**Hospital Management System (HMS) for The Mayo Clinic**

A city street with a building and a street light

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CBAP Certification course through Simplilearn

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**Overview and Summary:**

The Mayo Clinic is an American nonprofit academic medical center currently based in three major locations, Rochester, Minnesota; Jacksonville, Florida; and Scottsdale, Arizona focused on integrated patient care, education, and research. Mayo Clinic holds the number 1 rank among hospitals in the United States.

It was opened on the 30th of September 1889. Over the years it grew and facilities. It increased the size of its premises and the number of doctors it employs.

**Business Analysis Core Concept Model (BACCM):**

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|  |  |
| --- | --- |
| **Core Concept** | **Description** |
| **Need** | **Problem:**   * The vast number of patients it treated made the management of such a huge hospital an arduous task. The paperwork and storing of all patients’ records was becoming unmanageable.   **Opportunity:**   * The need is to have a hospital management system (HMS) software that helps the clinic to manage hospital operations. |
| **Change** | Implementing an online Hospital Management System (HMS) that will help:   * To move all the paperwork and manual work to a system that can record and manage all the data digitally and reduce the staff load. * The new system will help reduce hospital operating costs and save patients’ time with online record management and patient communication. |
| **Solution** | A software-based hospital management system (HMS) that can accommodate:   * Access to facilities for the patients and an easy approach for staff to fetch patient records. * Hospital staff can retrieve data for details such as bed availability, laboratory tests, billing tasks, and new patient registrations. * Generating reports for senior management in the decision-making process and staff management. |
| **Context** | The Mayo Clinic is an American-based non-profit organization that was opened on 30th Sep 1989. It has now expanded to three locations and over the years has grown and facilities.   * The increased hospital facilities and accommodating vast numbers of patients and much more resulted in arduous tasks for staff to manage patient data, generate reports, and manage operations daily. |
| **Value** | **A data-based management system (HMS) will help Mayo Clinic:**   * To reduce operating costs of the hospital * Provide reports to senior management for better decision-making. * Saves patients’ time. * Keeps patients’ medical records secure and stored in the cloud. * Keeps track of empty and filled beds in the hospital. * Easy access to patient data. * Reduces documentation in the hospital. |
| **Stakeholders** | **Internal stakeholders:**   * Hospital staff and managers * Doctors and nurses * Medical team * Patients * Lab attendants   **External stakeholders:**   * Suppliers (Medical-equipment vendors) * Project manager * Domain SME(DSME) -Familiar with hospital software * Implementation SME (ISME) – IT department * Operational SME * Tester   Simplilearn Business Analyst |

**Identifying Stakeholders:**

The **RACI** matrix stands for the four types of responsibility that a stakeholder may hold on to the initiative. Responsible, Accountable, Consulted, and Informed.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Stakeholders** | **Responsible** | **Accountable** | **Consulted** | **Informed** |
| Supplier | **R** |  |  |  |
| Project manager |  | **A** |  |  |
| Implementation SME |  |  | **C** |  |
| Operational team SME (IT) |  |  | **C** |  |
| Tester | **R** |  |  |  |
| Domain SME |  |  | **C** |  |
| Doctors and nurses | **R** |  |  |  |
| Medical team |  |  | **C** | **I** |
| Patients |  |  |  | **I** |
| Lab attendants | **R** |  |  | **I** |
| Hospital staff | **R** |  |  |  |
| Business Analyst | **R** |  |  |  |

* **Responsible (R):** the persons who will be performing the work on the task.
* **Accountable (A):** the person who is ultimately held accountable for the successful completion of the task and is the decision maker. Only one stakeholder receives this assignment.
* **Consulted (C):** the stakeholder or stakeholder group who will be asked to provide an opinion or information about the task. This assignment is often provided to the subject matter experts (SMEs).
* **Informed (I):** a stakeholder or stakeholder group that is kept up to date on the task and notified of its outcome. Informed is different from Consulted as with Informed the communication is one-direction (business analyst to stakeholder) and with Consulted the communication is two-way.

**Proposed System’s Workflow:**

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**In-scope and Out-of-scope requirements for this software:**

**bed**

**Data management –** Upload and update patient’s medical records and reports generation for management in the decision-making process

**Hospital staff management-** Login timings and shift managing among nurses and ward boys

**Laboratory tests, blood work, and radiology department results to be managed**

**Bed occupancy**- to keep track of bed availability and update every 6 hours

**Patient appointment management and reminders sent to patients**

**Login and new registration for patients, account setup for staff**

**Billing and Insurance claims-**To generate bills and make sure to settle payment for one time not separate bills

**In-scope requirements**

**Visitors Log**

**Appointment changes and cancellation**

**Out-of-scope requirements**

**Hospital employee details**

**Hospital staff payroll management**

**Emergency department services 24\*7**

**Main features that need to be developed:**

A web-based hospital management system

* Must have MySQL database and operating system with Windows 2016.
* Should support 500 users at a given time.
* Must be a user-friendly interface with self-explanatory features.
* Response time should be always one second.

**Patient registration:** new patients need to be registered and staff should create an ID so that they can create and update medical records with all the details including admission and discharge.

**Patient appointment management:** All hospital doctors' timings are to be displayed on the website. Patients can select the doctor they would like to visit based on the appointment slot available for that doctor. The system shall book the appointment for that patient with the doctor selected.

**Appointment reminders:** The system shall send an email and SMS reminders to the patient one day before the appointment date to remind the patient of the appointment.

**Bed occupancy:** It keeps track of all the beds in the hospital. It will show the list of all the occupied and unoccupied beds in the hospital. Every 6 hours, the person in charge of the hospital floor will update the bed occupancy.

**Billing:** HMS will total all the expenses of a patient at one time and produce a complete bill at the end of the consultation or discharge. This will save time and effort for each department as they need not produce separate bills for a single patient.

**Reports:** Reports are generated from the HMS for senior management to clearly understand the hospital’s revenue, expenses, bed occupancy, and other details.

**Staff management:** It stores the names and timings of the nurses and ward boys on duty with their respective ward numbers.

**ER diagram for the hospital management system (HMS):**

**A diagram of a medical procedure

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**Data flow diagram for HMS:**

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**Functional and Non-functional requirements for this software:**

**Functional requirements:**

* **Patient Registration**
* New patients can be able to register and capture personal information, and medical history.
* Generate unique IDs for patients for identification purposes.
* Storage and retrieval of medical records.
* **Appointment management**
* Displaying doctor’s schedule and slot availability to patients.
* Allowing patients to book appointments with preferred doctors.
* Sending appointment reminders to patients via email or SMS.
* **Bed occupancy and treatment management**
* Tracking and managing the status of beds in the hospital including availability and occupancy.
* Managing bed allocations and updating treatment given to patients in medical records.
* Regular updates in bed occupancy and managing hospital facilities.
* **Billing and financial management**
* Recording and managing patient billing and expenses gathering from all departments.
* Generating customized bills at the end of consultations and discharge.
* Integrating with insurance systems for claims purposes.
* Providing financial reports and analytics for revenue analysis.
* **Laboratory, Blood bank, and radiology department**
* Performing tests as suggested by the doctor with a confirmed record of the ordered test.
* Coordinating with the laboratory and radiology department to allocate tests for the patients.
* Updating and storing test results in patient medical records.
* **Reporting and analytics**
* Generating reports of patient statistics, bed availability, and revenue for senior management and stakeholders.
* Supporting data is provided for decision-making analysis.
* **Staff management**
* Recording and managing shifts for nurses and ward boys.
* Tracking staff given responsibilities and coordinating among them.

**Non-functional requirements:**

* **Usability**
* System should have a user-friendly interface and be easy to navigate.
* The home screen and options presented should be self-explanatory.
* **Performance**
* The system responsive time should be one second irrespective of several users.
* It should have the capacity to accommodate 500 users within a given timeframe.
* **Scalability**
* System should be designed to accommodate future growth and scalability.
* It should be capable of handling increasing patients, doctors, and data storage without significant performance impact.
* **Reliability**
* The system should be reliable and minimize the occurrence of system failures and errors.
* Regular system back-ups and recovery procedures should be integrated into the system.
* **Compatibility**
* The system should be capable of standard operating systems (Windows 2016) and common web browsers.
* MYSQL database be used since it is open source and free.
* **Privacy and security**
* System should implement security measures to protect patient data and confidentiality.
* Access to information should be restricted based on roles and permissions.
* The system should comply with relevant data protection regulations and guidelines.

**Flowchart for patient admission process:**

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**Mock screens or wire frames for HMS:**

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**A screenshot of a medical registration form

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