Design and implementation of health clinical database information system

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KEYWORDS	A B S T R A C T
Design, implementation, health, clinic and information	This project is centered on health clinical database information system. The current process of keeping records of patients is being operated manually and due to this procedure, numerous problems are been encountered. A survey was taken to computerize the manual process in order to check these problems. The problems were identified after series of interviews and examination of documents after which analysis was made and a computerized procedure recommended. This project will also suggest how to successfully implement the computerized procedure and to overcome the obstacle that would hinder the successful implementation of the system. The new system was designed using Microsoft visual basic 6.0 programming language. This language was chosen because of its easy syntax and features for developing windows based applications.

Introduction

Integration of documentation and knowledge based computerized services in information system is a tremendous means to help health professionals in their daily practice and to improve its quality. Programmers worldwide are working everyday with the aim of making information dissemination and storage easier by creating better, bigger and more reliable databases and software that will suite the everyday businesses of the nation. This project is about the design and development of a clinical database system for medical management of the JAJA medical center and shows how records and data can be handled and stored within the system.

The system will store patients' records, drug inventory and dispensation as well as other relevant clinical information within the polytechnic community. The system will be used by the staff doctor, nurses, clerks, consultants, and other relevant authorities as the demand may be within the clinic. It will process data speedily and accurately, provide information when and where required.

The clinical database system will be used to store data, produce reports and handle management enquires. In clinics that are made up of doctors, nurses, patient and other personnel staff, an Information system is required to keep track of the day to day transaction of the clinic and to improve the communication skills. Also this system will help in highlighting risk/complex patients for consultant input alert; easily identifying all patients taking certain medications; monitor frequency of major complication example peptic ulcer, check for known drug interaction; improve evidence based practice, record questions in clinic for later response from the team when not sure of correct reply. Therefore, it is hoped that the design and development of a clinical database system would provide a flexible and reliable management of the clinic. This program is carefully design to work in a standalone system or in a multi-user environment.

The primary aim of this project is to design and develop a clinical database system for JAJA clinic, which will achieve the following:

- Improve information efficiency and human relations skill in the clinic.

- Keep proper patients' record, drug inventory, dispensing and efficiency of drug dispensed.

- To bring about a computer pollution free environment that will ensure a secured public health of the staff, and the polytechnic community

- To acquire practical experience in the design and development of a clinical database system and other related software

Methodology

The project is carried out, following the appropriate stage involved in design and development of clinical software. The stage are briefly discussed below:

- Problem identification: The problems associated with the medical center are first identified. This is done by critically analysis of the existing system.
- Data collection: The data required for this clinical database is obtained by interviewing staff, students and other medical personnel. Also vital information was also obtained in designing and developing a clinical database.
- System modeling: Using relevant facts obtained from relevant sources, the clinical database system is designed.
- System development and implementation: The conceptual designed are developed and implemented as computer program. After the development and implementation, the system is tested to ensure that, is fulfils the objective of the project.
- System installation: The developed clinical database system software is installed on the computer system and made ready for use.

Research methodology, system investigation and analysis

Research methodology is a collective term for the structured process of conducting research. There are many different methodologies used in various types of research and the term is usually considered to include research design, data gathering and data analysis. Research methodologies can be quantitative (for example, measuring the number of times someone does something under certain conditions) or

qualitative (for example, asking people how they feel about a certain situation). Ideally, comprehensive research should try to incorporate both qualitative and quantitative methodologies but this is not always possible, usually due to time and financial constraints. Research methodologies are generally used in academic research to test hypotheses or theories. A good design should ensure the research is valid, i.e. it clearly tests the hypothesis and not extraneous variables, and that the research is reliable, i.e. It yields consistent results every time.

Research Methodology

Research is the systematic collection, analysis, design and reporting of data finding relevant to a specific situation facing the organization. This sample of the study, the volatility and administration and method of data analysis employed.

The research is based on developing software that would solve a particular problem. The approach is geared towards software engineering methodology, which is a framework that is used to structure, plan, and control the process of developing an information system. There are different methodologies which includes;

- Agile Software Development
- Crystal Methods
- Dynamic Systems Development Model (DSDM)
- Extreme Programming (XP)
- Feature Driven Development (FDD)
- Joint Application Development (JAD)
- Lean Development (LD)
- Rapid Application Development (RAD)
- Rational Unified Process (RUP)
- Scrum
- Spiral
- Systems Development Life Cycle (SDLC)

- Waterfall (a.k.a. Traditional).

However, in this project work, we used the waterfall model. The waterfall model is a popular version of the systems development life cycle model for software engineering. Often considered the classic approach to the systems development life cycle, the waterfall model describes a development method that is rigid and linear. Waterfall development has distinct goals for each phase of development where each phase is completed for the next one is started and there is no turning back. The perceived advantages of the waterfall process are that it allows for departmentalization and managerial control. A schedule is typically set with deadlines for each stage of development and a product can proceed through the development process. I used this model because it is efficient and the first software Development Life Circle (SDLC) model used widely in software Engineering to ensure success of the project.

Research according to Olaitan and Nwoke (1992), it is the processing of arriving at dependable solution to problem the planned and systematic collection analysis and interpretation of data defined research as a systematic and objective research for new knowledge of the object of the study and or application if a novel problem. Research methodology is defined as a set of method used in a particular area of activity Oxford Advance learner's dictionary (5th edition also methodology is structured approach to a particular task). Therefore, research methodology is the structured approach of aiming at dependable solution to a problem through planned and systematic collection analysis and interpretation data research methodology in this case encompasses system investigation analysis sources of data etc.
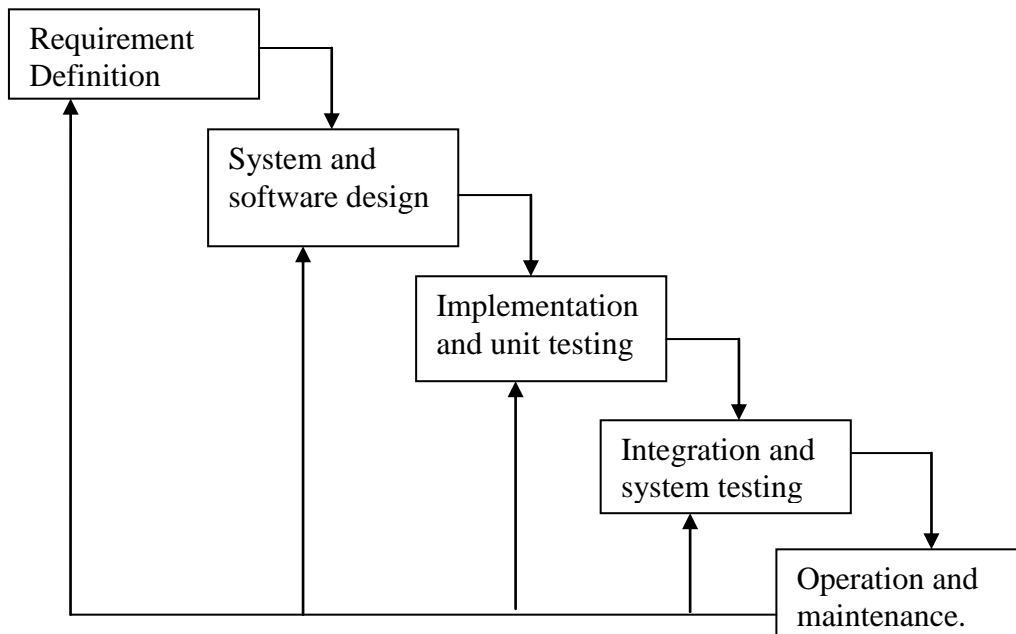
Figure.1 Water fall model

Method of Data Collection

The primary and secondary sources of data collected were adopted in this research work and they are explained in brief below. These methods where chosen because they were seen as all encompassing (i.e. they cover much grounds in data collection).

Primary Source: Data in the category were collected mainly though visits, personal participation and observation and distribution of questionnaires to the individuals under study. The various methods were adopted independently to reduce the incidence of bias or subjective views about the subject on investigation.

Secondary Source: Secondary data in this research work were collected through the review of related literature; the relevant literatures were obtained from books journals, magazines, and newspapers. Consequently, libraries were consulted; prominent among them were the Michael Okpara University of Agriculture Umudike library, Umuahia, Abia State library, Abia state polytechnic library, Computer Science Department library (Babcok University) and Babcok University main library etc. More so, in this era of globalization, information from the internet was also valuable.

Instruments of Data Collection

The instrument of data collection for this research work was through distributed questionnaires and oral interviews.

Questionnaire Method

The questionnaire (also called survey) is a set of questions given to a sample of people. The purpose is to gather information about the people's attitudes, thoughts, behaviors, and so forth. The researchers compile the answers of the people in the sample in order to know how the group as a whole thinks or behaves. Questionnaires are often used by people who do political or market research. For example, if an analyst wanted to know what individuals thought about a particular issue, he or she could do a survey. The survey would ask about the voters' opinions related to the issue.

Advantage of Questionnaire

Using a questionnaire with a random sample is a good way to find out the attitudes, thoughts, and behaviors of a large group of people. We can be more confident in generalizing our findings than we can be with a case study. In other words, because we have a group of people (random sample) instead of one case, we are surer that the findings apply to the population.

A questionnaire provides better data for politicians or businesses to use for making decisions. If the senator learns that 75% of the people in the random sample of voters favor a proposed law, he or she can be confident that essentially 75% of all the voters in the state also favor the proposed law. This is more useful information than a case study of one voter.

Disadvantages of Questionnaire

There are two elements of a questionnaire that are not so much disadvantages as potential problem areas.

The way a question is worded can change how people answer the question. A question that asks for an opinion about "tax breaks for small businesses" would yield different responses than an opinion question about "corporate welfare." When you read about the results of a survey or questionnaire, it's important to know exactly how the question was phrased.

Getting a random sample of people from the population can be difficult, so sometimes people doing surveys do not get a random sample. It is much easier to go to a shopping mall or diner and ask people their opinions of a proposed law than to generate a random sample of voters in the state. When you read about the results of a study using a questionnaire, it is important to know whether the participants were a random sample.

Questionnaire Result Analysis and Evaluation

A total of 50 respondents were issued the questionnaire. The average age of respondent is 27 with 34 males and 16 females. Below are sampled questions as well as evaluation of the responses.

System Investigation

Before the system was developed, the benefit of the new system was seriously considered. The examination of the existing system provided relevant facts that were used in designing the new system. This helped to identify the objectives, limitations, and indispensable aspects in the existing system that was truly helpful in designing the new system.

Current System

An organization's operation is always out by employing a particular system or method which may be by use of machine or manual system of operation. During this process of manual operation, the records department is responsible for the overall control over the compilation, implementation and maintenance of patient records.

From the investigation and data obtained from the present system, it has been observed that the present system made use of manual processes and thus the following weakness were detected.

- Errors due to human fatigue.
- Error due to human fatigues
- Low speed and efficiency
- Lack of standardization of data format
- High degree of insecurity

- Large amount of time used in operations and searching of records.

The Administrative Unit

This unit is not different from the polytechnic administration department. They see to the proper day-to –day operation of the medical center. They also see that qualified workers are employed to manage the clinic.

They organized screening and conduct interview for applicants in accordance to polytechnic governing rules and regulations. They advise and conduct training program to improve staff skill and devise job description. They also devise means such as safety programs to retain staff and control staff absence, shift, sick leave and turn over to develop established work force.

The Pharmaceutical Unit

A pharmacy can be defined as anywhere drugs are prepared, distributed and sold to consumers, but the most pertinent being the presence of an efficient and qualified pharmacist in that premises. This unit is the major concern of this project.

Operations and Pharmaceutical Unit

One major operation of this unit is to ensure that drugs are restocked even long before the start finishing. However, bureaucratic bottlenecks and lack of funds still results to out of stock syndrome before they can be replenished.

How Drugs are Received and Dispensed

The distribution and manufacture of drugs are the major concern of the pharmaceutical unit.

In Federal polytechnic Nekede medical center, a number of pharmacist are invited to tender for list of drugs compiled according to the needs of the community. This is looked into by the health services tender communities. The main consideration taken by the committees are the prices of the drugs and brands of drug, based on this local purchasing order (L.P.O) are raised. If the prices are cheap or moderate and the brand is uniform, then the committee will go for it and the lucky supplier is expected to supply the specified drug item at specified time.

When they are received and documented, they are issued as needed to they is dispensary and are dispensed as prescription demands. Usually, the Prescriptions are verified by the pharmacist and other consideration looked into before dispensing of drugs.

Nursing Unit

The nurses play a critical role in any medical system. They ensure that drugs and treatment prescribed by the physicians are properly administered. They check the B.P and the temperature of both outpatient and the in-patient in the clinic; give injections, treat and dress wounded patients. They assist the doctors and give routine drugs to patient to reduce their body temperature as the case may be while waiting for the outcome of the patients' lab. Test, since it is not their duty to prescribe drugs rather the physicians. They keep record of every development in a patient' system and passes on the information to the physicians to ascertain the efficacy of his prescription.

The Public Health Unit

Environmental sanitation and fumigation of professorial residential houses, hotels, lecture halls, the clinic and offices are the major concern of this unit.

This unit organizes health seminar for both the staff and student of the institution to enlighten them on issues of health. Also, refuse disposal is another issue that boarder the public health unit. This is to ensure that the students and staff of the institution enjoy a pollution free environment.

The Medical Record Unit

This unit is responsible for keeping all medical information in the clinic. They keep both the out-patient and the in-patient files. This file contains confidential information that includes the patients name, address, last admitted, time discharged, description of disease/sickness suffered, treatment etc. it also contains both the family history and the patient medical history. This unit makes sure that these files are well protected and is made available when required by a qualified medical practitioner.

The Laboratory Unit

This unit runs laboratory diagnosis for patient as recommended by the physician. They collect urine, blood sample and other relevant fluids and substances to determine the exact disease or sickness being suffered by the patient. After performing the test, they pass on the result confidentially to the physician who studied the result and prescribe drug for the patient. They laboratory scientist do not prescribe drugs for the patient.

Problems Observed in the Present System

The problems observed in the present system include:

- **Time Delay**

  Due to the time spent in entering a record into the registers and also checking of records that already exists, there is always time delay in trying to check and maintain the financial records through the manual methods.

- **Lack of Space**

  There exist lack of enough space for the vast volume of papers and in the course of keeping for a long time, it occupies much office space.

- **Loss of Records**

  There is always tendency of information that is on paper to be lost. One can encounter misplacement of paper records through carelessness.

- Lack of organization and inaccurate data.
- The management does not have any software program that can help in the organization of data for both patient and doctor's report.
- Poor drug inventory and management.
- The present system has resulted in a decay, time wastage, poor quality service, drug mismanagement and communication problems between patients and management of the clinic.
- Difficulty in retrieval of medical records.

Expectation of the New System

- Proper drug management because of accurate software package
- Easy manipulation and retrieval of medical records, thus, reducing the time spent in searching patient's record.
- The system will adequately and efficiently organize and present the database files for easy manipulation.
- The new system will enhance a better communication link between student and the management.

- Decision making would be made faster and prompt because accurate information is provided.

System Analysis

This is the analysis of data processing requirements. System analysis is the determination of data processing requirements of a company, project procedure or task, and the designing of computer systems to fulfill them.
Effiong, (2001), defined system analysis as a process of breaking down system into sub system and their component parts so as to analyze on detailed information needs of a user and thereafter develop the system requirements. During system analysis, information gathered using the methods is analyzed. System analysis shows that personal interview method is somehow advantageous over questionnaire method because the researcher got more responses. This is because questionnaires are mostly restricted to limited areas, but with personal interview method, the researcher satisfies her curiosity by asking several questions.

Statistical Analysis of Findings

Tables and samples percentage with pie chart are used here to analyze the various data collection. The researcher issued questionnaire to 50 respondents. The formula for calculating percentages is as follows.

$$Q = \frac{\text{Number of Responses}}{\text{Number of Respondents}} \times \frac{100}{1}$$

The formula used for plotting a pie chart is
$$Q = \frac{\text{Number of Responses}}{\text{Number of Respondents}} \times \frac{360}{1}$$

Question 1

Do you know what a computerized database information system is?

Table 1: Responses on number of people that know what a computerized database information system is.

Option	Number of respondents	Percentage of respondents (%)	Angle of respondents
Yes	15	30	108
No	30	60	216
Not Sure	5	10	36
Total	50	100	360

Question 2

If yes, how effective is a computerized database information system?

Table 2 responses on how effective computerized database information system is.

Option	Number of respondents	Percentage of respondents (%)	Angle of respondents
Very Effective	40	80	288
Effective	8	16	57.6
Ineffective	2	4	14.4
Total	50	100	360

Question 3

In your own opinion how will you rate the effectiveness of manual method of record keeping?

Table.3 Responses on effectiveness of manual method of record keeping.

Option	Number of respondents	Percentage of respondents (%)	Angle of respondents
Very Effective	35	70	252
Effective	15	30	108
Ineffective	0	0	0
Total	50	100	360

Question 4

In your own assessment, how will you rate your adherence to manual system of record keeping in the hospital?

Table 4 Responses on adherence to manual system of record keeping.

Option	Number of respondents	Percentage of respondents (%)	Angle of respondents
High	9	18	64.8
Average	14	28	100.8
Low	27	54	194.4
Total	50	100	360

Question 5

How many patient files do you receive in a month?

Table 5: Responses on how many new patient files do you receive in a month.

Option	Number of respondents	Percentage of respondents (%)	Angle of respondents
One	4	8	28.8
Two	9	18	64.8
Three	16	32	115.2
Specify	21	42	151.2
Total	50	100	360

Proposed System

The new system which is computerized has so many benefits that will be fetched if introduced into the operation. And it has the following benefits. Thus:

❖ **Accuracy**

Measures of accuracy will be achieved since the computer system will maintain stability in assigning tasks based on assessment and making of accurate calculation.

❖ **Neatness**

Computerization gives room for production of a very neat job. Besides, since the vast volume of paper which is used in keeping/storing information will no longer be needed, it will help in keeping a very neat office.

❖ **Reduction of Cost**

The computerized system will keep in reducing cost of operation due to constant production of forms and registers for keeping records as less form will be used.

❖ **Use of Less Space For Record Storage**

There will be elimination of much space used in storing records by introducing a computer storage media (disks) which can keep vast volume of information in a less space.

❖ **Fastness**

This will eliminate the problems of time wasting in registering records, checking from one line to the next as well as preparing a revenue report which is faster than using manual process to do it.

❖ **Retrieval of Information Fast**

There will be fast retrieval of information over the manual system, that it will have advantage over the manual system thereby enabling the user to retrieval information fast most especially as it concerns the financial management of a public institution, to call up their information than in manual system where you search for information record line after the other.

System Design and Implementation

Overview of System Design

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. One could see it as the application of systems theory to product development.

There is some overlap with the disciplines of

Systems analysis
Systems architecture
Systems engineering.

If the broader topic of product development "blends the perspective of marketing, design, and manufacturing into a single approach to product development," then design is the act of taking the marketing information and creating the design of the product to be manufactured. Systems design is therefore the process of defining and developing systems to satisfy specified requirements of the user. Until the 1990s systems design had a crucial and respected role in the data processing industry. In the 1990s standardization of hardware and software resulted in the ability to build modular systems. The increasing importance of software running on generic platforms has enhanced the discipline of software engineering.

Also, when developing a computerized financial management system, it is important that it cater to management needs – not just those of the central sub bodies, but also other bodies. Moreover, as a management tool it should support the management of change. It must be viewed as an integral part of budget system reform – hence not be designed just to meet present requirements, but also to support those needs that are likely to arise as parallel budget reforms are implemented.

Design involves developments such as system flowchart, job step, program narratives which enhances organization for computer execution (Osuagwu O.E 2000).
System design outlines the information flow, worksheets, and functions, evaluate charts, and file usage, system file definition, and hardware and software requirement. In system design, the logical overview of processing is translated into fully operational computer application. After the analysis of the data from studying the existing system record keeping and also considering the limitation to the project. It was observed that the main process and description can be grouped in four, they are:

Process	Description
1. File processing	Process personnel information, staff information, admission information, patient information.
2. Drugs	This takes care of drug supplied, drug dispensed and total drug inventory.
3. Reports	This generates report for the database
4. Files	This includes functions such as save, edit, delete, print and exit.

Table 6: groups of system design.

Input/ Form Design

The input into the system are in the form of fields in the following tables, personnel records, staff records, admission records, patient records, drug supplied, drug dispensed and drug inventory. However, below are the different fields found in the forms;

IN-PATIENT MODULE

Patient ID	Text box
First Name	Text box
Surname	Text box
Gender	Combo box
Date of Birth	Text area
Address	Text box
Phone (Home)	Text box
Phone (mobile)	Text box
Patient Occupation	Combo box
Marital Status	Combo box
Account Type	Text box
Company ID	Text box
Company Name	Text box

Table.7 Inpatient Module

OUT-PATIENT MODULE

Patient ID	Text box
First Name	Text box
Surname	Text box
Gender	Text box
Date of Birth	Text box
Address	Text box
Phone (Home)	Text box
Phone (mobile)	Text box
Patient Occupation	Text box
Marital Status	Text box
Account Type	Text box
Company ID	Text box
Company Name	Text box
Corporate ID	Text box
Assigned Doctor	Text box

Table.8 Outpatient Module

IN-PATIENT ADMISSION

Admission ID	Text box
Patient ID	Text box
First Name	Text box
Surname	Text box
Account Type	Text box
Assigned Doctor ID	Text box
Department ID	Text box
Department Name	Text box
Ward Number	Text box
Room ID	Text box
Admission Date	Date-Time picker
Today's date	Date-Time picker
Length of Stay(Days)	Text box

Table.9 Inpatient Admission

IN-PATIENT BILL

Doctor's Charges	Text box
Medical Treatment Charges	Text box
Service/Treatment Charges	Text box
Room Charges	Text box
Hospital Charges (at 1000/ day)	Text box
Total	Text box
VAT	Text box
Discount	Text box
Net Total	Text box

Table.10 Inpatient Bill

OUT-PATIENT BILL

Patient ID	Text box
First Name	Text box
Surname	Text box
Account Type	Text box
Assigned Doctor ID	Text box
Doctor's Charges	Text box
Hospital Charges	Text box
Total	Text box
Discount	Text box
Net Total	Text box

Table.11 Outpatient Bill

SEARCH ENGINE

Information Table	Combo Box
Search Criteria	Combo Box
Search Text	Text box

Table 12: Search Engine.

REPORTS

Master Report	Command Button
Treatment Report	Command Button
Revenue Report	Command Button

Table 13: Research

Process Design

This can be seen as the ways or mode the data can be processed in the proposed system.
The ways or modes are:
1) On-line processing
2) Distributed processing
3) Timesharing processing

1) **On-Line Processing**
   In this mode of processing, the processing environment is where the peripheral devices are in direct communication with the central processing unit and from the information reflecting current activity is introduced into the system as soon as it occurs.
2) **Distributed Processing**:
   In this mode of processing task in large organization may be transferred to small microcomputer located at remote stations. This mode of processing highly favored in a local area network (LAN) to assist the central station in processing aspect of an going activities in the system.
3) **Timesharing Processing:**
   Time-sharing is a computing system that permits many users to use the

system at the same time such that each use is unaware of the fact that other people are still using the system. This is possible due to the high speed processor which assigns priority to a queue of requests by users on basis of FIFO (First-In-First-Out) in multi-terminal interactive computing.

OUTPUT DESIGN

The result obtained from the processed data is referred to as the "output" in this work, the output are results obtained from processing collected by the data entry routines. Basically, the output form are to be gotten from report expect of the written program. The output is going to be in the form of report generators to the actual facts.

Database Design

The database has been designed using visual basic 6.0, a number of the family product of Graphic User Interface (GUI). The database is created using table as the fundamental building blocks of the database management system.
The tables are as follows:

PATIENTS RECORD

FIELD NAME	CHARACTER	FIELD WIDTH
PATIENT ID	NUMBER	SINGLE
SURNAME	TEXT	10
FIRST NAME	TEXT	10
LAST CHECKUP	DATE/TIME	NIL
DIAGNOSIS	TEXT	50
PRESCRIPTION	TEXT	50
DOCTOR'S NAME	TEXT	20
COMMENT	TEXT	50

Table 14: Patient Record

DRUG SUPPLIED

FIELD NAME	CHARACTER	FIELD WIDTH
SUPPLIED –ID	NUMBER	INTEGER
COMPANY NAME	TEXT	20
COMPANY ADRESS	TEXT	50
DRUG NAME	TEXT	25
QUANTITY	TEXT	35
AMOUNT PAID	TEXT	25
RECEIVED BY	TEXT	20
SIGNATURE/INITIALS	TEXT	5
COMMENT	TEXT	50

Table.15 Drug Supplied

DRUG DISPENSED

FIELD NAME	CHARACTER	FIELD WIDTH
PATIENT-ID	TEXT	20
DOCTORS'S NAME	TEXT	20
ISSUED	TEXT	
PHARMACIST'NAME	TEXT	15
COMMENT	TEXT	50

Table.16 Drug Dispensed

DRUG INVENTORY

FIELD NAME	CHARACTER	FIELD WIDTH
QUANTITY IN STOCK	TEXT	80
QUANTITY DISPENSED	TEXT	80
QUANTITY EXPIRED	TEXT	80
LAST SUPPLY	DATE/TIME	
NEXT SUPPLY	DATE/TIME	
PHARMACIST ID	NUMBER	
COMMENT	TEXT	50

Table 17: Drug Inventory

PERSONAL RECORD

FIELD NAME	CHARACTER	FIELD WIDTH
PATIENT ID	NUMBER	SINGLE
SURNAME	TEXT	10
FIRST NAME	TEXT	12

DATE OF BIRTH	DATE/TIME	NIL
SEX	TEXT	6
PATIENT ADDRESS	TEXT	50
NEXT OF KIN	TEXT	20
NEXT OF KIN'S ADDRESS	TEXT	20
DATE ADMITTED	DATE/TIME	NIL

Table 18: Personal Record

STAFF RECORD

FIELD NAME	CHARACTER	FIELD WIDTH
STAFF ID	NUMBER	INTEGER
SURNAME	TEXT	15
FIRST NAME	TEXT	9
POSITION	TEXT	15
DUTY	TEXT	12
JOB DESCRIPTION	TEXT	30
TELEPHONE NUMBER	NUMBER	INTEGER
DATE EMPLYED	DATE/TIME	NIL

Table.19 Staff Record

ADMISSION RECORD

FIELD NAME	CHARACTER	FIELD WIDTH
PATIENT ID	NUMBER	SINGLE
DATE ADMITTED	DATE/TIME	NIL
DOCTOR'S NAME	TEXT	20
DIAGNOSIS	TEXT	50
PRESCRIPTION	TEXT	50
DOCTOR'S COMMENT	TEXT	70
DATE DISCHARGED	DATE/TIME	NIL

Table 20: Admission Record

PROGRAM DESIGN

In program design, it involves the statements of solution, solution coding and identification of all the modules of the software with their relationships. The purpose of the analysis lead to the program design, to identify a problem and set a capacity that users consider as helpful in arriving at a decision of the problem.

TOP DOWN DESIGN

In an application designed from top down method the top level main menu controls the entire system. These modules contain the program data entire and validation processing and output capability

PROGRAM MODULE FLOWCHART (SYMBOLS)

Program flowcharts are essentially logic diagram is used by programmers to graphically depict a sequence of operations. Flowcharts are typical prepared in several levels of details ranging from an overview of general program logic to detailed specification of individual work steps which can later be translated into coded instruction below are the flowchart symbols and what each of them represents (functions).

Implementation of the New System

One major incentive for computerized clinical database information system is the desire to reduce the growing burden of patient file handling, processing and general manual clinical management. In this chapter the researcher looked at the implementation of the newly developed computerized system, with emphasis on the problem definition, program design, program coding, program testing and documentation, method of change over and maintenance.

Change-Over Procedure

The changeover procedure is a method of moving from the existing system to the newly designed system. There are four basic procedures for achieving the change-over, they include:

- **Direct change over:** The existing system is discontinued altogether and the new system becomes operational immediately.
- **Parallel change over:** Here, the existing system and the new system are run simultaneously using the same input. The outputs are compared and reasons for differences resolved. The output from the existing system continues to be considered until the new system proves satisfactory. At this point, the existing system is discontinued and the new system takes its place.
- **Pilot Run change over:** This involves a changing over of a part of the system either by Parallel or by Direct.
- **Phase change over:** Here bits of the new system are introduced, one at a time.

The conversion plan chosen is the **PHASE CHANGE OVER.** This is because Phase Change Over processes is done in phase, it is similar to parallel running except that initially only a portion of the current system is run parallel on the new system, i.e., only one department or section.

During the following weeks, new sections are transferred in to the system and in each case the old system runs parallel for one processing cycle only; until after training and much knowledge has been acquired by the user, then the existing system will be faced out. Also all other documentation done manually in previous years can now be incorporated into the new system.

Testing

Since this project involve programming, we presented the program specification, which sets out the system requirements, in terms of what task the computer is processing. This enabled the researcher who inversely is the programmer, to use the specification code to program in the chosen programming language (VISUAL BASIC 6.0).

System Maintenance

System maintenance is the on-going process of monitoring and evaluating the new system in order to give the desired services. It involves identifying the need for change in the current system and making the appropriate changes upgrading the programming language is also another aspect of system maintenance to keep with the new version of the software. The hardware also needs to be upgrading in order to meet up with the ever-changing computer technology. The hardware is also maintained carefully handling the computer and also immediate repairs needing the help of a professional like software and hardware engineers.

Project Costing

During the implementation stage of any system development life cycle, it is important to consider the cost involved this would also go long way in ascertaining the feasibility of the proposal (new system) against the backdrop of cost-benefit analysis.

The costs are considered based on:

   i) Labor
   ii) Software
   iii) System Life Cycle Maintenance
   iv) Hardware

- **Labor**: The operators of the new system must be trained and paid. Three or more operators must be needed and a specialist is also needed.
- **Software:** The software to run this system is brought from the software and can come in suites and variant cost.
- **Maintenance:** Costs can also be incurred in maintaining the system. The cost implications of the above described is as follows.
- **Hardware:** Computers consumable printers must require (VIA) through purchase.

Conclusion

This project is aimed at replacing and improving the manual mode of clinical record keeping with a more sophisticated computerized system of record keeping in the clinic via the case study; Jaja Medical center.
The program aids in an easier record keeping of patients and drug management for quick access process, update, retrieval and storage of records for use and future reference. The benefits of this develop software includes:

- Speed: the program gives faster access to any data and aids in the improvement of the standard of decision making
- Reliability: This is achieved since data entered interactively to the computer are saved in files and duplicated to other external disk at choice; also records can be adjusted by authorized bodies.
- The new system can also allow to be printed, such as reports, forms if needed which the old system cannot offer.

Recommendation

Since the aim of this project is to produce an enhanced clinical record keeping, which has been tested and approved, I therefore, recommend this package (software) to all clinics (especially computerized clinics) and relevant medical centers that needs efficient patient and drug record keeping management system. It makes it easier for the manipulation of record in the clinic.

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