

Malpractice Error Reporting System (MERS) for Al Mashfa

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Abstract:

Reporting system plays a significant role for the hospital in terms of data reporting and handling. Furthermore, there is a proliferation of medical error reporting that is considered to be a malpractice error. AlMashfa is a well-known hospital at Saudi Arabia and it currently using ordinary reporting system. Therefore, a reporting system for monitoring malpractice error has been developed for this work. This system was developed to be used by human resource (HR) managers, board members, and administrators of the hospital. The functional requirement of this system includes the ability of HR managers to create new personalized records for each medical staff that have made an error. HR managers are able to create report pages, document each incident separately and include these pages for viewing and printing under each recorded document. In addition, HR managers will be able to send automated and manual alerts on the status of medical personnel. The system was tested on a preliminary basis and the result showed that the system was able to identify the inputs accordingly. The application of this system will allow AlMashfa to better manage its data reporting and reduce the occurrence of malpractice errors.

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1. INTRODUCTION

Reporting systems are a small component of information management systems. These systems enable data collection through predefined templates or structures and assist organizations in documenting its information, as well as in managing records in an efficient manner [1]. Some

reporting systems have more sophisticated features that display indicators and statistical results based on the information collected or submitted, but are usually integrated with decision support systems or data mining tools [2].

In many organizations, business performance is managed through results-oriented metrics. These

are Service Level Agreements (SLAs) for external groups. Key performance indicators (KPIs) are used for internal management [3]. Typically, there are agreed targets to be tracked over a period of time. They can be used as part of other management strategies, such as Total Quality Management (TQM) [3]. Furthermore, there is another method known as data dashboard [4]. This method is a popular idea that presents a range of different indicators on one page, just like a dashboard in a car. This approach allows users to customize their view of the dashboard and set targets for different metrics [4].

Balance scorecards is a method developed that seeks to present an integrated view of success in an organization. In addition to financial performance, they also include customer, business processes and learning and growth perspectives [5]. Ad hoc analyses are another method where it is ordinarily embraced once to manage a particular evaluation activity. This method frequently includes building a model in a spreadsheet to permit investigation of "what if" situations [6]. On the other hand, they may appear as a one report for the executives [6]. Likewise, interactive querying is a specific technology that allows an analyst to directly manipulate the presentation of data. Analysts may select dimensions (e.g. time, location, department, employee, etc.) for assessment and presentation of data [7]. Moreover, there is another method known as data mining and advanced statistics [8]. For this method, techniques such as neural networks and machine learning are used to discover novel, interesting and useful data patterns. This is best suited for analyses such as classification, segmentation, clustering and prediction [8].

It is important to understand the structures of medical insurance for any health institution in order to develop professional and sound policies when dealing with a malpractice error [9]. Medical professionals are struggling to exercise the highest level of professional care while providing their services to patients. However, as human error can

not always be eliminated, errors and oversights are creeping-in some cases, leading to claims against medical professionals for malpractice [10]. These professionals are therefore at risk of being legally liable to pay compensation for any alleged malpractice committed by them.

Several previous works have been reported in analyzing the usage of malpractice reporting system. Mello and Studdert [11] presented the development of domestic monitoring framework for claims of malpractice and found that this system assisted the process claim flow and while preserving people's privacy in an appropriate manner. Björkstén et al. [12] analyzed medical error caused by nurse using malpractice system and found that these errors could be reduced with the application of the system. Mushtaq et al. [13] analyzed the occurrence of surgical errors using confidential reporting system and found that cognitive limitations had contributed to these surgical error. Thus, appropriate corrective action to overcome the existence of the error was then recommended. Riga et al. [14] examined the application medical error reporting system in a Greek healthcare industry and have discovered that the error detection system has helped to detect the primary variables causing adverse events and has revealed serious inconsistencies in the Greek health scheme. Parikh et al. [15] evaluated the effect of error reporting system in plastic surgery training and found that the error reporting system exhibited noteworthy amendments in impediment reporting.

AlMashfa is a luxurious private state of the art hospital in Saudi Arabia that covers all medical specialties. The main focus of the hospital is to provide primary care in all areas of medical specialties. AlMashfa is committed to providing the highest level of care at the patient centre. AlMashfa is currently using commonly used applications such as Microsoft (excel) and (access) data analysis and error reporting. Thus, AlMashfa plans to install error reporting systems for its

various departments, including human resources, finance and hospital administration.

Therefore, in order to meet the requirement of AlMashfa, this work has developed a reporting system for monitoring malpractice error. This system serves as a component in other systems to ensure more thorough monitoring of the medical field.

2. SYSTEM ANALYSIS

2.1 Functional/ Non Functional Requirements

In this work, the following is the functional requirements. Human resource (HR) managers and board members will be able to search and display records. HR managers are able to create new personalized records for each medical staff that have made an error. HR managers are able to create report pages, document each incident separately, and these pages will be included for viewing and printing under each recorded document. The system shall make it possible to send automated and manual alerts concerning the standing of medical personnel. The system will allow admins to modify reports only. If a member of the staff is suspended from the hospital, they will be placed in a prohibited database of medical staff. In addition, according to the clients' request, the system shall store the applicant's data in order to allow HR employees to search for CVs more efficiently.

The non functional requirements of the system are stated as follow. The system should have a high response time and a high tolerance for undue access from different users. It should also perform its main tasks effectively without any room for error. In terms of interface, the system should be user-friendly and easy to learn and use, easy to navigate and compatible with most web browsers. In terms of security, due to the sensitivity of the data inside, the system should be highly protected by providing information in secure channels such as (SSL) and by applying strict authentication and access control measures along with installed firewalls. In terms of

maintainability, the system should be maintained frequently but easily in order to ensure that it performs to the best of its ability. Finally, authentication functions are allowed based on the user's type of authentication.

2.2 User Cases

Figure 1 shows the user case diagram of the system. Based on Figure 1, the functions in which HR managers interact with the system once they log in are creating new records, searching records, displaying records, adding new reports, viewing medical personnel who were suspended and also viewing new applicants coming to the hospital, and send alert to medical staff. As for the board members, the functions are searching record and displaying record. As for the system, its primary functions are storing the new records in the system's database, displaying the search results to the HR manager, managing reports, providing a list of banned medical personnel and new applicants, and sending alerts to medical staff about their status.

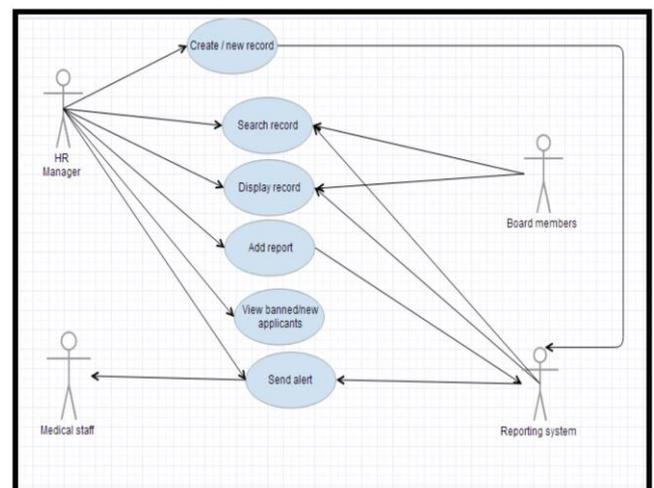


Figure 1. User case diagram

3. PROTOTYPE

A prototype gives an estimated look at what the system will look like when it is fully implemented. It helps both clients and designers to present a somewhat tangible result of the current project. For this work, the system has three views, namely: HR managers, board members, and administrators. The

first page is the same page that all users face when they tap the system, which is the login page. After users are authenticated, the pages that are displayed are based on the role of the user.

For the HR managers, based on Figure 2, the main page HR managers are met to navigate them to the functions that they are allowed to perform through the system, such as: creating new records, searching current records, sending alerts, and viewing prohibited medical staff and new applicants. This page allows HR managers to create profiles for medical staff once they have committed their first malpractice error.

The screenshot shows a web form titled "Create a new record" for the Al Mashfa organization. The form contains the following fields and controls:

- Staff name:
- Nationality:
- License Number:
- Position:
- Picture:
-

Figure 2. Prototype page: Create record page

Furthermore, the other functions of the prototype are it allows the HR managers to search the system's database base for current records. Once the search is done, the system will display the results and the HR manager will choose which one they want to see. For the add the report page, it allows HR managers to add report pages to each record, by inserting the error information into the assigned fields. Based on Figure 3, this page enables HR managers to view the list of banned medical staff and new applicants.

The screenshot shows a web page titled "View banned practitioners / New applicants" for the Al Mashfa organization. It contains two tables:

Banned medical staff:

Name	Release Date	License	Reason

New applicants:

ID	Name	CV doc	License doc.

Figure 3. Prototype page: view banned practitioners and new applicants

Furthermore, for the HR managers, there is a send an alert page. This page allows HR managers to send alerts in the form of e-mails to the medical staff informing them of their current status and about any warnings against them regarding their cases. For the board members, the main page for is used to navigate them to the functions that they are allowed to perform through the system, which are: searching current records and viewing prohibited medical staff / new applicants. As for the administrators, the main page navigates them to the functions they are allowed to carry through the system which are: registering users, modifying databases/records, and creating backup for the system.

Figure 4 shows the sequence diagram. Based on Figure 4, for the system home page section, the actor will initiate interaction with the object by logging in. An authentication will then be requested to the database of the system. After that, the database will respond with either access or denial of access. To create a new record section, the actor will initiate interaction with this object by inserting the name of the physician or medical staff into the system. The system will then respond by storing the record and updating the database inventory. For the search and display current records section, the actor will initiate interaction with this object by inserting the name of the physician or medical staff in the search box. The system will then respond by displaying the results. Then the actor will initiate

another interaction by selecting the result they wanted to find, and the system will respond by displaying the record of the selected result. For the add report section, the actor will initiate interaction with this object by inserting the required information into the system, and the system will respond by storing the information and updating the database inventory. For the view banned practitioners/ new applicants section, the actor will initiate the interaction by requesting for a page, and the system will respond by displaying the tables or the list. For the send alert section, the actor will initiate the interaction by clicking on the option to send an alert in the form of an e-mail or event calendar.

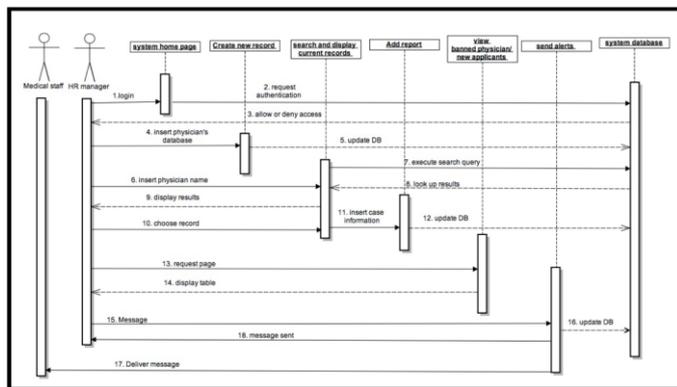


Figure 4. Sequence diagram

4. IMPLEMENTATION AND TESTING

Implementation is a phase in which the plotted logical design becomes physical, tangible and available for use. The tools that were used for the implementation stage is visual studio, c-sharp and asp.net. Figure 5 shows the login interface and Figure 6 shows the doctor data interface.



Figure 5. Login interface

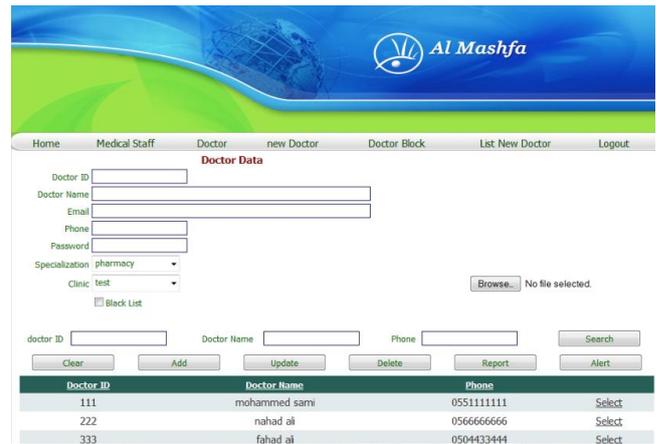


Figure 6. Doctor data interface

The main function of this system is to handle the malpractice errors. The purpose of the business process is to monitor and deal more closely with malpractice errors by documenting cases and notifying medical staff in a more agent-related matter. First it receives patient’s complaint at the hospital administration. Second, the administrator informs the medical director of malpractice error. Third, the medical staff that participated in the complaint is summon. The fourth step is investigation of the incident. Next, complaint is scheduled for a trail either at the ministry of health or to the public court. Finally, the trail date is decided. Table 1 shows the test outcome for the system. Based on Table 1, the system was able to identify the correct input and the incorrect input for log in and report creation. Furthermore, for the add report and send alert function, the system was able to differentiate the commands and it gave the feedback accordingly. The comprehensive details of the system test outcome are listed in Table 1.

Table 1. System test outcome

Use Case	Scenario	Expected System reaction	Actual System reaction	Result
Log in	Enter username = “admin” And password = “09”	Access as an “admin” user. The system will allow	Logged in.	“Success”

		this user to log in as an administrator		
Log In	Enter username = "admin1" And password = "1234"	Access is not granted to user.	The user ID or password is error	"Failure"
Create new record	Enter doctor ID = "222" Doctor name = "Nahad Ali" Email = nahad@hotmail.com Phone = "056666666"	Record created	The record are added	"Success"
Create new record	Enter doctor ID = "111" Doctor name = "Malak Alnory" Email = malnory@effat.edu.sa Phone = "055111111"	Record already exists	The record can't added please check input data	"Failure"
Add report	Select doctor name Choose error type Report data Attach file if needed.	The records must be added and updated	The records are updated	"Success"
Add report	Click on the report button without selecting the doctor name	Please select doctor	Please select doctor	"Failure"
Send alert	Select doctor name Click on alert button	Alert sent	The record are added	"Success"

5. OVERALL DISCUSSION

In this work, reporting system for monitoring malpractice error was developed. In this work, first a prototype was developed and then the final system interface was designed. This system has the following functions of creating records, searching records, displaying records, adding reports, viewing banned media personnel and new applicants, and finally the system can send alerts. This system was design to be used by HR managers, board members and administrators. With the development for this system, AlMashfamanagement can used it to monitor their malpractice error more efficiently. This system will enhance the overall process and it may reduce the occurrence of error. The findings of Johnson and Safdar [16] have confirmed that the application of reporting system has enabled enhanced data management and has reduced the occurrence of malpractice errors. This is also similar to the work of Mello and Studdert [11], the work of Björkstén et al. [12] and Mushtaq et al.[13] where it was confirmed that error reporting system is efficient in reducing reoccurrence of error among the staff and has improved data recording and management.

6. CONCLUSION

This work has demonstrated the development of a reporting system for monitoring malpractice error for AlMashfa hospital. At present in AlMashfa hospital, a manual reporting and monitoring system has been used. Therefore, the development of this system has enabled more automated monitoring system. The test phase of the system has shown that this system is functioning accordingly. This version of the system is specified for AlMashfa hospital and a generalized version for all hospital platforms may be developed in the near future. Furthermore, the system can be integrated with the Ministry of Health and the Saudi Health Commission.

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