Requirement Analysis of Hospital Management System

Abdul Wahid[1][ID: 193-15-2992], Ata-E-Elahi[1][ID: 193-15-2946]

[1] Daffodil International University, Dhaka, Bangladesh

Abstract. The project is about "Hospital Management System." The system will help the hospital employee, patients, and receptionist to easily maintain their daily tasks. Without a hospital management system, it's very difficult to maintain a hospital, and takes a lot time to give service to a patient. A patient can get benefit from our system such as report delivery via hospital website, digital prescriptions, self-booking appointment with specialized doctors etc. A doctor can write prescription digitally. Hospital receptionist can get book an appointment with doctor. All the data will be protected in database.

Keywords: Hospital Management System, Database, HMS, Requirement analysis

1   Introduction

The project Hospital Management System includes registration of patients, storing their details into the system, and also computerized billing in the pharmacy section, and lab reports will be accessible via patient profile. This website is able to give a unique id for every patient in the hospital and stores their details and the staff's id when they are registered in the website. It includes a search function that helps receptionist to check current status of each room. User can search availability of a doctor. The doctor can check details of a patient using the id. The Hospital Management System can be entered using a username and password that will be stored in database. The database is accessible either by an administrator. The receptionist can add patient to the empty room and patient will be charge automatically. The doctor can add patient health status into database. The data can be retrieved easily later by doctor. The interface is very user-friendly. Hospital Management System is powerful, flexible, and easy to use and is designed and developed to deliver real conceivable benefits to hospitals. Hospital administration and critical financial accounting are easily can be calculated. Hospital Management System is a software product designed to improve the quality and management of hospital management in the areas of clinical process analysis. Hospital Management System enables to develop organization and improve its effectiveness and quality of work. Hospital Management System will be as simple as possible using Structured & Menu oriented interface. The website will be developed in such a way that user may not have any difficulty in using this website and further expansion is possible without much effort. The website performs Hospital's activity in computerized way rather than manually which is time consuming.

2   Requirements Engineering Process

Hospital Management System is a web base product suite designed to improve the quality and management of hospital management in the areas of clinical process analysis and activity-based costing. We get the different people opinion what they needed most in the hospital management system. Most of the people said if they can set an appointment with doctor via the hospital website from home that will be easy for them. Another important thing is report delivery system. If a patient can get their reports via website that can save a lot of time for them. To get the clear view of what a hospital wants in this system we contact with some of our local hospital.

2.1   Elicitation Problems

Hospital management software is a web-based system that functions to manage different aspects of a medical institution. It aims to make different processes of the medical center paperless. It incorporates all important data with regards to doctors, patients, staff, administrative details, etc. The information is very difficult to retrieve and to find particular information like: Find out about the patient's history, the user has to go through various registers. This results in in convenience and wastage of time. The information generated by various department takes time and efforts to be stored at one place. It is among the most important features of hospital management software. It holds the potential to monitor the entire journey of every patient who associates with the hospital. A receptionist or doctor can search the name and every single medical detail about the patient will be in front of them in a matter of a few seconds. Various changes to information like patient details or immunization details of child are difficult to make as paper work is involved. In the billing sections manual calculations are can be error and take a lot of time this may result in incorrect bill for patient. An online appointment scheduling portal allows patients to schedule and book an appointment with a doctor online. It helps them in saving waiting time and money. Patient's data collection and storage, its easy accessibility enables Doctors to make error-free, quick decisions. Thus, improving patient care and clinical processes.

2.2   Analysis and Negotiation Problems

When we approaching some users, we have gathered some requirements from them. First of all, they want a website, that can be easily navigable. Users want a website with automated updated notice. This feature cannot be added at this time. But it will be added in the next phase of development. Built in Live video call is another feature that users want to use. At the current time this features too hard to implement in the website. But we can add an online chat feature in the website. Through that features user can chat with their appointed doctor. We have also faced some technical challenges that fail the implementation of HMS in the healthcare industry includes Networks and computer have different maintenance problems, lack of no standards for Data entry and data retrieval, difficulties in training users technically to use HMS. Shortage of professional healthcare faculty who have in-depth knowledge of HMS is another problem to be solved. We explore some of the ways in which a negotiation lens may be of value to medical professionals, administrators, and other stakeholders in the health care sector. In facing the inevitable tradeoff between breadth and depth of coverage, we have opted to focus on only a handful of core insights from the field of negotiations, while devoting more attention to providing examples of how these insights can be applied to doctors and hospitals. Overcoming the negative impressions on HMS new and experienced staffs can be neglected through the development of HMS training programs and in-house hospital orientation programs. We are also planning to make the healthcare professional participate and involve in various stages of system implementation, development, and deployment to improve the healthcare specialist's support.

2.3   Requirements Documentation

The hospital management system (HMS) is a website that handles different directions of clinic workflows. It manages the smooth healthcare performance along with administrative, medical, and financial control. That is a cornerstone for the successful operation of the healthcare facility. The implementation of hospital management system project provides the institution with different advantages that improve the service quality and efficiency. It is created for three groups of users: patients, hospital staff and management, and third-parties like pharmacy. The interaction between them conveys the general

performance. The benefits received by a certain group of users also positively influence the work of the others. The fundamental requirements are given below:

- Digital medical records: The hospital database includes all the necessary patient data. The disease history, test results, prescribed treatment can be accessed by doctors without much delay in order to make an accurate diagnosis and monitor the patient's health. It enables lower risks of mistakes.

- Staff interaction: It is vital to engage all of your employees for improved coordination and teamwork. They do not need to make special requests and wait for a long time for an answer. Each specialist will be in charge of certain process stage and can share outcomes with colleagues just in one click.

- Patient self-service: Patients have their own system accounts where the list of various actions can be performed. They are able to make online requests or reservation, receive the test results, receive the consultation of the medical specialists and many more.

- Laboratory and tests management: Lab management module shows the test results of the particular patient. The lab data can be viewed by the staff and generated for the patients' reports. It is usually integrated with other hospital information system modules for the better overall functionality of the system.

Functional Requirements. There are a lot of software requirements specifications included in the functional requirements of the Hospital Management System, which contains various processes, namely Registration, Check out, Report Generation, and Database.

Registration Process.

- Adding Patients: The Hospital Management enables the staff at the front desk to include new patients in the system.
- Assigning an ID to the patients: The HMS enables the staff at the front desk to provide a unique ID for each patient and then add them to the record sheet of the patient. The patients can utilize the ID throughout their hospital stay.

Check Out.

- Deleting Patient ID: The staff in the administration section of the ward can delete the patient ID from the system when the patient checkout from the hospital.
- Adding to the beds available list: The Staff in the administration section of the ward can put the bed empty in the list of beds available.

Report Generation.

- Information of the Patient: The Hospital Management System generates a report on every patient regarding various information like patient's name, Phone number, bed number, the doctor's name whom its assigns, ward name, and more.
- Availability of the Bed: The Hospital Management system also helps in generating reports on the availability of the bed regarding information like bed numbers unoccupied or occupied, ward name, and more.

Database.

- Mandatory Patient Information: Every patient has some necessary data like phone number, their first and last name, personal health number, postal code, country, address, city, 'patient's ID number, etc.
- Updating information of the Patient: The hospital management system enables users to update the information of the patient as described in the mandatory information included.

Non-Functional Requirements. There are a lot of software requirements specifications included in the non-functional requirements of the Hospital Management System, which contains various processes, namely Security, Performance, Maintainability, and Reliability.

Security.

- Login ID: Any users who make use of the system need to hold a Logon ID and password.
- Modifications: Any modifications like insert, delete, update, etc. for the database can be synchronized quickly and executed only by the ward administrator.
- Front Desk Staff Rights: The staff at the front desk can view any data in the Hospital Management system, and add new patients record to the HMS but they don't have any rights to alter any data in it.
- Administrator rights: The administrator can view as well as alter any information in the Hospital Management System.

Performance.

- Response Time: The system provides acknowledgment in just one second once the 'patient's information is checked.
- Capacity: The system needs to support at least 1000 people at once.
- User-Interface: The user interface acknowledges within five seconds.
- Conformity: The system needs to ensure that the guidelines of the Microsoft accessibilities are followed.

Maintainability.

- Back-Up: The system offers efficiency for data backup.

Reliability.

- Availability: The system is available all the time.

2.4   Requirements Validation.

Hospital management system can help a doctor decide what is best for a patient within a short time. When we gather requirement from the users, doctors, hospital staff and administrator they want some features that are not very useable and most of the users cannot use this feature. Users want to online chat features with another user. This feature is not going to use all the users. Because user will use hospital management system for short amount of time. Hospital staff want to automation email for report delivery system. When a patient's report is ready, they will get the report via email from the hospital automatically. Thought this feature is important for patient and it will save them a sometime. But in Bangladesh most of the people does not check their email all the time. So, if we implement this feature this will increase the software price and some lower profit hospitals are not going use the website. Online video chatting with doctor is another feature that users want. This feature is helpful in some situation but most of the time general user of the website are not going to use it. In Bangladesh the

internet is not stable as the western countries. For that reason, video call quality will be very low. This feature will take time implement. Medicine delivery is another feature that user wants. This is a extra features for the website. At the initial phase of development this feature will be hard to implement.

3   An extended Requirement Model

Hospitals are an essential part of the health-care system, and having a competent online hospital management system is a must in today's environment. Patients, doctors, and hospital administrators can all benefit from this Hospital Management System, which is designed to give a faster and more efficient response to their diverse demands. This HMS will be automated. Patients can schedule doctor visits based on their medical symptoms. They can also place prescriptions, request an emergency admission, and view discharge summaries and bills. Doctors will have access to patient prescriptions and test results. Users can be registered, available doctors can be assigned for consultation, ICU/CCU and doctors can be assigned in case of emergency admission, and so on.

Require-ment ID	Requirement from user	Modified Requirement from Developer	What will be implemented
R1	Keep record all of his/her previous medical records.	To Differentiated individual user, we have assigned every patient, doctor, receptionist and hospital staff unique ID.	Use can see basic static info without signup. To keeping record in the database user must need to signup, the website will automatically assign a unique ID to the users.
R2	Self-booking Appointment with doctor	Patients who want to make an appointment at the hospital must describe their health problem in detail, and a specialized doctor will be assigned to them based on their medical condition/disease.	Patient need to input their Specialized doctor. Then a list of specialized doctors will be shown. Patient or receptionist can use this functionality. Users also need to select a appointment time of the selected doctor,
R3	Hospital doctor can view patient health records	Doctor can see patient's health records which will be included previous doctor's opinion, health data, prescriptions etc. When doctor search in the doctor panel by patient they can see it.	Patients can choose to see hospitalization details, test reports, prescription etc. Patients can upload test reports for ease of consultation or reports can be added by laboratory department. All of these records will be added corresponding to patient ID.
R4	Admission in the hospital	Admission of a patient in case of medical emergency and identification of the medical condition and specialized doctor along with ICU/CCU allocated according to availability.	For admission patient need to registered in the system. System will provide a patient ID. This patient ID be used for further process. If any doctor recommends to admitting in the hospital receptionist will add the patient to a room

			(ICU, CCU, Deluxe, Super Deluxe).
R5	Patients want to view their prescription	Doctors can view prescription of only those patients who are currently undergoing treatment under him/her for ease of diagnosis of patient's disease	Doctor logs in with his credentials if he/she is an existing user or signs up with needed information. To Search and see patient's prescription from list, Doctor searches patient from list using patient ID
R6	To get better treatment doctors want to see the patient report	Doctors can view test reports of only those patients who are currently undergoing treatment under him/her for ease of diagnosis of patient's disease.	Doctor login with his credentials if he/she is an existing user. Doctor can see list of only those patients currently undergoing treatment under him/her.
R7	Getting the total bill when discharged from hospital	Patients can pay offline, depending on their preferences. A payment receipt will be provided upon successful payment.	Payment receipt will be generated from doctor appointment, cabin type (standard, Deluxe, Super deluxe, ICU, CCU), extra charges. Different types and different specialized doctors will be having different amount of charge. Every charge will be added to patient ID.

4 Conclusion & Recommendations

Without a hospital management system every hospital follows manual procedures to keep track of its day to day activities. When scenarios such as patient information handling, employee handling, report handling, financial analysis and report generation is taken into consideration there exists many issues with regard to different factors such as efficiency, security, accuracy and reliability. Due to improperly managed details medical center faces quite a lot of difficulties in accessing past data as well as managing present data. This mismanagement keeping patient to get the best treatment. The manual file systems which are being used at present require storage facilities which is also another overhead. This storage facility is very delicate system and patients data can be hampered easily. Also it require a lot of time to sort the data and finding any patient or staff information. The fully functional automated hospital management system which will be eliminate the disadvantages caused by the manual system by improving the reliability, efficiency and performance. The usage of a database to store patient, employee, doctor details etc. will accommodate easy access, retrieval, search and manipulation of data. The access limitations provided through access privilege levels will enhance the security of the system. The system will facilitate concurrent access and convenient management of activities of the medical center. There are some things that are not helps the users and some things that we are not able implement in the project. But we can give the user different facility of the feature. All of these are described in the above sections. Task of the hospital management system is to support patient care and associated administration by providing: information, primarily about patients that information needs to be correctly collected, stored, processed and documented. Hospital management system is of great importance in modern hospital.

5   References

1. Sommerville, I. (2010). Software Engineering, 9th edn., Addison-Wesley.
2. Christel, M.; Kang, K. (1992): Issues in Requirements Elicitation. Software Engineering Institute Technical Report CMU/SEI-92-TR12. Pittsburgh, PA: Carnegie Mellon University.
3. Young, R. R.(2002): Recommended Requirements Gathering Practices, CrossTalk, 15(4), April 2002, pp. 9-12.
4. Apshvalka, D.; Donina, D.; Kirikova, M. (2009): Understanding the Problems of Requirements Elicitation Process: A Human Perspective, Information Systems Development, Springer, pp 211-223
5. Hofmann, H. F.; Lehner, F. (2001): Requirements Engineering as a Success Factor in Software Projects. IEEE Software, 18(4), pp. 58-66.
6. Web Based Project Management System, Anne-Mai Adamson, 2010
7. https://www.guru99.com/learn-software-requirements-analysis-with-case-study.html
8. http://www.itu.dk/~slauesen/Papers/IEEEtasks.pdf