SCHOOL OF PUBLIC HEALTH

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UNIVERSITY OF GHANA

HEALTH PROVIDERS EXPERIENCES AND PERCEPTIONS ON THE USE OF ELECTRONIC HEALTH RECORD SYSTEM AT THE HOLY FAMILY HOSPITAL, NKAWKAW

BY

JENNIFER TWUM-BARIMAH

(10262845)

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DECLARATION

I, the undersigned, confirm that this dissertation is entirely my own work. Reference to, quotation from, and discussion of the work of any other person has been duly acknowledged in accordance with University of Ghana guidelines for the production of a dissertation proposal. I further declare that this dissertation proposal has not been submitted for any degree programme in this university or other universities elsewhere.

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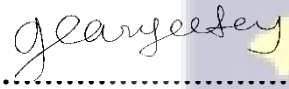
Jennifer Twum-Barimah **Date**

(STUDENT)



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Dr. Genevieve Cecilia Aryeetey **Date**

(ACADEMIC SUPERVISOR)

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DEDICATION

I dedicate this work to the Almighty God for His divine strength, guidance and protection throughout the period of this work and to my families for their encouragement, emotional and financial support.

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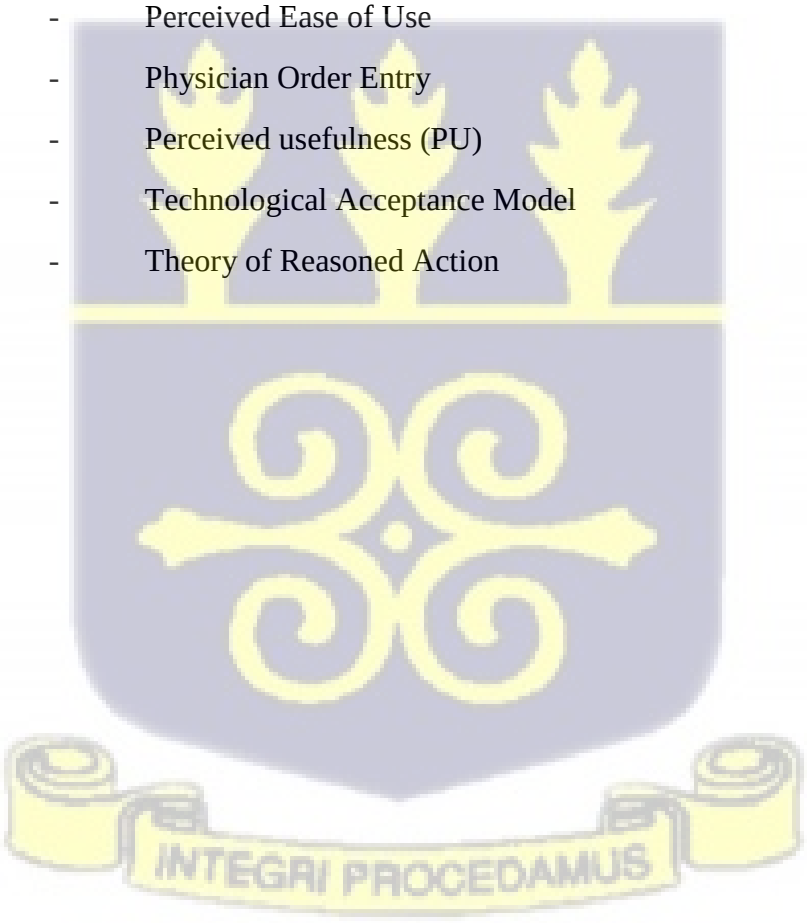
LIST OF ABBREVIATIONS

ANC	-	Antenatal Care
EHR	-	Electronic Health Record
EMR	-	Electronic Medical Record
HFH	-	Holy Family Hospital
IDIs	-	In-depth interviews
IOM	-	Institute of Medicine
IT	-	Information Technology
NAHIT	-	National Alliance for Health Information Technology
OPD	-	Out Patient Department
PEOU	-	Perceived Ease of Use
POE	-	Physician Order Entry
PU	-	Perceived usefulness (PU)
TAM	-	Technological Acceptance Model
TRA	-	Theory of Reasoned Action



ABSTRACT

Background: It is posited that an electronic health record (EHR) that is well implemented can maximally enhance the workflow of health staff and allow them to improve the quality of care. Since health staff are the largest group of users of health care information technology, they would be greatly impacted by the introduction of an EHR system.

Objective: To determine experiences and perceptions of health care providers on the use of electronic health record at the Holy Family Hospital

Methods: The study was a facility based cross-sectional design which employed quantitative and qualitative approaches to gather and analyze data. A total number of 114 staff were selected through simple random sampling while 10 staff were purposively selected for the qualitative data. Descriptive test statistics (frequency, percentage) were used to assess experiences (making referrals for further care, prescribing medicine) and perceptions (power supply, constant access to patient records) of health care providers on the use of EHR. Themes with corresponding codes which are consistent with the objectives was used to analyze the qualitative data.

Results: Most of the providers at the Holy Family Hospital (51.8%) had favorable experience with the EHR and 65.8% are satisfied with the EHR. Also, 49.1% of the respondents have good perception of her, thus, it improves the overall quality of care offered to patients. Reducing long queues (85.1%), waiting time (70.1%), and misclassification of patients file (60.9%) are factors that informed the implementation of the EHR. One of the participants experience with EHR from the interviews indicated that patient waiting time is reduced. One medical officer was not satisfied the EHR because in cases where the clients

are detained, their details will not be on computer for future reference. Another participant explained that reducing long queues and misclassifying patient folders informed the EHR

Conclusion: Healthcare providers at Holy Family Hospital have favourable experience and perception on the use of electronic health records. Just as the use of EHR improves productivity, it is recommended for the Ministry of Health to support clinicians to undergo electronic management systems training. This will make the adoption of EHR by clinician easier

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

As health care providers focus on the importance of quality of care and the ever-changing demand to keep up with a more complex, fast paced health system, electronic health record systems (EHR) are becoming the standard of keeping and/or recording patients information (Vigil, 2010). To effectively manage patients' information, the traditional paper-based medical records systems are increasingly being replaced by Electronic Health Record (EHR) systems (Hsiao, & Hing, 2012). The adoption of EHR are being implemented by an increasing number of hospitals around the world. This is mainly due to several initiatives driven by government regulations or financial incentives in most developed countries (Boonstra et al., 2014; Moreen & Ejiri, 2016). In 2013, for example, it was predicted that the global market for EHR was worth $19.7 billion, with growth rates of 7.6% in Asia Pacific, 6.6 in Africa, Europe, and Latin America, and 9.7% in North America (Accenture, 2010). The population's needs for services and the availability of healthcare resources determine whether the EHR is used in developed or developing nations (WHO, 2006). However, because to resource shortages, EHR usage is gradual and scarce in Sub-Saharan Africa (Douglas et al., 2010).

EHR, used interchangeably with Electronic Medical Record systems (EMR), is defined by the National Alliance for Health Information Technology (NAHIT) (2008: 6) as "electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organization who are involved in the

individual's health and care". As a result, a fully effective EHR is an application made of of apps for pharmacy, laboratory, radiography, decision support, order entry, computerized provider order entry, and clinical recording (Dobrev et al., 2008). EMR is essentially a strategy that might be used to enhance record keeping in a medical facility. Therefore, it is hypothesized that EHRs will result in better quality of care by, among other things, lowering medication-related adverse events, minimizing testing and duplication of health care services, and enhancing the management of chronic illnesses (Hillestad et al., 2005; Jayawardena et al., 2007; Boonstra et al., 2014).

With the use of electronic medical record systems, the gap between data collection and knowledge can be closed by gathering, organizing, and displaying medical data in a way that is valuable to all healthcare practitioners (Al-Shorbaji, 2001). Once more, the introduction and use of EMR will lower costs for the healthcare industry, cut down on service faults, and improve the standard of treatment (Hillestad et al., 2005). When combined with network technologies, EMR systems provide a way for doctors to share information and enhance patient care (Weeks, 2013). EMR is used to access, distribute, and store patient data, for instance, in Canada, Europe, and the United States of America. This enhances the quality of policy choices and the delivery of healthcare (Hillestad et al., 2005; Williams & Boren, 2008). Furthermore, a well-planned, carefully executed strategy for electronic medical records can make healthcare service delivery more satisfying and efficient, improving work relationships with patients (Gyamfi, 2016). The results of a study by Marcus, Lubrano, and Murray (2009), in Malawi showed that EMR has enhanced health care provision by increasing the accuracy and completeness of data collection. While advantages of EMR are

well described, important drawbacks exist (Chaudhry et al. 2006). For instance, some studies show EMR use can prevent doctors from focusing on patients, impede communication, and be detrimental to the patient–doctor relationship (Hsu et al. 2005; Doyle et al. 2012; Ventres et al; 2005; 2006).

The adoption and use of electronic health records are gaining popularity in developing. The acceptance and use of electronic health records are aimed at addressing access, quality, and cost issues in health service delivery (Moreen & Ejiri, 2016). Electronic health record systems serve as the foundation for the development of further electronic health solutions. The OpenMRS, for example, is a user-friendly interface for remotely preserving patient records that has proven to be quite effective in Kenya (Sood, 2008). In Kenya, the Mosoroit Medical Record System (MMRS) is used; in Malawi, the Lilongwe EMR is used; in Peru, Partners in Health (PIH)-EMR is used; in Haiti, the HIV-EMR system is used; in Uganda, Careware is used; in Tanzania, the PEPFAR project is used; and in Zambia, the National EMR is used. The integration of electronic medical records (EMRs) has shown promise in improving healthcare quality (Bani-issa et al. 2016). The extent to which healthcare facilities for people and individuals increase the likelihood of the desired health results is referred to as care quality (quality principles). Services must be consistent with demonstrating professional knowledge (practitioner competencies) and satisfying market expectations for healthcare customers (Buttell, et al., 2008). The Holy Family Hospital (HFH) is one of many public hospitals in Ghana that have recently embraced EMRs to increase the quality and safety of patient treatment. The Holy Family Hospital started the implementation of EMR in 2017. Since its assentation into full use in 2014, staff perception

as well as the quality of care has not been assessed for further improvement and adjustments. This study sought to assess the influence of EMR on quality of healthcare at HFH.

1.2 Statement of the problem

Given the complex nature of healthcare delivery and the numerous decisions that must be taken, sometimes under extremely trying circumstances, it is imperative to have accurate, trustworthy, and timely data (Hayford, 2019). It is proposed that an EMR that is properly implemented can greatly improve the workflow of healthcare personnel and enable them to improve the quality of service by updating facility policies and adding to the decision-making resources available to them (Deese & Stein, 2004).

However, the slow adoption of EMR has become a critical challenge in the health care industry (Chepkwony, 2015). Even among hospitals that have made efforts to implement EMR, there seem to be high failure rate as studies show that up to 80% of EMR implementations fail (Siddhartha, 2017; Chepkwony, 2015). For example, a study carried out in the US revealed that 30% of EMRs are not fully utilized by the care personnel, and that 19% of EMRs are uninstalled after adoption (Lorenzi et al., 2008). EMR adaption is rare in poorer nations (Moreen & Ejiri, 2016). Mulwa (2013) discovered that manual data entry at Nairobi hospitals is prone to human error, including numerous entries of patients' records and the inability to track patients' records because they can't recall their identification numbers. In some hospitals in Nigeria, Uganda, Zambia and Tanzania, for example, patients' data are still recorded manually (Morren & Ejiri, 2016; Hassibian, 2013) which result in errors as a result of poor technological knowledge among health providers, and resistance to change to the computer-based system.

Holy Family Hospital (HFH) is Catholic Facility under the Christian Health Association of Ghana located in Nkawkaw in the Eastern Region of Ghana, and has a functioning Healthcare Information System (HIS) in the departments of laboratory, pharmacy, outpatient department, eye clinic, emergency ward and special clinic which comprises diabetes clinic, hypertensive clinic, HIV/AIDS clinic. As the hospital acclimatizes to the new technology, the need for assessment of the experiences and perception of providers as they use this new system has become relevant. In addition, there seem to be limited number of studies on EMR use and quality healthcare in hospitals in Ghana (Kossman & Scheidenhelm, 2008; Gyamfi, 2016). As such, this study sought to determine the experiences and perception of healthcare providers on the use of electronic health records at Holy Family Hospital, Nkawkaw in the Eastern Region of Ghana.

1.3 Justification

Since health staff are the greatest users of electronic health care systems, as has been shown to have the potential of increasing staff efficiency by making work easier, faster and safer, they would be greatly impacted by EHR implementation. It is posited that an EHR that is well implemented can maximally enhance workflow and allow health staff to improve quality of care provided for patients (Deese & Stein, 2004).

This study is expected to reveal the challenges health staff are confronted with since the implementation of electronic health record system. It is hoped that the results of this study will help inform management of Holy Family Hospital on segments of EHR that requires improvement for health staff acceptance. The study is expected to inform hospital

managers/leaders who are involved in the assessment, design, and implementation of EHR to involve health staff in decision making process concerning EHR to ensure ease of use. Finally, it also adds to existing literature on quality of healthcare with EHR implementation.

1.4 General objective

To determine experiences and perceptions of health care providers on the use of electronic health record at the holy family hospital

1.4.1 Specific objectives

1. To assess provider's experience on the use of electronic health record system
2. To assess provider satisfaction with the electronic health records
3. To explore provider perception with the use of electronic health record
4. To assess the operational challenges with the use of EHR

1.5 Research questions

1. How does providers experience the use of electronic health record system?
2. Are providers satisfied with the use of electronic health records?
3. What are providers' perception on the use of electronic health record?
4. What are the operational challenges with electronic health record?

1.6 Conceptual framework

The conceptual framework in Figure 1.1 presents experiences and perceptions of health care providers on the use of electronic health record at the holy family hospital. An effective and operational EHR application is key in clinical process as it 'houses' a complete medical

information of patients. That is, irrespective of the doctor on duty and/or a scheduled appointment with a physician, based on the records available, any physician on duty can interpret the data and take a decision on the patients' behalf.

The quality of service provided as a result of the conversion of manual/paper folders to EHR is crucial to the sustainability of EHR implementation. That is, the ability of EHR to seal the gaps in the manual/paper records is grounded on the quality of care with use of the application. Factors such as socio-demographic characteristics of staff, health process such as drug prescription and referral for further treatment and management support are likely to impact on the quality of care with EHR.

The ease with which health providers communicate with patients and other health professionals, ease with which patient records are entered into the application, ease and speed at which patients are taken off and a simplified interface of the application serves as barometer to measure providers level of satisfaction with the application as well as the quality of care provided.

Notwithstanding the quality of healthcare EHR provides, it is confronted with challenges. Although, information technology (IT) is quick and effective, access information can be daunting. Thus, during internet downtimes, it becomes frustrating accessing the internet which houses the data required. Additionally, poor leadership thus, reluctance of management to resolve staff concerns will make EHR use frustrating and annoying. Without any fore knowledge on how to use computers and access the internet, EHR may be much of a burden to staff than a relief. There are many peculiar factors impeding the progression and diffusion of EHR usage (Sood et al., 2008).

In a nutshell, providers' experience of EHR to a large extent are influenced by providers experience with the use of EHR, providers satisfaction with EHR, providers perception on quality of care for EHR use and operational challenges with the use of EHR. All of these factors link up to influence providers experience and perception with electronic health records.

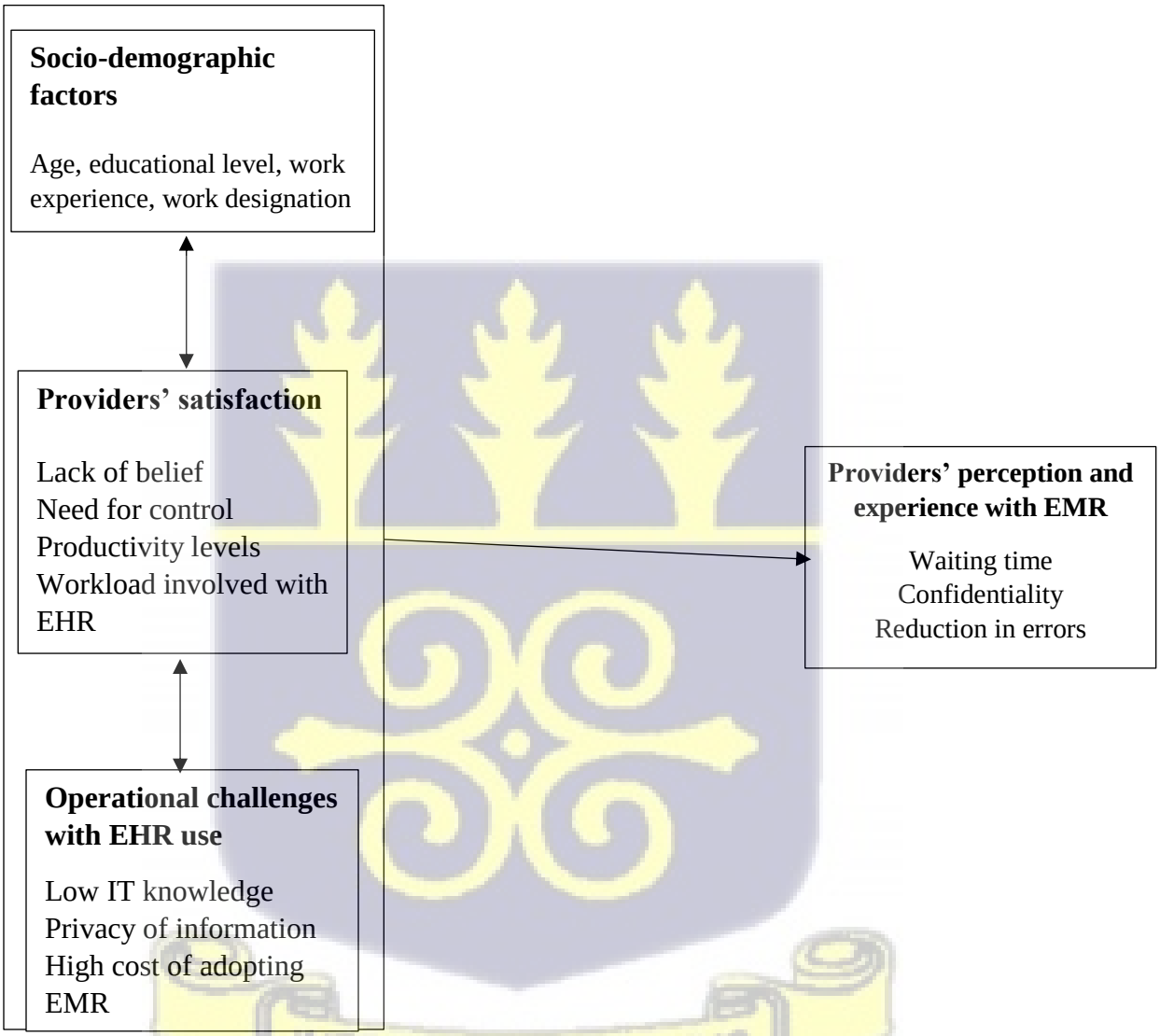


Figure 1.1 Conceptual framework showing experience and perception of HCWs on HER use

CHAPTER TWO

LITERATURE REVIEW

2.1 Scope of the review

An extensive literature search was conducted regarding the influence of Electronic Health Records (EHR) on quality of health care. Using the School of Public Health, UG Library database, searches with Medline, CINAHL, PubMed and Google Scholar (English only, full text) was conducted. The search was guided with the keywords such as health care, quality health care, electronic health records, features/component of EHR, Clinical decision making and EHR, quality of health care and EHR, challenges of HER and quality health care.

To be considered for the literature review, a study had to be published in a peer-reviewed journal; the search was not be limited by date of publication or to a country. The resulting search yielded more than 421 studies distributed unevenly among the main variables under consideration. The search was, hence, be defined to studies that pertained to quality health care, electronic health records, features/component of EHR, Clinical decision making and EHR, quality of health care and EHR, challenges of HER and quality health care which produced 21 studies. The selected studies were reviewed under the major themes and were separated and screened for relevancy and applicability (Burns & Grove, 2009:105). After screening, a total of 19 studies were found to be applicable to the study.

After the extensive literature review, it was realized that not many studies have assessed the influence of EHR in health facilities in the Eastern Region of Ghana. However, a handful of studies had reported on EMR/EHR and these studies were used as proxies for the present study.

2.2 Healthcare Administration

The medical diagnosis, treatment, and/or prevention of disease, illness, injury, physical, and/or other mental limitations in humans is referred to as healthcare (WHO, 2008). Once more, those who supply healthcare services in the fields of medicine, chiropractic, dentistry, nursing, pharmacy, allied health, and other embrace this description (Aduo-Adjei, 2015). They define health as the work done in public health, primary care, secondary care, and tertiary care (Aduo-Adjei, 2015). Additionally, common wisdom holds that healthcare plays a significant role in fostering global human wellbeing and general health (WHO, 2010).

2.3 Quality of care

To begin the "discussion" on healthcare quality, it is necessary to have a common knowledge of what constitutes quality and to be aware of the advantages, disadvantages, and misconceptions of major points of view. Different priorities and objectives will depend on the perspective of the constituents, including patients, their families, healthcare professionals, regulators, insurers, and employers. A product or service has quality, according to Edward W. Deming, who spearheaded the Japanese and American quality revolutions, "if it serves someone and enjoys a good and sustained market." It refers to the significance of a product or service, both in terms of its capability to help the user and its marketability, without specifically describing quality (Buttell, 2007).

Donabedian, a leader in quality theory and healthcare management, has suggested previously that “several formulations are both feasible and valid, based on where we are in the care scheme and on the nature and magnitude of our duties.” Rationally, various opinions and

quality definitions will involve separate approaches to measurement. Another author acknowledges the intrinsic quality definition issue by saying, “it would be hard to discover a realistic definition of quality that did not, implicitly within the definition, have a basic expression or implied concentrate on building and maintaining relationships.” Understanding different quality views does not preclude the achievement of quality of care unless important quality of care has been achieved (Buttell, 2007).

In 1990, the Institute of Medicine (IOM) formulated the most durable and widely cited definition of healthcare quality. According to the IOM, quality is “the degree to which individual and population health facilities boost the probability of required health results and are compatible with present professional understanding.” Other authors have highlighted Deming's understanding of the importance of the market. They relate to care that satisfies the demands of other patients as well as the nurses working in healthcare institutions. Therefore, the IOM's definition of quality health care is expanded for the purposes of this 'discussion'. Quality is the level of effort put forth by healthcare facilities to increase the likelihood that desired health outcomes for individuals and groups will occur (Quality Principles), adhere to current professional knowledge (Professional Practitioner Skills), and satisfy market demands for healthcare (Buttell, 2007).

Technical excellence determines the accuracy of medical diagnoses and procedures. Functional quality, on the other hand, illustrates the facility's method of providing services. Given that technical quality surpasses patients' opinions of their primary fields, there are compelling reasons within these two points of view that functional quality primarily

describes patients' experiences (Asubonteng et al, 1996). Given the inherent difficulty of evaluating technical quality critically and the general lack of technical knowledge among most patients seeking healthcare, it follows that the majority of criteria used to evaluate service quality were traits like reliability, responsiveness, and empathy (Wiesniewski & Wiesniewski, 2005). These qualities offer insight and data on patients' levels of quality satisfaction, which are utilized to enhance service delivery (Devebakan et al, 2005).

2.4 Electronic health records applications for use

Computerized patient's medical record is another name for electronic health record (EHR) (Sumita, 2007). EHR enables medical practitioners to switch from manual patient registers to electronic ones. The EHR system keeps doctor's notes, x-rays, prescriptions, and other medical data electronically rather than in paper files, making it simpler and more effective to search for, retrieve, and share patient data (Zaheer & Sayed, 2013). EHR is deemed vital due to its effectiveness in providing high-quality treatment, optimal patient management, and a reduction in medical errors in the delivery of healthcare (Sumita, 2007; Yoo et al. 2008). Many healthcare provider organizations in industrialized nations have invested in the development and deployment of EHR systems because they have the potential to improve the quality and effectiveness of healthcare delivery (Zaheer & Sayed, 2013). However, in many developing countries the EHR system is not widely spread or implemented. Published literature shows low acceptance and high failure rate of EHR (Benson, 2002; Littlejohns, Wyatt & Garvican 2003). User resistance has been a suspected core factor in the failure of EHR implementation (Zaheer & Sayed, 2013).

Contrarily, other research has demonstrated that the adoption of EHRs results in improved healthcare quality, less time spent on administrative tasks, higher patient satisfaction, and cost savings (Loomis et al. 2002; Van Der et al. 2003). It does away with the requirement for handwritten records, saving time on record storage in turn decreasing patient wait times (Lium, Lerum, Schulz, & Faxvaag, 2006). By using the computerized central system to access the electronic medical records, tracking time for earlier records is also decreased (Zaheer & Sayed, 2013). Accurate medicine lists, readable notes and prescriptions, and readily accessible charts are further advantages (Zaheer & Sayed, 2013). Despite these benefits, if users are dissatisfied, EHR system deployment may face resistance.

2.5 Components of EHR

Tang (2003), noted that an effective EHR system should have the capacity of storing patient health information, enabling proper management of results, facilitating electronic communication and connectivity; providing patient support and helping administrative processes and reporting. Nøhr (2006), highlights the common components of EHR as:

Clinical Documentation: EHR enable health professionals to better handle progress notes of their patients either as free text directly entered into the system or by predefined structured notes.

Physician Order Entry (POE): EHR allow for ordering diagnostic test and medication in a standardized and formalized way.

Booking service: An EHR system allows for patients to book appointments with their medical professionals be it face to face or online.

Communication/Messaging: EHR systems also enable the exchange communication between various hospitals, general practitioners, pharmacies and laboratories.

Results Management: EHR systems also facilitate the evaluating of medical results. The system should be able to show some warnings to abnormal results.

Charge Capture/Billing: EHR makes it easier to track expenses owed to the facility by virtue of the health service provided to the patient.

Disease Management: EHR also help in management of chronic diseases, by allowing health professionals to access data to assess whether or not disease is been managed properly.

Management of security issues: All EHR systems have special features that help manage authentication and authorization of users.

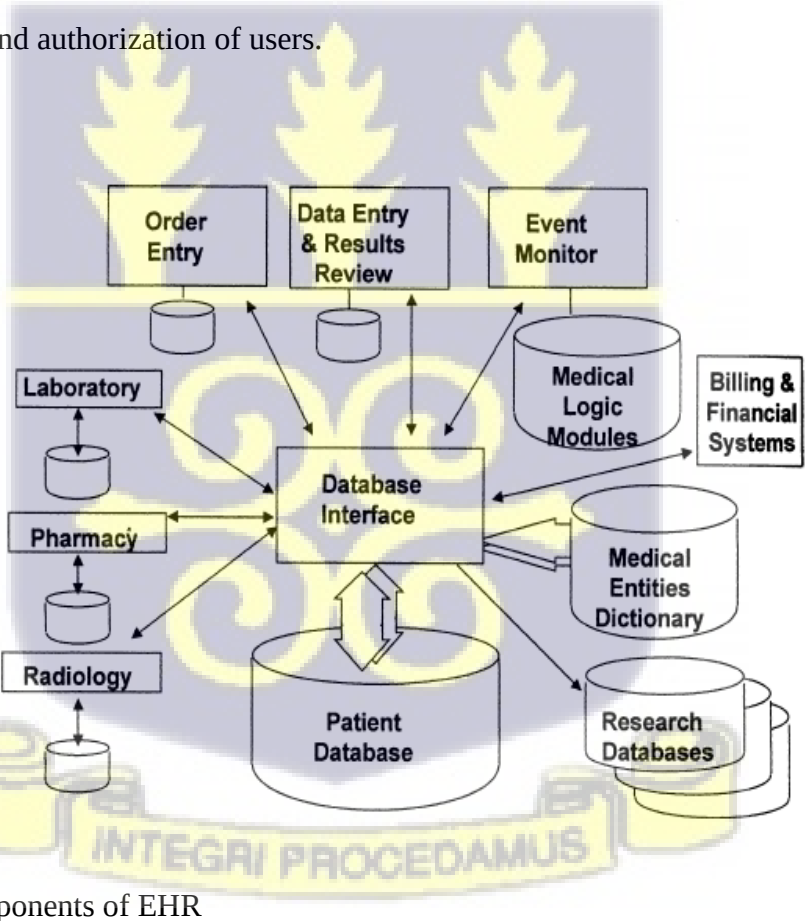


Figure 2.1 Components of EHR
(Source: Tang & McDonald, 2007)

2.6 Empirical Review

2.6.1 Providers experience on the use of EHR

More than half of doctors who don't use EHRs (58.1%) don't believe they can improve patient care or clinical outcomes (Kemper et al., 2006). According to other researchers, those who are unwilling to adopt the EHR system are dubious about promises that the system will significantly raise the caliber of medical practices (Jha et al., 2009). As a result, there is a personal reluctance to the widespread use of EHR systems.

Physicians' working habits heavily rely on professional autonomy, which is described as professionals having control over the circumstances, processes, procedures, or substance of their work. This ensures that their work is not subject to scrutiny or evaluation from others (Walter & Lopez, 2008). Since these data will be evaluated by others and shared with others, physicians are worried that the installation of EHR systems may result in a loss of their control over patient information and working procedures. Physicians' perceptions of the threat posed by the use of EHRs to their professional autonomy are crucial in determining how they will respond, according to Walter and Lopez (2008). Implementing EHR systems does require a change in the working habits of physicians, who are typically resistant to change and question its usefulness. Additionally, the social pressures in their environment have an impact on how doctors view EHR systems, which contributes to their skepticism and hostility.

Worries about subsequent expenses are frequently linked to concerns about the quality of healthcare, and loss of clinical productivity and poor work performance, particularly during

the transition to an EHR system, have been viewed as hurdles (Randeree, 2007). However, this same study also found that nurses perceived EHRs as improving workplace productivity because they provided better access to and organization of patient care information. According to Simon et al. (2007), nurses claimed that increased time spent interacting with the EHR system decreased their job performance because they spent less time with patients.

Lack of time and workload for managers, doctors, and other healthcare workers are significant roadblocks to EHR deployment. Studies involving healthcare workers made more general claims regarding severe workloads (Greenhalgh et al., 2008), the time-consuming nature of using an EHR (Chronaki et al., 2007; Randeree, 2007), and worries that physicians' clinical tasks will be hampered by EHR deployment. Managers' concerns regarding the adoption of EHRs increasing physician workload have been raised in studies (Miller & Sim, 2004). The introduction of EHRs is perceived by physicians as slowing their workflow because it always results in more time being needed for implementation, data entry, and learning how to use the EHR system. A smooth workflow is believed to be highly crucial in the work of physicians. As a result, their workload will be increased and their productivity will be reduced.

2.6.2 Providers satisfaction with EHR

The power of EHR systems to alter medical practice has been used in recent years to improve decision-making and promote the best possible patient care. Correct and current data, rapid and universal access to a patient's lifetime health records, the right facility to refer a patient

to in order to receive optimal care, and a decrease in medical treatment errors are some of the advantages (Bean et al, 2001).

Consistency is enforced via the electronic medical record. Every laboratory finding, radiological report, and progress remark so adhere to a consistent format. Standardized formats make incomplete or strange information stand out (Lincoln, 1997). Health care providers can spend less time figuring out what the report says. In the conventional medical record, clinic visit notes, lab results, and progress reports are entered in strict chronological order. But medicine is non-linear and demands for access to patients notes from various perspectives (Lincoln, 1997). With EHR, the clinician can rearrange the information in any preferred order to see how they have changed over the past year. Single laboratory value, such as the patient's blood potassium level, can be extracted and analysed.

In any setting, quality assurance is a crucial component of healthcare. In a perfect world, people shouldn't undergo costly tests and treatments they don't need because they don't prolong their lives (Robinson, 2017). Due to the computer system's ability to check the patient's problem list, diagnoses, laboratory results, prescriptions, and procedure notes, EHR make quality assurance realistic (Mamlin et al, 2006).

The prospect of a consolidated database with the patient's whole medical history is provided by EHR (Hoch et al, 2003). Doctors can track their patients when they have been relocated to faraway regions, confer with doctors in other cities, or check in on them from home. Now personal physicians can actively participate in their patients' hospital management,

reviewing the daily notes and treatment plan, and adding suggestions of their own to the chart (Stormo et al, 2004).

2.6.3 Operational challenges with EHR use

The ease of transition would be increased by addressing software integration difficulties by improving software designs for healthcare practitioners. Another obstacle to the integration of healthcare information systems is problems with information sharing between healthcare information systems at various hospitals and medical facilities. Accessing clinical data including lab results, radiology, and referral systems is challenging due to the lack of integration. The length of time it takes to provide patient care also grows as a result of the delayed integration process (Benson, 2002).

For the EHR system to be more productive, both doctors and workers must find it easy to use. In addition, hospitals and medical facilities frequently use obsolete computer technology due in part to a lack of funding, as is the situation in the majority of poor nations (Chebole, 2015). In order to make any significant progress toward achieving a satisfactory utilization of EHR systems, the problem of interface usability must be resolved. Due in part to their lack computer literacy, physicians and staff struggle to handle both basic and complex technologies, which results in poor system execution (Chebole, 2015). Users who are used to entering data into computers using more traditional methods have found it more challenging as a result of more sophisticated support software like voice recognition, touch screens, and mobile devices. Additionally, the staff is typically in charge of entering patient data into technology information systems (Tian, 2011). Staff members' inadequate

computer skills could cause the entire system to fail. Low productivity and a slow work flow may be the outcomes of these circumstances. Such incidences may negatively impact the patient's circumstances. Thorough training of new doctors who will eventually replace the aging and retiring doctors is the long-term answer to knowledge-related hurdles.

Many health care professionals worry that integrating new EHR systems into current workflows would change current workflows or cause other changes (WHO, 2010). Therefore, healthcare workers frequently reject new technological innovations like EHR that could endanger their careers, especially when staff members foresee a drop in staff numbers (Acheampong, 2012). This has a significant impact on how well-liked such EHRs are. Despite the advantages of EHR adaptation, healthcare personnel continue to be resistant to using computers to treat patients. For instance, some experts would rather write prescriptions by hand than make better use of technology. Numerous factors have been linked to ICT resistance. Healthcare professionals claim that retrieving patient records from computer programs is a time-consuming operation (Omary et al., 2010). EHR are high-tech systems with intricate hardware and software, thus users must have a particular level of ICT proficiency. Additionally, some technical (capacity) issues with EHRs cause doctors to complain, necessitating their improvement.

2.7 Theoretical review

If potential consumers do not adopt and apply emerging information technology, it cannot boost corporate effectiveness. The Technological Acceptance Model will serve as the foundation for this research investigation (TAM). It was first presented by Fred Davis in

1986 and was designed primarily for user acceptance modeling of information systems. The Theory of Reasoned Action (TRA), developed by Davis in 1989, is the basis for TAM. It is one of the best measures of how effectively people use computers among professionals and academics. In order to help academics and practitioners understand why a certain system might be unsatisfactory and take the necessary action, TAM tries to provide explanation in addition to prediction. The evaluation of developing information technology's user adoption is the goal. Tracing how external influences affect internal beliefs, attitudes, and intentions is a key component of TAM. TAM addresses two specific beliefs, namely perceived utility (PU) and perceived ease of use (PE) (PEOU). The subjective likelihood that a potential user will perform better on the job within an organizational environment is known as perceived usefulness, or PU. The degree to which a potential user anticipates using the target system without exerting any effort is known as perceived ease of use (PEOU). The behavioral intentions of embracing and implementing a technology system are influenced by these ideas. In relation to these two, perceived usability directly influences both perceived utility and technology use (Adams et al., 1992; Davis, 1989). Additionally, Davis (1989) discovered a connection between consumers' attitudes and intentions toward using a technology and the views they hold about its utility. He discovered that, compared to other variables, perceived usefulness had a greater and more reliable association with utilization.

Because new technologies, such as personal computers, are complex and decision-makers have some level of uncertainty regarding the successful adoption of technology, Bagozzi, Davis, and Warshaw (1992) assert that people form intentions and attitudes toward trying to learn to use a new technology prior to initiating efforts. After some first attempts to learn

how to use technology, intentions and attitudes toward its use may develop, but they may be missing or ill-formed. As a result, such attitudes and objectives could not follow naturally from real usage. Therefore, the purpose of this study is to evaluate the effectiveness of TAM in predicting healthcare professionals' perceptions and experience with HER use.

2.8 Summary and conclusion of chapter

Accessibility to ICT infrastructure may be a hindrance to EHR system adoption, according to studies on this topic (Vishwanath & Scamurra, 2007; Andreassen et al., 2007; Santana, Lausen, Bujnowska-Fedak, et al., 2011; Kummervold & Wynn, 2012). Lack of these 'basic' facilities and hardware makes it difficult to implement EHR systems because they require internet connections, computers, and phone lines (Laerum, Ellingsen, & Faxvaag, 2001). The researcher was interested in these situations to see whether resistance to ICT infrastructure had an impact on health staff satisfaction with application use. Despite the fact that computer skills are taught today and are a part of everyone's daily lives, Loomis et al. (2002) found that there have been a number of obstacles to its adoption for service delivery. There is a need to determine experiences and perceptions of health care providers on the use of electronic health record at Hope Family Hospital.

CHAPTER THREE

METHODS

3.1 Study design

The study employed a cross-sectional design for the quantitative part of the study. A cross-sectional study is a study that assess all variables in a sample systematically, often to quantify potential causative associations between exposures and outcomes (Vandenbroucke et al., 2007). A cross sectional study is ideal for this study because it is generally quick, easy and often based on a questionnaire survey and inexpensive to perform (Sedgwick, 2014).

The exploratory design was used for the qualitative part of the study. This design emerges from the discipline of nursing and medicine and it focuses on using the knowledge gained to benefit patients, families and improve health outcomes (Burns & Grove 2009). Qualitative methods are particularly suitable for exploring individual knowledge and experiences on health issues (Parahoo, 2014) and to obtain insight into the lived experiences of the participants (Burns & Grove 2009). Also, to explore in their own words the unique understanding of the research topic and experiences they have encounter (Parahoo, 2014 2006). Hence reason behind choosing this study design.

3.2 Study area

Holy Family Hospital as a Catholic mission facility aims at providing quality health care in line with the healing ministry of Christ. Clinical Performance indicator figures from other departments and units are covered in the appendices. Key performance indicators for 2018 are discussed in comparison with that of the previous years. In 2017, the hospital had a total

ward bed capacity of two hundred and fourteen (214) and nineteen (19) at the emergency unit as compared to one hundred and ninety-eight (198) at the wards in 2016. The total attendance of the hospital including Out Patient Department (OPD) and Antenatal Care (ANC) was 112,113 in 2018 as compared to the 2017 figure of 99,338 which represent 12.9% increase. Out of the total OPD attendance 60.4% were re-attendants whereas about 39.6% were new clients. Female constituted about 70.3% of the total attendance mainly due to ANC coverage. Moreover, ANC constitute about 13.3% of total attendance whiles children under five accounted for 11.5% of the attendance compared to 88.5% adults. There was an increase in the number of scans taken from 3319 to 4172 representing 25.7%. The facility recorded a mortality rate of 3.1. Neonatal mortalities continue to be a challenge for the facility. Institutional Neonatal Mortality Rate increased from 24.4/1000 to 28.5/1000 livebirths from 2017 to 2018. The hospital continues to receive visiting specialist doctors. The hospital is a recognized center for Urological services provided by visiting Urologists from Catholic Medical Centre in South Korea, who provide training on neonatal resuscitation as well.

The Electronic Health Records systems was implemented in the hospital in 2017. The implementation of the EHR was aimed at reducing the amount of papers work related to patient's records. Considering the cost involved in setting up and maintaining the EHR, it is implemented at the laboratory, pharmacy, out-patient department, eye clinic, emergency ward and special clinic which comprises diabetes clinic, hypertensive and HIV/AIDS clinic. In the various wards, however, the paper and/or manual systems of keeping patients' records are still in use.

The Holy Family Hospital was used as the study site as it is serves a large number of patients on daily basis and also because it's a referral hospital where several dire health cases are treated. Hence, assessing the influence of Electronic Health Records on quality of health care among health care providers is central to the objective of the hospital in saving lives and enhancing the quality of health care provided to patients.

3.3 Study population

The population comprised all health staff in the various departments in the Holy Family Hospital (HFH).

3.3.1 Inclusion criteria

- Both clinical and non-clinical staff who work with the EHR at HFH
- Management of the hospital who are responsible for implementation of EHR

3.3.2 Exclusion criteria

- Staff who have less than three years working experience with the hospital.
- Staff who are sick and cannot give consent

3.4 Study variables

The variables and their operational definition as well as scale of measurement are detailed in Table 3.1.

Table 3.1 Study variables showing dependent and independent variables

Variables	Operational definition	Scale of measurement
Socio-demographic factors		
Age	Age at last birthday	Nominal
Gender	Male, female	Nominal

Department of work	Records, finance, physiotherapy	Nominal
Length of service	1-2 yrs, 3-4 yrs, 5yrs and above	Ordinal
Providers experience		
Referral for further care	Deterioration of patient condition	Nominal
Prescribe medicine	Emergency admission	Ordinal
Provide medical advice based on past records	Medicinal and lifestyle changes	Nominal
Providers satisfaction		
Patients data	Easy access to patients records	Ordinal
Expedite healthcare	Number of patients to attend to are known	Ordinal
Reduces workload	Less time for patients data input manually	Ordinal
Providers perception on quality of care		
Need for control	Loss of control over patient's data	Ordinal
Productivity levels	Loss of clinical productivity	Binary
Workload involved with EHR	Extra time for data input	Ordinal
Operational challenges with HER		
Privacy of information	Ease to information	Ordinal
Inexperience with computers	Difficulty in accessing records	Ordinal
High cost of adopting EHR	Continuous low speed of internet	Ordinal
Resistance to new technologies	Difficulty to use IT	Ordinal

3.5 Sample size determination

The sample size was calculated using the formula provided by Yamane (1967). The formula is used for sample size calculation since the population of the study is known, the total number of health care providers at HFH as of January 2021

$$n = \frac{N}{1+N(e)2}$$

N = Population

n = sample size

e = degree of freedom (0.05)

$$= \frac{318}{1+1\ 318\ (0.0025)}$$

$$\frac{318}{1.795}$$

n = 177.16

n = 177 health care providers

Calculating for non-respondents

Non-respondents = $\frac{n}{1-a}$

a = Non-response rate (5%)

a = $\frac{177}{1-0.05}$

$\frac{177}{0.95}$

Non-respondents= 186.5~187

Therefore, the sample size for the study comprised 187 healthcare providers. Out of the 187 questionnaires administered, 114 were completely answered and returned. This signifies a 61.0% response rate.

3.6 Sampling procedure

Quantitative sampling procedure

Simple random sampling technique was employed to select staff for the study. This was done by obtaining staff records from the human resource department at Holy Family Hospital. Medical staff who are actively involved in the use of electronic health records were selected. A total of Three hundred and eighteen (318) staff composed of fifteen (15) laboratory technicians, twenty-five (25) medical officers and physician assistants, eleven (11) medical records, two hundred and twenty-five (225) nurses, sixteen (16) pharmacists and pharmacy technicians', one (1) nutrition officer, three (3) physiotherapist, four (4) x-ray attendants, two (2) public health officer, six (6) anesthetist, ten (10) accounts obtained from the data and records department of the hospital served as the sample frame for the study. The selection of staff from the database was done by generating one hundred and seventy-seven (177) staff from the sample frame of three hundred and eighteen (318) with the help of a random number

generator. Staff whose names and/or staff numbers were selected were identified and subsequently 'interviewed' with the aid of a structured questionnaire.

Qualitative sampling technique

Health care providers who are directly involved in the daily use of the EHR in the hospital were purposively selected. Hence, ten (10) health care providers were purposively selected from the records departments (2), out-patient department (OPD) (2), laboratory (1) and pharmacy (2), emergency (2), special clinic (1). Though there is no consensus on the perfect sample size for qualitative studies, literature suggests that a sample of 5 – 20 is good. This is consistent with the sample size for the present study (Mocănașu, 2020). The interviews, with the aid of the structured guide, were conducted in one of the consulting rooms during breaks and after works. This was done to ensure that participants were not rushed through the interview while ensuring that they were relaxed enough to speak freely.

3.7 Data collection techniques

This section presents the data collection techniques that was used in this study as quantitative and qualitative.

3.7.1 Quantitative data collection

Through the use of a closed-ended questionnaire and the quantitative technique, the researcher was able to produce statistics on the data gotten. The questionnaire was designed in such a way that it sought pertinent data to address the specified study objectives. The medical director of HFH was contacted to request permission to use their facility for the study and was issued a letter of introduction from the School of Public Health (SPH) and

ethical clearance from the Ghana Health Service Ethics Review Committee. This was done to guarantee unhindered access to information from chosen participants. Respondents who satisfy the inclusion criteria were selected to participate in the study. All selected respondents were approached by the principal investigator and two trained research assistants to agree on appropriate time to commence the survey. Respondents were provided with copies of survey questionnaire along with information about the aim of study and consent form (Appendix A) to review and sign respectively prior to data collection. To ensure completeness of the questionnaire and minimize errors, the principal investigator and the two research assistants approached the selected staff during their lunch breaks to respond to the questionnaire. Face-to-face questionnaire administration was conducted for the selected respondents from Monday to Friday from 7am to 4pm each day. Each questionnaire was administered within 10-20 minutes at the Holy Family Hospital.

3.7.2 Qualitative data collection

In-depth interviews (IDIs) was employed to collect the data from participants (healthcare providers). The IDIs were done for 10 participants who have used the paper system and are using the EHR now. A structured interview guide was used to guide the interviews. The IDIs was conducted by the principal investigator based on the preferred language of the participants. Also, the IDIs took place at a venue convenient to both the principal investigator and the selected participant. IDIs was carried out using a face-to-face approach and was recorded with an audio recorder. Handwritten notes was also taken. Each interview lasted for about fifteen minutes.

3.8 Data collection instrument

Survey instrument

Structured questionnaires and interview guides were used to gather the data. The questionnaire was designed in a way that sought for pertinent data to address the study's unique aims. The survey was taken from Chebole (2015). The questionnaire was divided into five sections to collect information as follows; Section A comprised five (5) questions which explored the respondents' socio-demographic factors such as age, sex, educational attainment, department of work and work experience. Thus, this gave a snapshot of the biographical information on the respondents. The second part of the questionnaire, Section B, consisted of Likert-scale item questions (or statements) to assess providers experiences with EHR. The Likert scale was a five-item scale that ranged from 1 (strongly disagree) to 5 (strongly agree). A total of eleven (11) questions were asked with regard to providers experiences. These include the belief of healthcare providers in EHR, need for healthcare providers to control EHR, productivity levels and workload involved with EHR. Section C of the questionnaire assess providers satisfaction with EHR. This was also obtained using a 5-tiem likert scale questions (or statements) that ranged from 1 (strongly disagree) to 5 (strongly agree). About 6 questions relating to provider's satisfaction were obtained. These referral for further care, prescription of medicine, laboratory test process, provision of medical advice among others. Section D of the questionnaire sought to assess the implementation issues (challenges) with use of the EHR record system. Here also, the five-item likert scale was used to address questions (or statements), to which providers are to select the most appropriate from 1 (strongly disagree) to 5 (strongly agree). The six questions

(statements) asked in this section were experience with the use of computers, privacy of information, cost of adopting EHR, leadership and resistance to new technologies.

IDI guide

With regard to the qualitative data collection process, the interview guide directed the researcher during the IDIs. The interview guide was structured in a way to solicit information that is consistent with the objectives of the study. Questions were to explore providers perceptions of quality of care with use of EHR system and factors associated with the implementation of EHR among health providers at HFH. Some of the questions included were has the implementation of EHR improved or worsen your service delivery; has the implementation of EHR increase or reduce the waiting time at the OPD, and how easy or difficult is appointment booking at the hospital?

3.9 Quality control

- Study materials were explained to respondents prior to the administration of questionnaire.
- Research assistants were intensively trained to carry out survey accurately.

3.10 Pretesting

Pretesting of data collection tool (questionnaire) was done at KENOP Care Hospital, Nkawkaw with 10 respondents to validate survey tools. The purpose was to ensure that the tool was clearly worded and bereft of major ambiguities and seeks the type of information intended. It was also carried out with the aim of eliminating irrelevant questions so as to

make it reliable. On the qualitative side of the research, the semi-structured interview guide was validated by the academic supervisor of the researcher.

3.11 Data processing and analysis

To ensure accuracy of the information gathered, data from the questionnaire was entered into Stata version 15 for cleaning. Cleaning of the data was done by running frequencies of the variables to check for inconsistently coded data. The completed questionnaire was analyzed using Stata 15.

Quantitative analysis

Descriptive statistics were used to describe provider characteristics. Analysis provider's experiences, satisfaction and implementation using the likert scale was as follows. For provider's experiences, there were eleven (11) questions (statements) ranging from 1 to 5. The minimum that a respondent can obtain from the responses is (1x11=11) and the maximum obtainable is (5x11=55). Thus, we obtain a range of 11-55. Dividing the range into three equal parts, the decision, all who obtained scores between11-25 were characterized as 'poor', i.e people with poor experience with the EHR system. Those within the range of 26-40 were characterized as 'moderate' experience and those between 41 and 55 were characterized as 'good' experience with the EHR system.

Similarly for provider satisfaction, there were six (6) questions (statements) using the same 5-item likert response. Here the minimum obtainable per respondent is (1x6=6) and the maximum obtainable is (6x6=36). The range of response is 6 to 36. Dividing this into three equal parts, scores between 6 and 15 was classified as 'poor' satisfaction; scores between 16

and 25 was classified as ‘moderate’ satisfaction and scores between 26 and 36 as classified as ‘good’ satisfaction.

Qualitative analysis

The interviews were initially listened to for about three times and transcribed verbatim. A codebook was created based on the objectives of the study and the subject areas that were explored during the interviews. The transcribed data was read line-by-line and coding was done. The coding was reviewed, where some nodes were rearranged and others merged to develop themes. Afterwards themes emerged and exported into word for further interpretation of the data.

3.12 Ethical consideration

The following actions were taken to address the study's ethical concerns. To perform a study in a medical facility, ethical approval was required from the Ghana Health Services' Ethics Review Committee **[GHS-ERC:039/12/21]** The Medical Director of the Holy Family Hospital received an introduction letter from the School of Public Health (SPH) to let the various departments easily access the data required to finish the study. Other ethical issues involved in the study was addressed by doing the following;

3.12.1 Participant’s consent

The purpose of the study was explained to the research participants. A participant’s consent form (Appendix A) was given to study participants.

3.12.2 Confidentiality and anonymity

Respondents were assured of confidentiality and privacy of the information provided. To ensure this, personal information such as full name, and residential address of the participants were not asked/collected.

3.12.3 Voluntary consent

Respondents were assured that participation in this research is entirely voluntary. They were free to withdraw consent and discontinue participation in this study at any time without prejudice from the study team.

3.12.4 Reward/compensation

Respondents were not provided any reward/compensation to respond to the questionnaire.

3.12.5 Potential risks/benefits

This study had minimal risk such as contracting Covid-19, however, there was no anticipated risks of participation to respondents. Most of the questions were not sensitive to inflict any emotional injury on respondents.

3.12.6 Declaration of conflict of interest

There was no conflict of interest

3.12.7 Covid 19 protocols

Strict GHS ERC guidelines which are in line with the World Health Organization (WHO) were adopted and strictly adhered to in the data collection process. The ideals of hand washing with soap under running water or sanitizing the hands with alcohol-based hand sanitizers was used by all participants before participating in the study. Second, all participants were encouraged to wear facemask during interview sessions. These facemask were provided by principal investigator at no cost to study participants.

3.12.8 Data storage/security

Information was gathered with a structured questionnaire. The research instrument (questionnaire) containing the data was saved in a locker for two years before disposing them off. Analysed data/information saved on laptop and memory sticks/pen drives was kept under protected password and discarded after five years. In addition, the audio-recorded interviews were saved on google drive which is password protected

3.12.9 Cost

The entire research work costed one thousand one hundred and twenty Ghana cedis only.

3.12.10 Protocol funding

The entire work was funded by the principal investigator.

CHAPTER FOUR

RESULTS

4.1 Introduction

The chapter presents findings from the quantitative approach (questionnaire) and the findings from qualitative approach (interviews). The findings are presented in sync with the specific objectives of the study as; providers experience with electronic health records; providers' satisfaction with electronic health records, providers perception on quality of care with electronic health records and factors associated with electronic health records implementation. The chapter also present information on the socio-demographic characteristic of respondents.

4.2 Sociodemographic Characteristics

The socio-demographic characteristics of respondents at Holy Family Hospital is presented in Table 4.1. Close to half of respondents 55/114 (48.3%) were between the age category 30 - 39 years and the least represented age category were respondents aged 50 -59 years 2/114 (1.7%). Close to one thirds of the respondents 37/114 (32.5%) had served with the hospital between 5 – 10 years and respondents who have served 11 – 15 years were in the least category 22/114 (19.3%). Majority of the respondents 81/114 (71.1%) were females and the remaining 33/114 (28.9%) were males. Most of the respondents 81/114 (71.0%) were nurses from the nursing department, followed by medical officers from the medical block 23/114 (20.2%), 7/114 (6.1%) of the respondents from the data/records department and 1/114 (0.9%) respondent each from the accounts, laboratory and pharmacy departments respectively.

Table 4.1 Socio-demographic characteristics of respondents (n=114)

	Parameter	Frequency (n)	Percentage (%)
Age of respondents			
	≤ 30 years	29	25.4
	30 – 39 years	55	48.3
	40 – 49 years	28	24.6
	50 – 59 years	2	1.7
Length of Service			
	≤ 5 years	29	25.4
	5 – 10 years	37	32.5
	11 – 15 years	22	19.3
	≥ 15 years	26	22.8
Sex of respondents			
	Female	81	71.1
	Male	33	28.9
Department			
	Accounts	1	0.9
	Data/records	7	6.1
	Laboratory	1	0.9
	Medical	23	20.2
	Nursing	81	71.0
	Pharmacy	1	0.9

(Source: Field work, 2022)

4.3 Providers experience with electronic health records use.

The experiences of providers with the electronic health record (EHR) in Holy Family Hospital is presented in Table 4.2. Most of the respondents 66/114 (57.9%) agreed that the adoption of EHR helps to hasten clinical decisions while 62/114 (54.4%) of the respondents strongly agreed that the EHR makes it easier to retrieve patients records. In addition, the adoption of EHR has reduced patients waiting time as agreed by 45/114 (39.5%) of the respondents and it was also agreed by 49/114 (43.0%) of the respondents that EHR has improved the confidentiality of patients records.

Furthermore, most of the respondents 54/114 (47.4%) disagreed that the adoption of EHR interfere with their performance compared with the paper (folder) system. Similarly, 41/114 (36.0%) of the respondents disagreed that the adoption of the EHR will not provide enough security for patients information.

Generally, most of the providers at the Holy Family Hospital 59/114 (51.8%) had good experience with the EHR compared with the 33/114 (29.0%) with poor experience (Fig. 4.1).

Table 4.2: Providers experience with EHR use in Holy Family Hospital

	SA, n (%)	**A, n (%)**	**N, n (%)**	**D, n (%)**	**SD, n (%)**
Quickens the process of clinical decision-making	30 (26.2)	66 (57.9)	9 (7.9)	7 (6.1)	2 (1.8)
Makes it easier to retrieve patients past medical records	62 (54.4)	45 (39.5)	3 (2.6)	0 (0.0)	4 (3.5)
Patient waiting time is shortened	37 (32.5)	45 (39.5)	24 (21.0)	7 (6.1)	1 (0.9)
Improves confidentiality of patients records	42 (36.8)	49 (43.0)	10 (8.8)	8 (7.0)	5 (4.4)
Reduce medication errors	20 (17.5)	56 (49.2)	27 (23.7)	4 (3.5)	7 (6.1)
Easier to maintain a patient appointment system records	47 (41.2)	53 (46.5)	7 (6.1)	5 (4.4)	2 (1.8)
I prefer an EHR system for my day-to-day operations than using paper-based record systems	58 (50.8)	37 (32.5)	17 (14.9)	0 (0.0)	2 (1.8)
I feel much in control while using paper-based patient records than using HER	6 (5.3)	33 (29.0)	20 (17.4)	37 (32.5)	18 (15.8)
Transitioning from paper-based system to EHR will interfere with my overall performance	4 (3.5)	16 (14.0)	14 (12.3)	54 (47.4)	26 (22.8)
NOT assured of the security of the patient information	10 (8.8)	27 (23.6)	19 (16.7)	41 (36.0)	17 (14.9)

SA=Strongly agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly disagree.
n=Frequency, %=Percentage
(Source: Field work, 2022)

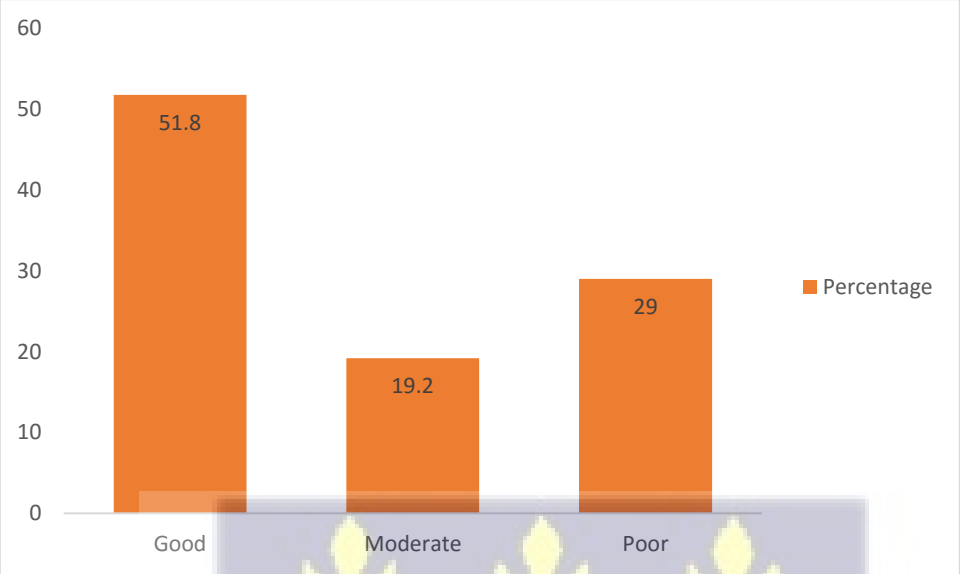


Figure 4.1 Providers experience with EHR at Holy Family Hospital

4.4 Providers' satisfaction with EHR

Details of providers' satisfaction with the electronic health record are shown in Table 4.3. Most of the respondents 70/114 (61.4%) agreed that the adoption of EHR makes medical care delivery prompt to patients while 66/114 (57.9%) of the respondents agreed that the EHR makes it easier to refer patients for prompt treatment at a resourced hospital. Furthermore, about half of the respondents 56/114 (49.1%) agreed that EHR provide easy access to diagnosis information of patients for drugs/medication change when necessary.

Most of the respondents 61/114 (53.5%) agreed that the adoption of EHR has quicken treatment advise process for patients. Likewise, it was agreed by 60/114 (52.6%) of the respondents that medical advice for patients is enhanced because of the easy access to

patients' information. Generally, most of the providers 75/114 (65.8%) were satisfied with the electronic health records (Fig. 4.2).

Table 4.3: Providers satisfaction with EHR at Holy Family Hospital

	SA, n (%)	**A, n (%)**	**N, n (%)**	**D, n (%)**	**SD, n (%)**
Provision of prompt medical attention to patients	32 (28.1)	70 (61.4)	7 (6.1)	5 (4.4)	0 (0.0)
Prompt patient referrals for further treatment	29 (25.4)	66 (57.9)	13 (11.4)	2 (1.8)	4 (3.5)
Diagnosis information provided for drugs change	40 (35.1)	56 (49.1)	13 (11.4)	3 (2.6)	2 (1.8)
Quick treatment advise	45 (39.5)	61 (53.5)	5 (4.3)	1 (0.9)	2 (1.8)
Easy access to patient information for medical advice	50 (43.9)	60 (52.6)	4 (3.5)	0 (0.0)	0 (0.0)

SA=Strongly agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly disagree.
n=Frequency, %=Percentage
(Source: Field work, 2022)

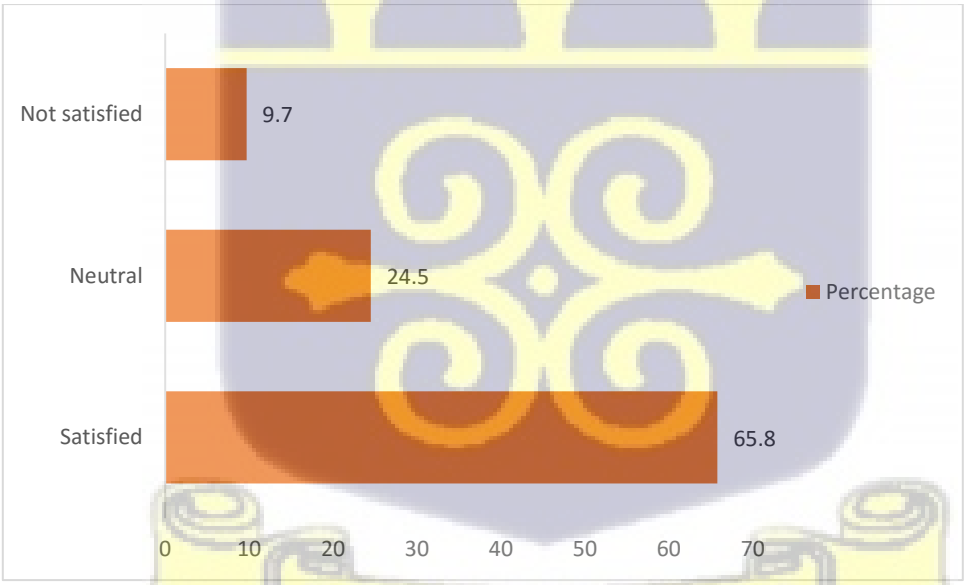


Figure 4.3 Providers level of satisfaction with EHR at Holy Family Hospital

4.5 Providers' perception on quality of care with use of EHR

Table 4.4 present providers' perception on the quality of care with the use of EHR at Holy Family Hospital. It was strongly agreed by 49/114 (43.0%) of the respondents internet downtimes make access to patient records difficult. It was also agreed by 55/114 (48.2%) of the respondents that patient records can be hacked and/or attacked by a virus. Similarly, it was agreed by 69/114 (60.5%) of the respondents that power fluctuations make EHR use frustrating.

Again, it was agreed by 44/114 (38.6%) of the respondents that cost of internet bundles make EHR use unbearable. Similarly, it was agreed by 34/114 (29.8%) of the respondents that there is lack of commitment from management of the hospital to regularly update the EHR. It was however disagreed by 53/114 (46.5%) of the respondents that using EHR is daunting and it was agreed by 56/114 (49.1%) of the respondents the adoption of the EHR has improved the overall quality of care offered to patients.

Table 4.4: Providers perception on quality of care with EHR at Holy Family Hospital

	SA, n (%)	**A, n (%)**	**N, n (%)**	**D, n (%)**	**SD, n (%)**
Difficulty in accessing patients records during internet downtimes	49 (43.0)	48 (42.1)	5 (4.4)	4 (3.5)	8 (7.0)
Records/history of patients are not secured enough as it can hacked and stolen or can be lost to virus attack	25 (21.9)	55 (48.2)	22 (19.3)	6 (5.3)	6 (5.3)
The unpredictable power supply make EHR usage frustrating	29 (25.4)	69 (60.5)	12 (10.5)	2 (1.8)	2 (1.8)
The cost of internet bundles makes EHR unbearable	27 (23.7)	44 (38.6)	20 (17.5)	19 (16.7)	4 (3.5)

Lack of commitment and clear decisions from management on system upgrade	16 (14.0)	34 (29.8)	38 (33.3)	23 (20.2)	3 (2.6)
Using EHR is daunting	6 (5.3)	15 (13.2)	12 (10.5)	53 (46.5)	28 (24.5)
Improve the overall quality of care offered to patients	31 (27.2)	56 (49.1)	24 (21.0)	1 (0.9)	2 (1.8)

SA=Strongly agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly disagree.
n=Frequency, %=Percentage
(Source: Field work, 2022)

4.6 Operational challenges with the use of EHR

Figure 4.3 presents the operational challenges with the use of EHR in Holy Family Hospital. Most of the respondents 80 (85.1%) agreed that long queues is an operational challenge with the use of EHR. It was also agreed by 80/114 (70.1%) of the respondents that waiting time at the various unit of the hospital is an operational challenge with the use of the EHR.

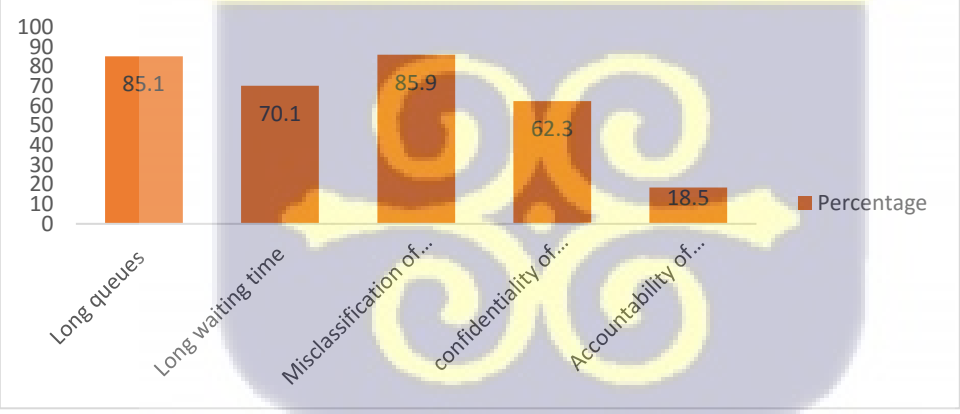


Figure 4.4 Operational challenges with the use of EHR in Holy Family Hospital

(Source: Field work, 2022)

4.7 Qualitative Analysis

In the qualitative study, an interview-based case study was used, and the case data was processed using the thematic data analysis technique.

4.7.1 Socio-demographic characteristics of participants

Most of the participants were females 7/10 (70.0%) and nurses 3/10 (30.0%). In addition, half of the participants 5/10 (50.0%) had tertiary education and 3/10 (30.0%) had Diploma education. Details of the sociodemographic characteristics of the participants are presented in Table 4.5

Table 4.5: Socio-demographic characteristics of participants' n (10)

	Frequency	Percentage
Sex of respondents		
Females	7	70
Males	3	30
Work designation		
Medical officer	2	20
Nurse	3	30
Pharmacist	1	10
Biomedical scientist	1	10
Account office	1	10
Data analyst	1	10
Records officer	1	10
Educational Attainment		
MBChB	2	20
Tertiary	5	50
Diploma	3	30

Overall, four main themes were identified from the interview transcribed data as; (1) providers experience with electronic health records, (2) provider satisfaction with electronic health records, (3) providers perception on the quality of care with electronic health records use and (4) factors associated with electronic health records implementation.

4.7.2 Providers experience with electronic health records

The primary role and/or responsibilities of care providers include clinically screening patients' prescriptions, assuring accuracy as well as suitability and practicality for usage. While this is still the case, the outcome of the interviews indicate that providers are coping very well with the electronic health records irrespective of the fact that it's fairly new. Generally, the providers indicated that the adoption and implementation makes access to healthcare easy and faster. Providers reported that the electronic health records provides clinical alert of patient upcoming task and provides improved communication and interactions between health care providers. A nurse at the OPD expressed a favorable experience with the electronic health records. She said that;

> "*With electronic health record, patient waiting time is reduced, efficient is also realized because there is no element of misfiled folders hence helping prescribers in making good judgement because previous patient records or information is always available. Same cannot be said about systems without EHR*" (Nurse)

However, a laboratory technician reported an unfavorable experience with the introduction of the electronic health records. He expressed that,

> "*With EHR, it takes sometime before the health worker can open the computer to have access to information and administer the necessary care for the client, but if it's not electronic everything is on paper, client attended to without any delays. To make matters worse is when the electronic information gets a problem, which means everything comes to a halt, hence increasing waiting period and complicates conditions whiles waiting*" (Lab Technician)

4.7.3 Providers' satisfaction with electronic health records

Ideally, some form of resistance is always expected at the introduction of a system, especially when its process and interface is entirely new. However, the introduction of the electronic health records have been welcomed with mixed reactions in terms of providers' satisfaction of the system. From the interviews, however, providers were more satisfied with the introduction of the electronic health records. One of the providers complained about the possible loss of patients' data especially when the patient is not on admission. He explained that,

> "*In a case where the client is been detained, the clients history or details will not be on computer for future reference*" (Medical Officer, Holy Family Hospital)

More of the providers who were interviewed, however, were satisfied with the electronic health records. One nurse explained how easy the introduction of the electronic health records have made her work and other care providers of the hospital. She explained that,

> "*In my unit, the paper base was quite a long process, picking folder, making payment, taking folder to the consulting, pharmacy etc. but with the E health paperless system, right after payment every information goes straight to the doctor and in that order pharmacy, Lab etc*" (Nurse)

A data analyst (statistician) made a strong argument in favor of an electronic health records compared with the paper based system. He argued that

> "*With the paper base you have to write all complains and may miss some pertinent information whiles the EHR is an already structured questions and just needs ticking. Paper base can be lost forever but EHR cannot be lost easily*" (Data analyst, Holy Family Hospital).

Another care provider explained her satisfaction with the electronic health records. She stated that,

> "*Healthcare delivery with electronic health records is more efficient, effective and time friendly and improves productivity which is unlikely the case of electronic health records*" (Accountant, Holy Family Hospital)

4.7.4 Providers' perception on the quality of care with electronic health records

Though the introduction of the electronic health records system has been accepted by care providers, the quality it provides in terms of care delivery is questionable as uncovered from the interviews. A number of complains, which in my opinion are justifiable, is hampering the quality of care when using the electronic health records.

> "*We need constant power supply to make work easier, if there's power shortage, working with EHR is not possible and delay healthcare delivery*" (Pharmacist)
>
> "*If everybody can have knowledge about computer and how to operate it, I think it can help improve productivity and also make work easy for everyone*" (IT staff)
>
> "*Slows care delivery down a bit as medical staff after seeing to a client now would have to sit and put in their findings before next action is taken*" (Nurse,)
>
> "*It affects care delivery in emergency situations in sense that most of stable patients at the OPD don't understand why critically ill patients should be attended to, since they believe in first come, first serve and sometimes the network goes off which makes work stressful and hectic*" (Medical Officer)

These complains notwithstanding, one of the participants reported that the adoption of electronic health records reduce medical errors. He explained that,

"*Electronic health records increases productivity of workflows and offers safer way to care for patients. It minimize medical errors*" (Medical Officer)

4.7.5 Operational challenges with the use electronic health records

The adoption of any new product and/or system is informed by challenges with a previous one, hence, the implementation of the electronic health records was informed by several factors. While one sect of the participants indicated the electronic health records was implemented to safeguard patient records. Another sect of the participant reported that patient history is readily in the system which makes it easier for prescribers unlike previously sending patient to retrieve folder from records. Another factor that informed the implementation of the electronic health records is that it reduces waiting time, improve service delivery and ensure utmost confidentiality of client information. Some of the detailed responses from the participants are presented as follows

"*Misfiled folders: frequent loss of patients' folder contribute greatly to moving to electronic health records. Long Patient waiting time: patients spent a longer time before folders are retrieved for further service to be rendered*" (Nurse, Holy Family Hospital)

"*Involvement and commitment of all relevant stakeholder groups in health. System can fail when it's rejected by the users. It must be accepted by doctors, nurses and other health professionals for it successful implementation. Involvement of people and patients also helps in implementation of EHR*" (Accountant, Holy Family Hospital)

"*Protocol is one of the factors for instance when a family member is rushed to the hospital for consultation and healthcare delivery instead of a staff exercising patience he or she rather rushed to be seen first before others who are already around*" (Nurse)

"*It is easy to retrieve information of patients with a click on the computer. Also, patients' confidentiality remains between him/her and the health care provider*" (Data Analyst)

"*Too much waiting time of clients and also easy way of monitor or assess revenue generation*" (Accountant)

The introduction of the EMR is important for the growth and seamless administration of care to patients, however, these challenges must be worked on to make the use of this innovation truly beneficial to the staff at Holy Family Hospital

CHAPTER FIVE

DISCUSSION

5.1 Introduction

The chapter is presented in four main sections as providers experience with EHR, providers satisfaction with EHR, providers perception with quality of care with EHR and factors associated with EHR implementation.

5.2 Providers experience with EHR

The result showed that most of the respondents (57.9%) agreed that the adoption of EHR helps to hasten clinical decisions. This was confirmed during the interviews that the use of EHR helps healthcare providers make good clinical judgment. The results resonate with a study by Deese and Stein (2004) which concluded that an EMR that is well implemented can maximally enhance the workflow of health staff and allow them to improve quality of care by updating procedures at the facility and adding decision support tools. The finding further corroborates that EHR make quality assurance practical as the computer system is able to audit the patient's problem list, diagnoses, laboratory tests, medications, and procedure notes (Mamlin et al, 2006). Consequently, healthcare personnel can check up on their patients from home, consult others in distant locations, or follow their patients when they've been transferred to remote locations. Now personal physicians can actively participate in their patients' hospital management, reviewing the daily notes and treatment plan, and adding suggestions of their own to the chart (Stormo et al, 2004).

Another positive experience with use of the EHR was the ease of retrieval of medical records. More than half (54.4%) of the study participants indicated that EHR facilitates the

retrieval of medical records. The result corroborates with Al-Shorbaji, 2001 who found electronic medical record systems provided the potential for capturing, organizing and presenting medical information in a form that will make it useful to all healthcare professionals and help in bridging the gap between captured data and knowledge (Al-Shorbaji, 2001). The result implies that patients information are permanently recorded in a password protected system where patients information cannot be altered, yet it is easier to update the records of the patient for ease of retrieving and sharing patients with little effort. Similarly, the result is consistent with a study by Zaheer and Sayed (2013) which concluded that the EHR system stores physicians' notes, x-rays, prescriptions, and other medical information in electronic format rather than paper files thus making searching, retrieving, and sharing patient data easier and more efficient. The similarities in the findings suggest that the adoption of EHR makes the clinical process expedient by eliminating the 'long hours' of searching for patients folders as well as relieving patients of the burden of carrying their medical folders anytime they visit the hospital. With the advent of EHR, when patients forget their medical folders at home and are dire need of prompt medical care, it becomes easier to retrieve their information in order to access prompt medical care by any medical officer on duty.

Furthermore, the result showed that EHR has improved the confidentiality of patient records as agreed by 43.0% of the respondents. The result is contrary to a study by Walter and Lopez (2008) which concluded that physicians are concerned about the loss of their control of patient information and working processes by the implementation of EHR systems, since these data will be assessed by other providers within the service delivery chains who are not

physicians. Thus patient confidentiality should be included as workplace training for non-clinical staff who are likely to have access to patient information. Alternatively, access could also be restricted to relevant providers at a given time.

Generally providers perceived that the EHR did not interfere with their performance compared with the paper (folder) system. The result is inconsistent with a study by Randeree (2007) which concluded that loss of clinical productivity and decreased job performance, particularly during the transition period to an EHR system, has been perceived as barriers and concerns about consequent costs are often associated with quality of health care. Contrary to the result of the present study, a study by Simon, et al., (2007) found that increased time spent interacting with the EHR system decreased their job performance because they spent less time with patients. The difference in the study could be attributed to the type of EHR adopted in the respective study sites. Thus, the ease of use and increased performance as found in the present study could be that the interface of the EHR adopted at Holy Family Hospital require minimal time to implement, enter data and learn how to use the EHR system. As a result, their workload decreased and their productivity increased.

Generally, most of the providers at the Holy Family Hospital (51.8%) had good experience with the EHR compared with the 29.0% with poor experience. This is consistent with a study by Shaker et al. (2015) which concluded that healthcare providers have positive experience with EHR. The finding is similar with another study by Alzobaidi et al. (2016) which found that healthcare providers have favorable experience with the adoption of EHR. The good experience as expressed by healthcare providers at Holy Family Hospital with EHR could

be due to the length of time they have used the system and/or modified the system to meet their needs in real time, thereby reducing the time spent on administrative tasks.

5.3 Providers satisfaction with EHR

Most of the respondents 61.4% agreed that the adoption of EHR makes medical care delivery prompt to patients. The result is in agreement with a study by Hillestad et al. (2005) which found that EHRs lead to improved quality of care by reducing adverse events related to medications, decreasing testing and duplication of health care services and improving the management of chronic conditions among other things. In addition, the result support the fact that the EHR is widely used to enhance medical records in most hospital in both developed and developing hospitals (Deutch et al. 2010). The plausible explanation for the similarities in the findings is that patient information and/or medical history is readily available for use by several healthcare providers.

Again, the result of the study revealed that 57.9% of the respondents agreed that the EHR made it easier to refer patients for prompt treatment at a resourced hospital. Again 49.1% agreed that EHR provided easy access to diagnosis information of patients for drugs/medication change when necessary. The result is consistent with a study by Kane (2014) which found that EMR systems are required to highlight abnormal test results, alert provider of abnormal (outside the normal range) vital signs, alert provider if a known allergic drug is prescribed or if a known drug interaction is likely to occur and provide reminders of recommended care due such as tests due and medication due. The similarities in the findings indicate that EMR systems have made communication hitches a thing of the past. This is due

to their ability to support SMS, email and real time chatting which have enabled faster and better communication as queries can be sent directly to the department needed and responses are immediate. This has also enabled better management of the patient as solutions, ideas and other options can be discussed by the healthcare.

Generally, most of the providers, 65.8%, were satisfied with the electronic health records. The results contradict other studies undertaken in hospitals in Nigeria, Uganda, Zambia and Tanzania, which found that patients' data are still recorded manually (Morren & Ejiri, 2016; Hassibian, 2013) which result in errors as a result of poor technological knowledge among health providers, and resistance to change to the computer-based system. However, the result rehashes a study undertaken by Open Clinical (2005) which concluded that most physicians in Kenya believed the EMR has improved the quality of time with their patients and the quality of documentation in the records. The results indicate that EMR systems have not only made work of healthcare providers easier through ease of access of patients information, medication lists and tests available but it has made them more productive through the collaboration with other healthcare providers.

5.4 Providers perception with quality of care with EHR

The result revealed that internet downtimes made access to patient records difficult as confirmed by 43.0% of the respondents while 48.2% of the respondents indicated that patient records can be hacked and/or attacked by a virus. The result is in agreement with other studies which found that lack of access to internet connectivity affect the fluent use of electronic health records (Achampong, 2012; Idowu et al. 2005). An important function of

the Internet is that it makes available enormous amounts of health related information that may be very useful for individuals as well as organizations such as hospitals (Santana et al. 2011; Kummervold & Wynn, 2012). The hospital lacked proper Internet connectivity from their Internet providers and even in case where Internet connectivity available, the speed is often low speed and this result in a high utility cost thus making the use of the Internet unreliable and often expensive (Bedeley & Palvia, 2014; Swinfen & Swinfen, 2002).

Similarly, it was agreed by 60.5% of the respondents that power fluctuations made EHR use frustrating. Because of the erratic power supply, the hospital is unable to rely confidently on the flow of energy supplied by the Electricity Company of Ghana. This problem is particularly concerning since it affects the country's overall healthcare delivery system (Adu discovered, 2013). The system is an electronic equipment that runs on electricity; therefore, if electricity is unavailable, the system will not function or will function only when electricity is available. The hospital has purchased standby generators to mitigate the effects of the power outage; nevertheless, the hospital is also paying additional costs in purchasing fuel to run these plants and this could deter some departments from fully automating their operations due to the high cost of fueling them.

The result from the study revealed that 46.5% of the respondents disagreed that using EHR is daunting and 49.1% of the respondents agreed that the adoption of the EHR has improved the overall quality of care offered to patients. This finding is contrary to a study by Kemper et al. (2006) which found that more than half (58.1%) of the physicians without an EHR have doubts that EHRs can improve clinical outcomes or patient care. As asserted by other

researchers those who are not willing to use the EHR system are skeptical about claims that the system will successfully improve the quality of medical practices (Jha et al., 2009). This therefore creates a personal resistance to the wide adoption of EHR systems. However, the finding is in agreement with other studies which found that EHR lead to improved quality of care by reducing adverse events related to medications, decreasing testing and duplication of health care services and improving the management of chronic conditions among other things (Hillestad et al., 2005; Jayawardena et al., 2007; Boonstra et al., 2014). The finding corroborates that as health care providers focus on the importance of quality of care and the ever changing demand to keep up with a more complex, fast paced health system, electronic health record systems (EHR) are becoming the standard of keeping and/or recording patients information (Vigil, 2010).

5.5 Operational challenges with the use of EHR implementation

The result revealed that 85.1% of the respondents agreed that long queues at the OPD impede the EHR while 70.1% of the respondents agreed that long waiting time at the various unit of the hospital affects the efficient of use EHR. The result conforms with a study by DesRoches et al. (2008) which found that 97% of respondents stated that EHRs depletes the timely access to health records. This implies that reduced test result wait times and overall patient wait times in the health institution are indicators of high-quality patient treatment. EHR systems can enhance patient care quality by providing more access to health information through the reduction in long queues and waiting times which reduces medical mistakes that were previously connected with paper-based record systems.

Also, the study found that 85.9% of the respondents agreed that misclassification of patients records is another operational challenges with the use of EHR. This suggests that when using paper records, there is a great chance of assigning incorrect codes or symbols to medical files, making it exceedingly difficult to retrieve these files at a later period. According to Warshawsky, Pliskin, Urkin, et al., (1994), retrieving a medical file from a stack of health data can be difficult and time consuming. These erroneous categorizations of medical records obstruct data access and exchange, which is essential for effective healthcare delivery.

5.6 Strengths and Limitations of the study

The methods of data collecting are a primary strength of this study. The use of open-ended questionnaires in conjunction with interviews allowed the study to acquire a wide range of responses from respondents. Respondents were able to openly voice their thoughts as a result of these data collection methods. The field observation is another strength of the study. The researcher is a staff at the Holy Family Hospital, which allowed her to observe the day-to-day operations of the employees and their use of the hospital's systems. This encouraged the researcher to change the questionnaires and interview guide to match the system's real execution. The observations also aided in the validation of some of the respondents replies.

Staff evaluations (through interviews and open-ended surveys) may not completely reflect the perspectives of healthcare providers, particularly when it comes to EHR influence on healthcare delivery. The questionnaires were generic in nature, and the study would have been more complete if questions on how EHR assist particular hospital duties had been

asked. Although the study did not intend to generalize its findings, the questionnaire was not based on a validated format, which might be considered to reduce the generality of the results. Another limitation of the study is that responses from respondents may be vulnerable to recollection bias, particularly in the assessment of the hospital's early preparations prior to the system's implementation. Again, the cross-sectional design restricted the ability to discern any temporality.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

The study concludes that healthcare providers at Holy Family Hospital have good experience with the electronic health records. It is also concluded that healthcare providers at Holy Family Hospital are satisfied with the utilization (use) of the electronic health records. In addition, it is concluded that healthcare providers perceive the quality of care provided by the electronic health record as good. Lastly, it is concluded that long queues and waiting time as well as misclassification of patient records are among the several operational challenges with the use of the electronic health records at Holy Family Hospital.

6.2 Recommendations

The following are recommended based on the findings

For Policy

- Though most of the respondents had good experiences with EHR use, it is recommended for management of Holy Family Hospital to organize periodic trainings for clinicians to update their knowledge. Just as the use of EHR improves productivity, it is recommended for the Ministry of Health to support clinicians to undergo electronic management systems training. This will make the adoption of EHR by clinician easier

For Practice

- There is need to sustain the favorable perception clinicians have towards EHR use by increasing the amount of funding to EHR use to all departments of the hospital for ease of information sharing.
- Among the many factors with EHR implementation is to reduce waiting time, misclassification error, long queues among others, hence, the role of constant poor power supply and internet connectivity is imperative. It is therefore recommended for Holy Family Hospital to source competitively for firms that assure uninterruptible network supply during procurement process and procure backup generators which can automatically power the computers like the one used by the main operating theater. This will guarantee that any medical information can be accessed or entered quickly and without delay.

For Research

- Because this study only looked at a CHAG hospital, it is suggested that a similar study be conducted for public facilities to determine their level of EMR adoption.
- Further research is needed to evaluate country-specific policies and their impact on the deployment of EHR, particularly in developing nations like Ghana. This would aid in identifying the limitations and challenges to ICT system adoption posed by national rules and regulations. It would also assist emerging nations in determining their national readiness for EHR.

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APPENDICES

School of Public Health

College of Health Sciences

University of Ghana

Appendix A: Consent form

Tittle of study	**ASSESSMENT OF THE INFLUENCE OF ELECTRONIC HEALTH RECORDS ON QUALITY OF HEALTH CARE AT HOLY FAMILY HOSPITAL**	
Researcher	**Department**	**Phone**
Jennifer Twum-Barimah	Health Policy Planning & Management	0244044734

Background

Dear respondent, my name is Jennifer Twum-Barimah, a student of the School of Public Health, University of Ghana, Legon. I am undertaking a study on the above topic. The study hopes to assess the indicators of EHR that influence the quality of health care delivery in Holy Family Hospital.

Procedures

Questions will be asked based on EHR implementation on quality of health care. It will involve the use of structured questionnaires and audio-recording interviews. No risk or discomfort is foreseen concerning your participation in this research apart from your time that will be spent in participating in answering the questions contained in the questionnaire and interview guide. It is anticipated that each questionnaire will take 15-20 minutes on the average to complete and the interview is expected to last for 25 minutes. No direct benefit to participant, however the outcome of this study will be used to inform management on

areas of the EHR that requires improvement to ensure quality healthcare delivery. I would be very grateful to have you as part of this study.

Risks and Benefits

The study will not cause any discomfort to participants. It is hoped that results obtained for this study will be used by policy makers and the hospital in particular to either improve upon excerpts of EHR or to enforce existing measures with the objective of better improving healthcare delivery at the hospital.

Right to refuse

Participation in this study is voluntary and participants can choose not to answer any particular question or all questions. You are at liberty to withdraw from the study at any time. However, it is encouraged that you participate since your opinion is important in determining the outcome of the study.

Anonymity and Confidentiality

I would like to assure you that whatever information provided will be handled with strict confidentiality and will be used purely for the research purposes. Your data will not be shared with anybody who is not part of the research team. Data analysis will be done at the aggregate level to ensure anonymity. Your identity will not be disclosed in the material that will be published.

Data storage/security

Information will be gathered with a structured questionnaire. The research instrument (questionnaire) containing the data would be saved in a locker for two years before disposing

them off. Analysed data/information saved on laptop and memory sticks/pen drives would be kept under protected password and discarded after five years. In addition, the audio-recorded interviews will be saved on google drive which will be password protected.

Cost

It is expected that the entire research work will cost one thousand one hundred and twenty Ghana cedis only.

Compensation

Respondents will not be provided any reward/compensation to respond to the questionnaire.

Protocol funding

The entire work will be funded by the principal investigator

Declaration of conflict of interest

There will be no conflict of interest

Dissemination of results

The result of this study will be mailed to you if you provide your address below. Before taking the consent, do you have any question you wish to ask about the study?

Yes ☐

No ☐

Participant's Consent

I……, declare that the purpose of the study has been thoroughly explained to me in English language and Twi and I have understood. I hereby agree to answer the questions

Signature……. Date……

Thumb print 

Interviewer's Statement

I, the undersigned, have explained this consent form to the subject in the English language that he/she understands the purpose of the study, procedures to be followed as well as risks and benefits involved. The subject has freely agreed to participate in the study.

Interviewer's signature……

Date…….. Address……

If you have questions later, you may contact me on 0244044734 or the Administrator, Nana Abena Apatu, Ghana Health Service Ethics Review Committee, in case of ethical concerns

School of Public Health

College of Health Sciences

University of Ghana

Appendix B: Research Questionnaire

HEALTH PROVIDERS EXPERIENCES AND PERCEPTIONS ON USE OF ELECTRONIC HEALTH RECORD SYSTEM AT THE HOLY FAMILY HOSPITAL, NKAWKAW			
PARTICIPANT CONSENT I am a student of the School of Public Health, University of Ghana**.** The administration of this questionnaire is to solicit your response on the above topic. All the information is strictly for academic purposes and will be highly treated with the greatest level of confidentiality. Thank you.			
Questionnaire ID	QID	Interview code	ICODE

QID	**QUESTIONS**	Coding categories	Skip	CODES
Section A: Socio-Economic Characteristics				
1	Age of respondents	Under 30 years…… [ ] 30 – 39 years…… [ ] 40 – 49 years…… [ ] 50 – 59 years…… [ ] 60 years and older…… [ ]		AGE
2	Length of service	Less than 5 year…….. [ ] 5-10 years…….. [ ] 11-15 years…… [ ] Above 15 years…….. [ ]		LENGTH
3	Sex	Female…….. [ ] Male…… [ ]		SEX
4	Department of service	Accounts…… [ ] Data/records…….. [ ] Pharmacy…… [ ] Laboratory…… [ ] Nursing…….. [ ]		DEPT

	Section B. Perception of Physicians on EHR			
5	An EHR system quickens the process of clinical decision-making	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		QUIC_CLI_DEC
6	An EHR system makes it easier to retrieve patients past medical Records	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		EASY_RETRI_MED_REC
7	With an EHR system the patient waiting time is shortened	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		SHORT_WAITING_TIME
8	Implementing an EHR system improves confidentiality of patients records	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		CONFIDENTIALITY
9	EHR system can help reduce medication/prescription errors	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		REDUCE_PRES_ERROR
10	It is much easier to maintain a patient appointment system records using EHR than paper-based system	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		EASE_MAINTAIN_PATIENTS_APPOINTMENT
11	EHR system can improve the overall quality of care offered to Patients	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		IMPROVES_QoC
12	I prefer an EHR system for my day-to-day operations than using paper-based record systems	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		GOOD_OPERATIONAL_EFFICIENCY
13	I feel much in control while using paper-based patient records than using HER	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		PREFER_EHR_PAPER

14	Transitioning from paper-based system to EHR will interfere with my overall performance	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		IMPEDE_PERFORMANCE
15	I am NOT assured of the security of the patient information in the EHR system	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		SECURITY_LAPSES

Section C. Provider satisfaction with the electronic health records				
16	Provision of prompt medical attention to patients based available records	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		PRT_MEDICAL_ATT
17	Prompt patient referrals for further treatment	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		PROMPT_REFERRAL
18	Diagnosis information provided for drugs change	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		DIAGNOSIS
19	Quick treatment advise	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree……..[ ]		QUICK_TRT
20	Easy access to patient information for medical advice	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree……..[ ]		EASY_ACCESS

	Section D. Provider's experience on the use of electronic health record system			
21	Difficulty in accessing patients records during internet downtimes	Strongly agree……[ ] Agree……..[ ] Neutral……[ ] Strongly disagree……[ ]		ACCESS_DIFFICULTY

		Disagree……. [ ]		
22	Records/history of patients are not secured enough as it can hacked and stolen or can be lost to virus attack	Strongly agree……[ ] Agree……..[ ] Neutral……[ ] Strongly disagree……[ ] Disagree……. [ ]		SAFETY_SECURITY
23	The unpredictable power supply make EHR usage frustrating	Strongly agree……[ ] Agree……..[ ] Neutral……[ ] Strongly disagree……[ ] Disagree……. [ ]		EHR_FRUST_USE
24	The low speed and cost of internet bundles makes EHR unbearable	Strongly agree……[ ] Agree……..[ ] Neutral……[ ] Strongly disagree……[ ] Disagree……. [ ]		SPD_COST_INTERNET
25	I am not technologically inclined, using EHR is daunting	Strongly agree……[ ] Agree……..[ ] Neutral……[ ] Strongly disagree……[ ] Disagree……. [ ]		EHR_DAUNTING
26	Lack of commitment and clear decisions from management on system upgrade	Strongly agree……[ ] Agree……..[ ] Neutral……[ ] Strongly disagree……[ ] Disagree……. [ ]		LACK_COMMITMENT_MGT

Section E. Factors associated with implementation with of EHR				
27	Long queues	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		CONST_INTERENT
28	Long waiting time	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree…….. [ ]		PROMPT_REFERRAL
29	Misclassification of patients information	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ]		DIAGNOSIS

		Strongly disagree…… [ ] Disagree…….. [ ]		
30	Confidentiality of patients records	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree……..[ ]		QUICK_TRT
31	Accountability of financial resources	Strongly agree…… [ ] Agree…….. [ ] Neutral…… [ ] Strongly disagree…… [ ] Disagree……..[ ]		EASY_ACCESS

Appendix C: Interview Guide

A. Background Information

1. Sex: (…..) Male (…..) Female

2. Age: …….

3. Educational level: ……..

4. Job title: ……..

5. Number of years worked with the hospital: ……..

Opening:

I appreciate your time. This study is to get your perspectives on the impact of EHR on the quality of care at Holy Family Hospital. These questions pertains to your experience with EHR to determine the impact of EHR on quality of care.

Confidentiality is assured in this interview. While this form would not document your name, you would be assigned a unique number for reference. Please permit me 15 to 20 minutes of your time. You can choose not to answer a question, at any time, if you are not comfortable.

Questions:

1. Has the implementation of EHR improved or worsen your service delivery?

2. Has the implementation of EHR increase or reduce the waiting time at the OPD?

3. How easy or difficult is appointment booking at the hospital?

4. Has the implementation of EHR increase or reduce cost of healthcare at the facility?

5. Are you satisfy with how patients' information is shared with regards EHR at the Hospital?

6. How does the healthcare delivered with EHR compare to the one without EHR. Explain

Appendix D: Results

	SA, n (%)	A, n (%)	N, n (%)	D, n (%)	SD, n (%)
Long queues	49 (43.0)	48 (42.1)	5 (4.4)	4 (3.5)	8 (7.0)
Long waiting time	25 (21.9)	55 (48.2)	22 (19.3)	6 (5.3)	6 (5.3)
Misclassification of patients information	29 (25.4)	69 (60.5)	12 (10.5)	2 (1.8)	2 (1.8)
Confidentiality of patients records	27 (23.7)	44 (38.6)	20 (17.5)	19 (16.7)	4 (3.5)
Accountability of financial resources	6 (5.3)	15 (13.2)	12 (10.5)	53 (46.5)	28 (24.5)

Appendix E: Ghana Health Service Ethics Review Committee Clearance Letter

GHANA HEALTH SERVICE ETHICS REVIEW COMMITTEE

In case of reply the number and date of this Letter should be quoted.

Research & Development Division
Ghana Health Service
P. O. Box MB 190
Accra
Digital Address: GA-050-3303
Mob: +233-50-3539896
Tel: +233-302-681109
Email: ethics.research@ghsmail.org

My Ref. GHS/RDD/ERC/Admin/App 1065/22
Your Ref. No.

18th February, 2022

Jennifer Twum-Barimah
Nursing and Midwifery Council of Ghana,
PMB 44 Okponglo-Accra.

The Ghana Health Service Ethics Review Committee has reviewed and given approval for the implementation of your Study Protocol.

GHS-ERC Number	**GHS-ERC: 039/12/21**
Study Title	Health Providers Experiences and Perceptions of Quality of Care of the Electronic Health Record System at the Holy Family Hospital
Approval Date	18th February, 2022
Expiry Date	17th February, 2023
GHS-ERC Decision	**Approved**

This approval requires the following from the Principal Investigator

- Submission of a yearly progress report of the study to the Ethics Review Committee (ERC)
- Renewal of ethical approval if the study lasts for more than 12 months,
- Reporting of all serious adverse events related to this study to the ERC within three days verbally and seven days in writing.
- Submission of a final report after completion of the study
- Informing ERC if study cannot be implemented or is discontinued and reasons why
- Informing the ERC and your sponsor (where applicable) before any publication of the research findings.

You are kindly advised to adhere to the national guidelines or protocols on the prevention of COVID -19

Please note that any modification of the study without ERC approval of the amendment is invalid.

The ERC may observe or cause to be observed procedures and records of the study during and after implementation.

Kindly quote the protocol identification number in all future correspondence in relation to this approved protocol

SIGNED... .....
Dr. James Akazili
(Head, Ethics & Research Management Department)

Cc: The Director, Research & Development Division, Ghana Health Service, Accra