IJHRIM

Intl J Health Recs & Info Mgt. Jan – Dec 2021;4(1):11-15

Research article

Print ISSN 2645-2464; E ISSN 2695-1770

Towards the design of primary health care web based system: an introductory approach

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ABSTRACT

Background/Objective: A primary health care center provides first contact, person focused and ongoing care over time that meets the health related needs of the people. Routine activities in a primary health facility include; consultation and diagnoses of diseases by physicians, provision of treatment facilities, facility for admitting patients (providing beds, nursing, medicines) and immunization of patients/children. Documentation of patient information, such as medical, personal, financial or recording of medical personnel information on paper is at risk of being stolen, affected by fire outbreaks and misplaced by employees. The staff experience difficulty in timely location of records, sorting documents and identifying key pieces of information. It is nearly impossible to accurately account for each person who accesses a paper based file and audit their use of that record. This means that individuals can access data without permission and make copy of documents without anyone knowing. There is no centralized secure database where information collected can be stored thereby making it difficult to prepare accurate and prompt reports. Therefore, there is a need for the use and application of ICT tool. The main aim of this study is to design a web based system to control the flow of patients and staff data in the primary health care facility. ***Methods/Design****:* The study design was spiral model and iterative model. The logical and physical design tools used include Data flow and Use case Diagrams for the proposed system. ***Results****:* Keeping in view a strong need for managing the various important information fast and efficiently, Primary Health Facility Information System (PHIS) has been designed awaiting further development. Proper analysis and assessment of the designed system indicates an efficient, usable and reliable records-management system, which when developed will adequately meets the minimum expectations that were set for it initially. A complete design of a database application for searching and locating patient folders has been carried out. ***Conclusion****:* The new PHIS will provide better services for healthcare providers such as reduction in time taken to find a folder, accuracy and timeliness of record preparation and so on. If this study is implemented, it will go a long way to eliminate data redundancy, inconsistency and improve on the integrity of the data stored in the system.

Keywords: Data, Web Site, Web Browser, Hyper Text Markup Language, Information

Edited by *Adeleke IT; submitted on 30.06.2021; peer reviewed by SM Omole, M Achinbee, TC Anamah; accepted 21.10.2021; published 07.11.2021.*

Please cite as: *Onyemauche UC, Okwor JU, Chinazor EC, Osundu BU. Towards the design of primary health care web based system: an introductory approach. Int J Health Recs & Info Mgt. 2021;4(1):11-15.*

Conflict of interest: None declared.

Funding disclosure: No funding was solicited for nor obtained for this study

INTRODUCTION

From time immemorial, the health system has engrossed much consideration in terms of infrastructure and services. The primary health care model was affirmed as the appropriate scheme for guaranteeing health for all however, not many studies have assessed the services provided by primary health centers in terms of its fundamental requirements. A primary health care center is termed as a facility that provides first contact, person dedicated and ongoing care over time that meets the health related needs of

individuals[1]. Activities at a primary health care facility includes; consultation and diagnoses of diseases by physicians (GMP), provision of treatment facilities, facility for admitting patients (providing beds, nursing, medicines etc.) and immunization of patients/children. These are the various duties performed by the primary health workers. Documentation of patient information such as medical, personal, financial or recording of medical personnel information on paper is at risk of being stolen, affected by fire outbreaks, misplacement by employees and even petty things such as handwriting legibility. Whenever the patient visits, his information is recorded again. Diagnostic information about patients is recorded on the file, which contains patient information. This can be destroyed after some time to decrease the paper load in the filing area.

A computerized primary health information system will be necessary because there are a lot of difficulties in maintaining a large amount of information on paper, especially as there is usually no backup for the information. Access to information can prove difficult and time-consuming if it has to be searched for, and accuracy is needed in the recording of vital information. Also, the facility manager cannot oversee all that is written on the vast amount of paper to be used. Therefore, a system is needed that can perform all the above said operations automatically. Furthermore, the system to be designed and developed should be user friendly, flexible, fast, robust, reliable and highly secured. The merits of using this computer based technology was summarized by Yamamato (2016) as the process of minimizing the documentation of patient incidents, improving communication of information to physicians, improving access to patient medical information, reduction of errors, forming a data repository for research and quality improvement and reduction of paper files[2]. The purpose of this research is therefore, to design and create a primary health care center information system.

METHODS

The methodology employed for this study is the spiral model and iterative model.

Spiral model

The spiral model combines the idea of iterative development with the systematic controlled aspects of the waterfall model. This Spiral model is a combination of iterative development process model and sequential linear development model i.e. the waterfall model with a very high emphasis on risk analysis. It allows incremental releases of the product or incremental refinement through each iteration around the spiral. The following illustration is a representation of the Spiral Model, listing the activities in each phase.

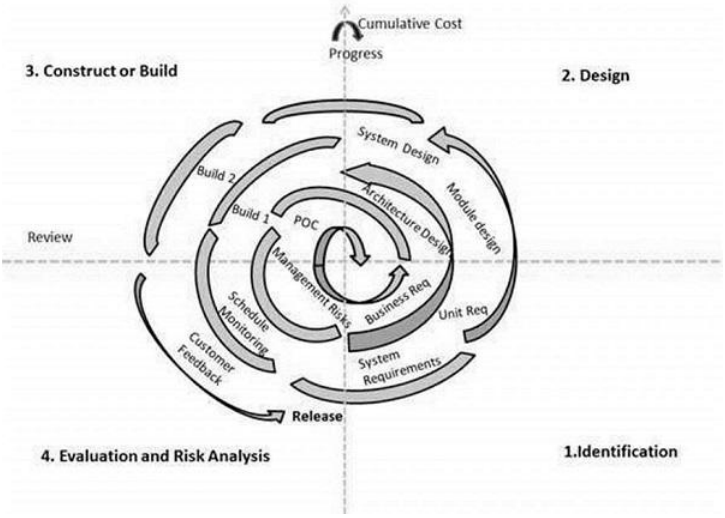


Fig 1: Sipral Model

Based on the customer evaluation, the software development process enters the next iteration and subsequently follows the linear approach to implement the feedback suggested by the customer. The process of iterations along the spiral continues throughout the life of the software.

Spiral model application

The Spiral Model is widely used in the software industry as it is in sync with the natural development process of any product, i.e. learning with maturity which involves minimum risk for the customer as well as the development firms.

RESULTS

Design, Results & Discussion

Use-Case Diagram of the Existing System

A use-case diagram is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. A use-case diagram can identify the different types of users of a system.

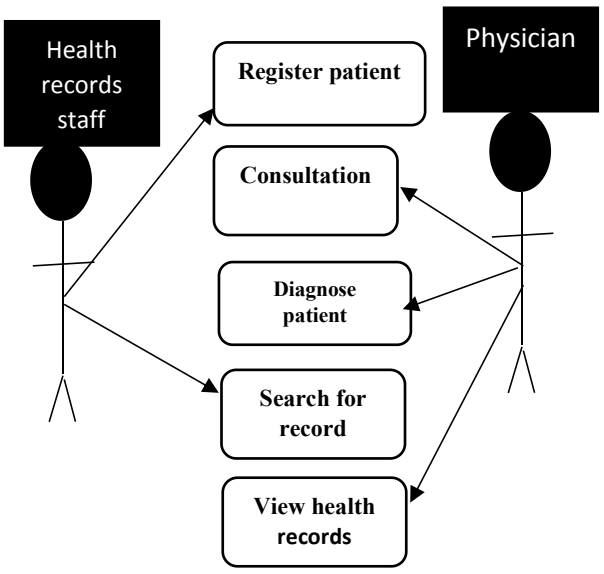
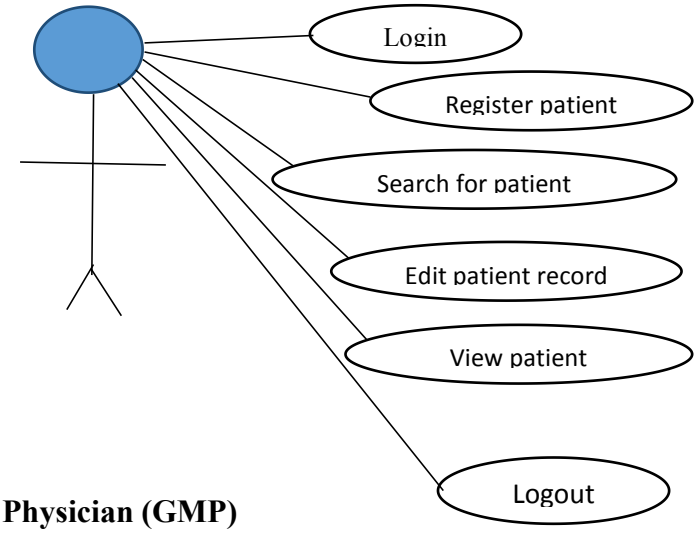


Fig 2: Use Case diagram

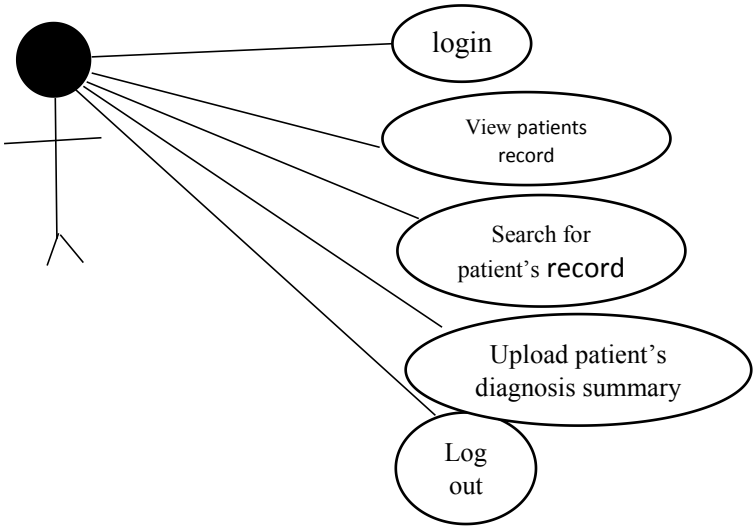
Use-Case Diagram of the Proposed System

A use-case diagram can help provide a higher-level view of the system. It has been said before that use-case diagrams are the blueprints for your system. They provide the simplified and graphical representation of what the system must actually do.

System Administrator/ HIM professional



Physician (GMP)



Patient

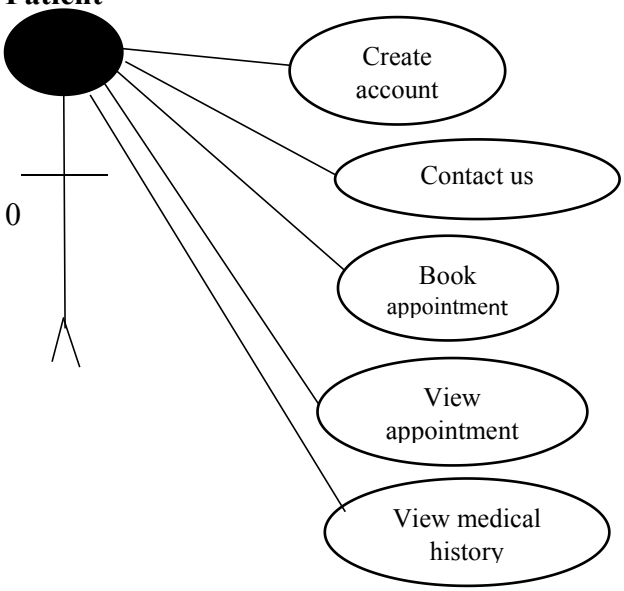


Table 1: Description of The Use-Case Diagram for the Proposed System

Use-case	Description	Actor
1.Create account	The creation of a new account by the patients	System Admin/ HIM prof, patients.
2.Search for records	The retrieval of a patient's records	Physician, System Admin/ HIM prof
3.Book appointment		Patient
4.Upload patients' diagnosis summary	When the physician uploads a patient's diagnosis summary	Physician
5.View appointment history		Patient, physician, System Admin/ HIM prof
6. Manage patient/Add patient	This describes the situation where the doctor adds or manages the patient.	Physician
7.Contact	When different users sends queries to get information or lodge a complaint.	Patient
8.Drug prescription		Physician
9.Edit patient record	The process of editing an already existing record.	System admin/ HIM prof, patient
10. Check vital signs	The vital signs of the patients and recording	Nurse

Features of the Proposed System

The features of the proposed system include the following;

i. Graphical user interface: This is an interface that allows users to interact with electronic devices through graphical icons.
ii. Database: This is a collection of logically related records. This will be responsible for storage and retrieval of information
iii. Remote access: Remote access enables users to access the system when they are not physically able to connect directly; in other words, users access system remotely by using an internet connection. This is the essence of the system being web based.

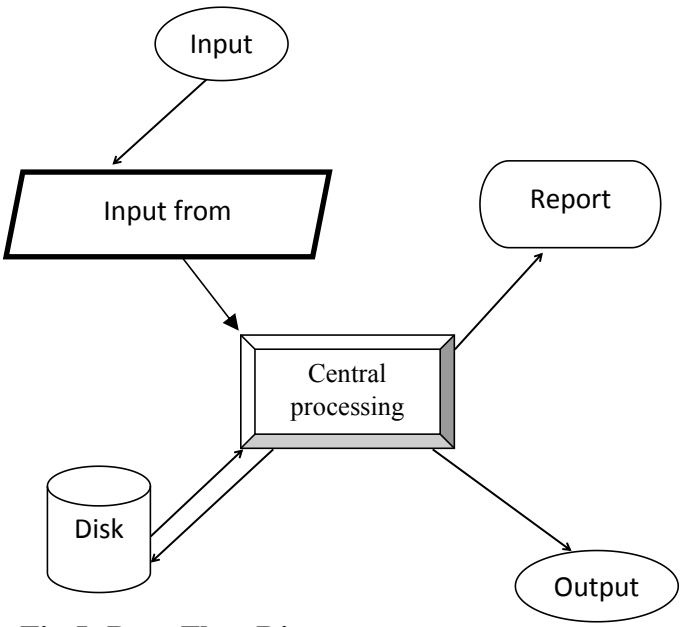


Fig 5: Data Flow Diagram

CONCLUSION

Computers are finding their way into every business, industry and research activity today. In primary health care facilities, the process of maintaining the record of patients and employees

requires processing and record keeping. Keeping in view a strong need for managing the various important information fast and efficiently, Primary Health Facility Information System (PHIS) has been designed awaiting further development. Proper analysis and assessment of the designed system indicates an efficient, usable and reliable records-management system, which when developed will adequately meets the minimum expectations that were set for it initially. Primary Health facility Information System (PHIS) will provide better services for healthcare providers such as in reduction in time taken to find a folder, accuracy and timeliness of record preparation etc. If this study is implemented, it will go a long way to eliminate data redundancy, inconsistency and improve on the integrity of the data stored in the system. The security of the computerized system will also be employed to avoid unauthorized person(s) having access to data.

Recommendation and suggestion for further studies

i. Since data management is a vital part of the operations and survival of a hospital in the modern world, it must be well updated.
ii. There is a need that the new system will run simultaneously with the existing system for a period of time so that if the new system disappoints, we revert back to the old system so as to correct the loopholes (parallel changeover).
iii. Training and retraining of primary health care staff by the government is essential to allow all members of the primary healthcare team to benefit from investment in information technology.
iv. Specifically, many general practitioners will need considerable training to allow them to use these resources and help make the PHIS information technology strategy succeed.

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Authors Contribution:

OUC conceived of the study, initiated its design, participated in literature search, data abstraction and collection, analysis and coordination and drafted the manuscript. OJU, CEC and OBU participated in the design, literature search, technical process, data analysis and coordination and reviewed the final manuscript.