UNIVERSITY OF GHANA

ASSESSMENT OF ELECTRONIC HEALTH MANAGEMENT INFORMATION SYSTEM AT UNIVERSITY OF GHANA HOSPITAL

BY

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THIS IS A LONG ESSAY SUBMITTED TO THE UNIVERSITY OF GHANA BUSINESS SCHOOL, UNIVERSITY OF GHANA, LEGON, IN PARTIAL FULFILLMENT OF THE REQUIREMENT FOR THE AWARD OF MASTER OF BUSINESS ADMINISTRATION (HEALTH SERVICE MANAGEMENT OPTION)

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DECLARATION

The author of this completed thesis hereby solemnly declares that this is the end product of her year-long back-breaking research and all references made have been duly and formally acknowledged in the reference section and that no part or entire thesis has been submitted to this university or any other academic and non-academic institution for such an award.

SIGNED: ……...…… **DATE**……..

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CERTIFICATION

I hereby certify that this long essay was supervised in accordance with the procedures laid down by the University of Ghana.

SIGNED..... **DATE**……..….

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DEDICATION

I dedicate this piece of work first and foremost to God Almighty for granting me the grace, wisdom and understanding to produce this work.

Also, to my parents Charles Amankwah (Mr.) and Victoria Odei Wontumi who have played a vital role in my studies and have guided me at every step with their precious financial, and spiritual support and encouragement throughout the period of this course.

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ABSTRACT

Incorporation of Information and Communication Technology into healthcare system has electronically transformed the approaches to medical data collection, storage, retrieval and its management across all health institutions in the world. However, there has been a drift of focus from core issues pertaining to the preparation processes, benefits, challenges, and prospects of such transformative innovation in the health sector. This study therefore sought to examine such fundamental shift by focusing on the electronic health management information system at the University of Ghana Hospital at East Legon in Accra after two and half years of its implementation. The purpose was to examine the effectiveness of the implementation of the eHMIS adopted as a new EHR system for providing healthcare at the university hospital. The specific objectives were to evaluate prior assessment made before implementation, the benefits, and challenges of the eHMIS. To achieve these specified objectives, the study adopted interpretive design combined with qualitative methods to collate and analyze the primary data from 27 sampled health professionals who use the eHMIS system to render healthcare services.

Findings revealed that the participants possess a general knowledge about health information system (HIS). Also, the university policy makers made well planned preparation towards the purchase and adoption of the eHMIS system at the University's hospital at East Legon but there were some lapses. In spite of that, the use of the system has brought enormous benefits such as easiness, quickness, and simplicity to the accessibility of patients' health records. Nonetheless, resolvable challenges identified included unstable internet service, intermittent power outages, and inadequate training. It was conclude that, the implementation of the eHMIS has been tremendously successful, which has brought benefits such as easiness, quickness, and simplistic accessibility to patients' health records hence the prospects of the eHMIS is very optimistic when the recommendations that target the lapses and challenges are considered in the further review and use of the system. Recommendations made included the installation of uninterruptible power supply, and engagement of more ICT superintendents to offer assistantship to the health professionals who have no or limited ICT or computer skills and knowledge to use the system effectively and efficiently.

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LIST OF ABBREVIATIONS

ANT	Actor Network Theory
EHR	Electronic Health Record
EHRS	Electronic Health Record System
eHealth	Electronic Health
eHIS	Electronic Health Information System
HAMS	Health Administration Management System
HIS	Health Information System
HMIS	Health Management Information System
ICT	Information and Communication Technology
ICTs	Information and Communication Technologies
IT	Information Technology
SPSS	Statistical Product for Social Sciences
UG	University of Ghana
UPS	Uninterruptible Power Supply
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION TO THE STUDY

1.1 Background

The infusion of modern information technology into the medical records keeping has made electronic healthcare (i.e. eHealth) gained much prominence in the healthcare sector across the globe. This owing to the concerted effort at national, regional, and international levels to make the management of patients' health information more enhanced, efficient, and effective for quality medication.

Generically, the World Health Organization (WHO) defines eHealth in its broad scope as the cost-effective and secure adoption of information and communication technologies (ICTs) to assist health and health-related fields, comprising healthcare services, and health surveillance, education, knowledge, literature, and research (WHO, 2019). In a narrowly construed manner, it is described as the healthcare practice assisted by electronic processes (Talking Medicines, 2017) or the use of ICTs for healthcare practice (WHO, 2019). It therefore comprises technology such as patient administration systems, lab systems, and electronic health records (Talking Medicines, 2017).

Since the introduction of the electronic health records (EHR) in the health sector, there has been a great total transformation of paper-based health record keeping and transmittal systems to an electronic system (Routine Health Information Network [RHINO], 2019). Before the introduction of eHealth, patients' health records were kept manually in large volumes of printed folders, which demanded appropriate records management practices in order to ease storage and retrieval of records. The Center for Medicare and Medicaid (2012) defines EHR as "an electronic version of a patient's medical history that is maintained by the provider over time, and may include all of the key administrative clinical data, relevant to that person's care under

a particular provider, including demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports". That is, the invention of EHR systems were designed as a clinical and administrative tool to stock and retrieve patients' medical history. Today, EHR system is one of the eHealth techniques to effectively handle patients' health information and records.

It is generally known that health information or records is one of the important blocks of the EHR system strengthening because health policies and planning mostly depend on the accurate and timely information on various health issues which improves the overall health status of a country. That notwithstanding, it as well serves as a vital element for individual health organization in managing and improving healthcare delivery (WHO, 2019).

One of the great ICT innovations to organize and manage health information or records to strengthening any EHR system is Electronic Health Management Information Systems (eHMIS). This eHMIS is a facility-based data aggregation system designed purposely to automate accurate and timely collection, aggregation, store, analyze, and evaluate medical data for health-related decisions (RHINO, 2019; para. 2). It is best referred as an automated health information management system composed of a set of interrelated procedures and components that function together to generate health information and intelligence to monitor and manage peoples' health status and healthcare services to advance healthcare decisions at all levels (RHINO, 2019; para. 4).

The WHO recognizes the potential benefits of integrating information communication and management technology into healthcare administration (WHO, 1998). In its Health-For-All Strategy, the organization recommended member states to incorporate the appropriate usage of health telematics in the overall health policy framework for the realization of quality healthcare delivery for all and sundry in the 21st century (Dawson, 2011; WHO, 1998). Thus, ensuring

the global vision of equitable distribution of the diverse benefits of science, technology and public health development is achieved for all and sundry around the globe (Dawson, 2011).

As part of this modernization vision, in December 2015, the University of Ghana (UG) Health Services (hereinafter called UG Health Services) implemented an eHMIS, as a new EHR system, into their mainstream service delivery framework to receive and retrieve medical records of patients at one of its long built health facility, popularly called 'University of Ghana Hospital' (hereinafter called UG Hospital). The installation of the eHMIS was to facilitate services delivered by the university's healthcare professionals and to promote quality medical services to patients mostly students and staff of the university. The new electronic healthcare system also automates access to information and has the potential to streamline the clinician's workflow (University of Ghana-Health Services, 2019: para. 3).

The eHMIS implementation agenda was laudable and met with high expectation and full institutional and administrative support. Since its inception, the system has been serving over 30,000 students and over 1000 staffs of the university and it environ inhabitants. However, for time being nothing has been heard about the progress of the implemented eHealth system let alone whether it is meeting its expectations. For this, the study seeks to assess how the implementation of the new EHR system in the university's health facility has been, particularly in terms of its pre-implementation preparation, relevance and challenges in the healthcare delivery framework at the health facility. Such an assessment sought the best way(s) to strengthen the system and help in providing an implementation plan for future similar initiatives.

1.2 Problem Statement

In actuality, varied systems of eHealth have been successfully adopted in thousands of health facilities in the developed countries and minimally adopted among the health facilities in the

developing countries of which Ghana is a part. The various eHealth systems have been designed to lessen the limitations that comes with the paper record system and help improve the quality of healthcare yet several reports on such an innovation show that the use and success rate of the prevailing systems are unsatisfactory (Muvungani, 2012: 12).

Aside the growing interests in the implementation of eHealth systems in the developing countries, most of these projects have been recorded to have survived partially or fully at the pilot stage and have been repealed at the full implementation phase (Adjorlolo & Ellingsen, 2013: 33). In Africa for instance, there have been many efforts by governments and other developing agencies to see to the full implementation of the eHealth system. However, these efforts have not gathered the needed support, thus its less usage, throughout the hospitals in the country (Ministry of Health, 2005: 38). According to Acheampong (2012: 43), the meager uptake of information technology (IT) in the health sector could be attributable to lack of a HMIS strategic plan, policy and legal framework for health data reporting as well as the lack of medical records policy, framework for a central data repository, computerized district HMIS and a centre for health information at central level are cited for the low usage of IT in the health sector in most part of Africa. This notwithstanding, poor communication has been implicated in many instances of inefficiencies in the health sector, with even well-rehearsed procedures to combat emergencies and epidemics suffering major hiccups due to the general lack of good communication among health practitioners (Ministry of Health, 2005: 54).

In the case of Ghana, eHealth system is still at the neophyte stage where a lot of hospitals are still at the partial stage of implementation and others at its piloting stage (Acheampong, 2012: 19). Hopefully, most of the public health institutions are gradually implementing eHealth systems and the UG Health Services is one of them. In December 2015, the UG Health Services implemented an eHMIS—new EHR system—at one of its health facilities (i.e. UG Hospital)

at East Legon as part of their eHealth peregrination to offer state-of-the-art health service deliveries. The implementation of the new EHR system (i.e. eHMIS) has brought mixed reactions from the staff and management of the hospital and service users about the usefulness of the initiative. Looking at the level of attention that has backed the eHMIS of the university, it is fundamental to assess its implementation and usage to identify the pros and cons of it, to inform decisions concerning the system's prospects and ways it can be improved.

In addition, the majority of the empirical studies on the subject matter have focused on developing standards as well as the security, privacy and confidentiality concerns associated with eHealth adoption (Anderson, 2007; Adebesina, Kotzéb, Greunenc & Foster, (n.d.), 2014). This focus has invariably shifted attention from core issues pertaining to the preparation processes, benefits, challenges, and prospects of eHealth projects in the health sector. This study therefore seeks to investigate these fundamental issues without losing sight of the constraints that could impede the adoption and use of eHealth technologies in Ghana.

In the light of this that the study sought to examine the preparatory actions made prior to the implementation and use of the eHMIS as well as its benefits, challenges and prospects since two and half years of its launch by the University of Ghana Health Services.

1.3 Research Objectives

The purpose of this study is to examine the effectiveness of the electronic health information system (eHMIS) adopted in providing healthcare at the UG Hospital. The specific objectives the study sought to achieve were:

1) To examine the prior assessment made by the hospital before the implementation of the eHealth system available.
2) To examine the benefits of the implemented eHMIS at UG Hospital.

3) To examine the challenges of the implemented eHMIS at UG Hospital.

1.4 Research Questions

The study sought to address the research questions outlined as follows.

1) What was the initial preparation (assessment) made before the implementation of the eHMIS?
2) What are the benefits brought by the implemented eHMIS?
3) What are the factors impeding the usability of the implemented eHMIS?

1.5 Scope of the Study

The study assessed the efficacy of the implemented eHMIS at the UG Hospital for delivering healthcare services. The study was confined to the UG Health Services offered at the health facility behind the University's police station. That is, the University's Noguchi and clinic, and other district and regional health facilities were excluded from the assessment. With this, the focus was on the initial preparation made before the usage of the system began, the benefits and challenges that have emerged following the implementation of the electronic record system. The participants were only those who use the eHMIS to render services to patients with the exclusion of patients, heads, and donors of the system facility.

1.6 Significance of the Study

Assessment of how an eHMIS is used in a healthcare facility is of enormous benefits to all stakeholders of an implemented eHMIS and the healthcare facility. First it is of high expectation and at the heart of the study that the issues clouding the implementation of the eHMIS in general be resolved. That is, conducting the study is a way of redressing the core issues pertaining to the level of use and adoption of eHMIS in public health facilities and the factors that drive and constrain them.

Secondly, it sought to contribute to the technological effort and approaches towards streamline the healthcare service delivery. It is a strong contribution of the study to offer feedback of the nature of the kind of healthcare record system that has been installed. The perspectives that the study sought are not just about the implementation process of the eHMIS but also the functionalities and performance of the application being used. It is through this feedback mechanism that, policy makers and the programme developers can address the bugs of the application.

Not just a mere feedback mechanism but a more scientific approach of informing policy makers through evidence based. That is, it enables policy makers to make right and evidence-based decisions that befit the nature of their services. This is very significant and quintessential as wrong decisions can cause a lot of health-related issues and sometimes ends in death.

To the healthcare clients, it will inform them about the nature of technological service offered to them and its trustworthiness. This in a way can boost the trust that healthcare patients have for the health facility of the University.

The study is considered more as an exploratory study; hence, its findings and methodical approaches pave the way for further research to be done within the same area. It therefore facilitates the pace at which other research into same area will be done.

Finally, it is to contribute to literature on eHMIS. The study investigates and documents the preparatory approaches, benefits, and challenges of an implemented eHMIS, and how such findings relate with similar studies done elsewhere. Such a document can be used for further research by both students and professional researchers.

1.7 Limitation of the Study

There were numerous restrictions encountered in the course of executing the study as planned. Most of these constraints emanated from the adopted methodology. One key condition that limited the study was the sole reliance on users of the assessed eHMIS. There was no engagement with the health clients whom the system was meant to serve. Their perspectives were not solicited for the assessment of the eHMIS, hence the study's results were based on solely on the perspectives of the users. This has limited the study's findings and that should be applied with caution.

Lastly, is the qualitative approach of data collection. The method is not replicative hence, the approaches including the research instruments that were used to collect and analyse the primary data will be very hard for any researcher or study of this kind to follow. This implies that, findings will not be consistent if the same approach is repeated elsewhere.

1.8 Chapter Organization

This study was organized into five chapters as usually done. It begun with the chapter one, which outlined the background to the study, problem statement, research questions and objectives, rational for conducting the study, delimitation of the study and this section—organization structure. Then Chapter two followed with the literature review, which elaborated on the theory underpinning the study and clump findings from the diverse scholarly findings related to the study. Next was the chapter three with the methodology. The methodology detailed the research design and methods used to conduct the study. It also consisted of the setting and its profile, target population, sample and sample size, sampling technique, data type and sources, data collection procedure, and the technique for analyzing the data. The chapter four presented the research results from the analyzed data and offered its discussion in relation

to the literature findings. Then finally, the chapter five summarized the study's major findings to deduce conclusions from it and offer appropriate and applicable recommendations.

1.9 Summary

In summary, the chapter gave a global and historical overview of eHealth systems and its relation with information technology. This overview included eHealth description and implementation in health institutions across the globe. It as well offered how information technology has transmogrified healthcare records keepings and its potential in modern world. Cases were drawn from developed and developing countries including Ghana, where the UG Health Services became the center of discussion. As part of the discussion, the chapter offered a brief description of how the implementation of UG's eHealth system at its health facility has been since its inception in December 2015 in the course of offering modern technological services to patients. This led to the problem statement where it was put forth that there have been mixed reactions from both the staff and management of the hospital and service users about the implementation and usefulness of the initiative. Investigating these mixed reactions, the chapter presented research objectives and questions that guide the conduct of the study. Furthermore, the chapter offered scope of the study, which outlines the parameters of the investigation in particular the participants, setting, and the confined areas to be investigated. Much more, the importance and implications to be derived from the final outcome of the study that motivated the researcher to embark on were all outlined. Proceeded with this, are couple of limitations that were considered to have affected the study and its findings. The chapter then ends with the structure of the entire study.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

In order to get a concrete basis for analysis of data, this chapter reviewed intensively, scholarly works and institutional reports from broad sources relating to eHealth and EHR. The review is centred more on EHR as it is broader than eHMIS. Thus, it is deeply oriented beyond the scope of implementation and usage of eHMIS at the UG Health Services but integrates the literature works and theoretical framework engulfing electronic health record and management in other countries as well. In more elaborative manner, this chapter reviewed literature on the historical perspective of EHR, its main objectives, factors that facilitate its implementation and the associated benefits and challenges. This is to give a well-informed and detailed evaluation of the implementation and usage of EHR system in various institutions from world experiences.

2.2 Theoretical Framework

2.1.2 The Actor Network Theory

This study is underpinned by the Actor Network Theory (ANT). The ANT seeks to conceptualize the relationship between technology and societies and this has gained prominence in much research involving information systems, since it provides new concepts and ideas for the understanding of the socio-technical nature of information systems (Walsham, 1997). Thus, ANT is seen as an approach taken by social scientists to investigate the social and technical aspects of an organisation that include people, organizations and technology—all enmeshed in a network (Monteiro, 2000; Walsham, 1997). The theory is credited to the writings of Michel Callon, Bruno Latour, and John Law. ANT asserts that the use of technologies in organisations does not come as a result of any scientific inference. Rather, technologies themselves evolve because of an inherent social momentum that the technologies themselves

possess. The theory again contends that, the only way of ensuring order and efficiency in an organisation rest on the ability of the organisation to establish networks that will shape social interaction within the organisation (Callon & Law, 1995; Hanseth & Monteiro, 1998; Latour, 1991). The ANT views an information infrastructure (EHR) as both an actor in the organisation and also as a tool for establishing a network that links all other actors. Therefore, the actors within a network consist of both human and non-human factors that are heterogeneous to the extent that they are treated in the same way and are even given the collective name of hybrid *collectif* (Callon & Law, 1995; Chilundo & Aanestad, 2004; Latour, 1991; Walsham, 1997). As an Actor-Network, the EHR system in University of Ghana Health Service facility consists of various social and technical actors that play specific roles within a network, which the EHR itself establishes. In this vein, the activities of an actor (both human and non-human) are conceived within a network, but not as acting independently (Chilundo & Aanestad, 2004). Hence, establishing the EHR system and ensuring its effectiveness demands the detection of plausible actors that directly or indirectly affect the continuation of the system. Thus, ANT offers a language for explaining the many small, concrete technical and non-technical mechanisms that go into the building and use of EHR in the facility. The ANT would aid in recognising key actors who are involved in the implementation of the EHR in the hospital as well as explain the necessary elements required for developing a stable EHR in the facility.

2.3 The Concept of eHealth, and Electronic Health Records

2.3.1 eHealth

Globally, eHealth is one of the electronic terms (i.e. e-terms) that has proliferated in the world of health and information technology for decades. The e-term is widely used by many individuals, scholars, academic institutions, professional bodies/organizations, and scientific and non-scientific organizations. Currently, it is a generally accepted neologism in spite of its

conflicting definitions (Oh, Rizo, Enkin, & Jadad, 2005). For instance, the WHO defines it as the cost-effective and secure use of ICTs to support health and health-related fields, comprising healthcare services, and health surveillance, education, knowledge, literature, and research (WHO, 2019). Similarly, the Pan American Health Organization (2010) describes it as the application or use of ICTs to healthcare and a means of enhancing health services efficiency, quality, and access. Irrespective of suggested definitions of eHealth, two disparate concepts: *Health* and *technology,* dominate all (Oh et al., 2005). This suggests that, the e-term is a broad health-related activity that use electronic apparatus to offer health-related information, services, and resources (WHO, 2019).

Generally, eHealth is recognized as a generic health information technology with broad components namely: mHealth, telehealth, and telemedicine (Pan American Health Organization, 2010). These, according to Oh et al. (2005), are eHealth techniques designed as a clinical and administrative tool to improve clinical patient care.

2.3.1 Electronic Health Records System

Generally, there has been increasing definitions and terminologies given to the concept of electronic health record. Nguyen, Bellucci and Nguyen (2014) refers to EHR as any clinical, health or medical records in a digital or electronic format. According to Chilundo and Aanestad (2004: 8), it refers to organized data collected about an individual or aggregated information about clients who have patronized a specific healthcare service. The term has also attracted varied terminologies, including health information system, management of health information system, health information, eHealth information system (eHIS), and electronic health record system (EHRS). For instance, Blair and Hilts (2003) use Health Information Record and defines it as a health data that has been organized in a meaningful format. It is referred to as eHealth information by Ball (1992) and he explains it to be an organized data collected about individual or aggregated information about clients who have benefitted from a specific health

service. Nguyen et al. (2014) detailed that, EHR is a virtual record of all health-related activities including in-patient and out-patient activities, hospital admission, visitations, etc. experienced by people over their lifespan from utero to death. They identified two types of EHR, namely Electronic Management Records, Electronic Clinical Records, Electronic Patient Record (Nguyen et al., 2014).

However, it is interpreted and defined, this study maintains the usage of both EHR and EHRS interchangeably. The management of EHR can be defined as a system to convert data from internal and external sources into information, communicate that information in an appropriate form, to managers at all levels and functions to enable them to make timely and effective decisions for planning, directing and controlling the activities for which they are responsible (Ball, 1992).

Traditionally, health services in developing countries have been centralized at the national level, under the management of the National Health Service (Effah & Abousi, 2013). Following the WHO's recommendations, some developing countries have decentralized their electronic health information and record system by creating regional health services and district health services to support quality care at the lower level (Kimaro & Sahay, 2007). Since then, enormous investments have gone into computerized hospital information and record systems worldwide (Johns, Wyatt, & Garvican, 2003).

2.4 History of Electronic Health Record System

Implementation of EHR system has been globally spread but was first introduced in 1960s by a physician scholar called Lawrence L. Weed (Mehmood, Aslam, Aslam, Waqar, Khan, Hassan ….., & Noor-e-Maham, 2017). He suggested a system which can save medical records of the patients in the electronic form to improve the delivery of care. This work started at the University of Vermont in 1967 to convert paper based medical records into electronic form.

The health care professionals and the IT experts developed a problem oriented medical record. In the same year Mayo clinic started developing Electronic Medical Record System (Mehmood et al., 2017; Nguyen et al., 2014). In 1970 the problem oriented medical record started working in a medical ward of the Medical Centre Hospital of Vermout (Mehmood et al., 2017). Touch screen technology was introduced and then drug information was added to the system for the doctors to check the dosages, side effects, diagnostic and treatment plans etc. Many research institutions were involved in the process of implementing an EHR and it increased during 1970s and 1980s (Mehmood et al., 2017). The inpatient systems were introduced by The Help System and Duke the Medical Record system. Registries record introduced the combination of both in patient and out patient's records system (Nguyen et al., 2014). With the advancement of ICTs many more features were introduced in the EHR. In the 21st century it is becoming a compulsion to install the EHR in the hospitals (Mehmood et al., 2017; Nguyen et al., 2014).

2.5 The Purpose of Electronic Health Record System

According to the WHO, health information and record system is a national asset. Globally, policy-makers, planners, healthcare providers, development partners and the general public use it to track health-system performance, to support better health policies and make effective health-related decisions (http://www.wpro.who.int, 2019). Specifically, the purpose of health information and record system includes:

- **Improving Patient Care:** Improvement in healthcare delivery to patients is the topmost priority of every healthcare center. Making patient information from other hospitals available where the patient is currently being treated is an integral factor (Blair & Hilts, 2003). In addition, improvement in the accessibility of patient related information to healthcare professionals through improved handling of medical records and getting results

of investigations more quickly (Adjei, 2003). Lastly, improving patient administration procedures result in shorter waiting times and better service (Johns et al., 2003).

- **Standardization of patient administration and management procedures:** According to Aspden, Corrigan, Wolcott and Erickson (2003), health administrators use EHR to administer patients' biodata, medications and managing patients' documents. This assist and standardize the administrative systems and purposes of the health industry (Aspden, et al., 2003).
- **Replacement of old system of database creation and management:** Prior to the creation and introduction of electronic information system, information systems and subsystems were mostly spreadsheet-based, which made the data management process prone to errors and lack of trust in data (data based) decisions (Ball, 1992). Nevertheless, this has now been over shadowed with the introduction of the HIS (Bansler & Havn, 2010).
- **Provision of data for performance evaluation and auditing healthcare:** Introducing EHR systems into the health sector has been so far successful in mitigating the challenges with service data collection and reducing the information transparency bottlenecks (Johnson, 2001). Captured records are the basic parameter for evaluation and auditing (Adjei, 2003). Electronic health data from patients, laboratory test, field operations and other sources is what is used for assessing the performance of every health center (Aspden, et al., 2003). In the public sector, periodic auditing is made possible because of available information; this help fill in the loopholes in financial malpractices and government over expenditure in the health service (Braa & Hedberg, 2002). As supported by Ball (1992), the collected data is also monitored and evaluated by health sectors and helps to assess overall systematic performance as well as identify weak areas for prompt intervention.
- **Improving management efficiency of hospitals:** The various health centers collect routine health service data on health services, morbidity and disease, which is useful to

health managers to make effective planning, budgeting and prudent decisions (Johnson, 2001). According to Johns et al. (2003), this effectiveness includes:

a. Allowing hospitals to manage their own finances.
b. Improving revenue collection.
c. Efficient management decision making through the availability of integrated management information.
d. Saving costs through the identification of primary cost drivers at hospital level and the monitoring of mechanisms introduced to lower costs.

- **Resolving tension between flexible information needs and standard information:** Experiences of South Africa and some developing countries show that electronic health information and record system has the capability and flexibility to address the tension between flexible information needs and standard information of the lower and upper levels respectively (Braa et al., 2007; Braa, & Hedberg, 2002).

In all, WHO asserts that better use of health data standards, validation processes, sharing, visualization and analysis will improve utilization of health information (http://www.wpro.who.int, 2019). Hence, WHO promotes HIS improvements through effective peer-to-peer networks, knowledge sharing and technical assistance (http://www.wpro.who.int, 2019).

2.6 Prior Preparation Stages that facilitate Successful EHR Implementation

The implementation of any EHR system undergoes stages and processes called preparation. Several studies on the implementation of EHRS in institutions, organizations, and countries have reported varied stages that were carried out. However, this section presents those with similar findings that are of general applicability.

Primary stage of preparation of every successful EHR implementation is gaining an insight and lessons from similar project. Gaining experience from other similar projects is considered the prime stage to embark on implementation of any EHRS. Acquah-Swanzy (2015) conducted an examination into EHRS at Effia Nkwanta regional hospital in Ghana with a mixed method approach and reported that successful implementation of EHRS begins primarily from lessons from institutions or organizations that have enrolled-out similar project. To Acquah-Swanzy (2015), this is the most important pre-implementation preparation stage towards any EHRS implementation, in that, it helps identifies failure factors as well as its strategic measures associated with the actual implementation of the system. Knowing these helps plan appropriately to test the feasibility of any EHRS (Acquah-Swanzy, 2015). Dick and Andrew (1996) advised based on the of similar health information project in South Africa, that learning from the experiences of past similar projects can eliminate contractual milestone and monitor cost, which will eventually make the implementation of any subsequent project viable and effective.

Further, literature reveals that identifying availability of adequate funding is central to every EHR implementation. Scholars have agreed that available sufficient budget for procuring EHRS infrastructures and equipment such as computers and network cables facilitate and argument implementation of any EHRS. For instance, Acquah-Swanzy (2015) pinpointed ‘adequate funding’ as one of the three stages that constitute adequate preparation towards any EHRS implementation.

Studies have shown that exclusive requirement in preparing for EHR implementation is the establishment of institution of ICT Department. Creation of a well-functioning ICT department is a requirement of the pre-implementation preparation of any EHRS. According to Acquah-Swanzy (2015), establishment of an IT department to coordinates the implementation and operation of EHRS is fundamental to successful EHRS implementation. He explained further

that, such an institution will not just coordinate operations but as well network all departments to support telemedicine and ensure the configuration of the EHR system to assist the work tasks of all user of the facility.

Much more, the realization of successful EHR implementation lies on the qualified implementation team. A team with ICT expertise and technical know-how in EHR system is a requisite to the sustainability of any implemented EHR. Acquah-Swanzy (2015) explained that, establishing ICT department requires human resource capable of initiating, maintaining and addressing all associated challenges and it is this that the feasibility of EHR system can be materialized. Acknowledging the role of team of experts, Mehmood et al. (2017) supported that establishing management of EHR system before its implementation is an approach to change organization from its present state to future state. They explained that, such a team is very cardinal to deal with technological changes, operational changes, and human behavioural changes.

Training and workshop organization have been identified to be an integral EHR implementation**.** This is considered the bottom stage of all the preparation processes toward the implementation of any EHR system. This stage involves series of practical training and discussion on the various elements of EHR system. According to Acquah-Swanzy (2015), implementation of any EHR system requires training for its users to understand the operation, performance, and use of the system as well as the importance of the system to their work. In respect to workshop, Mehmood et al. (2017) suggested that awareness programmes about the importance and essence of adopting EHR should be made to health professionals in that they are used to making decisions on their own hence would feel they do not need technology of that sort.

2.7 Benefits of Electronic Health Record System

There have been several studies (Elias, Barginere, Berry & Selleck, 2015; Petrides, Bixho, Goonan, Bates, Shaykevich, Lipsitz ….., & Melanson, 2017) on the significant impacts of adopting and implementing EHR, particularly in the health sector. These studies have reported multiple benefits including administrative, office, laboratory, and non-laboratory. For instance, Petrides et al. (2017) performed a pre-and post-implementation analysis of an EHR system and its impact on key laboratory processes, turnaround time, number of add-ons, number of stat request, and preanalytic inpatient phlebotomy, with different processes and interfaces in structured laboratory in many institutions and discovered through their structured laboratory results that, the EHR improves within-laboratory turn-around time as it decreases hematocrit and potassium's turnaround time significantly. Additionally, it decreases the number of stat orders from 40 percent to 7 percent for both hematocrit and potassium. Reduces significantly the average number of preanalytic errors from 2.24 to 0.16 per 1000 specimens per month. Moreover, it significantly increases the overall add-on test by 16 percent, which increases healthcare providers' satisfaction by eliminating phone calls to the laboratory (Petrides et al., 2017).

Aside laboratory importance, these scholars (Petrides et al., 2017) claimed the use of EHR system provides the ability to trace the longitudinal data of patients, minimizes cost, bridges patient-provider interaction, streamline seamless flow of data (information) from test ordering to result posting, reduce reorders, and minimizes the adverse drugs events. More to that, it reduces manual entry of orders and minimizes paper requisitions. They ended that, these benefits together with unintended ones enable clinical decisions and influence the management of time-sensitive conditions including stroke and coma (Petrides et al., 2017).

Elias et al. (2015) also investigated the implementation of an EHRS within an interprofessional model of care in an urban centre in the United States and identified that the system fosters a

more collaborative and coordinated patient centered care called huddles. They explained huddles to be an interprofessional briefing sessions, where all healthcare professionals converge to review and plan care for the patients they will see during the course of the day. Also, it builds correlation among healthcare professionals (Elias et al., 2015).

Muchmore, Mehmood et al. (2017) investigated the perception of 43 physicians about the use and effectiveness of EHR with exploratory design and mixed method in Pakistan and discovered several importance of EHR system. According to them, EHR system has: 1) increased health professionals' productivity by reengineering healthcare; 2) ensured proper planning and broad thinking in improving healthcare services; 3) minimized healthcare errors; 4) fostered better medical decision makings among healthcare professionals, and 5) improved healthcare quality to patients.

The importance of EHRS seems not to ending. Nguyen et al. (2014) conducted a broad review on EHR implementations worldwide and reported its associated benefits to include: 1) improved administration efficiency; 2) better quality, safety and coordination of healthcare; and 3) improved documentation quality.

2.8 Challenges with the Implementation of Electronic Health Record System

Contrary to the success stories of the implementation of EHR, other studies on EHR systems have disclosed that successful implementation of EHR can be very challenging particularly for large hospital networks.

One of the main challenges identified by literature is technical complexities. Some scholars hold that, for most developing countries, deploying an effective EHR system is hindered by disparate information systems (Braa, et al., 2007; Nhampossa, 2004; Chilundo, 2004). Supporting this, Petrides et al. (2017) reported that large hospitals that have adopted EHR

would face technical complexities owing to the interface design of the system, and the multitude of workflow. Additionally, how to balance standard information at various level and varied custom information needs is another key challenge (Bansler & Havn, 2010; Beckwith et al., 2013). Johns et al. (2003) also discovered that implementation of the health information system (HIS) in Limpopo Province, South Africa, failed because of poor functioning and implementation of the entire system. With this, Beckwith, Aller, Brassel, Brodsky and de Baca (2013) explained that, this problem emerges when there are multiple hospitals using the same EHR and as well provides the same tests or services but use same hospital-specific test codes. Petrides et al. (2017) detailed that most often such situations lead to wrong text codes, which affects the workflow hence impeding the efficiency of health professional; and addressing it itself is problematic as it is time consuming and requires huge clinical and technical resources. Furthermore, Petrides et al. (2017) disclosed increment in the number of patient venipunctures and orders placed using erroneous test code as part of the challenges with EHRS. Braa and Hedberg (2002) conceptualized this peculiar challenge as the paradox of tension between flexible information needs and standard information needs at unparallel levels.

Few scholars like Nguyen et al. (2014) identified that contingent to the technical complexities is the interruption to workflow, impede EHR implementation and usage. Nguyen et al. (2014) identified issues associated with EHR that negatively impacts its implementation and usage across the globe. To them it includes work interruption and changes to workflow (Nguyen et al., 2014).

That notwithstanding, orthodox hieratical-bureaucratic structure of interagency and interprofessional team setting is identified to be one of the critical challenges to the implementation of EHR system. Sahay and Walsham (2005) reported that one of the difficulties with the implementation of EHR system is how to integrate EHR and management under the

hierarchical bureaucratic reporting structure with that of donor and government sponsored vertical programmes such as for HIV/AIDS and malaria control, which according to Lippeveld (2001) often develop their own information systems and reporting channels. Adding to the above, Elias et al. (2015) examined the challenges of EHR implementation and evaluation with the case of an interprofessional collaborative practice model of care in the United States. They identified these cchallenges: delays in communication and untimely flow of information with inter-professionals (i.e. multiple healthcare professionals), and slow decision-making in terms of configuration with interprofessional stakeholders (advanced educators, dispensary personnel, dietitians, clerical staff, mental health providers, nurses, doctors, and physicians). Some scholars also hold that, for most developing countries, deploying an effective EHR system has been a difficult challenge due to complex and bureaucratic administrative structures (Beckwith et al., 2013; Braa et al., 2007; Elias et al., 2015; Sahay & Walsham, 2005).

It is revealed that poor stakeholder consultation is a critical bottleneck to the EHR implementation. This is a serious state that Acquah-Swanzy (2015) discovered to be inherently problematic. He reported that in the case of Efia nkwanta regional hospital in Ghana, there were gaps owing to limited consultation in the initial preparation towards the EHR implementation though it was generally satisfactory. Some of these gaps were attributed to poor stakeholder consultations. That is, users of the system were not involved in decisions by the hospital management prior to the procurement and the execution of the system (Acquah-Swanzy, 2015; Beckwith et al., 2013; Elias et al., 2015). Moreover, they were neglected in the design and configuration of the system at the health facility. It is explained that, such a situation can create resistivity and non-compliance from some stakeholders, which will end the implementation nowhere (Beckwith et al., 2013; Elias et al., 2015). In same manner, the findings of the study of Johns et al. (2003) again identified low involvement of all stakeholders in decision making caused the downfall of the implementation of the HIS in Limpopo Province,

South Africa. Their report elucidated the tangible reasons for failure as inability to ensure users understand the reasons for implementation from the outset, and underestimation of the complexity of healthcare tasks (Johns et al., 2003; Beckwith et al., 2013).

Finance has been mentioned to be a burdensome to most EHR implementation and usage. A good preparation can only make an implementation of an EHR system be successful if there are adequate funds to execute. Nguyen et al. (2014) asserted that usage of EHR has gained worldwide practice and has been recognized as a costly investment. (Beckwith et al., 2013; Paho.org, 2019). This is because the budget for health, however, has not changed very much (Beckwith et al., 2013; Elias et al., 2015; "Public eHealth," 2014) in most countries. In the study of Johns et al., (2003), it was revealed that the estimated costs for each large hospital is about $50 million, yet the overall benefits and costs of hospital electronic record systems have rarely been assessed. When systems are evaluated, about three quarters are considered to have failed and there is no evidence that they improve the productivity of health professionals (Beckwith et al., 2013; Elias et al., 2015; Johns et al., 2003).

It is disclosed that EHR implementation is challenged by poor workshops and training for users and implementers**.** Effective use of any EHR system lies on the practical training on the use and functions of the system. Acquah-Swanzy (2015) discovered in his study that training workshop offered to user of EHR system at Effia Nkwanta hospital in Ghana was woefully inadequate, which consequentially limited users on the 'know-how' required to operate the system. Mehmood et al. (2017) also confirmed with a conclusion that, if EHR system needs to be used effectively then proper training for its users is required to ensure they are capable of operating the system so to maximize the benefits from the system by utilizing all its functionalities.

The existence of inadequate infrastructure is considered problematic to EHR implementation. According to Acquah-Swanzy (2015) inadequate ICT infrastructure such as computers and internet logistics to support users of EHR system can result in EHR implementation failure because it impedes the smooth running of the system. Some scholars also concur that, deploying an effective EHR system in most developing countries, has been a difficult challenge due to limited resources (Beckwith et al., 2013; Braa, et al., 2007; Elias et al., 2015; Nhampossa, 2004; Chilundo, 2004). For instance, the findings of the study of Johns et al. (2003) again disclosed that inadequate infrastructure is one of the causes of the failure of HIS implementation in Limpopo Province in South Africa.

Failure to look for and learn from past projects is stated to be among the growing challenges of implementing EHR**.** This occurs when there is a lot of fragmentation of responsibilities. Managers usually monitor costs and meeting of contractual milestones, whereas health economists assess effectiveness and overall worth (cost effectiveness) of projects, hence no attention on examining past related projects (Dick & Andrew, 1996).

2.9 Summary

This chapter directly provided the global and broad scholarly perspectives on the major concepts: eHealth, EHR, and eHMIS. This was done to offer strong empirical background to and justification for the research undertaken. Additionally, it brought to bear the theory (i.e. Actor-Network Theory) that underpin the study. This theory has brought to the understanding that the technologies that emerge from its inherent social momentum is the right way to ensure order and efficiency in an organisation through the establishment of networks that will influence organizations; social interaction. It then proceeded to present reviewed findings of scholarly works on the concept of electronic health record in particular its multiple definitions, benefits, challenges, and implementations. It is established in this section that implementation

of any electronic record management system or project particularly in the health sector comes with its challenges which can be complex ranging from technical, institutional hierarchal-bureaucratic structure, finance, infrastructure, workshop, consultations, of the project's scope.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter presents the approach of conducting the study. It specifically deals with the description of the study area, the research design and method adopted, which includes the needed instruments, sampling technique and size, population, data typology and sources, and the process of collecting the primary data. The chapter concludes with data analysis techniques.

3.2 Research Design

According to Yin (2009: 9), research design is a procedure or plan a researcher adopts that connects data to a study's research questions and its conclusion. The appropriate design for this study is case study. Connaway and Powell (2010: 15) defines case study as research design that allows for the study of an individual, small or group of people, or a particular organization of interest in its real-life context. Similarly, Yin (2009: 11) defines case study design as an investigative technique for studying a phenomenon within its natural context. As the examines the use of a database system of a particular organization (i.e. UG Health Services), the design is ideally suited. Moreover, as a case study design, all efforts were geared towards assessing all the relevant issues under investigation in-depth and in a natural unregulated setting. According to Yin (2009: 10), the pros of the design is that, it helps make direct observations and collect data in natural settings. Last but not the least, the design is very effective for studies as this when deploying qualitative method of data collection and analysis.

3.3 Profile of Setting

The study was executed at the UG Hospital—a UG Health Services facility. This is a quasi-government health service facility established in 1957 by the Republic of Ghana but fully

owned by the university institution (UG-Health Services, 2019, para. 2). Geographically, it is located at East Legon and stationed behind Legon Police Station at few meters off the main Accra-Madina road in the Greater Accra region of Ghana. The health facility that started with five health personnel comprising a single doctor (Dr. A. B. Boyd) and four nurses to deliver healthcare services to 130 students at then, now has over hundred health service staff (UG-Health Services, 2019, para. 3).

Not just in personnel, the hospital facility has grown over time in infrastructure and medical resources. It has a 130-bed capacity including Dental Unit, Operating Theatre Maternity Wing, Pediatric Unit, Casualty and Emergency, and General Wards (UG-Health Services, 2019, para. 5).

The growth of the hospital in terms of personnel, infrastructure and resources matches the development growth level of the very community it is situated and meant to serve. Particularly, in 1976/77 as the community begun developing rapidly the facility witnessed exponential demands from its massive inhabitants who sought to seek healthcare. In recognition of the growth of its environs in terms of population and it health needs, the hospital gained a financial, medical resources, and legislative interventions from the Ministry of Health, which led to a dramatic change in the functions and purpose of the health facility till 1986/87 when the 'çash-and-carry' was introduced to put stoppage to the direct financial intervention.

Today, the health facility, which seeks to cater primarily for the health needs of 37,940 university population including 37,940 students, 1385 staff (1179 Senior research fellow, 206 Senior Administrative and Professional staff) and their dependent have been extended to the health needs of inhabitants within the entire Legon vicinity and the region at large (University of Ghana, 2019, para. 5). It has become one of the top hospitals for the delivery of healthcare services to the population of Greater Accra, estimated to be five (5) million (University of Ghana, 2019, para. 3).

With time, the hospital has attained the full status of a District Hospital and has assumed full medical responsibility for its wide catchments area. It has also extended its responsibilities and services to include Primary Health Care outreach program with the sole goal of educating, and counseling students, nursing mothers, maternal (pregnant) women, and the general public on personal hygiene, good diet, child care, including immunization against childhood communicable diseases, family planning and school health services (UG-Health Services, 2019, para. 6). To meet these pressing needs of the ever-increasing population, the hospital has introduced a new patients' health records management system called the eHMIS (UG-Health Services, 2019, para. 6).

The eHMIS is an EHR system used by the entire health professionals executing their mandate at the health facility to the various patients/clients of diverse needs. This holistic healthcare system is to enhance the professional capacity and competence of the skilled staff to attain the hospital's core mandate of offering a world class Gold Standard healthcare services with holistic medical system to all and sundry including all students, employees and its dependents and as well to extend such standard of deliveries to the university's immediate environs and beyond (UG-Health Services, 2019, para. 7).

The new EHR system (i.e. eHMIS) was implemented to coordinate and collate clients' medical information across all the services that hospital provides as follows: 1) Out-patient Department, 2) In-patient Services, 3) Maternal Care, 4) Pharmacy, 5) Radiography (X-ray and Radiology), 6) Ultrasound Scanning, 7) Laboratory Services, 8) Surgery, 9) Obstetrics and Gynecology, 10) Public Health Services, 11) Eye Care, 12) Accident and Emergency Services, 13) Accident and Emergency Services, 14) Laundry, and 15) Surgery (UG-Health Services, 2019, para. 9).

It is of these services combined with the increasing needs of the growing population of the University and Legon vicinity that the study chose the UG hospital to assess how the eHMIS is being implemented and achieving its expected goals.

3.4 Research Method

Basically, there are three types of methods used to conduct research of this nature (Boateng, 2014: 19; Yin, 2009: 21). These are qualitative methods, quantitative methods, and mixed methods. The appropriate one for this study to achieve its objectives was the qualitative methods.

Boateng (2014: 20) defines qualitative method as a research technique for gathering, analyzing, interpreting, and presenting narrative information. According to Yin (2009: 23) qualitative method involves measuring data which is usually related to human activities and the grounds behind them. The method is highly used in the behavioural and social sciences (De Vaus, 2002: 17). The method does not seek data that are quantifiable rather non-numerical. That is, the advantage of the method is that, it gathers data that are of non-numerical form, which can be interpreted severally. Thus, qualitative research is very efficient when it comes to identifying, collating and analyzing unmeasurable data (Creswell, 2009: 22). Additionally, it allows for the use of research instruments such as interview guides for unstructured interviews, focus group discussion, and unstructured observations. Last but not the least, the method supports design such as case study and ethnography (Boateng, 2014: 22; Connaway & Powell, 2010: 19).

On the other hand, the quantitative method is a technique that is applied to collate, analyze, interpret and report quantifiable data (Saunders, Lewis & Thornhill, 2009: 31; Connaway & Powell, 2010: 23). Theoretically, quantitative method deals with discovering statistical facts about social phenomena and data (Boateng, 2014: 20). The data here are numerical and

analyzed with the use of statistical techniques and tools. This means that, to apply this method one has to have at least basic statistics and be abreast with any statistical application (Bhattacherjee, 2012: 12). Besides, the method is effective for the collection numerical data that requires a questionnaire research instrument (Bhattacherjee, 2012: 14).

The mixed methods also called triangulation method is the combination both quantitative and qualitative methods to collect, analyze, interpret and present data (Boateng, 2014: 20; Bhattacherjee, 2012: 28; Connaway & Powell, 2010: 30; Saunders et al., 2009: 31). Such data are in both qualitative and quantitative format; hence, makes the method very effective for it collection. The strength of this method is that, it offers varieties of both qualitative and quantitative methods for the collection, analysis, interpretation and reporting of data of any format (Boateng, 2014: 31; Saunders et al., 2009: 32). This means that, it enables the user to overcome possible challenges during field data collection. In addition, the method offers complementary advantage. That is, both quantitative and qualitative methods complement each other in terms of pros and cons (Boateng, 2014: 21; Bhattacherjee, 2012: 31; Connaway & Powell, 2010: 30; Saunders et al., 2009: 29).

In this study, the use of qualitative method was because the study sought to gather an in-depth information concerning the use of the eHMIS that was introduced to facilitate healthcare deliveries by the selected institution owing to the exponential growth of the university population coupled with that of the entire region. It is also because of the nature of the data required. The method as said earlier is suitable for the collection of narrative or non-numerical data, which the study sought to collate for answering its research questions. Further, the method is suitable when using a case study design. Moreover, the technique helped the researcher to interrogate participants with the use of interview guides through face-to-face interviews. This enabled the participants to express enormously and share their experiences concerning the implementation of the system. Last but not the least, since all the staff members use the same

system, the researcher saw it wise not to include every user but to select key users and experts for interview as they were of the same experiences and perspectives concerning the implementation and the usage of the system.

3.5 Population and Sample Size

Population in research is define by Boateng (2014: 33) as the all the individuals or units with certain characteristics that a sample is drawn of which that sample and the findings represents. With this study, the population refers to all the Ghana health professionals that use eHMIS system to offer medications and consultations to the various health clients in the University Health Services facility.

The study sampled twenty-seven (27) participants from the University Hospital for interviews. This size was based on the fact that the study reached data saturation. This occurred at the point when the staffs of the hospital were giving similar responses. Moreover, the hospital health professionals were few hence the 27 were enough to represent the majority. Beside there were manageable as the researcher was able to handle them well which streamlined all the interviews conducted.

3.6 Sampling Technique

The selection of the participants was not done randomly. Rather, a purposive non-probability sampling technique was applied. It was the best technique to sample the 27 participants as it enabled the researcher to select participants who were abreast with the system, willing, ready, and available for interview. Moreover, it was the best option because, it was easy to apply and cost effective when compared to random probability sampling technique. Muchmore, it was more convenient, aside its limitations, which is bias and non-random.

3.7 Criteria for Selection of Subjects

The selection of the 27 participants influenced by perceived knowledge, skill and experience of the eHMIS system, which were necessary to get the required answers to the research questions on the topic of the study. However, the criteria based on which they were selected was that they be:

- Health professional
- User of the eHMIS
- Available
- Willing to participate
- Ready to participate
- At least with one-year familiarity or experience with the usage of the eHMIS.

3.8 Research Instrument

An interview guide was used to conduct all the interviews and to collect all the responses that were given. This was a semi-structured interview guide with open-ended questions that were categorized into sections in accordance with the research questions.

Also, an electronic recording device was used to record all the verbal responses uttered by the participants during the various interviews.

The interview guide enabled the researcher to standardize both the questions and the face-to-face interviews. This therefore ensured standardization of responses as all interviewees focused on the questions contained in the interview guide. Finally, it helped the researcher collected enormous data for its analysis.

3.9 Data Type and Sources

The study was based solely on qualitative primary data form the field interviews. These were the most needed data elicited from the interviewees with aid of interview guides, upon which the study relied on to provide answers to its research questions to achieve its ultimate goal. However, the study relied also on secondary sources for literature materials, which enabled the researcher identified scholarly findings, theories, assertions, and opinions disclosed in articles, reports, journals, books, magazines, and newspapers related to the study and available on the internet and at libraries.

3.10 Data Collection Procedure

The approach for the collection of the primary data was strictly open and practical. On the field, the researcher visited UG hospital to seek official permission to have personal interaction with the staffs.

Two weeks after obtaining feedback from the head of the health facility, the researcher visited the facility to sample the required number of participants with the aid of purposive sampling technique and sought their consent of engagement after selection. During this period that the researcher briefed them about the nature of the study and the importance of their engagement. An interview schedule was also outlined to each individual to choose convenient day for the interview. This was very effective and contributed significantly to the data collection success.

Knowing the various convenient days to conduct the interview, the researcher pre-informed each participant before reaching them for interview on the day of visit. Thus, all participants were pre-informed a day before their interview.

In all, the interviews were conducted in six weeks due to the day's intervals and tight schedules of the participants.

For every interview conducted, the researcher pre-informed the interviewee about the recording device and the nature of the questions. Every interview conducted took at most 30 minutes duration and with no third-party engagement. All interviews occurred at various selected places of the participants.

The researcher took notes during the interviews and all data gathered were transcribed for the analysis.

3.11 Ethical Consideration

Ethical guidelines were strictly adhered to during the field data collection. The study sought official approval from the head of the UG health facility before gaining access to interview health personnel.

The second principle was to clearly brief participants of the nature of the study and the relevance of their participation.

The next was consent seeking from all the participants. After briefing, all the participants were asked to sign or agree to participate in the study before the researcher engaged them.

Finally, the participants were given assurance of anonymity and confidentiality. All the participants were assured that their profiles will not be exposed to the public neither will it be outlined in the study. Also, their responses were coded into different form, hence were not directly exposed to the public. All their recorded responses were also passworded and kept in the researcher's secrecy.

3.12 Data Analysis Procedure

Analysis of the primary data was purely qualitative. As the study sought qualitative primary data from the participants that expressed variously and willingly their views and experiences

with the subject at hand, a content analytical technique was applied to bring out themes and in-depth perspectives on the final assessment of the eHMIS implementation. With this, the verbal responses recorded were transcribed, coded and analyzed into qualitative themes.

3.13 Summary

In this chapter, the methodological techniques and approaches adopted to sample participants collate and analyze data from the health from professionals at UG Hospital at East Legon were outlined and broadly described. It begun with the research design, which was case study that offered potentials to explore the subject of investigation in its real-life context. The chapter also offered the profile of the case (i.e. UG Hospital) including its historical development and current characteristics. It was stated that qualitative methods were used to collect qualitative data, through face-to-face interviews guided by interview guides, from a sample of 27 health professionals with the aid of purposive sampling techniques. Ethical issues including participants' identity anonymity, response confidentiality, and consent seeking were adhered to strictly. The kind of analysis conducted was content analysis with the aid of Microsoft Office.

CHAPTER FOUR

RESULTS

4.1 Introduction

In this chapter, the results of the field interviews are presented to unveil the various responses to the specific research questions that enabled the researcher achieved the overall agenda of the study. The arrangement of the presentation is into sections commencing from the background profile of the interviewees and followed by subsequent sections that are in accordance with the research objectives. Whereas the results are the views of the interviewees, the interpretation of the results are that of the researcher and that of the scholars in the literature findings.

4.2 Demographic Characteristics of Interviewees

This section presents the demographic profile of the twenty-seven (27) interviewees, which are vividly outlined in the Table 1. It entails the sex, age, position, work experience, knowledge of EHR system, and their experiences with Information Communication Technology (ICT) and EHR system.

4.2.1 Demographic Characteristics of Interviewees

The first analysis performed was to identify the background characteristics of the participants that the study selected. The demographic results demonstrated that, in all, 27 interviewees expressed their perspectives relating to the implementation, use, and benefits of the EHR system at UG Health Services. The table below present the sex, age, and experiences of participants.

Table 1: Demographic Characteristics of Interviewees

Interviewee Code (*IC*)	Sex	Age	Years of Experience in Position
IC1	Female	45	8
IC2	Male	24	1
IC3	Female	39	5
IC4	Male	26	1.5
IC5	Female	29	4
IC6	Female	30	4
IC7	Male	30	1
IC8	Female	23	2
IC9	Female	27	1
IC10	Male	51	11
IC11	Male	39	5
IC12	Male	38	8
IC13	Female	28	1
IC14	Male	25	1
IC15	Female	27	1
IC16	Male	29	2
IC17	Female	25	2
IC18	Male	38	3
IC19	Male	47	6
IC20	Female	40	5
IC21	Male	42	3
IC22	Male	25	1
IC23	Female	26	1
IC24	Female	26	3
IC25	Male	26	1
IC26	Male	33	1.5
IC27	Male	33	2

Source: Author's Construct, 2019

- **Gender**

The background profile results of these interviewees in Table 1 revealed that males (15) were more than the females (12). This meant the EHR system is used more by the male staff.

- **Age**

Concerning age, lots of differences in results were arrived at, which ranged between 23 and 51, thus the youngest age was 23 whereas the oldest age was 51 among all the participants. The many (4) were those with age 26, followed by 25-year (3) adults. However, the age range shows that, most (14) of the staffers were young adults within the ages of 23 to 29, whereas of the old adults 7 were in their 30s, 4 were in their 40s, and a single was in 50s. This meant that, majority

of the staffs who use the EHR system at the health facility were young who still have the potential to undergo ICT workshops and trainings to upgrade themselves with the use of the EHR system over time. It also meant that, the prospects of the implementation of the system will be affirmatively feasible if the young ones are maintained.

- **Years of Experience**

The results in the Table 1 illustrates the years of practical experiences the staffers interviewed had had in respect of their position and use of the EHR system as at the time of conducting the interviews.

The results in the Table 1 manifests that, the staffers interviewed had weak or moderate experience so far as the use of the EHR system and their position is concerned. According to the results, most (9) had only a year practical experience whereas only one (1) had eleven (11) years of practical or field experience. This extreme variation in the experiences of the staffers could possess inherent challenge to the implementation of the EHR system.

- **Occupational Position**

The figure below outlines the results of the various positions of the respondents interviewed, which establish the dominancy of medical records officers. The results in the Table 2 also reveal varied use of the EHR system at the University hospital facility.

Table 2: Respondents' Positions at Workplace

Position(s)	Frequency
Service Person (Dietician)	1
Billing Officer	2
Dietician	1
Physician Assistant	2
Nurse	1
Account Officer	4
Doctor	1
Mid-Wifery	1
Medical Records Officer	6
Pharmacist	1
Accounting Assistant (Clerk)	2
Physiotherapist	1
Laboratory Technician	1
Administrative Assistant	1
System Administrator	1
Store Superintendent	1
Total	27

Source: Author's Construct, 2019

The occupational records of the participants showed the dominancy of the medical records officers among the 27 participants interviewed. This could mean that the medical record officers (6) use the EHR system most followed by the account officers (4) than all other staffers. This is not surprising as the adaptation of the EHR system in the health facility was purposely to facility medical record delivery. This could also mean that, indeed the implementation and use of the EHR system at the health facility is attaining its purposeful goals.

4.2.2 Knowledge and Experiences with ICT/Computer

The knowledge profile results in the Table 3, demonstrate that most of the interviewees had an average computer knowledge, with most (11) with ICT or computer knowledge trained in school.

Table 3: Knowledge and Experiences of Participants with Computer/Information Communication Technology

(*IC*)	Rate Computer Knowledge	Source(s) of ICT/Computer knowledge	Microsoft Application Trained on			
IC1	Average	Trained in School	Word	Excel	Access	PowerPoint
IC2	Average	School and Self Training	Word	Excel		PowerPoint
IC3	Experienced	Trained in School			Access	
IC4	Novice	School and Self Training		Excel		PowerPoint
IC5	Average	Trained in School	Word			PowerPoint
IC6	Experienced	Trained in School	Word	Excel		PowerPoint
IC7	Average	Trained by the Facility and in School	Word	Excel	Access	PowerPoint
IC8	Experienced	Trained in School	Word	Excel	Access	PowerPoint
IC9	Average	Trained in School	Word	Excel		PowerPoint
IC10	Average	Trained by the Facility	Word	Excel	Access	PowerPoint
IC11	Average	School and Self Training	Word	Excel	Access	PowerPoint
IC12	Novice	School and Self Training	Word	Excel	Access	PowerPoint
IC13	Experienced	School and Self Training	Word	Excel	Access	PowerPoint
IC14	Experienced	Self-training	Word	Excel		PowerPoint
IC15	Novice	Trained by the Facility	Word	Excel		PowerPoint
IC16	Experienced	Trained by the Facility and in School	Word	Excel	Access	PowerPoint
IC17	Average	Trained in School	Word	Excel	Access	PowerPoint
IC18	Experienced	Trained by the Facility and in School	Word	Excel		PowerPoint
IC19		School and Self Training		Excel		
IC20	Average	School and Self Training	Word	Excel		PowerPoint
IC21	Novice	Trained in School	Word		Access	
IC22	Average	Self-training	Word	Excel		PowerPoint
IC23	Average	Trained in School	Word	Excel		PowerPoint
IC24	-	Trained in School	Word	Excel		PowerPoint
IC25	Average	Self-training	Word	Excel	Access	PowerPoint
IC26	Experienced	Self-training	Word	Excel	Access	PowerPoint
IC27	Experienced	School and Self Training	Word	Excel	Access	PowerPoint

Source: Author's Construct, 2019

The results in the Table 3 illustrate further that seven (7) acquired ICT knowledge through school and by self-training. Adding to that, it is very appreciative that most (9) had training in all the Microsoft Office applications, nonetheless all had at least training in one of the Microsoft Office applications.

As part of the knowledge assessment, it was also revealed that majority (16) of the participants had prior experience with ICT Program relating to their various work positions (see Table 4).

Table 4: Knowledge and experiences with ICT Program Relevant to Work Position

(*IC*)	Prior Experience with ICT Program relating to Work Position	Kind of ICT Program relating to Work Position
IC1	No	
IC2	No	
IC3	Yes	Hospital information system (HIS)
IC4	Yes	
IC5	No	
IC6	Yes	
IC7	Yes	Health Administration Management System (HAMS)
IC8	Yes	Statistical Product for Social Sciences (SPSS)
IC9	Yes	Electronic Health Record (EHR)
IC10	Yes	1.EHR 2. E-Archive System
IC11	Yes	Power BI
IC12	No	
IC13	No	
IC14	No	
IC15	No	
IC16	Yes	HIS
IC17	Yes	Integrated tertiary system
IC18	Yes	Microsoft word and excel
IC19	No	Ebizframe RX
IC20	Yes	Ebizframe RX
IC21	No	HIS
IC22	Yes	EHR
IC23	No	
IC24	No	
IC25	No	
IC26	Yes	
IC27	Yes	

Source: Author's Construct, 2019

Moreover, quite a number of them had had prior knowledge and experience with other (alternative) EHR system application such as Health Information System (HIS), Health Administration Management System (HAMS), E-Archive System, Power BI, Ebizframe RX, and Statistical Product for Social Sciences (SPSS). The Table 4 outlines the various results.

4.2.3 General Knowledge with the EHR System

As part of the measures to determine the knowledge level of users and administrators of the EHR system (i.e. eHMIS), the study asked interviewees to express their perceived definition of eHMIS. Surprisingly, there were numerous interpretations and definitions ascribed to the

system which support that of scholars like Blair and Hilts (2003), Ball (1992), Chilundo and Aanestad (2004), Oh et al. (2005), Nguyen et al. (2014), and WHO (2019). In most cases, majority of the staffs define eHMIS in terms of information (records) system such as: *A System that provides health records of patients available during and after consultation (IC4), It has to do with a client health information that is kept electronically overtime and could be accessed anytime (IC6, IC8, IC9),* and *It is the electronic version of a patient medical history that is the use of computer in keeping a patient record rather than (IC15).*

Whereas most describe it as a health or medical information (records) of patients, minority of the staffs interviewed hold contradictory interpretations. With couple of them, eHMIS has to do with a computer system. The below statements attest to that.

> *It is computerised system of keeping data of in and out patients of a hospital that also provides easy access to this information when needed (IC16).*
>
> *It is an electronic or computerised means of keeping or handling patient data and any other data that has a direct or indirect influence on health care provision (IC23).*
>
> *Registration and booking of patients using the computer electronic system to enable doctors get access to patients' records to treat them (IC10).*

Much more, couple of interviewees also interpreted it to be a software. These were their comments: *I know it is a software used to store patient's health record (IC5), Computerized programme to aid efficient and effective healthcare delivery (IC20),* and *It is made up of software that stores patients' records and with which administrative work is done to make hospital work easier and faster (IC21).*

Notwithstanding that, perceived understanding of couple of this minority staffs were in relation to storage and management concepts. These were captured in their statements such as:

An alternative electronic data storage system for health information gathered from patients instead of the use of the manual patient folder (IC1, IC3);

For storing and managing clients/patient's health information and the number of times they visited the hospital (IC26).

Electronic storage of patient health records (IC18).

Health records created, provided and stored electronically or via computer system (IC12).

Further analysis of the results showed that, the various interpretations and definitions provided by the staff were drawn from the functionalities of the eHMIS. Thus, most staffs defined and interpreted along the lines of how the system work. Even with that, some defines it in terms of organization. E.g. *It is an organized collection of patient medical records (IC11).* Some to as a facilitator: *A system that facilitates the documentation of clients' data and record electronically (IC24).* As an administrative tool: *A means of conveniently administrating records of hospital patients via the computer (IC13).* Others showed a mixed of functionalities: *It is used to input and show medical information of patients (IC2),* and *An electronic platform for keeping patient records, accessing patient investigation and previous treatment plans (IC22),* and *Facilitate easy working (IC19).* However just a few were unable to demonstrate their knowledge on the EHR system. These their affirmative definitions: '*Not much (IC7),*' and '*Nothing (IC25)'.*

All these varied definitions and interpretations given accomplish three lessons. First, there remains the constancy of *health* and *technology* as Oh et al. (2005) declared that irrespective of suggested definitions of eHealth, two disparate concepts: *Health* and *technology,* dominate all. Secondly, the varied definitions and interpretations suggest that the staffs interviewed have a strong knowledge and experiences with EHR systems (in this case eHMIS). Thirdly, it is a confirmation that, there has been increasing definitions and terminologies given to the concept of EHRS (Blair & Hilts, 2003; Ball, 1992; Chilundo & Aanestad, 2004; Oh et al., 2005; Nguyen et al., 2014; WHO, 2019).

4.3 Prior Assessment to the Implementation of eHMIS

The first specific objective of the study was to unveil the initial preparations made by the hospital before the implementation of the eHMIS system. To achieve this, the focus was on the engagement of users in decision making relating to eHMIS purchase.

4.3.1 Lack of Engagement in Decisions to Purchase eHMIS

The data results showed that many of the users were not involved in the preparations towards the decision to implement eHMIS in the health facility. Some of the negative statements were: '*We were not involved…they just brought it'(IC1, IC2), 'It is not good that it was implemented without our us being included' (IC3, IC17, IC19)* and *'Not at all… we came to see it' (IC5, IC8, IC11).*

However, the few (3) who claimed they were informed explained that they got involved in the decision to introduce EHR through staff durbar and department presentation. Below were some of their claimed statements: '*I was later informed and joined the department meeting' (IC5), 'In fact, I participated in the meeting on that during staff durbar and made my recommendations…'(IC16),* and *'I knew it long ago at staff durbar and got participated to contribute to the intentions to purchase an EHR system'(IC17)*.

The above views show that there existed bias in communication of the eHMIS purchase prior to its implementation. This can result in inability to ensure users understand the reasons for implementation from the outset, and underestimation of the complexity of healthcare tasks (Johns et al., 2003).

4.3.2 Limited influence (awareness) on how eHMIS work prior to its implementation

Aside the majority of users not being involved, it was revealed many had little or no influence on how the system would work before its introduction. These statements: '*If we were not included how can I do that… no infleunce'IC5, IC14.* A little over 6 had that level of influence

on how the system will work. Some of their statements were: '*I tested it and offered some recommendations'IC19, 'We all made some suggestions'IC12.*

4.3.3 Biased (Limited) Training on eHMIS prior to its implementation

To ensure effective implementation and successful usage of any EHR system, Acquah-Swanzy (2015) advised that implementation of any EHR system requires training for its users to understand the operation, performance, and use of the system as well as the importance of the system to their work. This was not the case of eHMIS implementation. As results showed that most (18) interviewees that they did not receive any training on the eHMIS before its implementation. Although many were not included in the decision-making process however it could have been better if they had had even elementary training on EHR system before it was introduced.

On the contrary, few (7) had training opportunity for which all claimed it was adequate for them to use the EHR system. Their perspectives were "*I think the training we had was enough…(IC10, IC16); 'Even though we had tough time but the training was OK (IC19, IC20),* and *'It was tedious and demanding, but all the same was good'*. Perhaps these were the qualified implementation team, which confirms what Acquah-Swanzy (2015) explained that, establishing ICT department requires human resource capable of initiating, maintaining and addressing all associated challenges and it is this that the feasibility of EHR system can be materialized.

4.3.4 eHMIS Implementation Effectively Planned

In all, the EHR system implementation was acknowledged by the overwhelming majority of the interviewees as well planned. Very common statements affirming this were '*Wow very fantastic…. excellently planned'IC1, IC4; 'I think it was well thought through'IC12; 'Very good plan…in fact fantastic'IC24.* These views simply imply that the planning of the

implementation of the EHR was met with the laudable support. There was further probe to identify if the implementation of the eHMIS underwent the preparation stages: 1) Insight and lessons from similar project, 2) Availability of Adequate funding, 3) Institution of ICT Department, 4) Qualified implementation team, and 5) Workshop Organization, that facilitate successful EHR Implementation disclosed by Acquah-Swanzy (2015), Dick and Andrew (1996), and Mehmood et al. (2017).

Results presented in this section wholly suggest existence of some lapses in the preparation (decision) towards the eHMIS purchase however in general the preparation was well planned as disclosed by the actual users of HMIS.

4.4 Benefits of Electronic Healthcare Record System

Many studies including the works of Elias et al. (2015), Mehmood et al. (2017), and Petrides et al. (2017) have reported multiple benefits of EHRS including administrative, office, laboratory, and non-laboratory benefits. It is part of the objectives to ascertain the benefits brought by the implementation of the electronic healthcare system available (i.e. eHMIS) at UG Hospital. To achieve this, the interviewees were asked several questions that relate to the benefits of UG Hospital eHMIS. The results obtained from the data outlined the benefits as follows.

4.4.1 ***Easiness***

a) Easy and Quick Accessibility

One of the essentials of the eHMIS is its ability to make access to medical (health) information and records of patients with ease and quickness. This was disclosed by many interviewees with some of their comments outlined below.

Their records are well apt and could be accessed easily (IC2, IC6, IC11, IC19, IC22, IC26).

Enables quick access to patient records (IC9).

Relatives of patients can access the procedure and treatment package of their patient if they want to (IC14).

It is quick and efficient (IC14).

Clients' data can be accessed without a hospital card and readily available (IC24).

b) Easy Retrieval

Easy and quick accessibility have enabled the retrieval of patients' records in the system of much relaxation and convenience. According to the interviewees, since access to the system if easy and quick, retrieving records has been very easy. This is confirmed in their statements below:

It has helped in easier retrieval of patient information for monitoring and medical treatment of patients (IC3).

Reporting to previous needs is easier using the eHMIS (IC4).

For the patient, it makes getting a complete and account medical records possible (IC21).

The eHMIS has also instilled more convenience in dispatching both in and out patients (IC14).

It is seen that, the users of the eHMIS system have being benefiting from the ability of the system to make querying of information much more convenient. This finding attests to Petrides et al. (2017) finding that the use of EHR system provides the ability to streamline seamless flow of data (information).

c) Easy Tracking and Update

Associated with easiness is the simplicity to track and update patients' medical details. According to interviewees, the system enables them to follow and find significant features of patients' medical record and as well update those records. These: '*Patients are easily able to get updates on their bills upon request (IC25)*' and '*Easy tracking of patients' health records (IC26)',* were their views.

The outlined findings in this section meant that EHR system as the application or use of ICTs to healthcare and a means of enhancing health services efficiency, quality, and access (The Pan American Health Organization, 2010).

4.4.1 Quickness

Directly linked to the above, it was discovered that the easiness of the EHR system has fast-tracked the works of the users. Couple of statements suggesting that were: *It is Fast (IC1), Trace their folder fast and easy (IC17), Faster healthcare provision that s less clerical delay (IC23),* and *The eHMIS has made it easy and fast to access patients and treat them in the shortest possible time (IC18).* Upon these expressive statements it is settled that the eHMIS makes the staffs work speedily.

4.4.2 Not Cumbersome

Nguyen et al. (2014) refers to EHR as any clinical, health or medical records in a digital or electronic format. Indeed, this is what was revealed that unlike the manual recordings of patients' medical treatments and directives, the eHMIS has unleased the much effort required to carry printed folders that were considered burdensome to them. Their views below demonstrate that.

> *They don't have to carry results to their lab wards around which could get lost (IC4).*
> *They don't have to hold huge files at their shoulders (IC4).*
> *Avoid more paper/document usage (IC17).*
> *Patients do not have to carry pilled-up folder around (IC24).*

The views of the interviewees illustrate again convenience benefit of the system.

4.4.3 Prevention of Wastage

Based on one interviewee, the eHMIS avoid excessive use and printing of manual folders. This 'Reduces wastage with regards to the use of folders and also printing of more folder when the hospital is out of stock (folder) (IC26), was the affirmation.

4.4.4 Secured/Safer and Confidentiality

It is revealed that the eHMIS system guarantee safety and confidentiality of medical data. This is also mentioned to be among the benefits of the implementation of the EHR system in the hospital. The comments testifying this are as follows: *Provides safer care (IC9), More secrecy in observed as compared to the manual system (IC11),* and *Client data is safer as compared to paper documentation (IC24).*

4.4.5 No Loss of Records/Files

Prevention of loss of medical records is also part of the benefits of the implementation of the EHR system in the hospital. This is not surprising as the EHR system offers safety to medical data. Some of the interviewees' statements that affirm this are outlined below.

Medical Track History of Patient is not lost (IC1)

No missing (IC2)

No loss of folder issues (IC8)

Patients information and history is not easily lost (IC14)

Patient history can be kept for eternity (IC23)

In this case, one could say that the EHR system is very reliable and minimizes healthcare errors (Mehmood et al., 2017).

4.4.6 Time Efficient (Swiftness)

The Pan American Health Organization (2010) describes EHR system as the application or use of ICTs to healthcare and a means of enhancing health services efficiency, quality, and access. Thus, efficiency is very fundamental in achieving the best out of the available scarce resources. According to the respondents, the system enables them work with surprising swiftness.

It reduces waiting time at the booking (main records) (IC8).

The eHMIS has eradicated the time delays and stores in retrieving manual folder for booking (IC14).

Clients do not wait in long queues to pick folders (IC24).

The views illustrate timeliness in medical service delivery as it prevents the conventional delays that used to be the norm in the past.

4.4.7 Ensures Information Accuracy by Minimizing Medical Errors

Mistakes are problematic but medical mistakes meant danger. The prevention of such mistakes in medication is what makes the EHR system more beneficial. These views: '*Reduce medical errors (IC9)'* and *'Accuracy of information (IC11)'* demonstrate the system offers precision in the provision of records for medication, which directly meant that there is high precision of the kind of treatments that are offered to patients through the system. Mehmood et al. (2017) investigated the use and effectiveness of EHR and reported that it minimizes healthcare errors. In same manner, Petrides et al. (2017) performed a pre-and post-implementation analysis of an EHR system and one of their results disclosed that, the EHR reduces significantly the average number of preanalytic errors. This finding confirms all these scholars' statement.

4.4.8 Improved Data Storage

The storage capacity is crucial to make the system reliable and of high efficiency. It is revealed that the system has advanced the storage of patients' medical data. These views: '*It has increased efficiency and has improved patient data storage gathering (IC20)'*and '*Makes booking of clients/patients easy (IC26)'* led to this finding.

4.4.9 Discretionary Privileges

There is flexibility in the EHR system, which has enabled users and the administrators to exercise their rights and unrestricted choice as to what to do particularly in times of dilemma. Though only one person's statement, "*It promotes discretion however on the extreme it makes a billing officers look dubious, which is not so (IC15)" unfolded this but still established that system offers some element of discretion.*

4.5 Challenges of the eHMIS

As part of the study's objectives, the researcher sought to identify the factors that impede the usability of the system on healthcare delivery. There were several challenging factors as outlined and discussed below.

4.5.1 Unstable Internet/Network System

The critical issues with the implementation and use of EHR systems are associated with the interruption to workflow. One of these critical issues identified was the instability of the internet network, which is the fulcrum of the eHMIS. This was articulated by many of the interviewees as follows: *Poor network/Network Error (IC2, IC6, IC9),* and *Slow internet from service provider/mobile network (IC26).* It is not just instability but sometimes system break down. These statements: *System breakdown delays work at the hospital (IC3),* s*secondly, it cannot be used without an internet connection (IC14),* and *Lack of internet access break down the various departments in the hospital since none of them would have access to patients records and files (IC19)* revealed it. Adding to the above, it is disclosed that unstable network system severely affects access to eHMIS. Some interviewees disclosed that as they stated that: *When the internet connectivity becomes slow, access to the EHR becomes difficult (IC3),* and *Poor internet connection affects work (IC25, IC26).*

4.5.2 Intermittent Power Outages/Interruptions

Thus, internet disconnection is not the only severe problem that interrupt workflow with the use and implementation of EHR systems but also unreliable electric energy. This came from the below views: *Power Shortage (IC2, IC9, IC13), Power outages interrupt the system operation (IC23). Power outage can disrupt health delivery services (IC25),* and *Unexpected power outages interrupt the use of the EHR (IC17).*

It was revealed such an interruption by intermittent power outages come with debilitating consequences. The first is it leads to data loss, according this statement, 'Light *outs when a file is not saved leads to the loss of relevant information (IC3)'.* Aside that, it makes the usage of the eHMIS difficult or slow, '*Electronic power outages make it difficult to use the EHR system (IC3)'* and '*Due to intermittent power outages work is sometimes slow (IC12)'.* More, such an interruption stuck the operation and use of the system. This *Power shortage causes a standstill of all operations (IC19),* and *One demerit constitutes the event of lights out, when there is an absence of electricity the computers cannot be used (IC14),* and *Power outages also causes work to stop (IC26)* confirm that.

4.5.3 Inadequate Training

Usage of the system has been hit by the limited training that was offered to the users. Some of the interviewees claimed, there was "Inadequate training (IC12)", "Less training and sensitization (IC18)," and "Users' lack of training (IC19)". These sentiments demonstrate poor training preparation for the users, which has made it difficult for some staffers to use the system more efficiently and with easiness.

4.5.4 Difficult to Operate Without ICT Knowledge

It seems it is highly impossible to operate or work with the system without ICT or computer technical know-how, perhaps owing to the inadequate training offered to the user. The interviewees' views below suggest that.

> *Member who have difficulty with IT knowledge find it hard to operate the system (IC3).*
> *Users' lack of knowledge in computer making it difficult for them to use it (IC19).*
> *Low level of ICT knowledge of staff hinders the system progress (IC23).*
> *Less ICT proficiency among most healthcare providers is very worrying (IC24).*
>
> *It may make work difficult for individuals who have no IT knowledge initially (IC15).*

Thus, not all staffers find it difficult to operate the system, which meant that some have ICT or computer knowledge hence faces no challenge. However, since it is a system which requires teamwork, the inability of others to operate it fully could hinder the progress of medical service delivery.

4.5.5 Costly

A good preparation can only make an implementation of an EHR system be successful if there are adequate funds to execute. The implementation of the EHR system is considered to be very expensive, according to two interviewees. There was no specification as to whether the cost is related to the operations and/or the resources. This "EHR could be costly (IC10, IC12)" was their statement. This is a clear attestation to what Nguyen et al. (2014) asserted that usage of EHR has gained worldwide practice and has been recognized as a costly investment.

4.5.6 Inadequate ICT Equipment

Acquah-Swanzy (2015) inadequate ICT infrastructure such as computers and internet logistics to support users of EHR system can result in EHR implementation failure because it impedes the smooth running of the system. This is exactly what is discovered here. The eHMIS implementation is constrained by limited ICT resources in the hospital. According to two interviewees, there is "Lack of assets and computers (IC18)". Consequentially, this "sometimes derails work if patients are more because the computers are limited (IC15)". Perhaps this is as a result of the expensiveness of the resources.

4.5.7 Diminishes Confidence/Self-Esteem

A key challenge of the EHR system attributed to perception is self-worthiness. One interviewee made this revelation when she made this statement, "*It lowers your self-worth in the eyes of some patients who think you want to take advantage of them because they do not have access*

to the system (IC1)". That is, the system implementation has limited the medical personnel's physical display of their capabilities.

4.5.8 Negligence

The system has brought carelessness on the side of the health personnel that use it. According to one interviewee, "When there is an issue which was not taken care of during the designing stage of the system (IC19)". This meant that, the user remains unconcerned when the system could not capture or identify certain things that are part of the medical recordings or treatments.

4.5.9 Breach of Confidentiality and Lack of Interoperability

The system sometimes breaches the confidentiality condition of patients' records. This, "Breach of confidentiality (IC23)" confirmed that. It is also revealed that the system lacks interoperability function or capability, which limits the broad functionalities of the systems. There is "Lack of interoperability (IC10)," according to one interviewee.

4.5.10 Slow Pace of Work and Creates Duplicity

There is slowness in the entire system, according to two interviewees. These statements: *'Slow pace of work (IC23)'* and '*It promotes discretion however on the extreme it makes a billing officers look dubious, which is not so (IC15)'*, testify that.

Upon these factors identified that the study attained the objective that examined the challenges in the electronic healthcare system.

4.6 Summary

This chapter, contains findings from the analysis of the data obtained from the twenty-seven (27) participants interviewed. Demographically, it was revealed that of the 27 participants interviewed, males (56%) were more than the females (44%). Also, the youngest age was 23 whereas the oldest was 51 years, with that the majority (15%) were those 26 years. Moreover,

medical record officers were more (22%), most (33%) had just one-year experience in position at the health facility, and averagely vast majority (16) have acquired ICT knowledge from school. Primarily, it was revealed that the preparation towards the purchase and adoption of the eHMIS at the UG Hospital was well planned but were some lapses due to: 1) lack of engagement (consultation) with most of the health professionals (users) in decisions to purchase eHMIS; 2) limited influence on how the eHMIS work prior to its implementation; and 3) biased (limited) prior training. More importantly, the results put forth that the implementation of the EHR have brought enormous benefits including easiness and quickness to accessibility of patients' records, prevention of wastage record resources, safety and confidentiality of patients' data, time efficiency, improved data storage, information accuracy, and discretionary privileges to both users, patients, and the hospital. However, achieving such benefits through EHR implementation comes with challenges including: 1) Unstable internet/Network System, 2) Intermittent power outages/interruptions, 3) Inadequate training, 4) Difficult to operate without ICT knowledge, 5) Costliness, 6) Inadequate ICT equipment, 7) Diminishes confidence/self-esteem, 8) Negligence, 9) Breach of confidentiality and lack of interoperability, and 10) Slow pace of work and creates duplicity.

CHAPTER FIVE

DISCUSSION

5.1 Introduction

The previous chapter presented the outcomes of the primary data collated from the field interviews as primary action that enabled the researcher addressed the research questions outlined in the earliest chapter. Those findings form the basis of this chapter as it discusses them in accordance with the study's objectives outlined below.

1. To examine the prior assessment made by the hospital before the implementation of the system
2. To examine the benefits of the implementation of the eHMIS at the UG Hospital.
3. To examine the challenges in the eHMIS at the UG Hospital.

That notwithstanding, the chapter begins with the discussion of the results, proceed to make some recommendations, and then ends with conclusion.

5.2 Discussion of Findings

The sole aim of embarking on this research study was to examine how effective the EHR system implemented by the UG Health Services to render healthcare services for patients is. In so doing, primary data were collected from twenty-seven (27) selected participants who were staff and users of the University health facility at East Legon. The data was in qualitative form, hence was analyzed qualitatively. The qualitative analysis showed several results discussed as follows.

5.2.1 Prior Assessment Made before the Implementation of Electronic Healthcare Record System

The first objective sought to assess the prior preparation towards the implementation of the eHMIS. The results obtained brought to bear mixed reactions and concerns about the manner in which eHMIS purchase and adoption was prepared.

One critical preparatory activity was restricted stakeholder consultation. Thus, there was lack of full engagement with most of the health professionals (i.e. users or staffers) in decisions to purchase eHMIS. Due to this restriction, some of the stakeholders who remained members of the UG Hospital staffs were sidelined, hence could not express their contributions towards the eHMIS implementation. Several comments were made by the respondents of which two were: '*It is not good that it was implemented without our us being included'* and '*Not at all… we came to see it'.* This finding supports that of Acquah-Swanzy (2015), who reported after investigating similar studies at Effia Nkwanta EHR system in Ghana reported that the actual users of the hospital EHR system were not involved or consulted in both decisions to purchase and execute the system at the hospital. It also justifies Johns et al.'s (2003) finding that low involvement of all stakeholders in decision making caused the downfall of the implementation of the HIS in Limpopo Province, South Africa. On the contrary, few participants believed to be involved in the administration and decision-making body of the health facility were involved, hence had their voice in all decisions concerning the implementation of the health record system.

Secondly, most of the users or staffers did not have influence on how the eHMIS work before its implementation. This is more related to the functionalities of the system and how it fits their services offered to the patients. These statements: '*I tested it and offered some recommendations'IC19,* and '*We all made some suggestions'IC12.* were relation to staffers'

level of influence on eHMIS prior to its implementation. As literature discloses, this finding contravenes the advice that Mehmood et al. (2017) suggested that awareness programmes about the importance and essence of adopting EHR should be made to health professionals in that they are used to making decisions on their own hence would feel they do not need technology of that sort. In reality, this is one of the issues that hinder successful EHR implementation and usage.

Much more, there was unfairness in the participation of training on eHMIS offered to the staffers. Elements of biasness were identified even in the eHMIS training that was offered to the users. Whereas some of the users of the system were enrolled on practical exercise to be abreast with the system others were left out. Although, some did participate, but most (18) staffers were not involved in the eHMIS training organized that sought to empower its users to know how to operate the eHMIS before its implementation. This also was at variance with the advice offered by Acquah-Swanzy (2015) that any EHR system implementation should seek to train its users so to comprehend the performance, use, operation, and significance of the system in relation to their work functionalities.

It is worth to state that the eHMIS implementation effectively planned before it was carried out. The generally agreeable views of all participants bore to the fact that, the eHMIS prior preparation was done properly and excellently. Some of the respondents expressed this: '*Wow very fantastic…. excellently planned'IC1, IC4,* which undoubtedly affirm that the concerns raised as discussed above did not derail the preparatory processes and measures considered and outlined by the implementers of the system. Some scholars including Acquah-Swanzy (2015), Dick and Andrew (1996), and Mehmood et al. (2017) recommended that to foster successful eHMIS implementation, the preparation processes should engulf five stages, namely 1) Insight and lessons from similar project, 2) Availability of Adequate funding, 3) Institution of ICT

Department, 4) Qualified implementation team, and 5) Workshop Organization, that facilitate successful EHR Implementation. Though, these stages were not vividly disclosed per the results but per overwhelming majority of respondents agreeing to an effective planning, it meant that, irrespective of the challenges that may arise, proper planning can make eHMIS implementation a reality.

These findings helped established that generally the preparation towards the purchase and adoption of the eHMIS at the UG Health Services centre at East Legon was well planned however there exist some lapses that need to be redressed.

5.2.2 Benefits of Electronic Healthcare Record System

The study also aimed at identifying the benefits gained from the implemented eHMIS being used by the health professionals.

One of the benefits derived from the implemented system is easiness. The implemented eHMIS has made it easy and quick to access health records. Comments such as, '*Their records are well apt and could be accessed easily (IC6)'* and '*Relatives of patients can access the procedure and treatment package of their patient if they want to (IC14)'* manifest that the system has enabled staffers access medical records easily and promptly. This confirms Johns et al.'s (2003) assertion that improving patient administration procedures result in shorter waiting times and better service.

Associated with easiness, simplicity of tracing and upgrading medical data is therefore one of the significant features of the eHMIS. The system has made it possible for staffers to retrieve patients' medical information in the hospital's database with ease. Meaning that it makes querying of information much better of little effort and more convenience. These statements: '*Reporting to previous needs is easier using the eHMIS (IC4)'* and '*The eHMIS has also instilled more convenience in dispatching both in and out patients (IC14)'* were among the

confirmations made by respondents. It therefore supports that the adoption of EHR system offers the capability to streamline easy flow of information (Petrides et al., 2017). Furthermore, tracking and updating of medical records is among the easiness the system has brought to bear on the healthcare services offered by the UG Hospital. This '*It has helped in easier retrieval of patient information for monitoring and medical treatment of patients (IC3)'* confirms what Petrides et al. (2017) claimed that the use of EHR system provides the ability to trace the longitudinal data of patients. These findings are affirmation to the fact that, eHMIS is acknowledged to be capable of enhancing healthcare efficiency, quality, and access (The Pan American Health Organization, 2010). It also suggests that the eHMIS has facilitated the handlings of medical records of patients.

Secondly, the system has brought rapidity in healthcare delivery system in the hospital. The staffers can retrieve and input patients' medical records within the shortest possible time. Evidentially, the eHMIS fast-tracks the works of the users, which enable to them to deliver theirs services promptly. Some of the comments: '*Faster healthcare provision that s less clerical delay (IC23),* and '*The eHMIS has made it easy and fast to access patients and treat them in the shortest possible time (IC18)* of respondents suggest promptness in the use of the system.

Owing to the simplicity, easiness, and fastness of the eHMIS, there is no cumbersomeness with its usage and implementation. Thus, compared to the conventional recordings of patients' medical data, the eHMIS has relieved the burdens and efforts previously required to discharge printed folders. The system prevents usage of papers and carrying of lad results around, according to responses such as '*Avoid more paper/document usage (IC17)'* and '*Patients do not have to carry pilled-up folder around (IC24)'.* Until then this conventional way of carrying out printed folders were of much burden to the health professionals. This disclosure affirms

Nguyen et al.'s (2014) findings from their broad literature review on EHR implementations worldwide that EHR system has improved documentation quality.

There is also prevention of wastage since the inception of the implemented system. The eHMIS prevents excessive use and printing of manual folders. The reliance on physical materials to print and store medical records have been minimized though not totally eradicated ever since the eHMIS was introduced. This meant that eHMIS organizes health information records in a meaningful format (Blair & Hilts, 2003) and prevents or reduces reorders (Petrides et al., 2017).

As part of its importance, the eHMIS ensures security/safety and confidentially of medical records in the UG Hospital. This has made the system very reliable because there is trustworthiness. Thus, there is high assurance that patients' profile and medical records are in the safest hands as long as the system is concerned. This is tantamount to trust worthiness and also an attestation to Nguyen et al.'s (2014) statement that from review on EHR implementations worldwide that one of the benefits of EHR system is better safety.

According to Mehmood et al. (2017), eHealth reduces errors in healthcare system. This exactly was revealed, as among the benefits of the implemented eHMIS. It was disclosed that, since the inception of the system there has not been loss of records or files of patients. The system is known to prevent loss of medical data as it effectively handles them well.

Swiftness is recognized as one of the essential benefits of eHMIS. This is not surprising as scholars have disclosed that the time efficiency is one of the strengths of any electronic health record system (The Pan American Health Organization, 2010). Timeliness was one of the key factors considered for the adoption of the eHMIS. The system therefore enables the professionals to deliver with swiftness. This is in line with the view of Nguyen et al. (2014) that EHR implementation improves administration efficiency and that of Johns et al. (2003)

that eHMIS ensure efficient management decision making through the availability of integrated management information.

In every human institution or corporate organization mistakes are bound to happen hence precision or prevention of medical errors are matters of high priority in the health sector. The eHMIS ensures information accuracy by minimizing medical errors. Thus, it prevents medical mistakes hence minimizes the possibility of causing misleading medication. Mehmood et al. (2017) investigated the use and effectiveness of EHR and reported that it minimizes healthcare errors. In same manner, Petrides et al. (2017) performed a pre-and post-implementation analysis of an EHR system and one of their results disclosed that, the EHR reduces significantly the average number of preanalytic errors. This finding confirms all these scholars' statement.

Muchmore, the eHMIS has improved the data storage system of the UG Hospital. The system has provided an expansive storage capacity to store data of all sizes and this is considered crucial to determine the usefulness of the system.

The discretionary privileges offered by the eHMIS after its implementation cannot be overemphasized. This system offers the users multichoice tools to perform unrestricted functions. This has offered the users an unrestricted right to do anything with the system.

In all, the benefits of the eHMIS implementation and usage in this section of the discussion confirms that there were voluminous significant impacts of adopting and implementing EHRS, particularly in the health sector, which ranges from administrative, office, laboratory, to non-laboratory (Elias et al., 2015; Mehmood et al., 2017; Petrides et al., 2017). Moreover, it means that EHR system has: 1) increased health professionals' productivity by reengineering healthcare; 2) ensured proper planning and broad thinking in improving healthcare services; 3) minimized healthcare errors; 4) fostered better medical decision makings among healthcare professionals, and 5) improved healthcare quality to patients (Mehmood et al., 2017).

5.2.3 Challenges of Electronic Healthcare Record System

The study sought to elucidate the challenges associated with the implementation and use of the eHMIS at UG Hospital. From the analysis, numerous challenges were identified as discussed below.

One of the critical challenges to associated with the implementation and use of the eHMIS in the hospital is the unstable internet/network system. There is no eHealth system that can operate without internet services. According to Acquah-Swanzy (2015) inadequate ICT infrastructure such as computers and internet logistics to support users of EHR system can result in EHR implementation failure because it impedes the smooth running of the system. This is exactly what was identified. There were number of complaints that the internet services, which is the pivot of the eHMIS has been experiencing interruptions. This is very discouraging as it delays the operational activities of the users and in severe situations it halts their services as such interruptions block access to the whole medical records in the hospital. The indicates that the system is faced with persistent disconnection or breakdown of internet service and it supports what Nguyen et al. (2014) revealed in their studies that work interruption and changes to workflow are the identified issues associated with EHR that negatively impacts its implementation and usage across the globe.

Another critical issue associated with interruption with the workflow of eHMIS is intermittent power outages/interruptions. Ghana once experienced severe electric power supply outages and still occurring though not as severe as previous however, such an electricity problem also affects the health sector, which the UG Hospital is part. There is continues disconnection of electricity that powers the eHMIS in the hospital. This is disrupting the full operational activities of the eHMIS hence, affecting it expected efficiency and effectiveness. The fact is, the system and its peripheral resources rely directly and heavily on electricity that is vastly produced by the nation, which the institution has no control over it. Meaning that, anytime

there is power blackout, the system has to standstill. This is a very crucial challenge to the system that some scholars like Nguyen et al. (2014) identified in their studies on EHR to be a negative impact to EHR implementation and usage across the globe. Also concur that, deploying an effective EHR system in most developing countries, has been a difficult challenge due to limited resources (Beckwith et al., 2013; Braa, et al., 2007; Elias et al., 2015; Nhampossa, 2004; Chilundo, 2004).

Furthermore, there was inadequate training for the users. The effect of this is that, still there are some users who cannot use the eHMIS proficiently. Some of the users complained of not getting experts' assistance in times of difficulties as they were not always able to execute all the functionalities of the system. This is in affirmation to Acquah-Swanzy's (2015) disclosure in his study that training workshop offered to users of EHR system at Effia Nkwanta hospital in Ghana was woefully inadequate. Upon that, Mehmood et al. (2017) recommended that, if EHR system needs to be used effectively then proper training for its users is required to ensure they are capable of operating the system so to maximize the benefits from the system by utilizing all its functionalities.

It seems that the ICT knowledge level of users do not match up with the required expertise for operating the eHMIS. This is because it is very difficult to operate the eHMIS without ICT knowledge. Though severity of this moderate but it was explained that, without in-depth IT knowledge one cannot execute the functions of the system to its fullest. This brought to the understanding that some of the health professionals rely on the basics of the system to render healthcare services.

There is also costliness associated with the implementation and use of the eHMIS. Every invention comes at a cost so the eHMIS. According to Nguyen et al. (2014), usage of EHR has been recognized as a costly investment. This is exactly was revealed. Implementation and use

of the eHMIS is faced with inadequate funds that could sustain the system to achieve its future prospects. It is sudden that the respondents could not specify, which areas of the system accrues much cost however there was strong admittance that the system incur heavy cost to the hospital.

The system is also faced with inadequate ICT infrastructure to meet the needs of all the users. Acquah-Swanzy (2015) inadequate ICT infrastructure such as computers and internet logistics to support users of EHR system can result in EHR implementation failure because it impedes the smooth running of the system. This is exactly what is discovered here. The eHMIS implementation is constrained by limited ICT resources in the hospital.

People, in particular healthcare professionals, after spending several years of the life time in acquiring medical/healthcare talents, skills and expertise do not give any chance or opportunity to undermine their integrity. This in a way is not uphold by the system as some of the respondents claimed the system diminishes their confidence/self-esteem. This occurs in times they do not have direct or close interaction with the patients. To some of the respondents, in times they were unable to interact with the patients directly they fell a sense of unworthiness as they perceive the patients would think it is rather the system that is curing them and not the doctors. This is a peculiar challenge to some doctors in respect of the use of the system.

Negligence has become one of the attribute of the eHMIS. It was portrayed that the system is fostering carelessness among the healthcare professionals that use it for healthcare services. The system was developed holistically to tackle all medical care data hence in times that it there is malfunction the users become very unconcerned as it is not their doing. This habit of over relying on the eHMIS has made some healthcare providers very reluctant in meeting all the needs of patients they treat with the system.

Breach of confidentiality and lack of interoperability are issues strongly associated with the eHMIS. The system occasionally infringes on the privacy of patients' medical records. This is

a serious concern that requires urgent attention, particularly when data is expensive and cyber-crime is on the rise.

The last aspect of the challenges with the implementation and use of the system is that the system slows the pace of work and creates duplicity. There is slowness in the entire system, which delays the progress of services, making patients wait for a while before they receive their full medical care. This slowness can render the system ineffective if it becomes often to the operational activities of the healthcare professionals.

Lessons from the Study

Many lessons have been learnt from the outcomes of the study. One critical lesson is that, preparation towards the implementation of any eHMIS initiative should involve all stakeholders, in particular the users of the system so as to have broad views and experiences of everybody inorder to have a holistic system that could not lure to the benefit of the few.

More importantly, the eHMIS though is costly but is more efficient and effective because it is reliable, ensures data security and confidentiality, makes health records easily and quickly accessible, foster prompt service deliveries, minimizes medical errors, and prevent wastage, than the manual system of recording and keeping medical records, and that it helps minimize the workload of healthcare professionals hence, it is the best alternative system for recording and storing medical records.

Lastly, owing to cost attached to eHealth its infrastructure and other resource requirements including ICT Department and experts, implementation of any eHMIS should have adequate funding so it can be sustained.

5.3 Recommendations

A very critical ambition for conducting this study is to contribute meaningfully towards the prospects of the eHMIS, by soliciting strategies that deem prudent and effective to redress the lapses and curtail the challenges of the implementation and use of the eHMIS at the UG Hospital. In so doing, the study thrived to uncover appropriate and applicable policy and implementation suggestions that when applied will facilitate the upgradation of the eHMIS being used at the university to its utmost efficiency and effectiveness. That said, the study recommends

- Addition of ICT superintendents to offer assistantship to the health professionals who have no or limited ICT or computer skills and knowledge hence experiencing difficulties with the use of the system effectively and efficiently. This assistantship can take the form of occasional or regular in-service training so the inexperienced computer users can fully get abreast with the system.
- Installation of uninterruptible power supply. Another approach is to fix the intermittent electricity power supply outages by installing an uninterruptible power supply (UPS)—an electric gadget that stores and regulates power supply outages. This intervention is much concern to the users insofar as the system is expected to be excellent in the future.
- Provision of adequate ICT Resource and effective network system. Limited ICT resources obviously undermines the comfortable usage of the system as it will delay responses and cause unnecessary pressure on the few computers that support the system. Also, addressing the instability in the internet service provision is very quintessential to achieve the fruitfulness of the implementation of the eHMIS. In actuality, the future success of the eHMIS lies on constant stability of internet. Adding to this, it is not just the provision of constant internet service but also ensuring its effectiveness is very relevant.

5.4 Conclusion

The adoption of eHIMS in the health sector has gone worldwide and Ghana is no exception. The global usage of HIS had been attributed to the importance of the innovation, particularly of its capacity to address facility healthcare delivery. This and other several factors motivate other local health institutions like the UG Health Services. The university in 2015 adopted such a modern innovation into its health policy framework implemented at the various health facilities that offer health services to the public including its staffs and students' population and nearby neighbours. This study attempted to assess how such an innovation has been implemented and being used at the university's health facility at East Legon in Accra. There were several outcomes of the assessment, which have led to this critical conclusion that the university hospital authorities and policy makers made sufficient preparations including its purchase, mundus operandi, and applicability, prior to the implementation of the innovation (i.e. eHMIS) though there were couple of lapses such as lack of broad stakeholder consultation, restricted users' influence on functionalities of the system and biased prior training. In spite of such minorities, the implementation of the eHMIS has been tremendously successful owing to its enormous significant contributions—such as its easiness, quickness, and simplistic accessibility to patients' health records, time efficiency, information accuracy, improved data storage, and discretionary privileges—of its usage by the users (i.e. health professionals) for healthcare deliveries at the facility. Nonetheless, the system usage has been faced with several resolvable challenges including unstable internet/network system, intermittent power outages/interruptions, inadequate training, difficult to operate without ICT knowledge, costliness, inadequate ICT equipment, diminishes confidence/self-esteem, negligence, breach of confidentiality and lack of interoperability, and slow pace of work and creates duplicity. That notwithstanding, considering the suppositions, the prospects of the eHMIS is of high

optimism on condition that the lapses and challenges will be addressed and the policy suggestions be considered in future policy assessment of the system.

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APPENDICES

Appendix I: Interview Guide

Interviewee: Systems Administrator

Interview date…

DEMOGRAPHIC INFORMATION

(1). What is the Staff composition of the hospital

No. of general

Physicians…….

No. of specialist

Physicians……..**.....**

No. of nurses……

No. of

paramedics……

No. of IT technical

officers……..

Others……...

(b). How many departments are there in the hospital? **.....**

(c). what are the healthcare services provided by the hospital? **.....**

Q2: (a) Which of the Departments provides any form of ICT application?

(i). Do you have Internet access at the hospital? Yes/NO

If yes,

(j). How many Departments have access to the Internet facility? .....

(k). How many Departments do not have access to the Internet facility? .....

(l) Do you have inter-connected communication system that connects the various

department? (Yes/No)

If Yes

(m) How many department are connected? ……

(n) Does the hospital have constant electricity supply in all department?

.....

Initial Preparations made before the implementation of Electronic Health Record

Q3. Briefly describe the measures taken before the acquisition of the system.

a. How was the decision arrived at for the purchase of the system?

i. Were the users involved in the decision making process. Yes/No

If yes,

ii. How were they involved in the decision making process?

iii. What were some of their concerns and how were they handled

iv. Were the users trained to use this new system?

If No,

ii. Are they any special reasons for their non-involvement in the decision making process?

b. Was the hospital prepared before the introduction of the system?

i. Were the users trained to use this new system? Yes/No

ii. What was the feedback from the users after the training?

c. What was the preparation made for funding this project in terms of its;

i. Acquisition

ii. Maintenance

iii. Upgrading

Q4. To assess the implementation of the system

a. Briefly describe the implemented electronic health record system in the facility.

b. What does the system entail and how does it work?

c. Have there being any user client satisfaction surveys in the past?

Impact of the system

Q6. Has the introduction of the system impacted/ benefited healthcare delivery? Yes/ NO

*If No, why has the system failed to have an impact on healthcare delivery?

Q7. How has it impacted healthcare delivery?

Q8. What are some of the challenges to the implementation of the system?

Q9. How are these challenges addressed or what steps are being taken to addressing them?

Q10. What is the desired future of the system?

Q11. What measures are designed to attain the desired future of the system?

Appendix Ii: Questionnaire For Users Of The Ehr

*I am a second year student of **The University of Ghana, Legon** undertaking a research project in partial fulfilment of the requirement for the award of a Master degree in Health Services Management. The purpose of this study is to **assess the electronic health information management systems of the University hospital, Legon**. I would be appreciative if you can take some time off your busy schedule to complete this questionnaire. Please read each questionnaire item carefully and respond according to your true and candid opinion and where you are unable to give an answer to any question, please leave that question unanswered. Be assured that this study is solely for academic purposes. The information provided will be treated as **confidential** and the identity of respondents will be kept anonymous.*

Section A: Information about Respondent

1. What is your role in the hospital (eg. Nurse, doctor, Midwife, etc)? .....

2. How long have you worked in your current position? .....

3. What do you know about Electronic health records? ……..

.....

.....

.....

.....

4. How would you rate your computer knowledge? Novice [ ] Average [ ] Experienced [ ]

5. How did you acquire the computer knowledge? Self-Training [ ] Trained by the facility [ ] Trained in School [ ] Other (please specify)…….

6. Which Microsoft application were you trained on? (Tick as many as trained on) Word [ ] Excel [ ] Assess [ ] PowerPoint [ ]

7. Do you have prior experience with the use of any ICT programme in the performance of your role? Yes [ ] No [ ]

8. If Yes, which programme (Electronic health record (EHR), etc)? .....

Section B: Initial Assessment made (This section is to identify the initial assessment made by the hospital before the implementation of the EHR)

9. Were you involved in the decision to introduce the electronic health records? Yes[ ] No[ ]

10. If Yes, how were you involved in the decision making (e.g staff durber to communicate intentions to purchase an electronic system, ask for your preference and views, etc)?

.....

.....

11. Did you have any influence on how the system should work before its introduction? Yes [ ] No [ ]

12.. **If yes,** did you receive any training on the EHR before it implementation? Yes [ ] No [ ]

13. Was the training adequate for you to use the EHR? Yes [ ] No [ ]

14. Do you think the implementation of the EHR was well planned? Yes [ ] No [ ]

Section C: Usability and User Satisfaction

16. Do you use the implemented EHR? Yes [ ] No [ ]

If yes, answer questions 17 and 18 (then Skip question 20)

17. How often do you use the EHR? Very often [ ] Often [ ] Not Often [ ] Never [ ]

18. When do you use the system? …….

.....

If No

19. What are your reasons for not using the EHR?**.....**

……...

20. Was it easy to learn how to use the EHR? Yes [ ] No [ ]

a. If **Yes**, what contributed to the ease in the use of the EHR (e.g. your background with similar application, adequate training on use, etc)?

……

……

b. If **No,** what were some of the difficulties identified? **.....**

……

……

21. How easy is it to document information in the EHR? Very easy [ ] Easy [ ] Not easy [ ]

22. Generally, does the EHR support your work procedure? Yes [ ] No [ ]

23. How would you rate your satisfaction with the EHR? Very Satisfied [ ] Moderately Satisfied [ ] Satisfied [ ] Less Satisfied [ ]

Section D: The impact of the EHR on healthcare delivery

24. What do you think are some of the benefits of the EHR to the patients? .....

……

……

……

25. What do you think are some of the challenges to the overall introduction and implementation of the EHR? ……

……

……

……

26. What do you think should be done in future implementation to improve the system?

……

……

THANK YOU