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SCHOOL OF PUBLIC HEALTH

DEPARTMENT OF BIOSTATISTICS

ASSESSMENTAND USE OF ELECTRONIC MEDICAL RECORDS AT THE AIRPORT CLINIC, GREATER ACCRA REGION

BY

MOHAMED ABDUL BANGURA

(10639051)

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DECLARATION

I hereby declare that this dissertation, except for the references to other people's work which has duly acknowledge and cited, this work is a product of my efforts as a student of University of Ghana School of Public Health, College of health Sciences. This work is submitted in partial fulfilment of the requirement for the Masters of Science Degree in Health Informatics 2017/2018. This work has never being submitted either in part or whole in any other institution for the award of a degree.

Signature……. Date…….

Name of Student: Mohamed Abdul Bangura

Supervisor

Signature…….. Date……..

Name of Supervisor: Dr. Francess Baaba da- Costa Vroom

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DEDICATION

This work is first dedicated to the Almighty God for giving me the strength and knowledge to successfully complete this dissertation in good health.

I also dedicated this work to my parents who are dead but not forgotten (RIP) Mr. Mamoud A. Bangura, Mrs. Gbonu Songo and my elder sister who was so dear to me. Madam Marie Kendor.

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ABSTRACT

Introduction

Electronic medical record (EMR) systems, have the potential of improving the quality and reliability of health information and communication and the overall quality of healthcare services in the healthcare system. Reliable health information leads to timely health policies and planning, which improves the general health status of a country, as well as, serving as a vital element for individual health facilities in managing and improving healthcare delivery.

The key objective of this research is to assess the EMR system implementation and use at the Airport Clinic Limited.

Method

The study employed an institutional cross sectional quantitative research design using a complete census method of active users of the system for data collection. The population for this study was 43 respondents from the different units and department in the facility. Data obtained were summarized as frequencies and percentages using STATA software.

Results

Welch's *t*-test is designed for unequal variances, was used to test for user satisfaction which clearly indicated that user satisfaction was very low, and estimated 28.9% [95% CI: 27.6 – 30.1] and no statistical significance of the sociodemographic group of the study.

About 67% of respondents indicated that EMR made it easier for the users to retrieve patients past medical records. Some disagreed that the transition from paper-base to EMR was not beneficial to their daily work. Majority of the users agreed that one main experience they can still appreciate is

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the support that was available for all the participants during the implementation preparations at the facility. Some challenges identified by users of the system that was affecting the implementation process include, system goes off most times and internet fluctuations and staff shortage.

Conclusion

Electronic Medical Records System assessment and use has been successful because the study objectives were achieved although it was clear that the overall user satisfaction of using the system was very low. The challenges associated with the implementation that were affecting some of these objectives are areas, as management and other stakeholders of the facility should closely look at in other to help improve the quality of health care and service delivery.

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ABBREVIATIONS

DHIS	District Health Information System
DHIMS	District Health Information Management System
ECG	Electricity Company of Ghana
EHR	Electronic Health Records
EMR	Electronic Medical Records
GACL	Ghana Airport Company Limited
GCAA	Ghana Civil Aviation Authority
GOG	Government Of Ghana
HIPAA	Health Insurance Portability and Accountability Act
HMIS	Health Management Information System
ICAO	International Civil Aviation Authority
ICTs	Information Communication Technologies
IOM	Institute Of Medicine
IT	Information Technology
MDGs	Millennium Development Goals
MMRS	Mosoroit Medical Record System
MOH	Ministry Of Health
OPD	Out Patient Department

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PIH	Partners In Health
PIN	Personal Identification Number
POE	Physician Order Entry
TV	Television
UPS	Uninterrupted Power Supply
WHO	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.1 Background information

Health information is an essential factor that contributes to health care delivery support all over the world. For timely policies and planning, information on health must be reliable to help improve a country's overall health status as well as enable individual health facilities manage and improve delivery of healthcare (Teviu, Aikins, Abdulia, 2012). Norman, Aikens & Binka (2011) asserted that the benefits that accrue from using Information and Communication Technologies (ICTs) to aid improvement in the management of health information cannot be underrated and this is recognized by ICTs capability of storing, analyzing, capturing, retrieving and transmitting health information in large volumes across different locations.

ICTs implementation and use in healthcare delivery is commonly referred to as e-health and is well-known to improve health information reliability and efficiency, with the numerous innovative applications and the Electronic Medical Records (EMR) is an example of such an innovation (Yusif & Soar, 2014).

Yusif and Soar (2014) indicated that in the health sector, ICT introduction is not new to developed nations, but in developing nations, the implementation and advancement has become principally valid with constraints in resources and healthcare systems characterized by severe restrictions in technical, finances, human resource and infrastructure. In developing countries research reveal that ICT use in delivery of healthcare leads to better access to the facilities by patients and professionals which improves quality of healthcare and thus translate into labour productiveness while developing the country (Oyeyemi & Wynn, 2014; Khan, Shahid, Hedstrom & Anderson, 2012;

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Cecchini & Scott, 2003). Since governments in developing countries are determined to meet the Millennium Development Goals (MDGs), they have acknowledged the importance of ICT in successfully improving the over-all healthcare of citizens and EMR systems are considered a part of the ICT implementation in the healthcare delivery ssystem of Ghana. Huge investment have been made by the Government of Ghana (GoG) in ICT information systems in an effort to help improve the quality of healthcare (Yusif & Soar, 2012). The private sector and institutions are also investing in the adoption of ICT systems. According to Ghana e-Health Strategy (2010) the GoG's objective for the health sector is to certify that the delivery of health service is made affordable, up to date with improved quality of care in a justifiable and suitable way using communication and information enhancement for effective planning and management.

Acheampong (2012) recounts that EMR is still at the neophyte stage with most hospitals being only partly electronic although efforts for a management information system that is adequate are established and ongoing, although their implementation is rather disjointed. According to Acheampong (2012), the meager uptake of technology in the health sector could be attributable to lack of a Health Management Information System (HMIS) Strategic Plan, Policy and Legal framework for reporting health data. According to Bleich and Slack, (2010) in an era where population of patients increases at an accelerating rate, technological innovations for medical record keeping provides a gradually more effective and efficient means of healthcare delivery therefore the primary goal of this study is to assess the use of electronic medical record system in one hospital in Ghana.

1.2 Problem Statement

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The use of ICT over the last few decades in healthcare services delivery has grown rapidly and records that are paper-based in most developed countries have given way to EMR and this is progressively moving to developing nations. In the healthcare sector, the introduction of new technologies has brought about benefits, risk and barriers to EMR implementation systems and these condition are changing constantly. According to Meum, Wangensteen, Soleng and Wynn (2011); Tang & McDonald (2006) to minimize the limitations related with the paper based system while improving quality of care delivered, EMR was designed to help improve the quality of care delivered. With remarkable development in EMR implementation and adoption, numerous EMR projects are documented as incompletely and lasted only at the preliminary stage only to be cancelled at the adoption period (Adjorlolo & Ellingsen, 2013). More (1990) conducted an investigation which opined that the large scale technology projects implementation for instance the EMR system were associated with about a 30% or greater rate of failure. However in developing countries, this challenge is even higher (Vargneses & Scotte, 2004). The World Health Organization (WHO) (2006) indicated that numerous physicians are reluctant to use computer systems and attending to patients at the same time and are resisting change as they prefer writing on paper while others lack adequate knowledge to use the systems. In spite of the many EMR benefits, initial costs and system maintenance are substantial, due to the lack of finance, the systems have not been embraced (WHO, 2006). Clinicians and hospital administrators are not involved in the system development process to system acquisition as a result systems are not tailored to meet users' needs (Banshanga & Ejiri, 2016). Ogwang (2006) reiterated that user involvement is essential to acceptance of the system. Other factors attributed to the slow EMR implementation include the unstable electricity supply, making the EMR undependable to the users (Banshanga & Ejiri, 2016)

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The healthcare system in Ghana is experiencing an ascendancy in EMR implementation as some institutions have resorted to the system to aid in record keeping improvement and the overall quality delivery of healthcare services. As recorded in literature, it is possible that the challenges of EMR implementation will be realized if suitable measures are not embraced in such implementations. Therefore, it is necessary to conduct for an assessment in Ghana of such implemented systems. Hence this study investigates and assesses the implementation and use of EMR at the Airport Clinic Limited.

1.3 Research Objectives

The key objective of this research is to assess the EMR system implementation and use at the Airport Clinic Limited and specific objectives are as follows:

1. To determine the benefits derived from the installation of the system
2. To assess user experience during the use of EMR system
3. To examine user's level of satisfaction with the EMR system
4. To determine challenges associated with EMR implementation

1.4 Research Questions

1. What are the outcomes derived from EMR
2. What are some experiences users encountered?
3. What are the factors affecting implementation of EMR?
4. Are the users satisfied with the use of the EMR?

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1.5 Significance of Study

The findings of this study will enlighten all stakeholders in the healthcare sector on the challenges, benefits and impact of an implemented EMR. It will also contribute to literature as it looks at the EMR system from other perspectives to help in the development of comprehensive information structure in Ghana. In addition, this study will highlight the benefits of EMR and issues that may arise, and suggest various ways by which developing countries can benefit from adopting EMR systems according to Sood, Nwabueze and Mbarika (2008). The results of the study is expected to guide developers of information systems, managers of hospital, as well as healthcare practitioners interested in EMR implementation to help design systems that are tailored to the needs of the health institutions. Furthermore the findings may also serve valuable purpose in the formulation of policy, on EMR as well as other applications in the healthcare sector of Ghana.

1.6 Organization of Chapters

This study is organized into six chapters. Chapter one introduces the subject matter and presents the problem of the study, objectives, significance, research questions and organization of the study completes this chapter. Literature review on theories and empirical evidence are done in the next chapter. This second chapter discusses relevant theories in line with the study's main objective and provides evidence of related literature on the subject. The methodology for the study is presented in chapter three with descriptions on research design, study population, data analysis process, and study area profile. Results of the study are presented in chapter four. In chapter five presents the implications of the findings are discussed in relation to literature. The summary, conclusion and recommendations are present in chapter six.

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CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on the advancement of EMR over the years and looks the origin of its adoption in Ghana. It further discusses the challenges, EMR composition and its components and the extent of its usage as well as the opportunities available in the utilization of the service in the health sector. The review concludes with the conceptual framework of the study.

2.2 Electronic Medical Records

For many years, the EMR which has software solutions used to store and retrieve records on patients has been around since 1958 (Grams, 2009; Reid, 2010; Stead, 2009). Angst & Agarwal (2009) indicated that the EMR is a technological software programme that was developed to enable the storage, exchange and processing of medical data by providers. As a basis of the United States (U.S.) department of health and human service's blueprint to extend the use of IT technology in healthcare, the Institute of Medicine (IOM) endorsed the adoption of EMR (Layman, 2008; Simon et al., 2009). In incorporating systems that are advanced technologically in the healthcare sector, the institutions capacity are enhanced to serve patients, offer revolutionary treatment while maximizing efficiency (Venkatraman et al., 2008). The EMR system has one or numerous clinical information systems that are computerized and used during the course of patient doctor/provider visit. The system has many benefits and the ability to integrate testing, storage of records and analysis helps reduce needless visits to doctors and this has been shown to improve the care of patients (Anderson & Bowers, 2008).

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2.2 EMR Implementation

To ensure that healthcare practitioners adopt the EMR successfully, a framework is crucial for implementation since understanding the innovation process helps management to direct the changes required for continued practice (Katterhagen, 2012). For continuous provision of healthcare and to remain competitive, stakeholders must adopt a strategic plan for EMR implementation to ensure success. The framework needed to produce an implementation plan can be adapted from Rogers' theory on diffusion of innovation (Roger, 2010).

According to Roger (2010) at the knowledge phase, users identify a need which meets their practice criteria and determine if the innovation requires a more comprehensive review. It is important for the healthcare institution to be ready for change while understanding the core principles and institutional context as well as the overall strategy of the establishment in addition to user needs (Kotter, 1995; Bardi, Raghunathan & Bagchi 1994). Numerous studies conclude that implementations fail because leadership makes assumptions about what users need nevertheless implementations that have user buy in are likely to succeed (Massaro, 1998; Keil, et al., 1998). During the decision making phase involvement of all stakeholders facilitates acceptance of system and is critical for success.

At the persuasion phase, users turn out to be more knowledgeably involved in the process making decisions that are capable of affecting the success of system adoption (Roger, 2010)

Roger (2010) indicated that at the decision phase, stakeholders determine whether or not to accept the innovation. However if a decision is taken to purchase an EMR system an important step is to choose the software wisely. According to Sánchez, Savin and Vasileva (2005) the leadership must seek technical expertise to choose system tailored to meet their needs to improve the chance of success. The implementation of the system makes it a reality and this takes time and effort and as

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the implementation progresses might necessitate for numerous reinventions (Rogers, 2010). In the confirmation phase information of whether implemented system meets users' needs is determined.

2.3 The Importance of EMR

In the healthcare industry, the implementation of the EMR system is regarded as having incredible prospect in helping improve quality, safety and stability all over the world. The conversion of paper records to the electronic version makes available record on patients to practitioner which are easily reached from various providers and are vital bearing in mind the frequency with which patients change providers when problems occur (Mason, 2013). According to Yamamoto and Khan (2006) the importance of EMRs include enhancing patient encounter documentation while improving quality, communication, billing and access to medical data on patient, error and paper reduction. Health facilities are seeking ways to change from paper records to electronic so that there is a centralized patient records management with physician order entry that is computerized so that patient records can be accessed easily and timely while data privacy and security are improved for reduced costs and operational efficiency (Hanover, 2011).

Randeree (2007) opined that as the introduction of technological advances such as the EMR has enabled healthcare institutions to reduce cost and increase efficiencies since practitioners get the information they need exactly when they need it. According to Simon et al. (2007) in facilities with EMR, practitioners reported regularly on the optimistic views of the possible consequence of computers on healthcare system than practitioners who had not.

2.4 EMR usability and user satisfaction

For successful implementation and use of EMR the satisfaction achieved by users of the system is of utmost importance and a prerequisite for healthcare institutions (Coeira, 2003; Vikkelsø, 2005).

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According to Gans et al. (2005) EMR usability is recognized as one of the fundamental barriers to the adoption of the system. In a study conducted by Perednia and Allen (1995) it was identified that the ultimate EMR success centers of health facilities ability to address challenges experienced by management as well as acceptance of technology by users. According to Walker et al. (2005) in the assessment for pre purchase, a definite constituent is the testing for usability of the system. Tang et al. (2006) specified that usability signifies human interactions that characterize the use of the system. As a result, to define the system as having good usability indicated that it is relatively easy to learn, remember, efficient with limited errors which leads to pronounced satisfaction from users of the system (Nielsen, 1994; Tang et al., 2006).

2.5 Measure to increase usability

To raise EMR acceptance by users, healthcare institutions' management must adopt strategies to promote the use of technology by stressing, establishing and communicating regularly system usefulness not only to users but everyone in the entire organization (Chau & Hu, 2002). This strategy is important to help change the negative perception towards system use. Schumacher et al. (2010) asserted that to improve system usability and satisfaction, the system must be perceived as smart, capable of augmenting the total value of healthcare practitioners after patient encounter while competent enough to disclose any hidden content to interrupt obvious medical errors.

Many facilities that use EMR would be probably satisfied if it presents discreet support with framework sensitive reference algorithms as well as data sets (Ibid). According to Walker et al. (2005) for absolute user satisfaction and to guarantee usability, it is important to engage in constant awareness and training programmes in IT in addition to usage of the system. Sahay and Walsham (2006) also indicated that due to the system technical complexities, training users in the technical aspect is key hence to ease system use problems, training is necessary.

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2.6 Challenges of EMR implementation

Many factors hinder the advancement and diffusion of the EMR technology to many facilities across the world although challenges for developed and developing countries. In a study by Khalifehsoltani and Gerami (2010), they specified e-health challenges in developed countries and identified six areas of Technology and Operational; Social and Cultural; Native Environment; Legal; Policymaking; and Financial. Nevertheless in developing countries some challenges identified include financial issues, lack of infrastructure, insufficient electricity supply and clinician's resistance to technology as discussed below

2.6.1 Inadequate electric power supply

In sub Saharan Africa, it is difficult to have uninterrupted power supply from and this affects any IT technology service such as the EMR (Achampong, 2012). The unreliable power supply does not only affect the system but could damage it and resources are required to fix the problem which adds to the cost component of the system whereas in extreme cases the damaged system cannot be repaired and has to be replaced.

2.6.2 Lack of ICT Infrastructure

Lack of IT resources such as unavailability of computers, physical space and weak infrastructure affect EMR implementation. The WHO (2010) specified that infrastructure that supports EMR operations are limited. This is consisted with study by Bedeley and Palvia (2014), which indicated lack of infrastructure as a key challenge as infrastructure in place for most implementations were not enough for the new system. Therefore constrained access to computers as well as other IT facilities persist as a challenge to the effective adoption of the EMR system (Martinez, Villarroel, Seoane & del Pozo, 2005).

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2.6.3 Lack of basic ICT knowledge/skills

Healthcare practitioners in developing nations lack elementary knowledge in IT which is required to use the system effectively and this impedes the their complete utilization of the system (Alverson et al., 2009; Bedeley & Palvia, 2014; Martinez et al., 2005; Pradhan, 2004; Sood & Bhatia, 2005; Xue & Liang, 2007). Also since the period usually allocated for training is short, clinicians sometimes acquire skills that are limited or nothing at all which hinders their effectiveness.

2.6.4 Poor internet connectivity

Lack of access to the internet is another challenge that confronts EMR implementation (Achampong, 2012; Idowu, Adagunodo, Aderounmu & Ogunbodede, 2005; Seini, Abdulai, & Asenso-Okyere, 1998). In situations where the internet connectivity is available, low speed as well as high cost makes the system unreliable and expensive (Bedeley & Palvia, 2014; Swinfen & Swinfen, 2002). Furthermore poor connectivity can greatly affect adversely diagnosis and treatment routines effectiveness (Stutchfield, Jagilly & Tulloh, 2007; Zhao, Nakajima & Juzoji, 2002).

2.6.5 Financial issues

Financial resources represents another challenge to EMR implementation in the health sector as such projects are huge and requires capital (Pal, Mbarika, CobbPayton, Datta & McCoy, 2005; Xue & Liang, 2007). The cost components include cost of hardware and software, transport and

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installation, maintenance as well as training cost and other unexpected cost deter stakeholders from implementing the system (al Shorbaji, 2008; Alverson et al., 2009; Durrani, & Khoja, 2009; Martinez et al., 2005). As such EMR implementation has substantial financial cost commitments that aggravate the many prevailing financial challenges of healthcare organizations (Bedeley & Palvia, 2014).

2.6.6 Resistance to new technologies

According to WHO (2010) practitioners in healthcare institutions fear that incorporating technology into their practice may change their practice or interfere with their workflow. Therefore practitioners try to resist advances in technology and this affects EMR acceptability (Achampong, 2012).

2.7 Adoption of EMR in Developing Countries

Although the developing countries are willing to adopt EMR, they are still facing some barriers and challenges that have slowed down the adoption of these systems some of which were also observed in the history of EMR adoption in developed countries as well. These barriers and challenges differ from place to place and to these factors, the adoption and implementation of EMR has been very slow in developing countries (Hassibian, 2013; Kalogriopoulos et al., 2008). In Uganda these barriers include; Shortage of technical personnel: computer-based patient records users in Uganda still have limited knowledge and necessary skills to fully exploit software benefits (Tushabe et al., 2008). WHO further notes that the high cost of equipment, software and lack of funds is also a major issue in the adoption of EMR. Despite the several benefits of EMR, the initial

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costs and maintenance costs of the systems are so significant and due to the lack of funding, EMR systems have not been adopted (WHO, 2006). There is lack of involvement of clinicians and hospital administrators in the development process of the systems which to acquisition of systems that are not customized to meet the needs of the users. According to Ogwang points out that it is important to involve users within the software development process. User specifications and input are therefore important to the acceptance of the system. This leads to systems with terminology that is wrong and limited knowledge of how to make corrections in the systems (Ogwang, 2006). The process involved in conversion of the physical records to EMR is expensive and time consuming and there is limited or no personnel to convert it as most hospitals already have a shortage of clinicians and the paper work is too much which would make it hard to convert to digital. As a result clinicians are reluctant to adopt EMR (WHO, 2006).

2.8 EMR in Ghana

IT technology in Ghana is at a developing stage with numerous projects at different institutions on the viability of eHealth (Acheampong, 2012). Although several projects suffer setbacks, the motives for EMR implementation from the perspective of the private sector and that of the government hospitals. Acheampong (2012) summarized the fundamental building blocks of the Health Management Information System (HMIS) as follows;

1. Strategic plan for HMIS

2. Framework on policy and legal for health information reporting

3. Policy on medical records

4. Central information pool framework

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5. Computerized district health management information system

6. The formation of a centre for health data at central level

Although HMIS has been set up successfully in some facilities, various facilities use different software (Wager et al., 2009). GOG framework for interoperability has been established and this provides policy and standards for the public sector (MOH, 2010). According to the MOH (2010) the GOG has many guidelines on how electronic information will be managed and created for the benefit of the nation in the digital era and includes bill on electronic transaction and information protection, regulation of electronic investigations and inception a well as electronic payment mediums.

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CHAPTER THREE

RESEARCH METHODS

3.1 Introduction

This chapter outlined procedures that were used in conducting the study. The chapter entails methodology and research design used for the research. The methodology used, the study design, study area, target population, the data collection instrument, the procedure used in collecting data, data analysis, ethical consideration and limitations of the study is explained in this chapter.

3.2 Background of Study Area

3.2.1 Profile of study Area

The Airport clinic consists of an Outpatient Department (OPD) and an Inpatient Department. The OPD serves as the first point of call to all clients whenever they visit the facility. The OPD is made up of the Records Unit and the Consulting rooms. The facility also has a Pharmacy Department, Radiology Unit, Dental unit, Eye unit, Laboratory, Ultra scan unit, a Maternity Clinic, and a Surgical Unit. The clinic has a total of ten (10) bed capacity that takes care of inpatients. The facility also has a total workforce capacity of about sixty (60) staff with an approximately 42 clinicians and 18 non-clinical staff. The clinic over the years has been serving as a practical training center for student nurses and other medical house men or interns. Annually, the facility sees approximately 30,950 clients and an estimate of 800 new patients' records are created.

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3.3 Research design

The study employed a cross-sectional design using quantitative research method. The research participant's experiences and observed behavior's in the implementation and use of the EMR system were gathered through interviews and personal interactions made during data collection in the Clinic.

3.4 Study population

The study population in this study were individuals working at the Airport Clinic in Greater Accra Region. The respondents in this study were administrators, Doctors, Nurses, Medical Records, Laboratory, Pharmacy, Compliance, Stores, Finance and ICT staff.

3.5 Sampling procedure and size

This involves the method of selecting respondents to be representative of a whole population. The population for this study was 43 respondents out of a total of 48, who were active users of the EMR system at the units and department in the facility were selected for the study. The study was a census of every unit in the hospital.

3.6 Data Collection Tools and Procedure

This study utilized questionnaire as a tool for data collection. The questionnaire contained five sections containing structured and unstructured questions which involved use of closed and open-ended questions. Section A captured questions on demographic characteristics of respondents. In the other four sections closed and open-ended questions were posed to seek views or opinions from respondents on the topic under investigation.

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A structured questionnaire was administered to the selected respondents after permission and consent was sought from management and respondents from the healthcare facility respectively. A detailed explanation of the questionnaire was given to the respondent to ensure clarity and also for the avoidance of ambiguity in their responses. The questionnaire entailed both Likert-scale questions and open ended questions in relation to the research topic. The questionnaire was pre-tested before they were administered. This exercise helped to make some necessary modifications to the questionnaire and this made the final questionnaire administration very easy.

3.7 Data analysis Process

The data obtained from the interview was cleaned, reduced, differentiated and explained during the data analysis process. Cleaning of data required editing, coding and tabulation to determine any inconsistencies then data entered in Microsoft Excel, finally keyed using STATA version 15.0 with codes and suitable variable specifications which were checked for probable inaccurate entries.

Descriptive statistics (bar graph, pie charts, frequency tables, etc.) was used to summarize and present data on demographic findings of the respondents for section A. Measure of central tendency and measure of variability was used to describe the data obtained. Chi square analysis helped in measuring the strength of association between categorical variables.

3.8 Limitation of Study

The limitation of the study was that it was difficult in getting respondents to participate in the study because of their busy time schedule and the busy nature of their work. Again, baseline data on the implementation and use of EMR was not available for referencing.

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CHAPTER FOUR

RESULTS

4.1 Introduction

This chapter presents results of the analysis. Data obtained from the questionnaire used in the study has been analyzed and presented in tables and bar charts with their corresponding percentages and frequencies. This was done to give clear and more detailed understanding of the study results. The result from the observation has also been summarized in this chapter.

4.2 Demographic Information of Respondents

The results of the demographic characteristics of respondents from the various units in the hospital is presented in frequencies and percentages as shown in Table 4.1. In the sample population, 35% were females whereas 65% were male. Out of a total of 43 respondents, majority were within the age category of 25-29 years and 20-24 years, with 37% between the age 25-29 years and 23% between the ages 20-24 years.

The Airport hospital has eight department from which respondents were interviewed. Of this total, 40 % of respondents from the Hospital were from the Nursing department followed by pharmacy with 14%. From the study, 12 % of respondents were from the laboratory and medical records department. The hospital has various professional representation of which 40% of the respondents were Nurses whilst 23% were data operators who were attached in the other department to do the data entry. Study results indicated that 12% of the respondents were Doctors and Pharmacist.

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Table 4.1 Demographics Characteristics of Respondents

	Airport Clinic Limited	
Sex	**Frequency**	**Percentage**
Male	15	35
Female	28	65
Total	**43**	**100**
Age		
20-24	10	23
25-29	16	37
30-34	6	14
35-39	5	12
40-44	5	12
45-49	1	2
Total	**43**	**100**
Department		
OPD	5	12
Nursing	17	40
Laboratory	5	12
ICT	1	2
Medical Records	5	12
Accounts	3	7
Pharmacy	6	14
Stores	1	2
Total	**43**	**100**
Profession		
Doctor	5	12
Nurse	17	40
Data Operator	10	23
Pharmacist	5	12
Laboratory Technician	4	9
Accounts	2	5
Total	**43**	**100**
Years of Work		
Work duration in Years		
0-2	20	47
3-5	16	37
6-8	3	7
9-11	1	2
12-14	0	0
15-17	3	7
Total	**43**	**100**

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Source: Field work, 2018

User Satisfaction		
System currently in use		
Yes	41	95.4
No	2	4.6
Total	**43**	**100**

4.3 Experiences derived from the installation of EMR system

Table 4.2 shows some benefits derived from the installation of the EMR at the Airport Clinic after a successful implementation and utilization by users. Respondents from this facility were asked if there were any benefits derived after the implementation of EMR. Some of the key benefits indicated were, that 51.2% of the respondents strongly agreed that EMR quickened clinical decision making which made their work much easier.

Out of the 43 respondents, 67.4% strongly agreed that the system makes it easier to retrieve patient past medical records. Another 55.8% of the respondents strongly agreed that the system was able to reduce the waiting time of patients when they come for services at the hospital compared to when paper base was in use. Slightly more than half 55% of the respondents agreed that it is considerably easier to keep an appointment record on patient with the system.

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Table 4.2 Benefits derived from Installation of the EMR system

Benefits	Strongly Disagree %	Disagree %	Uncertain %	Agree %	Strongly Agree %
An EMR system quickens the process of clinical decision-making	2.3	2.3	2.3	41.9	**51.2**
An EMR system makes it easier to retrieve patients past medical Records	2.33	0	2.33	27.91	**67.44**
With an EMR system the patient waiting time is shortened	0	2.33	4.65	37.21	**55.81**
Implementing an EMR system improves confidentiality of patients records	0	2	14	42	42
EMR system can help reduce medication/prescription errors	0	4.65	11.63	41.86	41.86
It is much easier to maintain a patient appointment records using EMR than paper-based	2.33	2.33	9.30	**55.81**	30.23
EMR system can improve the overall quality of care offered to Patients	0	2	5	**53**	40
I prefer an EMR system for my daily operations than using paper-based systems	2	5	7	35	51
I feel much in control while using paper-based patient records than using EMR	19	30	7	35	9
Transitioning from paper-based system to EMR has interfered with my overall performance.	14	**53**	12	14	7

Source: Field work, 2018

4.3.1 Reliability of the EMR System

Figure 4.1 is a bar chart showing the perceived reliability of the EMR by users at the Airport clinic. Study results indicated that 72% of respondents stated that the system is available at their units at any time they want to use it. More than half (67%) of respondents stated that system

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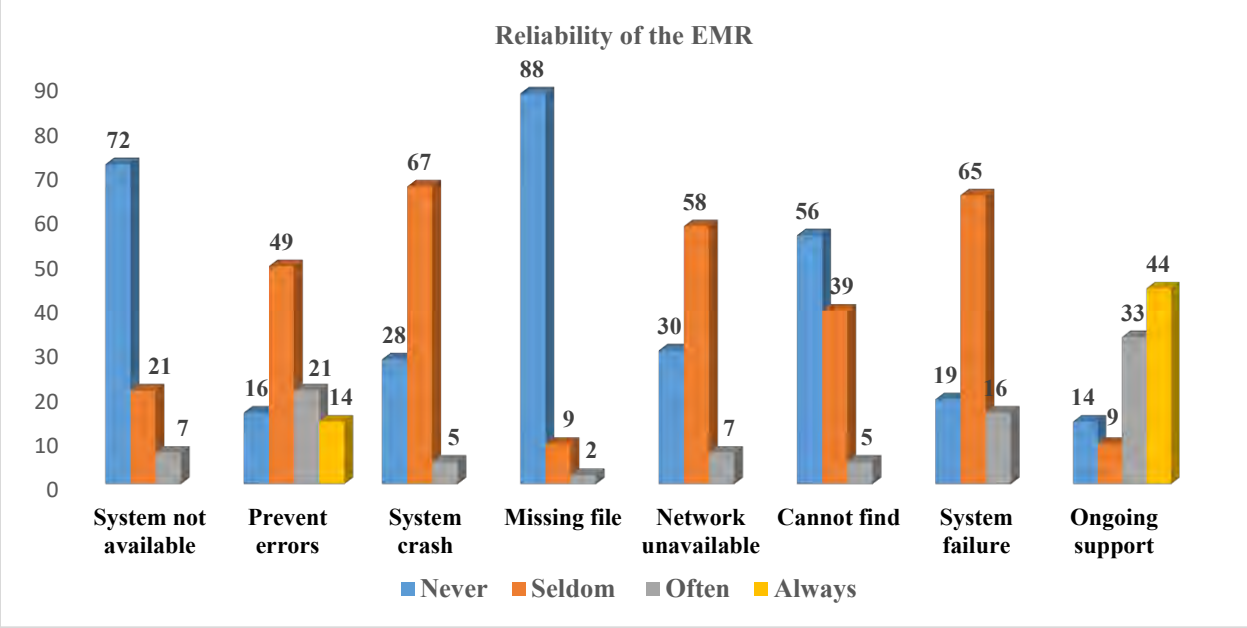
downtime/crashing seldom happens with the system whilst 28% stated that this has never happened.

Majority (88%) of the respondents stated that there is no issue of missing file with the EMR system. More than half (58%) of the respondents mentioned that network unavailability seldom occurs. Slightly more than half (56%) stated that they can always find what they are looking for in the system making their work easier and 39% mentioned it seldom happens. From the results of the study 5% of the respondents stated that they can't find what they are looking for in the system. Nearly half (44%) expressed that ongoing system support is always available when the need arises especially from the ICT unit and the Administration of the hospital



Source: Field work, 2018

Figure 4.1: A bar chart showing the perceived reliability of the system at the Airport clinic

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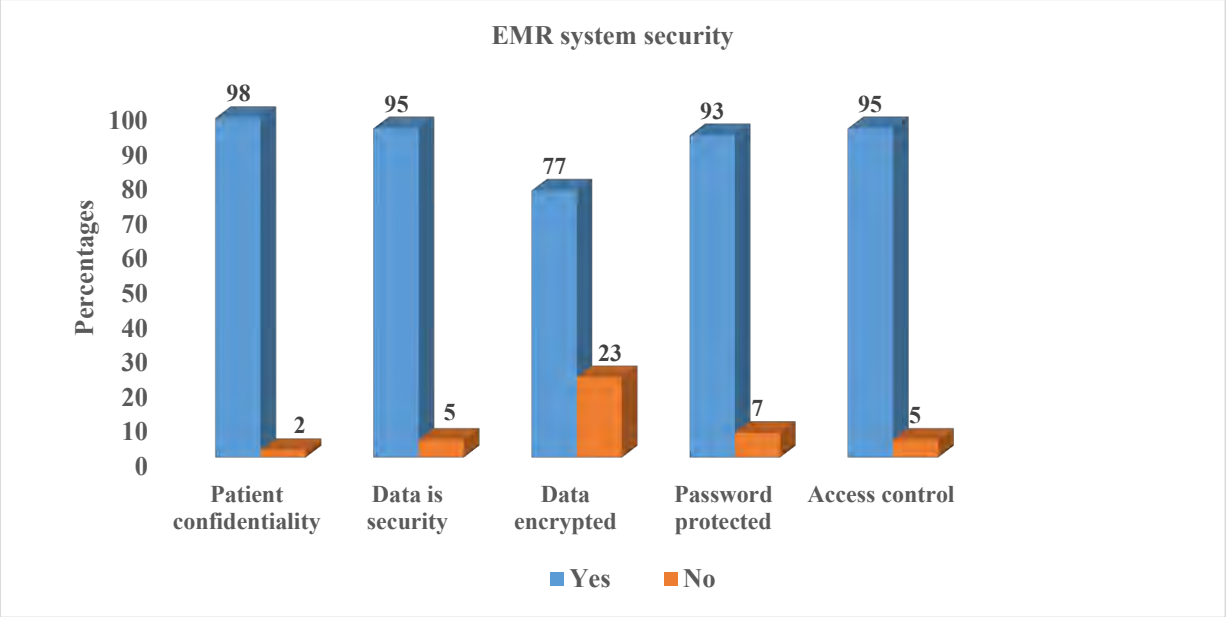
4.3.2 How does the EMR system fare in terms of security?

The reliability was also looked at how users fare on with the system. Almost all (98%) of the respondents agreed that the system maintains the confidentiality of the patients only 2% revealed that patient confidentiality is not maintained. For data security, 95% of the respondents said data is well secured with the EMR system than the paper-based.

Only 5% objected that data is not secured with the system. Majority (77%) of the respondents responded that data is encrypted whilst 23% were opposed to it that data is not encrypted.

Almost all (93%) of the respondents reported that their password to use the system was protected and only 7% said their password for the system is not protected. Study results indicated that 95% of the respondents responded that access to the system is well protected such that it is only you that have the right to access information when you want to but about 5% reported that access to the system is not controlled



Source: Field work, 2018

Figure 4.2: A bar chart showing the reliability of EMR system in terms of security

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4.3.3 How does the EHR system fare in terms of Usability?

Nearly all 93% of the respondents were comfortable with the system and reported that the system is easy to use with only 7% having problems with the system that it is not easy to use by them. More than two third (79%) of respondents responded that the response time of the system is fast enough to carry out their normal work in the hospital but another 21% responded that the response time for most operations is not fast enough for them to carry out their normal work.

About 84% of the respondents agreed that the operation of the system depends on one's experience with the system and computer knowledge, while 16% responded otherwise. Almost all (95%) of the respondents accepted that the system improved workflow in the hospital unlike when they were using paper-based records but another 5% reported that the system has not improved workflow since its implementation. Majority (91%) of the respondents responded that the system makes access to patient data very easy and 9% of the respondents reported that the system cannot make access to patient data very easy.

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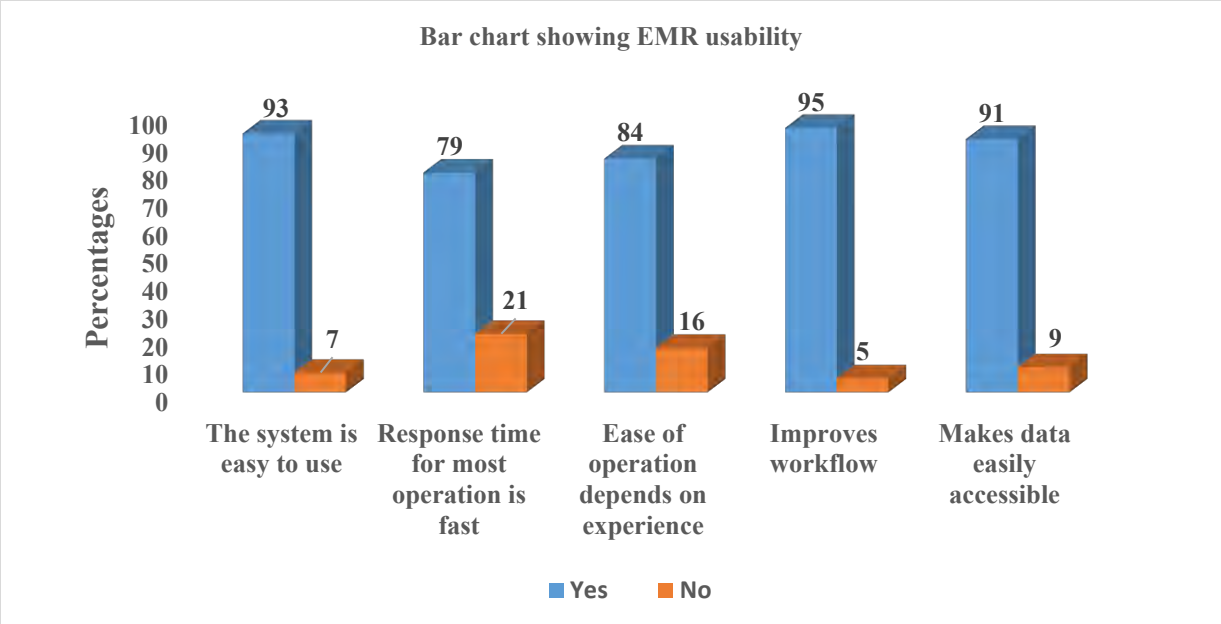

Source: Field work, 2018

Figure 4.3: A bar chart showing EMR system usability

4.4 To assess user experience during EMR Implementation

Table 4.4 shows some user experience of the EMR implementation at the Airport clinic. Respondents from the various units in the facility were asked about their experience in the use of the system since its implementation in the hospital.

Majority (70%) of the respondents agreed to the fact that the training was well organized and that the facilitators were competent to train the users, all training materials were provided for all participants during the training sessions. More than half (63%) of the respondents disagreed to the fact that the training was insufficient because they were all happy for the number of days and the way the training was conducted. Again, (74%) of the respondents agreed that training support was available during the implementation of the EMR in the hospital. This made all participants to be

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committed during the training sessions. Also, slightly more than half (53%) of the respondents agreed to the fact that the implementation process was smooth because all the protocols and procedures were observed by both the hospital Administrators and the facilitators who happen to install the EMR system in the hospital.

Another 53% of the respondents agreed to the fact that the implementation of the EMR system did not put any extra burden on them because it was a system they were all waiting for, so it came at the right time and were ready to promote the implementation in the hospital. Majority of the respondents (74%) disagreed that they lack trust in the system because information about the client is always available and a lot of mistakes in hand writing, prescriptions and loosing of files have been reduced if not eliminated. About half (51%) of the respondents agreed to the fact that the system was easy to use and understand how the system works to deliver service to the patients. On the whole, (56%) of the respondents agreed on the system meeting their required needs to perform the functions. It is because of this that patients are also happy that they no longer spend longer time in the hospital for services.

Table 4.3: User experience during EMR implementation

User Experience	Strongly Disagree %	Disagree %	Uncertain %	Agree %	Strongly Agree %
The training for the EMR was well organized with the right facilitators and training materials	5	9	2	**70**	14
The training for the EMR was insufficient	9.3	**62.8**	16.3	9.3	2.33
Training support was available for EMR implementation	0	9.3	11.6	**74.4**	4.7
Training affect focus on work	9	47	16	23	5
The implementation process was smooth	0	9.3	14	**53.5**	23.2
EMR processes are time consuming	20.9	46.5	11.6	20.9	0
Implementation of EMR puts extra burden to clinicians/users	23.3	**53.4**	13.9	9.3	0
Lack of trust in system	18.6	**74.4**	4.7	2.3	0

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Easy and intuitive to use	0	2.3	2.3	**51.2**	**44.2**
Documentation screens are visually appealing and easy to maneuver	0	16.3	32.6	37.2	13.9
System met required needs to perform functions	0	13.9	18.6	**55.8**	11.6

Source: Field work, 2018

4.5 To determine user's level of satisfaction with the EMR

4.5.1 User Satisfaction

All the respondents indicated that the system is currently in use in their respective departments. The EMR system users level of satisfaction was one of the objectives of this study conducted, the table clearly states how respondent expressed their views about the level of satisfaction. More than half (67%) of the respondents agreed to the fact that the implementation of the EMR system at the facility was very useful because many challenges with the previous system was resolved. Slightly more than half (51%) of the respondents agreed that they need the system to provide effective care of the patients in the hospital.

More than half (67%) of the respondents agreed to the fact that using the EMR system in the hospital was a good initiative because of the difference it is creating in service delivery in the hospital. Also, (56%) of the respondents agreed that the system has shortcuts that are easy to use there by making the work faster and patients are also satisfied. Slightly more than half (53%) agreed to the fact that coordination of patient care by users of the system has improved in the hospital whilst (42%) also strongly agreed to this. Fifty Eight percent (58%) of the respondents in the hospital agreed that the system can generate simple graphs to show trends for monthly clinic attendance, disease prevalence for comparisons. More than half (65%) of the respondents agreed

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that the system reduces many errors. Nearly half (44%) of the respondents strongly agreed to the fact that technical support is readily available when there is an issue with system.

There is a strong ICT team that always intervene when there is an issue with the system in any unit in the hospital. Slightly more than half (53%) of the respondents strongly agreed to the fact that the system has improved the quality of care of the patients because it helped to reduce prescription and medication errors. More than half (58%) of the respondents agreed that the system is regularly updated by the IT officers who go round to check all the PC s of users in the different units in the hospital.

Table 4.4: User Satisfaction

User Satisfaction	Strongly Disagree %	Disagree %	Uncertain %	Agree %	Strongly Agree %
I feel EMR system is useful	2.3	2.3	0	28	**67.4**
I need the EMR to provide effective patient care	0	4.7	4.7	51	39.5
EMR system speed is fast enough	0	4.7	4.7	48.8	41.9
Using EMR is a good initiative	0	4.7	0	27.9	67.4
Features or are shortcuts easy to use	2.3	2.3	13.9	**55.8**	25.6
Improves coordination of patient care	0	4.7	0	**53.5**	41.7
Patient's data can be accessed simultaneously at different sites	0	11.6	6.9	41.8	39.5
Has huge storage capacity	0	7	9	33	51
Graphs on EMR help monitor trends	0	4.7	23.3	58.1	13.9
Reduces error rates	0	2.3	4.7	**65.1**	27.9
Facilitates sharing of data between health care workers	0	9.3	20.9	27.9	41.9
Back up makes data safe	2.3	2.3	18.6	51.2	25.6
Technical support is readily available	0	7	5	44	44
Makes data accessible	0	5	2	49	44
Has improved quality of patients' care	0	5	0	42	53
Is compatible with other to systems	0	16	44	35	2

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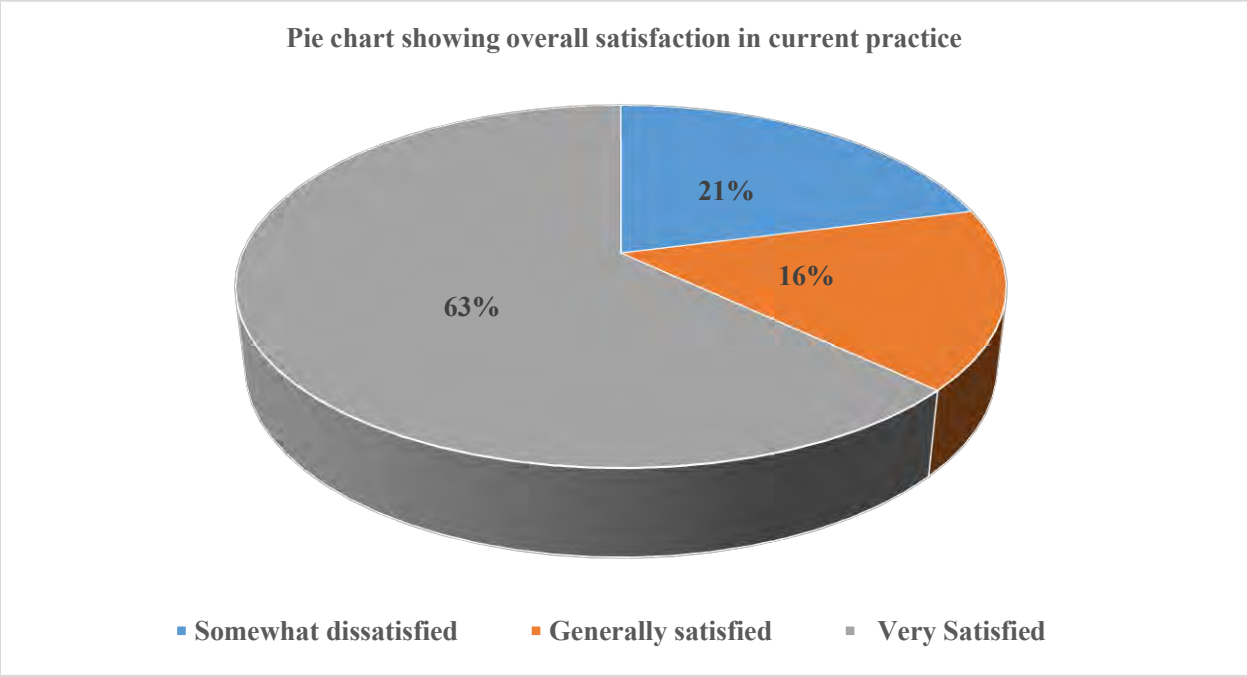
Is updated regularly	0	4.7	25.6	**58.1**	11.6
Can validate data	0	2	40	51	7

Source: Field data, 2018

Another method used to know the level of satisfaction of the EMR system users was to know the overall level of satisfaction at the Airport clinic, the table below clearly states how respondent expressed their views about the level of satisfaction. Overall, (63%) of respondents were very satisfied with their current practice with the system, (16%) generally satisfied whereas (21%) of the respondents interviewed were somewhat satisfied. The overall satisfaction was generated from the information collected on the three options as seen above.



Source: Field work, 2018

Figure 4.5: Pie chart showing overall satisfaction in current practice

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The user satisfaction was graded from (0-100%). The higher the score the higher the user satisfaction. The mean user satisfaction was estimated to be (28.9%) [95% CI: 27.6 – 30.1]

The results from the Welch t-test and One-way analysis of variance did not show statistically significant difference in the mean satisfaction score among the various sociodemographic characteristics that were studied (p>0.05; Table 4.5).

Table 4.5: Comparing the mean user satisfaction score by sociodemographic characteristics

	User satisfaction Score		
Variable	**Mean±SD**	**t**	**P Value**
Age		**0.47**	**0.6423**
20-24 years	**29.22±1.49**		
25 years+	**28.79±4.60**		
Sex			
Male	**29.78±1.93**	**1.31**	**0.1965**
Female	**28.41±4.82**		
Education			
Diploma or less	**28.37±4.85**	**-1.161**	**0.2524**
Tertiary	**29.67±2.41**		
Work Experience			
0-2 years	**29.78±1.96**	**1.42**	**0.1662**
3 years+	**28.12±5.21**		
Position			
Medical officer	**29.33**	**1.33#**	**0.2781**
Nurse	**29.08**		
Pharmacist	**29.58**		
Others	**25.55**		

#: This estimate is from the F-test

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4.6 Challenges associated with EMR implementation

This section covers the analysis of the challenges associated with EMR implementation. Some of the respondents interviewed, (15.4%) indicated that power supply was not stable. About (10.3%) of the respondents stated that there was inadequate office space, whilst (20.5%) stated system goes off most times and (12.8%) complained of problem with balancing of stocks, inability to keep post-surgical notes on the system.

Majority of the respondent (41%) indicated that internet fluctuations was a key challenge in enhancing their work. Not enough room to key in nursing procedures adequately in the system, high cost of system, inability to access previous data on patients, lack of a generator when electricity goes off, staff shortage were among the other challenges identified.

However respondents indicated that the IT team comes around to help resolve some of the challenges and also the administration is also very supportive in addressing some of these challenges when they occur.

According to respondents interviewed, the following should be done for future implementation; a faster system should be purchased, all technical users should be brought on board, all material must be available before implementation, an improved system should be purchased, offline access so that people with no internet connection can still access the system, IT support, the system should have more features and more easy to use, more computers, training of staff before implementation, all unit heads be consulted before implementation.

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CHAPTER FIVE

DISCUSSION

5.1 Introduction

In this section, the findings of the study are interpreted in light of empirical research and the implications drawn.

5.2 Demographic Information

It was evident from the study that the ages 20-24 years and 25 years and above showed a mean SD of 29.22±1.49, 28.79±4.60 and p-value of 0.6423 indicating no statistical significance in user satisfaction by age. Professional factors such as being male or female, indicated a P value of 0.1965 also showing no significance in user satisfaction by gender. Also being young and having a higher education and having spent more years in the professional role are important in influencing the implementation of EMR devices among health professionals. All of these sociodemographic characteristics showed no statistical significance in user satisfaction of the system at the facility as shown from the table above. These suggest that the demographic characteristics of the health practitioners in terms of satisfaction in using the system was poor as seen from the overall mean satisfaction estimated to be 28.9% [95% CI: 27.6 – 30.1].

5.3 Benefits derived from installation of EMR system

It is apparent that EMR is used by Airport Clinic in a variety of ways. Higher integrations in the administrative, patient record, pharmaceutical/prescriptive system, procurement and supply chain and the laboratory management systems was observed.

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The above findings confirm Dawson's (2011) and Rodrigues' (2008) argument that the usage of ICTs in healthcare delivery advancing is gaining grounds in developing countries with volatile economies as well as the technologically advanced countries. It also means that the WHO (1998) Health For All Strategy, which acclaims that members states "integrate the appropriate use of health telematics in the overall policy and strategy for the attainment of health for all in the 21st century, thus fulfilling the vision of a world in which the benefits of science, technology and public health development are made equitably available to all people everywhere" is being adhered to some extent in healthcare delivery in Ghana. These findings also confirm the arguments of Dixon (2007) that though the adoption of EMR has lagged behind ICT integration in the operations of the financial sector, its innovations have been applied in the health sector since the invention of ICT. The results of Likert scale analysis confirm that clinicians at the facility have received various benefits from the implementation of the EMR system. Although 41.9% indicated that an EMR system quickens the process of clinical decision-making, it is worth noting that some respondents further indicated that an integration of EMR confirm that indeed some institutions have come to believe that the industry is evolving whiles Wallin and Xu (2008) opined that EMR system represents an effective means of providing quality healthcare delivery and narrowing health disparities through appropriate equipping of health care providers.

As indicated by Smith (2011) physicians specified that EMR use saved them from going through paper charts that was endless and this allowed them spend more time with their patients. Bercovizet and colleagues (2013) indicated that the most commonly used feature of EMR system were the capturing of patient's demographics, decision support systems used for clinical activities, clinical notes and computerized physician order entry. This study also confirms their findings, because the facility involved in the study highly utilized these features like the patient information capturing

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and computerized physician order entry. However, the use of the system for entering clinical notes was not highly utilized in this study.

As stated by Kuo and Lee (2011), to complete responsibilities successfully with maximum benefits, users will embrace technology. According to the findings, it is evident that the transitioning from paper-based system to EMR has interfered with the overall performance of respondents since 53% disagreed with this statement.

5.3.1 Reliability

The reliability of the system was one other way the researcher used to get the views of the users after the installation of the system in the hospital among the other benefits. In this research, majority of users were happy that the issue of missing file is no more even though they still use some filing system but it is far better than it was before. In dealing with information on patients high reliability is essential as many clinicians are apprehensive about temporarily losing access to patient records in case of a virus attack, computers crashing or power supply failure occurs (Kemper, Uren & Clark, 2006; Menachemi, 2007; Randeree, 2007). Additionally, a number of clinicians also fear the likelihood of losing records as a result technical deficiency unidentified in the system. Problems due to reliability may result in financial losses which will cause an increase in ongoing costs.

5.3.2 Security

The rights of patients information are protected by the Health Insurance Portability and Accountability Act of 1996 (HIPAA) privacy rule, Public Law 104-191. In this study, it was revealed that nearly all of the users maintained the confidentiality of the patient information as

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information is made accessible only to those who have the privilege to such information. It was also made clear that they are bound by the ethical code of conduct of the Ghana Health service maintain confidentiality of patient health information. National governments have data protection laws that help in addressing concerns on the privacy and security of patients.

Data encryption in EMR security was high and each respondent had their password which was strictly maintained. Therefore for any one taking over from the other in a shift would wait until they log out before they could log in with your own password and start work. Access control was also high indicating that before using the system clinicians should have all it takes to access and use the system. Generally, the security of the EMR system was high as far as the assessment of the system was carried out during the study period.

Despite evidence, nonusers trust that there risks associated with security and confidentiality are numerous with the EMRs than paper records. Various researchers proposed that the EMR system may have an undesirable effect on the privacy of the patient (Bates et al., 2009; Earnest et al., 2004; Kemper et al., 2006; Loomis et al., 2002; Menachemi et al., 2007; Vishwanath & Scamurra, 2006). Clinicians argue on whether the EMR system is secure enough for information and records storage on patients and they fear that unauthorized persons may access data from the system as the unfortunate patient information disclosure may lead to legal problems although some countries do not have clear regulations on security to help ensure patient privacy and confidentiality. A study by Simon et al. (2007) designated that clinicians are apprehensive about this challenge than the patients themselves. Furthermore the clinicians who use the EMR system believe risks associated with security and confidentiality are many with EMRs than with paper records (Loomis et al., 2002).

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5.3.3 Usability

Tang et al., 2006 stated that the human characteristics in dealing with the computer or interactions with the system signifies the usability of the system. To describe an EMR system as being usable indicated that it is user-friendly, efficient to use, easy to remember and learn which ultimately leads to greater user satisfaction (Nielsen, 1994; Tang et al., 2006).

5.4 User experience during EMR Implementation

Research has shown that ICT can reduce medical errors which will in turn transform health services delivery thus improving outcomes on health of patients. It is possible for the users of the EMR system to be productive however any gaps in skill and understanding can cause members of the team to feel dissatisfied which will result in they not working to their full potential. In a study by Denomme et al., (2011) nearly one third agreed that they had experience during the implementation of the EMR meaning there were disparities in with the experiences. Respondents expressed that training support was available for EMR implementation. Hands on support and mentoring was done by the ICT team and the vendors who brought the system to the hospital. They indicated that training the system users to be equipped with knowledge about EMR helped to adopt the system. This made it easy to use hence improving the productivity of the workers and hence system adoption. They also made sure that staff were not selected on duty so that the training cannot interfere with the user work schedule hence 47% of respondents disagreed that training affect focus on work.

Majority disagreed to the fact that they trusted the system because it was making work easy for them and also improving the care of the patients, confidentiality and workflow and far less than half strongly disagreed that the implementation of the EMR did not put any extra burden on the users instead it increased their performance and improve health service delivery.

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5.5 User's level of satisfaction

Dalkir (2005) indicated that the flow of work enable knowledge artefacts of a system to be dispatched through organizations by means of a relative fixed process. The expectations of users in implementing EMR system include the quick retrieval of records, entry of data made easy and error reduction was confirmed by respondents. However the usefulness of EMRs become apparent when data which is needed exist in fields that are discrete so that they can be easily manipulated, organized and accumulated since data existing in free text fields need manual intervention to extract and scrutinize. Van de Velde (2003) maintained that the system must be user friendly which must provide a response that is fast and easily adaptable to the daily practice of clinicians. The user friendliness of system which allows for fast data retrieval and probably decrease patient waiting time was a major concern for the respondents.

5.6 Challenges associated with EMR implementation

It was evident from the study that initial preparation by the facility before implementation and use of the system was adequate. It is evident from the study that training programmes were organized by the facility so users could gain understanding in the use of the system and how the system was going to augment their productivity. In spite of the above, some challenges were encountered by respondents with the EMR implementation. The findings showed that availability of resources is a vital component in EMR implementation or any other system since for the system to operate at its full potential resources such as hardware, software, electricity and others like internet must be

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readily available and it was noted that, lack of stable electricity supply, slow internet connectivity among others that hindered the use of EMR.

Respondents indicated this as one of the challenges that there was not enough room to key in nursing procedures adequately, they had inability to keep post-surgical notes on the system, and there were problems with balancing of stocks and inability to access previous data on patients.

It also necessary that infrastructure or equipment required for the system to run must be set up since the results of the study indicated that the system goes off most of the times. However evolving technologies for instance cloud computing, telemedicine, 4G mobile telecommunication in addition to others can be explored to determine how issues arising can be resolved with such innovations. The system freezing frequently and system slowness was identified as a challenge nevertheless it is important that initial assessment of the various systems available are made during the planning stages and if possible modification made by the technical experts so that the system can run without such problems.

Another barrier identified during the study was the physical space which had workspaces that were disorderly, lack of rooms for the use of computers with computer stations not suitable to some users, the insufficiency of space for a paper chart when using EMR and clinicians not physically located at a computer station. When these issues are resolved, users will experience job satisfaction with their working conditions which will translate into productivity

Other factors also cited as challenges was the shortage of staff which makes the systems difficult to use by the clinicians. Respondents indicated that the IT team comes around to help resolve some of the challenges. Most clinicians claim the vendors' services are poor in areas such as follow up with technical issues as well as lack of support for problems associated with the system (Randeree, 2007). Since the clinicians do not have technical knowledge of the inherently complicated system,

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they perceive that adequate training and support cannot be underestimated and are sometimes reluctant to use the system without it. A study by Simon et al. (2007) revealed that two-thirds of clinicians specified that a hindrance to them in adopting EMR was a lack of technical support while Ludwick et al. (2009) also discovered that lack of access to technical support was a problem for the physicians. Respondents indicated that it was worth considering training respondents to fix minor system problems.

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CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

The main object of this study was to assess the implementation and use of Electronic Medical Records system at the Airport Clinic. The study was also looking at to determine the benefits derived from the installation of the system, assess user experience during EMR implementation, determine user's level of satisfaction with the EMR and determine challenges associated with EMR implementation. The general conclusion about the assessment of the implementation and use of the EMR at the Airport clinic was encouraging because the objectives of the study were achieved somehow. The first objective clearly indicated that the benefits derived from the installation during the implementation and use of the EMR was generally satisfactory because it improved the skills and competence of the users and at the same time patient care and service delivery was improved. Some did not realize any benefit but were also able to deliver service as and when necessary, and some were not certain about any benefit they derived from the EMR installation and implementation which the study objective was trying to determine.

The reliability of the system or the work to minimize failures, improve maintenance effectiveness, shorten repair times and meet patient and organizations expectations has many benefits. This was one other benefit the study was trying to determine though it was not a main objective. The results of the study showed that the system was generally reliable because the system was always available, errors seldom occur with the system, network was available as long as there is electricity.

Also the security of the system was in terms of patient confidentiality, data security, data encrypted, password protection and access control was very high.

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The usability of the system was also very encouraging because it came out clearly that the system was easy to use, response time for most operation with the system was fast, workflow was improved and data accessibility was also very perfect. All this contributed positively to service delivery and improved patient care.

Assessment of user experience during EMR implementation and use was one key objective of the study and from the results, the experience gained was generally satisfactory, especially during the training when it was their first time to use such a system. The training that was conducted before the implementation of the system helped a long way in understanding and improving their skills with the system.

The level of user satisfaction was also a very important objective of the study and the user satisfaction was very low though all the system in the different units were functional and in use.

This was clearly indicated using welch t test which showed that the overall satisfaction of the system users was very low and the sociodemographic characteristics had no statistical significance among user.

The initiative by the administration to implement and use the EMR was one other main intervention that made users satisfied and also the many advantages the system have over the old paper- base system they were using.

Finally, the EMR system like any other Electronic Health Information system may face challenges and this is no exception when the system is now fully implemented and functional. These challenges may affect the desired outcome of the implementation and usage of the system. In this study, inadequate office space, system goes off most times, problem with balancing of stocks, inability to keep post-surgical notes on the system, internet fluctuations, not enough room to key in nursing procedures adequately in the system, inability to access previous data on patients, staff

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shortage were among the challenges identified. However respondents indicated that the IT team comes around to help resolve some of the challenges and the administration is also very supportive in addressing some of these challenges when they occur.

According to respondents interviewed, the following should be done for future implementation; a faster system should be purchased, all technical users should be brought on board, all material must be available before implementation, offline access so that people with no internet connection can still access the system, IT support, the system should have more features and more easy to use, more computers, training of staff before implementation, all unit heads be consulted before implementation.

6.2 Recommendation

- The institution to consider having sufficient health care providers to meet the need of the ever increasing number of patients visiting the facility on a daily basis. This will assist in reducing the daily workload.

- There should be periodic evaluation of the system to help know the lapses in the system and improved upon it.

- To improve on capacity building activities, there is need for the suppliers of the system and the ICT unit in the hospital to constantly retrain health workers on the changes and operational procedures of the system. This ensures that majority of employees are able to work with minimal challenges.

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- Policies regarding the use of the system should be made very clear to help prevent users from unnecessary use of the computers for non-work purposes even though this did not come out as an issue during this study.
- Users of the Electronic Medical Records should be fully involved during the implementation process and the system must be design to meet the user needs.

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APPENDICES

Appendix 1: Questionnaire for assessment of the implementation and use of EMR

I am a student at the School of Public Health, University of Ghana. I am carrying out a study on the assessment of the implementation and use of Electronic Medical Records in your facility as a course requirement. I kindly request you to spare a few minutes and answer the attached questionnaire. The information provided will be used for academic purposes only and will be

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treated with utmost confidentiality. Please do not write your name anywhere on the questionnaire.

I would appreciate your voluntary participation in completing the questionnaire.

Thank you.

(Please read the instructions carefully before every question and provide your response appropriately.)

Section A: Demographic Information

Please Tick (√) the appropriate answer.

1. Gender

   Male ( ) Female ( )

2. What is your Age?.....

3. What is your highest level of education?
   1. Certificate [ ] 2. Diploma [ ] 3. Graduate [ ] 4. Post Graduate [ ]

4. In which department do you work

   …….

5. Your position in this health facility

   ……

6. For how long have you been working in this facility? ……

SECTION B: To determine the benefits derived from the installation of the EMR system

Please rate the extent to which you agree with the following statements. Please tick (√) the appropriate answer.

1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, 5 = strongly agree

	Benefits	**1**	**2**	**3**	**4**	**5**
7	An EMR system quickens the process of clinical decision-making					

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8	An EMR system makes it easier to retrieve patients past medical Records					
9	With an EMR system the patient waiting time is shortened					
10	Implementing an EMR system improves confidentiality of patients records					
11	EMR system can help reduce medication/prescription errors					
12	It is much easier to maintain a patient appointment records using EMR than paper-based					
13	EMR system can improve the overall quality of care offered to Patients					
14	I prefer an EMR system for my daily operations than using paper-based					
15	I feel much in control using paper-based patient records than using EMR					
16	Transitioning from paper-based to EMR system has interfered with my overall performance.					

Reliability: How often does the following occur?

Please tick (√) the appropriate answer

1 = Never 2 = Seldom 3 = Often 4 = Always

	Reliability	**Never**	**Seldom**	**Often**	**Always**
17	System not available				
18	Procedures and systems are good at preventing errors from occurring				
19	System downtime/ crashing				
20	Missing file				

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21	Network unavailable				
22	Cannot find what I am looking for				
23	System failure occurring				
24	Ongoing systems support				

25. How does the EMR system fare in terms of security (Tick all that apply)

Patient confidentiality is maintained ( )
Data is secure ( )
Data encrypted ( )
EMR password protected ( )
System access controlled ( )
Others (Specify)……

26. How does the EHR system fare in terms of Usability? (Tick all that apply)

The EMR system is easy to use ( )
Response time for most operation fast enough ( )
Ease of operation is always dependent on your level of experience ( )
Improves workflow ( )
Makes data easily accessible ( )
Others (Specify)……

SECTION C: To assess the user experience during EMR implementation

Please rate the extent to which you agree with the following statements. Please tick (√) the appropriate answer

1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, 5 = strongly agree

	Experience	**1**	**2**	**3**	**4**	**5**
27	The training for the EMR was well organized with the right facilitators and training materials					
28	The training for the EMR was insufficient					

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29	Training support was available for EMR implementation					
30	Training affect focus on work					
31	The implementation process was smooth					
32	EMR processes are time consuming					
33	Implementation of EMR puts extra burden to clinicians/users					
34	Lack of trust in system					
35	Easy and intuitive to use					
36	Documentation screens are visually appealing and easy to maneuver					
37	System met required needs to perform functions					

SECTION D: To examine user's level of satisfaction with the EMR

38. Is the system currently in use in your department?

Yes ( ) No ( )

If No, Why is the system not in use?.....

Please rate the extent to which you agree with the following statements. Please tick (√) the appropriate answer

1 = strongly disagree, 2 = disagree, 3 = uncertain, 4 = agree, 5 = strongly agree

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	User Satisfaction	1	2	3	4	5
39	I feel EMR system is useful					
40	I need the EMR to provide effective patient care					
41	EMR system speed is fast enough					
42	Using EMR is a good initiative					
43	Features or are shortcuts easy to use					
44	Improves coordination of patient care					
45	Patient's data can be accessed simultaneously at different sites					
46	Has huge storage capacity					
47	Graphs on EMR help monitor trends					
48	Reduces error rates					
49	Facilitates sharing of data with users in the hospital					
50	Back up makes data safe					
51	Technical support is readily available					
52	Makes data accessible					
53	Has improved quality of patients' care					
54	Is compatible with other system					
55	Is updated regularly					
56	Can validate data					

57. Overall, how satisfied are you with your current practice?

Very dissatisfied ( ) Somewhat dissatisfied ( ) Generally satisfied ( ) Very Satisfied ( )

SECTION E: To determine the challenges associated with EMR Implementation

58. What do you think are some of the challenges to the overall implementation of the EMR?
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59. How are these challenges addressed?

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

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61 What are your recommendations?

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