February 2018

EVALUATIVE STUDY OF DIGITAL RECORD MANAGEMENT SYSTEM IN THE HOSPITALS IN MINNA METROPOLIS. (A CASE STUDY OF GENERAL HOSPITAL MINNA, NIGER STATE. NIGERIA).

Akor Solomon Obotu
obotusolex@yahoo.com

Uganneya Solomon A. Ph.D
University Librarian. University of Agriculture, Makurdi, Nigeria, solomonachia@gmail.com

Ikese Christopher Ogezi

INTRODUCTION

Health record management practice is imperative in any health service providing institution in ensuring quality service delivery. Health records are among the vital tools that hospitals require in order to attain the missions and visions of the respective hospitals. The purpose of health record management is to ensure quality, accuracy, accessibility, authenticity and security of information in both paper and electronic systems (The United States Department of Labour, 2013). Medical service delivery does not only depend on the knowledge of doctors and nurses but also records-keeping processes in the hospital. Health records are in of different types depending on the size and activities of the given hospital. Records managed in hospitals include patient case notes, x-rays, pathological specimens and preparations, patient indexes and registers, pharmacy and drug records, nursing and ward records. (International Records Management Trust, 2010) The health records management program is run in diverse ways in different parts of the world, although differences depend on the needs and scope of service of the specific hospital or health institution. Iron Mountain (2014), notes that health care provider ensures competent service provision and proper health information management to keep costs down, secure patient data, and maintain compliance in rapidly expanding regulatory environment. This means that hospitals determine the priorities rolled by the record management policy. The role of the health record manager is to develop policies for health records management and procedures in order to promote better health records management practice in the hospitals as working together with heads of departments. (National Hospital Services, Portsmouth Hospitals 2011) Jens-Uwe (2013) asserts that cross-enterprise records are electronic case files aimed at the patient and /or the treatment.

In order to cope with the unsustainable rising costs of health care, several governments in industrialized countries including the US, France, Germany and the UK, are driving initiatives through regulations or financial incentives so as to accelerate the adoption of Electronic Health Records (EHRs) by primary care providers as well as hospitals (The Economist Intelligence Unit Limited, 2011). Electronic Health Records (EHRs) are a growing phenomenon that is considered the cornerstone of modern healthcare systems of the current information age to the extent that, "failure to adopt an HER system may constitute a deviation from the standard of care" (Chetley, 2010). In this context, it is worth noting that there have been limited studies on EHR implementation in hospital settings (Evans *et al*, 2014) despite the fact that hospitals account for a substantial share of total health care spending.

EHR is defined as an "electronic record of health-related information on an individual that conforms to nationally recognized interoperability standards and that can be created, managed, and consulted by authorized clinicians and staff across more than one health care organization (National Alliance for Health Information Technology, 2008). EHRs entail high potential benefits and high likelihood of improving individual patients and populations health outcomes (e.g. –clinical outcomes- reductions in medication errors, improved quality of care; organizational outcomes- financial and operational benefits; and societal outcomes- improved ability to conduct research, improved population health, reduced costs that are often challenged by their high level of risk that is persistent over time all along the EHR lifecycle as it is for other software packages (Zlabek *et al*, 2011).

Implementation of clinical information systems in general and EHR in particular has had limited success. The failure of an HER implementation or the poor management of EHR risk associated with its use may hamper a hospital's ability to generate potential benefits in addition to putting

patients' lives at risk and wasting scarce resources. In a broad sense, the poor management of EHR risk has resulted in a high level of dissatisfaction of hospitals with their EHR systems to the extent that recent surveys have reported that about 20% of hospitals want to retire their current EHR and switch to another system (Daly, 2015). In more concrete terms, it has resulted in poor system usability, deficiency in important functionalities, low levels of interoperability, low levels of customizability, and high levels of system vulnerability with regard to security and privacy. In this regard, it is important to note that even successful implementations of EHR have not always generated the expected, later benefits. Hence, it is not surprising to find that, "in the excitement over [EHR], the potential risks associated with it have received less attention" (Mangalmurti, *et al* 2010).

General Hospital Minna is a government owned Hospital in Minna Local Government area of Niger State, Nigeria. The hospital was established under Decree 36 of 1996 (now, Act 36 of 1996), was commissioned on 22nd May 1999 by the Former Head of State, His Excellency, General Abdusalami Abubakar, and opened its door to patients on 11th October, 1999, when the first baby (female) was delivered.

Health care in Niger State as in many other states or even countries is confronted with growing demand for medical treatment and services, due to factors such as growing population and higher standard for the quality of life. Miller (2014), say that health care has been an issue of growing importance for national government. Many national and regional health care plans have been developed in the past decades, in order to control the cost, quality and the availability of health care for all citizens

Anderson (2015), notes that health care provider ensures competent service provision and proper health information management to keep costs down, secure patient data, and maintain

compliance in rapidly expanding regulatory environment. This means that hospitals determine the priorities rolled by the record management policy. The role of the health record manager is to develop policies for health records management and procedures in order to promote better health records management practice in the hospitals as working together with heads of departments.

The major sources of health records in General Hospital Minna, are from the hospitals admissions office and the attending physicians. The source and the process of creation of the records are vital since the two determine the value of that record and its usability. Entries will be made in all inpatient, outpatient, and service treatment, dental and occupational health records by the healthcare provider who observes, treats, or cares for the patient at the time of observation, treatment, or care. This documentation requirement applies to both electronic and paper records.

Based on the above mentioned shortfalls faced by hospitals, this project focuses on the availability of digital record management system, the degree of application as well as the constraints to the application of digital record management system in Hospitals in Minna metropolis.

Statement of Problem

In spite of the important function of medical record, it has come under severe threat by the manual system of medical record keeping. This system involves taking down patient data on pieces of papers, which are then put in to the files and filed in cabinets. The researcher observed that there is missing of pieces of information. One standard hospital study by Okafo-Dike (2014) reveals that on the average, patient records visited, there are pieces of information the doctor could not find in the paper file. Physicians and their office staffs have said that, they spent more time looking for patient information, than the time they have for the patient, as issues related to risk management is security. The first consideration is the physical safety of the data being

stored. Threats exist externally in the form of natural disasters. The most important issue is the security involved in patient's privacy. The implication of this is that there is delay in health care provision, also mistakes could be made due to missing records.

Worldwide medical requests are generally made on simple structured form. If properly filled and handled, it could serve as a reliable and useful medical records (MR) for continuing patient care; protection of the legal interest of the patients, the physician and the Hospital; and meets requirements for standard and researches (Abdulkadir *et al*., 2010). Incomplete, illegible handwriting, use of confusing abbreviations and inappropriate request could limit the value of medical requests Girish and Richard 2006). With these considerations in mind, the researcher carried out an evaluative study of digital record management system in the hospitals in minna metropolis.

Objectives of the Study

The major objective of this study is to carry out an evaluative study of digital record management system in the hospitals in Minna metropolis (General Hospital Minna as the case study). The specific objectives are as follows:

1. To examine the extent of application of digital record management system in General Hospital Minna.
2. To find out the benefits of digital record management system in General Hospital Minna.
3. To investigate the constraints to the application of digital record management system in General Hospital Minna.
4. To find out the ways by which the application of digital record management system in General Hospital Minna can be improved for effective services delivery.

Research Questions

This study sets out to provide answers to the following research questions:

1. What is the degree of application of digital record management system in General Hospital Minna.
2. What are the benefits of digital record management system in General Hospital Minna.
3. What are the constraints to the application of digital record management system in General Hospital Minna.
4. In what ways can the application of digital record management system in General Hospital Minna can be improved for effective services delivery.

REVIEW OF RELATED LITERATURE

Concept of Records

Record is a set of data relating to single individual or item. It is also referred to as any instance of a physical medium on which information was put for the purpose of preserving it and making it available for future reference (Tumba, 2013).

Records can also be seen as a recorded information, regardless of medium or characteristics, made or received by an organization in pursuance of legal obligation or in the transaction of business (Wikipedia, June, 2013).

The Information Science Organization (ISO) defines records as “information created, received, and maintained as evidence and information by an organization or person, in pursuance of legal obligations or the transaction of business”. The Information Council on Archives (ICA)

committee on Electronic Records defines a record as "recorded information produced or received in the initiation, conduct or completion of an institutional or individual activity and that comprises content, context and structure sufficient to provide evidence of the activity (Record Management Glossary, 2013).

Concept of Digital Records

It is important to note that digital records are most times called electronic records. So many individuals, professional, scholar and other association/organization had defined digital records looking at it from various points of view. Some of the definitions are given below.

Digital records are created, communicated and maintained by means of computer technology. They may be ''born digital'' (created using Computer Technology) or they may have been converted into digital form from their original format e.g. scans of paper documents (National Archives of Australia, 2013).

Also digital records are records created digitally in the day-to-day business of the organization and assigned formal status by the organization. They may include for example, word processing documents, emails, databases, or internet web pages (Digital Preservation Coalition, 2012).

Digital record or electronic record can also be seen as a record maintained in a coded numeric format that can only be accessed using a computer system that converts the numbers into text or images that can be comprehended by the human eye. This may include records stored in electronic and non-electronic formats such as optical disk (Kol *et al*, 2013).

Some people use the terms 'electronic medical record' (EMR) and 'electronic health record' (EHR) interchangeably. In fact there is a general level of confusion over the difference in the health sector in most countries due to overall lack of clarity by policy-makers, health

professionals, and consultants; the fact that there are no standardized and accepted definitions across the sector furthers the confusion. The following definitions have been selected on the basis of their clarity and comprehensiveness.

An electronic medical record (EMR) is a real-time patient health record with access to evidence-based decision support tools that can be used to aid clinicians in decision-making. The EMR can automate and streamline a clinician's workflow, ensuring that all clinical information is communicated. It can also prevent delays in response that result in gaps in care. The EMR can also support the collection of data for uses other than clinical care, such as billing, quality management, outcome reporting, and public health disease surveillance and reporting.

Furthermore, an EMR may contain clinical applications that can act on the data contained within its repository, for example, a clinical decision support system (CDSS), a computerized provider order entry system (CPOE), a controlled medical vocabulary, or a results-reporting system. In general terms, EMRs are clinician-focused in that they enhance or augment the workflow of clinicians or administrators. EMRs are said to be interoperable if they are able to exchange data using standardized data transmission formats (Ulrich, 2015)

The electronic health record (EHR) is a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting. Included in this information are patient demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data, and radiology reports. The EHR automates and streamlines the clinician's workflow. It has the ability to generate a complete record of a clinical patient encounter – as well as supporting other

care-related activities directly or indirectly via an interface – including evidence-based decision support, quality management, and outcomes reporting (Henderson, 2016).

A third type of record and one which is controlled and managed by the citizen is the personal health record (PHR). It is a universally accessible, layperson comprehensible, lifelong tool for managing relevant health information, promoting health maintenance and assisting with chronic disease management via an interactive, common data set of electronic health information and eHealth tools. The PHR is owned, managed, and shared by the individual or his or her legal proxy(s) and must be secure to protect the privacy and confidentiality of the health information it contains. It is not a legal record unless so defined and is subject to various legal limitations (Field, 2014).

Health care in Nigeria as in many other countries is confronted with growing demand for medical treatment and services, Chambliss *et al*, (2008) due to factors such as a graying population and higher standard for the quality of life. Miller (2014) say that health care has been an issue of growing importance for national government. Many national and regional health care plans have been developed in the past decades, in order to control the cost, quality and the availability of health care for all citizens. Brown (2009), opined that the application of electronic clinical information system (ECIS) has generated useful insight into the quality of data accuracy and health care provision in primary care settings. This is partly one of the adapted style and approach to data entry influenced by the design presented by the recent structure. They further emphasize, that there is a great need for improved education and protocols for consisting data entry in the (ECIS) and also subsequent follow up of patient clarification on the policy for duration and frequency treatment.

Anderson (2015), define medical, health record, or medical documentation of a patient's medical history and care as "medical record" used both as the physical folder of patients and for the body of information which comprises the total of each patient's health history. Medical records are

intensely personal document and there are many ethical and legal issues surrounding them such as the degree of third-party access and appropriate storage and disposal.

The key advantage of shifting to computer-based patient record is the opportunity to strengthen the link between the hospital records and management information system so that resources uses and quality of care can be analysed using Hospital database which increase physician efficiency and reduce costs, as well as promote standardization of care.

Concept of Paper-based Patient Medical Record

Paper-based records require a significant amount of storage space compared to digital records. In the United States, most states require physical records be held for a minimum of seven years. The costs of storage media, such as paper and film, per unit of information differ dramatically from that of electronic storage media. When paper records are stored in different locations, collating them to a single location for review by a health care provider is time consuming and complicated, whereas the process can be simplified with electronic records. This is particularly true in the case of person-centered records, which are impractical to maintain if not electronic thus difficult to centralize or federate (Milewski *et al*, 2009).

When paper-based records are required in multiple locations, copying, faxing, and transporting costs are significant compared to duplication and transfer of digital records. Because of these many "after-entry" benefits, federal and state governments, insurance companies and other large medical institutions are heavily promoting the adoption of electronic medical records. The US Congress included a formula of both incentives (up to $44,000 per physician under Medicare or up to $65,000 over six years, under Medicaid) and penalties (i.e. decreased Medicare and Medicaid reimbursements for covered patients to doctors who fail to use EMRs by 2015) for EMR/EHR adoption versus continued use of paper records as part of the Health Information

Technology for Economic and Clinical Health (HITECH) Act, enacted as part of the American Recovery and Reinvestment Act of 2009.

Most of the patient and administrative information that flow throughout the health care system is still recorded on paper. According to an earlier report by cnnmoney.com, only about 8% of the nation 5,000 Hospital and 17% its 800,000 physician currently use the kind of common computerized record keeping system. Philadelphia (May 1, 2009) medicine part B spending on Imaging rose from $6.80 billion in 2000 to $ 14.11 billion in 2006 (webpage, Wikipedia "Advantage of electronic medical records").

In general, medical records may be on physical media such as film (X-rays), paper (note) photographs, often of different sizes and shapes, physical storage of documents in problematic as not all document types fit in the same size folder or storage spaces. In the current global medical

COMPUSOFT, An international journal of advanced computer technology, March-2013 (Volume-II, Issue-III) environments, patients are shopping for their procedures many international patients travel from one country to the other for special treatment or to participate in clinical trial co-ordination these appointment via paper-based record is a time consuming procedure. Physical records usually requires significant amount of space to store to them, when physical records are no longer maintained, the large amount of storage space are no longer required paper film and other expensive physical media usage can be reduce by electronic record storage. Paper records are stored in different location, furthermore, collecting and transporting them to a single location for review by a health care provider is time consuming. Also when paper records are required in multiple location, copying, faxing and transporting cost are significant (Okeke, 2008).

In 2004, an estimate was made that 1 in 7 hospitalizations occurred when medical records were not available. Additionally, 1 in 5 lab-tests were repeated because results were not available at the point of care. All these were as a result of paper-based medical records. Hand written paper medical records can be associated with poor legibility, which can contribute to medical errors (Pierce, 2008).

Paper-based patient record hinder flow according to (Schneider & Wagner, 1993) once information has been recorded within a set of bulky paper records, it may not be readily accessible later, effort to compile more complete paper records are likely to make this problem worse. Paper records can only be used in one place at a time. The data are only as secure as the paper itself and the entire records are individual page within a record can easily be misplace, damage lost or stolen.

Concept of Computer-based Patient Record

Laing (2002), suggested that if all information in paper-based records were digitized and embedded within information system that will provide rapid context sensitive access to the data and link to other information in the institution. The health care delivery could fully documented information using a variety of convectional and handheld computers equipment with keyboard, pen-based. Structured data entry or handwriting recognition illegible or consistent entries could be caught and corrected as they are entered in medical order, their results and all others internal transactions could be tracked automatically. Though, (Lating, 2006), have made a significant contribution toward the development of a computerize medical records for medical institutions, however this project intends to look at how medical record of a hospital would be share only within the hospital by the staff and not across the institution.

Health information could be stored as individual indexed items of information that could be abstracted into reports and compare among patients. Record could be accessed and easily duplicated when necessary. Information anywhere within the record could be access by minimal delay. Data could be located from any one delivery medium and digital device that access them could be designed with a wide variety of capability and capacity (Hunt *et al*, 2012). A page from a paper base patient record could be stored electronically in many different ways. The information could be scanned and store as an image (much like a fax) that is the picture of a paper form but is not searchable or editable document imaging system are widely available that use computer and optical disk to store such image and make them available to clinicians on workstation with graphic terminals. These system reduces the amount of physical storage space require for patient record and they allow the record to be shared by clinicians and administrative officers without physically transporting the records.

Handwritten medical record can be associated with poor legibility which can contribute to medical error, pre-printed firms, the standardization of abbreviation and standard for penmanship were encouraged to improve reliability of paper medical records. Electronic record help with the standardization of forms terminology and abbreviation and data input. Digitization of form facilitates the collection of data for epidemiology and clinical studies. Duplication of lab tests, diagnostic imaging, and other services can be prevented by good record-keeping of any type. However, because database records can be available at many locations at once, integration of services and awareness of duplication can be reduced. Database management system enable health organization to access old records instantly, thereby allowing the health work to send to another health organization in the event of an emergency.

According to Pierce (2008), there are affordable digital technology solutions for reducing paper dependency well within the reach of practices that are uncertain whether they could benefit from a fully integrated electronic medical records system.

Automated storage and retrieval systems can provide many of the same benefits as EMR technology for less cost or may be used to complement an EMR system by providing large volume electronic storage of sensitive paper files that include protected health information. Typically, the solution includes hardware and software that enable secure capture, printing, scanning, electronic storage, and retrieval of medical documents.

Hardware components may include:

1) a digital multifunction product (MFP) which includes print, scan, copy, and fax capability where hardcopy documents (such as paper copies of EKGs, consultation letters and release forms) are scanned;

2) a secure electronic filing and retrieval system; and

3) a dedicated backup server for added protection from data loss. Software components may include applications for indexing and retrieving documents, and for generating accountability reports.

Paper-to-digital uploading applications help solve the problem of redundant data entry between paper forms and digital data systems. Until recently, organizations have had no choice but to manually re-enter data from paper documents into digital practice management or medical records systems requiring staff time and introducing the potential for errors. Now there are reliable solutions that simplify the uploading of information from paper forms via a single scanning operation.

The advantages of paper-to-digital uploading include:

• Easily turn paper documents into digital format to reduce redundant filing of paper and electronic documents

• Use familiar office technology (copier/scanner) that may already be in place

• Easily fit within existing workflow

• Integrate into selected information systems

• Feature built-in security of vital records and tracking of use

• Require relatively little training to use.

Indexing applications are useful for capturing the "metadata" of each transaction — such as the name of the person retrieving the file, the name of the person requesting the file, the date and time of transaction, and the number of copies generated. This information can be captured automatically for reporting purposes, creating a verifiable audit trail that will help a practice meet HIPAA privacy regulations. With a single, reliable, and searchable location for patient records and other documents, organizations can reduce the incidence of lost and misplaced files. The automated storage and retrieval system virtually eliminates the risk of employees returning files to the wrong location. Automated storage and retrieval also increases efficiency by automating manual processes. And although the automated process is electronic, it conforms to existing workflows for file capture and retrieval.

Network scanning and routing can be an effective strategy for distributing healthcare documents in organizations that use email. Network scanning software allows you to route scanned documents to other doctors or healthcare providers as email attachments directly from the control panel of a digital MFP. The attachments are sent as TIFF, PDF or other easily transferable file formats. Security can be ensured through encrypted transmission and login authentication that associates a specific user with a specific transaction.

Web-based storage and management can provide a single access point for healthcare documents without requiring substantial investment in technology. This solution uses a scanning-enabled digital multifunction product (MFP) to transmit pages directly to a secure Internet site, where they are filed in individual private folders holding all related records, including physicians' notes, test results, and other files. Authorized users can then access these folders through any Web-connected device. Access is password protected, and data transmission is encrypted for added security.

Automation of Patient Record Management Program in Hospitals

Most hospitals have embraced the aspect of implementing electronic health record management system. Kola, Shoewu.&Olatinwo, (2003, p 1) report that many hospitals are incorporating ICT into health record management due to the high level of the shortcomings of manual health records management, such as misfiling of patients health records, enormous amounts of space, legibility of doctors handwriting, transfer of medical records or files from one department to another. Mackenzie K. (2013), states that: *"Medical errors account for 98,000 deaths each year in the U.S., according to a 1999 report published by The Institute of Medicine (IOM)...interestingly, the report claims that medical errors are not due to incompetent people, but to bad systems that include the processes and methods used to carry out various functions."* These, together with many other evidences make it clear that indeed automation of health records is a vital step in any health institution. The choice of a record management system depends on quiet a number of factors. The system of choice determines the safety and availability of records when needed. ISO 15489 (2001) gives criteria for auditing a record management system. The system must ensure; authenticity, reliability, integrity, and usability.

Maintaining records for as long as the records are required; records must be retained for a period of time that is in accordance with authorised legislative and jurisdictional requirements. Decisions about how long records must be retained are defined in disposition or disposal policies and rules. There will be some records that must be retained permanently while others will be required to be retained for varying periods or have a maximum retention period. Automation of health record management program comes with other obligations. Dollar (2000), states that staff training on new record management systems is imminent if the system is expected to cause positive change in the record management program. Rothenberg, (2001), states that automation of record management practice is a gradual process.

Benefits of Hospital Information Systems

Hospital Information Systems improve workflow and increase patients' access to health care (Ouma & Herselman, 2008). Sisniega (2009) asserted that the applications of information and communication technologies facilitate ubiquitous and instantaneous communication between organizations and their stakeholders. ICT enable people and organizations to achieve seamless workflow and effective processes through improved interactions. Electronic health technologies enable effective networking by physicians, allow online review of patients' treatment, and provide for accurate prescription of drugs. Radiology information systems enable the transmission of radiological images for evaluation in remote sites (Weimar, 2009).

Electronic data interchange is part of the applications of a robust and integrated electronic health

record system. The type of integrated system envisioned by President Bush's administration is aimed at warehousing the health care information of all Americans in a national database by 2014 (Thielst, 2007). Electronic data interchange primarily is aimed at achieving seamless

continuity of care, irrespective of patient migration from one clinician to another or from one city to another.

A study on electronic medical records by Keenan et al. (2006) found improvement in daily work and enhanced patient care: (a) medication turn-around times fell from 5:28 hours to 1:51 hours; (b) radiology procedure completion times fell from 7:37 hours to 4:21 hours; and (c) lab results reporting times fell from 31:3 minutes to 23:4 minutes. In the same study, transcribing errors for orders declined, and length of hospital stay decreased. Other benefits of electronic medical records systems are possibility for online monitoring of vital signs, capability for multi-site review of patients' records, and improved physicians' collaboration in patient care. EMR facilitates easy access to medication administration records, sharing of consultation reports, and decreased transmit time of test results by reducing the time taken to deliver paper versions (Keenan et al., 2006).

In a heterogeneous society like Nigeria with significant disparity in accessibility of health care facilities between urban and rural communities, hospital information systems may help to bridge the gap in availability of patient care (Ouma & Herselman, 2008). Sammon, et al. (2009) associated patient data analysis systems (PDAs) with enhanced storage and analysis of patient data enabling physicians to reach improved clinical decisions on patient care. Similarly, clinical information systems capture clinical data to enhance prompt and efficient decision making (William & Boren 2008). Health care policy makers seeking ways of improving quality of patient care at a reduced cost are leveraging hospital information systems to achieve these objectives (Sammon et al., 2009; Simon et al., 2008).

A major challenge that exists for health care systems is the integration of software systems that can service the various needs of the organization. Stone, Patrick, and Brown (2005) opined that

effective organization creates specific and strategic objectives, including objectives related to the clinical and operational strategies (p. 33). Failing to address the interrelationships that exist between the strategies can result in unforeseen negative consequences (p. 34). In the implementation of an electronic medical record, an organization that fails to identify the need for the EMR system to communicate or integrate with the billing software may likely encounter increase process failures requiring additional resources for correction. Successful organizations develop strategies capable of identifying organizational needs. Such organizations anticipate challenges and launch remediation efforts by installation of computer networks and systems (Stone et al., 2005)

Information technology in general enables intra organizational networking that facilitates effective information flow within the various units of a firm. In the world of an organization's complex network, workforce diversity, and departmentalization, information can become lost in a milieu of activities; hence, decision-making, schedule of responsibilities, and an information flow chart are necessary for effective organizational operations (Kaliyadan *et al*, 2009). In addition to prompt delivery of investigation reports to patients and clinicians, some aspects of information technology enable decisions made on organizational processes to be timely and effectively disseminated to the workforce.

Analytical software systems provide means for both dissemination of information and relevant quantitative data to support management decisions. Analytical information systems help organizations to maintain a competitive edge in the marketplace by increasing operational speed and maintaining fluidity of information flow (Keenan *et al*, 2014). Crane and Crane (2006) reported that numerous solutions for the medication error problem in hospital settings might be averted with the use of an integrated systems approach. However, execution of an organization's

integrated electronic medical record without use of communication billing software may escalate process breakdowns. Phillips (2009) stated that the use of an integrated system offers considerable conceptual flexibility and data integration capabilities instead of using one module for electronic records. An integrated records system promotes a user-interface with e-records repository to facilitate storage and eventual retrieval of records.

Other benefits of electronic health systems include optimization of clinical time because of effective communication and increased compliance with regulatory guidelines (Georgiu *et al*, 2005). Keenan *et al*. (2006) opined that electronic medical records system provide an effective educational tool for training of resident doctors and medical students. Health care information technology and e-health offer strong potential in research and development of clinical protocols.

Challenges in Health Records Management Practice

In the case of manual records, it is established that the greatest issue is lack space for the increasing number of health records. With concern to physical space for storage of paper health records, Dollar (2002) notes that it is a challenge many institutions will keep battling with. Hospitals producing hundreds to thousands of records each day means that after a given period of time the records accumulate huge volumes of paper records. This may bring about difficulty in locating some records and also lack of sufficient space to carry all the records before they are disposed. This becomes the major challenge for paper records. For electronic records many challenges have been identified. These challenges include high costs of installation, system failure, cyber-crime, lack computers operational skill of the record management staff. The study focused on the aspect of legal requirement and technological obsolescence, in electronic records management. Unlike paper, loss of electronic records is guaranteed unless actively managed. Paper can be ignored for 100 years, and when it is opened the information is perfectly readable.

If the state ignores electronic records for 10 years, the fragility of the media and technological obsolescence will make access difficult. The longer one waits to manage these records, the less likely the data will be recoverable. Therefore, the condition poses a challenge of obsolescence of electronic records management systems, hence the record therein. The Department of Technology Services, Philippines (2012), also points out that like the floppy disc, the CD, or its operating system, may become obsolete in the future, requiring State Archives to either maintain obsolete technology or to upgrade or convert information to newer technology formats. All the options mentioned above will be costly. This means that there is need to always keep up to date with the new technologies to make sure that the information available in the current formats can be accessed even in future when technology has changed.

Another challenge of electronic health records management, according to the International Record Management Trust (2006) is that of legal requirement. The Trust argues that, in hospitals where the introduction of a patient administration system is feasible, it may be possible to dispense with certain types of records needed in a paper based environment. In particular, the patient registers are likely to be deemed irrelevant or less necessary. Where the registers above constitute duplicate records of the same information in different formats, their use can be discontinued where appropriate computer systems are in place. Nevertheless, where the content of paper registers may be needed for legal or archival purposes, appropriate measures must be taken before any decision is made to rely solely on the electronic system and to abandon paper altogether. These legal requirements may include the need to sign, by hand, a document to authorise for instance a medical operation on a patient.

Summary of Literature Review

This chapter reviewed related literatures on the evaluative study of Digital record Management System in Hospitals in Minna Metropolis. The review was conducted under the following sub-headings for effective and efficient literature review process.

The study reviewed the overview of hospital information system in Nigeria, overview of health records in hospitals, overview of paper-based patient medical record, review of computer-based patient record, automation of patient record management program in hospitals, benefits of hospital information systems and challenges in health records management practice as asserted by various authorities in this discipline.

This literature review process reviewed the availability and the extent of use of digital record management system in hospitals to ensure timely medical services delivery and some of the functions identified is that electronic health technologies enable effective networking by physicians, allow online review of patients' treatment, and provide for accurate prescription of drugs. Also, Radiology information systems enable the transmission of radiological images for evaluation in remote sites. And some of the problems of digital record management system identified in the literature include high costs of installation, system failure, cyber-crime, lack computers operational skill of the record management staff. The Literature also revealed that the poor attitudes to recording and archiving in our tertiary hospitals call for concern. Unless good record practices is imbibed and the use of large volume record books that will increase paper damages and sheet loss from handling is discouraged, what is recorded today may neither be useful nor be available tomorrow. Hence, to close this gap, medical staff must strive to make appropriate medical recording and good record handling a habit today, because our tomorrow may depend on it.

RESEARCH METHODOLOGY

Research Design

The study will adopt the descriptive survey design. In survey design, the researcher selects a sample of respondents and administers a questionnaire to collect information on variable of interest. This design is considered appropriate for this study because descriptive survey research describes data and characteristics about the population being studied. Put forward that research design describes situations and help you better understand research findings, whether reported in the mainstream, or when reading a research study.

Population of the Study

The population of the study will consist of the entire medical staff of General Hospital Minna.

The medical staff of the General Hospital Minna that constitute the population is 124 (Doctors 35, Nurses 56, Pharmacists 14 and Laboratory Technologists: 19) (Registry Department, 2017).

Sample and Sampling Technique

A sample size comprises the total number of population elements or sampling units that are selected (i.e. sampled) for investigation in a research study (Murphy & Bird, 2012). In addition, Meyers (2003) emphasized that a good sample size must be a near representative of the entire population as possible for the generalization of findings. In a condition where the population is small and all the needed criteria to be investigated exist in the small population there is technically no need for any sampling. There will be no sampling as the entire population will be used for the study.

Research Instrument

The “closed ended” type of questionnaire will be adopted for this study. The questionnaire will be designed for the evaluative study of Digital Record Management System in the hospitals in

Minna metropolis. The information that will be provided will help to achieve the aim and objectives of the study.

Validation of Research Instrument

The validation of the research instrument is necessary in order to ensure that it measures what it was designed to measure within the context of the research objectives (Uzagulu, 2012). A research design is said to be valid if it enables the researcher to elicit the correct responses from sampled subjects; otherwise, it is a faulty design and may not lead to correct findings (Garshnek & Burkle, 2012). Three experts in the field of Library and Information Technology will assist in vetting the measuring instrument objectively, in order to critically examine and determine the appropriateness of the items and indices drawn in measuring the variables included in the study, their suggestions, corrections, and ideas will be incorporated into the final production of the research instrument.

Method of Data Collection

The questionnaire was self-administered by the researchers.

Method of Data Analysis

The data will be analyzed using frequency count and simple percentage of responses. Data collected will be presented in tables; each of the items in the questionnaire will be added up and divided by the total number of questionnaire returned for the percentage to be determined.

DATA ANALYSIS AND INTERPRETATION

This chapter presents results of the data analysis and discusses the findings of the research. It was carried out under data presentation, analysis, interpretation, and discussion of findings.

Data Presentation and Interpretation

Table 1: Research Question 1: What is the degree of application of digital record management system in General Hospital Minna?

S/N	Questions	SA(0%)	A(0%)	D(0%)	SD(0%)	Total (100%)
1	Is your hospital currently using any form of digital record management system?	49(39.5)	53(42.7)	14(11.3)	8(6.5)	124(100)
2	Is the digital record management system a customized one mainly for your hospital?	41(33.1)	62(50)	16(12.9)	5(4)	124(100)
3	Is the digital record management system in your hospital easy to use when patient's records are being stored, accessed and retrieved?	52(41.9)	57(46)	9(7.3)	6(4.8)	124(100)
4	Is the digital record management system in your hospital accurate in handling patient's record?	46(37.1)	58(46.8)	13(10.5)	7(5.6)	124(100)
5	Is the digital record management system more efficient than the traditional manual health record?	50(40.3)	53(42.7)	13(10.5)	8(6.5)	124(100)

Table 1 shows that 49(39.5) of the respondents strongly agreed while 53(42.7) agreed, 14(11.3%) disagreed and 8(6.5%) strongly disagreed respectively that their hospital is using digital record management system. Also, 41(33.1%) of the respondents strongly agreed while

62(50%) agreed, 16(12.9%) disagreed and 5(4%) strongly disagreed respectively that the digital record management system was a customised one for their hospital. Furthermore, 52(41%) of the respondents strongly agreed while 57(46%) agreed, 9(7.3%) disagreed and 6(4.8%) strongly disagreed respectively that the digital record management system in their hospital is easy to use when patient's records are being stored, accessed and retrieved. 46(37%) of the respondents strongly agreed while 58(46%) agreed, 13(10.5%) disagreed and 7(5.6%) strongly disagreed respectively that the digital record management system in their hospital is accurate in handling patient's record. Finally, 50(40.3%) of the respondents strongly agreed while 53(42.7%) agreed, 13(10.5%) disagreed and 8(6.5%) strongly disagreed respectively that the digital record management system is more efficient than the traditional manual health record system.

The above result indicated that General Hospital Minna apply digital record management system in rendering their services having a response indication of 62(50%) agreed and 52(41.9%) strongly agreed to the degree of application of digital record management system in their hospital.

Table 2: Research Question 2: What are the benefits of digital record management system in General Hospital Minna?

S/N	Benefits of digital record management system	SA(0%)	A(0%)	D(0%)	SD(0%)	Total (100%)
1	Digital record management system enables health organization to access old records instantly.	62(50)	39(31.5)	12(9.7)	11(8.9)	124(100)
2	Electronic record help with the standardization of forms, terminology, abbreviation and data	40(32.3)	49(39.5)	21(17.0)	14(11.3)	124(100)

	input.					
3	Transfer of medical records or files from one department to another.	60(48.4)	40(32.3)	14(11.3)	10(8.0)	124(100)
4	Enables intra organizational networking that facilitates effective information flow within the various units of a firm.	42(33.9)	47(37.9)	20(16.1)	15(12.1)	124(100)
5	It facilitates universal and rapid communication between organizations and their stakeholders.	50(40.3)	50(40.3)	16(12.9)	8(6.5)	124(100)
6	It enables effective networking by physicians, allow online review of patients' treatment, and provide for accurate prescription of drugs.	53(42.7)	46(37.1)	16(12.9)	9(7.3)	124(100)

Table 2 shows that 62(50%) of the respondents strongly agreed while 39(31.5%) agreed, 12(9.7%) disagreed and 11(8.9%) strongly disagreed respectively that digital record management system enables health organization to access old records instantly. Also, 40(32.3%) of the respondents strongly agreed while 49(39.5%) agreed, 21(17%) disagreed and 14(11.3%) strongly disagreed respectively that electronic record help with the standardization of forms, terminology, abbreviation and data input. Furthermore, 60(48.4%) of the respondents strongly agreed while 40(32.3%) agreed, 14(11.3%) disagreed and 10(8.0%) strongly disagreed respectively that one of the benefits of digital record management system is that it enables the transfer of medical records or files from one department to another.

42(33.9%) of the respondents strongly agreed while 47(37.9%) agreed, 20(16.1%) disagreed and 15(12.1%) strongly disagreed respectively that digital record management enables intra organizational networking that facilitates effective information flow within the various units of a firm. Also, 50(40.3%) of the respondents strongly agreed while 50(40.3%) agreed, 16(12.9%) disagreed and 8(6.5%) strongly disagreed digital record management system facilitates universal and rapid communication between organizations and their stakeholders. Finally, 53(42%) of the respondents strongly agreed while 46(37.1%) agreed, 16(12.9%) disagreed and 9(7.3%) strongly disagreed respectively that digital record management system enables effective networking by physicians, allow online review of patients' treatment, and provide for accurate prescription of drugs.

The above result implies that the benefits of digital record management system among many other include: enables health organization to access old records instantly and transfer of medical records or files from one department to another.

Table 3: Research Question 3: What are the constraints to the application of digital record management system in General Hospital Minna?

S/N	Constraints to the application of digital record management system	SA(0%)	A(0%)	D(0%)	SD(0%)	Total (100%)
1	Legal requirements (the need to sign, by hand, a document to authorise for instance a medical operation on a patient).	41(33.1)	64(51.6)	14(11.3)	5(4)	124(100)
2	High cost of installation, system failure and cyber-crime.	47(37.9)	65(52.4)	9(7.3)	3(2.4)	124(100)

3	Lack computers operational skill of the record management staff.	33(266)	43(34.7)	29(23.4)	19(15.3)	124(100)
4	Loss of electronic records is guaranteed unless actively managed.	41(33.1)	49(39.5)	21(16.9)	13(10.5)	124(100)

Table 3 analysed the constraints to the application of digital record management system. The most significant of these constraints which were very common to this hospital included: legal requirement and high cost of installation, system failure and cyber-crime.

About 41(33.1%) of the respondents strongly agreed while 64(51.6%) agreed, 14(11.3%) disagreed and 5(4%) strongly disagreed respectively that legal requirement is one of the constraints to the application of digital record management system. Also, 47(37.9%) of the respondents strongly agreed, while 65(52.4%) agreed, 9(7.3%) disagreed and 3(2.4%) strongly disagreed respectively that High cost of installation, system failure and cyber-crime are some of the constraints to the application of digital record management system. More also, 33(26.6%) of the respondents strongly agreed, while 43(34.7%) agreed, 29(23.4%) disagreed and 19(15.3%) strongly disagreed respectively that one of the constraints to the application of digital record management system is lack computers operational skill of the record management staff. Furthermore, 41(33.1%) of the respondents strongly agreed while 49(39.5%) agreed, 21(16.9%) disagreed and 13(10.5%) strongly disagreed respectively that loss of electronic records is guaranteed unless actively managed.

The above result revealed that the constraints to the application of digital record management system in the hospital were highly felt by the medical staff. These constraints were: legal requirements, high cost of installation, system failure and cyber-crime.

Table 4: Research Question 4: In what ways can the application of digital record management system in General Hospital Minna can be improved for effective services delivery?

S/N	Questions	SA(0%)	A(0%)	D(0%)	SD(0%)	Total (100%)
1	The electronic health record system should be web-based in order to provide a full fledge internet services in the system.	60(48.4)	63(50.8)	1(0.8)		124(100)
2	The Government should be involved in the funding of EHR system development and implementation in the hospital.	58(46.8)	64(51.6)	1(0.8)	1(0.8)	124(100)
3	The EHR system should be user friendly.	61(49.2)	63(50.8)			124(100)
4	The hospital should not depend on power supply by the Power Holding Company of Nigeria (PHCN) alone but to have a stand power source that will automatically inter switch.	51(41.1)	67(54)	3(2.4)	3(2.4)	124(100)

The table above presents the suggestions raised by the respondents in the hospital on the improvement of digital record management system for effective medical service delivery. Some of the suggestions raised included: the electronic health record system should be web-based in order to provide a full fledge internet services in the system with 60(48.4%) of the respondents strongly agreed while 63(50.8%) agreed and 1(0.8%%) disagreed respectively. Also, 58(46.8%) of the respondents strongly agreed while 64(51.6%) agreed, 1(0.8%) disagreed and 1(0.8%) strongly disagreed respectively that the Government should be involved in the funding of EHR system development and implementation in the hospital. Furthermore, 61(49.2%) strongly agreed while 63(50.8%) agreed respectively that the electronic health record system should be user friendly. Finally, 51(41.1%) of the respondents strongly agreed while 67(54%) agreed, 3(2.4%) disagreed and 3(2.4%) strongly disagreed respectively that the hospital should not depend on power supply by the Power Holding Company of Nigeria (PHCN) alone but to have a stand power source that will automatically inter switch.

Discussion of Findings

Linking the analysis of this research with the research questions, it was observed that the degree of application of digital record management system is high in general hospital Minna having a response indication of 62(50%) agreed and 52(41.9%) strongly agreed to the degree of application of digital record management system in the hospital.

Also, from the data gathered, it was observed by the researcher that the respondents agreed with the benefits of digital record management systems ranging from transfer of medical records or files from one department to another, to help with the standardization of forms, terminology, abbreviation and data input, and other benefits.

The study further revealed that the constraints to the application of digital record management system in the hospital were highly felt by the medical staff. These constraints were: legal requirements, high cost of installation, system failure and cyber-crime.

Summary

This study evaluated digital record management system in the hospitals in General Hospital Minna. The study revealed that digital record is easy to use when patient's records are being stored, accessed and retrieved. The study clearly revealed that a number of benefits exist in the use of digital record management system. Some of these benefits included:

1. Digital record management system enables health organization to access old records instantly.
2. Electronic record help with the standardization of forms, terminology, abbreviation and data input.
3. Transfer of medical records or files from one department to another.
4. Enables intra organizational networking that facilitates effective information flow within the various units of a firm.
5. It facilitates universal and rapid communication between organizations and their stakeholders.
6. It enables effective networking by physicians, allow online review of patients' treatment, and provide for accurate prescription of drugs.

These findings also include some constraints to the application of IT in COE Minna Library which is as follows:

1. Legal requirements (the need to sign, by hand, a document to authorise for instance a medical operation on a patient).
2. High cost of installation, system failure and cyber-crime.
3. Lack computers operational skill of the record management staff.
4. Loss of electronic records is guaranteed unless actively managed.

However, in order to improve the application of IT in the academic library, various suggestions were given which include:

1. The electronic health record system should be web-based in order to provide a full fledge internet services in the system.
2. The Government should be involved in the funding of EHR system development and implementation in the hospital.
3. The EHR system should be user friendly.
4. The hospital should not depend on power supply by the Power Holding Company of Nigeria (PHCN) alone but to have a stand power source that will automatically inter switch.

CONCLUSION AND RECOMMENDATION

Conclusion

The study revealed that digital record management is of great significant in rendering medical services. Its application is more evident in the transfer of medical records or files from one department to another and it enables health organization to access old records instantly. Based on the findings of this study, it was concluded that e-health record has the ability to improve the quality of health care services rendered by the hospital.

Recommendations

The following recommendations were made, based on the findings of this study.

1. The hospital should devote a substantial budget to technological development annually for maintenance of equipment and infrastructure in the hospital.
2. Policies, strategies and decisions to positively support and guide the proper implementation and usage of digital record management system should be upheld and considered very important in the hospital system.
3. Adequate provision should be made for alternative power supply to solve the problem of erratic power supply which makes accessibility to the electronic record difficult for the medical staff.
4. The dearth of unskilled staff in ICT should be urgently addressed. Periodic staff training should be organized for the medical staff to improve their ICT skills and make them relevant in the present day technological-driven health care delivery.