AN OBJECT ORIENTED APPROACH TO ELECTRONIC MEDICAL REPORTING

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ABSTRACT: Due to the growing demand for effective quality medical care, there is need to transform the paper based record to digital form. This will enhance accuracy, efficiency and better patient tracking as well as increasing the production of services. The research paper work explores the use of an object oriented approach to an electronic medical reporting. The aim of this paper is to streamline patient information and make it accessible at any point in time for proper and quality medical treatment. It was designed using object oriented programming (OOP) which makes it is very simple, easy to develop and maintain the system. It is strongly believe that this research paper work will help to streamline patient's information and its accessibility which helps to improve the efficiency, quality as well as standardization of medical care in Nigeria.

KEYWORDS: Electronic, patient, medical records, object oriented, standardization, information,   streamline.

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1.0 INTRODUCTION

According to the Deloitte 2008 survey of health care consumers, over 70% of the consumers want their hospital to provide on line access to an integrated view of their medical information including test results,doctors visit and hospital stay while the actual percentage of hospitals that have deployed a true patient portal is still in the digits(Electronic health records, 2008).

Patients wish to review test results electronically and while there, order pre-approved medications and refills and schedule follow up visit with their prescribing physicians (Mc Bride,2008)

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The international organization for standardization (ISO) defines EMR as a repository of patient data in digital form, stored and exchanged securely and accessible by multiple authorized user. It is an information management system designed to help doctors to have quick access to their patient medical record. Hence it can serves as a communication tool; facilitates the transfer of data from one physician to another without any delay. It can also serve as an evaluation tool because it contains a comprehensive information about a patient medical history which can be send to any organization such as Insurance companies or any employer of labour.

Every medical record must contain the following specific information

The patient's record such as date of examination, patient's first name, last name,

surname, sex, age address, marital status, mobile number, contact address and so on.

The doctor's report which include the doctor's name, history of sickness and treatment taken, examination type, data on medication investigation and so on.

Document report and Event report which include the type of treatment and the place of the event.

With the use of electronic medical record management system, collection and management of patient data becomes more effective and it becomes very easy to track patients and their treatment including clinical assessment, medications and billing data. Other benefits include;

- Provides real time access to medical information.
- It increases efficiency and reduces cost.
- It improves quality of medical care and increase productivity.
- It is more accurate and offer better service to patients.
- Increases diagnostic reliability and less time consuming.
- It help to advance in the field of statistical and clinical researches.

1.1 STATEMENT OF THE PROBLEM

In Nigeria and most of the developing countries like hers, the world paper based records are still predominant despite the disadvantages associated with them are; poor availability, illegibility, poor organization and incompleteness. In most cases, looking for a patient folder can take up a lot of time or days causing frustration to the patient as well as the doctor. This cause a lot of havoc resulting in waste of time, energy and human resources. The electronic medical records management system was designed to help substantially

hospital doctors in their everyday practice to ensure proper diagnosis and quality treatment.

1.2 AIMS AND OBJECTIVES

The following were the aims and objectives of this research paper work;

- ➢ To make all medical reports readily availableand easily accessible at any point in time.

- ➢ For statistical and research purposes.

2.0 LITERATUREREVIEW

Timely and accurate information is very vital to the success and growth of any organization especially in the health sector. The right information at the right time and in the right place helps to make a better management decision. Hence," better information will lead to better treatment." Electronic technology has greatly expanded the method of creating, editing, maintaining, transmitting and retrieving information. Most of these information are used by the health care providers to make decision that will guide the clinicians. Though the electronic information processing system contains very important information, they do not perform electronic record keeping functions [3]. Research shows that keeping records of clients who visit hospital facilities is one of the most studies of hospital irrespective of the capacities and the nature of activities that take place in such health facilities. Records provide clinical information about patients data, presented at appropriate time to enhance better health care. Health care facilities who understand the important of record keeping often takes it very serious and have integrated their records into electronic format.
"An EMR would enable us to keep better track of data and patient will receive quality treatment because information would not

fall between the cracks [1]".Record keeping is a systematic way of entering, processing, analyzing, distributing, storing and retrieving information for an ultimate goal. According to [2], an Electronic Health Record (EHR) refers to an individual patient's medical record in digital format. Electronic health record system co-ordinate the storage and retrieval of individual record with aid of computer.

2.1 BASIC REQUIREMENT OF AN ELECTRONIC RECORD KEEPING SYSTEM

The basic requirements of an electronic record keeping system include

> LIFE CYCLE MANAGEMENT; The system manages the record throughout their life cycle and must be able to do the following ;
> Distinguish between record and non-record material.
> Must match each record to the application record schedule.
> Identify the final disposition date which is calculate from the date of closure.
> Allow for the separation and deleting of temporary (records and non- records) and transfer of permanent record to the database.

> METADATA; The system must capture metadata about the records it manages and be able to correlate records maintained in the system with related records on paper; identify each record well and give access only to authorized personnel to manage the system.

> INTERGRITY; Must ensure the integrity of the records it manages

and be able to give access only to authorized personnel and minimized the risk of unauthorized alteration.

> SECURITY; Thesystem must provide optimal level of security and be able to comply with appropriate regulatory authority.

> RETRIEVAL; The system retrieve records and be able to permit easy retrieval in a timely fashion, ensure that records are accessible by individual who have a business need for information in the record.

> BACK UP; The system must be allowed for records to be backed up to protect against information loss and be able to; backed up regularly to prevent loss of information due to system failure or human error. Allow duplicate copies of permanent records to be maintained in storage area different from the location of the records that have been copied.

3.0 SYSTEM ANALYSIS AND DESIGN

OBJECT ORIENTED ANALYSIS: The main objective of object oriented analysis to describe what the new system will do using the following major steps;

- Class modelling
- Use-Case
- Dynamic modelling

Class modelling

Class modelling diagram are wisely used to describe the types of object in a system and their relationship as shown in figure I;
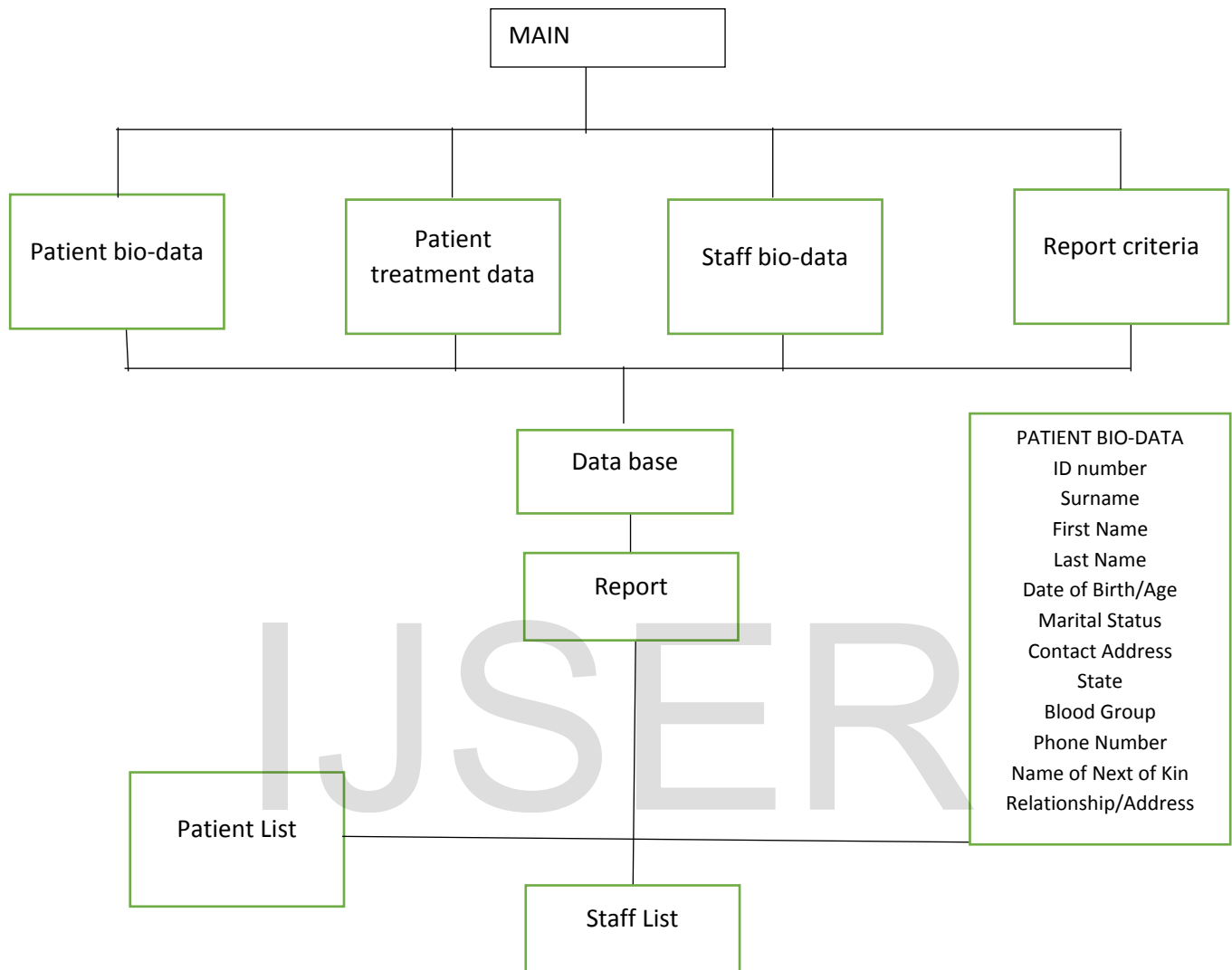
Figure 1: Unified modelling language(UML) class diagram.

Use-case modelling

This is a set of scenario that describe an interaction between a system and a user .The main component of the use case diagram are use case and actors. It uses diagram to displays the relationship among actors and use case. The actor are medical staff (doctors and nurse), clerical staff and pharmacy. Use –cases include patients bio

data entry, patient treatment data entry, staff entry and Reports.

Dynamic modelling –A state represents a particular set of values for an object. The main objectives of dynamic modeling is to produce a state diagram which are used to describe the behavior of an object in terms of number of state and the transition between these states**.**

4.0 DISCUSSION

The electronic medical report is composed of objects which have relationship with each other. Objects with common characteristics can be categorized by other objects,object types which denote those common characteristics. Real world objects are actual instance of object types in the clinical world such as a particular patient. An event is said to occurred when two or more real world object interact with each other.The two principle event types are patient – related such as blood pressure measurement and non-patient related event which include hospital administration order.

With the use of Object-oriented programming, It is very easy to reuse the codes, reduced maintenance, improved reliability and flexibility. These features makes management of patient data to be very effective and reliable.

Access must be given to only authorizedpersonnel to protect the patients information and ensure regular back up.

It is also very important to understand what resources are available and or already in place. The implementation of EMR requires the use of internet but without the proper infrastructure, the project is doomed to fail from the onset. It has been able to establish that despite the fact that EMRS improves the efficiency of keeping patient`s records, special staff will need to be employed and

trained to ensure regular update and the smooth running of the system.

4.1 RECOMMENDATION

It is recommended that hospital/clinic currently using the manual paper filling system should switch to the electronic system because it is more efficient, effective, less time consuming, reduce costs as well as promoting standardization of care. Adequate qualified staff should be employed and well trained to manage and update the EMR's system. Only the authorized personnel should have access to manage the system. Constant power supply is also needed to ensure smooth running of the electronic medical record system.

5.0 CONCLUSION

Electronic Medical Records management system has to be an essential technology for health care and necessary tool for improving patient safety and the quality of medical care.

References

1. Mc bride, M.(2008)" All I want for chistimas ",Health Management Technology ,Vol 29,No 10 6p

2.Electronic Health Records (2008)" the numbers ,medicalEconomics,vol 85 no21,18p"

3. Gray D; Aileen A; Barry D.K (2002) A handbook on electronic medical Record. Laing K. (2002).

4. Rogoski, R. (2005, May). Look before you leap, Health managementTechnology,25(5), 10-15

5. Abdullah, M.H Gainers, S.A and Lagier (2003) International journal of systematic Educationary medical oxford press, London

6.The benefits and challenges of the computerized electronic Medical record (Web page retrieved February 20, 2007 from the world wide web. http;//en wikipedia.org/wiki/medical prescription. http://en.wikipedia.org/wiki/laboratory.

7. Hunt, Dereck, L. Hayners, R.B. Hanna S.C, Smith and Kristia (1999).Effects of computer based clinic. Decision system on physician. http//www.va.gov./133h.

8. EPA (2013) Basic requirement of an electronic recording system

9. Concepts and paradigms of object oriented programming by peter Wegner, Brown University.

10. American Medical Association (AMA), (2006 october24).Benefits of an EMR. Retrieved on May 2007 from www.ama.assn.org

11.Fellegi, A., Mooney, S. (1998). Population and higher individual standard for the quality of life.

12. Object Oriented programming in C++ by Robert Lafore

13. Hughes, J. G. Object-Oriented Databases. Prentice Hall, (1991).

14. Catell, R. Object Data Management: Object-Oriented and Extended Relational DatabaseSystems. Addison-Wesley, Reading, Mass., (1994).

15. Huff, S. M., Rocha, R. A., Bray, B. E., Warner, H. R. &Haug, P. J. An event

model of medical information representation. Journal of the American MedicalInformatics Association 2(2),116-128 Mar/Apr (1995).