CLINICAL MANAGEMENT SYSTEM (CMS)

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Clinical Management System (CMS) is a user support system which is developed to assist doctor and nurses in patient records management. There are two main modules that need to be developed in CMS – electronic patient record module, and reporting and charting module. Apart from offering a better solution by using a computerized system, CMS also provide an efficient and systematic management environment within the clinic. In addition, this system is able to produce repository of data and provide simplified reports to the user. Studies were conducted on current manual process and similar clinical management system through Internet in order to gain understanding on the implementation of an effective computerized system for the clinics. The methodology used for developing CMS is System Development Life Cycle (SDLC). This system is written in Visual Basic 6.0. Microsoft Access was utilized as the database for the system. This thesis will explains the background study, methodology, system analysis, system design, system development and implementation, testing and evaluation and lastly, the potential of future enhancements.
ABSTRAK

CHAPTER 1: AN OVERVIEW

1.1 Introduction

Currently, many clinics in our country are still store patients' record by using paper or card manual system. Nurses need to manually write down the patients' information and index the patients' medical card. Then, these medical cards are kept on the organized racks or in the cabinets. These works are so troublesome and plaguing. Moreover, patients' information is not secure.

Nowadays, there are several changes in health care sector that leading more doctors to consider the impact of Information Technology (IT) in their practices. The proposed system is attempted to solve the patient records management problems that are facing in many clinics.

Clinical management system (CMS) is a computerized patient record system. The main purpose of the system is to reduce the burden of doctor and nurses and improve the patient records management system. The CMS integrates clinical, scheduling, electronic medical record, charting, and data consolidation/reporting components that enable clinics to provide patients with quality care in a timely and cost-effective manner. CMS is a central repository of information that can be updated and accessed electronically within a clinic, allowing sharing of vital patient information between nurses and doctor with security password access. The electronic patient record has a familiar resemblance to traditional paper record that currently seen in many clinics.

This proposed system will adopt the System Development Life Cycle (SDLC) as its methodology. SDLC is the most suitable model to guide the progress of developing the system. It divides the development processes into phases. Each phase will be integrated and validates.
As a conclusion, the proposed system will bring benefits to doctors and nurses. Much workloads and planning can be schedule more effectively. It is aims to assist users in achieving their respective goals and objectives.

1.2 Problem Statement

The paper-based system currently in use cause many problems to the user. When the patient first visit to the clinic, the nurse is require to fill in a new medical card for the patient. This include some private information that can be obtain from the patient’s identity card such as name, identity card number, date of birth, gender, and mailing address. The nurse will pass this medical card to the doctor. After the patient sees the doctor, some diagnosis information and treatment will be written down on the medical card by the doctor. Once again, this medical card is passing to the dispensatory. After patient getting their medicine, the nurse will keep that medical card on an organized rack based on index of the card. Usually, these medical cards are arranged in alphabetical order according to the patient’s name or based on the reference number for each card. The nurse needs to search through the file for the medical card that match the patient’s name for any subsequence visit of the patient.

This kind of paper-based system is tedious and plaguing. There are a few problems that have been arisen by using manual system. They are,

i. Insecure

- The medical card is easily exposed to unauthorized user. They can easily get the vital patient information from clinic because the medical cards are just kept on the rack without any security lock.
ii. Time consuming
   - By using medical cards, times are wasted when the medical card need to pass from the nurse to doctor and then to dispensatory. Besides that, clinic also needs to spend times to organize the medical cards from time to time.

iii. Space
   - Clinic needs to provide space to store these medical cards. When the quantity of cards increases every year, they need more and more space to store the cards.

iv. Redundant information
   - Sometimes, a patient can have more than one medical card. This happen when the patient forgot whether he/she have been visit the clinic or not and people who do the registration did not check properly and just directly use a new medical card.

v. Limited capacity
   - What can be written on the medical card is limited. Doctor cannot include other related information in the card. The card just includes some basic patient information, diagnosis and simple treatment information.

1.3 Objectives

This proposed project aims to:

i. Assist doctors and nurses in patient record management.

ii. Computerized manual procedures for both doctors and nurses.

iii. Generate report and chart automatically.
1.4 Scope

The proposed system is to be used in any clinics in Malaysia. The target users of the system are doctors, nurses or any office workers in the clinic. This project is mainly emphasized on developing a system for storing electronic patient records and report generating. It also includes some other functions that can help the target users to improve their performance.

Basically this proposed system can be divided into two modules.

i. Electronic patient record module

ii. Reporting and charting module

The first module is electronic patient record module. This is a database module of the proposed system. It keeps the patient information and their medical record. The medical record includes the patient medical history, previous diagnosis records and previous treatment records.

The second module emphasizes on detailed reporting and charting of the information needed by the doctor. It provides an easier way to auto-generate reports from existing stored information.

1.5 Research Significance

There are several reasons why information technology will change your life. Among these are an increasing focus on redefining the responsibility, accountability and authority of various players in the health-care field. There is a growing interest among governments, hospitals and various other health authorities/district health councils to "manage" health-care services, create integrated services, and focus on population health.
The confluence of these changes is leading many doctors to realize that they will be swept up by events unless they understand the significance and then help direct the change to achieve appropriate outcomes.

There is an enormous opportunity for future expansions and enhancement of this project in our country. Nowadays, everything is computerized, there will be less paper used for keeping records in the future. There will be a paper-to-digital transition happen. People can spend less time searching through file cabinets and racks. They can access the patient information in seconds with the increase of efficiency of technology. It also eliminates the need of writing and rewriting the patient information and transcription errors.

Besides that, the privacy and security of the patient’s personal information is also a significance of research in this project. The proposed system need to ensure the system is secure enough to prevent any unauthorized person access to the record.

The significance of research is to computerized the current paper-based system, which can automate the process of patient record management, appointment scheduling, electronic report generating and others. The comprehensive components enable efficient management of patient record. The proposed system is designed based on the problems and requirements gather from the target user by interview them.

1.6 Project Plan and Schedule

The project plan and schedule is used as guidance for the progression of the proposed project. There are five main tasks in the project plan – planning and scheduling, system analysis, system design, system development and implementation, system testing and evaluation. A simplified table of tasks is shown in Table 1.1 and the Gantt chart for this project can be referred in Appendix A.
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**Table 1.1: Project time schedule**

1.7 **Outline of Project Report**

To give the readers a better understanding about this report, a general description of each chapter is given as below:-

**Part I – Identification of Clinical Management System (CMS)**

**Chapter 1** consists of an overview of project. This chapter include introduction of the proposed project, problem statement of the existing paper-based system, objectives of the project, scope, research significance, project plan and schedule and the outline of the project report.
Chapter 2 emphasizes on reviewing existing systems. This chapter starts with the introduction and followed by the reviewing of existing systems. It also included comparison of the reviewed systems. Some comparison on programming language used, system interfaces and system features of existing systems was done. Lastly is the conclusion for this chapter.

Chapter 3 concentrates on the methodology used to develop the Clinical Management System (CMS). This chapter will discuss on the methodology – System Development Life Cycle (SDLC) that used as a guidance model to develop this system. All seven phases in SDLC and the implementation of each phase in the project will be explained in detail.

Chapter 4 discuss about the system analysis. The introduction to system analysis, feasibility study, method of investigation and requirement specifications are all under the subtopic that will discuss under this chapter. Method of investigation divided into interview and review existing systems. Requirement specifications can be divided into user requirements, software requirements and hardware requirements.

Chapter 5 is focus on the system design. This chapter consists of the introduction of system design, system architecture, database design and interface design. Context diagram, Data Flow Diagram (Diagram 0) and some child diagrams is shown in the system architecture. The Entity-Relationship Diagram (ERD) and Data Dictionary are included in the database design.

Part II – Clinical Management System (CMS) development

Chapter 6 describes about the system implementation, which includes the introduction to system implementation, system configuration, database implementation, implementation of system modules, and additional functions.

Chapter 7 gives emphasis to the system testing and evaluation. The tests that carried out in this chapter are system testing, functional testing, and usability testing. System testing
invokes unit test, module test and system integration test. On the other hand, system evaluation involved user acceptance test.

**Chapter 8** is about the conclusion and further enhancement of the project. In this chapter, the achievement of the project is stated and the future enhancement of the project also included here. There is also an overall conclusion of the project.
CHAPTER 2: REVIEW EXISTING SYSTEMS

2.1 Introduction

There are many clinical management systems available in the market. Most of the systems are using computerized system to assist them in managing patients’ record, and also other functions like billing, insurance claiming, scheduling, reporting and so on. The purpose of computerize the manual system is to save time, space, and money, enhance the patients’ record management process to more efficiency and effective, reduce man power, improve clinical and administrative efficiency, and protect the data. In Malaysia, there are many clinics still employ card/paper-based system. This ineffective, inefficient, and unsafe system can cause troublesome in managing a huge amount of patient records.

This chapter is discussing on current system that is implementing in local clinics and some existing systems in the market. Apart from this, comparison on the programming language used, interfaces design and features among the existing systems also will be discussed in this chapter.

2.2 Reviewing on Current System in Clinics

2.2.1 Medical Card

Currently many clinics still keeping patients’ record manually. One of the most popular techniques used is medical card. Medical cards are printed cards which include brief patient information, the date for each visit, diagnosis and treatment for each diagnosis. (Refer Appendix B)

A medical card will be generated by the nurse when the patient first visits the clinic. Usually, patient will ask by the nurse to show their identity card during registration. Then, the
nurse will fill in their information based on what are stated on the identity card. The nurse will also get the contact number from the patient as usual. Some of the clinics will rewrite the new patient information in a record book for backup purpose. After that, the medical card will be passed to the doctor to write down the diagnosis and treatment information after doctor diagnosed the patient and then passed it back to the dispensary. The nurse will prepare the medicine based on the prescription written on the medical card. Finally, patient gets their medicine at dispensary and they pay for it. These medical cards will be later kept in a cabinet or a rack and it is organized according to the reference number on the card.

The medical card is mainly used for recording the diagnosis and treatment that have been done on the patient. The medical card is also used for reviewing the treatment and diagnosis that is previously done by the doctor. Normally each patient will have their own medical card. However, for children less than 12 years old, they are allowed to share the same card with their parents. There are some clinics that group the medical of one family under one card. Thus, doctors can refer to their family medical history using the same card.

2.3 Reviewing of Existing Systems

Reviewing similar clinical management systems allows the generation of ideas to develop an efficient system for this project. Most of the sources are come from overseas. These systems are either online or standalone. The areas of review are the programming used, the interface design, system features and tools.

i. Programming used

- Some of the clinical management systems are developed in web-based platform.

The programming language or scripting languages used to develop the system include Hypertext Markup Language (HTML), Hypertext PreProcessing