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**Investigating Challenges to Electronic Medical Record Systems Adoption, - A Case of Coast Province General Hospital.**

**By:**

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**Reg. No: - MBA-HCM/83162/14**

**Submitted in partial fulfillment of the requirements for the Degree of Masters in Business Administration, in Healthcare Management, at Strathmore Business School.**

**Institute of Healthcare Management**

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**Nairobi, Kenya.**

**June, 2016**

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Everlyne Mbinya Sumbi

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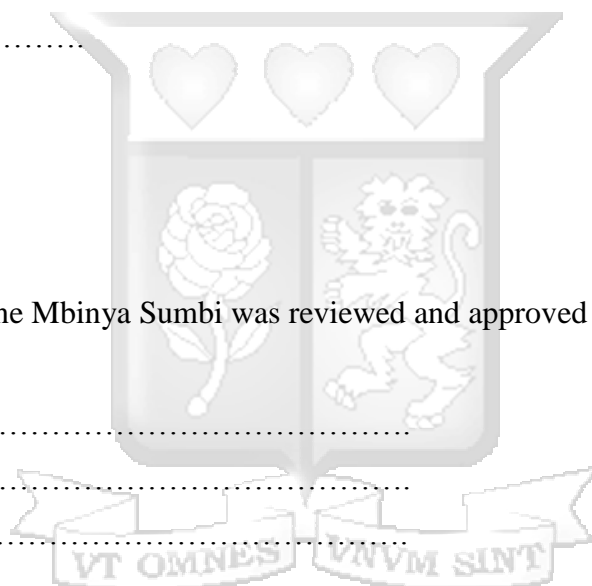
### Approval

The dissertation of Everlyne Mbinya Sumbi was reviewed and approved by the supervisor:

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Strathmore Business School.

Dean, School of Graduate Studies.

## **ABSTRACT**

**Background:** 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.

**Methodology:** A descriptive survey research design was used. 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.

**Results:** The study findings indicate that financial, technical and time constraints are among the challenges to EMR adoption at CPGH with change process as a mediating factor. 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 this change. EMR systems adoption requires extensive commitment to system administration, control, maintenance, and support in order to keep it working effectively and efficiently. High initial costs, ongoing maintenance costs and uncertain return on investment were highlighted as key financial barriers. Lack of the infrastructure and skills among the user groups, presumed complexity and lack of customizability were some of the technical barriers voiced. Time to learn the system; time to enter data and time to convert the records was perceived to have an effect on workflow and workload.

**Conclusions:** The policy makers thus need to budget for EMR adoption expenses, put measures to train staff, communicate the shared vision through stakeholder involvement, and have monitoring and evaluation strategy in place. The process of EMR adoption should be treated as a change project, and led by implementers or change managers. The quality of change management plays an important role in the success of EMR adoption. The

findings from this study will be shared with the hospital administration for consideration in policy formulation, decision making, research and development and in addressing the said challenges



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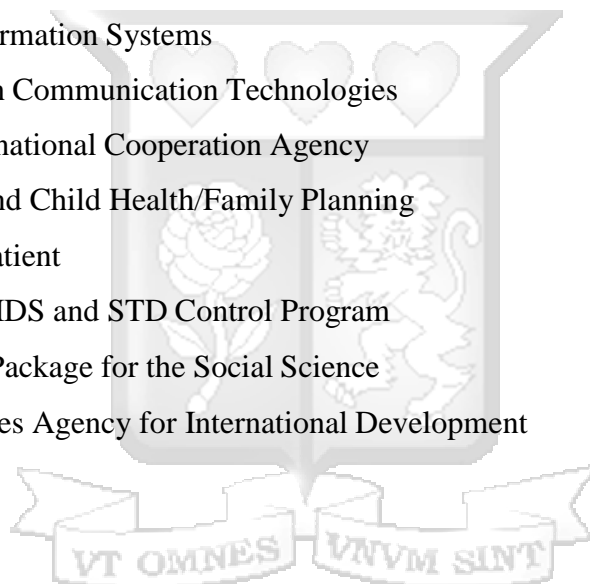
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## List of Acronyms and Abbreviations

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



## **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. James Wanjagi for his exemplary guidance and valuable feedback throughout this research work.

I recognize the efforts of my colleagues and secretary for assisting me in drafting, typing and editing this work.



**Dedication**

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



# CHAPTER 1

## INTRODUCTION

### 1.1 Background of the study

In the face of the rapidly increasing healthcare costs, associated with aging population and the concomitant 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 *et al*,2005).This has led to emphasis on deployment of information technology(IT) in support of the incremental 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 at all times. 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 at a later date 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 centre; 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 centre 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 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 infrastructure 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 high expectations and interest in EMRs worldwide, and their potential for quality improvement, their overall adoption rate is relatively low and they face several challenges (Davidson & Heslinga, 2007). For instance, they are seen as contrary to a physician's traditional working style, they require a greater capability in dealing with computers and installing a system absorbs considerable financial resources (DesRoches *et al*, 2008).

Previous literature has grouped barriers linked to similar problems into a single category and come up with eight categories i.e. A) Financial, B) Technical, C) Time, D) Psychological, E) Social, F) Legal, G) Organizational, and H) Change Process. Most of these categories are interrelated with Organizational and Change Process being mediating factors on the other barriers. A change management perspective would be required to develop some barrier-related interventions that could overcome the identified challenges. (Boonstra *et al* 2010 and Joan, 2004).

According to Meinert, the slow rate of adoption suggests that resistance among healthcare workers must be strong because they are the frontline user-groups (Meinert, 2005). Whether or not they support and use EMRs will have a great influence on its success. As a result, user groups have a great impact on the overall adoption level of EMRs. Studies on the adoption of EMRs in developing countries are scarce. This report explores the gap between where CPGH is now concerning adoption of EMR, where CPGH members believe they should be, why the gap exists i.e. the challenges and what can be done about it. The findings from this study will be shared with the hospital administration for consideration in policy formulation, decision making, research and development and in addressing the said challenges.

### **1.3 Research objectives**

The main objective of the study is to identify, categorize, and analyze barriers perceived by the health workers to the adoption of Electronic Medical Records (EMRs) in order to provide implementers with beneficial intervention options.

#### **1.3.1 Specific objectives**

- i. To establish the levels of EMR systems
- ii. usage at Coast Province General Hospital (CPGH)
- iii. To determine how financial challenges affect adoption of Electronic Medical Records systems at CPGH
- iv. To determine how technical challenges affect adoption of Electronic Medical Records systems at CPGH
- v. To explore how time constraints affects Electronic Medical Records systems adoption at CPGH.
- vi. To explore how the process of change affects EMRs adoption at CPGH.

### **1.4 Research questions**

- i. What are the levels of EMR usage at CPGH?
- ii. How do financial challenges affect adoption of EMR Systems at CPGH?
- iii. How do technical challenges affect adoption of EMR Systems at CPGH?

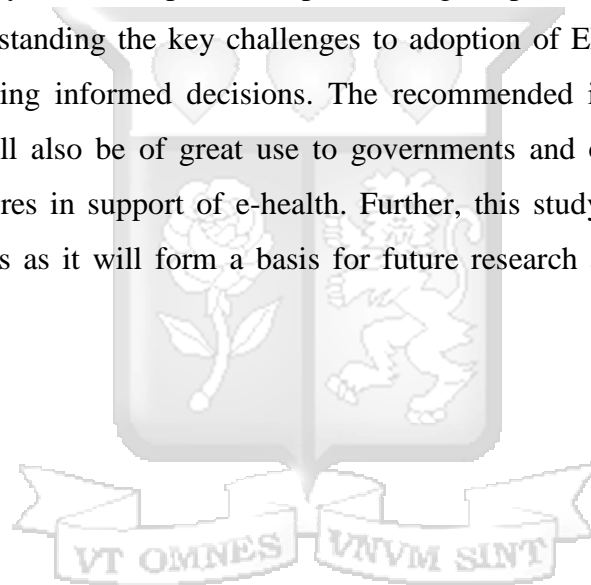
- iv. How do time constraints affect adoption of EMR Systems at CPGH?
- v. How does change process affect adoption of EMR systems at CPGH?

### **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.



## 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 Empirical 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 a number of other areas including Scandinavia and New Zealand where all 1,100 general practices use EMR (Protti, 2010).

##### 2.2.1 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 a number of 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 are able to 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).

### **2.2.2 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 particular 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.

### **2.2.3 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)

### **2.2.4 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 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 of these 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.

#### **2.3.1 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.

### **2.3.2 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 the majority of 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 an individual forms a 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 or not 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 more or less appealing (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 & Broekhuis (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 relative importance of the other barriers even before implementation has started. (Kazley & Ozcan, 2007)

Several obstacles have been cited by previous researchers as explanations why EMRs have not achieved more prevalent usage in physicians' offices; e.g EHR products are expensive and require a major investment; EHR applications are not standardized; EHRs are more difficult to use than paper-based records; EHR implementation reduces practice productivity and disturbs workflow (at least initially); EHR benefits accrue to others (such as society and payers) not to providers. (McGinn *et al*, 2011)

A study by Gans *et al*(2005) confirmed that the top barriers that physicians list are the cost of the systems, clinicians' concerns about technically supporting a system, and clinicians' ability to use the new system . This paper focused on the primary barriers and the change process as a mediating factor, as discussed below.

#### **2.4 Financial challenges**

Economic and market forces have been identified as obstacles to EMR adoption .(Pare' *et al*, 2014 and Tang *et al* 2006 ) .The financial 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 expenditure needed to get an EMR system working in the physician's practice, such as the purchase of hardware and software, selecting and contracting costs and installation expenses. These costs seem to be in the range from \$16,000 to \$36,000 per physician, with EMR software costs alone, typically \$10,000 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. (Davidson & Heslinga, 2007).

High ongoing costs In addition to the start-up costs, implementing an EMR system requires extensive commitment to system administration, control, maintenance, and support in order 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. All of these projected costs make physicians unwilling to adopt EMRs (DesRoches *et al.*, 2008).

The high start-up and ongoing costs of implementing an EMR system can result in problems finding sufficient financial resources in a medical practice. As these costs are very high, there can be inadequate financial resources to cover them, especially in small and medium practices with low IT budgets (Randeree, 2007).

Uncertainty about return on investment is a cause to worry in considering adoption of EMR. (Miller & Sim, 2004). Meade (2009), identified lack of financial resources, as one of the economic challenge, faced by institutions in adopting EMR. Physicians have also cited excessive cost in relation to uncertain benefits as an obstacle to EMR adoption (Simon *et al*, 2009).

## **2.5 Technical barriers**

Electronic Medical Records are hi-tech systems and, as such, include complex 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 lead to complaints from physicians, and they need to be improved. Therefore, barriers exist related to the technical complexities of the systems, the technical capabilities of the physicians and of the suppliers which are grouped in this second category.

Physicians and/or staff lack computer skills; physicians have insufficient technical knowledge and skills to deal with EMRs, and that this results in resistance. Meade *et al*, (2009) observes in this context that most of the current generation of physicians in Ireland 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 but in practice actually is very complex to use by these physicians.

Further, good typing skills are needed to enter patient medical information, notes and prescriptions into the EMRs, and some physicians lack them. Shachak *et al* (2009) found that EMR use introduces a new type of medical errors: typos. Further, it is not only the physicians but also other staff at medical practices who lack adequate computer skills. This general lack of skills hinders the wide adoption of EMRs.

Lack of technical training and support; 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 note 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.

Complexity of the system; Miller & Sim (2004) argue 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 have to learn how to use the EMR system effectively and efficiently which they may see as a burden. It is also possible that a lack of skills leads the physicians to regard the EMR system as extremely complicated.

Lack of Reliability; Randeree (2007) posits that “Reliability is the dependability of the technology systems that comprise the EMRs. 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 (Laerum *et al* 2001). Further, in such practices, the start-up costs associated with setting up EMRs will be higher as more resources are needed.

## 2. 6 Time challenges

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 (Boonstra & Broekhuis, 2010). 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 their regular work schedule. 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 (Pizziferri *et al.*, 2005).

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. (Harrison *et al.*, 2007) .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, "the demands and pressures of delivering office based care may not afford them the time to learn the system" (Simon *et al.*, 2007). 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 entering data; it is perhaps surprising that many researchers conclude that data entry is a problem for physicians using EMRs (Laerum *et al.*, 2001). 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 (Laerum *et al.*, 2001). If using EMRs, physicians may have to stop halfway through a consultancy in order 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 were able to 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.

## **2.7 Change Process**

Adopting EMR systems in a hospital is a major change for all the stakeholders. This change process can be a major challenge in itself. 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.

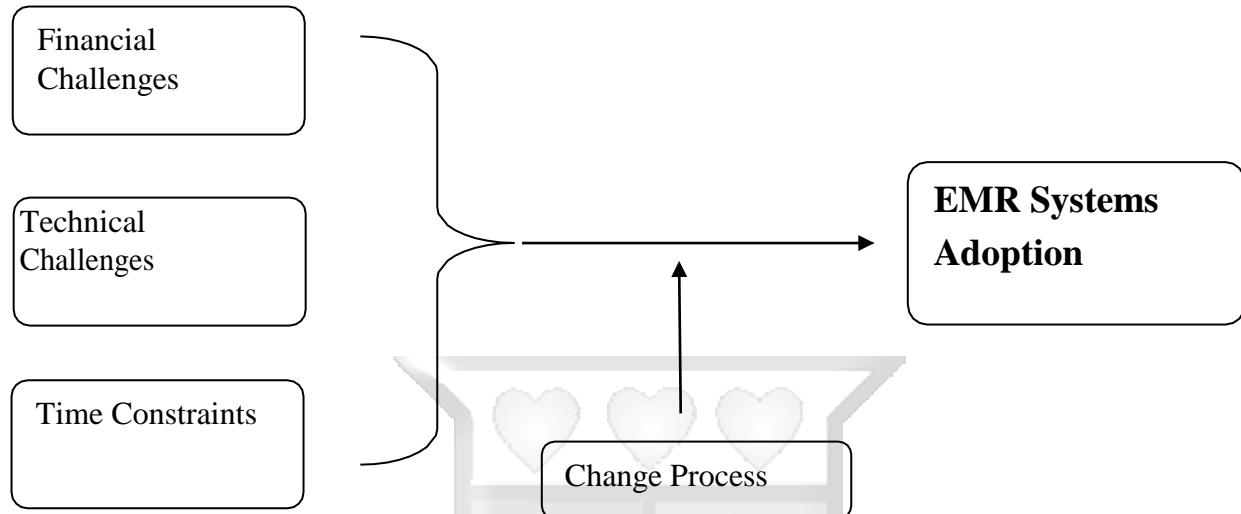
Organizational culture and issues surrounding adoption of technology in healthcare settings are crucially important, but not much research has been done on this. An EMR-friendly culture supports organization-wide use of EMRs. Randeree (2007) briefly mentions that if the change of culture required to accompany 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. Miller (2004) concluded 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. . Miller & Sim (2004) argue that practices without EMR champions may struggle to improve quality or see financial benefits from E M R s .

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 (Jha *et al*, 2009). 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.

## 2.8 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**

#### **3.1 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.

#### **3.2 Research design**

This study adopts a descriptive survey 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. (Janes, 2001).

#### **3.3 Population and Sampling**

In this study the target population was 473 employees on permanent, contract and temporary terms at the Coast Province General Hospital. The study sample was 141 personnel and this represents 30 % of the total population. According to Mugenda (1999), a sample of 30% is favorable and adequately representative of the entire population.

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 also 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).

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

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

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

### 3.4 Data Collection Methods

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.

### **3.4.1 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.

### **3.5 Data 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.

### **3.6 Research Quality – validity, reliability and objectivity of the research**

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).

An analysis was done to ascertain the reliability and consistence of the research instruments and it was found to be giving consistent results, hence it was adopted for the final study.

### **3.7 Ethical Issues in Research**

The study was approved by the Strathmore Business School Ethical Review Committee and the Coast General Hospital Ethical review committee. Informed consent was obtained from all the participants in this study.

**CHAPTER 4**  
**PRESENTATION OF RESEARCH FINDINGS**

**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 Demographic Information**

**4.2.1 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.

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

Table 4.1: OCCUPATION \* USE OF EMR Cross tabulation

		USE OF EMR			Total
		No	Yes	%	
OCCUPATI ON	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

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

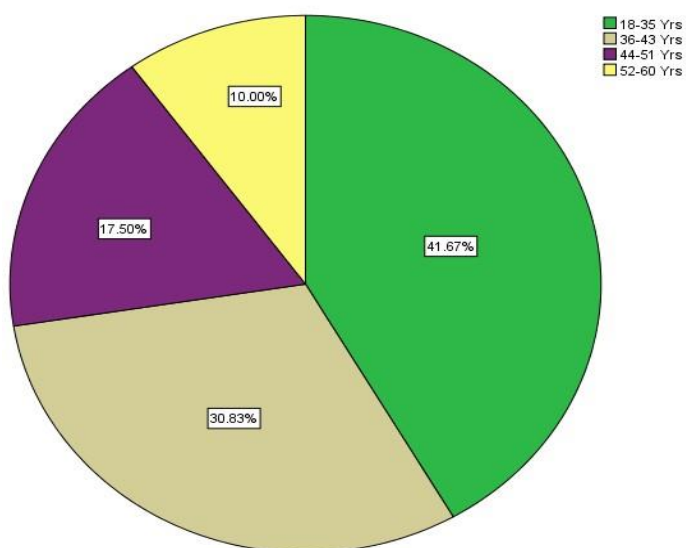


Figure 4.2: Age bracket

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	
AGE BRACKET	52-60 Yrs	11	1	12
	44-51 Yrs	19	2	21
	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

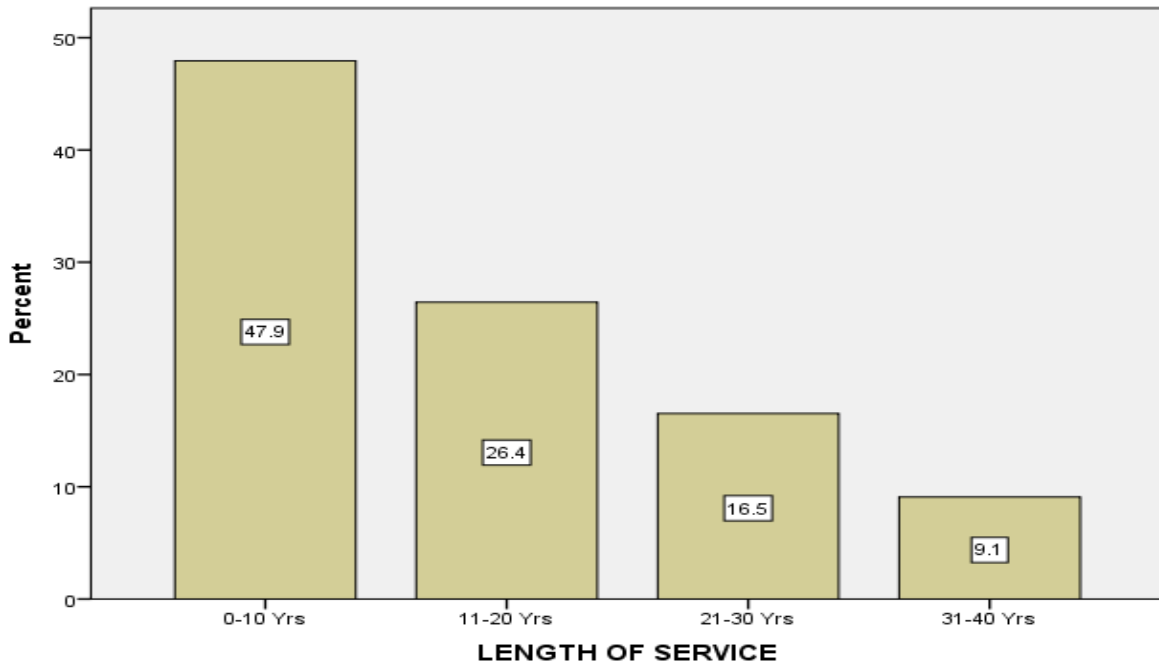


Figure 4.3: Length of service

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.

### 4.3 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 (1999), 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 considered to be excellent.

Table 4.3: Response rate

<b>CATEGORY</b>	<b>No. of staff</b>	<b>Sample Size (30 %) of staff</b>	<b>Response Rate (No.)</b>	<b>Response Rate (%)</b>
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
<b>Total</b>	<b>473</b>	<b>141</b>	<b>121</b>	<b>86</b>

#### 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

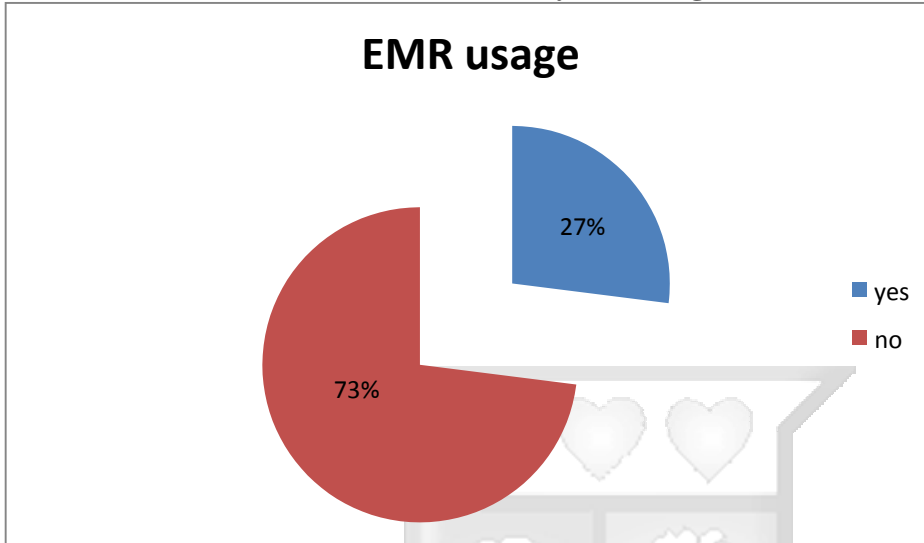


Figure 4.4: EMR usage

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
<b>Aggregate</b>				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 in order 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.

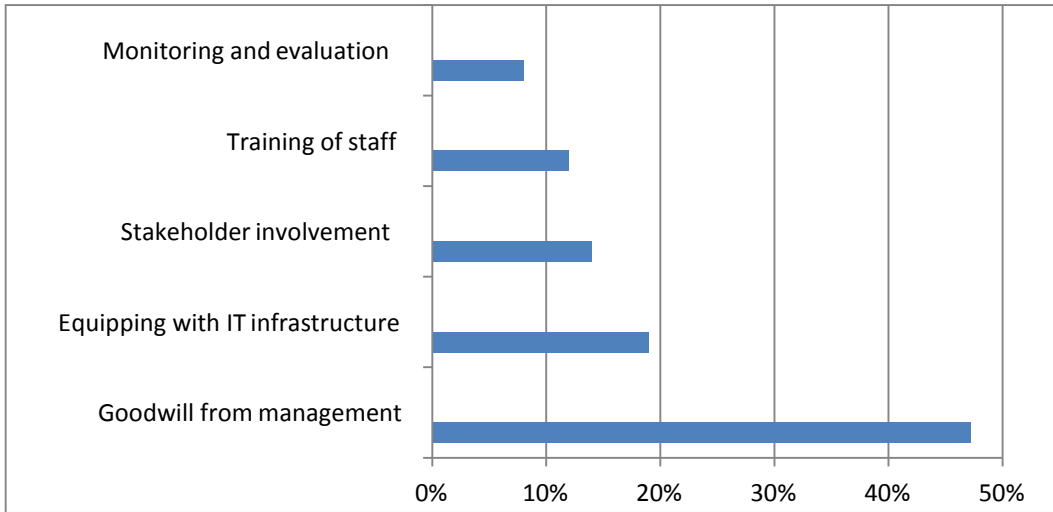


Figure.4.5 Recommendations by participants



## CHAPTER 5

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### 5.1 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.

The study findings indicate that change process factor has 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. (Boonstra & Broekhuis, 2010) 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. Previous authors stress the need for developing a flexible change management strategy when introducing EHRs that is relevant to the practice environment; the strategy should acknowledge the importance of relationship management and the role of individual staff members in helping the entire staff to manage change. Practice staff must create an actionable vision outlining realistic goals for the implementation, for all staff to buy into the project. (Lorenzi *et al* 2009). It is thus necessary for CPGH to identify a champion to serve as an advocate of the values of EMR and provide direction and encouragement for the project.

Financial challenges 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 DesRoches (2008) who portends that high ongoing costs in addition to the start-up costs significantly affect EMR implementation. A survey done on correlates of HER adoption in office practices got similar findings with the most frequently cited barriers to adoption being start-up financial costs (84%), ongoing financial costs (82%), and loss of productivity (81%) (Simon *et al* 2007). Implementing an EMR system requires extensive commitment to system administration,

control, maintenance, and support in order 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. All of 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. Kazley & Ozcan(2007) study found a similar trend and concluded that perhaps the greatest barrier to hospital EMR adoption is the cost of implementation and maintenance, and hospitals with greater financial resources are more likely to adopt EMR.

Technical challenges emerge 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. Similarly, technical challenges were identified as core issues in EMR adoption, alongside standardization and interoperability (Vishwanath *et al* 2007) .The technical challenges 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.

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, similar to a the findings in a time motion study done in five primary care clinics by Pizziferri *et al* (2005),who reported that HER did not require more time for physicians during a clinic session. 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.) It is therefore important to evaluate time efficiency in documentation since increased time for documentation is one of the most commonly stated barriers to successful implementation of an EMR (Poissant *et al* 2005).

## **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 look into 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.

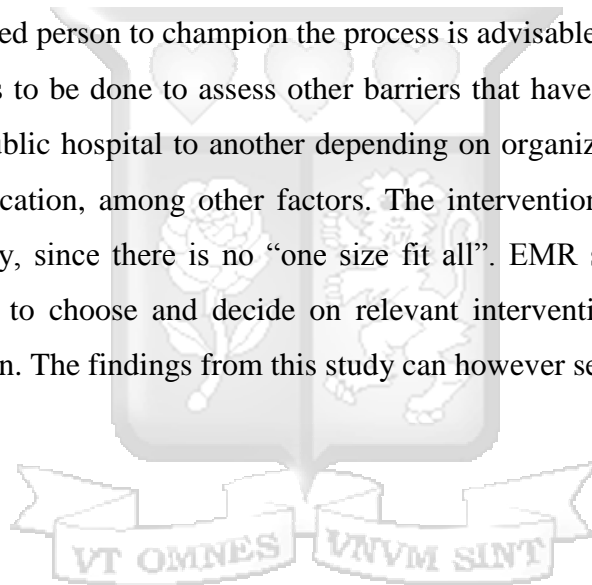
Setting policies: - the governing body of the institution, in collaboration with the county health management committee should come up with policies on how to overcome the challenges and have strategies in place to actualize their goals. Goodwill from management goes a long way in ensuring such a venture 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.



## REFERENCES

- Bates, D. W., Ebell, M., Gotlieb, E., Zapp, J., & Mullins, H. C. (2003). A proposal for electronic medical records in US primary care. *Journal of the American Medical Informatics Association, 10*(1), 1-10.
- Bodenheimer, T. (2005). High and rising health care costs. Part 2: technologic innovation. *Annals of internal medicine, 142*(11), 932-937
- Boonstra, A., & Broekhuis, M. (2010). Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC health services research, 10*(1), 1.
- Boussard, P., McEwen, M., & Willis, E. (2007). Learning theories. *Theoretical Basis for Nursing. (2 nd ed., pp. 398-400). New York, New York: Lippincott Williams & Wilkins.*
- Campbell, R. J. (2008). Change management in health care. *The health care manager, 27*(1), 23-39.
- Clark, C. M., & Springer, P. J. (2010). Academic nurse leaders' role in fostering a culture of civility in nursing education. *Journal of Nursing Education, 49*(6), 319-325.
- Cochran, W. G. (2007). *Sampling techniques*. John Wiley & Sons.
- Corrao, N. J., Robinson, A. G., Swiernik, M. A., & Naeim, A. (2010). Importance of testing for usability when selecting and implementing an electronic health or medical record system. *Journal of Oncology Practice, 6*(3), 120-124.
- Da've, D. I. V. A. N. (2004). Benefits and barriers to EMR implementation. *Caring: National Association for Home Care magazine, 23*(11), 50.
- Davidson, E., & Heslinga, D. (2006). Bridging the IT adoption gap for small physician practices: An action research study on electronic health records. *Information Systems Management, 24*(1), 15-28.
- DesRoches, C. M., Campbell, E. G., Rao, S. R., Donelan, K., Ferris, T. G., Jha, A., ... & Blumenthal, D. (2008). Electronic health records in ambulatory care—a national survey of physicians. *New England Journal of Medicine, 359*(1), 50-60.
- Dick, R. S., Steen, E. B., & Detmer, D. E. (Eds.). (1997). *The Computer-Based Patient Record:: An Essential Technology for Health Care*. National Academies Press.
- Dorr, D., Bonner, L. M., Cohen, A. N., Shoai, R. S., Perrin, R., Chaney, E., & Young, A. S.

- (2007). Informatics systems to promote improved care for chronic illness: a literature review. *Journal of the American Medical Informatics Association*, 14(2), 156-163.
- Fraser, H., Biondich, P., Moodley, D., Choi, S., Mamlin, B., & Szolovits, P. (2005). Implementing electronic medical record systems in developing countries. *Journal of Innovation in Health Informatics*, 13(2), 83-95.
- Fetter, M. S. (2009). Electronic health records and privacy. *Issues in mental health nursing*, 30(6), 408-409.
- Gans, D., Kralewski, J., Hammons, T., & Dowd, B. (2005). Medical groups' adoption of electronic health records and information systems. *Health affairs*, 24(5), 1323-1333.
- Gliem, R. R., & Gliem, J. A. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for Likert-type scales. Midwest Research-to-Practice Conference in Adult, Continuing, and Community Education.
- G.O.K. 2009- 2014 Strategic objectives for Kenya's Health information systems
- Grant, J. T. (2010). EHR: From paper to electronic: Plan ahead, avoid common pitfalls for successful integration into practice. *Ophthalmology Times*, 35(6), 44-46.
- Grieger, D. L., Cohen, S. H., & Krusch, D. A. (2007). A pilot study to document the return on investment for implementing an ambulatory electronic health record at an academic medical center. *Journal of the American College of Surgeons*, 205(1), 89-96.
- Gunter, T. D., & Terry, N. P. (2005). The emergence of national electronic health record architectures in the United States and Australia: models, costs, and questions. *Journal of Medical Internet Research*, 7(1), e3.
- Habib, J. L. (2010). EHRs, meaningful use, and a model EMR. *Drug Benefit Trends*, 22(4), 99-101.
- Harrison, M. I., Koppel, R., & Bar-Lev, S. (2007). Unintended consequences of information technologies in health care—an interactive sociotechnical analysis. *Journal of the American medical informatics Association*, 14(5), 542-549.
- Häyrinen, K., Saranto, K., & Nykänen, P. (2008). Definition, structure, content, use and impacts of electronic health records: a review of the research literature. *International journal of medical informatics*, 77(5), 291-304.
- Horner, S. D., Abel, E., Taylor, K., & Sands, D. (2004). Using theory to guide the diffusion of genetics content in nursing curricula. *Nursing Outlook*, 52(2), 80-84.

- Janes, J. (2001). Survey research design. *Library hi tech*, 19(4)419-421.
- Jang, Y., Lortie, M. A., & Sanche, S. (2014). Return on investment in electronic health records in primary care practices: a mixed-methods study. *JMIR medical informatics*, 2(2).
- Jha, A. K., Bates, D. W., Jenter, C., Orav, E. J., Zheng, J., Cleary, P., & Simon, S. R. (2009). Electronic health records: use, barriers and satisfaction among physicians who care for black and Hispanic patients. *Journal of evaluation in clinical practice*, 15(1), 158-163.
- Jones, S. S., Heaton, P. S., Rudin, R. S., & Schneider, E. C. (2012). Unraveling the IT productivity paradox—lessons for health care. *New England Journal of Medicine*, 366(24), 2243-2245.
- Kazley, A. S., & Ozcan, Y. A. (2007). Organizational and environmental determinants of hospital EMR adoption: a national study. *Journal of medical systems*, 31(5), 375-384.
- Kemper, A. R., Uren, R. L., & Clark, S. J. (2006). Adoption of electronic health records in primary care pediatric practices. *Pediatrics*, 118(1), e20-e24.
- Knaup, P. (2006). Electronic patient records and their benefit for patient care. *IMIA Yearbook*, 40-42.
- Kotter, J. P. (1996). *Leading change*. Harvard Business Press.
- Lærum, H., Ellingsen, G., & Faxvaag, A. (2001). Doctors' use of electronic medical records systems in hospitals: cross sectional survey. *Bmj*, 323(7325), 1344-1348.
- Lee, T. T. (2004). Nurses' adoption of technology: application of Rogers' innovation-diffusion model. *Applied Nursing Research*, 17(4), 231-238.
- Loomis, G. A., Ries, J. S., Saywell Jr, R. M., & Thakker, N. R. (2002). If electronic medical records are so great, why aren't family physicians using them?(Original Research). *Journal of Family Practice*, 51(7), 636-642.
- Lorenzi, N. M., Kouroubali, A., Detmer, D. E., & Bloomrosen, M. (2009). How to successfully select and implement electronic health records (EHR) in small ambulatory practice settings. *BMC medical informatics and decision making*, 9(1), 15.
- Ludwick, D. A., & Doucette, J. (2009). Adopting electronic medical records in primary care: lessons learned from health information systems implementation experience in seven countries. *International journal of medical informatics*, 78(1), 22-31.
- McGinn, C. A., Grenier, S., Duplantie, J., Shaw, N., Sicotte, C., Mathieu, L., ... & Gagnon, M.

- P. (2011). Comparison of user groups' perspectives of barriers and facilitators to implementing electronic health records: a systematic review. *BMC medicine*, 9(1), 46.
- McInnes, D. K., Saltman, D. C., & Kidd, M. R. (2006). General practitioners' use of computers for prescribing and electronic health records: results from a national survey. *Medical Journal of Australia*, 185(2), 88.
- Meade, B., Buckley, D., & Boland, M. (2009). What factors affect the use of electronic patient records by Irish GPs?. *International journal of medical informatics*, 78(8), 551-558.
- Meinert, D. B. (2005). Resistance to Electronic Medical Records(EMRs): A Barrier to Improved Quality of Care. *Informing Science: International Journal of an Emerging Transdiscipline*, 2, 493-504.
- Miller, R. H., & Sim, I. (2004). Physicians' use of electronic medical records: barriers and solutions. *Health affairs*, 23(2), 116-126.
- Mugenda, O. M., & Mugenda, A. G. (1999). Research Methods, Quantitative and Qualitative Analysis-African Center for Technology Studies. *Nairobi: Applied Research and Training Services (ACTS)*.
- Nassiuma, D. K., & Mwangi, J. W. (2006). Statistical methods and information analysis. *Njoro, Egerton*.
- Nickitas, D. M., & Kerfoot, K. (2010). Nursing informatics: Why nurse leaders need to stay informed. *Nursing Economics*, 28(3), 141-143.
- Paré, G., Raymond, L., de Guinea, A. O., Poba-Nzaou, P., Trudel, M. C., Marsan, J., & Micheneau, T. (2014). Barriers to organizational adoption of EMR systems in family physician practices: a mixed-methods study in Canada. *International journal of medical informatics*, 83(8), 548-558.
- Pearce, C. (2009). Electronic medical records-where to from here?. *Australian family physician*, 38(7), 537.
- Pizziferri, L., Kittler, A. F., Volk, L. A., Honour, M. M., Gupta, S., Wang, S., ... & Bates, D. W. (2005). Primary care physician time utilization before and after implementation of an electronic health record: a time-motion study. *Journal of biomedical informatics*, 38(3), 176-188.
- Poissant, L., Pereira, J., Tamblyn, R., & Kawasumi, Y. (2005). The impact of electronic health records on time efficiency of physicians and nurses: a systematic review. *Journal of the American Medical Informatics Association*, 12(5), 505-516.

- Polit, D. F., & Hungler, B. P. (1998). *Study guide to accompany nursing research: Principles and methods*. Lippincott Williams & Wilkins.
- Protti, D., & Bowden, T. (2010). Electronic medical record adoption in New Zealand primary care physician offices. *Commonwealth Fund*, 96, 1-13.
- Randeree, E. (2007). Exploring physician adoption of EMRs: a multi-case analysis. *Journal of medical systems*, 31(6), 489-496.
- Rogers, E. (1983). *Diffusion of Innovations*. New York, NY: Free Press.
- Rothstein, M. A. (2010). The Hippocratic bargain and health information technology. *The Journal of Law, Medicine & Ethics*, 38(1), 7-13.
- Sahin, I. (2006). Detailed review of Rogers' diffusion of innovations theory and educational technology-related studies based on Rogers' theory. *TOJET: The Turkish Online Journal of Educational Technology*, 5(2).
- Schoen, C., Osborn, R., Squires, D., Doty, M., Rasmussen, P., Pierson, R., & Applebaum, S. (2012). A survey of primary care doctors in ten countries shows progress in use of health information technology, less in other areas. *Health Affairs*, 31(12), 2805-2816.
- Shachak, A., Hadas-Dayagi, M., Ziv, A., & Reis, S. (2009). Primary care physicians' use of an electronic medical record system: a cognitive task analysis. *Journal of general internal medicine*, 24(3), 341-348.
- Simon, C. J., Wolcott, J., & Hogan, P. (2009). Can We Reduce Health Care Spending?
- Simon, S. R., Kaushal, R., Cleary, P. D., Jenter, C. A., Volk, L. A., Orav, E. J., ... & Bates, D. W. (2007). Physicians and electronic health records: a statewide survey. *Archives of Internal Medicine*, 167(5), 507-512.
- Simon, S. R., Kaushal, R., Cleary, P. D., Jenter, C. A., Volk, L. A., Poon, E. G., ... & Bates, D. W. (2007). Correlates of electronic health record adoption in office practices: a statewide survey. *Journal of the American Medical Informatics Association*, 14(1), 110-117.
- Sujansky, W. V. (1998). The benefits and challenges of an electronic medical record: much more than a "word-processed" patient chart. *Western Journal of Medicine*, 169(3), 176.
- Vishwanath, A., & Scamurra, S. D. (2007). Barriers to the adoption of electronic health records: using concept mapping to develop a comprehensive empirical model. *Health Informatics Journal*, 13(2), 119-134.
- Walter, Z., & Lopez, M. S. (2008). Physician acceptance of information technologies: Role of perceived threat to professional autonomy. *Decision Support Systems*, 46(1), 206-215.

Wolf, D. M., Greenhouse, P. K., Diamond, J. N., Fera, W., & McCORMICK, D. L. (2006).

Community hospital successfully implements eRecord and CPOE. *Computers Informatics Nursing*, 24(6), 307-316.

Yamamoto, L. G., & Khan, A. N. (2006). Challenges of electronic medical record

implementation in the emergency department. *Pediatric emergency care*, 22(3), 184-191.



## Appendix A: Introduction Letter



Strathmore Business School

Monday, 20<sup>th</sup> July 2015

To whom it may concern,

### **RE: FACILITATION OF RESEARCH – EVERLYNE SUMBI**

This is to introduce Ms. Everlyne Sumbi, admission number 83162 who is an MBA student at Strathmore Business School. As part of the SBS MBA Program, Everlyne is expected to do applied research and to undertake a project. This is in partial fulfillment of the requirements of the Master of Business Administration in Healthcare Management. The outcome would be of immediate benefit to the organizations she is researching on. To this effect, she would like to request for appropriate data from your organization.

Everlyne is undertaking a research paper on **Investigating Challenges to Electronic Medical Record Systems adoption – A case of Coast General Hospital**. The information obtained from your organization shall be treated confidentially and shall be used for academic purposes only.

Our MBA seeks to establish links with industry, and one of these ways is by directing our research to areas that would be of direct usefulness to industry. We would be glad to share our findings with you after the research, and we trust that you will find them of great interest and of value to your organization.

We very much appreciate your support and we shall be willing to provide any further information if required.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'Gilbert Kokwaro', enclosed in a light blue oval.

Prof. Gilbert Kokwaro

**Director, Institute of Healthcare  
Management and Academic Director, MBA  
in Healthcare Management**



**Strathmore**  
UNIVERSITY

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## Appendix B: IRB Ethics Clearance Letter



**Strathmore**  
UNIVERSITY

22<sup>nd</sup> October 2015

**Dr. Everlyne M. Sumbi**  
Institute of Health Care Management  
Strathmore Business School  
P.O BOX 598757-00200  
Nairobi, Kenya.

Email: [emsumbi@gmail.com](mailto:emsumbi@gmail.com)

MBA-HCM/83162/14

Dear Dr. Sumbi,

**REF: SU-IRB 0013/15 PROTOCOL "AN INVESTIGATION OF CHALLENGES FACING OPTIMAL UTILIZATION OF ELECTRONIC MEDICAL RECORDS (EMR) IN A LEVEL 5 HOSPITAL - A CASE OF COAST PROVINCE GENERAL HOSPITAL, MOMBASA COUNTY, KENYA"**

Thank you for submitting the proposal to the Strathmore University Institutional Review Board.

The committee has reviewed your application for the above referenced proposal. Your study does not pose any serious ethical concerns thus the IRB has granted you approval.

This approval is valid for one year beginning 22<sup>nd</sup> October 2015 until 21<sup>st</sup> October 2016.

In case the study extends beyond one year, you are required to seek an extension of the Ethics approval prior to this expiry.

Sincerely,

A handwritten signature in blue ink that reads "Amina Salim".

Amina Salim  
**Regulatory Affairs Fellow**

CC: DR. JAMES WANJAGI

Ole Sangale Rd, Madaraka Estate P O Box 59857-00200, Nairobi, Kenya Tel +254 (0)703 034000/200/300  
Fax +254 (0)20 6007498 Email [admissions@strathmore.edu](mailto:admissions@strathmore.edu) [www.strathmore.edu](http://www.strathmore.edu)

## **Appendix C: Consent Form**

Investigating Challenges to adoption of Electronic Medical Record systems,-A case of Coast General Hospital, Mombasa.

### **SECTION 1: INFORMATION SHEET-HEALTH PERSONNEL**

Investigator: Everlyne Sumbi

**Institutional affiliation:** Coast General Hospital

### **SECTION 2: INFORMATION SHEET-THE STUDY 2.1: Why is this study being carried out?**

Information from this study will inform the management on how to overcome the challenges and enhance adoption of Electronic Medical Records (EMR) in Coast Province General Hospital and other Level 5 Hospitals.

#### **: Do I have to take part?**

No. Taking part in this study is entirely optional and the decision rests only with you. If you decide to take part, you will be asked to complete a questionnaire .You are free to decline to take part in the study from this study at anytime without giving any reasons.

#### **: Who is eligible to take part in this study?**

People working at Coast Province General Hospital  
People working at Coast Province General Hospital who give informed consent

#### **: Who is not eligible to take part in this study?**

People working at Coast Province General Hospital, but have declined to give informed consent  
People not working at Coast Province General Hospital

#### **: What will taking part in this study involve for me?**

You will be approached at the point of work and requested to take part in the study. If you are satisfied that you fully understand the goals behind this study, you will be asked to sign the informed consent form (this form) and then taken through a questionnaire to complete.

#### **: Are there any risks or dangers in taking part in this study?**

There are no risks in taking part in this study. All the information you provide will be treated as confidential and will not be used in any way to penalize or victimize you.

**: Are there any benefits of taking part in this study?**

The information will be used to improve utilization of EMR, and will also benefit Coast Level 5 Hospital and other public hospitals.

**: What will happen to me if I refuse to take part in this study?**

Participation in this study is entirely voluntary. Even if you decide to take part at first but later change your mind, you are free to withdraw at any time without explanation.

**: Who will have access to my information during this research?**

All research records will be stored in securely locked cabinets. That information may be transcribed into our database but this will be sufficiently encrypted and password protected. Only the people who are closely concerned with this study will have access to your information. All your information will be kept confidential.

**: Who can I contact in case I have further questions?**

You can contact me, Everlyne Sumbi, at the Coast Province General Hospital, or by e-mail (emsumbi@gmail.com), or by phone (0715097169). You can also contact my supervisor, Dr. James Wanjagi, at the Strathmore Business School, Nairobi, or by e-mail (jwanjagi@strathmore.edu).

I, \_\_\_\_\_, have had the study explained to me. I have understood all that I have read and have had explained to me and had my questions answered satisfactorily. I understand that I can change my mind at any stage.

Please tick the boxes that apply to you;

**Participation in the research study**

I AGREE to take part in this research

I DO NOT AGREE to take part in this research

**Storage of information on the completed questionnaire**

I AGREE to have my completed questionnaire stored for future data analysis

I DO NOT AGREE to have my completed questionnaire stored for future data analysis

**Participant's**

**Signature: Date:**

*DD /MM / YEAR*

**Participant's**

**Name: Time: \_\_\_\_\_ / \_\_\_\_\_**

*(Please print name)*

*HR / MN*

I, \_\_\_\_\_ (Name of person taking consent) certify that I have followed the SOP for this study and have explained the study information to the study participant named above, and that she has understood the nature and the purpose of the study and consents to the participation in the study. He/ She has been given opportunity to ask questions which have been answered satisfactorily.

**Investigator's**

**Signature: Date:**

*DD /MM / YEAR*

**Investigator's**

**Name: Time: \_\_\_\_\_ / \_\_\_\_\_**

*(Please print name)*

*HR / MN*

## Appendix D: Questionnaire

### SECTION A: DEMOGRAPHIC INFORMATION

#### 1. OCCUPATION: Tick Appropriately (√)

A. Doctor	<input type="checkbox"/>
B. Health Records Officer	<input type="checkbox"/>
C. Nurse	<input type="checkbox"/>
D. Pharmacist	<input type="checkbox"/>
E. Lab Technologist	<input type="checkbox"/>
F. Administrative staff	<input type="checkbox"/>

#### 2. AGE BRACKET: Tick Appropriately (√)

A. 18-35 Years	<input type="checkbox"/>
B. 36-43 Years	<input type="checkbox"/>
C. 44-51 Years	<input type="checkbox"/>
D. 52-60 Years	<input type="checkbox"/>

**3. LENGTH OF SERVICE: Tick Appropriately (√)**

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

**SECTION B: EMR USAGE LEVELS**

1. I use an Electronic medical record in the course of my work YES  NO

**SECTION C: RESEARCH PARAMETERS**

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

**1 Financial Challenges**

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

B. High ongoing costs affect EMR systems adoption					
C. Uncertainty over return on investment affects EMR adoption					
D. Inadequate financial resources affect EMR Systems adoption					

## 2. 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					

### 3. 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					

### 4. Change Process challenges

	1-SD	2-D	3-U	4-A	5-SA
A. Lack of support from organizational culture affects EMR systems adoption					
B. Lack of incentives for users affects EMR systems adoption					
C. Lack of stakeholder involvement affects EMR systems adoption					
D. Lack of leadership/champions affects EMR systems adoption					

## SECTION D: RECOMMENDATIONS

List FIVE recommendations on how EMR systems adoption can be enhanced at Coast Province General Hospital

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