Abstract

This paper presents a prototype of a graphical user interface for a computer-based patient record that will help physicians and nurses in their interactions with patients in hospitals. The interface features two main windows. One window (View Record) provides access to: the subjective information which includes patient’s personal information, symptoms and medical history; the objective information which includes results from the physical examination; and the assessment information, which includes results from lab exams and other exams. The other window (Order Entry) provides an interface to allow physicians to enter medical order for patients (a process known as the plan).

The prototype will undergo user tests to determine if the user interface meets the needs of physicians and nurses.

1. Introduction

In recent years, the demand for computer-based patient records (CPR) has significantly increased because many hospitals and health care institutions are trying to keep up with technological advances [4, 6]. But health care institutions in PR and in the US do not have appropriate computer systems. The few existing systems for medical data manipulation are character-based systems that require users to remember a range of codes and commands. And most of those systems are only used for administrative purposes.

The main obstacle in creating a new computer system or in upgrading from an existing one is that this process will involve a substantial investment of money and time. A new computer system for handling patient medical records will require new software, new hardware, and training of the health care personnel.

In most hospitals, physicians and nurses generate a lot of documents to report on patients’ condition. The patient record consists of demographic information, medical history and other documentation resulting from physicians’ orders and nursing interventions. Physicians orders are usually transcribed by nurses into documents such as: laboratory request forms, drug prescription forms, diagnostics tests request forms, etc.

The goal today is to develop a computer-based patient record (CPR) systems to maintain and manipulate patient data and improve health care services. A computer-based patient record system will reduce the amount of time spent on patient’s data entry and retrieval, and also will improve the efficiency in the data communication inside the health care institution. The sharing of the medical information through intranets in hospitals and health care institutions will make the information more precise and also available at the right time, just when the health care provider needs it.
The efficient management of patient information is an aspect of great importance for everybody including health care institutions, health care providers and the patient himself. That is why the development of a CPR system, based on the principles of usability engineering, is very important to provide the medical institution with a reliable tool for their tasks and to provide the patients with the best care possible.

2. Previous Work

For the past six years in the Electrical and Computer Department of the University of Puerto Rico in Mayaguez, students and professors have been conducting a research study with the objective of developing a computer-based patient record for hospitals in Puerto Rico and the US.

Thus far a graphical user interface for nursing documentation and physician orders have been developed, [2,5]. A graphical user interface has also being developed to support physicians’ private practice, especially pediatricians [1]. A database for the patient record has also being developed [3]. There is also work in progress to develop an extension to the nursing documentation interface to allow nurses to enter notes and assist them with the nursing care plans.

3. Current Work

The main objective in this research is to develop and implement an integrated user interface of an inpatient computer-based medical record. This system will be built with the help of the research work already developed and the information acquired from hospitals in Puerto Rico and the Beth Israel Hospital of Boston. The user interface will be developed based on usability engineering principles.

The first step of the research was the development of a hierarchical task analysis describing the main tasks of physicians. From this diagram three main tasks that physicians need to perform in their practice were identified: access patients’ records, exchange of messages and access to support systems. This research will focus on the first two tasks.

The graphical user interface will be divided into two windows of information: View Record and Order Entry.

The subjective, objective and assessment information will be portrayed in the View Record window. The subjective information is information gathered by the physician through an interview process, usually consisting of patient’s complaints and medical history. The subjective information is represented in the interface by the following tabs: demographics; history, including past surgeries, hospitalizations, allergies and family conditions; and complaints.

The objective information results from the patient’s physical examination and is represented in the interface by the physical exam’s tab.

The assessment information is where physicians write down their consultation results, taking into consideration results from lab exams or any other exam. The assessment information is represented in the interface by the following tabs: problems; medications; diet; notes, including physicians and nurses notes; results, including results from laboratories and other exams; information from the nurse interface, including the kardex, daily assessment, medications and vital signs; and a summary of past orders.

The second window of the interface is the Order Entry window. This window contains information about the plan, which includes the diagnosis and all medical orders like: medications, diet, laboratories or any kind of examination, referrals, consultations with other physicians and intake and output (I/O) procedures.
An initial prototype for the patient’s record has already been developed using Jbuilder 4.0. This prototype consists of two main windows, one for the View Record information (Figure 1) and the other for the Order Entry information (Figure 2).

In further stages in the developing process, more tools and features will be included in the user interface to improve, accelerate and support physicians’ decisions.

4. Future Work

In the Patient Record System, more tools could be implemented to help physicians avoid mistakes.

One area of improvement could be in physician’s prescriptions. A system with in-depth identification and prevention of problems could be implemented to avoid the possibility that physicians could prescribe medications that can cause allergic reactions or any other problem to a patient.

Another area of improvement could be vitals signs representation. A new system could allow physicians to monitor the vitals signs of inpatients through the user interface, showing them live graphics of the data. The main advantage of such an interface is that the physicians will always have the updated information of the patient. Further more, the physician could receive alerts when the vitals signs are abnormal.

![Figure 1. The View Record Window](image-url)
A user test will be conducted to determine if the user interface meets the needs of physicians and nurses. This user interface will be tested with physicians and nurses in Puerto Rico and from the Beth Israel Deaconess Hospital in Boston.

The user interface that we will developed will be compare with a text-based computer system to identify advantages and disadvantages of the graphical version versus the text-based version.

References


