Hospital Management System Software:
A Case Study of Olabisi Onabanjo University Health Service Centre

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Abstract:- **Application of computer technology in processing clinical challenges is established in medicine. Hospital Management System (HMS) software has been used to widely reduce the queue of patients per day in hospitals around the world; greatly reducing stress for staff and ensuring a good experience for patients. This paper proposes HMS software that has the capacity and facility to give a unique ID for every patient and staff automatically. It includes a search facility to know the current status of each room, in addition to aid the pharmacists in enquiring about both drugs and stock ordered as well as the expiration time. This research generally looks for a more accurate, reliable and efficient method of computer to facilitate patient records keeping and other related activities of the Olabisi Onabanjo University Health Services Centre to ensure efficiency outcome that will lessen time-consuming. The design of a hospital management system will be a solution to the problem being experienced by the current manual method of running the University Health activities. This research work will serve as a baseline for other related future works in this field.**

Keywords:-
Healthcare; University; Hospital Management System; Software; JAVA; OOU.

I. INTRODUCTION

Health care in Nigeria as in many other countries is confronted with the growing demand for medical treatment and services [1]. The medical records must appropriately have all of the patients' medical history. Physicians must maintain flawless records because this record serves several purposes [2].

The employment of computer in processing clinical challenges is established in the medicinal world, trough researches in medical/health sciences. Medical research emphasizes the use of technology and considerable improvements have been experienced in diverse aspects that include statistics and simulations, and a computer-oriented information-system is being used to supplant manually recorded data. This is vital in our fast changing world where improving quality of life for everyone seems to be a priority for any government of any country [3].

Utilizing computer software will facilitate the discharge of excellent health services to individuals and communities. Electronic medical records can be used in the development and validation of machine learning models to identify high-risk surgical patients using automatically curate electronic health record data. Health services are needed on an emergency and information processing and information storage subsystem of a hospital, whereby it is not just about computer systems and network and computer-based application system that is installed on them, but it is about the information in a hospital as a whole. Hospital management system (HMS) software is designed as a solution for multi-specialty hospitals, to cover a wide range of hospital administration and management processes. It is an integrated end-to-end Hospital Management System that provides relevant information across the hospital to support effective decision making for patient care, hospital administration, and critical financial accounting in a seamless flow.

This study on the hospital management system was designed to transform the manual way of searching, sorting, keeping, and accessing patient medical information (files) into the electronic medical record (EMR) to solve the problem associated with the manual method. The existing system (manual) has been studied and hence a computer-based application was provided to replace this manual method. These computer-based systems generate the patient report as the patient register in and out of the hospital, keeps an accurate record of the patient, reduce the time spent with the patient to the nearest minimum, and efficient in the hospital activities. This research generally looks for a more accurate, reliable and efficient method of computer to facilitate patient records keeping and other related activities of the Olabisi Onabanjo University Health Services Centre to ensure efficiency outcome that will lessen time-consuming.

The study proposes that the design of a hospital management system will be a solution to the problem being experienced by the current manual method of running the University Health activities. After careful investigation of the current method of rendering medical and allied services to the patient and the kind of stress patient have to embark on before medical attention is given to them at the Olabisi Onabanjo University health services center on all campus most especially the main/mini campus, the problems of low work speed, overcrowding of the hospital premises,

inadequate record keeping, time factor, and lack of dataset from e-medical records were initially discovered.

In a study by [4], the hospital management system (HMS) software was used reduced the queue of 500 patients per day tend who visited St. Ross hospital, situated in Maputo city in Mozambique, greatly reducing stress for staff and ensuring a good experience for patients.

This paper focuses on the developing an efficient HMS software and Machine Learning for improving medical research analyses that will ensure the ease of following up patient's medical data in the health-centre; substituting manually imputed data in order to speed up processing, storage and retrieving of information. This would help medical staff in reaching medical goals on time [5]; producing well-maintained drug info, distribution of drugs from major store to the pharmacies while conveying to patients; enhancing decision-making through processing-time and communication-time reduction between doctors and other medical personnel. This will eventually minimize human-error while enhancing the confidentiality of medical records [6]. This work will help to ease the delay in manual health processing. The software developed will help school health center management to achieve an efficient information management system.

Since the current manual system is slow laborious and error-prone to computerize the same for quicker efficient results and customer satisfaction, this research will ultimately provide crucial information for proper management of the system.

II.   SYSTEM ANALYSIS AND DESIGN

System analysis involves comprehensive investigation of a range of operations carried out by a system, including their connections inside and outside it. An important query is: What must be done to solve the problem? One aspect of the analysis is defining the boundaries of the system and determining whether or not the candidate system should consider other related systems. During analysis, data are collected on the available files, decision points, and transactions handled by the present system. A feasibility study is an important phase in the software development process. It enables the developer to have an assessment of the product being developed. It refers to the feasibility study of the product in terms of outcomes of the product, operational use, and technical support required for implementing it.

A. Study of the Existing System
This system seems to be complicated as it involves manually executed work. Therefore completion time is longer. It is very hard for employees to ascertain patient information when the doctor calls for it.

In summary, the demerits of the existing system are:
1. Work-done is manual and time-consuming to identify the patients at the reg. office.
2. It involves more manpower.

3. Because of the high number of patients' records, finding them becomes cumbersome.

B. The Proposed System
The proposed system is simple to work with, as it involves computerizing each department, which will eventually reduce processing time of manual work. The manpower is greatly minimized. Registration is timely achieved and drug data becomes less complex, and there is automatic calculation carried out by the system.

In summary, the merits of the proposed system are:
1. It is fast, accurate and reliable.
2. Processing time of all data is minimized.
3. Inserting, deleting, and rectifying information is easy.

The demerit may be data loss as a result of system glitch. Therefore, an effective backup is important.

Main goals and objectives are as follows:
1. Service should be provided to patients efficiently.
2. The receipt is issued instantly when the patient purchases drugs.
3. Enquiry info with respect to the drugs will be properly maintained.
4. Searching process will be made easy and systematic, for drugs and patient data.

C. Analysis of the Proposed System
This project is carried out in five sections:
1. Registration
2. Drug Store
3. Case Record
4. E-Medication
5. Medicine Purchase

D. System Implementation and Data Analysis
Here, each section of the project is briefly described comprehensively:
i. Registration
ii. Drug stores
iii. Case Records
iv. E-medication
v. Medicine Purchase

i. Registration
This section has been divided into two subsections. They are:
a. New Record Insertion
b. Record Retrieval

a. New Record Insertion:
All records of students and employees are conveyed from each department and stored in the database where each individual is allotted a unique hospital number (HN). New record insertion involves HN for the provision of free services. It also includes Name, Sex, Age, Address, Family members and beneficiaries under the Health Centre.

b. Record Retrieval:

Record retrieval involves checking the records in the database to confirm if the visitor at the health centre is entitled to take any of the services provided. This is carried out by inserting the HN previously assigned to examine pre-existing clinical records. All services provided will be offered free.

ii. Drugs Store

This section is divided into three subsections:
a. Drug Entry
b. Drug Entry Update
c. Drug Purchase

a. Drug Entry

This entry is carried out upon collecting stock from medical suppliers. The info is then kept in the database. This info includes Drug ID, availability and prices, which may undergo update in future.

b. Drug Entry Update

Here, the enterer meticulously inserts drug details like expiration date, production date, description and cost.

c. Drug Purchase

In this section, all transactions made from buying drugs are recorded and a receipt is generated for proof of purchase.

iii. Case Records

This section has been divided into three subsections:

a. Students In-Patient Records
b. Employees and Beneficiaries In-Patient Records
c. Out-Patient Records (Students and Beneficiaries)

a. Students In-Patient Records

These records are properly stored in the database, and may be used for special case studies, particularly in understanding the occurrence of certain diseases coupled with safety measures taken to prevent contacting or spreading such diseases.

b. Employees and Beneficiaries In-patient Records

The employees and community members are maintained differently in a way that there are applicable for some charges. Unlike students, these employees have bed, X-Ray, and Scanning charges, estimated in proportion to hospital visits. Drugs may be offered freely.

c. Out-Patients Records

This is for common unserious health challenges. The treatment to all the beneficiaries and students are served at no cost. There are different wards for the ladies and gents and in some special cases, patients are sent to the chief doctor.

iv. E-medication

In this module, patients that do have the privilege or strength to come over to the health-centered are being diagnosed and given adequate medication and if the illness is much, an appointment is booked to see the doctor immediately or the next working day. Also, new diseases and

medications are being updated for easy diagnosis and medication.

v. Medicine Purchase

This module takes care of pharmacy activities such as buying drugs and issuing a receipt.

E. Screens for Sampled Development Modules (Java)

i. Welcome Page

This shows the school logo (Olabisi Onabanjo University Ago-Iwoye Ogun State) and the school's main entrance (See Fig 1).

Fig 1: Welcome Page

ii. Login Form

This gives a registered user the privilege to access the main menu which comprises all the activities done in the hospital. An unregistered or a new user is directed to the signup form.

Fig 2: Login Form

iii. Signup Form

This form gives a new or unregistered user the privilege to use the application after filling all the entries and pushing the signup button.

Fig 3: Signup Form

iv. Forget Password Form

This form makes it possible for a user that has forgotten his password to retrieve it after he/she has signup. The answer to the security question provided by the user will be the key to fetch the password from the database.

Fig 4: Forget Password Form

v. Menu Bar

The menu bar comprises of different modules in the application such as bio-data, change of password, report generation help, about the software, etc. It also comprises the search engine which helps to search through the database for the record of each patient (both the bio-data and the treatment record).

Fig 5: Menu Bar

vi. Bio-data Form

The bio-data form captures all the details of students, employees, and community members that are registering for the first time to enable them to get adequate treatment. It is divided into two; one for the student and the other for employees and community members.

Fig 6: Bio-data Form

vii. Laboratory Test Module

This module comprises of various tests that are carried out in the laboratory when a patient visits the hospital for the first time. These records are saved in the database for future references. It also gives a view or insight into likely disease affecting a patient.

Fig 6: Laboratory Test Module

viii. Treatment Record

This shows the complaint of a patient, the test result, and the drug prescribed to the patient, the dosage, and the duration of the drug. It also shows the details of the doctor or nurse in charge of the case for future references.

Fig 7: Treatment Record

ix. Medicine Registration Form

This form ensures the entry of all the medicines and various equipment purchased from the supplier before the full detail such as price is entered.

Fig 8: Medicine Registration Form

x. Medicine Inventory Stock Form

This form makes a detailed description of various drugs and materials bought from the supplier. It also contains the manufacture and expiry date of various drugs.

Fig 9: Medicine Inventory Stock Form

xi. Medicine Purchase Form

This form shows the details of the patient, drugs to be purchased, and the cost price for each drug. It also generates a receipt for the drugs purchased by the patient.

Fig 10: Medicine Purchase Form Screens for Sampled Development Modules (PHP)

xii. Student Login Form

This gives a registered student the privilege to use the e-medication application by using matric no. as username and surname as password. An unregistered student goes to the health center for proper registration.

Fig 11: Student Login Form

xiii. Staff Login Form

A staff is registered by the admin of the hospital online to give him/her the privilege to make use of the e-medical application.

Fig 12: Staff Login Form

xiv. Forget Password Form

This gives only the admin the privilege to change his/her password or to recall his/her password.

Fig 13: Forget Password Form

xv. Symptoms Form

Here the patient types the symptoms he/she observes. The symptoms are searched from the database and the likely illness and drug prescription is given.
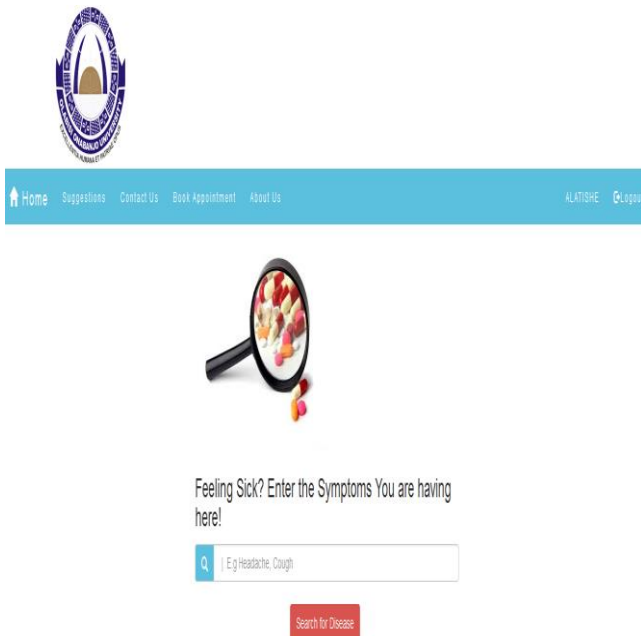
Fig 14: Symptoms Form

xvi. Search Result Form

The symptoms are searched from the database and the likely illness and drug prescription is given.
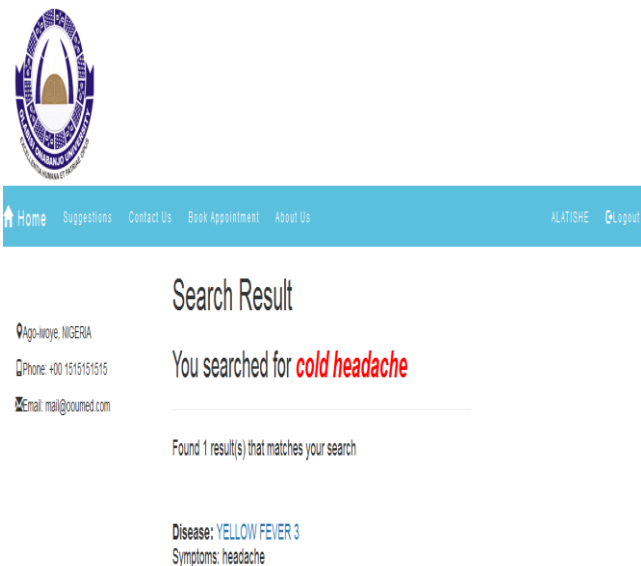
Fig 15: Search Result Form

xvii. Suggestion Form

This form gives patients the ability to make suggestions or comment about what they feel about the application for improvement and better servicing of the application.

Fig 16: Suggestion Form

xviii. Appointment Booking Form

This form gives patients the privilege to make bookings to see the doctor at the health center in case of emergency. This form generates an appointment reference which gives the doctor a better understanding of what the patient wants and avoids unnecessary delay.
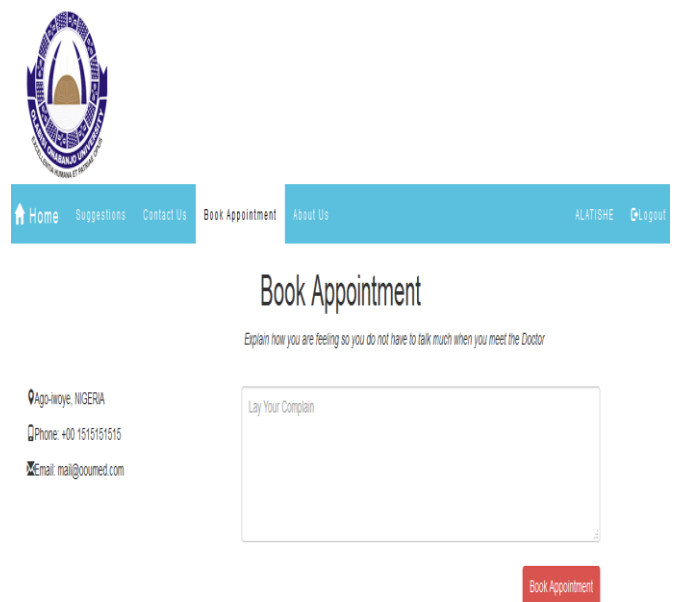
Fig 17: Appointment Booking Form

xix. Add New Disease Form

In this form, the admin adds newly discovered diseases, symptoms, drugs, dosage, and duration.

Fig 18: Add New Disease Form

xx. Delete Disease Form

In this form, the admin deletes diseases by typing the name of the disease and clicking the delete button.

Fig 19: Delete Disease Form

xxi. Appointment Report Form

This form displays all the appointments made by patients and their appointment no. Also, a search button is there to help search for various patients.

Fig 20: Appointment Report Form

xxii. New Admin Registration Form

This gives the overall admin to register other admins.

Fig 21: New Admin Registration Page

xxiii. Suggestion Report Form

This form displays all the suggestions made by various users of the application for better operation of the application.
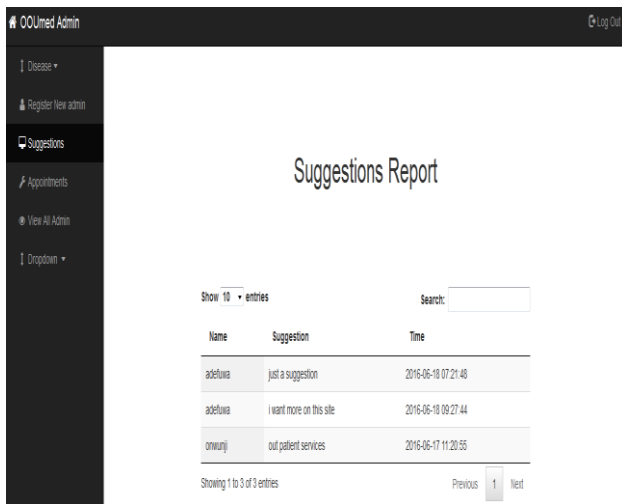
Fig 22: Suggestion Report Form

xxiv. Database Administrator
This describes how all data that are inputted into the software are stored. It serves as the back-end of the software where all records are kept for various actions such as inserting, deleting updating, and referencing.

xxv. Tables
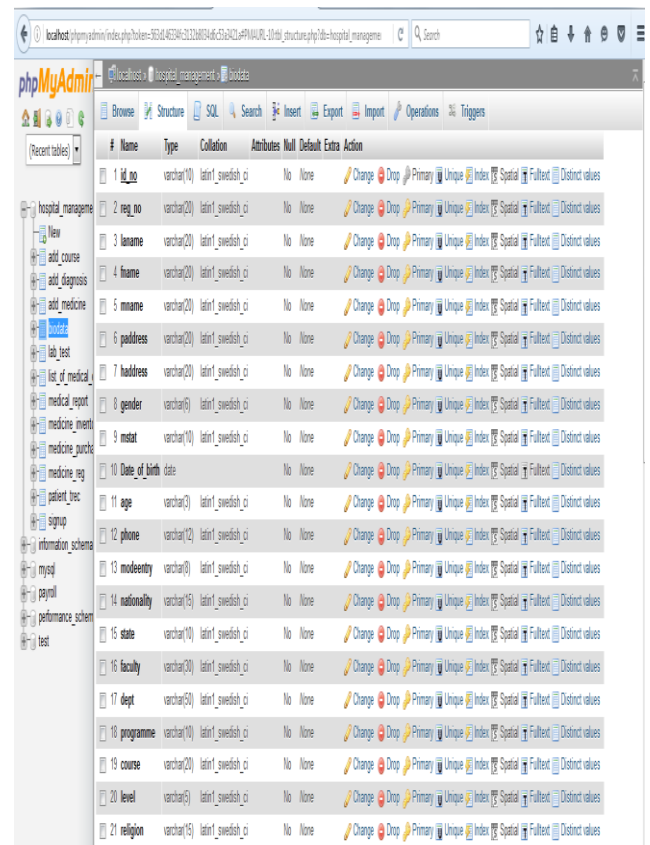
Fig 23: Signup Table

Fig 24: Bio-data Table

Fig 25: Lab Test Table

Fig 26: Medical Report Table

Fig 28: Medicine Purchase Table

Fig 27: Medicine Inventory Table

III. SYSTEM FLOW CHART
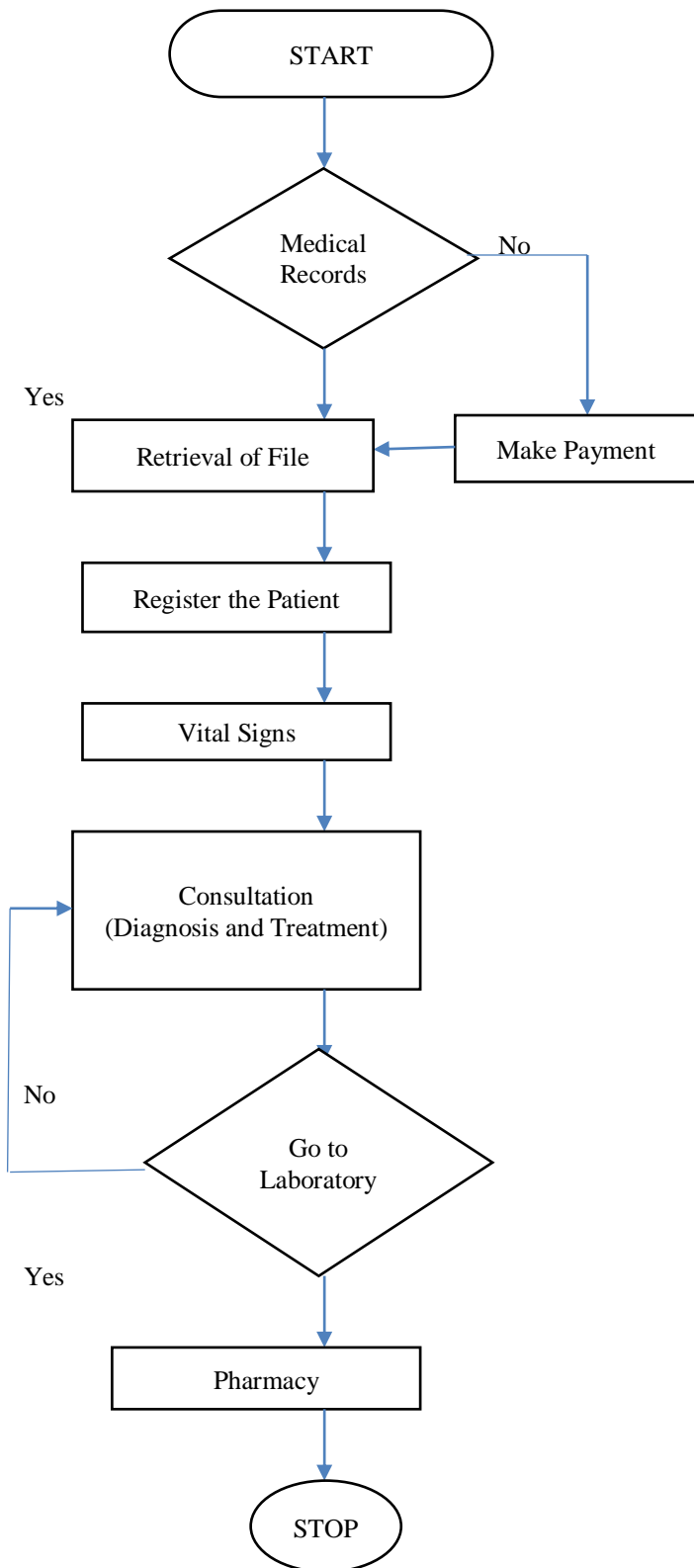
Fig 29: Flowchart for the Existing System Patient Consultation
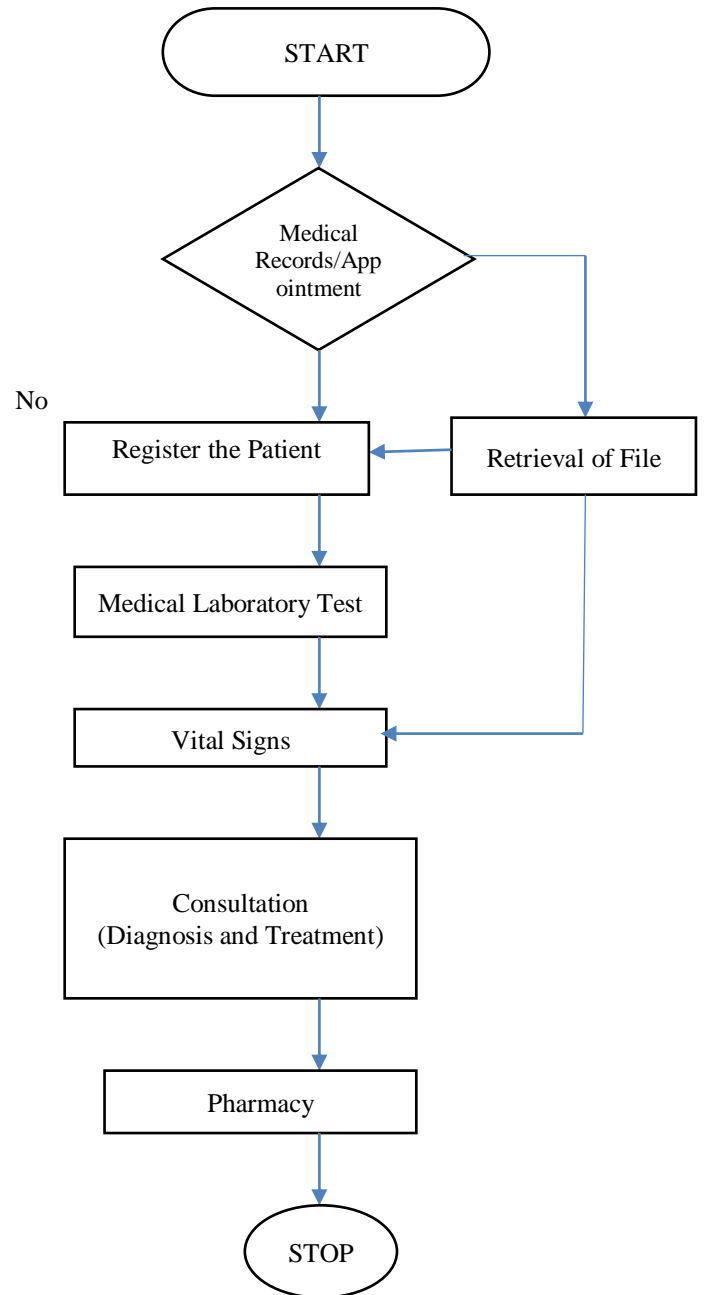
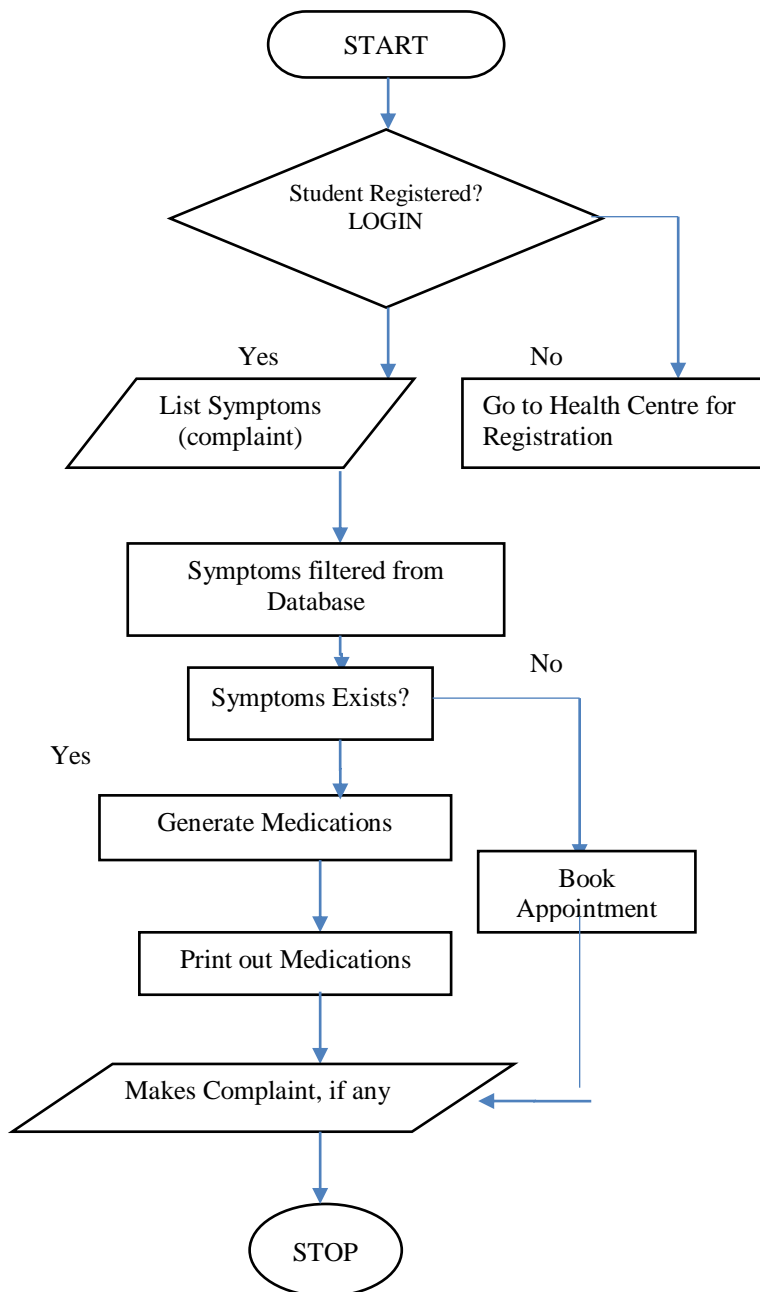Fig 30: Flowchart for the proposed System Patient Consultation

```
        ( START )
            │
            ▼
      ◇ Student Registered?
        LOGIN ◇
      │            │
    Yes           No
      │            │
   List Symptoms   Go to Health Centre for
   (complaint)     Registration
      │
      ▼
   Symptoms filtered from
   Database
      │
      ▼
   ◇ Symptoms Exists?      No ──┐
      │                         │
    Yes                         │
      │                     Book
   Generate Medications     Appointment
      │                         │
      ▼                         │
   Print out Medications        │
      │                         │
      ▼                         │
   Makes Complaint, if any ◄────┘
      │
      ▼
   ( STOP )
```

Fig 31: Flowchart for the proposed System E-medical Diagnosis

IV. CONCLUSION AND RECOMMENDATION

Going through the various stages in the development of Hospital Management System software, many considerable achievements have been accomplished:

a. It has helped in the reduction of human errors to the barest minimum and improving the confidentiality of medical records.

b. It has reduced the waiting time of patients in seeing the physician

c. It has curbed overcrowding in the hospital due to the e-medication application.

d. It has made it easier to follow up on the patient's medical records from all work station in the health center. Thus, it has replaced the method of one point of entry and retrieval with a database search engine.

e. It has also made provision for effective and rapid medical attention for patients who cannot come over to the health center for treatment by login into the e-medical online application and getting an adequate medical diagnosis and drug prescription.

Sequel to the aforementioned benefits of using this HMS software, the study hence concludes that this software is a great improvement over the manual system/conventional method due to its advanced features and easy to use attributes. The computerization of the system has speed up the process. The Hospital Management System was thoroughly checked and tested with dummy data and thus, it is found to be very reliable. On completion of this research, the authors hereby recommend that this Hospital Management System Software should be implemented by Olabisi Onabanjo University Health care center to improve the quality of services provided. Other institutions encountering similar record keeping problems can use imitate or build upon the processes discussed in this study.

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