**3.0 Problem Analysis Phase**

**3.1 Study the Problem Domain**

Our goal in researching the problem area is to figure out how to best deploy a program-based solution that can improve allocation of the bed in hospital. To do so, we'll go deep into each condition' diagnoses, therapies, and medical metrics to figure out the most logical approach to display and analyze data. In addition, we'll look at the best ways to incorporate referral and follow-up services so that we may create the most comprehensive system possible.

**3.1.1 Data Collected by Current System**

There is currently no comprehensive system established for the allocation of bed that also offers follow-up and referral management capabilities. When it comes to treating individuals who are smokers, diabetics, obese, or have excessive cholesterol, the treatments and medical measurements stay the same. Furthermore, many clinics may use a manual system to keep their records.

**3.1.1.1 Methods**

* + Doctors make treatment recommendations based on their knowledge.
  + Patient progress is analyzed and accordingly bed is allocated.
  + Follow-ups are planned with the help of a calendar or software such as Microsoft Outlook.
  + A spreadsheet or a physical ledger is used to track referrals.

**3.1.1.2 Storage**

* + Treatment information is saved in a doctor's head, in a textbook, or on the Internet.
  + Personal and medical information about patients is stored in a physical file, a computer hard drive, or a server.
  + Follow-up for beds is recorded in a calendar, computer hard disk, or server.
  + Referrals are store on a physical ledger, computer hard drive, or server.

**3.1.1.3 Personnel Involved**

Medical Clinicians, nurses, doctors, and patients are among those now active.

* + - 1. **Time Involved**

Attempting to accomplish a function that our system would give manually could take a long time. If no predefined module is provided, allocating beds for the patient and performing health analyses for intervals of one week, one month, three months, and six months, for example, might take roughly thirty minutes. Our technology, on the other hand, would do the identical operation in a couple of seconds with a single button press.

* + - 1. **Sample Data Model**

There is currently no complete system, and thus no data model.

**3.1.2 For Each Report Reproduced by the System**

**3.1.2.1 Name and format**:

* + *Patient Bed Management*: The patient is assigned a bed based on a physical file or commercial off-the-shelf software that includes patient vitals, medical history, and lab results that include medical metrics.
  + *Patient Personal Information*: A physical file or custom off-the-shelf software with patient personal information is used to store and generate a report with patient personal information.
  + *Treatments*: Treatment information is either remembered by the doctor, found in a textbook, or found on the Internet.
  + *Follow-Ups Scheduled*: Follow-up reports are frequently kept on a calendar or ledger of some form.
  + *Referrals*: Referral reports are usually in the form of an excel sheet or a physical ledger.

**3.1.2.2 Inputs and outputs**:

* + All of the patient's medical, bed, and personal information is entered into files. Follow-up appointments and referral information are also included in the inputs.
  + In the current system, there is no real output. Doctors manually analyze patient bed records to determine performance.
  + **3.1.2.3 Responsible personnel**:
  + The hospital staff is in charge of assigning a bed to the patient, collecting personal information, monitoring follow-ups, and handling referrals.
  + Clinicians are in charge of patient records, analysis of patient progress, and therapy prescriptions.

**3.1.3 Processes Currently Implemented**

**3.1.3.1 Processes**

The following are the processes that are currently in place.

* *Appointment*: Patient seeks medical attention for medical issues related to smoking, diabetes, cholesterol, and/or obesity.
* *Treatment Prescribed*: To identify the best therapies, the doctor either understands what treatments to recommend or reads a textbook or the Internet.
* *Bed Allocation:* Bed is allocated to the patient in the different ward like ICU, NICU, emergency ward or deluxe ward based on the treatment duration and existing bed availability.
* *Progress Analysis*: To determine the patient's status and progress, the doctor examines patient test records and medical history by hand.
* *Follow-Ups Scheduled*: Calendars or calendar software such as Microsoft Outlook are used to arrange follow-ups.
* *Referrals*: A Microsoft excel sheet is typically used to track referrals.

**3.1.3.2 Hardware and Software Used**

Hardware

* + - Physical files
    - Computers

Software – Custom off the shelf software

* + - MediTouch
    - NueMD
    - PrognoCIS
    - Microsoft Outlook

**3.1.3.3 Functional Decomposition Diagram for Current System**

**Level-0 Diagram for Current System**

***Figure 1***

Bed Management

Hospital Bed Management System

Doctor Management

Patient Management

Staff Management

**Level-1 Diagram for Current System**

Bed Management

Generate Bed Report

Generate Patient Report

Patient Management

Doctor Management

Generate Test Report

Check User Login Details

Staff Management

Hospital Bed Management System

Generate Medicine Report

Login Management

Ward Management

Generate Ward Report

***Figure 2***

**Level-2 Diagram for Current System**

Manage Hospital Details

Admin

Login to System

Modules System

Manage Patient Details

Forgot Password

Check Credentials

Manage Doctor Details

Manage Bed Details

Send email to user

Manage Reports

Manage User’s Role

Manage User’s Permission

Manage System admin

***Figure 3***

**3.1.4 System Interfaces**

**3.1.4.1 Location Served by the System**

Any of the generic Commercial Off-The-Shelf systems is currently the closest system to the Hospital Bed Management system. These systems are located in the hospital bed management services facility.

**3.1.4.2 Users Served by the System**

Hospitals and patients benefit from current systems.

**3.1.4.3 Other Systems Interaction**

Because of the risks posed by cyber security threat actors to important healthcare data controlled by healthcare providers, most systems do not connect with other systems outside of a private network. Databases comprise the network's systems.

**3.1.4.4 Context Diagram of Current System**

allocation

Bed

information

Current System

Patient

**3.1.5 Current Business Structure Hierarchy Chart**

Diagram

Description automatically generated

**3.2 Analyze Problems and Opportunities**

**3.2.1 Define Cause and Effect for Each Problem**

The Cause-and-Effect Analysis, as well as System Improvement Objectives, are summarized in the graph below. We looked at commercial off-the-shelf systems to see what functions they supply because there is no system like the one Hospital Bed Management System is meant to be. The study that follows is based on a patchwork of systems that all work together to execute a function. All referrals and follow-ups will be centralized on one system using the Hospital Bed Management System.

|  |  |
| --- | --- |
| **Cause-and-Effect Analysis** | |
| **Problem or Opportunity** | **Cause and Effects** |
| 1. **Current systems are not program based.** | * Hospital do not have a robust tool for bed allocation to the patient. * A new system is required. |
| 1. **Method of data input is not user friendly.** | * Because hospitals are scrambling to fill in the blank data areas, they may make mistakes. * Why Users dislike using the system, which may have a negative impact on patient satisfaction. |
| 1. **Current system does not produce graphical reports.** | * Hospitals must manually analyze and allocate bed to the patient. |
| 1. **Current referral system is outdated and may not integrate into the entire system.** | * Reporting on new referrals is difficult. |
| 1. **Current system does not have a treatment database.** | * Hospital workers must rely on memory, a textbook, or the Internet to remember bed specifics. * Because none of these sources are in a consistent format, personnel must sift through irrelevant data before finding what they need. |
| 1. **No way to track referring hospital’s information.** | * Managing all partner hospitals is difficult. * Using a ledger or an excel sheet to track information might be tedious. |
| 1. **No integrated follow-up system.** | * Follow-ups must be managed using other patchwork mechanisms. * Using a paper calendar or other path work software to track appointments might be tedious. |
| 1. **Build an application that can run on laptops and tablets without regard to different operating system.** | * Users and developers are not limited by technology when an application can run across platforms. * It also gives the goods a positive image. |

* 1. **Establish New System Improvement Objectives**

**3.3.1 New System Objectives**

The following goals will be used to improve the system. These goals are based on the issues and opportunities that were identified in the cause-and-effect analysis in section 3.2.

|  |  |
| --- | --- |
| **Problem or Opportunity** | **System Objective** |
| 1. **Current systems are not program based.** | * Develop a program based application that aids in bed allocation to the patient. * Every program must start with a diagnostic. * Medical metrics must be associated with each diagnosis. |
| 1. **Method of data input is not user friendly.** | * Develop a friendly and easy to use user interface. * All input fields must be within a form. * Forms cannot look like a data grid or excel sheet. |
| 1. **Current system does not produce graphical reports.** | * System must develop reports that are easy to read, yet comprehensive enough to cover all data. * Each report must be associated with a diagnosis. |
| 1. **Current referral system is outdated and may not integrate into the entire system.** | * Develop an extremely simple referral management system. * The new referral system must be able to produce reports related to new referrals |
| 1. **Current system does not have a treatment database.** | * Develop a system based on standardized treatment form. * System users must be able to add and modify treatments easily. * All treatments must be saved to a database. |
| 1. **No way to track referring hospital’s information.** | * Create a simple integrated system where referring hospital’s information can be stored. |
| 1. **No integrated follow-up system.** | * Develop a simple integrated follow-up system so that appointments can be tracked. |
| 1. **Applications may not run across all platforms.** | * Application must run on different platforms regardless of operating system. * Applications must run on laptops and tablets. |

**3.3.2 New System Constraints**

**3.3.2.1 Schedule**

The Hospital Bed Management system will be analyzed and designed. This allows you around three months to make sure the new system meets all design requirements. In two months after the design, the system will be developed. The system will provide a pre-determined routine with weekly, monthly, three-month, and six-month intervals. If new applications are added that require various reporting intervals, this becomes a problem.

**3.3.2.2 Cost**

The cost of developing the Hospital Bed Management system will be around $103,203. Furthermore, annual operational expenditures are expected to rise at a pace of 4% per year, while revenue is expected to rise at a rate of 6%. The project is expected to break even in the third year of operations, based on current projections.

**3.3.2.3 Technology**

There will be no external network access to the new system. All data will be kept on a local server in a database. The application will retrieve data from the database. Regardless of operating system, the application can be installed on a laptop or tablet.

**3.3.2.4 Policy**

The system is only accessible and usable by the Hospitals' management staff. The hospital is in charge of giving approval to the system. The hospital is responsible for ensuring that the system is not accessed by a third party using stolen credentials. During and after the development process, the hospital is also responsible for ensuring that the system is functionally acceptable. During and after the development period, the hospital must confirm that the system is completely HIPPA compliant.

**3.4 Re-Evaluate and Update Project Scope**

The scope of the project does not need to be re-evaluated!