

Challenges to Electronic Medical Record Systems adoption: A Case of Coast Province General Hospital.

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Declaration

This proposal is my original work and has not been presented to another university for the award of a degree.

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Approval

This proposal has been submitted for examination with my approval as University supervisor.

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Date

Acknowledgements

I am grateful to the Almighty God for enabling me to undertake this study.

My profound gratitude and deep regard also goes to my supervisor, Dr. Peter Kithae for his exemplary guidance and valuable feedback throughout this research work.

Dedication

To my family, your patience, prayers and understanding kept me going. May God bless you abundantly.

ABSTRACT

The recent worldwide focus on healthcare quality improvement, cost containment and enhanced patient experience has led to increased need for adoption of Electronic Medical Record systems (EMR). This would significantly reduce clinician workload and medical errors while saving the institution major expenses. Kenya is globally acclaimed as a leader for its Information Communication Telecommunications (ICT) innovations such as M-PESA. Yet compared to developed nations, Kenya has a long way to go on EMR systems adoption. This paper thus examines the potential challenges as perceived by user groups, to EMR systems adoption in a public hospital and suggests possible interventions to the said challenges. A descriptive survey research design was used in the methodology. A sample size of 141 was used out of a population of 473 employees working at the Coast Province General Hospital (CPGH). Stratified random sampling technique was used based on categories of staff establishment. Data was collected using structured questionnaires and analyzed using SPSS version 20 and Microsoft Excel 2007.

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List of Abbreviations/Definitions of terms

ALOS	Average length of Stay
BOR	Bed Occupancy Rate
BTR	Bed Turnover rate
CPGH	Coast Province General Hospital
EHR	Electronic Health Record
EMR	Electronic Medical Records
ENT	Ear, Nose and Throat
FOP	Female Outpatient
G.o.K	Government of Kenya
HIS	Health Information Systems
ICT	Information Communication Technologies
JICA	Japan International Cooperation Agency
MCH/FP	Maternal and Child Health/Family Planning
MOP	Male Outpatient
NASCO	National AIDS and STD Control Program
SPSS	Statistical Package for the Social Science
USAID	United States Agency for International Development

CHAPTER 1

INTRODUCTION

This chapter talks about medical records and how the same can be improved to make it easier for the medical personnel to access the information in a swift and timely manner when the patients visit the Hospitals. It highlights the genesis of electronic record systems which started when the medical fraternity realized that they needed to keep up with the rise in digitalization of a lot of record keeping systems.

1.1 Background of the study

In the face of the rapidly increasing healthcare costs, associated with aging population and the steady rise in chronic illnesses, governments in developing countries have felt obliged to improve the efficiency and effectiveness with which medical care is provided to their citizens. (Bodenheimer T *et al*,2005). This has led to emphasis on deployment of information technology(IT) in support of the increase and radical changes made by these governments to their health care systems. Electronic Medical Record (EMR) systems are one of the IT-based applications with a great potential for enhancing delivery of healthcare services. (Miller RH *et al*, 2004). An EMR can be defined as a computerized system where physicians record relevant information such as patient demographics, medical histories, consultation notes, lists of problems, allergies, vaccinations, vital signs, and prescriptions (Ludwick DA *et al*, 2009). More comprehensive EMRs contain other functionalities such as automated alerts, medical appointments and reminders. It is important to note that an EMR is generated and maintained within an institution, such as a hospital, integrated delivery network, clinic, or physician office.

Electronic Health Records. (EHR) is a term commonly confused with EMR but it is different in that it can do all the above functions and more. EHR is described as the concept of electronic collection of patient's health and health care- from cradle to grave. It combines information from different care settings held in different systems and can have the data aggregated and shown as a

single record. It focuses on the total health of the patient, designed to reach beyond the health organization that originally collects and compiles the information. (Gunter *et al*, 2005).

An EMR system is designed to represent data that accurately captures the state of the patient always. It allows for an entire patient history to be viewed without the need to track down the patient's previous medical record volume and assists in ensuring data is accurate, appropriate and legible. It reduces the chances of data replication as there is only one modifiable file, which means the file is constantly up to date when viewed later and eliminates the issue of lost forms or paperwork. Due to all the information being in a single file, it makes it much more effective when extracting medical data for the examination of possible trends and long-term changes in the patient (Habib, 2010).

The Coast Province General Hospital (CPGH) is a Level 5 public facility founded in 1908, located in Mombasa Island. It is the third largest public hospital in Kenya after Kenyatta National Hospital and Moi Teaching and Referral hospital. The hospital infrastructure has been expanding over the years with support from Government of Kenya, Japan International Cooperation Agency (JICA), and United States Agency for International development (USAID) amongst other partners.

CPGH offers a wide array of services which include accidents and emergency services; surgery (general, orthopedic, neurosurgery, urology, cardiothoracic, pediatrics (neonatology care) services; obstetrics/gynecology services; medicine (diabetic, cardiology, renal and oncology clinics); Ear Nose and Throat(ENT); ophthalmology; nursing; psychiatry (drug rehabilitation clinic); dental (maxillofacial); outpatient (Male and Female); Mother & Child Health/Family Planning; comprehensive care clinic(CCC) for adult and pediatric HIV/AIDs cases; palliative care for the terminally ill under the Coast Hospice; physiotherapy; laboratory; pharmacy; occupational therapy; catering; nutrition counseling and education; amenity (clinic and ward)' imaging (simple and specialized); theatre and ICU; gender based violence center; mortuary (storage, embalmment, post mortems); and monthly neurosurgery, maxillo-facial and pediatric operations by volunteer surgeons from Nairobi

The Hospital mainly uses IT in computerized revenue collection and partly in the comprehensive care center patient records. Most health records are paper based and manually coded. There are

a number of challenges in record keeping - due to the government directive that subordinate staff be rotated on a quarterly basis, the department is constantly training new staff; there are inadequate number of qualified health records officers, resulting in some information being collected by clinical staff or unqualified casuals resulting in compromised data; there is also shortage of space in the Health records office; and different partners have different reporting tools leading to unnecessary duplication and repetition.

1.2 Problem statement

Medical record book keeping is undergoing transition not only in the developed world, but also in the developing world. The developing world does not have a well-developed health care system against the many diseases ailing them. To aid in provision of the highest attainable standard of care, the basic paper-based medical record needs to be replaced by more efficient EMR systems. The government of Kenya recognizes the crucial role Information Communication Technologies (ICT) will play towards realization of the Vision 2030 economic blueprint. Kenya is globally acclaimed as a leader for its ICT innovations such as M-PESA. The Ministry of Health has been in the forefront in supporting public hospitals embrace ICT in their operations.

The perceived advantages of EMRs systems can be summarized as solving the logistical organizational problems associated with paper system, through optimizing the documentation of patient encounters, improving communication of information to physicians and other staff, improving access to patient medical information, reduction of errors, optimizing billing and improving reimbursement for services, forming a data repository for research and quality improvement, and reduction of paper (Yamamoto & Khan, 2006).The wide-ranging capabilities of EMR has led to its recognition as an important tool for improving patient safety and quality of care, especially by promoting evidence- based medicine.

Despite the expectations and interest in EMRs worldwide, and the potential for quality improvement, the overall take up rate is quite low and they face several challenges (Davidson & Heslinga, 2007). For instance, this method is seen to be different to a physician's normal working style, it requires a greater capability in dealing with computers and installing a system that takes up considerable financial resources.

1.3 Research objectives

The main objective of the study is to investigate challenges, categorize, and analyze challenges affecting the health workers at Coast General Hospital to the implementation of Electronic Medical Records (EMRs) to provide users with beneficial intervention options. General objectives are as follows.

1.3.1 Specific objectives

- a. To investigate the effect of cost implications on adoption of the EMR system
- b. To evaluate how technology affect adoption of Electronic Medical Records systems at CPGH
- c. To explore how time constraints affect Electronic Medical Records systems adoption at CPGH.
- d. To identify how leadership style is impacting on the adoption of EMR system at CPGH.**

1.4 Research questions

- a. How do cost implications affect adoption of EMR Systems at CPGH?
- b. To what extent does technology affect adoption of EMR Systems at CPGH?
- c. How do time constraints affect adoption of EMR Systems at CPGH?
- d. How do leadership styles affect adoption of EMR systems at CPGH?

1.5 Scope of the study

The researcher carried out the study at Coast Province General Hospital, Mombasa County with a view of investigating the challenges to optimal utilization of Electronic Medical Records (EMR) in a public health institution. The target population consisted of healthcare workers and administrators at Coast Province General Hospital.

1.6 Significance of the study

This study will help in understanding the theoretical framework on the adoption of Electronic Medical Records (EMR) systems in a public hospital setting. In practice, the findings will assist the management in understanding the key challenges to adoption of EMR systems and act as a guideline to help in making informed decisions. The recommended interventions can also be considered. The study will also be of great use to governments and other key stakeholders to target policies and measures in support of e-health. Further, this study will be useful to future scholars and academicians as it will form a basis for future research and provide literature for reference. The study is expected to be of importance to the following.

Hospital Management- The hospital management will learn a lot from this study on how to manage the EMR and how well the same can be used to assist in the smooth running and storing of patient's information with ease of retrieval when needed. They are also able to determine the cost implications that will arise from the implementation of the program me.

Hospital personnel-The personnel are going to benefit from additional skills of how to operate the electronic machine, this will also help them with easier storage method and quicker retrieval of patient's medical records when it is needed. This will also save the staff time as just clicking buttons on the system will get them the information they need as opposed to flipping through files.

The Government- the Government will benefit as they will be competitive in the market. This will also make it easy for them to monitor the activities of the Hospital.

Future researchers- The future researchers will have an easier time due to this study, as they will have a reference point and will know how it all started. They will be able to have a clear path to follow and have the knowledge of challenges faced.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter explores the literature available on Electronic medical records systems, the benefits of the same, and the challenges faced in their adoption. It also serves to identify the gaps in current available information.

2.2 Theoretical Framework

Initiating a change is a complicated process, and following a theoretical framework can provide a basis for making informed decisions that allows for better control over the outcomes of action (McEwen & Wills, 2007). Two theories on change and innovation that have been used successfully to facilitate the adoption of technology in health care organizations are Rogers' Innovation Diffusion Theory and Kotter's Change Management Model (Campbell, 2008; Wolf, 2006). Both models provide steps and guidelines for engaging individuals and organizations to support both willingness and ability, thus helping to improve the likelihood the EMR would be adopted.

2.2.1 Kotter's Change Management Theory

There are many different change management models, but one that has been used successfully in health care (Clark, 2010), and specifically to address the adoption of technological innovations (Campbell, 2008), is John Kotter's eight-stage process for transformational change (Kotter, 1996). This dynamic model is comprised of eight stages that can be organized into three phases. The first phase is "creating a climate for change" and includes establishing a sense of urgency, creating a guiding coalition, and developing a vision and strategy. The second phase is "engaging and enabling the organization" and includes communicating the vision, empowering action, and creating short-term wins. The final phase is "implementing and sustaining the change" and includes consolidating gains and producing more change, and anchoring new approaches in the culture.

Adoption of EMR for CPGH would be a change from the norm of paper based system; hence the management could put into consideration these eight steps to ensure smooth transition and buy-in from the user personnel.

2.2.2 Rogers' Innovation Diffusion Theory

Rogers (1983) defined innovation as “an idea, practice, or object that is perceived as new”, and diffusion as “the process by which an innovation is communicated through certain channels over time among the members of a social system”. As a new idea or innovation is shared throughout an organization there will be individuals within that organization that adopt the innovation sooner than others. Five classifications of individuals when it comes to the adoption of an innovation are explained. The very first people to adopt the innovation are known as the innovators, followed by the early adopters, early majority, late majority, and followed lastly if at all by the laggards. Innovators are keen to change and try new things, and represent a very small percentage of the population. Early adopters are the opinion leaders in an organization that other people will observe to determine if an innovation is worthwhile. The people in the early majority group take more time to consider if they will try an innovation than the early adopters, while those in the late majority group tend to adopt an innovation only after most individuals in the organization have already done so. The laggards are the last group to adopt an innovation after everyone else has accepted the change, and some individuals in this group may never adopt the innovation. (Sahin, 2006). The five main stages identified in the innovation diffusion process: knowledge; persuasion; decision; implementation; and confirmation. Rogers stated that “knowledge occurs when an individual is exposed to the innovation’s existence and gains some understanding of how it functions”. At the knowledge stage, an individual wants to know what the innovation is, and how and why it works. “Persuasion occurs when individuals form favorable or unfavorable attitude toward the innovation” (Rogers, 1983). In this stage people want to decrease the uncertainty about the outcome of using an innovation. People want to know the advantages and disadvantages of an innovation and how its use would ultimately affect them.

The decision stage is the stage where a choice is made whether to implement an innovation. Factors that may hinder or facilitate the decision to adopt an innovation are related to the perceived attributes of the innovation which include its relative advantage, compatibility,

complexity, trialability, and observability. These perceived attributes of an innovation are what make it appeal (Ting-Ting Lee, 2004). The relative advantage is the degree to which an innovation is perceived as better than the current practice.

It is the perception of how beneficial the change will be. Compatibility is the degree of fit between the proposed change and the individuals or organization that is undergoing the change (Horner, et *al.*, 2004). This relates to how consistent the innovation is with individual and organizational “values, beliefs, past experiences, and needs” (Ting-Ting Lee, 2004). The complexity is the degree to which an innovation is perceived as difficult to understand or use. Trialability refers to the availability of opportunities to test the innovation before wide-scale adoption, and observability refers to the extent that the results are visible to others. Innovations with a high degree of observability tend to be adopted faster than those where the results are not highly visible (Rogers, 1983).

Rogers’ Innovation Diffusion Theory and Kotter’s Change Management Theory provides a unique way to understand and approach the implementation of technological innovations. Understanding this can aid this institution in overcoming some organizational and user-based challenges during adoption of EMR systems, hence bringing all stakeholders onboard to enhance the shared strategic vision.

A review carried out by Boonstra (2010) on 22 articles showed a wide range of possible challenges to implementing EMRs and provided insight into the relationships between the challenges. Primary barriers i.e. Financial, technical and time were the most often identified than secondary barriers, which are psychological, social, legal, and organizational and change process. Barriers within different categories or subcategories seemed to interrelate. Organizational and change process barriers were found to be mediating by influencing the other six categories of barrier at different times. Organizational category determines the relevant importance of the other barriers even before implementation has started. This paper focused on the primary barriers and the change process as a mediating factor.

2.2.3 Henry Fayol's Management Theory

Henri Fayol's management theory is a simple model of how management interacts with personnel. Fayol's management theory covers concepts in a broad way, so almost any business can apply his theory of management. Today the business community considers Fayol's classical management theory as a relevant guide to productively managing staff.

The management theory of Henri Fayol includes 14 principles of management. From these principles, Fayol concluded that management should interact with personnel in five basic ways as follows:

Planning: According to Fayol's theory, management must properly plan and schedule every part of process before executing.

Organizing: Henri Fayol argued that on top of planning a manufacturing process, management must also make sure that all the necessary resources (raw materials, personnel, etc.) came together at the right time of production.

Commanding: Henri Fayol's management theory states that management must encourage personnel regularly

Coordinating: Per the management theory of Henri Fayol, management must make certain that personnel work together in a cooperative way.

Controlling: The final management activity, per Henri Fayol, is for the managers to evaluate and ensure that personnel follow management's commands effectively.

2.2.4 Theoretical Review

Health care systems across the globe are undergoing transformations to improve access and quality of care, value for money, and the patient experience. (Schoen *et al*, 2012). EMR is a computerized legal medical record created by organizations delivering health care, such as clinics and hospitals. Electronic medical records tend to be a part of health information system, allowing for the storage, retrieval and manipulation of records (Ludwick *et al*, 2009).

Electronic medical records (EMRs) have long been introduced into medical practice and have proven cost-effective in different clinical settings more so in the developed countries. In the US

alone, 27 billion dollars was allocated to facilitate their introduction (Jones *et al* 2012). Some countries such as Australia have high rates of EMR adoption with more than 90% of general practices now having some form of EMR and 60% now utilizing fully paperless systems (Pearce, 2009). Similar high rates are found in many other areas including Scandinavia and New Zealand where all 1,100 general practices use EMR (Protti, 2010).

2.3 Critique of the existing literature

2.3.1 Benefits of EMR systems

The computer-based EMR has been shown by several studies to be an essential technology tool for health care (Dick *et al*, 1997), modernizing the management of medical information and contributing to high-quality patient care and efficient patient management (Knaup, 2006).

The functions of electronic medical records (EMR) include patient billing, electronic ordering of investigations and receiving investigation results, electronic prescribing, recording of clinical information and in some circumstances, decision support software (Jones *et al* 2012).

From the patient's perspective, the benefits of EMR include: improved diagnosis and treatment, significantly fewer errors found within personal health records and faster care and decision-making responses from assigned medical professionals. (Bates *et al* 2003).

From the viewpoint of doctors and health practitioners there are numerous other advantages of implementing electronic medical records: The ability to quickly transfer patient data from one department to the next is a huge asset; the space saving benefit of a digital records environment; the ability to ultimately increase the number of patients served per day for enhanced patient workflow and increased productivity; improved results management and patient care with a reduction in errors within your medical practice; reduced operational costs such as transcription services and overtime labor expenses; customizable and scalable electronic medical records that can grow with your practice; advanced e-prescribing and clinical documentation capabilities and; an improved bottom line of the healthcare practice, enhanced through the ability to more accurately and support for clinical research (Fraser *et al* 2005)

The introduction of templates provides a more efficient, organized method of charting, enabling immediate inclusion of information into the patient record. When used to their fullest extent, EMRs provide a useful tool for promoting health and preventing disease (Fetter, 2009).

Reminders within the system prompt providers to order needed tests, procedures, or consults to monitor known conditions and facilitate preventive medicine. Cues in the system also remind practitioners to provide education on age-appropriate topics. Electronic records also help communities and systems by compiling data for use in disease surveillance and outcome evaluation (Fetter, 2009). EMRs enhance the accessibility and efficiency of retrieving pertinent patient data and increase the provision of comprehensive, collaborative care (Corrao, *et al*, 2010).

Critics believe the use of templates discourages nurses and other providers from fully documenting the narrative during patient interactions. Electronic records help staff avoid mistakes and improve the quality of patient care (Nickitas & Kerfoot, 2010). Electronic records offer nurses evidence-based care reminders as they work with patients at the bedside. This provides patients with the most current and proven treatments to improve care. The EMR also helps avoid mistakes by alerting nurses of potential errors as they care for patients. “The EHR helps connect and align patient-centered care into information that is distilled and used for good decision making towards improving quality and patient safety” (Nickitas & Kerfoot, 2010).

The use of EMRs has been associated with many financial effects to physician practices which can be central to the decision to adopt EMRs. These benefits include net overhead cost savings, increased revenue and positive return on investment (ROI). Overhead costs may be reduced through lower administrative costs (e.g. chart pulls and filing, transcriptions, phone calls, photocopying charts, faxing medical information), reduced storage costs, and reduced costs from increased provider and staff efficiency. Physicians may be able to increase their revenue from billings through enhanced charge capture and reduced billing errors. For example, physicians can enter charges in real time and are provided with drop down menus which enable more accurate billing. EMRs can provide a positive ROI for practices if the cumulative sum of reduced overhead costs and/or increased billing revenues is greater than the costs associated with EMR investment and implementation. (Grieger *et al* 2007).

Evidence in the international literature suggests that EMRs are associated with a positive return on investment. In a Canadian study, most practices were found to recoup their investments in an average of 10 months, with a range from 1 to 37 months. 14 of 17 primary care clinics in the study had a positive return on investment (Jang *et al*, 2014).

In addition to economic benefits, EMRs contribute significantly to the improvement of the quality of care (Dorr *et al* 2007). Primary care constitutes a pivotal specialty in the clinical management of patients within a healthcare system. The use of an EMR in primary care is of paramount importance for the effective and timely management of patients (McInnes *et al* 2006).

2.3.2 Electronic Medical Records and Patient Safety

The mechanisms of safety for electronic medical records in terms of both patient diagnosis and the security of their health records is one of the main elements that electronic medical records companies design into their software systems. The benefits of EMR on patient safety include; the reduction of medical errors represents a benefit to both patient and doctor; an electronic medical health records arena of information sharing within a medical practice naturally reduces unwanted hand transcribed errors. (Da'Ve, 2004). The problem of lost or misplaced patient files is also eliminated; these advantages of EMR help produce a marked increase in the health-related safety of patients and patient welfare; In addition, electronic medical records and patient care are synonymous in that such systems easily enable constraints to be placed upon end users' access to patient information and; This personal security aspect is also important to meeting a patient's privacy concerns. (Sujansky, 1998).

Opponents raise concern over confidentiality and privacy issues related to EMRs. Paper charts required manual copying, faxing, or physically exchanging for a transfer of data. The ease with which electronic records can be transferred or shared leaves the high possibility of breaches in confidentiality. Technology additionally offers a way to enhance security and privacy by requiring providers to use passwords to get into the EMR and limiting accessibility to the data based on the individual's role (Rothstein, 2010). Added tracking and auditing features exist with electronic recordkeeping systems that allow monitoring of persons entering medical records.

2.3.3 EMR in Kenya

The Division of Health Information Systems (HIS) has recognized the need to improve the use of ICT in health. Under Strategic Objective Five of the HIS Strategic Plan 2009-2014, the HIS aims to strengthen the “...use and application of information and communication technology, in data management” Tethered to this objective is the need to have standardized and interoperable ICT applications, including EMRs. It is with this objective in mind that the Ministries of Health, through the HIS, embarked on a process of standardization of EMRs in Kenya.

Electronic Medical Record (EMR) systems are increasingly being adopted in Kenya to improve medical record management, health program management, and the quality of patient care. Moi University School of Medicine (Eldoret, Kenya) has collaborated with Indiana University School of medicine for over 15 years, whereby in 2001 the Mosoriot Medical Records System (MMRS) was installed in primary care healthcare Centre. However, the development and implementation of these systems has not been properly coordinated, resulting in multiple EMR systems with varying objectives and functionality, and without the ability to share patient information with other systems, programs, and the Government. (Fraser *et al* 2005)

2.3.4 Vision for the EMR Initiative in Kenya

Kenya’s Ministries of Health, through the Division of Health Information System (HIS), envisions a health information enterprise that has, as one of its components, EMR systems that support the provision of holistic health care while improving on health records management and contributing to improved quality of patient care.

Fundamental to this vision is the need to have systems that can: maintain the validity, integrity and confidentiality of health information, ensure security through integrated system checks that prevent access and misuse of data and validate the accuracy of captured data (GoK, 2009).

The single most important feature of the EMR is the facilitation of information sharing between different users. This inter-operability and data exchange is vital for the success of the HIS enterprise architecture. In relation to clinical systems, a patient management system should be able to share relevant patient-level data with a pharmacy or laboratory information system and

vice versa. Additionally, patient management information systems should provide a degree of decision support that would help clinicians improve the quality of patient care (GoK, 2009).

2.3.5 Cost implications

Economic and market forces have been identified as obstacles to EMR adoption. (Pare' *et al*, 2014 and Tang *et al* 2006). The major cost barriers as per previous research are high start-up costs, high ongoing costs, uncertainty about return on investment, and lack of the financial resources.

High start-up costs. Start-up costs include all the expenses needed to get an EMR system working in the physician's practice, such as the intake of hardware and software, selecting and contracting costs and installation expenses. These costs seem to be in the expensive range per physician, with EMR software costs alone typically very high per physician. Many researchers state that these costs are significant and therefore should be regarded as a high barrier to physicians adopting EMRs, especially for those without large IT budgets.

High current costs. In addition to the start-up costs, establishing an EMR system requires high commitment to system administration, maintenance, control and support to keep it working effectively and efficiently. These costs include the long-term expenses incurred in following, changing, upgrading and maintaining EMRs, which will be relevant. Further, suppliers charge a lot of money for after-sales service. These expected costs make physicians unwilling to adopt EMRs.

The high start-up and ongoing costs of adopting an EMR system can result in problems finding enough financial resources in a medical practice. As these expenditures are very high, there can be inadequate financial resources to cover them, especially in small and medium practices with low Information systems budgets.

Doubts about return on investment is a cause to think twice in considering adoption of EMR. Identified lack of financial resources as one of the economic challenge faced by institutions in adopting EMR. Physicians have pointed excessive cost in relation to uncertain benefits as an obstacle to EMR adoption.

2.3.6 Technology

Electronic Medical Records are hi-tech systems and, as such, include complicated hardware and software. A certain level of computer skills by both suppliers and users (the physicians) is required. Further, there are still some technical problems with EMRs, which leads to complaints from physicians, and they need to be upgraded. Therefore, limits exist related to the technical challenges of the systems, the technical capabilities of the physicians and of the suppliers which are grouped in this second category.

Physicians and/or staff have no computer skills; physicians have insufficient technical knowledge and skills to deal with EMRs, and that this results in resistance. Observes in this context that most of the current generation of physicians received their qualifications before IT programs were introduced. EMR providers appear to underestimate the level of computer skills required from physicians, while the system is not only seen as it is but in practice is very complicated to use by these physicians.

Further, excellent typing skills are needed to enter patient medical information, notes and prescriptions into the EMRs, and some physicians do not have these skills. EMR use introduces a new type of medical faults: typos. Further, it is not only the physicians but also other staff at medical practices who lack adequate computer skills. This general lack of knowledge and skills hinders the wide adoption of EMRs.

Lack of technical training and support; many physicians complain of poor service from the sellers, such as poor follow-up with technical issues and a general lack of training and support for problems associated with the EMRs (Miller & Sim, 2004) similarly note that physicians have a hard time to get appropriate technical training and support for the systems from the seller. As physicians are not technical experts and the systems are greatly complicated, physicians perceive a need for proper technical training and support, and are reluctant to use EMRs without it.

Complexity of the system; It has been argued that most physicians “consider EMRs to be challenging to use because of the multiplicity of screens, options and navigational aids” The complexity and usability problem associated with EMRs results in physicians having to allocate time and effort if they are to master them. Physicians must learn how to use the EMR system effectively and efficiently which they may see as a challenge. It is also possible that a lack of skills leads the physicians to regard the EMR system as extremely complicated.

Lack of Reliability; High reliability is very important for a system dealing with patient information, and many physicians are concerned about the temporary loss of access to patient records if computers crash, viruses attack or the power fails. Moreover, some fear the possibility of record loss due to an unknown technical defect in the system. Further, reliability problems will lead to financial loss, such as in the form of an increase in ongoing costs.

Lack of computers/hardware the use of EMR systems requires a sufficient quantity of hardware in practices, including computers, phone lines and internet connections. Some researchers state that some practices lack these 'basic' facilities/hardware needed to support EMR implementation and that this issue blocks the widespread adoption of EMRs. Further, in such practices, the start-up costs associated with setting up EMRs will be higher as more resources are needed.

2.3.7 Time constraint

Lack of Time: Lack of time is a concern among healthcare practitioners. Lack of time, lack of financial resources and knowledge of computer skills have been shown to be the major barriers that prevents the use of electronic record over manual record by general practitioners. Physicians have concerns about lack of time due to their heavy workload. In addition, physicians tend to think that spending more time on training will affect their work schedule and decrease their productivity. Hence, training programs should be planned in such a way that it does not affect the regular work schedule of the staff. It is very crucial to understand the various components of EHR system and workflow process so training can be planned in such a way that specific components of training are given to specific people who would use only that component in their work. But it may also be possible to implement EHR with optimized time planning.

However, a time motion study in USA found that during primary care session EHR does not take more time compared to paper based system and EHR benefits can be expected without the physicians wasting their time.

A fluent workflow is very important to the work of physicians. The introduction of EMRs will slow a physician's workflow, as it will always lead to additional time being required to select, implement and learn how to use EMRs, and then to enter data into the system. As a result, their productivity will be reduced and their workload will be increased. This can cause financial problems, such as a loss of revenue.

Time to learn the system; alongside the barriers introduced in the “Technical” category (the lack of computer skills and the complexity of the EMR system, physicians also need to spend time and effort on learning how to use an EMR system. However, given this situation, they report that they lack the time to learn, as it would slow their workflow and increase their workload. However, other researchers argue that mastering an EMR system will help physician to work more efficiently.

Time required selecting, purchasing, and implementing the system; it has been found that physicians opt not to invest time in system selection and procurement as they think they should spend their time and effort on patients, rather than on selecting and contracting an EMR system, which is not regarded as part of their daily working practice (Meade *et al.*, 2009). However, there is no clear statement that physicians should be responsible for this work. Therefore, whether physicians investing time in selecting, purchasing, and implementing is really a barrier depends on the quality of project management during the EMR implementation process.

Time required to enter data; it is perhaps surprising that many researchers conclude that data entry is a problem for physicians using EMRs In Loomis’s (2002) research, more than half of the EMR users stated that data entry was both cumbersome and time- consuming. As such, data-entry is a widely-experienced barrier among physicians. It can be related to the complexity of the system, or the inability of physicians to properly handle the system, both mentioned within the “Technical” category.

More time per patient; many physicians report that using EMRs will take more time for each patient than using paper as, in some situations; it might be more convenient and efficient to use paper records during the clinical encounter, if using EMRs, physicians may have to stop halfway through a consultancy to enter information on patients or type a prescription, and this will disrupt the flow. Additionally, the fact that physicians are slow in typing and entering data will cost more time for each patient visit than before.

Focusing on this issue, Pizziferri *et al.*, (2005) carried out a time and motion study on physicians’ time utilization before and after implementing an EMR system and found that most physicians could avoid “sacrificing time with patients or overall clinic time, but they do spend more time on documentation outside of clinic sessions”. The same study also showed that using EMRs does

increase a physician's workload. Given the technical problems noted earlier, such as physicians' lack of computer skills and the complexity of EMR systems, an EMR system's ease of use is a key element in the efficiency and acceptance of such systems.

2.3.8 Leadership style

Adopting EMR systems in a hospital is a major change for all the stakeholders. This change process can be a major challenge. The existing organizational culture and the need to maintain status quo, lack of incentives, individual and local resistance by the staff and lack of proper leadership are some of the problems that can arise in initiating change.

Organizational culture and issues surrounding adoption of technology in healthcare settings are crucially important, but not much research has been done on this. An EMR-friendly culture supports organization-wide use of EMRs. Randeree (2007) briefly mentions that if the change of culture required accompanying a switch from the use of paper to an EMR system does not occur, this leads to slow adoption of EMR systems.

For users to be motivated to switch from traditional working procedures, incentives have been noted to play a role. The conclusion is that unless physicians have some personal incentives during the implementation of EMRs, the adoption of EMRs will not reach the expected level. The champions to EMR adoption need to strongly believe that the adoption will bring benefits and need to motivate the other stakeholders to participate in the change process. Practices without EMR champions may struggle to improve quality or see financial benefits from EMRs.

According to Kemper *et al.*, (2006) more than half (58.1%) of the physicians without an EMR doubt that EMRs can improve patient care or clinical outcomes. Other researchers have stated that those who are unwilling to use such a system are skeptical about claims that EMRs can successfully improve the quality of medical practices. This creates a personal resistance to the adoption of EMRs. However, this is very much a perceived barrier to EMRs, there is a lack of valid statistical data and success stories about EMRs available to non-users. Walter & Lopez (2008) concluded that physicians' perceptions of the threat to their professional autonomy are very important in their reaction to EMR adoption. The leader thus needs to convince these physicians to get a buy-in and achieve a shared goal, for effective EMR adoption.

2.4 Summary

The literature above discusses reasons for uptake and perhaps increase in the adoption of EMR systems in hospitals in the developed world. The authors are critical of the advantages and disadvantages of these systems including others feeling that adoption of these systems need to go along with upskilling of users with knowledge of how to utilize the systems. It is fair to conclude from the literature that training on use of these systems should cut across all employees of the hospital.

Cost implication of these EMR systems is also factor that is popping up in the literature which could be addressed alongside the fear of new technology. It is imperative to analyze the impact of these parameters in the research later as we ascertain whether the impact is felt in the Kenyan environment.

2.5 Research gaps

The gaps foreseen in this research revolve around the attitude in public hospital of staff when sourcing for information. Like the writers above most researches face challenges when it comes to raising funds for projects like this. This leads to delays in getting quality data and sometimes lack of the desired outcome. It must equally be noted that not all respondents are expected to respond for one or more reasons which might skew the data but that will be managed by the sampling techniques adopted

2.6 Conceptual Framework

This shows the relationship between the primary challenges, with change process as a mediating factor.

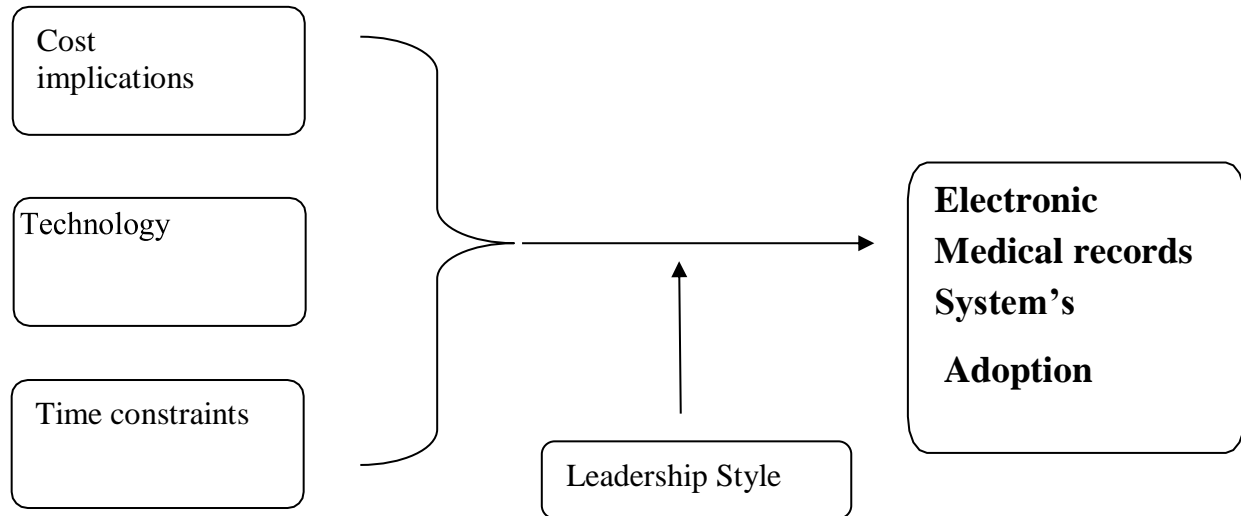


Figure.2.1: Conceptual Framework

CHAPTER 3

RESEARCH METHODOLOGY

3 Introduction

This chapter describes the method applied in investigating the subject matter. It presents the approach which was employed to carry out the study by explaining the research design, the population targeted and sampling techniques used. It also describes how data was collected and analyzed.

3.1 Research design

This study adopts a descriptive research design. This type of research describes what exists and may help to uncover new facts and meaning. The purpose of descriptive research is to observe, describe and document aspects of a situation as it naturally occurs. A descriptive research is concerned with conditions, practices, structures, differences or relationships that exist, opinions held, processes that are going on or trends that are evident (Polit & Hungler 1999). This involves the collection of data that will provide an account or description of individuals, groups or situations. Instruments we use to obtain data in descriptive studies include questionnaires, interviews (closed questions), and observation (checklists, etc.)

Survey research involves gathering quantitative and/or qualitative data from participants typically using a questionnaire or interview. A questionnaire may be delivered via mail, face to face or online. By using carefully controlled sampling procedures, it is assumed that samples responses to the survey will be representative of the target populations' likely responses. (James, 2001).

3.2 Population

In this study, the target population was 473 employees on permanent, contract and temporary terms at the Coast Province General Hospital. A high percentage of the population of the organization would need to be familiar with the electronic method of records as they were users. The study targeted was 141 personnel and this represents 30 % of the total population.

According to Mugenda (2003), a sample of 30% is favorable and adequately representative of the entire population.

Table 3.1 below illustrates the sample size of the study population.

Table 3.1: Sample size of the population used in the study

CATEGORY	No. of Staff	Sample size
Doctors	77	23
Health Records Officers	46	14
Nurses	268	80
Pharmacists	24	7
Lab Technologists	30	9
Administrative staff	28	8
Total	473	141

3.3 Sample and Sampling technique

The sampling frame was acquired from the hospital human resource manager who gave a copy of the current staff establishment records at the Coast Province General Hospital.

Stratified random sampling technique was used based on categories of staff establishment viz managers, clinical services, nursing and support services staff. The population was divided into relatively homogeneous groups called strata. Each stratum was selected randomly. Elements from each stratum are then combined to form the overall sample. This technique gives all the subjects an equal chance and reduces bias and errors. This was achieved using a web based random number generator. Stratified sampling entails first dividing the population into non-overlapping subpopulations called strata that together comprise the entire population and then drawing an independent sample from each stratum. If the sample in each stratum is a simple random sample, the whole procedure is described as stratified random sampling. Stratification is used to increase the precision of population estimates. (Cochran 2007).

3.4 Instruments

Chandran (2007) defines data collection as gathering empirical evidence to gain new insights about a situation and answer questions that prompted the undertaking of the research. This involves translating the research design into instruments of data collection with a view to collecting data to meet the research objectives. The data collection tools applied in this research include; questionnaires, interviews and observations.

Questionnaires

A questionnaire is a series of written questions on a topic about which the respondents' opinion are sought, (Sommer, 1997). Mugenda and Mugenda (2003), stresses that questionnaires are commonly used to obtain important information about the population. Emphasis is put on the need for each question in the questionnaire to address a specific objective research question or hypothesis of the study.

According to Mugenda and Mugenda (2003), the different kinds of questionnaires include; structured (closed-ended) questionnaires and unstructured (open-ended) questionnaires. A structured questionnaire refers to questions which are accompanied by a list of all possible alternatives from which respondents select the answer that best describe their situation. Mugenda and Mugenda (2003) describe the advantage of a structured questionnaire to include; they are easier to analyze since they are in an immediate usable form, they are easier to administer because each item is followed by alternative answers and they are economical to use in terms of time and money. The same writers point out the following limitations for structured questionnaires. They are more difficult to construct because categories must be thought out, responses are limited and the respondent is compelled to answer questions according to the researcher's choices.

Unstructured questionnaires refer to questions which give the respondent total freedom of response; by giving them the option to address questions in whichever manner they are comfortable (Mugenda and Mugenda, 2003). Unstructured questionnaires are advantageous in that they permit a greater depth of response, they are also simpler to formulate, and respondent's responses may give an insight into his feelings, background, hidden motivations, interest and decisions and can stimulate a person to think about his feelings or motives and to express what he considers to be most important. However, these questionnaires are disadvantageous because there is a tendency to provide information which does not answer the stipulated research questions or objectives, responses may be difficult to categorize and hence difficult to analyze quantitatively and lastly responding to open-ended questions is time consuming for respondents.

This study utilized questionnaires made up of closed as well as open ended questions touching on several areas targeting the set objectives. To better interrogate the employees of Coast General Hospital the researcher used both closed and open-ended questions to provide respondents with the latitude of providing all manner of response useful for the research.

Interviews

Mugenda and Mugenda (2003), define interviews as an oral administration of a questionnaire or an interview schedule. Mitchel and Jolley (1998) define interview as a technique in which an investigator asks the respondent questions and records the responses. Mugenda and Mugenda

(2003), proceed by outlining the advantages of the interview method as; they provide in-depth data which is not possible to get using a questionnaire, they make it possible to obtain data required to meet specific objectives of the study, interviews are more flexible than questionnaire, through interviews clarification and elaboration of the research purpose and questions can be done by the interviewer and interviews yield a high rate of response because it is difficult for a respondent to completely refuse to answer questions.

The limitations of interviews as a data collection method include; they are more expensive time wise, they require high level of skills like communication and interpersonal skills, the respondent may not give accurate response to personal or sensitive questions, responses may be influenced by the respondent's reaction to the interviewer.

Interview schedule

According to Mugenda and Mugenda (2003), an interview schedule is a set of questions that the interviewer asks when interviewing. The two writers claim that an interview schedule makes it possible to obtain data required to meet specific objectives of the study. They also claim that the interview schedule is used to standardize the interview session so that interviewers can ask questions in the same manner to all the respondents. Mugenda and Mugenda (2003) go further to explain that an interview schedule can be structured, unstructured or semi-structured. Structured interview schedules consist of structured questions that have categories with responses and the interviewer simply ticks the respondent's responses. Unstructured interview schedule has a

general plan that the interviewer follows and probing is commonly used to get deeper information. Semi-structured schedules consist of both structured and unstructured questions.

Observation

This method of data collection involves the researcher becoming involved in the phenomenon that is becoming a participant and then making his or her observations as one who was involved in the activities under investigation (Howard, 1985). The same writer states that this technique is rich in experience by becoming a participating member of a group or society but this advantage must be weighed against impartial scientific objectivity.

The study involved the use of questionnaires and interviews as data collection tools. As data collection tools, questionnaires were deemed necessary and suitable since respondents could answer them at their convenient time. The researcher observed that since hospital staff had busy schedules, questionnaires would be appropriate for this group of people. The questionnaires were sent to the respondents electronically using the internet while others were delivered by hand to the staff members. Follow-up on all the sent questionnaires was done after five days to remind those respondents who had not responded to respond. This was to help in achieving high respondent rate among the managers. The questionnaires contained both structured and non-structured questions and designed to gather maximum data to achieve each objective of the study.

Interviews were also used to gather research data from some respondents. The researcher observed that the use of interviews allowed her to triangulate the research methods used in this study and at

the same time confirmed information collected from the questionnaires. Triangulation has been defined as compatibility procedures designed to reconcile two major methodologies as these contribute to the solution of the major problem (Leedy, 1995). To undertake this research method, the researcher used the already designed questionnaire to undertake the interviews to maintain consistency of the information collected.

A cross tabulation of OCCUPATION * USE OF EMR is presented below.

Table 3.: OCCUPATION * USE OF EMR Cross tabulation

		USE OF EMR			Total
		No	Yes	%	
OCCUPATION	Doctor	18	5	22	23
	Health Records	11	3	21	14
	Nurse	46	14	23	60
	Pharmacist	0	7	100	7
	Lab technologist	7	2	22	9
	Administrative Staff	6	2	25	8

3.5 Validity and Reliability test

The reliability of the instrument was ascertained by conducting a pilot study of Likoni sub County hospital. Ten questionnaires were distributed to the respondents located in Likoni.

Internal consistency method was used. The most popular internal consistency reliability estimate was given by Cronbach's alpha reliability coefficient of 0.7 or higher which is considered "acceptable" in most social science research situations (Nassiuma & Mwangi 2004).

The researcher used structured questionnaires - they offer well planned and focused data and are ideal for a large group of respondents within a short time and limited budget. Biases and prejudices in responses are also reduced or avoided. The researcher also prepared a budget and a work plan that was used as a guide during the actual research.

3.6 Data collection procedure

Using the case study methodology applied in this study, questionnaires were used to collect data from a total of 141 staff. Each item in the questionnaire was developed to address a specific objective or research question of the study. Secondary data was sourced from documentary review of Health periodicals and reports, Government of Kenya policy documents Kenya Vision 2030 and academic journals.

3.7 Data processing and analysis

The completed questionnaires were first edited for completeness and consistency. Quantitative data analysis was used in the study. Data collected was coded and analyzed using SPSS version 20 and Microsoft Excel 2007. Descriptive Statistics using cross tabulation was used to describe the relationship between the independent and dependent variables.

The costs for the entire research process (budget attached), were sponsored by the researcher.

CHAPTER 4

DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter brings in the presentation of the findings obtained and their interpretation. The results are discussed based on the objectives of the study.

4.2 Response Rate

The study targeted 141 respondents but managed to get only 121 filled and returned questionnaires, resulting in a response rate of 82% as shown in the table below. This response rate was satisfactory and representative to make conclusions for the study. According to Mugenda and Mugenda (2003), a response rate of 50 percent is adequate for analysis and reporting; a 60% is good and a 70% and above is excellent. Based on this, the response rate was excellent.

Table 4.2: Response rate

CATEGORY	No. of staff	Sample Size (30 %) of staff	Response Rate (No.)	Response Rate (%)
Doctors	77	23	23	100
Health Records officers	46	14	14	100
Nurses	268	80	60	75
Pharmacists	24	7	7	100
Lab Technologists	30	9	9	100
Administrative staff	28	8	8	100
Total	473	141	121	86

4.3 Demographic Information

4.3.1 Occupation

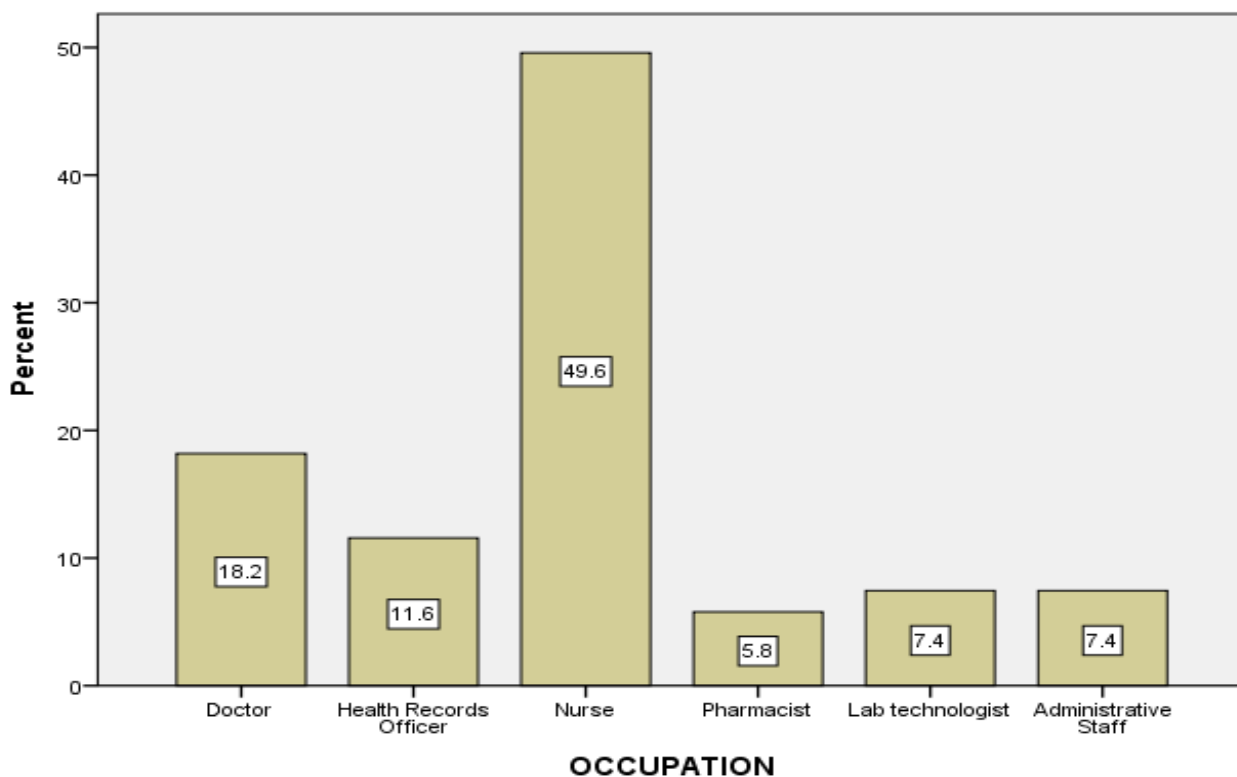


Figure 4.1: Occupation of the study population

Figure 4.1 above indicates that Doctors accounted for 18.2%, Health Records officers 11.6%, Nurses 49.6%, Pharmacists 5.8%, Lab technologists 7.4% and Administrative staff 7.4%. This is an indication that the various cadres of healthcare personnel in the institution were adequately represented.

It can be deduced that more than half of doctors, health records officers, nurses, lab technologists and administrative staff do not use any form of EMR in their daily work. All Pharmacists were noted to be using a form of electronic system in dispensing the prescribed medication.

4.2.2 Age Bracket

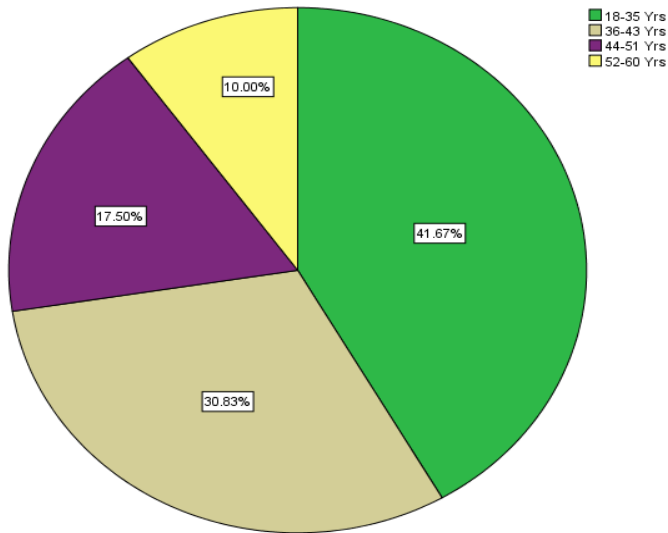


Figure 4.2: Age bracket

The pie chart shows that 41.7% of the respondents fell under 18-35 years age bracket, 30.9% 36-43 years age bracket, 17.5% 44-51 years age bracket and 10% 52-60 years age bracket. This is an indication that CPGH is dominated by a quite young generation of workers.

Table 4.2: AGE BRACKET * USE OF EMR

Cross tabulation

	USE OF EMR		Total
	No	Yes	
52-60 Yrs	11	1	12
44-51 Yrs	19	2	21
AGE BRACKET 36-43 Yrs	30	8	38
18-35 Yrs	28	22	50
Total	88	33	121

The cross tabulation above indicates that majority of EMR users fall in the 18-35 years age bracket and the least users are in 44-51 years bracket and 52-60 years. This is could be due to the generational gap with the young being more exposed to information technology and more receptive to change.

4.2.3 Length of Service

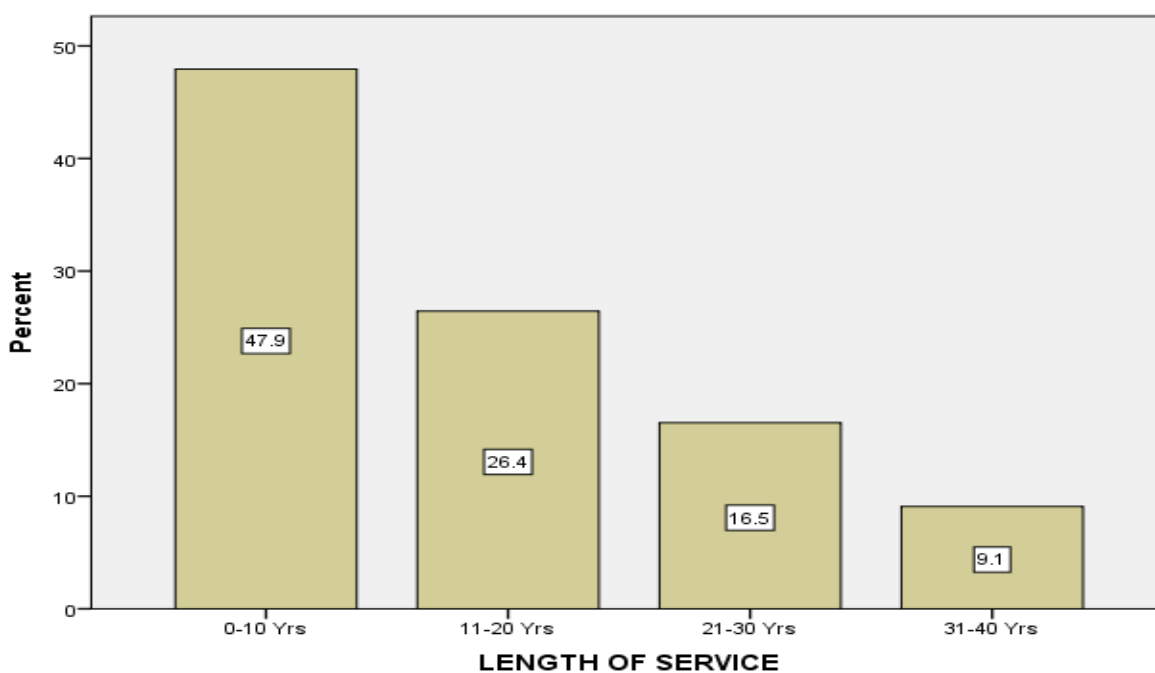


Figure 4.3: Length of service

Figure 4.3 above shows that 47.9% of the respondents have worked for 0-10 years, 26.4% for 11-20 years, 16.5% for 21-30 years and 9.1% for 31-40 years. This implies that Coast Province General hospital is dominated by relatively young work force, who have not been in the healthcare service delivery industry for long.

4.4. Reliability of test results

Table 4.4: Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.889	.892	121

Table 4.4 above, shows that Cronbach alpha coefficient for each of the variables, is well above the lower limit of acceptability of 0.70 (Gliem, 2003). The results indicate that the questionnaire used in this study had a high level of reliability as each of the items relates to the identified factor.

4.5. EMR usage Levels

4.5.1 Electronic medical records system usage at work

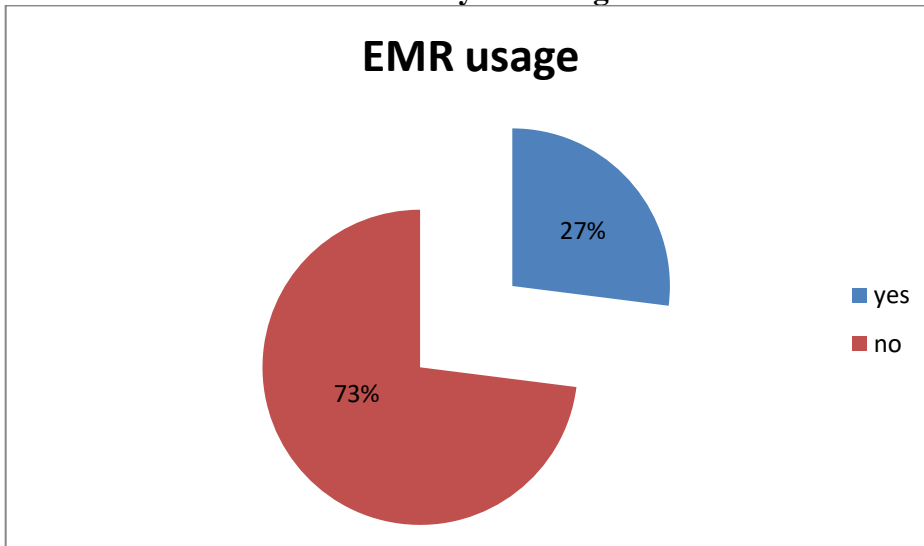


Figure 4.4: EMR usage

Figure 4.4 above indicates that only 27 % of the respondents have used a form of EMR at the workplace and 73% have not interacted with any EMR system. This finding drives the need to find out the challenges and barriers to EMR adoption at the said facility.

4.6. Financial Challenges

Table 4.5: Financial Challenges

	N	Minimum	Maximum	Mean	Std.Deviation
Inadequate Financial Resources	121	0	5	3.9669	1.10253
High start-up costs	121	0	5	3.9091	1.11803
High Ongoing costs	121	0	5	3.8281	1.16284
Uncertainty on ROI	121	0	5	3.6347	1.19384
Aggregate				3.8347	

Inadequate financial resources were perceived to significantly affect EMR utilization with a mean of 3.9669 followed by high start-up costs with a mean of 3.9091 and high ongoing costs with a mean of 3.6281. This is an indication that most of the respondents considered financial barriers to be a major factor affecting EMR systems adoption at CPGH. This being a public facility, the funding mainly is a responsibility of the government, but the management can push for a budgetary allocation or factor these in the facility improvement fund or cost-sharing money.

4.7. Technical Barrier

Table 4.6: Technical Barrier

	N	Minimum	Maximum	Mean	Std. Deviation
Unavailability of computers	121	.00	5.00	3.8926	1.11655
Technical training	121	.00	5.00	3.6942	1.23047
Computer Skills	121	.00	5.00	3.5950	1.42348
System limitation	121	.00	5.00	3.2314	1.10876
System complexity	121	.00	5.00	3.2149	1.17761
Customizability	121	.00	5.00	3.1736	1.04624
Reliability	121	.00	5.00	3.1653	1.10565
Aggregate				3.4239	

EMR utilization is hampered by the following factors as indicated in table 4.7 above; Lack of computers/hardware with a mean of 3.8926, Lack of technical training and support with a mean of 3.6942, Lack of computer skills among physicians and/or the staff with a mean of 3.5950, Limitation of the system with a mean of 3.2314, Complexity of the system with a mean of 3.2149, Lack of Customizability with a mean of 3.1736 and Lack of Reliability with a mean of 3.1653. This is a clear indicator that technical barriers significantly influence EMR utilization at Coast Province General Hospital.

4.8 Time barrier

Table 4.7: Time barrier

	N	Minimum	Maximum	Mean	Std. Deviation
Time to select, purchase and implement	121	.00	5.00	3.4380	1.29674
Time to learn system	121	.00	5.00	3.4215	1.26328
Time to enter data	121	.00	5.00	3.2479	1.22666
Time Convert records	121	.00	5.00	3.1240	1.21498
EMR usage leads to more time per patient	121	.00	5.00	2.3554	1.18925
Aggregate				3.1174	

EMR utilization is influenced by time barrier using different parameters as shown in table 4.8 above. Time to select, purchase and implement the system affects EMR utilization significantly with a mean of 3.4380 followed by Time to learn the system with a mean of 3.4215, Time to enter data also affects EMR utilization with a mean of 3.2479. Time to convert the records affect EMR utilization with a mean of 3.1240. Respondents however disagreed with the fact that using EMR leads to more time per patient during hospital visits. Time is an important resource often overlooked during EMR implementation and utilization.

4.9 Change process factor

Table 4.8 Change process

	N	Minimum	Maximum	Mean	Std.Deviation
Lack of proper leadership	121	.00	5.00	4.3884	.96929
Lack of support from organizational culture	121	.00	5.00	4.0579	1.10527
Lack of participation/stakeholder involvement	121	.00	5.00	4.0509	1.09009
Lack of incentives	121	.00	5.00	2.9835	1.34774
Aggregate				3.8719	

Majority of the respondents pointed out that lack of proper leadership and support from the decision makers, was a key challenge to the change process. Resistance to change in the current organizational culture, rated second with a mean of 4.0579. Respondents also agreed that lack of stakeholder involvement from the start was a barrier. There was also consensus that lack of incentives and means to motivate the users would elicit resistance to EMR adoption, although this was of low impact compared to the other factors. This is in tandem with the findings of Miller and Sim(2004). More attention should be paid to the role and influence of project leaders/champions to increase the adoption rate of EMRs.

Asked about the recommendations the participants would give to the institution to aid in adoption of EMR, the following suggestions were voiced as shown in Fig.4.5 below.

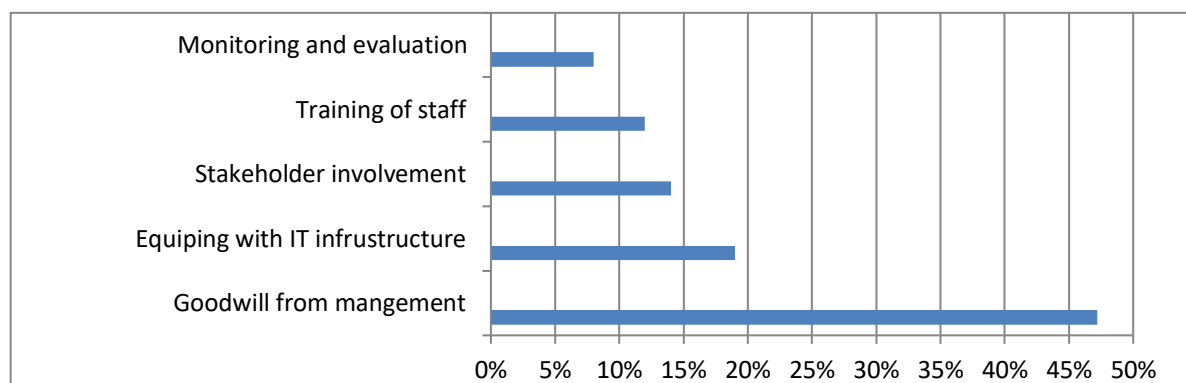


Figure.4.5 Recommendations by participants

CHAPTER 5

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the key findings from the study, and draws conclusions from the findings. Recommendations are then made in relation to the study objective.

5.1 Summary of the findings

In summary, the study came up with the following findings

5.1.1 Cost implications

Financial barrier ranks second with a mean of 3.8347. Majority of the respondents felt that the costs involved in adoption of EMR are a major impediment. This agrees with Des Roches (2008) who portends that high ongoing costs in addition to the start-up costs significantly affect EMR implementation. Implementing an EMR system requires extensive commitment to system administration, control, maintenance, and support to keep it working effectively and efficiently. These costs include the long-term expenditures incurred in monitoring, modifying, upgrading and maintaining EMRs, which will be significant. Further, vendors charge a lot of money for after-sales service. These projected costs make physicians unwilling to adopt EMRs (DesRoches *et al.*, 2008). This being a government facility; financial challenges are beyond the control of implementers. For instance, overcoming the high cost barriers, especially the purchase costs associated with EMRs, may require incentives from the government, such as low-interest loans or funding programs.

5.1.2 Technology

Technical barrier emerges third with a mean of 3.4239. This confirms Miller & Sim position that many physicians complain of poor service from the vendor, such as poor follow-up with technical issues and a general lack of training and support for problems associated with the EMRs (Miller & Sim, 2004). Ludwick *et al* (2009) similarly noted that physicians struggle to get appropriate technical training and support for the systems from the vendor. As physicians are not technical experts and the systems are inherently complicated, physicians perceive a need for proper

technical training and support, and are reluctant to use EMRs without it. This can be addressed by the policy makers coming up with training programs for the user groups, adapting the system to existing practices in phases and outsourcing technical support during implementation.

5.1.3 Time constraint

Time barrier is fourth with an average mean of 3.1174. The respondents felt that time to learn the system, to enter data and to convert previous records to electronic would interrupt their workflow and increase their workload initially. Some however felt that EMR systems adoption would not lead to more time per patient. Other researchers argue that mastering an EMR system will help physicians to work more efficiently (Meade, 2009). However, “the demands and pressures of delivering office based care may not afford them the time to learn the system” (Simon *et al.*, 2007.)

5.1.4 Leadership styles

The study findings indicate that leadership styles had the greatest influence on adoption of EMRs with an aggregate mean of 3.8719. The respondents strongly agreed that lack of proper leadership, lack of stakeholder involvement, resistance to changing the traditional way of working and lack of motivating factors were among the impediments to adopting change as far as EMR adoption is concerned. Barriers in the “Change Process” category can mediate other identified barriers during the implementation process by restricting the ability to overcome them and achieve a successful EMR adoption. Overcoming the barriers to EMR adoption is a complex process that needs support from several parties such as the government, insurance companies, vendors, managers, patients and especially the physicians themselves.

5.2 Conclusions

This paper focused on the primary challenges to EMR adoption as identified by previous research (financial, technical, time), to see if they also apply to the target population or not. More research is required to consider more barriers and challenges and possible interventions. Although the facility has made attempts at incorporating IT in some of its activities, it still has a long way to go as far as EMR systems adoption is concerned. EMR adoption is a major change that is often

felt throughout the practice; it demands complementary adjustments and innovation in other aspects such as to the structure and culture of a practice.

Some challenges are beyond the control of the immediate hospital management e.g. financial challenges; this being a government hospital, but the leadership of the hospital can influence policy and push for budgetary allocation. Technical and time challenges are more user related, and can be addressed by training the staff and involving them in the whole change process hence ensuring a positive buy-in. To realize the benefits of EMR adoption, a monumental effort will be needed by the management and other key stakeholders.

Setting policies: - the governing body of the institution, in collaboration with the county health management committee should come up with policies on how to overcome the challenges and have strategies in place to actualize their goals. Goodwill from management goes a long way in ensuring such a venture is successful. Developing safety and security policies in cooperation with physicians, patients and payers, would address concerns of safety of patient information that may be raised by regulators.

Alignment of Goals: - The key stakeholders i.e. the national government, county government, other financiers and management, need to come to the same threshold and agree on a shared strategic direction. Letting representatives of user groups participate during the implementation process is also key. Access to capital for initial investment and sustenance can be addressed if it's included in the annual county budget. Public, private partnerships and donor funds can be resourceful in raising funds necessary for purchasing the hardware and software and other IT infrastructure needed. This addresses the economic challenges to EMR adoption.

Communication and training: - There needs communication the advantages of the initiative would help the users understand that while it may take longer time to enter an individual order, there will be impressive payoffs downstream. The entire user groups need to be trained on the EMR systems before use and regular touch ups done. Induction and orientation of all new staff would also be useful in enhancing user acceptance. The training addresses the technical and technological challenges. Putting into consideration Koters change management theory and Rogers's innovation diffusion theory can aid in adapting to the change in the institution. Selecting an experienced person to champion the process is advisable.

Further research needs to be done to assess other barriers that have not been addressed; these may vary from one public hospital to another depending on organizational factors e.g. size of

facility, geographic location, among other factors. The interventions required may also vary from facility to facility, since there is no “one size fit all”. EMR systems implementers and change managers need to choose and decide on relevant interventions based on their actual conditions and situation. The findings from this study can however serve as a reference point.

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Appendix A: Letter of introduction

Dear Respondents,

You are invited to participate in this Case study of “**Challenges to Electronic Medical Record Systems Adoption, -A Case of Coast General Hospital**”.

The aim of the study is to investigate the Challenges to adoption of Electronic Medical Record systems at CPGH. The study will also recommend interventions to the said challenges.

Each respondent to the case study will receive via email a full PDF copy of the report containing the study's findings and recommendations. The Individual responses to the study will be kept strictly confidential and data will only be used in aggregate. I will greatly appreciate your participation and look forward to working with you in this important research endeavor.

Yours Sincerely,

Judith Ogolla

BML Student

Management University of Africa

Appendix B: QUESTIONNAIRE

Challenges to Electronic Medical Record Systems adoption: A Case of Coast Province General Hospital.

Demographics:

a. Please indicated your name & gender..... (a) Male () (b) Female ()

b. Kindly tick above your profession:

Doctor	Health Records Officer	Nurse	Pharmacist	Lab Technologist	Administration staff

c. Length of Service: Tick Appropriately (√)

A. 0-10Years	
B. 11-20 Years	
C. 21-30 Years	
D. 31--40 Years	
E. 41-50 Years	

d. I use an Electronic medical record in the course of my work YES () NO ()

e. Using a scale of;

1. Strongly Disagree (SD) 2. Disagree (DA) 3. Uncertain (U) 4. Agree (A) 5. Strongly agree (SA), tick the appropriate response to the following statements

Financial Challenges

	1-SD	2-D	3-U	4-A	5-SA
A. High start-up costs affect EMR systems adoption					

B. High maintenance costs affect EMR systems adoption					
C. Uncertainty over return on investment affects EMR adoption					
D. Inadequate financial resources affect EMR Systems adoption					
E. EMR system is reducing revenue collection					
F. Revenue numbers are not related to EMR adoption					

Technical Challenges

	1-SD	2-D	3-U	4-A	5-SA
A. Lack of computer skills of the physicians and/or the staff affect EMR adoption					
B. Lack of technical training and support affect EMR adoption					
C. Complexity of the system affects EMR adoption					
D. Limitation of the system affects EMR adoption					
E. Lack of Customizability affects EMR adoption					
F. Lack of Reliability affects EMR adoption					
G. Lack of computers/hardware affects EMR adoption					

Time related challenges

	1-SD	2-D	3-U	4-A	5-SA
A. Time to select, purchase and implement the system affect EMR adoption					
B. Time to learn the system affect EMR systems adoption					
C. Time to enter data affect EMR systems adoption					
D. Using EMR leads to more time per patient					
E. Time to convert the records affect EMR systems adoption					
F.					

Leadership style challenges

	1-SD	2-D	3-U	4-A	5-SA
A. Management at the top have embraced EMR adoption					
B. Departmental leaders are aware and supportive of the EMR systems					
C. Usage of EMR by leaders affect EMR systems adoption					
D. Using EMR leads to more time created for other roles					
E. Leaders can assess performance through EMR system					
F. Management are not involved in the deployment of EMR system					

**f. Has the adoption and usage of EMR system improved the management of records in the hospital?
Please explain.**

.....

Appendix D: BUDGET

Item		Quantity	Unit price (Kshs.)	Total cost
1.	Typing expenses	4 drafts	500	2,000
2.	Printing and editing final proposal	4 copies	400	1,600
3.	Field notebooks	6 pieces	100	600
4.	FoolsCaps	2 reams	250	500
5.	Photocopying papers	2 reams	400	800
6.	Piloting expenses	2 days	1,000	2,000
7.	Data collection expenses	10 days	500	5,000
8.	Data processing and analysis	10 days	1,000	10,000
9.	Draft reports	3 copies	1,000	3,000
10.	Final research reports	7 copies	2,000	14,000
11.	Miscellaneous			5,000
12.	Contingency			5,000
Grand total				49,500