
System of Prescription Management

ELHAM MOHAMMED THABIT ABDALAMEER

Computer Science Department

College of Science

Karbala University

Karbala, Iraq

Abstract:

Due to the tremendous technological and computational boom; the rapid improvement of the information systems and its technologies and methodologies; moreover the tendency of governments to downsize the overall expenditures on health care; in addition phenomenal emergence of the internet, that made most vital fields in everyday life are seeking the computerization of their environments to achieve better performance, reliability and cost reduction. That reflected also in the health care industry. In this paper we will study the e-health care information systems especially the health management information systems (HMIS) to replace manual work and a reliable web - based system which serves health care will be designed and built. This proposed system is centralized database which contains the patient's records. It will enable the pharmacist to access the database and show the patients profiles to give them the required medicine in the prescription by a physician and determine the number of iterations and doses as shown in the patient profile. This system ensures giving prescription in a safe manner and it is efficient due to reducing healthcare costs and providing the time.

Key words: EHIS, ICTs, E-medicine, Agile approach, DSDM Atern, System scope, Prescribed.

1. Introduction

Recently, the mastery of machines and computers in e-health

has evolved immensely (Chehri et al. 2011); the emergence of e-health care was a result of the advances in the information, telecommunication and network technologies (Khan et al. 2012). And the Information and Communication Technologies (ICTs) played a significant role to enhance health in both developed and developing countries through improving access to health information and making the services of health more dynamic (Burney et al. 2010) and (Chattopadhyay et al. 2008). As well Remote E-health and e-medicine are causing systematic changes to the traditional health care system and environment. However, applications of E-business and E-commerce concepts to the health care system have resulted in the use of the present low cost and available high speed internet and the wireless technologies have revolutionized the e-health care business. E-health care information systems (EHIS) emphasizes on the application of IT to replace manual work and information-processing tasks. Also to make information flow models used automatically to simulate organizational and managerial activities in health care (Tan, 2005). EHIS is amongst the projects supported under were services promoting health and improving the patients status management (Rezai-Rad et al. 2012).

However, several studies have emerged for support ehealth care information systems, from these studies: There is study studied the barriers for information systems implementation that helped to identify possible ways to overcome these barriers and to propose alternative ways to justify the implementation of ehealth systems (Fitzgerald et al. 2008). While there is study has proposed a cooperative management methodology for the development of privacy solutions for consumer ehealth (Chowdhury and Ray 2007). As well as another study that advanced a web-based system to interactively display image-based electronic patient records for secured intranet and applications of internet collaborative medical (Zhang et al. 2005).

The proposed system will design and build a system for

e-health care by action in the e-health sector under has sought to access to quality, cost and time reduction, and efficiency of healthcare on level. The patients attend the health centre to record their information; then the nurse will add this information to the system database to be ready to the physician to give them the required treatment. Lastly the pharmacist can access to the system to view the patient's profiles to give them the medicine in the prescribed by a physician. This introduction gave a brief ehealth care information systems and described the overall of proposed system by explained how it does. The rest of this paper is arranged as following: After a discussion the objectives and scope of the proposed system in section 2, section 3 discusses the development lifecycle of this system. Whereas section 4 explains the methodology and tools which used to design and implement the System of Prescription Management. While section 5 illustrates the interfaces and results of this system. Lastly section 6 provides the paper's conclusions.

2 Proposed System Objectives and Scope

The objective of the proposed system is to design and implement a system which serves health care by enables the pharmacist to access the database and show the patients profile to give them the required prescribed by a physician. It is for medical data management in support of evidence-based medicine, scientific and statistical research purposes. It is efficient by reducing healthcare costs and providing time. Also it helps to promote the communication between patient and clinician. The system will be easy implementation and user friendly front end interface.

While the scope of this system is to build a reliable web-based Electronic healthcare technologies support the interaction between patients and health service providers. These technologies promise to provide significant improvements in access to care, efficiency, quality of care, and productivity of the health sector. The system has five users which were

identified as: nurse, physician, pharmacist, and admin and each one has collection of functions in this system. The nurse has the ability to register, login in, login out, add new patient profile, search and update the patient information. While the physician is able to register, login in login out, view the patient profile, diagnose the patient's state, and write the prescription. Whereas the pharmacist is able to register, login in login out, search and view the patient profile, and give them the required medicine in the prescribed by a physician. Lastly Administrator has ability to plan, manage database, system backup and supervising (Satziger et al. 2007). Figure 1 shows the scope for System of Prescription Management.

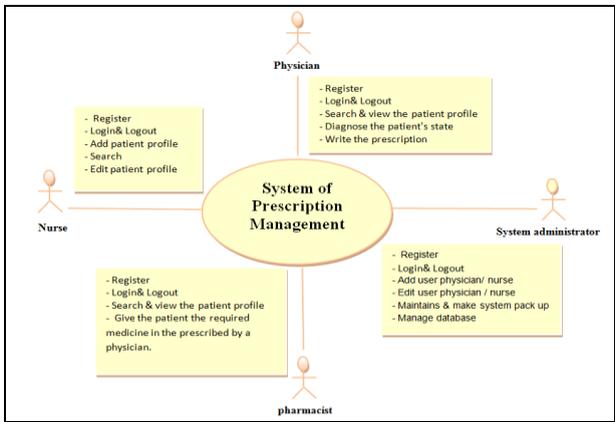


Fig. 1: Scope for System of Prescription Management

3 Proposed System Development Lifecycle

The Agile approach was chosen as the lifecycle in the development of System of Prescription Management. To develop and fulfill the project objectives, we will use DSDM (Dynamic Systems Development Method) Atern. It is an agile framework for management and delivery of projects at the right time without any delay. It has emerged for rapid development of technical application that aims to deliver the right solution-software aspects at the right time within fixed budgets. And it is very suitable approach to introduce non-software aspects of

development with more ease and flexibility. It is an iterative and incremental approach that confirming continuous user involvement. DSDM Atern has eight guiding principles: Focus on the business need, Deliver on time, Collaborate, Never compromise quality, Develop Iteratively, Build incrementally, Communicate continuously and clearly, Demonstrate control, and Demonstrate control. These principles must be applied in a system (Richards, 2010). However according to Agile approach, the System of Prescription Management will across within seven phases during its lifecycle as shown in figure 2.

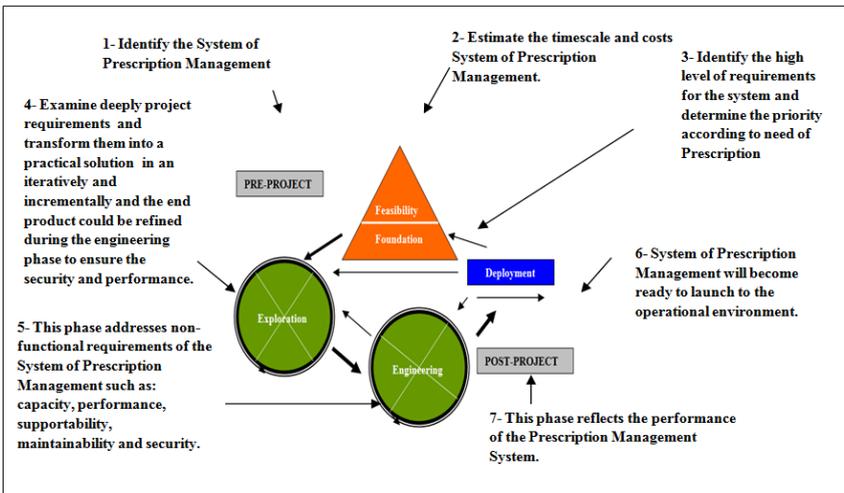


Fig. 2: Lifecycle Prescription Management System

3.1 Requirements Phase Elicitation

For having a lot of information may be able to be useful to apply System of Prescription Management; we had been an unstructured interview with the physician, nurse and the pharmacist and asked them about the needed requirements to describe the condition of the patient, the needed prescribed by a physician, determine the number of doses and the number of iterations.

3.2 Use Case Model

The Use Case Model was used in System of Prescription Management to identify the diverse actors and on completion of this; it is possible to establish the functional requirements of the final system. In other words, a use case describes "who" can do "what" with the system in question (Malan and Bredemeyer 2001). In the System of Prescription Management, there are five users in the use case diagram. Table 3.1 shows the use case specification to one of the system requirement. While figure 3 shows the system actors and their roles in this system.

Use Case Name: Add New Patient Profile		
Brief Decryption	Create new patient profile to database of the system.	
Primary Actors	Nurse	
Precondition	Login to the system.	
Description	Step	Action
	1	When the nurse selects add new patient profile from the menu, the use case will start.
	2	New patient form will be loaded by system
	3	The required fields of patient will be entered by nurse
	4	The nurse will press on the submit button.
	5	The system will check and validate the input data.
	6	The new patient to the database will be added by system
	7	The system will inform the nurse that the patient has been successfully added to the system.
Priority	Must	
Performance	Response from system	
Channels to actors	Online	
Post Conditions	Successfully added the patient to the database.	
Alternative Flow	Entering invalid or unacceptable data.	

Table 3.1: Use Case Specification

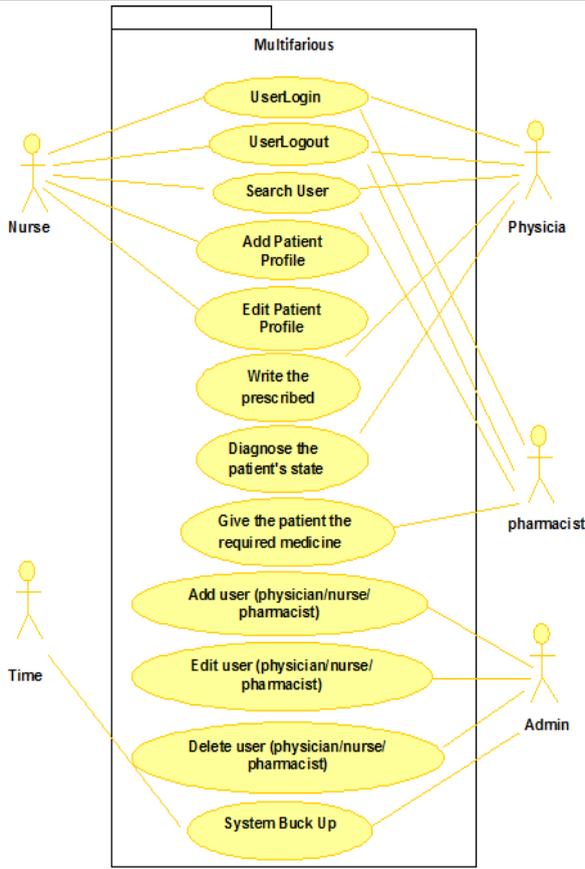


Fig. 3: Use Cases Models

3.3 System Requirements Analysis

In any successful system, it is necessary to understand the system requirements throughout its lifecycle; these requirements describe the system functionality or its services. However, it is necessary to understand both functional and non-functional requirements through the lifecycle of Prescription Management System and they should be flexible according to the ehealth system needs (Laplante 2009).

3.3.1 Functional requirements (FR): It is described as set of e-health care information system requirements, such as:

1. The system has ability to add new account for nurse, pharmacist, and physician.
2. The system enables the nurse to add new patient profile.
3. The system enables the nurse to search about specify patient.
4. The system enables the nurse to update the patient information.
5. The system enables the physician to view the patient profile to add treatment.
6. The system enables the pharmacist to view the patient profile to give them the required medicine in the prescription by a physician.

FR1	Add new patient profile
Descriptions	The system must allow the nurse to create new patient record.
Rationale	The system enables the nurse to create new patient record which includes the personal information of patient such as: name, address, contact info,...etc.

Table 3.2: One of FR for the system: Add new patient profile

3.3.2 Non functional requirements: They ensure success the system by describing security, usability, stability, compatibility, and performance with database of system, for example the System of Prescription Management must be user friendly and easy to navigate through each section instantly; and the system must have a fast reaction time with the user.

3.4 System Users Analysis

In the System of Prescription Management, five users were identified like: patient, physician, nurse, and pharmacist. The role of each user will analysis in this system, for example, table 3.3 illustrates the role of one user (Pharmacist) of the system (Spinhof and Calvi 2006).

User	Pharmacist
Role	The pharmacist has ability to access the database and show the patient profile to give them the medicine in the prescription by a physician and determine the number of iterations and doses as shown in the patient profile.
Activities	<ol style="list-style-type: none"> 1. View the patient profile to validate prescription by a physician. 2. Comment on any symptoms. 3. Controlling and distributing medicines. 4. Instruct a patient of the use of medicines and medical appliances.

Table 3.3: The role of one user (Pharmacist)

4 System Design Principles

The clinical database design methodology is divided into three main phases; conceptual, logical and physical design as shown in table 4.1.

Conceptual Data Model	Data analysis phase: identify data requirements of prescription management system and capture them graphically.
Logical Model	Convert the conceptual data model to the selected data model for implementation, such as relational model.
Implementation	Implementation phase using database management system (DBMS).

Table 4.1: Clinical Database Design

The purpose of the design phase is to create a technical solution which satisfies the system needs. Use Case Model and, Use Case Text are used in the design of system.

A use Case Model is a collection of possible scenarios between the system and the external users. While a use Case Specification / Text is a document used to collect the precise details of a use case. It provides a way to collect the functional requirements of a system.

In the database design of system, as database technology moves from the task of supporting paper systems to actually becoming the central digitized health information system. It is very critical phase to build a successful the system.

However when we started to build the system of

prescription management, the methodology of database design involved three main phases: Conceptual, Logical and Physical design (Connolly and Begg 2005).

4.1 Proposed System Design

According to the System Design Principle, the clinical database design of the system of prescription management, involves three phases:

The first phase which is conceptual design describes the relation and the connectivity between all components of this system.

Then the logical data model that consists of specified classes which will become seven tables as shown in table 4.2. After that the table's attributes became fields, and the associations became relationships.

While the last phase in the database design of the system of prescription management is physical design which is to translate the logical database into a physical database which can be implemented using the database management system. This phase will specify the system usability for instance screen layout.

No.	Table name	Brief
1.	Information	It contains information related to the patients and Physician.
2.	Patient	It contains information related to the patient.
3.	Nurse	It contains information related to the nurse.
4.	Pharmacy	It contains information related to prescription and patient cure.
5.	Physician	It contains information related to physician.
6.	Pharmacist	It contains information related to pharmacist.
7.	Prescription	It contains information related to physician, date of prescription.

Table 4.2: Tables contents of the System of Prescription Management

4.2 System Tools

The PHP and MySQL tools combination were used in implementation of this system. They are easy yet powerful way to create dynamic system web pages that actually interact with

the system users. In addition, HTML and CSS were used to create useful and well formatted web pages of the system. While PhpMyAdmin was used to create the database and wampserver, WAMP (Windows Apache MySQL PHP). The WAMP and MySQL use to manage database (Mistry and Misner 2012), and (Valade 2004).

5 System Interfaces and Results

The system interfaces that have been obtained through the implementation of the system of prescription management are the following:

1. When the nurse have access to the system after entering her own username and password; she will enter the patient information. Also she has ability to manage patient profile which includes (add - delete- update the patient information) as shown in figure 4.



Fig. 4: Nurse page for manage patient's information

2. Register Interface: This interface shows the possibility of adding or registers a new account of the system, whether this account is a doctor, pharmacist or nurse.

However the administer has the full access to the system by managing and evaluating the new account whether for the physician, pharmacist or the nurse. Figure 5 shows register

form page.

KARBALA Healthcare

Home

Manage Account

ADD ACCOUNT
DELETE ACCOUNT
UPDATE ACCOUNT

The work of this system is order to maintain the health of patients. Under time passing affected cases is many health caused by handling of endocrine or excessive or unregulated treatment without consulting your doctor. Therefore, this system requires consulting a doctor and Exchange treatment by Chibda who shall ensure cashed by your doctor and this guarantee no consumption of treatment, but healthy.

Add New Account

KARBALA Healthcare

Full Name:	sama asan ali	Profession:	pharmacist
Birthdate:	1374-05-15	Birthplace:	hilla
Gender:	<input type="radio"/> Male <input checked="" type="radio"/> Female	Marital Status:	Married
University:	hilla	College:	medicine
Graduation Year:	1309	Certificate:	Professor
Competence:	Stomach and Throat Specialist	Specialization:	Pharmacist, Specialist the surgery
Date Employ:	1390-11-09	Date Get On The Practice Or Store:	11/09/2013
E-Mail:	sama324@yahoo.com	Home Address:	
Phone Number:	07706574432	Username:	
Password:			

Fig. 5: Register Form Page

3. When the physician access to the system and looks for the patient's information through the patient's full name, the page in figure 6 will appear.

KARBALA Healthcare

Home

Search Patient

The work of this system is order to maintain the health of patients. Under time passing affected cases is many health caused by handling of endocrine or excessive or unregulated treatment without consulting your doctor. Therefore, this system requires consulting a doctor and Exchange treatment by Chibda who shall ensure cashed by your doctor and this guarantee no consumption of treatment, but healthy.

Search About Patient

sadd waf

Fig 6: Page for search about patient information

4. Figure 7 illustrates the prescribed by a physician.



Fig. 7: The page for give the treatment for the patient

RX is a symbol of the medical prescription which is known to specialists by clicking on the button "plus" will dangle prescription to start treatment

5. Figure 8 shows the prescription which includes: name of the physician, general competence.



Fig. 8: Prescription Information

6. When the pharmacist access to the system after entering his own username and password; the page as shown in figure 9 will appear for searching about prescription by patient's full name as the following:



Fig. 9: Pharmacist page for search about patient prescription

7. Figure 10 shows the prescription will appear to a pharmacist to give the required medicine to the patient.



Fig. 10: The prescription

6 Conclusions

In this paper we introduced the system of prescription management. This system has been presented the design and built a reliable data-based system for the treatment of the patient exchange lawfully and correctly. It contributed to enhance the quality of healthcare services and reducing their cost. And it has the ability to giving insight into perfect diagnosis and treatment of the patients also as enhancing the providing of services. However, after implementation the system of prescription management, it will be capable of achieving the following:

1. Ensures the security and privacy via safe access;
2. Ensures giving prescription by the physician in a safe manner;
3. Reduces maintenance costs because this system will be managed by a higher level language with easier database connection;
4. Processes the medical data with efficiency, reliability security manner;
5. Provides the best control of medicine use;
6. Executes the required functions of software in dependability and consistency;
7. Reduces the healthcare costs and provides time to the health care providers;
8. Helps to promote the communication between patient and clinician;
9. Supports and increases health awareness, and enhances decision making;
10. It can be viewed as an integrated field which deals with the following:
 - E-record keeping and e-health operational analysis;
 - E-health technology management.

BIBLIOGRAPHY:

- Burney, S. M. Aqil, N. Mahmood et al. 2010. "Information and Communication Technology in Healthcare Management Systems: Prospects for Developing Countries" *International Journal of Computer Applications* Volume 4(2).
- Chattopadhyay, S., Junhua Li et al. 2008. "A Framework for Assessing ICT Preparedness for e-Health Implementations." *Conference Publications* 124 - 129.
- Chehri, A., Hussein T. Moutah. 2011. *Survivable and Scalable Wireless Solution for E-health and Emergency Applications*. In EICS4MED 2011. Proceedings of the 1st International Workshop on Engineering Interactive Computing Systems for Medicine and Health Care. Edited by Ann Blandford, Giuseppe De Pietro, Luigi Gallo, Andy Gimblett, Patrick Oladimeji, and Harold Thimbleby. Pisa, Italy.
- Chowdhury, A. and P. Ray. 2007. "Privacy Management in Consumer e-Health." *Conference Publications* 29 - 33.
- Connolly, T. and C. Begg. 2005. *Database Systems: A practical Approach to Design, Implementation, and Management*. 4th Edition. Wesley.
- Fitzgerald, G., P. Piris et al. 2008. "Identification of Benefits and Barriers for the Adoption of E-Health Information Systems Using a Socio-Technical Approach." Proceedings of the ITI 2008 30th Int. Conf. on Information Technology Interfaces, June 23-26, 2008, Cavtat, Croatia.
- Khan, Z. and E. Michelson. 2012. "The Rockefeller Foundation, Accelerating Development Using the Web: Empowering Poor and Marginalized Populations Geoge Sadowsky, ed", Foreword from the Rockefeller Foundation, World Health Organization [2012].
- Laplante, Phil. 2009. *Requirements Engineering for Software and Systems*. (1st ed.). Redmond, WA: CRC Press.

- Malan, R. and D. Bredemeyer D. 2001. "Functional Requirements and Use Cases." Bredemeyer consulting white paper, Vol. 8/3/01. On line access document [Accessed 25 Aug. 2010] http://www.bredemeyer.com/pdf_files/functreq.pdf.
- Mistry, R., S. Misner. 2012. *Introducing Microsoft SQL Server 2012*. 1st edition.
- Rezai-Rad, M., R. Vaezi, et al. 2012. "E-Health Readiness Assessment Framework in Iran." *Iranian J Publ Health* 41(10): 43-5.
- Richards, K. et al. 2010. "Agile Project Management: Integrating DSDM Atern into an existing PRINCE2™ environment." Keith Richards Consulting.
- Satziger, J. W., R. B. Jackson et al. 2007. *Systems Analysis and Design in a changing world*. 4th ed. Thomson course technology. <http://faculty.kutztown.edu/tan/csc354/Datafiles/A.pdf>.
- Spinhof, L. and L. Calvi. 2006. "User and task analysis in a home care environment." http://www.hft.org/HFT06/paper06/26_Spinhof.pdf
- Tan, J. 2005. *E-Health Care Information Systems- An Introduction for Students and Professionals*. 1st ed. Jossey-Bass. A Wiley Imprint.
- Valade, J. 2004. *PHP & MySQL for Dummies*. 2nd ed. Wiley Publishing, Inc.
- Zhang, J. et al. 2005. "Image-Based Electronic Patient Records for Secured Collaborative Medical Applications." *Conf Proc IEEE Eng Med Biol Soc*.