional balance, and self-efficacy. The self-efficacy construct is fundamental in the model of light EMR that we are proposing. The theoretical construct of self-efficacy has been used widely in public health programs and interventions and medical practice (Brekke et al, 2001). The premise behind the construct is that greater confidence in performing a particular behavior makes it possible for an individual to change unhealthy or risk-taking behavior (i.e., stopping substance abuse) and become more engaged in the health-seeking process. The Self-efficacy theory suggests that any such change made by the individual will lead to an improvement in the health outcomes.The medical practitiones interviewed recommended the use of the patient-driven self-efficacy model in order to support the building of an EMR for homeless patients.

4. THE NEW MODEL FOR EMR SYSTEMS

The proposed patient-driven ERM model based on the self-efficacy theory is developed following the grounded theory approach. Grounded theory procedures (codes, concepts, categories, and theory) were used to analyze data from interviews with physicians from a non-profit organization that provide healthcare to homeless patients in the metropolitan area of San Juan, Puerto Rico. Three components and four mechanisms were identified through this process; the integration of these components and mechanisms within the model is depicted in Figure 1.

4.1 MECHANISMS OF THE MODEL

4.1.1   Database design

A large part of the logic of the EMR system is database driven, for this reason a proper database design is crucial for successfully building an EMR system. In this model we identified two key issues to consider in the database design:

Flexibility: The light EMR system should have capabilities to be connected o even integrated to a more complex EMR system, this require that a EMR system able to support the integration of multiple database systems.

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3

Integrity: The EMR system is designed to be used on streets where the connectivity may be an issue. In order to maintain data integrity, it is suggested the use of database replication, which is a way of keeping data synchronized in multiple databases.

4.1.2 GUI design

Usability is the measure of the quality of a user's experience when interacting with a product or system. Usability is a necessary condition for the success of a mobile EMR system which has to be easy to use and easy to learn. Medical interventions of patients on streets require spending least amount of time to enter information and more time in the actual success of the intervention. A tablet PC or any mobile device could be difficult to use, especially with regard to text entry, the GUI design have to avoid as far as possible entering text or complicated menus, visual mechanisms for data entry are highly recommended.

4.1.3 Front-end set up

The handheld computer is an indispensable mean for accessing the ERM system. The system must be designed to avoid complicated client (front-end) set up.

4.1.4 Data collection

Data collection is a vital mechanism in this model. One of the main goals of the EMR is to be capable of collect as much information about a patient in the least possible time. The data collection is performed according to the patient-driven self-efficacy model explained above. Three types of data have to be collected: demographic data, clinical data, and patient-driven self-efficacy data.
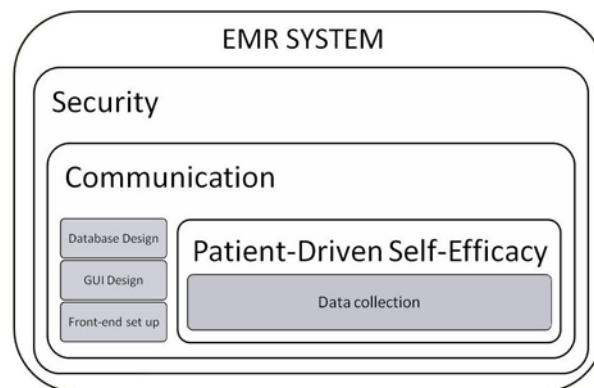

Figure 1: The patient-driven model for EMR systems

4.2 COMPONENTS OF THE MODEL

The proposed model incorporate the following components:

Communication: The EMR system has to be enabled to establish communication with remote databases, other EMR systems, and other services outside the scope of the location where the medical intervention is taking place. It is feasible to use wireless internet and cellular telephony for carrying out communications. Capabilities for off-line work are recommended for facing exceptional fails in communications.

Patient-driven self-efficacy This is the underlying model for data collection where the special needs of the homeless patients are considered. The data collection process deals with any information that is generated in accordance with the self-efficacy construct of the transtheoretical model of behavior change. This component ensures the treatment of information such as the evolution of the patient, goals that have been achieved by the patient, pending goals, etc.

Scurity: The EMR system is obligated to use secure connections and authentication process. The Health Insurance Portability and Accountability Act (HIPAA) requires the United States Department of Health and Human Services (HHS) to establish national standards for the security of electronic health care information.

5. CONCLUSIONS AND FUTURE WORK

In this work we presented a new model of patient-driven light Electronic Medical Records (EMRs), the proposed model is oriented to homeless patient and is inspired by the transtheoretical model of behavior change applied to healthcare. The model was developed following the grounded theory approach. Three components (patient-driven self-efficacy, communication, and security) and four mechanisms (database design, GUI design, front-end set up, and data collection) were identified through this process. The suggested model can provide a road map for designers and developers of mobile ERM systems. Future work includes the full implementation of a light EMR system for homeless patient and an exhaustive case study with a non-profit organization that provide healthcare to homeless patients.

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