CLINIC MANAGEMENT SYSTEM:
OUTPATIENT MANAGEMENT SYSTEM

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ABSTRACT

As people become more educated, hence people become more aware of the quality of their life especially something that is related toward their health .The poor service in health care would give an effect towards the development of our country .To receive a treatment from government hospitals, patients sometimes need to wait for hours .While for administration's task they need to keep track a huge number of filing where all details on patients were being kept, sometimes it leads to data redundancy and an additional workload .That is why Outpatient Management System is being proposed .Outpatient Management System is develop using a web-based concept. This system is develop using Java Server Pages (JSP) and is design using Macromedia Dreamweaver MX .Because Outpatient Management System is a management type of system thus, the development of this system is according to the Protocol Management System where this protocol is more like a guideline in order to develop a management type of system. Outpatient Management System helps Outpatient Department, which are attend by more than 500 hundreds patients each day perform a better service in term of registration process, patient's details and reduce time waiting for patients .With the existence of this system, the registration process would avoid data redundancy, records keeping on patient details can be find faster and time waiting for patient before received a treatment from doctor could be lessen, this is because all manual task that happen in Outpatient Department is being convert to computerized type of system .

ABSTRAK

Dalam arus pembangunan yang semakin pesat, masyarakat menjadi semakin berilmu dan terpelajar,tahap kehidupan juga meningkat .Masyarakat kini semakin mementingkan taraf mutu kesihatan mereka Kemudahan kesihatan dari pihak kerajaan yang kurang berkualiti menyebabkan proses pembangunan yang sepatutnya pesat menjadi perlahan .Untuk menerima rawatan dari hospital kerajaan, pesakit kebiasaannya terpaksa menunggu dalam jangka masa yang panjang .Selain itu masalah juga timbul di pihak pengurusan, dimana pihak pengurusan terpaksa berhadapan dengan timbunan fail pesakit yang kesemuanya menyimpan data-data penting, kewujudan fail-fail dalam kuantiti yang amat besar ini memakan ruang dan dalam masa yang sama membawa kepada simpanan data yang berganda .Selain itu, pihak pengurusan juga terpaksa berhadapan dengan pertambahan beban kerja kerana untuk mencari fail pesakit dari timbunan fail adalah satu kerja yang seharusnya dapat dipermudahkan .Kerana wujud permasalahan yang sebegini Sistem Pesakit Luar telah dibangunkan.Sistem Pesakit Luar ini adalah sistem yang berkonsepkan pembangunan aplikasi web .Sistem ini dibangunkan menggunakan 'Java Server Pages (JSP) ' dan antaramukanya dibangunkan menggunakan 'Macromedia Dreamweaver MX' .Sistem ini dibina berdasarkan Protokol Pengurusan Sistem, dimana protokol ini lebih kepada garis panduan untuk membangunkan system yang berbentuk pengurusan . Sistem Pengurusan Pesakit Luar yang diguna pakai di Jabatan Pesakit Luar yang kebiasaannya menerima lebih dari 500 pesakit sehari telah membawa banyak kebaikan .Beban kerja pihak hospital dapat dikurangkan dan pesakit tidak perlu menuggu dalam jangka masa yang panjang untuk memperoleh rawatan. Proses penyimpanan data-data juga tidak lagi memerlukan ruang yang besar dan ini dapat

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LIST OF ABBREVIATION

BCA	Business Computer Application
CMS	Clinic Management System
HTAA	Hospital Tengku Ampuan Afzan
JAD	Joint Application Development
JSP	Java Server Pages
OPD	Out Patient Department
OMS	Outpatient Management System
RAD	Rapid Application Development
WWW	World Wide Web

CHAPTER 1

INTRODUCTION

1.1   Introduction

In the era of technology, where everything needs to be done efficiently and effectively the existences of Clinic Management System (CMS) become necessary . The used of CMS can enhance the services and also the work flow of all activity that happens in hospitals where it helps in reducing the workload of medical staff, the number of man power needed and it also make hospitals management become more manageable and easier to control. This Outpatient Management System is happens to be develop in one of government hospitals in Kuantan Pahang, Hospital Tengku Ampuan Afzan (HTAA) .

The usage of Outpatient Management System in Outpatient Department (OPD) brings a lot of advantages to patient and also to people who works under this department .Outpatient Management System makes the registration process in hospitals become computerized and this feature helps a lot in keeping details of all patients and whoever has once received a treatment in Outpatient Department .

All in all, the development of Outpatient Management System with all necessary features would bring many advantages to all people in this country.

1.2 Problem Statement

Nowadays, the current CMS that are available had not been widely used .This is because the process of task that occurred in hospitals is quiet complex compared to other organization .The other reason it that, most of existing system does not full fill the requirements of doctor and other medical staff in our country .

1.2.1 Overview Of Current System

Current system that is being used widely in all government hospitals in Malaysia is a manual system .Where all information is being collect using form and all data is being kept in the archive, where this conventional ways lead to the need of space and time wasting .

1.2.1.1 Registration

In hospitals, the processes of works to be done are vary . In current system that is being used in Hospital Tengku Ampuan Afzan (HTAA) where the case study has been done, all tasks are done manually .Before a patient can received a treatment from doctors, first of all, they need to register .Person who is in charge in registration process must make sure either the person had ever received a service from the hospitals or not .If the person had been received treatments from the hospitals, then attendance are responsible to find back their file where a details of that particular person had been kept .

In registration process, usually the person in charge is someone who works under administrator department .This responsible person will hand out a form to be filled by patients who wish to receive a treatment in Outpatient Department .Patients

need to give details about themselves .In some cases, patient come to hospitals with serious injured and because of this, patient sometimes are not able to fill in the form themselves so someone need to fill in the form for them, before they are allow to receive a treatment from Outpatient Department .Because of this scenario, sometimes the details that had been given are not correct .So whenever patient are available to do it themselves they need to register again, and this lead to a data redundancy, time wasting and also and additional workload for hospital staff especially the registrar . They need to find out the previous details about the patients which are incorrect in the archive .Where, in archive, it contains thousand of files on patient's details .
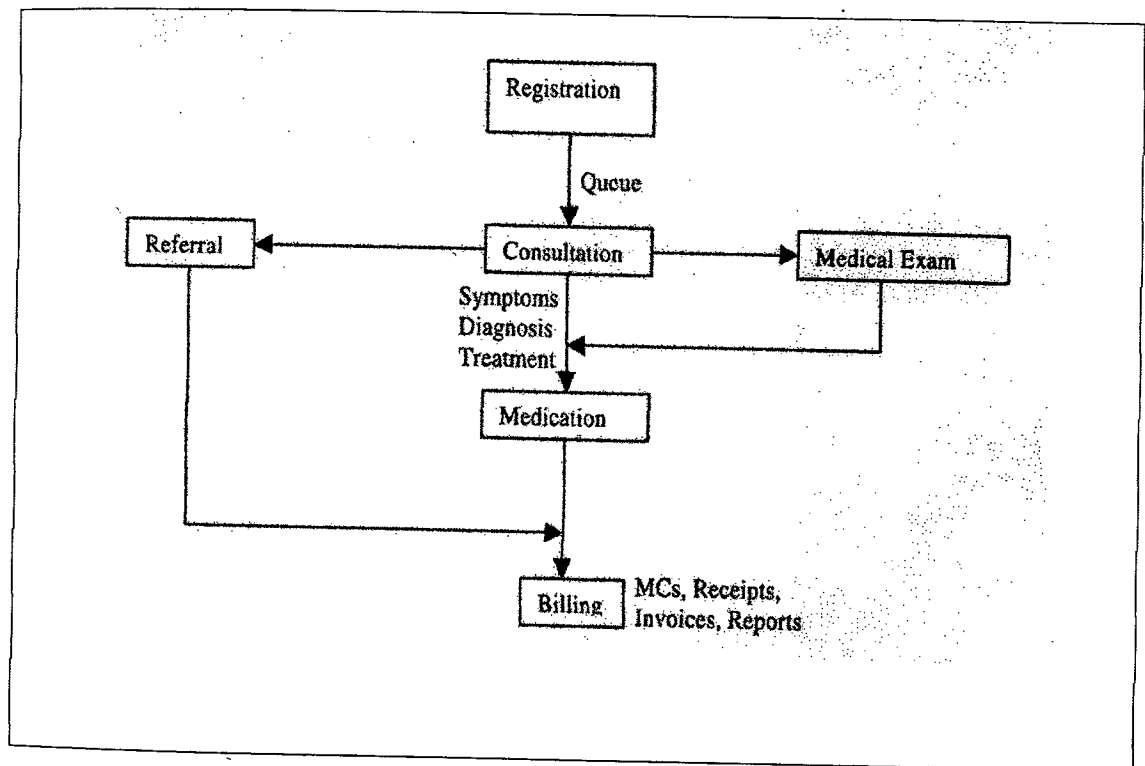
Figure 1.1 Workflow of Out Patient Department

1.2.2 List of Problems

Compare the current system to the available CMS and the one that is to be developed here are list of problems that people who works in hospitals are facing:

(i)   The manual registration process leads to data redundancy and also gives an additional workload to the person who is in charge .Because if the patients have received treatment from Outpatient Department before, then they need to find back the details on that particular patient in the archive .

(ii)   From the research, by interviewing the medical staff, and also people who work under this organization they feel that the current CMS that are available in the market nowadays do not full fill their requirement . This is because most of the current CMS system are develop by people from others country, so the system sometimes does not suits or compatible to be used in our country. The main reason is that, the management of many hospitals in our country is different from others country .

1.3 Objectives

The integrated CMS are planned to be develop to fulfill some of the problem that occurred in both manual system and also current CMS system which are not integrated. Below are the lists of the objectives:

(i)   To transform the manual system into computerized Outpatient Management System .

(ii)   To develop a prototype on outpatient department system using web-based application .

1.4   Scope of the project

The scope of this project will be focused on the outpatient department in hospitals. The scopes of the research are:

(i)   This case study of this project is Hospital Tengku Ampuan Afzan (HTAA) in Kuantan, Pahang .

(ii)   The development of this system is using the Java Server Pages (JSP) as language tools .

(iii)   The process of develop this system is done in a windows environment .

(iv)   To design this system, Macromedia Dreamweaver MX is software that is going to be used, other than that, Oracle 9i as a database and Jakarta Tomcat as a platform .

This system will have three (3) types of features which are:

(i)   Patient Registration Module - This module are responsible for all the registration process that happen in Outpatient Department . Registrar/nurse is the person involved under this module .

(ii)   Generate Medical Leave Module – This module is able to produce a medical leave on demand but under the permission of doctors .

(iii)   Manage Patient's Details – System must continuously update the database for any new information or changes on patient's details .

CHAPTER 2

LITERATURE REVIEW

2.1   Introduction

The current manual system that is being used widely in many government hospitals in Malaysia makes the services received by patients are not so efficient and effective . Time wasting, loads of paperwork, filing, and a huge numbers of man power needed are few to be listed . This list can be lessen if a computerized system is being implemented in this organization . This is to make sure the service and treatment that all government's hospitals offer become more standard and have a good quality .

2.2   Current Clinic Managements System (similar to OPD)

The used of clinic management system (CMS) is not new in our country . Nowadays, a lot of private clinic have practice this sort of system . The used of clinic management system can make sure the flow of the service that they offer are efficient and effective towards patients .

2.2.1   Overview of Clinic Management System

Current clinics management systems that are available nowadays have been widely practice in most of private clinic in Malaysia . This system is not so efficient because most

of them are a stand alone type of system .This system is capable mostly in registration process and billing, because most of these available systems are stand alone systems, so all data are not being updated on demand .People who work in the administration need to key in new data everyday .These types of work process are not so efficient, because still the workloads are there, where the admin need to enter important data before the clinics operations are being closed for that day .

Usually in clinic management system, clerk are responsible to handle the system, all registration process and payment of the clinic's bills from patients are done by clerk or registrar, from doctor's room, doctor can know either the patients in new to the clinic or the patients have received treatment before .This sort of information can be retrieved from the system .This way of working does reduce time waiting because doctors are prepared before they see the patients themselves .

2.3   Importance of Clinic Management System in Out Patient Department

Clinic Management System (CMS) is designed to be a tool for doctors and also registrar to manage their outpatients. Below is the importance of CMS:

(i)   Designed to provide better service to patient, patient's details, and other vital information for group clinics such as registration process .

(ii)   Lessen the workload of registrar, where all data are easier to retrieve without time wasting compare to the manual process where data about patients need to be search in the archive, which required extra effort and time .

2.4   Definition of Outpatient Department

Outpatient Department is a place in hospitals where it provides a variety of services for community and hospital's staff. Services that are beings offers by out patient department include medical care from a variety of physician specialists, outpatient procedures and etc [1] .

2.5 Clinic Management System for Out Patient Department

The idea to build a system that is more capable in brings an effectiveness to the service of all hospitals in Malaysia begin, when the current manual system that is being used in all government's hospitals lead to many problems and sometimes its effect the service towards patients .So as a solution, computerized system such as Outpatient Management System which used the web based concept should be implement because it is more efficient compared to the current manual system .

2.5.1 Outpatient Management System(OMS) – Registration Process

In OMS, registration process is done computerized .This is to avoid any data redundancy .If the particular patients have once received treatment from the hospitals even years before, the information on that particular patient are still available in the hospital's record .The person who is in charge for the registration process, just need to key in a keyword and then the system will search through the database to find out whether the patient is new to the Outpatient Department or vice verse .If the patients are an old patients, which means the patient have once received treatment from out patient department then the registrar can directly view the details about that particular patient by search the patient profile that are available in the OMS database .

Other than that, the information on patient also could be updated .If the patients have some new information on their details, then the registrar can just update the information in the database from the interface that is available .

The Outpatient Management System is able to generate medical certificate on demand .But this medical leave certificate can only be produce after doctors have diagnosed the patient's health. Only doctor can produce this medical certificate .The registrar can only print the medical leave certificate to be hand out to patient .In a registration module all certificate that have been produce will be kept in the database for reference whenever necessary .

Doctor do not need to re-write the patient's details on the medical leave certificate, doctor just need to enter the diagnosis that they have made and the date for the leave that patient received other data such as patient's name, and etc will be retrieve from the database .This work process does reduce the workload and also time for doctors to treat each patient .For patients, this work process reduces their time waiting.

Doctors also are able to view their entire patients .Either new patients or old patients, all details on patients are available for doctor to retrieve .

2.6   Available Clinic Management System (CMS) on Market

Nowadays there are a lot of CMS on the market, which offer varies function and capabilities .Most of CMS on the market are produce using modular method. Where every module such as registration, prescription, billing an etc can be functioning without one another, stand alone to be exact .Many private clinics which usually treat a non-critical patient prefer this type of system because they just need certain module to make sure their work process become efficient .Compare to hospitals where a lot of work need to be done and a huge numbers of patients received a treatment from hospitals everyday .

2.6.1   Clinic Management System (CMS-BCA) by Business Computer Application Inc

From the research that have been done through the internet, the existence CMS which have been develop by Business Computer Application Inc offer several function which are scheduling, appointment, patient registration and database management .

In patient registration user is given an option either to fill in manual form which is the conventional way that is being used in most hospitals in Malaysia nowadays or to register automatically .Only patient with previous appointment scheduling can register automatically this is because their data are available in the record .

Other than the registration process, this system also is capable in schedule, cancel and also reschedule appointment . This scheduling module has the ability to search for the next available day or next available time and also the type of appointment . This scheduling appointment module stores the date, time and length of the appointment, the provider, the location, the patient name and address, medical records number, date of birth, and the type of appointment . It also includes patient comments, transportation request, waiting list, and appointment letters .

This CMS system that was developed by BCA.Inc provides the ability to track patients with specified condition . The medical tracking module offers an effective and efficient means to manage patient charts . This module provide chart request on demand, so whenever patient need a medical report, user can received in via hardcopy or online .

On top of that, this system also helps in the database management where a very comprehensive relational database had been equipped . The Database Management system is used to enter and maintain all of the different files that are needed to customize the tables to your system specifications . This system also has the ability to print listings of the different data base files for reference and the new files can be entered or old ones may be modified . Database entries can be inactivated so that they will not show up within the system . This is an effective way to remove these from use without actually deleting them .

This system also offers other module such as immunization tracking module, patient billing and third party billing . This system is modular type of system, where each module can be run without each other .

2.6.2 Clinic Management System (CMS) by AIZ

The CMS system that was develops by AIZ Company which is a local company . AIZ Company built a CMS system with the objective to provide a flexible Clinical Management System to enable the clinic group to have better control over patient management, drug inventory, electronic medical records, billing and patient medical examination .

The Clinical Management System collects patient details and the medical record are then generated electronically .More importantly, this system supports the newly established workflow and performance at each level .

The workflow consists of a nurse registering the patient .Thereafter, a doctor will be assigned to the patient in queue .The assigned doctor will then retrieves the patient's details from the system, proceed with consultation, note the diagnosis, administer treatment, and prescribe medication and referral for an X-ray .

The patient will then be put on Open Patient Listing pending the X-ray report .Once the patient returns from the X-ray room, the nurse will retrieve the prescribed drugs and prepare the medication .After dispensing the medication, the nurse will print out the receipt and medical leave, if necessary, for the patient .This system is much more similar to the system that is going to be developed .The system that was developed by AIZ Company is a stand alone system, where data are not continuously updated .

2.7 Benefits of Outpatient Management System

From the survey and also research that had been done, the existence of Outpatient Management System that is being implemented in Outpatient Department does bring benefits to the department and also to the peoples involved .Below are some of the benefits that could be highlight:

(i)   Using Outpatient Management System, the registrations process become easier and efficient .Because if patients have once visited the hospitals and if they come in the next time frame to received other treatment they did not need to register for the second time because all the information about them are still available .

(ii) Using CMS the numbers of man power needed can be lessen and this help a lot in reduce amount of money hospitals need to spend every year .

(iii) Filing system which is being used nowadays can be discarded, because in Outpatient Management System all data is being kept in one database, this helps to reduce clerk's workload and also reduce the used of space in a hospitals .

2.8 Comparison between Available System and Outpatient Management System

There are a numbers of available CMS systems on the market .Below is a table consists the differences, similarities and also features that are available on selected CMS system on market with the Outpatient Management System .

Table 2.1 Comparison between Available Systems

Name Of System	Outpatient Management System	CMS for Out Patient Department	Clinic Management System
Type Of System	Web-based system	Stand alone system	Integrated Web-based system
Module	Consist of three module i. Patient Registration ii. Manage Patient's Details iii. Generate Medical Leave	Consists six modules some of the modules are: i. Patient Registration ii. Billing and Reporting iii. EMR iv. Referral	Consist many modules some of the modules are: i. Patient Registration ii. Appointment scheduling iii. CMS reporting iv. Immunization Tracking
Scope	Focus only on Out Patients Department	Focus only on Out Patients Department integrated with Drugs Management System	Focus on the whole department in hospitals
Developer	Proposed System	AIZ Company	Business Computer Application(BCA).Inc
Price	Affordable	Expensive	Very Expensive
Origination	Local Product	Local Product	International Product

From the comparison table, every system that is available on market nowadays does provide benefits to out patient department .In term of features that they offer, most of the available system provides functions that are important and useful in order to help out patient department manage and control workload and also operation that happen in the department each day .

Although the available system are good in terms of providing better performance, but still client refused to used the available system .This is because most of these available systems are too expensive .Other thing that is to be considered is that, the available system

that is produced by international companies frequently does not full fill the requirements of out patient department in our country .

Outpatient Management System is being proposed to overcome this sort of problem, because this system is a local product, so user requirements are better to be understood and full fill .Outpatient Management System is cheaper compare to all available system in the market .More over this system is a web-based application system so it is much better to be used compare to the stand alone type of system .

2.9   Overview of Web-Based Application

As the technology becomes an important thing today, thus the internet has become a new paradigm in computer world .In the next time frame, mostly part of computerization process will be based on the internet technology and so does the application .Because of this phenomenon the web-based application becomes the optimal alternative .

In order to develop an application that used a web-based type of implementation, numbers of development tools are available .A few to be list out are ASP, JSP, PHP, Java and Perl .All of these tools are chosen depends on the system need and also requirement of clients .

Web-based application does improve the performance of application .The competencies of web-based application are able to support the access of international software market .Web based providing the opportunity to save time and money .It also helps in improving the way users interact with the system .

2.10   Advantages of Web-Based

There are a lot of advantages that can be list out for the system that used a web based concept .Clinic Management System Out Patient Department implements the web

based concept because of the advantages that web-based application offers which brings benefit to the client . Among the advantages are as below:

(i) User friendly

The interfaces are easy of used, just point and click. It utilize familiar browser, buttons, drop down and text entry elements . The are no need for user to learn new application or menu system. So it does save cost and time .

(ii) Information/Data are updated

The biggest benefits in a web-based application in today fast-paced environment where all are frequently change is the data that are always updated . All users will automatically have the latest version of information they need .

(iii) Shorter Implementation Time

Because a web-based application is already up and running and available around the clock so the implementation time is reduced . User just needs to login and begin using the system, entering data, etc . This is important to the person who works in hospitals, where everything needs to be done fast and efficient .

(iv) Deployment is easy

Web-based application brings benefit in term of the deployment . This is because control of the web-based application is centralized at the web server . Hence, the support to user also can be much simpler because users are accessing the same version of the application .

Because of all the advantages that have been emphasizing, client of Outpatient Management System, which refers to Outpatient Department of Hospital Tengku Ampuan Afzan (HTAA) where the case studies have been done, has requested to make the Outpatient Management System as a web-based application type of system .