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Candidate Details			
<b>Name</b>	Sameera Madushanka Palliyaguru		
<b>E-Mail Address</b>	Sammy.7.ssk@gmail.com	<b>Registration No.</b>	2017/MIT/049
<b>Phone Number(s)</b>	0716331309	<b>Index No.</b>	17550498
Project Details			
<b>Proposed Project Title</b>	Automated Patient History Registration System for Asiri Group of Hospitles.		
<b>Name of the Supervisor</b>	Dr. M G N A S Fernando		



# **Automated Patient History Registration System for Asiri Group of Hospitals**

**A dissertation submitted for the Degree of Master of  
Information Technology**

**S M Palliyaguru**

**University of Colombo School of Computing**

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## **Declaration**

The thesis is my original work and has not been submitted previously for a degree at this or any other university/institute.

To the best of my knowledge it does not contain any material published or written by another person, except as acknowledged in the text.

Student Name: Sameera Madushanka Palliyaguru

Registration Number: 2017/MIT/049

Index Number: 17550498

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Signature:

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under my supervision. The thesis has been prepared according to the format stipulated and is of acceptable standard.

Certified by:

Supervisor Name: Dr. M G N A S Fernando

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Signature:

Date:

## **Abstract**

Patient medical history makes huge impact on when diagnose in doctor's perspective. Healthcare providers looking for provide value added service to patient. Accessibility of patient previous medical records require to accurate diagnose.

Asiri Group is one of the leading healthcare provider in Sri Lanka. Currently Asiri hospital system facilitate patient registration, Online appointment placement and online report view facility is granted. Improving of healthcare service Asiri group expected to implement patient medical history management system .

Automated patient history registration system for Asiri Group of hospitals focus to improve overall quality of health services. Because of the facilities available in the Asiri Group of hospitals hence the main healthcare provider in Sri Lanka it is expected to bring healthcare services in to next level of hospitality as world standards. Due to absence of patient medical history it is cause to accurate diagnose in critical situations. As a solution Automated patient history registration system proposed for group of Asiri hospitals.

Proposed system expected to perform as a centralized system to integrate pharmacy, laboratory, patient registration process and doctor involvement in diagnose. Keeping of medical records(doctor comments, allergies, previous operations etc.), prescription records expected to update under relevant patient in each and every visit to the hospital. System works as a centralized system that connects each and every stakeholder through the system. Doctors can view all kind of patient details including previous medical history. Patient also facilitated by improving access of own medical history. System developed using php, javascript and MYSQL database.

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## List of Abbreviations

<b>HMS</b>	-	Hospital Management System
<b>EMR</b>	-	Electronic Medical Health
<b>HER</b>	-	Electronic Health Record
<b>e-Health</b>	-	Electronic Health
<b>SQL</b>	-	Structured Query Language
<b>CSS</b>	-	Cascading Style Sheets
<b>PHP</b>	-	Hypertext Preprocessor
<b>HTML</b>	-	Hyper Text Makeup Language

# Chapter 01: Introduction

## 1.1 Motivation And Project Background

Birth to death, illnesses are met with accidents is normal in life. People are faced with these incidents throughout their lifetime. When certain party engaged with clinic, doctor has to check the medical history, allergies and medical reports which has to be provided to healthcare providers to diagnose the illness. In patents perspective keeping of medical records up-to-date and accordingly is not accurate as per the healthcare providers(doctors) expected. In generally they forget misplace or maintain inaccurate medical records. When critical situation occur hospital staff faced difficulties to identify biological facts(blood group, allergies, operations has done) of relevant patient. Due to the lack of patient medical records healthcare providers has to put extra effort to diagnose patient previous medical history. [1]

Often in majority of the countries around the world patient medical records such as medical history is paper based. Paper based medical records can badly affect both the patients and health care providers. These are some of the issues that come across with the use of paper based medical history of patients [2]

- The missing, illegible, inaccurate date could affect patient's safety.
- Unnecessary costs due to missing information. eg: Duplication of tests due to missing medical history.
- Problems regarding the continuity of care due to missing medical history of patients.

The above mentioned scenarios are true regarding the context of Sri Lanka also. Vast majority of the hospitals in Sri Lanka the medical history of the patients are paper based with the exception of few hospitals such as Nawaloka hospital and Sri Jayewardenepura General Hospital.

For this project Asiri Group of Hospitals have been selected .Currently an automated patient registration history is maintained which confirm the previous arrivals of patients. But the medical records of the patient are paper based. Therefore all the issues which are discussed in this section are true regarding Asiri Group of Hospitals. Asiri Group of Hospitals consist of three hospitals in Colombo area namely Asiri Hospital Holdings PLC,Asiri Surgical Hospital PLC and the Central

Hospital. The intention is to analyze the shortcomings of the traditional paper based medical history of the patients and come up with an automated solution or Health Information Technology (HIT) solution to overcome the issues which benefit both the patients as well as hospitals.

## **1.2 Problem Justification**

Considering about medical record maintenance, which is all about consistence and accessibility of medical record when it requires. Keeping of medical records by themselves not achieved expected outcomes of medical records in patient's perspective. They are not entirely aware of medical records maintaining in day today life. In doctor's perspective when doctor diagnose a disease medical records and prescriptions are really because of they take decisions based on reports and prescriptions. Whether the doctor can quickly access previous medical records of a patient which would be helpful to improve decision making and diagnose disease accurately. In patient perspective it is difficult to maintain medical records accordingly in a certain period of time and cannot maintain that mush accurate medical history. Accessibility of medical record not entirely up to the standards when considering of paper based medical records. Misplacements of medical records is a common issue in day today life's. Requirement of automated medical record registration system emerges with the situation of given scenario with the effect of giving the expected outcomes of the healthcare providers.

## **1.3 Aim and Objectives**

### **1.3.1 Aim**

The aim of this project is to analyze, design, develop and evaluate a web based Automated Patient History Registration System to provide expected outcomes with the system by improving of accessibility of medical records, patient medical history and prescriptions.

### **1.3.2 Objectives**

- Identifying the drawbacks of the paper based medical history and see how local and global organizations (if any) have overcome this issue.
- Improve accessibility of medical records in doctors and patient perspective.
- Maintaining of medical reports according to the order of dates that patient took medicine.
- Develop system security up to the standard and facilitate high secure patient medical history.
- Pharmacy management and prescription history maintaining according to the date that relevant patient.
- Improving accessibility for patient of test reports in quick time through the proposed system.

### **1.3.3 Scope**

Asiri Group of hospitals selected for this project by evaluating Asiri group background, feasibility of implementing new system and usefulness of this kind of system to the society. Web based automated patient history registration system proposed as a solution of many and more difficulties faced in healthcare providers by using of paper based medical records. The idea behind this project is eliminating difficulties of using paper based medical records and facilitate new tools to analyze, evaluate and monitoring when diagnose disease in doctors perspective. Improving accessibility of medical records in anywhere and anytime (improved accessibility through mobile devices) Because of target audience of the project is mostly in Colombo area e-channeling facility is an essential as a facility of proposed system. In build e channeling

proposed to embedded to the system and apps like doc.lk and e-channeling should be embedded to this system as future enhancements.

#### **1.3.4 Proposed Solution**

The proposed solution is expected to overcome the drawbacks identified in the current paper based medical records. The integration between the Asiri hospitals with its laboratory and pharmacy is facilitated by the proposed Automated system (Electronic medical records). Because of that accessibility of medical records and prescriptions are improved internally among main three hospitals of Asiri group. Information sharing improvements among the hospitals is one of most important expected outcomes of a system. Easy access to medical records for the doctors will be enhanced by the proposed system. Records will be maintained by the hospital database. The required records will be readily available for the doctors.

Since the medical records kept and maintaining is a secure database in this system, patient responsibilities will be greatly reduced from the proposed solution. In patient's perspective they can access medical records (prescriptions, medical reports, diagnose card) by using mobile diverse or computer to log into their profile of the system. Patient can make their appointment on their own or just make a call to asiri hospital and place the appointment through the receptionist.

In doctor's perspective real-time access of patient medical history couse to accurate diagnose and doctor convenience. Without sharing of any paper work, doctor can prescribe medicine through the system and doctor can place report request through the system. Using patient Id card number or mobile number pharmacy, laboratory can directly access of what doctor prescribe for the patient and work accordingly to the prescribe details.



## **Chapter 2 – Background**

### **2.1 Introduction**

It is expected to evaluate the background of given scenario, how existing system performs with relevant features of system, drawbacks of existing system and how proposed system overcome the scenario with newly embedded features. Furthermore requirement analysis according to the stakeholder feedbacks, how similar systems overcome the requirements, comparison of features of similar systems and what improvements can bring to your proposed system by following similar systems are discussed within this chapter accordingly. Under the comparison of alternative design strategies, different competing design strategies, development strategies, hardware environment and choice of system software are discussed.

### **2.2 Literature Review**

Evaluating of maintaining patient records has focused on scope of the patient medical history which mainly includes illnesses, surgeries, allergies and current medication [3]. And also it includes family medical history, social history (diet, exercise, smoking, use of drugs and alcohol), occupation history, current patient complaint recorded in patient's own words, physical examination results, results of laboratory and other tests and records from physicians or hospitals [1].

Bangalore-based Parcto technologies has recently launched a tab and software for doctors to simplify the booking procedure and maintaining patient medical history. Which can be used by hospitals and clinics to maintain patient medical history. Instead of doctors filling up forms, their data can be recorded on the tablet through the software. Among some of major hospitals [4].

Based on Health information technologies project structure has found drawbacks with paper based patient history.

The impact of missing, illegible, or inaccurate data on patient safety.

The lack of easily shareable information between healthcare providers.

Missing information that often leads to unnecessary costs, for example when it becomes necessary to duplicate tests because the previous results are not available to the present healthcare provider during consultation.[1]

Challenges related to continuity of care when a healthcare provider does not have readily available relevant information about the medical history of the patient.

Main findings of this project is quality healthcare is required accurate, accessible and shareable health information. Since a paper-based patient history cannot satisfy these requirements, the focus has shifted to technology based solution. And also this research shows the benefits of using automated patient history.[5][6]

- The quality of and access to the health data of the patient is improved, which in turn leads to more appropriate care being delivered to the patient.
- Information about the patient can be integrated over time and between various healthcare providers.
- It is easier to ensure the security and confidentiality of medical records.
- It is easier to control and audit access to records.
- Team-based care is more efficiently supported.
- Decision support tools are available to doctors.
- Unnecessary duplication of tests are avoided, which reduces costs.
- Medical knowledge is made more accessible.
- There is a reduction in medical errors.

Under the project, reports of medical history record database system has found scope of the system. The medical record system is a database management system that uses database technology to constructs, maintain and manipulate various kind of data about a patient's medical history and care cross time. The DBMS can track and update all the information of registered patients in the medical center during a particular time span.[7]

Electronic Medical Record (EMR) and Electronic Health Record (EHR) are two of the solutions when automating paper based medical records.

An EMR is a provider-oriented electronic version of the paper medical record created in most healthcare settings and belongs to the healthcare provider that created it, such as a clinic, general practice, or hospital. [8]

An EHR is an inter-organizational patient medical record that contains a summarized subset of information that has been aggregated from various sources, such as individual healthcare providers' EMRs [9]

Both EMR and EHR provide interoperability among healthcare providers.

## 2.3 Similar Systems

### 2.3.1 Types of Record management systems

	Patient Records Management System	Document Management System	Digital Imaging System
Speed	✓	✓	✓
Accuracy	✓		
Accessibility	✓	✓	✓
Completeness	✓		
Comprehensiveness	✓		✓
Compliance	✓	✓	
Effectiveness	✓		✓
Security	✓	✓	
Authenticity	✓		✓

**Table 1: Types of Record management systems**

### **2.3.2 Features of Hospital Management system**

- **Online Appointment Management System**

Which helps to hassle free patient management in peak time. Doctor can pre schedule their time according to the number of appointment he/she received. Patient can place appointment through the system if required payments can also be done through the system with secure verification.

- **In-Patient Management**

System manages availability of beds at the moment, Consultant list for certain time period to place appointments when patient requested. Management of clinical data, lab reports also manage with this features.

- **Out-Patient Management**

Which is manage of patient discharge process with reducing patient waiting time by involving of billing hassle. It is expected to perform medical support timely by issue medicine in pharmacy on time.

- **Laboratory Management**

Mostly which is a separate sub system that facilitate sample management, reporting and many more features.

### **2.3.3 Similar systems to Patient Medical History Management Systems**

Considering about health information management, which can be identified many similar and adaptive systems to facilitate healthcare service throughout the world. In the given scenario it is identified similar systems as follows.

### 2.3.4 Patient Management System

PMS is a software that acquire medical records of patients and doctors can retrieve that information of the treatments and diagnose of a patient. In 2002 Canada implement electronic health record system to cover cross the country. Which implemented as to run on desktop computers with accessibility of server which can facilitate multiple accessing. System established with the features of

- confirming QR code to perform payments
- Store patient medical records (Prescriptions, medical reports)
- Information sharing
- Limit accessibility

Because of the way of these features of this system facilitate retrieving and storing patient medical history, which is highly recommended by WHO to implement other countries as well. This system go beyond the patient medical history maintain, which consists of features to analyze doctors work process. Which facilitate management to see whether the number of patients a doctor has diagnose with the given period of time.

### 2.3.5 Open Source EMR System ‘Bahmni’

Bahmni is Indian based open source software solution for hospital management. Considering about Indian rural infrastructure this system design with user friendly way and simple design for easy understanding. User(Patient) can log into the system and see whether the doctor schedule and place the appointment him/her self. Bahmni just facilitates the patient management and if user wants they can download the source code and modify as required. Separate tools(sub systems) of **odoo** and **OpenELIT** use to make billing inventory and laboratory management accordingly. Which is a low cost health program implemented for rural areas in India. System included patient registration, appointment scheduling, clinical service management, Electronic billing, Laboratory management, Report generation and many more features[10].

### **2.3.6 Feature Comparisons of Alternative systems**

Mainly it can be identified two main types of hospital management systems in the industry. Commercial and Open source hospital management systems. Considering about these two types mainly it can be identified which have similar approach to facilitate healthcare providers and patients. Common areas that forces on industry level:

- Safety/Security
- Accessibility/Information Sharing
- Quality
- Efficient/Effectiveness
- Communication

Based on that many and more systems kept information to diagnose (medical history, allergies of patient, immunity status, Lab reports, Payment information). Considering about good Hospital management system apart from the mentioned features, there are some special features to embedded with systems.

- Visualized representation of system and clear visible and well organized interfaces.
- Developed web based solutions which can be access anywhere.
- System should be consists of decision supportive tools.
- Live time access and grant interconnections of each and every department in the hospital.

Open source systems can be customize each and every system different from each other.

Considering about each and every existing patient medical history management systems, which are developed mainly in hospital management perspective and that mainly focus on smooth day to day process in hospital. Improving accessibility of laboratory, pharmacy or any other department brings proactive and efficient health care process expected through the system. Comparing of proposed system for Asiri group and existing other systems main difference is this system developed as doctors perspective to facilitate efficient and accurate in diagnose.

### 2.3.7 Benefits of Hospital Management System as per Specific User.



Figure 1: Benefits of Hospital Management System as per Specific User

## 2.4 Analysis

### 2.4.1 Introduction

It is expected to evaluate existing system with the features that are performing in current situating and how it would be used in proposed system. Mainly requirement analysis and methods of requirements gathering is been explained. Which is expected to divide as functional and non functional requirements. Structure of the proposed system, how functionalities are placed within the system has been exhibit in this chapter.

### 2.4.2 Existing system

Asiri Group of hospital currently maintaining website to process several main operations in hospital management. Anyone can visit the site and without registering they can see what kind of test can be done in Asiri laboratories(Test availability). And also contact details of main Asiri hospitals, Labs are been included in the site. Website categorized to main three hospitles (Asiri Medical Hospitle, Asiri Central Hospitle, Asiri surgical Hospitle) and users can get the relevant service accordingly.

Site provide Consultation/Booking facility through the system when you register to the system. When patient go through the manual testing process in the hospital he/she can check the test results through the website using referral number which is given in the test prescription.

#### Lab Reports / റിപ്പോർട്ട് ലഭിക്കൽ / ஆய்வக அறிக்கைகள்

Lab Reference Number / ടെസ്റ്റ് നമ്പർ / குறிப்பு எண்

Ex: 00000000/00/00

Passcode (Printed on bill) / കോഡ് / கடவுள்/பாஸ்‌கോഡ் \*

Enter the passcode

Get lab reports

Figure 2: Existing system Lab Report Check

Availability of doctors can also be checked in this website by selecting the category of doctors and also available days, feasibility of appointment in according date can be placed.



### 2.4.3 Exiting Internal Hospital Management System

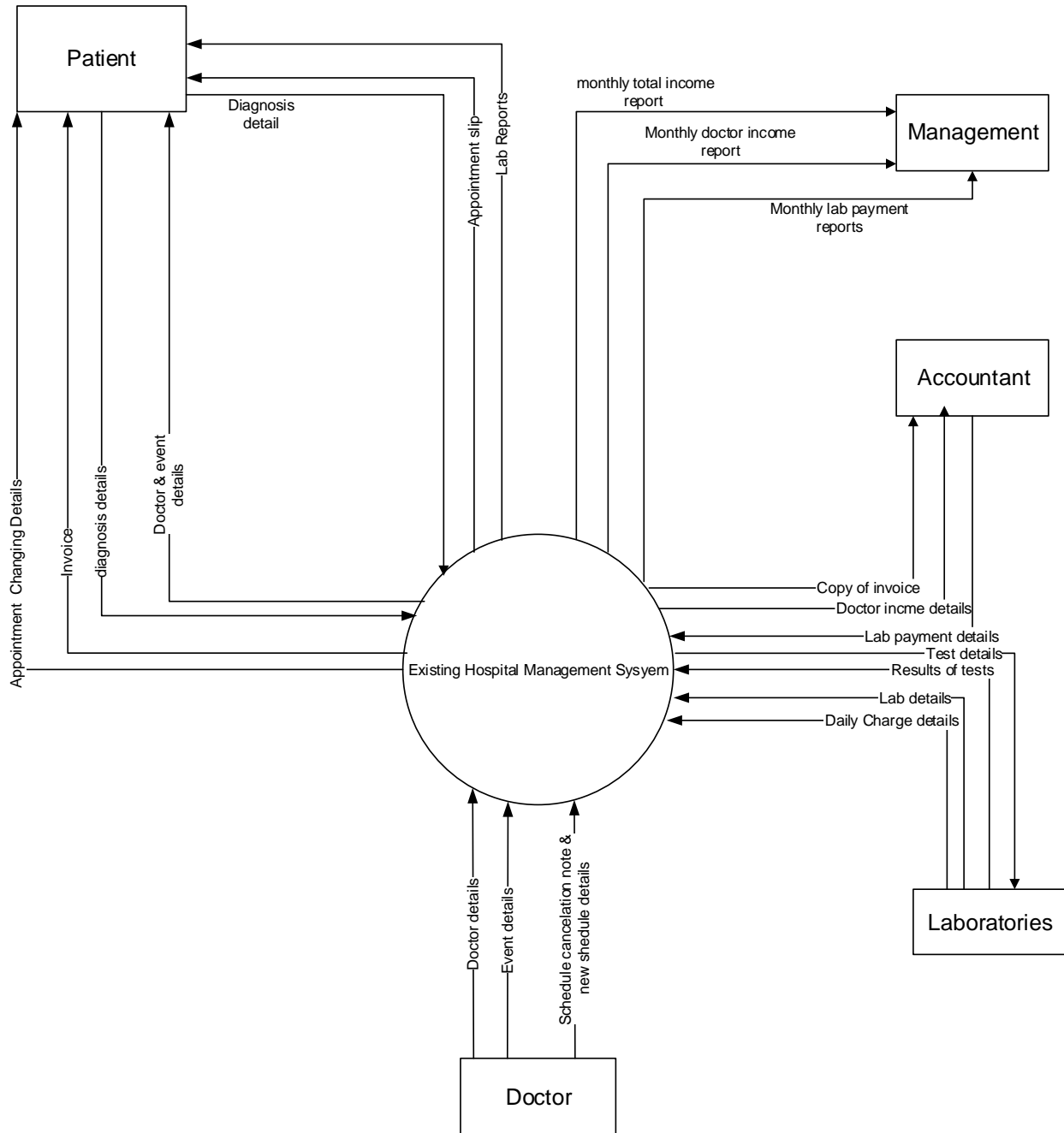


Figure 3 : DFD Diagram for Existing system

#### **2.4.4 Proposed System**

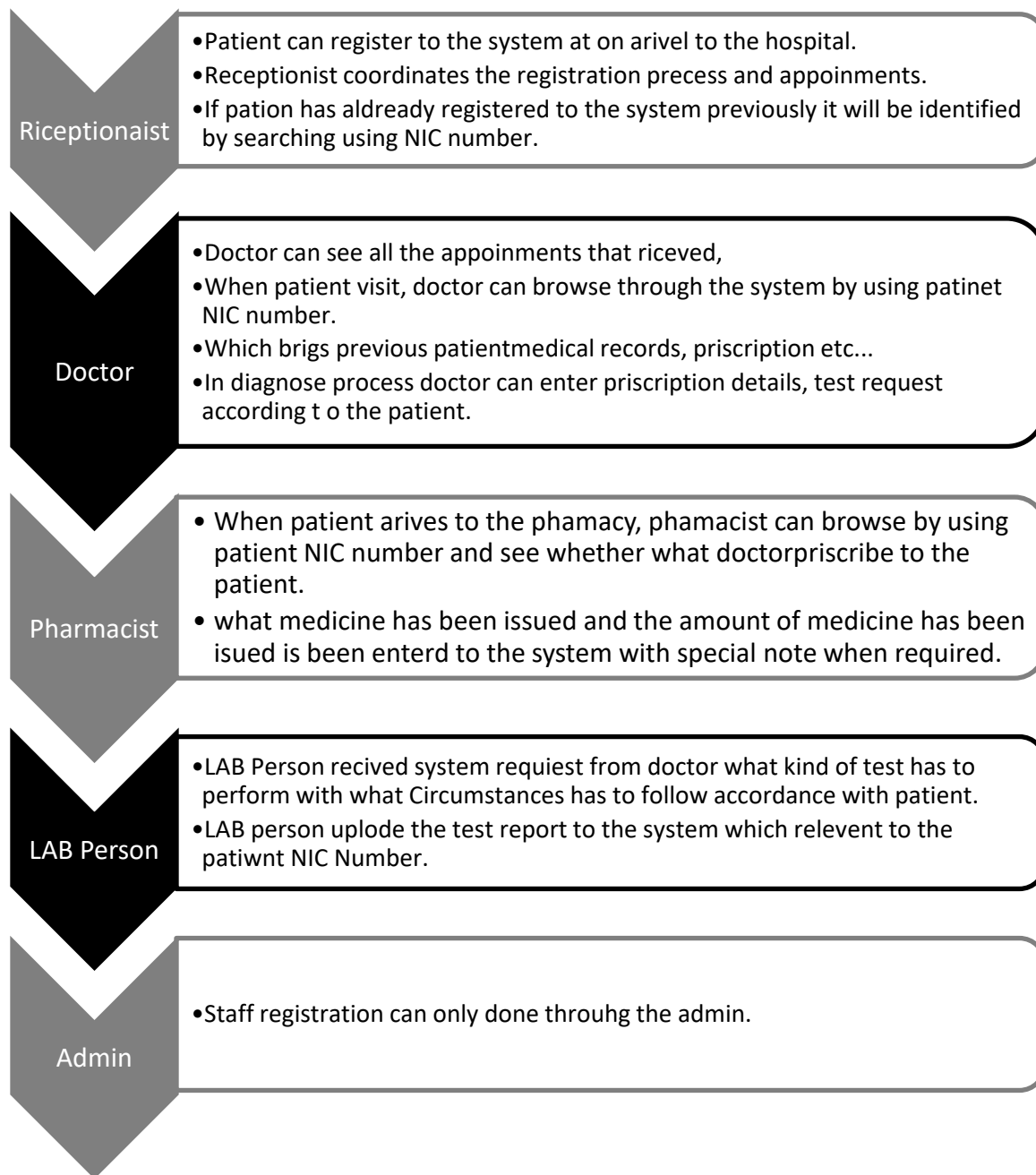
The proposed solution is expected to overcome the drawbacks identified in the current paper based medical records. The integration between the Asiri Surgical hospital and its laboratory and pharmacy is facilitated by the proposed EMR. The prescription which is clearer than a hand written can be printed from the system which could be taken to the pharmacy. The laboratory can access the automated patient records through the system which will facilitate information sharing which proved difficulties in paper based records.

Easy access to patient records for the doctors will be enhanced by the proposed EMR. Records will be maintained by the hospital database. The required records will be readily available for the doctors

Since the medical records kept in the database the issue of patients losing their medical records will not be occurred anymore. The patient responsibilities will be greatly reduced from the proposed solution.

The analyzing ability will also be increased by the new solution. Decision making tools are provided by the proposed EMR. Reports will be generated by the EMR which will be helpful for the consultants in arriving conclusions.

Medical errors had been occurred due to the absence of patient's medical history and other related health records. Correct medical treatments can be given since automated records contain problems such as previous allergy conditions. Also accurate diagnose is facilitated by the availability of electronic health records.



**Figure 4 : Proposed System**

### **2.4.5 Requirement Analysis**

Evaluating of existing system it is identified what requirements satisfied by the existing system and the drawbacks of existing system. Because of the total management and medical history will be automated in proposed system, it is expected to identify requirements according to the new system. Interviews, Questionnaires, Observations are methods that use to gather requirements. Considering of proposed system which uses by different level of stakeholders. Because of that requirement gathering methods should be depending on how user interaction with the system and user expectations of the system.

#### **2.4.5.1 Interviews**

Interviewed were conducted with number of doctors, managerial staff and hospital staff to identify who are directly involved in patient history process and what sort of information they need, what are the resources available for them and what are the problems they faced without an automated system.

The data gathering were conducted under questionnaire form. After this, the second stage of the interview process was conducted with the doctors of Asiri Group of Hospitals. During a these interviews, improvements that can be made for the development of a successful Health Information Technology solution can be identified.

#### **2.4.5.2 Questionnaires**

This method is considered to be one of the main methodologies in this research. The questionnaire were prepared for different levels of people in selected hospital and distribute the questionnaires among them, in order to gather information on how they really feel about the current treatment process of the hospital, what sort of things they like/dislike in hospital treatment process.

This questionnaire is to analyze the most reliable resources, ways, time consuming phrases and the degree of the awareness of central patient history system. A several type of questionnaires which suite for the different type of users regarding what sort of information we need to gather

from them are prepared. Ordinary patients and general population will be mainly targeted in the questionnaires

### **2.6.3 Data analyzing methods**

The process of evaluating the collected data is called the data analyzing method and analytical method will be used to analyze the raw data.

Once the data collection is completed, the gathered data will be analyzed based on the main research questions. In order to obtain accurate and qualitative information, this method will be used. This method is more efficient when it comes to providing a better output without time wastage and any mistake.

The following steps were followed while doing the analyzing part.

- Measurement of different values of variables
- Identification of the relationship between each variable and compare it.
- Summarizing the information
- Coming up with the best possible output eventually

Collected data from questionnaires and interviews will be analyzed based on the majority of the responses gathered. The data collected from the questionnaires will be computed in order to get the final output of responses. The methodologies of the data analyzing phase have been used in order to achieve the objectives of the research. Following steps were used to do the data analyzing process.

- Graphical methods
- Use of qualitative analysis

Microsoft Office Excel was used as the analysis tool Pack to represent the raw data in a graphical way. The collected data were analyzed using bar charts and pie charts. All these made it possible to conduct the analytical process to come up with the best possible solution accurately.

## **Chapter 03: Methodology**

### **3.1 Introduction**

According to the gathered requirements and availability of resources, this chapter expected to evaluate most suitable developing solution to the system. Furthermore it is expected to exhibit high level diagrams and design structures to implement best design for system. Use case diagrams evaluate how system behaves in each phase of users perspective according to the system. Mainly ER diagram places a main part in this section because of the complexity of the database required proper and clear way of design. Medical reports , prescriptions, diagnose card details, registration and appointment details expected to perform in different levels of database. ER diagram make it easier to details as it required.

Because of the existing system environment, Rational Unified Process methodology selected. Asiri hospital already has ongoing system of patient registration system and Appointment management system. Proposed system has to be accordance with the relevant systems parallel. Developing a new system an embedded with existing system is a complex and cannot be done with one time process. Because of that as a agile software development methodology Rational United Process(RUP) is selected. It is expected to secure patient medical details because of which are sensitive and confidential details. Under RUP method it is expected to develop high secure system by using RUP method.

### **3.2 Methodological Approach**

Because of the complexity of the system it is expected to use agile development method. Rational unified process(RUP) methodological approach selected as a development framework. RUP os a complete lifecycle software engineering process. It provides a risk driven approach to assigning task and responsibilities within a development organization. Its goal is to ensure the production of high-quality software that meets the needs of its end users within a predictable schedule and budget.

### **3.2.1 Features of RUP**

Rational unified Process is agile and iterative process based method which is ideal to implement given scenario because of in the initial stage it is difficult to identify each stakeholder behavior and their process. Because of that RUP model identified to develop patient medical history registration system for Asiri Group.

- Iterative Development
- Requirements management
- Visual modeling of system
- Quality Management
- Change Control Management

### **3.2.2 Phases of RUP**

#### **Phase No 01 – Inception**

Due to the first phase of the Rational Unified Process is expected to identify the basic idea and sketched schedule to determine what is the project is. Asiri group is one of the leading healthcare provider and which emerges new business opportunity with the help of healthcare technology. In the given scenario it is identified market research analysis, financial analysis and project plan to implement in the initial phase. Understanding of viability and suitability of Asiri group done through this phase.

#### **Phase No 02 – Elaboration**

Under this phase it is expected to understand the all the system requirements to feather process. This is the process that provides real outcomes of the project and what boundaries have to defined to the best results. System requirements and its required architecture are assign in this phase as a starting phase of the project. Performing interviews, questionnaires and evaluation of existing system behaviors of Asiri group it can be identified how automated patient medical history registration system should be behave in certain situations. Feasibility study is been performed to identify the feasibility of the project and project development plan defined in this



phase. Because of the system more behavioral on doctors perspective, project plan implemented mainly in the side of doctors perspective.

### **Phase No 03 – Construction**

Under the rational unified process software development method construction is most important phase which because software is fully constructed under this phase. Keeping main focus on doctors perspective main developments of the system implemented. According to the other stakeholders involvement with the doctors in the diagnose process feather developments has been done. As a example doctor an laboratory collaboration has determine in the previous phase and it is implemented in this phase under defining of boundaries and guidelines. Due to the selected software development model is iterative and agile initial it is expected to develop main processors initially and then only focusing on miner features.

### **Phase No 04 – Transition**

Due to the patient medical history registration system involves many stakeholders and each of them connected with each other in stake holders perspective it is always arise problems. Because of that testing process is very important to provide complete final process. Under this phase regression testing, functional testing, stress testing and usability testing performed to identify problems emerge with each stakeholders perspective.

### **3.2.3 Advantages of Retinal Unified Process**

- Regular feedback from and to stakeholder
- Efficient use of resources
- Your deliver exactly what the customer wants
- Issues are discovered early in the project
- Supports iterative development
- Improve risk management

### **3.3 Alternative Design Methodologies**

#### **3.3.1 Waterfall Model**

To implement waterfall model it requires developers to know the requirements 100% clear at the beginning of the system development. In this scenario it is difficult to identify all stakeholder's requirements because of the complex data transition in the system. Iteration developing process is ideal rather using waterfall model in this scenario. Patient medical history registration system of Asiri Group involving with many stakeholders due to that many cross functional process in between stakeholders cannot identify completely in initial stage. Which because the complexity of the Asiri Group process RUP model initialized as development model. Which is iterative and agile process which suites to develop the given scenario.

### 3.4 System Architecture

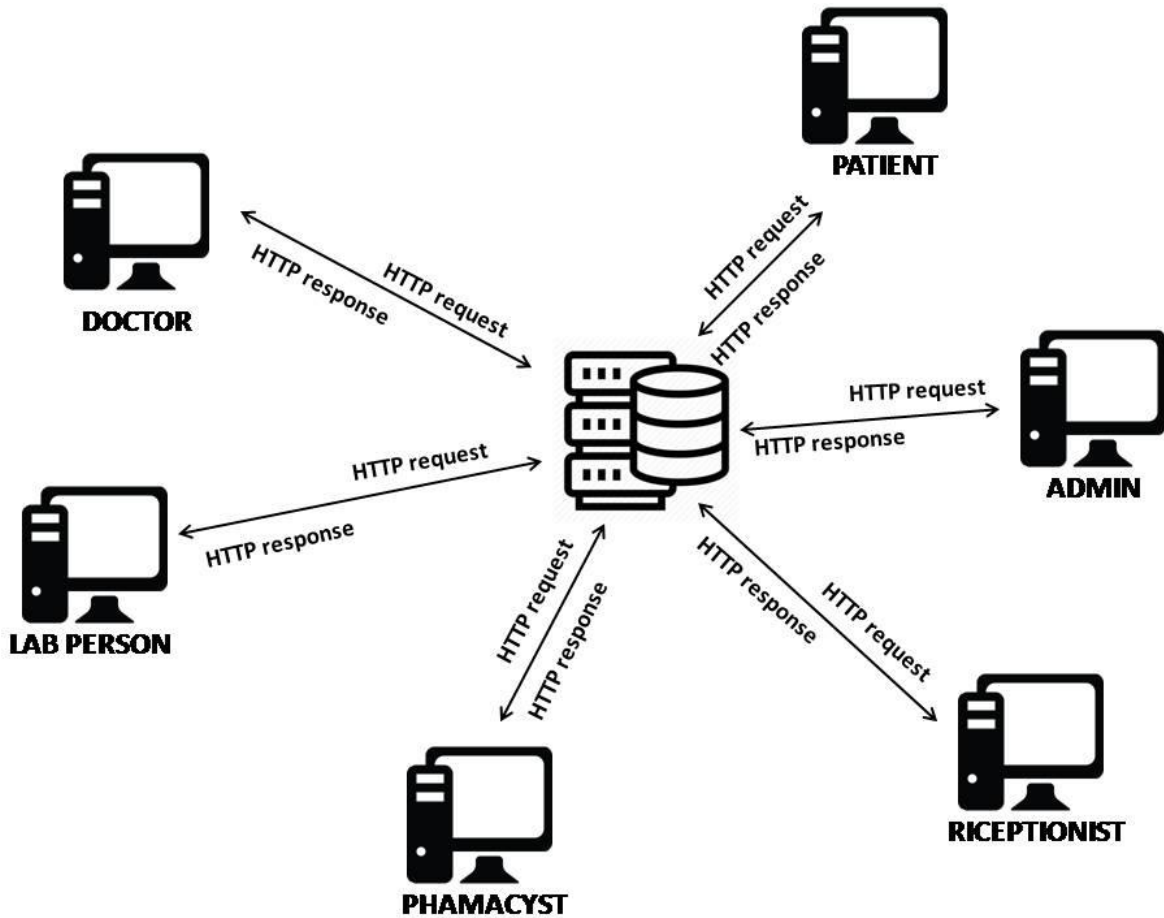


Figure 5 : System Architecture

Client Server architecture propose for this web based system. Which mainly consist of database server and client machines. All the test results(test reports), prescriptions, patient details are stored in the server when user requires to access data from the system according to the permission granted data can be retrieved.

### 3.5 System Users

It is expected to describe the activities that are performing in each user perspective.

**Admin** : Registration of internal staff(Receptionist, Doctors, Lab person, pharmacist ) has to be done through the system administrator. Permission is granted to address any issue come through the system.

**Doctor** : Doctor can view appointment details which patient place an appointment for the relevant doctor. Once patient visited doctor can view patient details and patient medical history such as test reports , prescription details, diagnose cards etc..

**Patient** : once patient register to the system, he/she can loin to the system and see appointment details, test reports, prescriptions when required.

**Receptionist** : Patient registration done through the receptionist. Its expected to coordinate the registration process with patient and facilitate patient and doctors when guidance required.

**Lab parson** : When patient is prescribed to do the test, lab person can browse through the system and see whether the patient has to do what kind of an how. Lab person uploaded report to the system when its completed.

**Pharmacist** : pharmacist can view the prescription through the system and issue medicine with the note how patient has to consume the medicine.

### 3.6 Use case Diagram

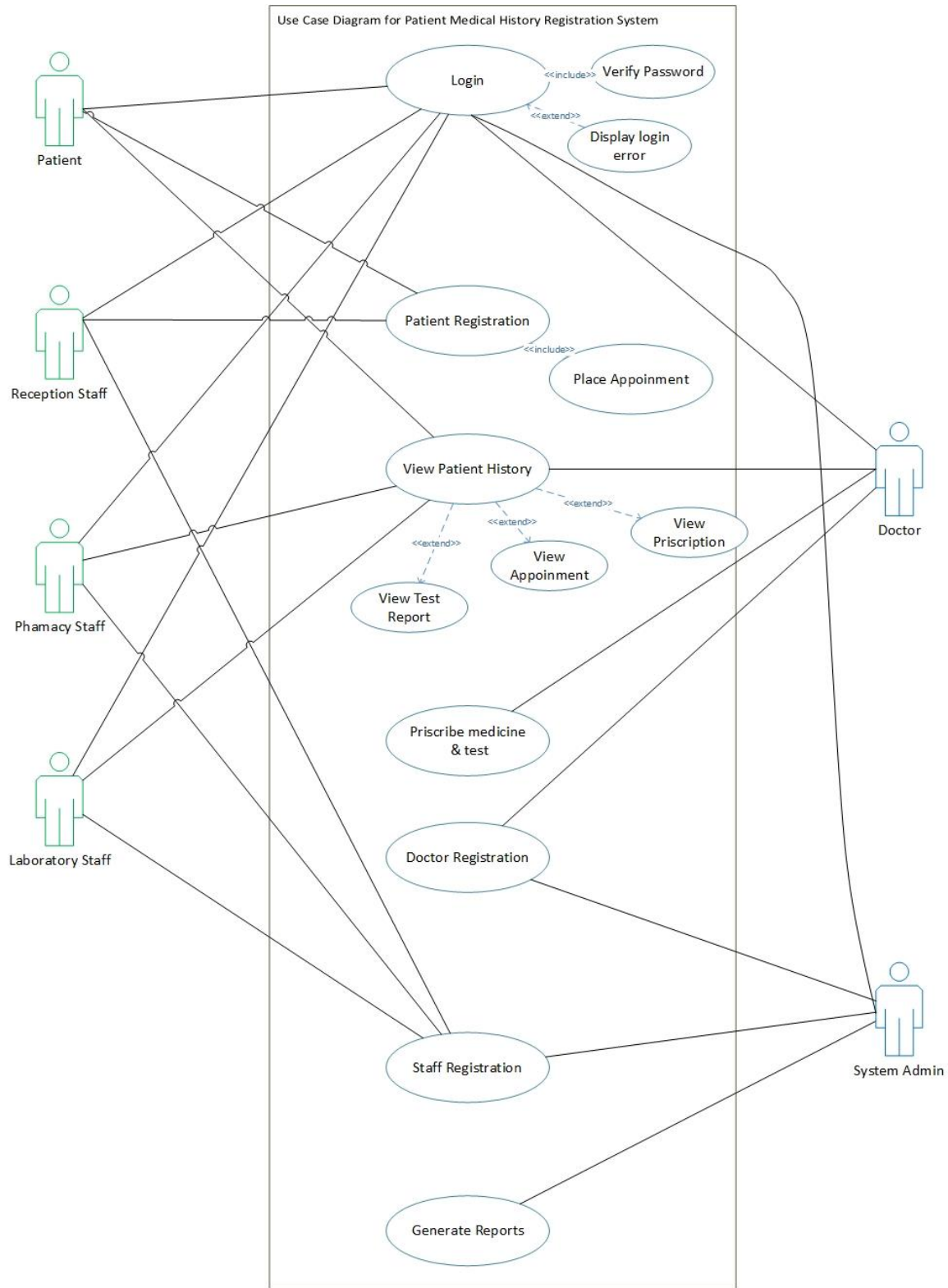


Figure 6 : Use case Diagram

### 3.7 ER Diagram

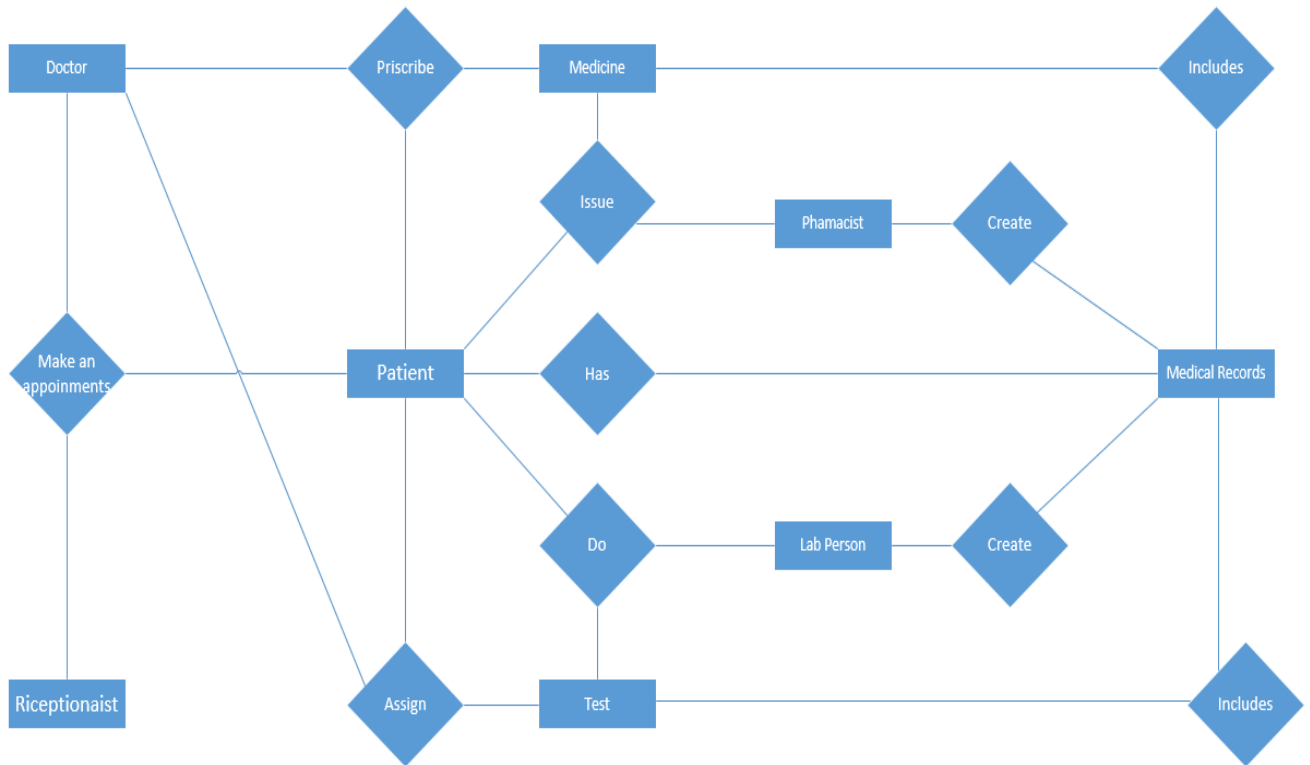


Figure 7 : ER Diagram

## 3.8 User Interfaces

### 3.8.1 Home Screen

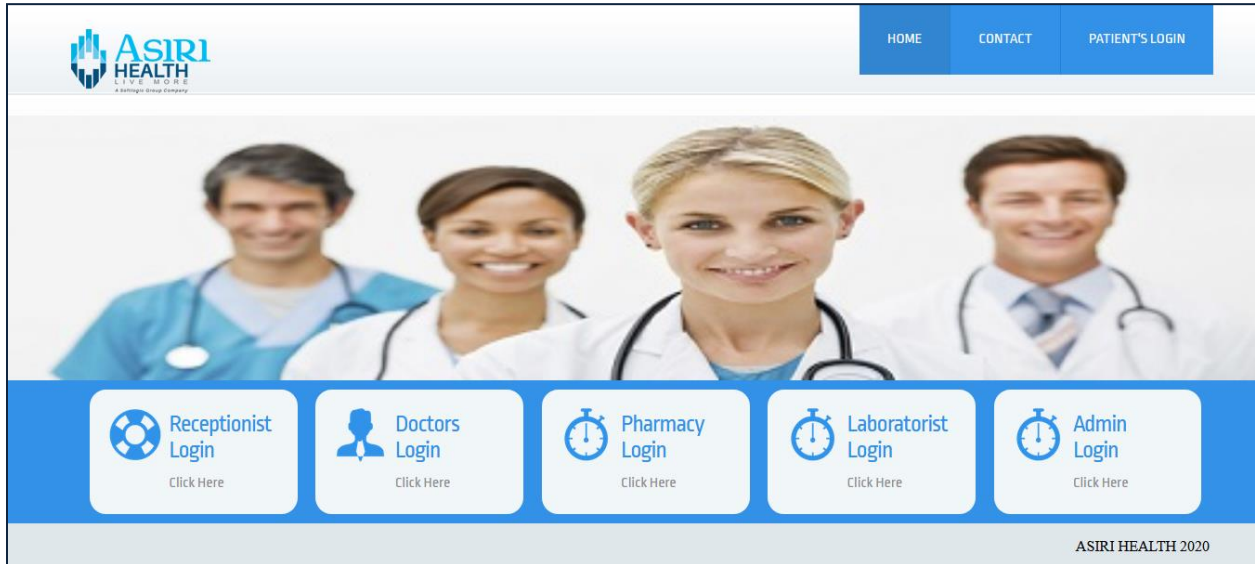


Figure 8 : Home Screen

### 3.8.2 Receptionist Main Screen

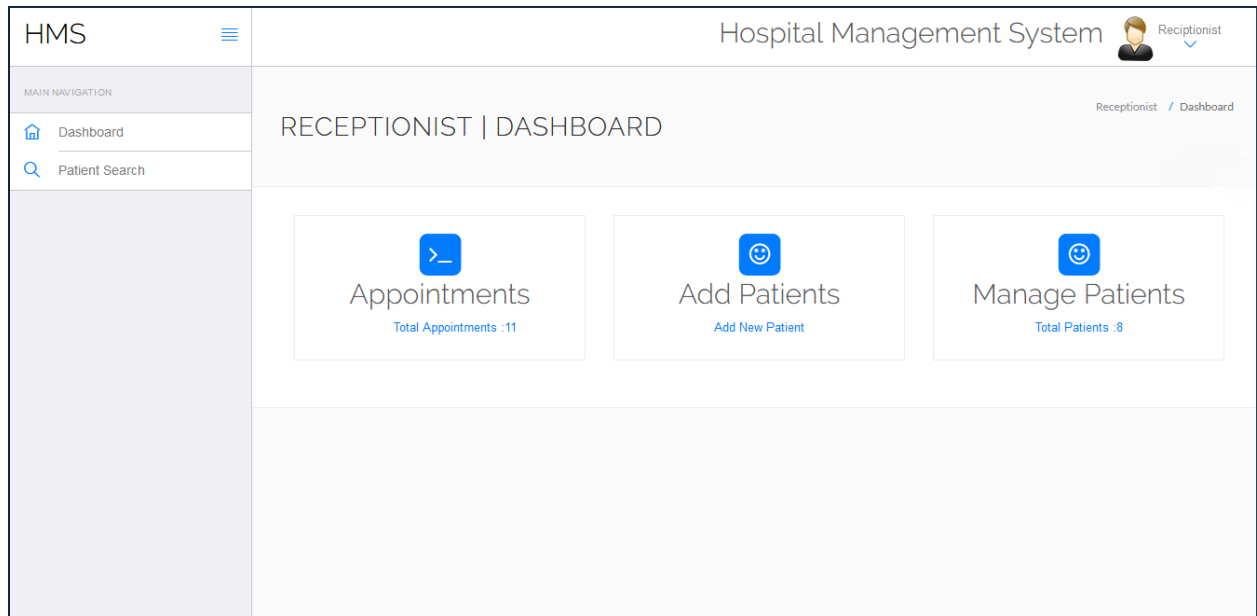


Figure 9 : Receptionist Main Screen

### 3.8.3 Doctors Main Screen

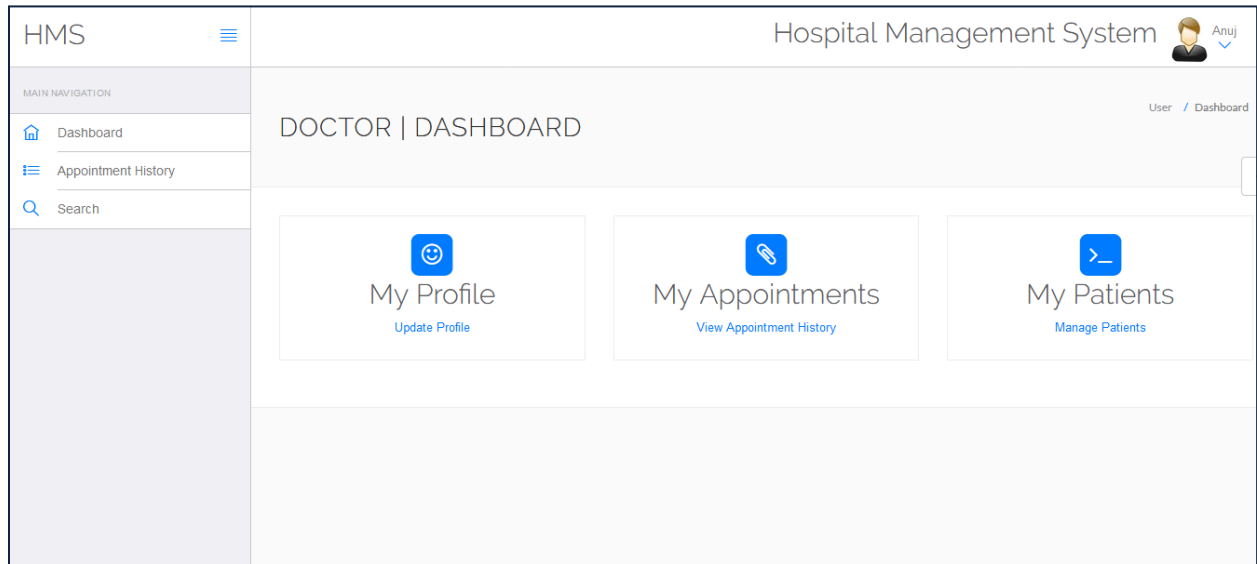


Figure 10 : Doctors Main Screen



### 3.8.4 patient Main Screen

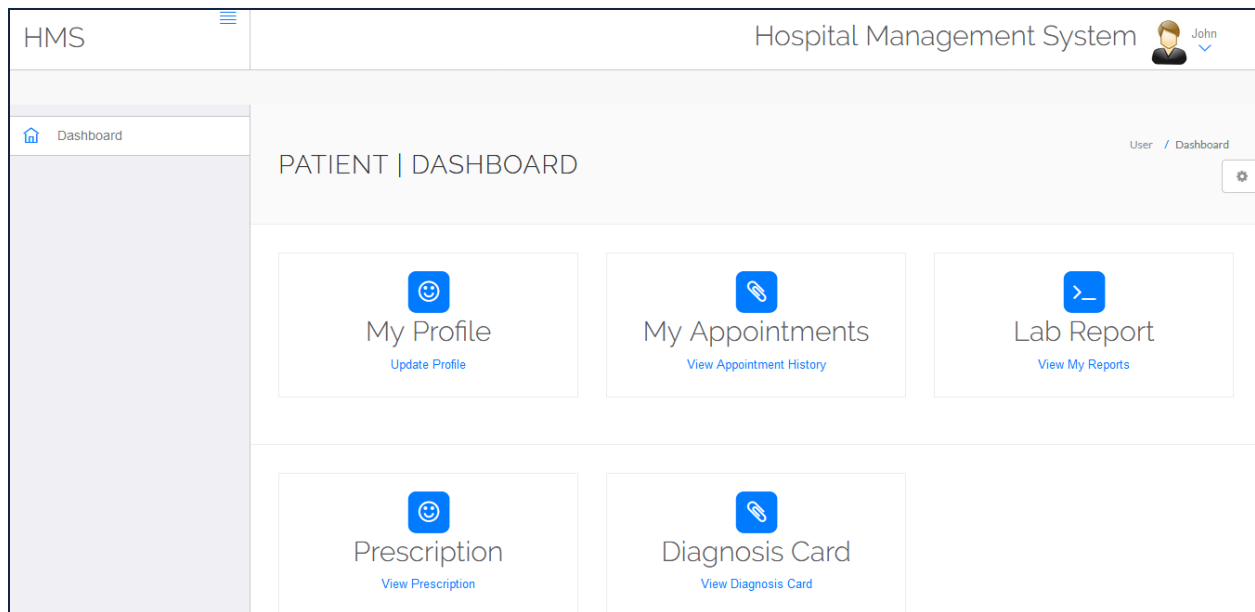


Figure 11 : patient Main Screen

## 3.9 Implementation

### 3.9.1 Introduction

Web based system selected as a system which is fulfill the requirements of end users. As requirement of system can have access in several location in Colombo, it is decided the system should be a web based. Which can allows the users access in different locations(Labs, pharmacy etc..) Because of the proposed system is a web based one registered patient can access the system and get facilitated in any where in the world. Background and methodology chapters identified requirements of the end users and decided what methodological approach have to get in the development stage. Based on that php language is selected as as a main developing language. XAMPP act as a local server (localhost) to develop the system in a local machine. XAMPP facilitates suitable environment for testing MYSQL, PHP Apache and Perl applications on a

local computer. PHP 7.2.30, Apache 2.4 and MYSQL 8.0.20 versions selected as developing tools.

Considering of developing UI designing wireframe, javascript, JQuery, CSS3, HTML and Bootstrap used as a scripting languages. Specially the bootstrap facilitate desktop based developed web system convert to mobile version automatically. Proposed system expects to allow patient to access the system using mobile devices.

### 3.9.2 Hardware Environment

Server of this centralized system consist of 16Gb ram with Intel Core i7 3960x, Base clock speed 3.3Ghz, cache memory 15MB with memory support 4channel DDR3 1600. 1Tb SSD memory prefer as to improve quick accessing ability with 2Tb storage proffered as a requirement with high end hardware components.

### 3.9.3 Development Tools

Environment	Application/Language	Software Used
Operating System	-	Microsoft Windows 10
Web Browser	-	Firefox, Chrome, Safari
Web Server	Apache Version 2.4.2	Xampp Server 1.8.0
Business Logic	Framework, Javascript	Dream Viewer, Sublim 3
Database Server	mySQL 5.5.25a	phpMyAdmin 4.5.1
User Interfaces	HTML 5, CSS3, JQuery, Bootstrap	wirefame

Table 2 : Development Tools

### 3.9.4 Information Security and Privacy

Information security is not all about securing information from unauthorized access. Information securing is basically the practice of preventing unauthorized access, use disclosure, disruption,

modification, inception, recording or destruction of information. Due to the system is web based system and which contains highly sensitive and personal data of patients, its highly considerable factor of information security and privacy of the stem.

Privacy is a high concerned when maintaining of personal information is gathered and stored. Many more countries established standards and acts for privacy and protected health information about patient. Hence Sri Lanka laws are still not up to standards to cover certain areas of protecting medical records perspective. Currently which only cover the basic telecommunication guidelines.

### **3.9.5 Web Application Security**

Which is a process of securing website and online services against various security threats that exploit vulnerabilities in an application code.

- Content management systems(word press)
- Database administration tools/phpMyAdmin)
- Saas applications

Patient Medical History Management System requires eliminate web application vulnerabilities such as

- SQL Injections
- Cross Injections
- Remote file Inclusion

In the given scenario by using authorization and authentication accessing data is been limited and secure by several ways. Passwords are stored in database using MD5 encryption. There is a login tables for doctors and other users of the system separately identify login details such as login date/time, pc IP address etc... .Which course to identify responsive logins and unauthorized logins to system. Using session variables user authentication has been done. Which are checked user logins instantly. Initial stage, basic and important security sanitizations has been done. In further improvements web application firewall is preferred to more secure in system perspective.

Web application firewalls are hardware and software solution sued for protection from application security threats. (Refer Appendix A)

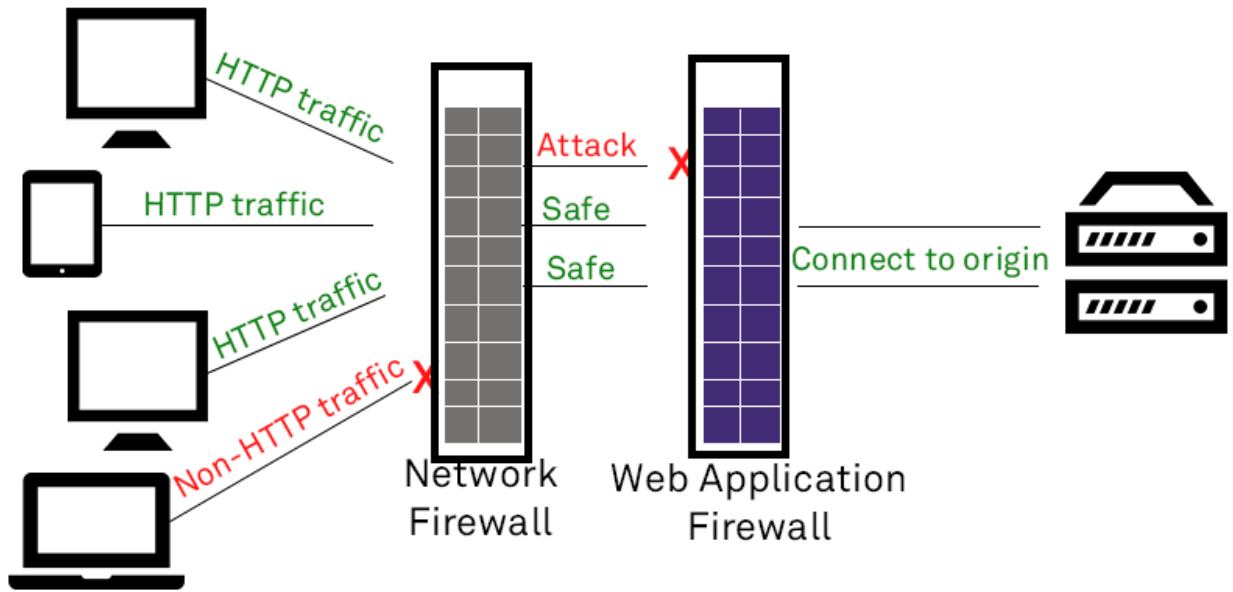


Figure 12 : Web Application Firewall

## Chapter 4: Evaluation

### 4.1 Introduction

This chapter describes the testing environment that has to follow according to the development methodologies to get high performance, accurate, secure system for end user. Aim of testing, test place accordance with the system and testing strategies are included in this scenario.

## 4.2 Overview of Testing

Entire testing life cycle, test plan, how testing process carrying out and key areas that suppose to test and inputs and outputs according to the different test cases are included to enable in this section.

## 4.3 Aim of Testing

Testing is an essential part of development process. Hoe ever exhaustive testing can not be done in practical. Its responsible of development team to eliminate errors in highest possible way. As a expectation error free secure and accurate product expect as a final product.

## 4.4 Declaration of Test plan and Test Strategy

Test plan is a formal document derived from requirement documents, describing in detail the scope of testing and the different activities performed in testing. Test strategy is a high-level document describing the way testing will be corrected out in an organization.

	<b>Test Plan</b>	<b>Test Strategy</b>
1	A test plan is derived from software requirement specification(SRS), describing in detail the space of testing and the different activities perform in testing	A test strategy is a high-level document describing the way testing is carried out.
2	A test plan is a project level	A test strategy organization level
3	It describes the whole testing activities in detail the technical used. Schedule, resources etc..	It describes the high-level design techniques to be used, environment specifications etc..
4	It is prepared by test lead or test manager.	It is generally prepared by the project manager.
5	Components: Test Plan ID, test environment, features to be tested, entry, exit criteria, status, type of test etc.	Components: Scope, objectives, business issues, risks, testing approach, testing deliverables, defect tracking, training, automation.
6	A Test plan usually exists individuals.	Test strategy is divided into multiple test plans that are taken care further independently.

**Table 3 : Declaration of Test plan and Test Strategy**

## 4.6 Testing Type

### 4.6.1 Regression Testing

Regression testing uses when modification (code change) has done to the system to make sure the system when the system run in proper way after the modification has done. When running of regression testing, previously executed test cases has to re executed just to make sure all the system runs properly after the relevant modification.

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	When patient cancel the appointment, that should be able to view in doctors appointment history	1.login as a patient 2. Click appointment history in the dashboard 3. cancle the appointment relevant doctor. 4.login as a doctor 5. Click appointment history	View cancel display in the appointment history regarding to the relevant patient.	successful	Pass
2	Logging to the system using most usable web browsers currently used	1.Open Mozilla Firefox, Google Chrome, Opera mini and windows explore. 2.Run the system	Successfully login to the system.	successful	Pass

Table 4 : Regression Testing

#### 4.6.2 Functional Testing

Which comes under the black box testing and that perform to identify and confirm functionality of the system runs properly according to the achieve expected outcomes.

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Enter valid user name and valid password	1.Enter 'Patient@gmail.com' 2.Enter 'Test@123'	Display Patient home dashboard	successful	Pass
2	Enter invalid user name and valid password	1.Enter 'Test@gmail.com' 2.Enter 'Test@123'	System should prompt the user to enter valid values.	successful	Pass
3	Enter valid user name and invalid password	1.Enter 'Patient@gmail.com' 2.Enter 'Patient@123'	System should prompt the user to enter valid values.	successful	Pass
4	Enter invalid user name and invalid password	1.Enter 'Test@gmail.com' 2.Enter 'Patient@123'	System should prompt the user to enter valid values.	successful	Pass

Table 5 : Functional Testing

### 4.6.3 Stress Testing

Which is a testing that to determine software or hardware performance is up to level (satisfactory) under the extreme conditions. In this process in generally perform the software to high performance level and see how software reacts in the given circumstances and what errors occur in the given situation.

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Login as a doctor, patient, receptionist, pharmacist, Lab person and admin at same time and work parallel.	<ol style="list-style-type: none"> <li>1. Login as a receptionist and register a patient.</li> <li>2. Patient login to the system.</li> <li>3. Place appointment</li> <li>4. Doctor enter prescription and lab report to relevant patient to get.</li> <li>5. Lab person search the patient and upload the lab report.</li> <li>6. Pharmacist issue medicine to the relevant patient.</li> <li>7. Admin log in to the system and add new user.</li> </ol>	Run the system once smoothly in every stakeholders perspective.	successful	Pass
2	Enter 500 character long prescription	<ol style="list-style-type: none"> <li>1. Login as a doctor</li> <li>2. select relevant patient</li> <li>3. Enter prescription details 500 characters long.</li> </ol>	First 250 characters save in the database space.	successful	Pass

**Table 6 : Stress Testing**



#### 4.6.4 Usability Testing

Which is a test that testing how well software design familiar with end users. User friendliness and familiarization get as a basic expectation of this testing. Evaluating of user experience shows the design success and whether the designs get done as expected. Which can achieved by prototype designing and conducted reputedly in early development stages.

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Login as a doctor and see whether the patient history is accessible	1. Login as a doctor 2. Select relevant patient from appointment list 3. Click patient history icon	View patient history for the given patient.	successful	Pass
2	Login as a receptionist and register new patient or place and appointment for already registered patient.	1.Login as a receptionist 2.search in id number to identify whether the patient is already registered. If so place appointment. 3.If not register new patient and place an appointment.	Place an appointment correctly	successful	Pass

**Table 7 : Usability Testing**

#### 4.6.5 Security Testing

Which is a test that perform to identify vulnerabilities, threats, risks in a software and implement prevention methods. Due to the detecting of possible risk in early stages in development process, developers can eliminate and fix the problem through coding.

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	Detect ip address in fail loggings in user log.	1. Login as a pharmacist. 2. Go to dashboard> select pharmacist log.	User log updates fail logging with ip address and time of	successful	Pass

		3. Enter valid user name and incorrect password. 4. press login.	try to login.		
2	Detect ip address in fail loggings in doctor log.	1. Login as a doctor. 2. Go to dashboard> select doctor log. 3. Enter valid user name and incorrect password. 4. press login.	Doctor log updates fail logging with ip address and time of try to login.	successful	Pass

Table 8 : Security Testing

## 4.7 Test Cases

### 4.7.1 Test cases for patient registration.

Test Case #	Test Case Description	Test Data	Expected Result	Actual Result	Pass/Fail
1	New patient registration.	1. Login as a receptionist. 2. Go to Dashboard of receptionist > Click add new patient 3. Enter patient details. 4. Click add	1. Display new record added. 2. Redirect to new patient add tab.	successful	Pass
2	Patient registration with without entering some fields	1. Login as a receptionist. 2. Go to Dashboard of receptionist > Click add new patient 3. Leave some fields and fill other with patient details 4. Click add	1. Display please fill mandatory details. (first name is required)	successful	Pass
3	Search patient	1. Login as a receptionist. 2. Go to Dashboard of			

		receptionist > Click patient search. 3.Enter patient contact number or			
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**Table 9 : Test cases for patient registration**

**4.7.2 Test cases for doctor registration.**

<b>Test Case #</b>	<b>Test Case Description</b>	<b>Test Data</b>	<b>Expected Result</b>	<b>Actual Result</b>	<b>Pass/Fail</b>
1	New doctor registration.	1. Login as a admin. 2.Go to Dashboard of admin > Click add new doctor 3.Enter doctor details. 4.Click add	1.Display new record added. 2.Redirect to new doctor add tab.	successful	Pass
2	Doctor registration with without entering some fields	1. Login as a admin. 2.Go to Dashboard of admin > Click add new doctor 3.Leave some fields and fill other with doctor details 4.Click add	1.Display please fill mandatory details. (first name is required)	successful	Pass
3	Search patient	1. Login as a doctor. 2.Go to Dashboard of admin > Click patient search. 3.Enter doctor contact number or	View doctor details	successful	Pass

**Table 10 : Test cases for doctor registration**

## **4.8 Critical Evaluation of a System**

It is expected to achieve several objectives during the project whether the project whether the accurate diagnose and help to doctor perspective. System brings Asiri groups of hospitals to patient medical history management system that course to accurate diagnose by facilitating high level accessibility of medical records, prescriptions etc.. System brings high level of security for the high sensitive data of patients which was not achieve by existing manual system. Only patient itself and doctor are granted permission to access the sensitive medical data. On time accessing of medical reports is highly usable in doctors perspective. Prescriptions also save with reference to the relevant patient. Accessibility of previous prescriptions given and medical reports in previous occasions course to accurate diagnose. In this system inventory management of pharmacy is established and all the process of pharmacy is been automated. Patient allow to access their reports through the system. The overview of the system shows which is achieved objectives and certain outcomes with the developed system. Implementing laboratory accessibility of all the Asiri laboratories all around the country will provide the wide range of accessibility of system. Due to the scope of the project and time limitations , project focus on developing the project for main three hospitals in Colombo. In future developments its is expected to expand the laboratory accessibility.

## **4.9 SWOT Analysis**

Which provides powerful way of evaluating project status and expected outcomes of a project. Performing SWOT analysis course to identify strengths, weaknesses, opportunities and threats. Strengths and weaknesses comes under the internal factors of a system and threats and opportunities considered as external factors to the system.

### **Strengths**

- Web based system facilitate accessibility for many people at once by using and smart device at any time.
- Data analysis can be done through the system and can identify data patterns which course to identify trends of deceases and helps to diagnose in doctors perspective.

- Real-time access patient history cause to accurate diagnose.
- System navigation helps to go through the system.

### **Weakness**

- Uploading heavy data files(x ray reports, scan reports) to the system low down the system performance.

### **Opportunities**

- Currently in Sri Lanka there is no patient history registration system ongoing in any of hospitals. Requirement of these kind of systems arise in near future.

### **Threats**

- System dealing with high sensitive and confidential data of patients. Because of that maintaining such data collection in a database required high security.
- System based on complex process of patient medical history management. Adaptability to the system is difficult in initial stage.

### **Summary**

This chapter mainly forces on testing of main functionalities and how test plan is implemented accordance with to the system functions. Furthermore which describes test plan categorization. System evaluation done by user adaptability to the system in measured by stakeholder feedback.

## Chapter 5

### 5.1 Conclusion and Future work

Proposed automated patient medical history registration system expected to overcome the issues with paper based manual medical records and facilitate proactive healthy platform to work of healthcare providers. Elimination of errors, misplacements of medical records, facilitate online access of patient previous medical records and prescriptions are achieved by the system and which mainly course to convenience of doctors perspective. When considering of medical records, security of medical data is main concerned. Proposed system overcome the security issues with high potential techniques and tools. System builds inter connection between all the stakeholders engaged with healthcare process through the system. That engagement course to smooth workflow in peak situations and which facilitate proactive service to patients with accurate diagnose. Asiri Group of Hospitals engage and highly concern about medical records an medical history of a patient. Because of one of the leading healthcare provider in Sri Lanka it is expected them to bring their quality of medical service up to the standards and develop beyond that. So that Asiri Group of hospitals pretty much in to this project and look closely to implement and embedded to their system with this project. Whether the Sri Lanka hasn't have any hospital which maintaining patient medical records system thus Asiri Group engaged with this project.

However Asiri Group consists of largest laboratory network all around the country. Implementing this system for all the laboratories and make network for all over the country would be more important for Asiri group and also concern of patients. Currently this system implemented based on three main hospitals in Colombo area. Due to the considering of future enhancements project developed as web based system, in initial stage which is implemented for main three hospitals in Colombo. Embedding of other laboratories in all around the country will be done as future enhancement. Which required heavy server side equipments to bare the storage. In this initial stage system scope covers main three hospitals in Colombo area.

## **5.2 Challenges**

Considering of system it is really difficult to automate what doctors do in manual process engagement in the diagnose. The process embedded with multiple sub sequences, sensitive data processing and specialties according to the doctor. Bringing all these characters and qualities in to the system was a big challenge. Developing system should not be more complex and it should developed in user friendly way to get covered the scope. Frequent feedback from doctors perspective is very mush important in system developing. Due to the busy schedule that they have getting feedback from doctors are difficult. Designing of patient history view for doctors are difficult because of which contain many details and features such as prescriptions, medical reports ect...

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## Appendices

### Appendix A: Questionnaire for Requirement Analysis QUESTIONNAIRE

Name :

Age :  15-30     30-45     45-60     60-75

Gender:  Male             Female

#### Doctors Perspective

01    Accessibility of current patient history?

Very positive

Positive

Neutral

Negative

02    How much patient history effect for accurate diagnose?

Very positive

Positive

Neutral

Negative

03    Do every patient bring their patient history when they come to treatments?

Very often

Moderately often

Slightly often

Not at all

04 Your willingness to use automated system?

- Very likely
- Moderate likely
- Slightly likely
- Not at all

05 Your knowledge to use automated system?

- Excellent
- Good
- Fair
- None

06 Do you think automated system helps to report analysis?

- Very much
- Sometimes
- No
- No idea

07 Will an automated system helpful laboratory testing?

- Very much
- Sometimes
- No
-

No idea

08 Are there any medical errors take place because of paper based medical history?

Very often

Moderately often

Slightly often

Not at all

09 Do you think automated system helpful for patients?

Very often

Moderately often

Slightly often

Not at all

10 Does the accuracy increase when information is shared using an automated system?

Very positively

Positively

Neutral

Negatively

11 Do you face critical situations due to the absence of patient history?

Very often

Moderately often

Slightly often

Not at all

12 Is there any errors happen when handle patient transfer to another wards?

- Very often
- Moderately often
- Slightly often
- Not at all

13 Quality of medical records?

- Excellent
- Good
- Fair
- Poor

14 Have you previously come across any HIT solutions( automated medical records)?

- Very often
- Moderately often
- Slightly often
- Not at all

15 If yes, will it provides any convenience for access?

- Very positively
- Positively
- Neutral
-

Negatively

16 The effect of automated patient medical history of time saving?

Very positively

Positively

Neutral

Negatively

17 How many patients do you check for a day ?

0-5

5-10

10-15

15-20

## Patients Perspective

01 Do you keep your personal medical history?

- Very often
- Moderately often
- Slightly often
- Not at all

02 How often you bring your Medical history when you go to the treatments?

- Very often
- Moderately often
- Slightly often
- Not at all

03 Is it convenient if the hospital keep your medical records instead of keeping them by yourself?

- It will reduce our responsibilities.
- It will not effect for us
- No, there's a risk of losing records
- I have no idea

04 What do you think about maintain automated patient history?

- It will reduce our responsibilities.
- Paper based medical history more reliable than automated history.
- It might not practically
- I have no idea about benefits of automated history.

05 The effect of the advantage gain by automated patient history on patient?

Excellent

Good

Fair

Poor

06 Your willingness to use electronic media to record patient history?

Very likely

Moderate likely

Slightly likely

Not at all

Accurate diagnose - 02, 14

Easy access - 01, 25

Analyzing - 06, 15

Medical errors - 08, 12

Information sharing - 07, 10

Patient responsibilities- 1, 2, 3, 4

Doctors convenience - 04, 16

Patients convenience - 24, 23



## Appendix B : User Interface Designings

Table	Action	Rows	Type	Collation	Size	Overhead
appointment	★ Browse Structure Search Insert Empty Drop	11	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
doctors	★ Browse Structure Search Insert Empty Drop	9	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
doctorslog	★ Browse Structure Search Insert Empty Drop	42	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
doctorspecilization	★ Browse Structure Search Insert Empty Drop	11	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
tblcontactus	★ Browse Structure Search Insert Empty Drop	3	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
tbldiagnosecard	★ Browse Structure Search Insert Empty Drop	9	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
tblmedicaltest	★ Browse Structure Search Insert Empty Drop	9	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
tblpatient	★ Browse Structure Search Insert Empty Drop	11	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
tblprescription	★ Browse Structure Search Insert Empty Drop	12	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
userlog	★ Browse Structure Search Insert Empty Drop	52	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
users	★ Browse Structure Search Insert Empty Drop	11	InnoDB	latin1_swedish_ci	32 K <i>B</i>	-
user_account	★ Browse Structure Search Insert Empty Drop	6	InnoDB	latin1_swedish_ci	16 K <i>B</i>	-
<b>13 tables</b>	<b>Sum</b>	<b>190</b>	<b>InnoDB</b>	<b>latin1_swedish_ci</b>	<b>224 K<i>B</i></b>	<b>0 B</b>

**Table 11: Table structure of the system**

HMS
Hospital Management System
Receptionis

MAIN NAVIGATION

- [Dashboard](#)
- [Patient Search](#)

## PATIENT | ADD PATIENT

**Add Patient**

Patient Name

Patient Contact no

Patient NIC

Patient Email

Patient Login Password

**Figure 13 : Patient add screen of receptionist**

HMS
Hospital Management System
Receptionist

MAIN NAVIGATION

[Dashboard](#)

[Patient Search](#)

### RECEPTIONIST | MANAGE PATIENTS

Manage Patients

Patient Details

Patient Name	sameera palliyaguru	Patient Email	samm@gmail.com
Patient Mobile Number	77777777	Patient Address	222/W, palawatta, colombo
Patient Gender	Male	Patient Age	28
Patient Medical History(if any)	no sergeries blood presure	Patient Reg Date	2020-05-02 18:53:38

View/Add New Doctor

Patient - Doctor Details

Doctor Name	Amrita	Specilization	General Physician
-------------	--------	---------------	-------------------

Add New Record

**Figure 14 : Manage patient screen for Receptionist**

[Dashboard](#)

[Patient Search](#)

### RECEPTIONIST | BOOK APPOINTMENT

Book Appointment

Patient

Doctor Specialization

Doctors

Consultancy Fees

Date

Time

eg : 10:00 PM

**Figure 15 : Appointment Book Screen For Receptionist**

HMS Hospital Management System

Doctor / Appointment History

### DOCTOR | APPOINTMENT HISTORY

#	Patient Name	Specialization	Consultancy Fee	Appointment Date / Time	Appointment Creation Date	Current Status	Action
1.	Test user	Demo test	600	2019-06-29 / 9:15 AM	2019-06-24 00:01:28	Cancel by you	Canceled

**Figure 16 : Doctor Appointment History View**

HMS Hospital Management System

Doctor / Edit Doctor Details

### DOCTOR | EDIT DOCTOR DETAILS

**Edit Doctor**

**abcd's Profile**

Profile Reg. Date: 2017-01-07 13:38:58

Profile Last Update Date: 2020-02-23 08:10:21

---

Doctor Specialization

Doctor Name

Doctor Clinic Address

**Figure 17 : Edit Detail Screen For Doctor**

HMS Hospital Management System Sanjeev

DOCTOR | MANAGE PATIENTS

Doctor / Manage Patients

Manage Patients

#	Patient Name	Patient Contact Number	Patient Gender	Creation Date	Updation Date	Action
1.	Raghu Yadav	9797977979	Male	2019-11-05 16:10:13	2020-04-07 14:01:08	<a href="#">✎</a> <a href="#">👁</a>
2.	sameera palliyaguru	777777777	male	2020-05-03 11:45:44		<a href="#">✎</a> <a href="#">👁</a>

**Figure 18 : Manage Patient Screen For Doctor**

HMS Hospital Management System Sanjeev

DOCTOR | MANAGE PATIENTS

Manage Patients

Patient Details


Patient Name	sameera palliyaguru	Patient Email	patient@gmail.com
Patient Mobile Number	777777777	Patient Address	444/A abc road, colombo.
Patient Gender	male	Patient Age	28
Patient Medical History(if any)	new registration	Patient Reg Date	2020-05-03 11:45:44

Medical History

#	Blood Pressure	Weight	Blood Sugar	Body Temperature	Visit Date
<a href="#">Add Medical History</a>					

**Figure 19 : Manage Patient History View of Doctor**

HMS
Hospital Management System


Sanjeev

MAIN NAVIGATION

- [Dashboard](#)
- [Appointment History](#)
- [Search](#)

**Medical History**

#	Blood Pressure	Weight	Blood Sugar	Body Temperature	Visit Date
<a href="#" style="background-color: #007bff; color: white; padding: 2px 10px; border: none;">Add Medical History</a>					

**Prescription History**

#	Medicine	Special Note
<a href="#" style="background-color: #007bff; color: white; padding: 2px 10px; border: none;">Add Prescription</a>		

**Lab Reports**

#	Test	Test Description	Status	View
---	------	------------------	--------	------

**Diagnose Card**

#	Diagnose Date	View
<a href="#" style="background-color: #007bff; color: white; padding: 2px 10px; border: none;">Add Diagnose Card</a>		

**Figure 20 : Manage Patient History for Doctor**

## Appendix C : Questionnaire Analysis QUESTIONNAIRER

### Doctors Perspective

#### 01 Accessibility of current patient history?

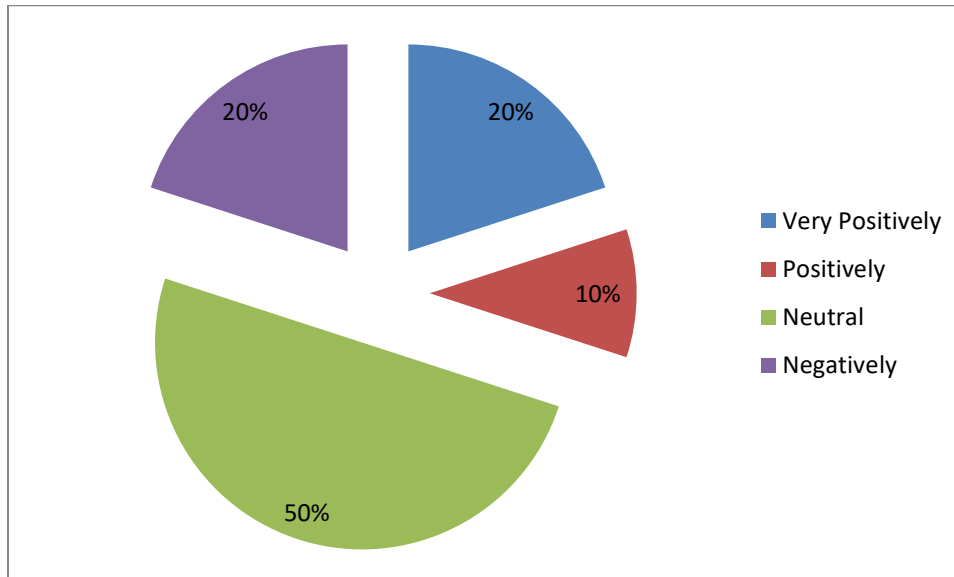
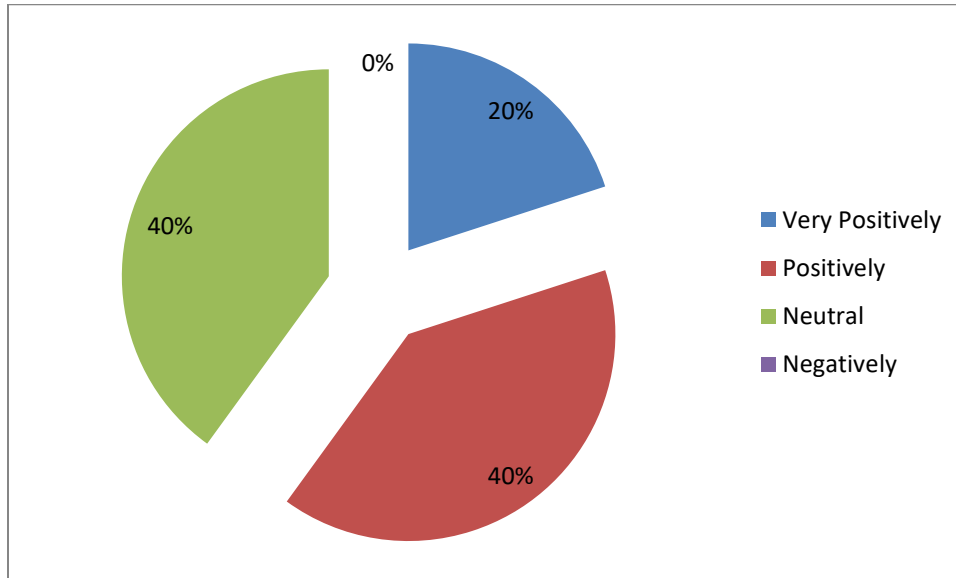


Figure 21 : Accessibility of current patient history

Based on the Figure 23, 50% of doctors are impartial about the current patient history; While 20% identify current patient history is quite good(very positively); while 10% identify its good(positively); while 20% of doctors disfavor about current patient history. This results is ensuring that majority(70%) of the doctors disfavor with current patient history.

02 How much patient history effect for accurate diagnose?



**Figure 22 : Impact of patient medical history to accurate diagnose**

Based on the Figure 24, 20% of doctors have been identified patient history very much (very positively) effect on accurate diagnose; While 40% of doctors desiderated patient history positively effect on accurate diagnose; while other 40% impartial about this factor. This results is ensuring that majority (60%) desiderated patient history is important to accurate diagnose and rest of doctors also have been neutrally agree with this factor.

03 Your knowledge to use automated system?

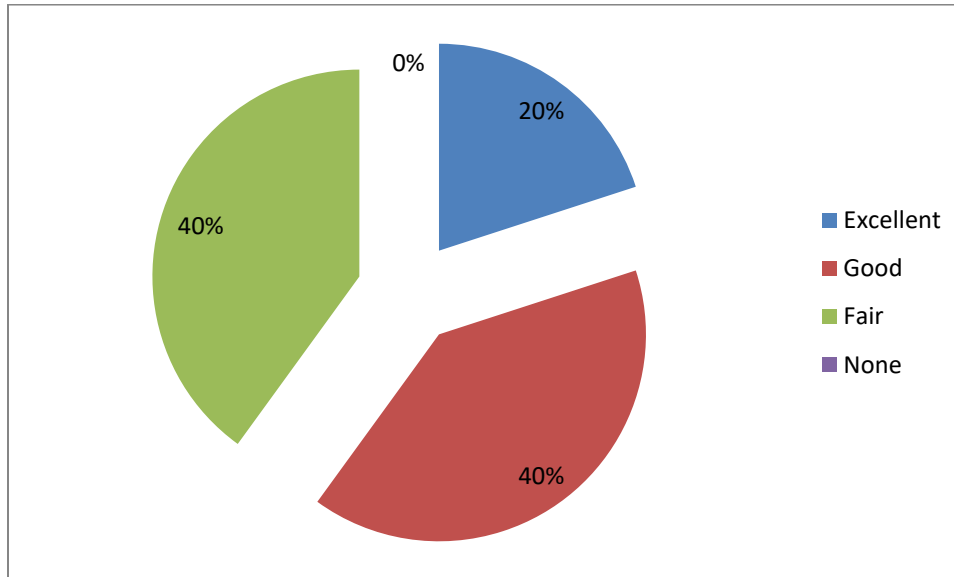
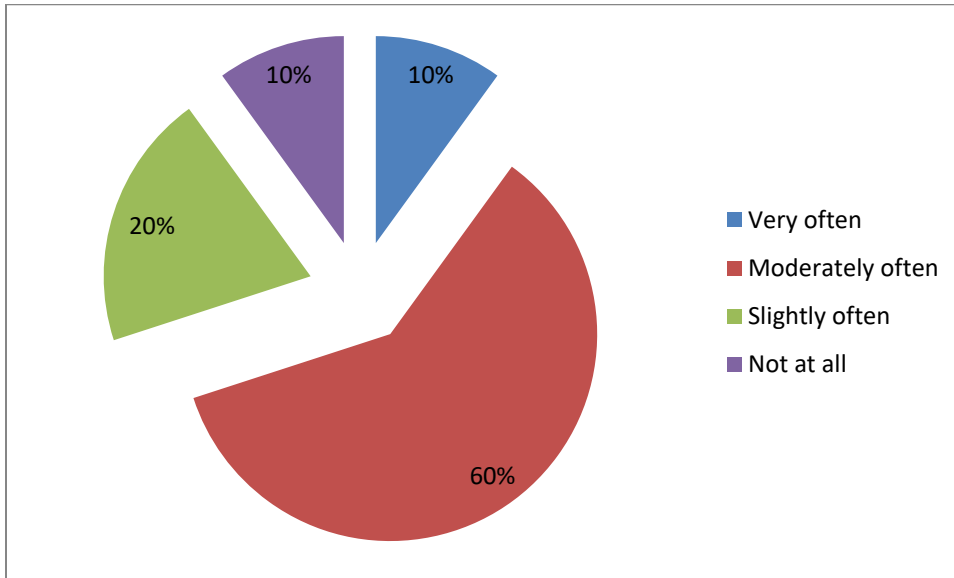


Figure 23 : Willingness to use of automated systems

Based on the Figure 25, 20% of doctors have been excellent knowledge about automated system; while 40% have been Good knowledge about automated system; while rest of others have been fair knowledge. This results is ensuring that majority (60%) of doctors have been wish to use such system.



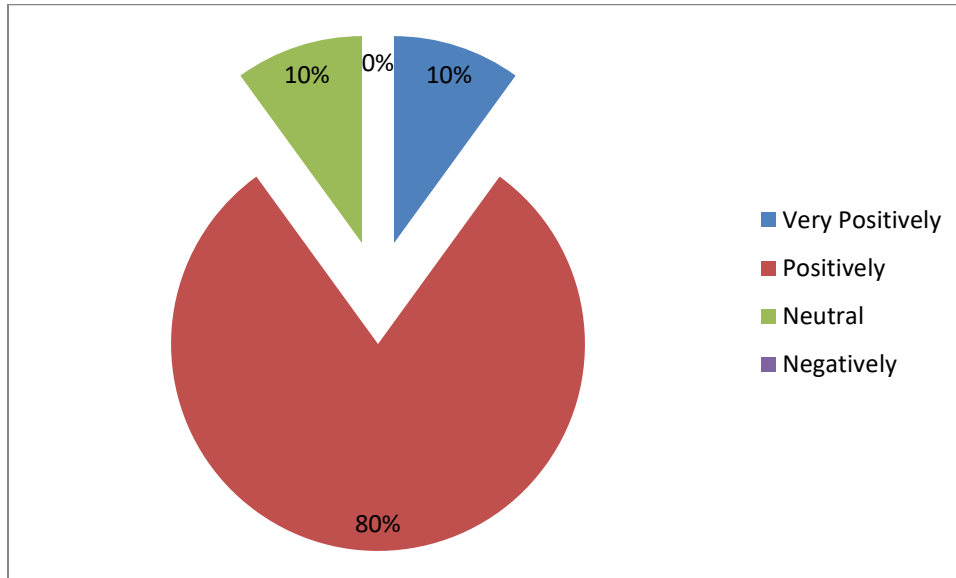
04 Are there any medical errors take place because of paper based medical history?



**Figure 24 : Issues immerge with paper based medical records**

Based on the Figure 26, 60% of doctors have been identified moderately often medical errors take place because of paper based medical history; while 20% of doctor identified slightly often medical errors take place; while 10% have been identified very often and other 10% been identified not at all. This results is ensuring that majority (90%) of doctors have been identified medical errors take place because of paper based medical history.

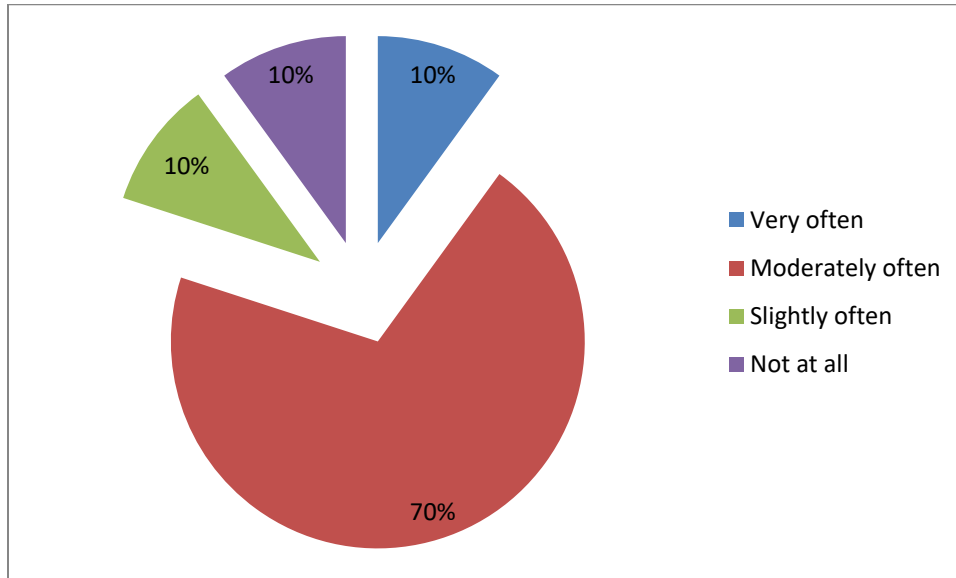
05 Does the accuracy increase when information is shared using an automated system?



**Figure 25 : Impact of information sharing by using automated systems**

Based on the Figure 27, 80% of doctors have been desiderated automated systems positively effect for information sharing; While 10% have been desiderated automated systems very positively effect for information sharing. Rest of other 10% have been desiderated neutral. This results is ensuring that majority of (90%) have been desiderated automated systems very much effect on accuracy of information systems. Base on the above findings most of the doctors have preferred automated system for information sharing.

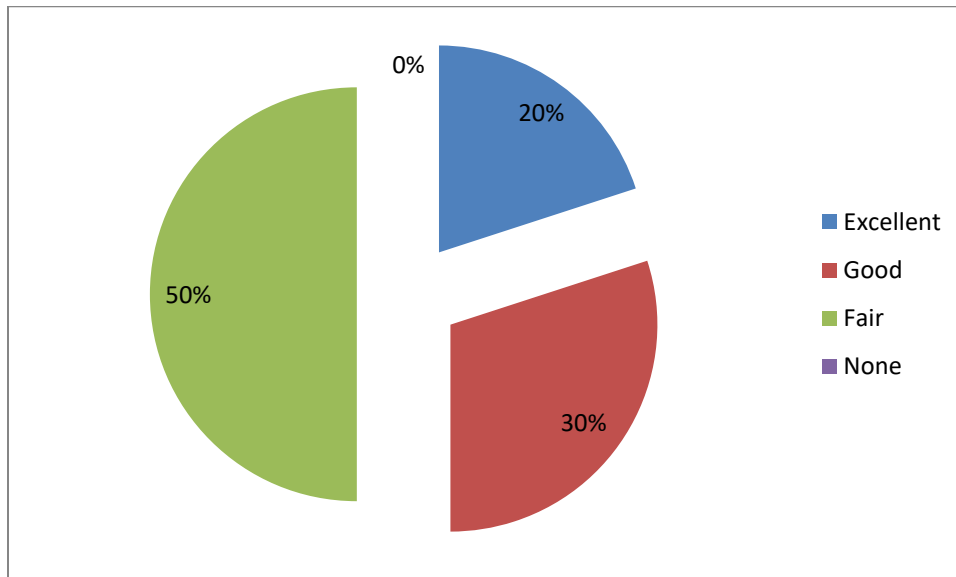
06 Do you face critical situations due to the absence of patient history?



**Figure 26 : Difficulties faced in critical situation by absence of patient medical records**

Based on the Figure 28, 70% of doctors have been desiderated, they have been face critical situations due to the absence of patient history moderately; While each 10% of others have been desiderated very often, slightly often and not at all. Based on this results ensuring that majority of (80%) have been desiderated they have been face critical situations due to the absence of patient history.

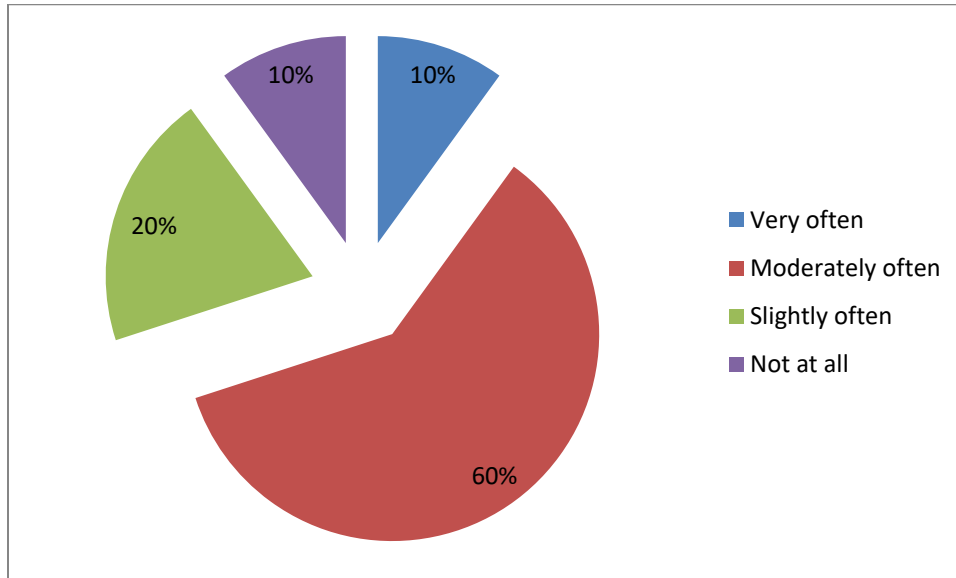
07 Quality of medical records?



**Figure 27 : Importance of quality accessible medical records**

Based on the Figure 4.13, 50% of doctors have been desiderated quality is fair of medical records; While 30% have been desiderated good and 20% have been desiderated excellent about the quality of medical records. Based on this results ensuring that 50% of doctors have been not relay satisfied with the quality of medical records.

08 Have you previously come across any HIT solutions (automated medical records)?



**Figure 28 : Previous experiences of work with HIT solutions**

Based on the Figure 4.14, 60% of doctors have been desiderated, they have been moderately used automated medical records; while 20% have been desiderated slightly often and 10% very often come across with HIT solutions. Just 10% of doctors have been desiderated never come across with automated systems. Based on this results ensuring that majority of (70%) have been used HIT solutions( automated systems).

