

1 Abstract

The goal of this article was to build and implement an automated system that would solve the challenge of dealing with patient data at a hospital. The inherent flaws of the manual system of hospital file administration inspired the researchers to embark on this study.

This manual system has a slew of issues, including file security, a sluggish file retrieval system, and a slow file update system, to name a few. This study looks at a hospital's present information system and proposes an automated solution that will assist Medical Doctors and those who work with hospital data in performing their jobs more successfully and efficiently. WAMP (Windows, Apache, MySQL, and PHP) would be used to create the system.

A online application that operates on a computer network would be the HDBMS. It would provide different users easy and quick access to stored data as needed, while also providing security against illegal access. Based on their user-assigned-role, each authorised user can add, delete, and update data in the database. It would also have the capability of assigning a unique identity to each individual and automatically storing the information of each patient and staff member. It has a search feature that allows you to find out the current status of each room in the hospital. The system allows a user to look for doctor availability and patient information. The user interface is quite intuitive.

Index Terms—Hospitals, database, management, medical doctors, patients, system

2 Introduction

Hospitals are important institutions, and they require efficient service delivery because good health is essential for a happy society. As a result, a system that will allow hospital management to make effective and efficient decisions is required.

Recently, attempts have been made to design and build a user-friendly and dependable database system to meet the needs of hospital or medical administration systems.

On the other hand, many hospitals and medical facilities continue to use a manual hospital administration system. Medical practitioners, nurses, patients, and other personnel in both government and commercial hospitals have continued to face several setbacks and challenges as a result of these medical management systems.

2.1 The Need for Hospital Database Management Systems

Database systems are required by all large businesses in order to manage information. The hospital is one of these businesses. Data processing becomes more important in hospitals due to the enormous number of patients, doctors, and other employees. In a hospital, data management can be used to obtain patient information, schedule doctors, and keep track of finances. Doctors should have access to the patient's medical records in order to provide the

best diagnosis possible in order to cure the patient. Patients, on the other hand, have access to their lab results as well as any other information that their doctors indicate. The hospital's data base makes it simple to manage the accounting department.

2.2 The Hospital Database Management System has a number of features

All patient information, including prescriptions, surveys, and diagnoses, can be entered into the database management system.

- 1) All data includes a prescription survey and patient diagnoses.
- 2) Both the patient and the physician are capable of handling all information.
- 3) If the organisation is online, patients can make an appointment for a visit and access their information via internet.
- 4) The hospital's statistics, such as patient capacity and employee numbers, are available to the administration.

2. Sources of Data

2.1 Observation Method

The researcher went to the hospitals on multiple occasions to study and analyse the management manner of operation.

2.2 Interview

Doctors and other employees were interviewed in order to gather information that would aid in the development of the new system.

2.3 Information from Published Sources

Information was obtained from a variety of existing publications on the subject. Several books and periodicals on hospital database management were read in order to gather information for the new system's designs.

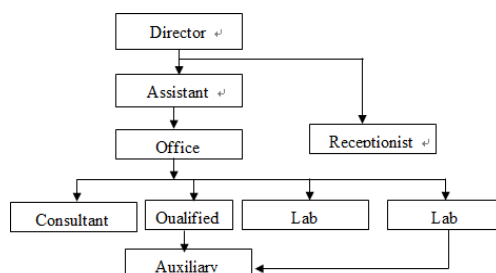
2.4 Documentation and Events in the Hospital

Many hospitals are still using a manual hospital management system. Medical practitioners, nurses, patients, and other hospital employees in both private and government hospitals have continued to face numerous setbacks and challenges as a result of this form of hospital management.

Our Lady of Mercy Hospital in Owerri is a good example of these institutions that have yet to implement the automated method of hospital management. Mercy Hospital has about 2,000 patients each week, the majority of whom are outpatients, and they treat between 30 and 50 patients per day, according to a case day.

2.5 Organizational Structure of the Hospital

The hierarchy structure of Our Lady of Mercy hospital is depicted in figure 1



The hospital is made up of the following personnel

- 1) The Director (medical doctor).
- 2) Assistive (medical doctor).
- 3) Manager of the office.
- 4) Medical doctors who serve as consultants.
- 5) There are eight certified nurses and two auxiliary nurses on staff.
- 6) The person who works at the front desk.
- 7) Laboratory technologists, and so on.

4 Methods of keeping Records

Patients' files and records are gathered by the hospital, stock and payroll, and processes them in a single day month.

4.1 Input and Output System

The system is made up of two parts: patient inventory, which is made up of patient records that are arranged or organised in a file, and general store inventory, which is made up of the quantity in stock, drug code, drug number, and expiration date of each drug in a database.

The system's output will be to update, add, delete, clear, and present a summary of the entire monthly, yearly, and even daily records of happenings in the hospital's many departments. It will also generate an estimate of the report generated by each module.

4.2 Files and Records

The files and records will both contain the details of the event that took place in each department, as well as the actions taken by each module or form.

4.3 Problems and Weakness of the Current System

The existing system's problem is that it is too expensive. The start-up costs are astronomical. You must not only purchase technology to capture and store patient charts (which is far more expensive than paper and file cabinets), but you must also make efforts to convert all charts to electronic format.

Patients may be in a state of transition, in which old records have not yet been transformed and doctors are unaware of this. Furthermore, paying personnel to undergo training and paying trainers to teach practitioners adds to the cost of using the hospital software.

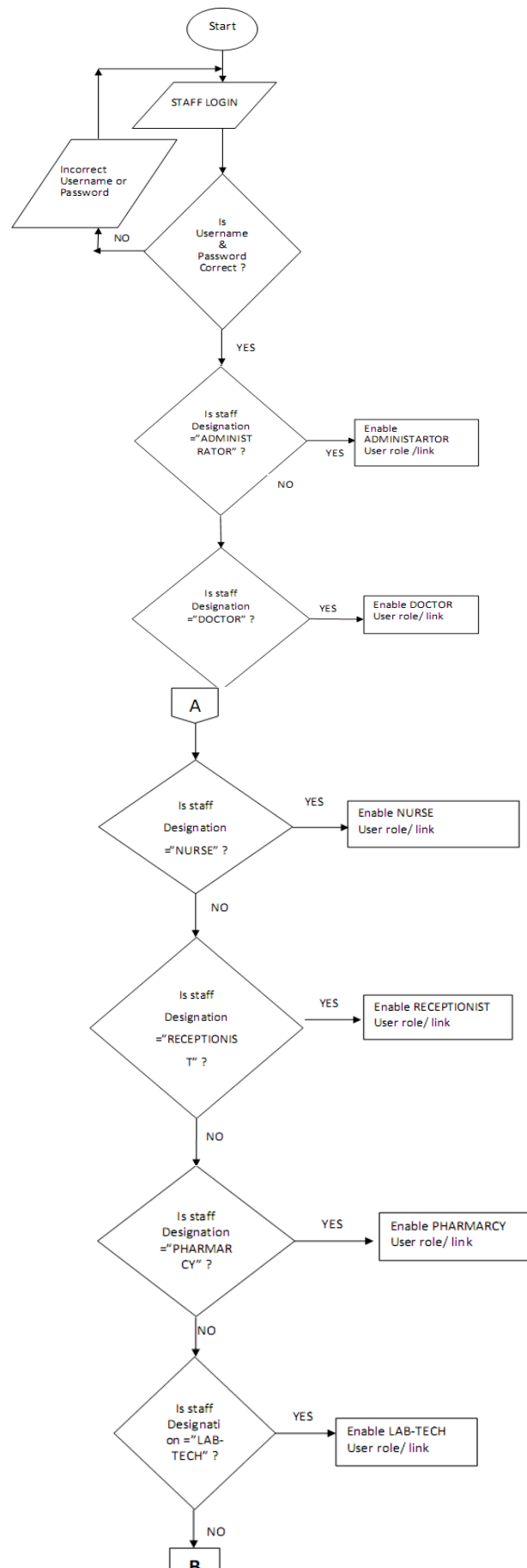
Some people are also concerned about the safety of their medical records, which should be kept private. Despite security efforts, hackers may eventually be able to breach the system and leak personal information to outsiders. Some people are concerned about the safety and confidentiality of their electronic medical records as a result of this.

5 Proposal of new system

Personnel and patient management will be the emphasis of the proposed system. The suggested system also aims to create a computer management foundation. Figure 2 depicts the proposed new system's flow chart.

5.1 Expectation of the New System

- 1) To totally automate the hospital's operations as well as its management system.
- 2) To improve and standardise the hospital's practise planning and communication skills.
- 3) To improve the hospital's management and staff's computing skills.
- 4) To increase the hospital's record-keeping accuracy.
- 5) To give patients and personnel records with rapid access.



5.2 Justification of the New System

This system is justified by comparing the cost of running a manual system against the cost of running an automated system.

We discovered through observation and interview that the management spent a lot of money on buying files and folders for different access, therefore according to the analysis, the hospital spent up to forty thousand Naira (N40,000.00) each month on buying files and stationery.

While the installation and operation of this new system will cost no more than N400, 000.00, the management considers it to be more advantageous.

5.3 Advantages of the New System

The following are the long-term benefits of the suggested system:

- 1) It provides guidance to the hospital on management concerns and serves as a foundation for a huge database.
- 2) It supplies the hospital with precise management information and serves as the foundation for a huge database.
- 3) It also exposes the user to computer knowledge. The approach eliminated the needless squandering of time during medical operations.

5.4 System Design

The goal is to completely automate the operation and management of Owerri's Our Lady of Mercy Medical Centre. The system's goal is to create a database that automates all of a patient's activities in the hospital, from registration to discharge. As observed in the case study, the system to be constructed would have the following components.

- 1) The module for administration
- 2) The Receptionist module is for those who want to work as a receptionist.
- 3) The Module for Medical Doctors
- 4) Pharmaceuticals Module
- 5) Nurse's Module
- 6) The Laboratory Technician module
- 7) The Accounts section

6 Program structure

A web browser is used to access the Hospital database application. It was designed specifically for the Mozilla Firefox and Safari browsers. It greets the user with the following information on the package's initial screen.

- 1) Our Lady of Mercy Hospital's logo and banner
- 2) On the left hand side, there is a login section that asks for the user's username and password in order to use the application.

3) Picture slides exhibiting various sections and equipment of the hospital at the heart of the application.

4) and an overview of the Hospital application's applicability. Username and password are necessary for one to use the application. If you click on login without first entering your password, you will be prompted to do so. If you give an incorrect username or password, the system will notify you without opening the system for you. It's made to use e-mail addresses for the username field.

The application will enable a hyperlink that assigns duties based on user role if the login process is successful. For example, a Nurse's user role differs from that of a Doctor. A Doctor, on the other hand, can prescribe drugs to patients, whereas a Nurse cannot.

6.1 System Requirement

The system requirement refers to the software and hardware that enable the package under development to function properly. It also necessitates networking equipment that allow for connectivity within a LAN (LAN).

6.2 Software Requirement

The server and client software needs are essentially the same. WAMP (Windows Apache MySQL PHP) is required on the server side, whilst simply web browsers are required on the client side.

The following is a list of the items:

- 1) Install the WAMP server.
- 2) Internet Explorer (Mozilla Firefox or Safari)
- 3) The type of operating system (Windows XP, Windows 7)

6.3 Hardware Requirement

This has an impact on the database's usability and functionality in the hospital management system. Because the software operates on common hardware, whether in a time sharing network, on a mainframe, or on a minicomputer, the hardware requirements are IBM Intel or Microsoft compatible processors. A hard drive with a capacity of at least 2 GB and a RAM size of at least 64MB. CD/DVD writers, CD ROMs

for backing up files or DVD ROMs, Pentium II with at least 26Hz, Laser Jet/Desk Jet

Printer, CD/DVD writers, CD ROMs for backing up files or DVD ROMs, All client PCs are connected to the server via a switch, and all hospital units are connected to the server by network connections.

6.4 System Input/Output Design

The input design for the patients record in the data entry design shown in Table I, II, III and IV.

TABLE I: PATIENTS RECORD

| S/N | Fields | Data Type (Field width) | Relationships | Description |
|-----|--------|----------------------------|---------------|-------------|
|-----|--------|----------------------------|---------------|-------------|

| | | | | |
|----|----------------------|--------------|-------------|-----------------------------|
| 1 | patients_id | Varchar(20) | Primary Key | Patient Identifier/Car |
| 2 | patients_firstname | Varchar(30) | Not Null | Patients firstname |
| 3 | patients_lastname | Varchar(30) | Not Null | Patients lastname |
| 4 | Age | Int | Not Null | Patients age |
| 5 | marital_status | Varchar(10) | Not null | Patients marital status |
| 6 | Gender | Varchar(10) | Not null | Patients gender |
| 7 | Lga | Varchar(30) | Not Null | Patients LGA origin |
| 8 | State | Varchar(20) | Not Null | Patients state of origin |
| 9 | home_address | Varchar(100) | Not Null | Patients home address |
| 10 | resident_address | Varchar(100) | Not Null | Patient resident Address |
| 11 | phone_no | Varchar(15) | Not Null | Patients Phone number |
| 12 | Email | Varchar(30) | Not Null | Patients E- mail |
| 13 | next_of_kin_id | Varchar(5) | Foreign key | Next of kin Identity |
| 14 | Comment | Varchar(200) | Not Null | Receptionist comment |
| 15 | Symptom_ sickness | Varchar(200) | Not Null | Patients sickness |

TABLE II: PATIENTS TRIAGE

| S/N | Fields | Data Type (Field width) | Relations hips | Description |
|-----|----------------|----------------------------|-------------------|-------------------------|
| 1 | triage_id | Varchar(5) | Primary Key | Each Triage identity |
| 2 | patients_id | Varchar(5) | foreign Key | Patients identity |
| 3 | nurse_id | Varchar(5) | foreign Key | Nurse identity |
| 4 | blood_pressure | Varchar(20) | Not Null | Blood Pressure |
| 5 | heart_beat | Int | Not Null | Heart beat |
| 6 | sugar_level | Varchar(20) | Not Null | Patients sugar level |
| 7 | Height | Varchar(20) | Not Null | Patients height |
| 8 | Weight | Varchar(20) | Not Null | Patients weight |

| | | | | |
|----|-------------|--------------|-------------|----------------------|
| 9 | time_of_reg | Varchar(20) | Not Null | Time of triage check |
| 10 | Comment | Varchar(200) | Not Null | Nurse comment |
| 11 | Fee | Int | Primary Key | Fee charge |

TABLE III: PATIENT TEST

| S/N | Fields | Data Type (Field width) | Relationships | Description |
|-----|------------------|----------------------------|---------------|------------------------------------|
| 1 | test_id | Varchar(5) | Primary Key | Each Test identity |
| 2 | test_name | Varchar(20) | Not Null | Test name |
| 3 | test_description | Varchar(50) | Null | Test description |
| 4 | patients_id | Varchar(5) | Foreign key | Patients identity |
| 5 | lab_scientist_id | Varchar(5) | Foreign key | Lab technologist identity |
| 6 | doctor_id | Varchar(5) | Foreign key | Doctors identity |
| 7 | Date_time | Date/Time | Not Null | Date and time of test prescription |
| 8 | return_date | Date/time | Not Null | Return date |
| 9 | test_result | Varchar(50) | Not Null | Test result |
| 10 | Comment | Varchar(200) | Null | Lab scientist comment |
| 11 | Fee | Int | Not Null | Fee charge |

TABLE VI: PATIENTS' BILL

| S/N | Fields | Data Type (Field width) | Relationships | Description |
|-----|------------------|----------------------------|---------------|-------------------|
| 1 | bill_id | Varchar(50) | Primary Key | bill identity |
| 2 | patients_id | Varchar(5) | Foreign Key | Patients identity |
| 3 | doctor_charge | Int | Not Null | |
| 4 | medicine_charge | Int | Not Null | |
| 5 | room_charge | Int | Not Null | |
| 6 | operation_charge | Int | Allow Null | |
| 7 | no_of_days | Int | Allow Null | |
| 8 | nursing_charge | Int | Allow Null | |
| 9 | Advance | Int | Allow Null | |
| 10 | health_card | Varchar(50) | Allow Null | |
| 11 | lab_charge | Int | Allow Null | |
| 12 | Bill | Int | Not Null | Total Fee charge |

6.5 Database File Specification

The following techniques are used to access the database's files and records:

6.5.1 Easy access

The use of a key field or index to gain access to files in a database.

6.5.2 Access to serial data

This is what data control allows you to do in a project to go to the previous first or last record in the collection database.

6.6 The System Development

The techniques for constructing a system using the system development life cycle were followed in the creation of this hospital database management system (SDLC).

Following the identification and definition of problems in our Lady of Mercy Hospital, the system was identified, defined, and followed by identifying the problems, setbacks, and bottlenecks of the existing system, thus the alternative solution to the problems, device, and implementation to put the automated system in place. The results of the feasibility study will aid in the modelling of the new computerised system. In addition, the new system has been evaluated in terms of the problem and the challenges it faces. As a result, the system began to develop. Perhaps, in the future, the new system will be available for various tasks such as programme upgrading and modification, as it is open to maintenance and properly documented.

7 Program Design

The software is an online application that runs in web browsers, particularly Mozilla Firefox. The entire programme development is made up of programme modules, each of which performs a certain duty, as illustrated in the system's overall structure.

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The programme incorporates a user interface, resulting in a user-friendly package. The options are accessible via popup menus at the hyperlink, such as the Doctor's popup menu, which allows you to view patients, diagnose patients, and subscribe to drugs, among other things. Popup menus will only show options that are relevant to your job title or user role. The logout button is always present next to the welcome message, allowing users to logout after their session.

7.1 Testing and Evaluation

First and foremost, a module for the initialization phase was added to the skeleton of the entire system. Subroutines were introduced after testing to ensure accuracy. As a result, systematic top-down testing was performed before the rest of the complexity was introduced.

As a result, programmers worked on modules in parallel during implementation, and periodic testing and performance checks of the entire system allowed management to grow in complexity without introducing untraceable bugs. This entails instructing users on how to use a new information system.

7.2 System Change Over

This can be accomplished in two ways:

- 1) Transition to a new system gradually
- 2) Changeover of direct/immediate or direct systems

7.2.1 Transition to a new system gradually

This occurs when the new system is used in conjunction with the manual or old method, and the old system is phased out over time while the new system continues.

7.2.2 Changeover of direct/immediate or direct systems

This entails switching to the new system immediately and without any major delay.

7.3 System Maintenance

Once the system is completely operational, the maintenance function begins. This is the process of modifying software after it has been delivered. This necessitates a thorough knowledge of the program. This is accomplished by thoroughly analysing the program code and documentation. In most cases, there are two sorts of maintenance.

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Enhancement maintenance is concerned with the modification of software as a consequence of changes in the ever-changing environment, whereas corrective maintenance is performed as a result of a fault detected after the software has been delivered.

8 Recommendations

Because data in the Medical Center is so important that the management cannot function without it, we recommend that the administration of Our Lady of Mercy Hospital do everything possible to ensure that:

- 1) For security reasons, all files have backups. To execute the application, each office has its own computer with enough of memory.
- 2) Each office should be networked to decrease the requirement for transporting files from one office to another while also saving time.
- 3) Every computer should have an uninterruptible power supply (UPS) with an inverter to lower the rate of hard disc or system failures.
- 4) Enough electricity generating capacity should be available to meet demand.

9 Conclusion

The designed solution has been used to improve the database system and management procedures at Our Lady of Mercy Hospital, and it has been evaluated so far. As a result, from the beginning, special attention was paid to how information about the hospital and patients was handled.

Typically, as the population of a region grows, so does the database. As a result, in order to meet any condition, hospital database administration must be updated or upgraded. It can store a wide range of databases in a high volume. Furthermore, the software has been built to

incorporate programme modules for managing Medical Centre information, such as patient data, supply (medication) management, and patient billing, among other things.

As a result, this programme contains the hospital database files of Our Lady of Mercy Hospital and will give the necessary information for the hospital, as well as being compatible, accurate, versatile, secure, and efficient for the intended purpose.

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