# A Web Based Employee Medical History Management and Monitoring System

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*Abstract*—**Almost all organizations have their own medical benefit program for their employees to ensure a healthy work environment. However, current function of this medical benefit program is to manage the payment of medical treatment when their employees received the treatment from health care provider. The existing system fails to store the medical record of employee and monitor the health of employee. Therefore, there is a need for a new system to fulfill this need. This paper is focusing on developing and designing an Employee Medical History Management and Monitoring System. The aims of this study are to create an online database of employees' medical history for management of employer, develop platform for information exchange between employer, employee and health care provider using web service. The World Wide Web (WEB) technology has been applied to implement the system. The Hypertext Preprocessor (PHP) language and Hyper Text Markup Language (HTML) were used to design the interface of this system by addressing the friendliness, flexibility and communication.**

***Keywords- health management information system, online database, employees' medical history management, healthcare***

## I. INTRODUCTION

Health Management Information Systems (HMIS) is a branch of information system specially designed to assist in the management and planning of health programs [1]. The aims of this system are helping decision making for detect and control health problems [2] and monitor progress towards health goals, help the administrator to monitor and control the function of hospital with using decision support indicator [3]. Besides, HMIS also assist the doctor and medical staff to improve health services [3].

A medical or health program is a part of HMIS in which provided by organizations to their employees. It is an employee welfare benefit plan established or maintained by an employer, an employee organization or both. This program provides medical care for employees and their families directly or through insurance, reimbursement and others [4]. The aim of this program is to ensure a healthy work environment. Besides, the health and well-being of employees are important in maintaining the employees effective, safe and positively motivated to accomplish the organization mission and vision. Therefore, almost all organizations have their own health program provided to their employees.

The Electronic Medical Record (EMR) is a one example of HMIS. It is because the function of EMR system is to assist in the management of patient medical records. In Malaysia, there are several hospital using EMR as a medium to manage and monitor patient medical record and assist doctors and nurses in monitoring patients' medication such as the drugs or medicine taken by patients during their stay in the ward [5][6]. Hospital Selayang and Hospital Putrajaya are among hospitals that use EMR in Malaysia. However, the EMR is only used in hospitals thus this system cannot be accessed by people other than doctors, nurses and hospital administration. Therefore, the EMR is not suitable to be used in organizations.

The Basic e-Medicine Service (BEMS) is a national e-medicine network which provides a Web-based GUI for healthcare institute. The BEMS facilitates the information exchange between healthcare institutes for purpose of consultation and also for maintaining electronic patient information [8]. The web based technology is used because the system can be used universally and providing access to different computer systems [9]. Once again, this system can only be accessed by doctors, nurses and hospital administration. Employers are still unable to access this system to monitor and manage the treatment of their employees.

In this project, we will be using Universiti Teknologi Malaysia (UTM) as a model organization. At UTM, there is a website that serves to monitor and manages its employee. The website is called HRFin (https://hrfin.utm.my/smuhr/) which provides medical services for their employees [7]. This website used to manage the treatment fee of their staff and families who seek treatment at panel clinics. This website can be accessed by panel clinics and employer to monitor and manage medical payment of their employees. Unfortunately, the website does not store data about medical history of their employee and cannot store a record of employee attendance to

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the clinic. Thus, employer cannot monitor the health status of employees.

In this paper, Employee Medical History Management and Monitoring System was designed to create an online database of employees medical history for management of employer, develop platform for information exchange between employer, employee and health care provider using web service and design information integration of electronic patient record through web services. Therefore, this system is able to overcome the limitation of existing medical record system.

In the following section, this paper describes the methods used in this study. The results and discussion of present method are shown in Section 3 and finally we draw some conclusion in Section 4.

## II. METHOD

The following figure shows steps involved in designing and developing the Employee Medical History Management and Monitoring System. Each of these steps is elaborated below.

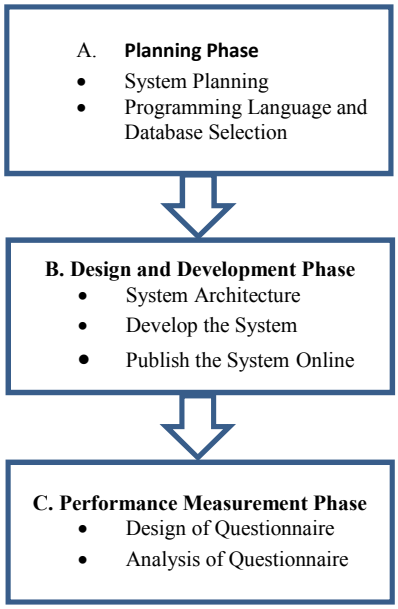


Figure 1: Flowchart of Employee Medical History Management and Monitoring System

### *A. Planning Phase*

The system is designed specifically to cater for four different types of user. The users include employee, employer, panel clinic and administrator of the system. Every user is designed to have their own login. The function of employee login is to insert or fill in their personal information and update if there is any change in personal information besides to monitor their own health condition. An employer login is to view the previous medical records and diagnostic test results such as urine test, blood test and x-rays image of their staff. Therefore, employer can manage the charges for payment and monitor the health status of their employees. The login for panel clinic/healthcare provider is to insert new medical record and diagnostic test results each time the employee comes to get treatment from their clinic. In addition, panel clinic can also review the employee's previous medical records and charges. The administrator login is to register new user for both the employee or the panel clinic.

The Hyper Text Markup Language (HTML) and Hypertext Preprocessor (PHP) were chosen as programming language to design the website due to comfortable environment for Web application design, capability to function at any platform and its excellent qualities at processing tasks [10][11][12]. The MySQL is chosen for database storage because it is effective combination, rapid and robust [6] [13].

### *B. System Architecture*

The architecture of this system consists of three layers namely the application layer, the mediator layer and the resource layer as shown in Figure 2. The function of each layer is explained below.

#### i. The Resource Layer

The resource layer allows panel clinic to fill in and update the employee medical record. The employee themselves required to key-in their personal information so that their profile can be retrieved at the upper mediator layer.

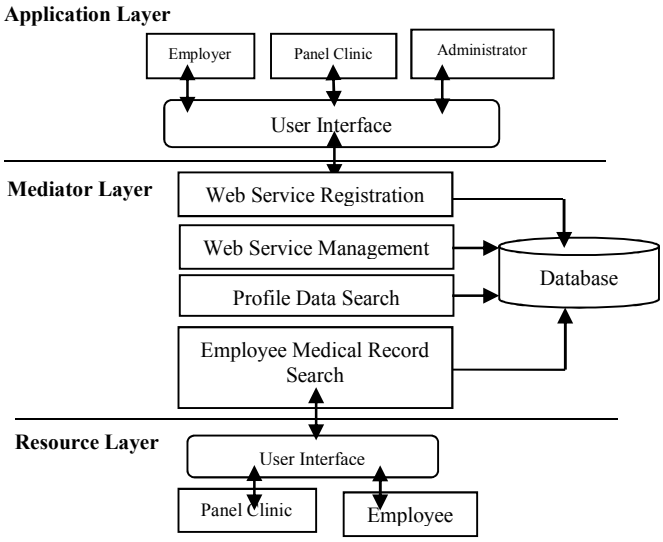


Figure 2: The Architecture of Website

#### ii. The Mediator Layer

This layer controls the system's operations and allows the retrieval of information at the top level of the application layer. The distinctive operational components include:

- **The Web Services Registration** allows staff to register the Web service and then filling personal details.
- **The Employee Management** enables staff to update their personal information.
- **The Employee Profile Database** records and stores the personal information of staff.
- **The Employee Medical Record Search** is for the retrieval of information of an employee's medicinal treatment from Staff Medical Record Database.
- **The Employee Medical Record Database** store information an employee's medicinal treatments.

This includes the patient record searched from the Web service.

- **The Profile Information Search** is for the retrieval of information of an employee's personal information from Employee Profile Database.

**iii. The Application Layer**

This layer is developed in order to allow contact with the system users, namely, administrator, physicians and employer. This layer has been designed as a Web application to allow Internet access.

### C. *Performance Measurement*

In order to measure the performance of the system, several of future users of the website were asked through questionnaire. Those future users were UTM employees such as lecturers, technician, administrative staff and others UTM employees as well as physicians of panel clinic. These interviews are conducted to investigate the performance of Employee Medical History Management and Monitoring System in comparison with the existing website. Finally the result from the questionnaire has been analyzed and presented in section III.

## III. RESULT AND DISCUSSION

In this section, the result of the interface built for the employee medical history management and monitoring system is presented in part A. Meanwhile, in part B, the result of the survey is presented.

### A. *Employee Medical History Management and Monitoring System*

Figure 3 shows the main page of the system. The user interface consists of four main modules namely 'Employee', 'Panel Clinic', 'Employer' and 'Administrator'. As mentioned before, the user needs to enter their username and password before start using this system. This website consists of security system to prevent unrelated people from invading the website.

Figure 4 shows the staff login page. From Figure 4, it can be seen that employee needs to login and fill in all personal information such as position, marital status, spouse name, number of children and others. This means the employee can update the system fast without have to rely on many documents and administrators.

Meanwhile, Figure 5 shows the clinic panel login page. The panel clinic/healthcare provider need to login for every employee who receives treatment from their respective panel clinic. After that, the panel clinics are confronted with patient searching page. The clinic panels need to enter staff number to retrieve the patient information and medical record from database. Each treatment is stored into the database using medical form shown in Figure 7. The information stored inclusive of diagnostic tests, treatments, medicine prescribed, charges, medical leaves and etc.


Figure 3: Main Page of the system

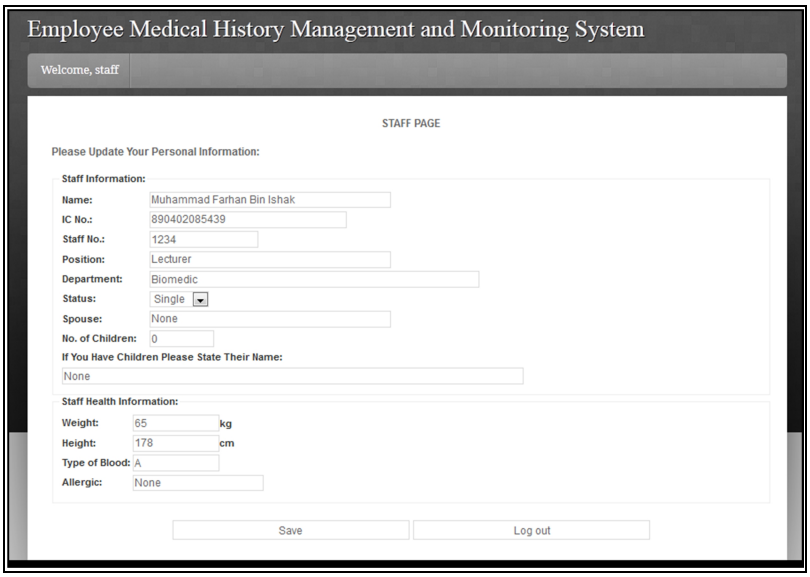


Figure 4: Staff Login Page of the Website

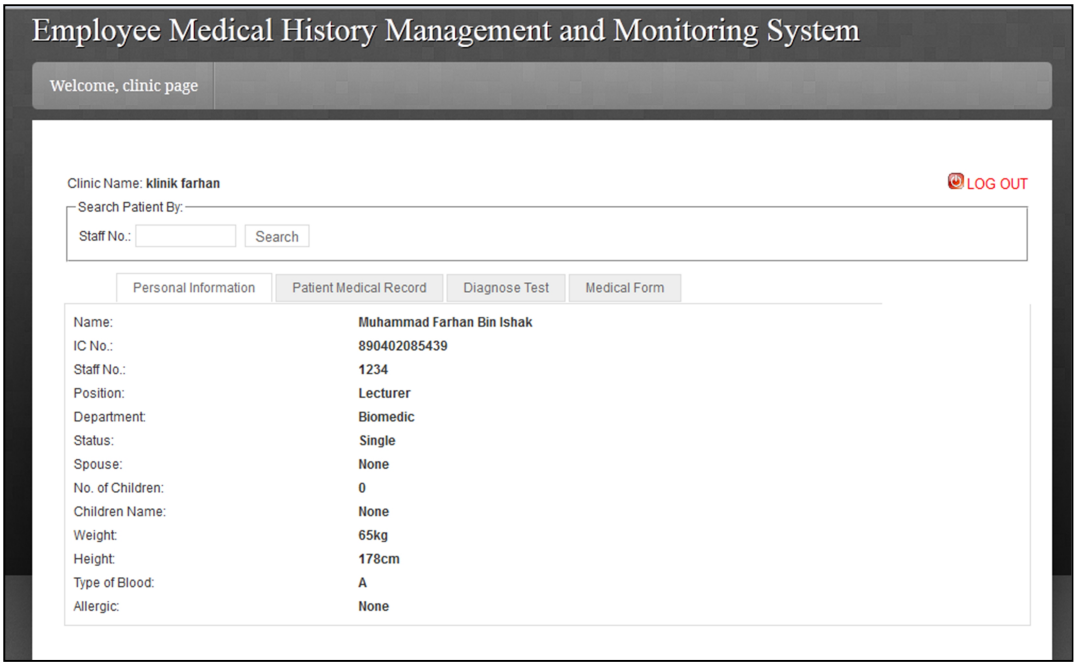


Figure 5: Panel Clinic Login Page of the Website

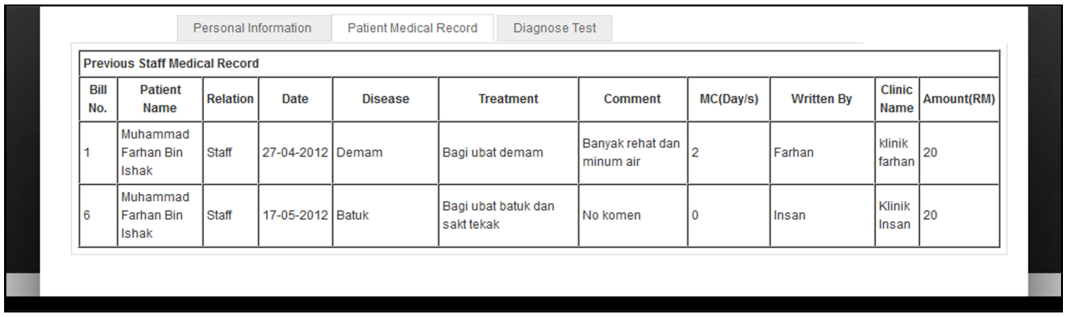


Figure 6: Employer Login Page of the Website

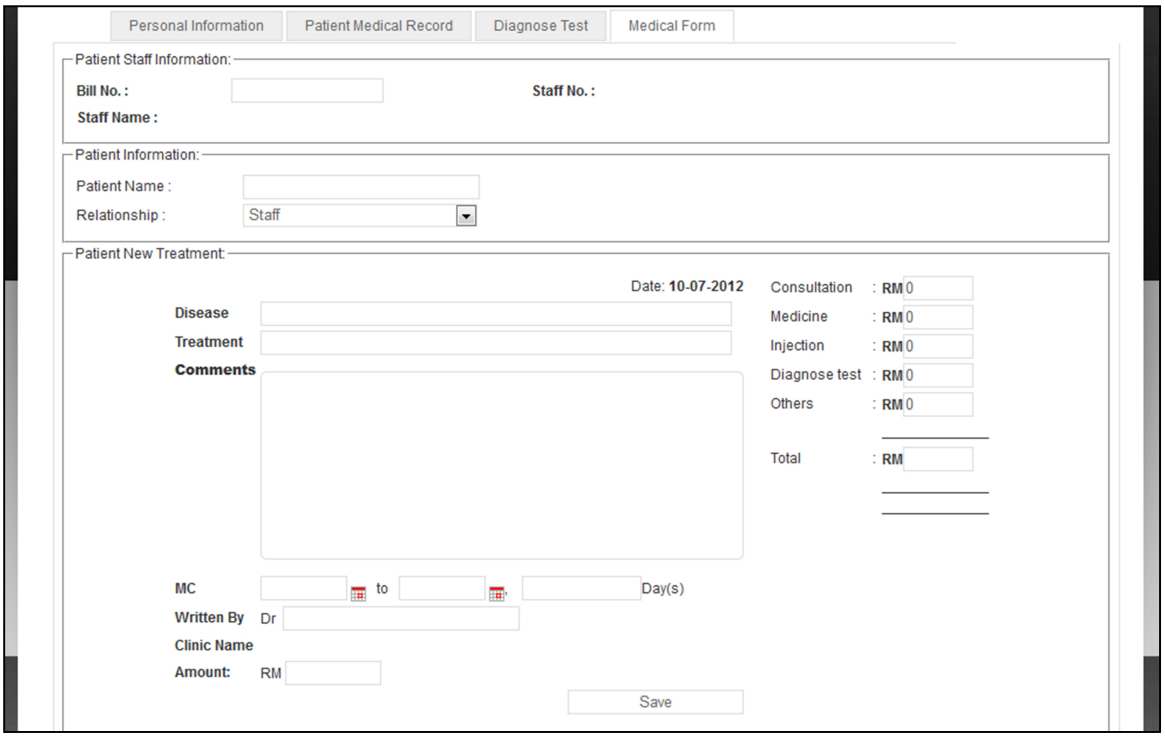


Figure 7: The Medical Form for Panel Clinic

Figure 6 shows the employer login page. The employer needs to login in order to manage treatments charges and monitor the health status of their employees. These info is important in order for an organization to understand the health condition of its employee and able to gauge the performance of an employee. From the number of medical leaves and treatment charges and type of disease, an organization should be able to assign jobs to appropriate employee. Also, employer will be able to measure its own performance based on the health condition of its own employees. In addition, employers should be able to organize suitable health awareness programs for its employees based on the health condition of its employees. The employer main page is only accessible by the admin/manager of an organization.

### *B. Analysis of System Performance Measurement*

In order to measure the performance of the system, a survey was conducted by distributing questionnaire forms directly to the future user of the system. For this preliminary stage, the questionnaires were distributed to 10 employee of Universiti Teknologi Malaysia (UTM), 3 panel clinics associated to UTM and one health administrator in health department of UTM. The respondents were asked in questionnaire form to determine if the system is easy to operate. The finding shows approximately 66.67% of responded strongly agrees that the system is easy to operate. Meanwhile, 16.76% respondents agree that the system is easy to operate. However, about 16.67% responded not sure whether the website is easy to operate. Figure 8 shows the result for this question.

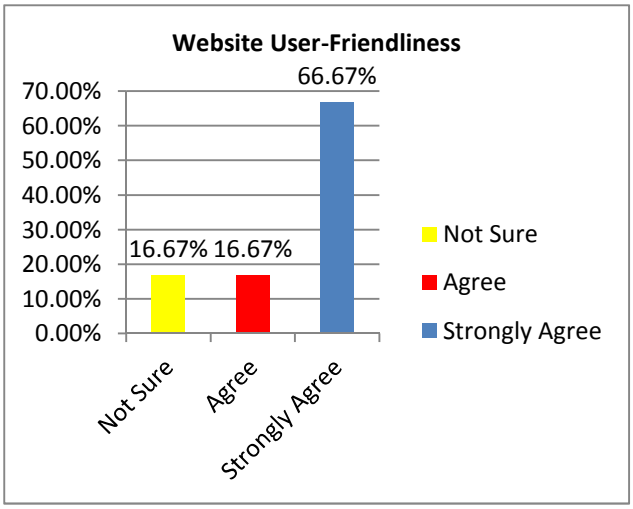


Figure 8: Percentages on user-friendliness of the website

This interview also focused on feature that help employer to monitor health status of their employees. The results showed a large number of the respondents agreed on that question. However, about 16.67% respondents answered not sure for question whether the website can help employers to monitor their employees' health status. Figure 9 shows the analysis of respondent about the question whether the website to help employer to monitor health status of their employees.

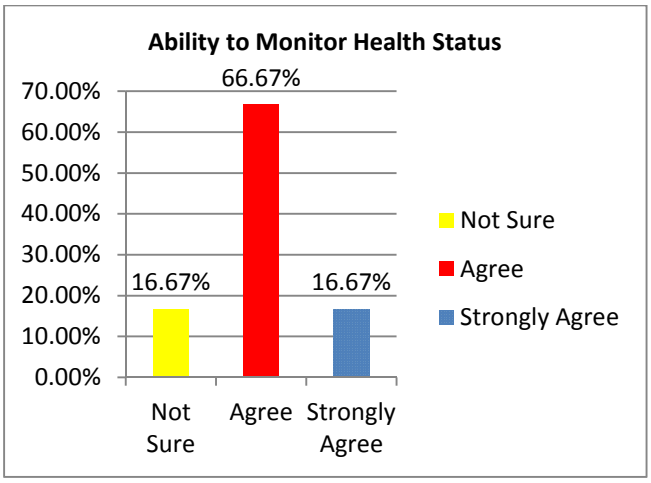


Figure 9: Percentages on ability of the system to monitor health status

The respondents also were asked if the website can replace the current medical services website. The percentage of respondent's vote can be seen in Figure 10. Half numbers of the respondents which are 50%, strongly agreed on that question. While, about 13.33% of respondents agree on that question. However, approximately 33.33% of the respondents give answer not sure whether the website is suitable to replace the current medical services website.

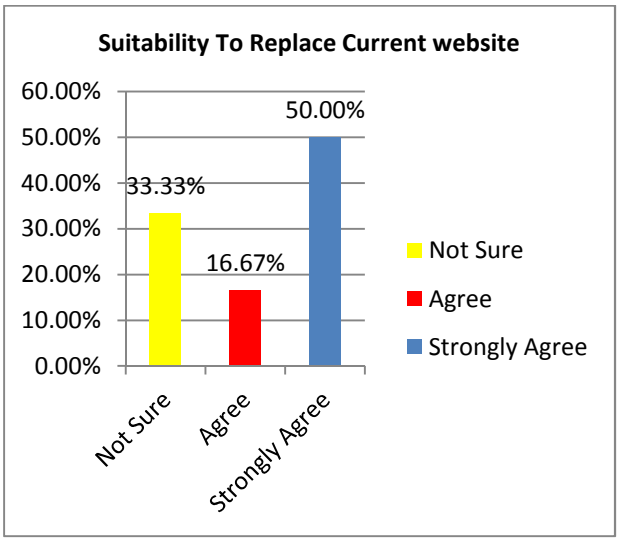


Figure 10: Percentages on suitability of developed website to replace current medical services website (HRFin)

## IV. CONCLUSION

In conclusion, a new employee medical history management and monitoring system has been designed and developed. The new system allow employer to manage the payment of treatment and also to monitor the health status of their employees. Besides, panel clinics is able to store and retrieve patient or staff medical records from the database of this system. Therefore, the system facilitates the panel clinics to provide proper treatment. The website also act as medium for information exchange between employer, employees and panel clinics. The implementation of Employee Medical History Management and Monitoring System can help employer and panel clinics to ensure their staff or patient get the best medical service.

The analysis of performance measurement which conducted on employers, employees and the panel clinic shows that almost all of them agreed that the Employee Medical History Management and Monitoring System is easy to operate and help the employer to monitor health status of their employees. In addition, the system is suitable to replace the current medical services website based on analysis of performance measurement that has been conducted.

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