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GBS 800: RESEARCH THESIS

Research Topic: The Impact of Electronic Health Records Management in Provisions of Health Care at Mansa General Hospital in Luapula Province-Zambia

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DECLARATION

This thesis depicts my own work, not aided by anyone. The thesis is submitted for the Degree of Master of Project Management in the Directorate of Distance Education and Open Learning at the Copperbelt University, Kitwe. The thesis has not been submitted at any University or for any degree for examination.

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Dr. Reuben Lembani

DEDICATION

I wish to dedicate this thesis to my family, particularly my wife Dr. Nancy and my children Nathalie and Loreto. I also dedicate this thesis to my supervisor Dr. NilanjanaKumari for providing the necessary guidance when writing this thesis.

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CHAPTER ONE

1. INTRODUCTION

1.0 Overview

Zambia as a country in 2022 detected 58,616 Tuberculosis (TB) patients out of which 50% to 80% of these patients were estimated to be infected with the Human Immune Virus (HIV) (Ministry of Health, 2022). To halt the impact and spread of the combined morbidity of TB/HIV, the country has been integrating TB and HIV activities over the last few years (USAID, 2022). Activities integrated include; referring HIV positive clients, providing voluntary counselling and testing HIV services to TB patients, offering HIV testing and counselling services in ART to all TB/HIV patients; cotrimoxazole provision to HIV clients; screening for TB for people living with HIV (PLHIV) and vice versa (Ambareen, 2020). According to Kasonka (2022) Ministry of Health (MOH) coordinates HIV/TB activities through routine supervision, issuing of guidelines and coordinating meetings at all levels; national, provincial, district and health facility levels. These meetings facilitates joint planning, identification of gaps and sharing of roles between stakeholders and MOH (WHO, 2020). The need for proper patient records and information management in HIV/TB is another key element usually discussed in meetings between MOH and the stakeholders (Kasonka, 2022).

Several systematic reviews conducted have indicated that Electronic Health Records (EHRs) with improved functionalities have potential to significantly contribute to improving care processes and reducing errors with medication, patient satisfaction and patient engagement (Cardlogix, 2017). The adoption of health information technologies contributes adequately to enhancing safety in information management, improving data quality and reducing health care costs (Ambareen, 2020). Furthermore, Mwanahamuntu (2019) argued that improved evidence-based information management is key in improving health care delivery with potential for increased minimization in patient's errors. Additionally, Ambareen (2020) indicated that fostering adoption of information management technology in form of EHR is key in pursuit of improved patient care. Further, it is argued that EHR information systems contributes to innovations in health

that improves efficient, safe, effective, equitable, patient centred and timely health care delivery (Ludwick and Doucette, 2019).

1. 2. Background of the study

SmartCare is one of the EHR management systems, which has been running in Zambia (HMIS, 2020). This portable integrated EHR system (SmartCare) has been deployed in Zambia, South Africa and Ethiopia (Makasa, 2019). The UNDP Report (2014) states that the largest EHR system which was developed in Africa by Africans was specifically designed during a protracted transition to cater for environments with power that is unreliable and with little or no telecommunications (Ambareen, 2019).

SmartCare normally uses an interface of graphics that is touch screen in nature called Graphical User Interface (GUI) to enable data entry by, multiple data entry and minimize learning curves (HMIS, 2019). This is then copied to smart cards for permanent ownership of data by clinicians (Makasa, 2019). Furthermore, longitudinal record-keeping for variety health verticals is supported in SmartCare including; TB care, antenatal care and HIV/AIDS treatment (UNDP, 2014). In addition, Ambareen (2020) stated that touch screen interaction provides off-line data synchronization providing for clinical decision and data portability through smart cards support (MOH, 2019). Another vital and cost effective EHR system ideal in information management and promoting health care delivery is the Health Management Information System (HMIS) (Ibid). The HMIS system uses a catalogue that provides complex data access that promotes efficiency in health care data management (HMIS, 2020).

Some components of this EHR system therefore include the following: One click HMIS and PEPFAR generated report; rider circuit and merged capabilities for national, provincial, and district datasets. Other datasets are; portable health records, paediatric HIV modules patient dashboard, secure Smart Cards and pharmacy drug dispensation modules which buy into EHR for improved patient care (http://www.smartcare.org.zm/).

The Institute of Medicine report (2019) indicates that imperfect and insufficient patient's records or data at the point of care contributes to medical errors. Furnishing physicians with adequate and thorough patient clinical data including medical history of patients, medical tests, physician see which are provided for in EHR systems, enables physicians to make better decisions on patient care especially HIV positive patients ultimately contributing to better health outcomes (MOH, 2019).

According to Wulsin and Dougherty (2018) SmartCare as a form of EHR has potential to contribute to unique and timely identification and tracking of patients. Ambareen (2019) added that functional EHR is the cornerstone of confidentiality and security of medical data for the patients. Dephillips (2007) noted that using EHR controls transmission and storage of patients' data resulting in improved health outcomes for the patients. The use of EHR contributes to respect for patients' legal and ethical rights ultimately strengthening privacy and improved health care outcomes (HMIS, 2019).

Reports from UNICEF (2019) indicates that EHR promotes security in transfer of information for patients to the end points of communication. This was amplified by Makasa (2019) who stated that using standard terminology, institutional information at the point of care is universally generated, understood, and issues of validity, reliability and accuracy are dealt with. Furthermore, Carayon (2007) argues that EHR systems provides better decision making on healthcare practitioners in delivery of quality health services. According to Ambareen (2019) provision of better information for clinicians through improved EHR enhances patient confidentiality, privacy, healthcare planning, and treatment decisions. Dephillips (2007) added that problems associated with coding of procedures and disease burden at the point of care through improved clinical documentation using EHR contributes to better health outcomes. Carayon (2007) also added that mortality and morbidity statistics with improved EHR in place eliminates problems of filing and missing sheets. Furthermore, storage challenges associated with paper medical records is reduced through the use of EHR ultimately increasing efficiency with decreased costs in the long-run (HMIS, 2019).

Zambia with many other countries worldwide in 2001 implemented and adopted EHR system in healthcare provision considering the critical importance of patient records in primary health care (MOH, 2019). According to Mwanahamuntu (2019) before, 2001, the country maintained records on paper which were often cumbersome, incomplete and not used fully for decision-making purposes (HMIS, 2019). Above all, health care workers were expected to report manually, a process, which was not only laborious but time consuming as well (Makasa, 2019).

Vital Wave Consulting Report (2019) re-affirmed that EHR in Zambia were introduced in Zambia at a time HIV prevalence was at 15.6% in 2001. The government took decisive action to raise awareness against the pandemic and opted to introduce EHR to improve health outcomes (ibid). The Government allocated 10% of the 2002 budget to respond to the epidemic by declaring HIV/AIDS a national emergency (MOH, 2019). In 2004 PEPFAR funding of 81.6 million dollars was donated to Zambia and part of the funds were used to introduce an EHR (PEPFAR, 2019). The introduction of EHR was to ensure proper management of patient health records bearing in mind that if patients ART is not closely monitored the chances of developing resistance to medication are very high (MOH, 2019). UNICEF (2019) added that EHR are critical engines to effective HIV response as they enhance continuity of health care providing patients with updated portable health records (Vital Wave Consulting, 2019). The cornerstone of proper healthcare delivery system is proper management of patient information or records brought about by EHR (UNDP, 2014). Therefore, SmartCare as a form of EHR is the basis of this study particularly its impact in enhancing provisions of health care to patients at Mansa General Hospital (MGH).

1. 3. Problem Statement:

The provision of an effective and efficient health care to the citizenry is affected by various challenges of which one of them is management of patients' records (UNICEF, 2019). As argued by Murutha (2011), doctors and nurses usually struggle to render effective and timely health services to the citizens due to ineffective EHR management systems. Poor EHR management leads to errors in patient care as health care workers

treat patients with inadequate information about the background of the patient (Ambareen, 2019).

According to Ministry of Health (2019) Zambia realised the importance of managing patient's records especially those on TB and HIV treatment by adopting EHR. According to the Zambia E-Health Strategy (2013), observed fragmentation in implementation and maintenance of EHR despite significant investment into information systems. Makasa (2019) added that limited human resource, insufficient infrastructure development, lack of an E-Health Strategy and insufficiently developed infrastructure are contributing factors that envisioned this study. Furthermore, little research has been done on the impact of EHR in provisions of healthcare in Zambia (Mwanahamuntu, 2019). It is from this background that a study of this magnitude was envisaged to assess the impact of electronic health records in the provision of health care to HIV positive patients at Mansa General Hospital of Luapula Province in Zambia

1.4 Aim and scope of the study

To assess the impact of EHR management particularly SmartCare in the provision of primary health care at Mansa General Hospital of Luapula Province in Zambia

1. 5. Research Questions

1. How are electronic records used and managed at hospital level?

2. What challenges are faced in using Electronic Medical Health Records?

3. How would the use of E-health records management be encouraged and improved in promoting primary healthcare?

4. How the use of E-health records has fostered an efficient management of records and provision of healthcare?

1. 6. Research Objectives

1. To analyze how electronic records are used in provisions of healthcare at hospital level

2. To establish challenges faced in use of EHR at hospital level.

3. To determine how the use of E-health records management can be encouraged and improved in promoting provisions of healthcare at the hospital.

4.   To assess how use of E-health records can foster an efficient management of records and provision of health care.

1. 6.1 Research Hypothesis

- ▪ H0 Null hypothesis- There is no significant impact of electronic health records management on the provisions of healthcare to patients at Mansa General Hospital in Luapula Province- Zambia
- ▪ H1 Altenative hypothesis- There is significant impact of electronic health records management on the provisions of healthcare to patients at Mansa General Hospital in Luapula Province- Zambia

1. 7 Significance of the Study

The study provided insights on usage of EHR management systems in management of patients. Secondly, the study unearthed the role played by EHR in ensuring efficient health care to Zambians thereby providing direction for policy improvements. Findings of this study will significantly contribute to the existing body of knowledge for future research, policy and practice in the field of EHR management and for management of patients.

1. 7.1 Operational Definitions:

Record: A written legal or printed work official in nature used as evidence or proof (Mon, 2004; Amatayakul, 2004).

Electronic Health Records (EHR): these are patient texts, charts, spreadsheets, databases, documents, and graphics in machine-readable forms. (Government of Zambia, 2006).

Electronic Medical Records (EMR): are records that provide patients demographics, medical history, intolerance, allergies and lab test histories for management and decision support. (Hill, 2007).

E-Health Records: refers to aggregated, longitudinal, patient-oriented systems that assemble patient health information (Ludwick and Doucette, 2009).

Primary health care: refers to first point contact of a person with the health system resulting in health care family practice of daily needs (Ludwick and Doucette, 2009).

1. ## 7.2 Theoretical Framework:

The unified theory of acceptance and use of technology (UTAUT) was adopted to guide this research. This theory was developed by Vankatesh et al, (2003) based on the model of information technology and social cognitive theory (Taiwo and Downe, 2013). Four constructs including social influence, effort expectancy, performance expectancy are direct determinants of information management and behavioural management (Venkatesh et al., 2003). The theory postulated that EHR are powerful vehicles that drive patient desired outcomes especially management of HIV positive patients (ibid). Another theory that guided this research was the Theory of Reasoned Action (TRA) developed through mapping, reviews and integration of EHR in patient care and improved health outcomes (Murutha, 2011). The theory also concluded that proper management of patient's information using EHR improves patient care with desired outcomes. The third theory that guided the research is the Technology Acceptance Model (TAM). This model states that a personal computer utilization improves delivery of timely, efficient and efficacious delivery of quality health outcomes (Thong and Xu, 2012). The three theories have one thing in common that is they stress the importance of social influence using technology as a prime vehicle of leading to better health outcomes (Taiwo and Downe, 2013; Williams et al, 2013; Venkatesh, Thong and Xu, 2012). The three theories were therefore used in this study to assess the impact of electronic health records in the provision of health care to patients at Mansa General Hospital in Luapula Province of Zambia.

CHAPTER TWO

2. LITERATURE REVIEW:

2.0 Conceptual Framework

This chapterreviewed literature and provided more insights on studies conducted on the impact of EHR in providing health care to patients at Mansa General Hospital. Literature review builds on logical framework and covers studies on EHR in a logical and thorough manner with reference to the purpose and impact of records management in providing health care particularly to patients (Taiwo and Downe, 2013).

Several studies have been done on EHR in improving health outcomes for patients in different countries (HMIS, 2019). According to Campbell (2011) EHR can improve overall adherence to clinical guidelines, shorten length of hospitals stay, clinical documentation and completeness. In a study conducted by Ambareen (2019) it was argued that when compared to paper-based medical records, EHR have proven to be reliable, efficient, cost effective and contribute significantly to avoiding dirt that come with papers. Another study by Makasa (2019) suggests that EHRs are closely linked with better quality of care for the patients. Therefore, this study provided more insights on the role and impact of EHR on provisions of healthcare to patients.

According to Campbell (2011) potential for EHR in improving coordination and quality of care is widely acknowledged. Ambareen (2019) argues that evidence based guidelines for treatment and disease detection propelled by EHR leads to coordination of care and better adherence to patient guidelines and improved medication. In addition, Dephillips (2007) added that the basis for health care development and quality that ensures effective and safe communication in provision of health care is through a Comprehensive Electronic Health Record System (CEHRS). The Health & Medicine report (2006) states that automation and streamlining of workflow in healthcare increases safety, improved reporting and evidence based decision support.

To illustrate this, Aouma (2012) argues that the EHR allows patients and physicians to interact, view medical history, view test results and send electronic prescriptions to pharmacies. Ambareen (2019) further argues that EHR reduce risks associated with reading bad handwritings that leads to medical errors and can compromise administering wrong medicines to patients. Schloeffel (2016) added that EHR also provides physicians guidelines and checks and generate printed summaries for patients in what is termed decision support.

According to Aouma (2012) EHR provides patient safety and improve quality for health care in organizations. Schloeffel (2016) argues that what is needed is to provide relevant, accessible, comprehensive, reliable and timely patient information to each member of the healthcare team, whether in secondary or primary care.

According to Armijo and Werner (2009) EHRs are the tools that doctors and nurses view, enter and share information required in delivery of quality health care. Presentation of patient information in either electronic or paper form has impact on clinical decision making (Marchionini and Wildemuth, 2007). Furthermore, Aouma (2012) states that effective EHR actualizes clinical knowledge and decision making. Schloeffel (2016) further argues that inconsistent and incomplete information when combined affects decision making in clinical practice, which can be avoided using EHR.

According to UNICEF (2019) improvements in health outcomes and increased efficiency of health systems has advantages associated with EHR. Dephillips (2007) added that EHR particularly SmartCare can help mitigate problems of patients on antiretroviral therapy lost to follow-ups. Aouma (2012) indicated that in Peru, almost 40% of the lost to follow-up problem for HIV patients was reduced through the use of EHR. This shows that cost effectiveness is enhanced and more efficient utilization of health services is amplified (Ambareen, 2019). In Cambodia, a consulting email based service reduced complaints from patient's side through the introduction of an EHR (Dephillips, 2007).

Doolan et al., (2003) indicates clinical processes and problems associated with information technology are solved with a reliable and efficient EHR system in place. Achieving acceptance of EHR rather than predicting benefits in the future is cardinal in addressing physician's immediate needs and contributes significantly to better health outcomes of the patients. For continued medical feedback, continued use of EHR is key in improving outcomes of patients (ZAMPHIA, 2021).

Hoffman and Podgurski (2008) argue that EHRs are ideal in promoting effective medical practices through improved clinical data for research. The benefits can only be actualised with widespread EHR in place that can be used as avenues to share information (Guthrie, 2001). Another advantage of EHR is that these records can connect to other medical records and can therefore reduce pressure associated with time, which is common in paper-based records (Aouma, 2012).

8.2 Empirical Literature

Campbell et al (2011) conducted a study on impact of Health Information Technology on Work Process and Patient Care in Labour and Delivery. The study concluded that EHR improves patient safety and patient care in fast paced hospitals. Another study by Dephillips (2007) evaluated the impact of EHR on clinical workflow in specialised hospitals and concluded that after the introduction of EHR, patient activities needing care increased from 12.0 to 15.4, while computer activities increased from 1.9 to 8.5 (ibid). The study also concluded that there was an increase in patient care activities upon introduction of EHR (Campbell, 2011)

Carayon et al (2007) in a small family clinic examined the implementation of an EHR. The study concluded that EHR implementation changed time spent on patients by physicians (Hill, 2007). Furthermore, clinical staff attitude significantly changed with improved work culture on patient management (Carayon, 2007).

Zurovac, Dale and Kovac (2012) conducted a study on perception of EHR and the impact on quality health care. The study concluded that primary health care practices

improved significantly with EHR in place. Furthermore, EHR in the study were said to have a positive impact on quality of health care, data security and improving confidentiality

Williams and Boren (2008) also conducted a study and investigated the role medical records play in health care delivery in developing countries. The study concluded that EHR help improve health care quality particularly when dealing with HIV positive patients. Another systematic review examined benefits of EHR on HIV positive patient's treatment outcomes (Hill, 2007). It was concluded in the study that EHR have potential to enhance medical care practice including positive contributions to better health outcomes (UNDP, 2014). The study had shown that EHR are feasible in improving better health outcomes for the patients.

Gill et al (2011) carried out a study to assess impact of EHR on clinical decisions and concluded that these systems have potential to support adherence to guidelines for the patients. Another study by Boyer et. al (2008) evaluated interest health care workers take in quality improvement and quality assurance of EHR and concluded that physicians unlike nurses considered EHR in medical prognosis as cardinal in improving quality of care for patients with a strong emphasis on HIV positive patients (UNDP, 2014). Furthermore, EHR have significant impact on completeness and efficiency in patient management (Gill, 2011).

Matheson et al (2012) in Haiti conducted a study to describe use of iSanté, Haiti's national HIV treatment and care EHR system. The study concluded that there is potential associated with EHR in improving clinical practice and efficient data reporting, population health and quality improvement of health services. (UNDP, 2014). The study further indicated successes associated with improved perceptions of data quality, timely reporting and accuracy (UNICEF, 2019).

CHAPTER THREE

3. RESEARCH METHODOLOGY

3.0 Description of the study

The methodology used in this study was explained together with paradigms and design of the research, sampling procedure, data collection instruments, sampling methods as well as instruments are discussed in this chapter. This resonates with Ngulube (2005) who argues that the research procedure is all about the sampling method, population, data processing, instrumentations and treatment of statistics which are necessary components because without these, there would be no research. The research combined both quantitative and qualitative methods known as mixed methods (Carneiro and Howard, 2011). The mixed method has the advantages of improving the quality of the research by minimising biases, limitations and weaknesses. This is because a disadvantage of one method can be closed easily by another advantage and vice versa (Johnson and Christensen 2004; Matveev 2002; Creswell 2003).

The rationale for using the qualitative research methodology is that it explores quality of information in form of descriptions, narratives and explanations (Ngulube, 2005). The qualitative research method gave participants an opportunity to give their thoughts, interpretations and understanding by describing and explaining the situation in their environment (Carneiro and Howard, 2011). It concentrated much on the context of what is studied to provide an understanding of the political, social, psychological, economic and cultural condition of the environment under the study (Anderson and Arsenault, 1998).

The quantitative research method on the other hand as argued by Murutha (2011) explores and measures the situation basing on statistical information such as how many people supported or did not support certain issues or statements and interpret the

results. According to Blanche, Durrheim and Painter (2006:138) "data are basic material with research work that comes from observation and can take a form of number (numeric or quantitative data) or language (qualitative data)".

3.1. Study Population

The population of this study consisted 500 health workers from Mansa district health facilities and Mansa General Hospital. The sample size was calculated using the Centers for Disease Control and Prevention (CDC) EPINFO version. This   population included Doctors, Nurses, Medical Licentiates and Clinical Officers, using EHR. The sample size was determined by a 95% confidence level; an 80% power level can detect true differences in the study at 483. After adding 5% contingency for missing data and multivariate data analysis, the sample size attained was 500 (483 + 17).

The hospital, clinics and health facilities targeted were those installed with the electronic health records management systems and are then linked to Information Management office at the district, which links to the Luapula Provincial Health Office (LPHO, 2020). The selected units and health personnel working in the hospital or clinics were relevant because they use patient files and/or records and interact with the system on a daily basis to discharge their duties (MGH, 2019). The population was drawn from Luapula Provincial Health Office (LPHO)SmartCare server (HMIS, 2022).

11. Sample size and Sampling Procedure

Simple random sampling was used to select respondents from the list of health personnel using electronic records as provided by LPHO using the formulae n = N/(1+N(e)2 (LPHO, 2020). To ensure that best and quality information was selected the study employed purposive sampling method to select health personnel that could have been omitted from the first sample (Marutha, 2011). Using this method enabled the researcher to purposively target a group of people believed to be reliable for the study. According to Donald and Kombo (2006), the power of purposive sampling lies in

selecting information rich cases for in-depth analysis related to the central issues studied.

12. Data Collection Methods

In this research, both primary and secondary data was used (Carneiro and Howard, 2011). Primary data, which is first hand information, was collected using data collecting instruments (questionnaires) consisting both open ended and closed ended questions from the respondents sampled from within the research area (Murutha, 2011). Structured interviews were also used to collect information from respondents to collect in-depth data (Donald and Kombo, 2006). Secondary sources of information included various sources such as journals, internet data which was collected, analysed and presented by various scholars in textbooks, newspapers, information from health related journal and articles (Murutha, 2011).

12.1 Pilot-Testing

Piloting and validating research questionnaires is without doubt an important undertaking in research (Hill, 2007). Bryman (2004) argues that questionnaire testing is vital in the identification of problems for both participants and researchers with respect to question wording and content; and visual design. In addition Gray (2004) stresses the importance of piloting by suggesting that all the content of the questionnaire should be taken into account when piloting a questionnaire.   For the purpose of this study, the questionnaire was tested using 20 health professionals that share similar characteristics and work with the E-records just like the targeted respondents, who filled the questionnaire and answered the interview questions and made suggestions that helped improve the quality of the questions (Hill, 2007). Adjustments were therefore made before administering the questionnaire to the target group (Murutha, 2011).

13. Data Analysis

The analysis of Data for this research was done using computer software called Statistical Package for the Social Sciences (SPSS) (Carneiro and Howard, 2011). The reason for using SPSS was because it offers a comprehensive solution for reporting,

modelling and analysis of data (Murutha, 2011). The software is user friendly in the sense that it can automatically convert data into statistical charts,graphs, percentages, tables and draw correlations to determine tendencies in response patterns (Hill, 2007). Moreover, SPSS is also systematic and accurate in analysing data (ibid). Qualitative analysis involved sorting qualitative data into categories of responses using thematic analysis (Murutha, 2011). Qualitative data analysis as argued by Hatch (2002) implies interrogating and organizing data in ways that allow researchers see and identify themes, patterns, make interpretations and draw explanations. This usually involves mind work as intellectual capabilities of researchers are employed (ibid). Therefore, qualitative data was sorted out into categories of responses, interpretations and conclusions were drawn thereafter through thematic analysis(Carneiro and Howard, 2011).

14.1 Reliability of the study

Reliability refers to how consistently a method measures something. If the result was consistently achieved using the same procedures under the same circumstances, the measurement is considered reliable (Middleton, 2019). A preliminary designed questionnaire is attached at the end of this document. In order to establish the reliability of the study, a pilot study was conducted first at MGH. The administering of the questionnaire in itself enhanced validity of the study.

14.2. Validity

Validity is an expression of the degree to which a test can measure what it was intended to measure. In its purest sense, validity refers to how well a scientific test or piece of research actually measures what it sets out to or how well it reflects the reality it claims to represent (Duke et al., 2020)). Therefore, the validity of the instrument were evaluated. For maximizing validity, questions were designed in the way of reaching the understanding of the participants.

15. Ethical Consideration

The purpose of the interview was described to the interviewees and was done with their consent with responses used in the context of this research (Hill, 2007). To ensure privacy, interviews were conducted in a place selected by respondents (Murutha, 2011). Consequently, the information obtained during interviews and observations was used with proper care (ibid). During data analysis, anonymity of the interviewees was maintained (Carneiro and Howard, 2011).The study involved human participants to generate data, therefore, deliberate measures to avoid causing harm were put in place. Ethical clearance was sent to Copperbelt University for approval. Respondents signed consent forms, but before this, information sheets were given to the respondent to read. Participants were made aware that data to be collected was to be stored in a secure place (Peterson, 2004)

CHAPTER FOUR

16. RESULTS

The study revealed that 75% of health care providers indicated that EHR have potential to improve provision of health care services and health care systems at Mansa General Hospital (MGH). However, 15% of the respondents believed that EHR only impact on provision of health care services to an insignificant extent while 5% of the respondents had out rightly indicated that EHR have no impact on improving the existing health systems particularly provisions of health services. The other 5% had no opinion on whether EHR can lead to an improvement in provisions of health care services and this suggested little interest in the issue of electronization of health care on the part of some health care providers at MGH as shown below.

Provision of healthcare services

- potential to improve healthcare
- Insignificant impact of EHR
- No impact of EHR
- No opinion on impact of EHR
- Total
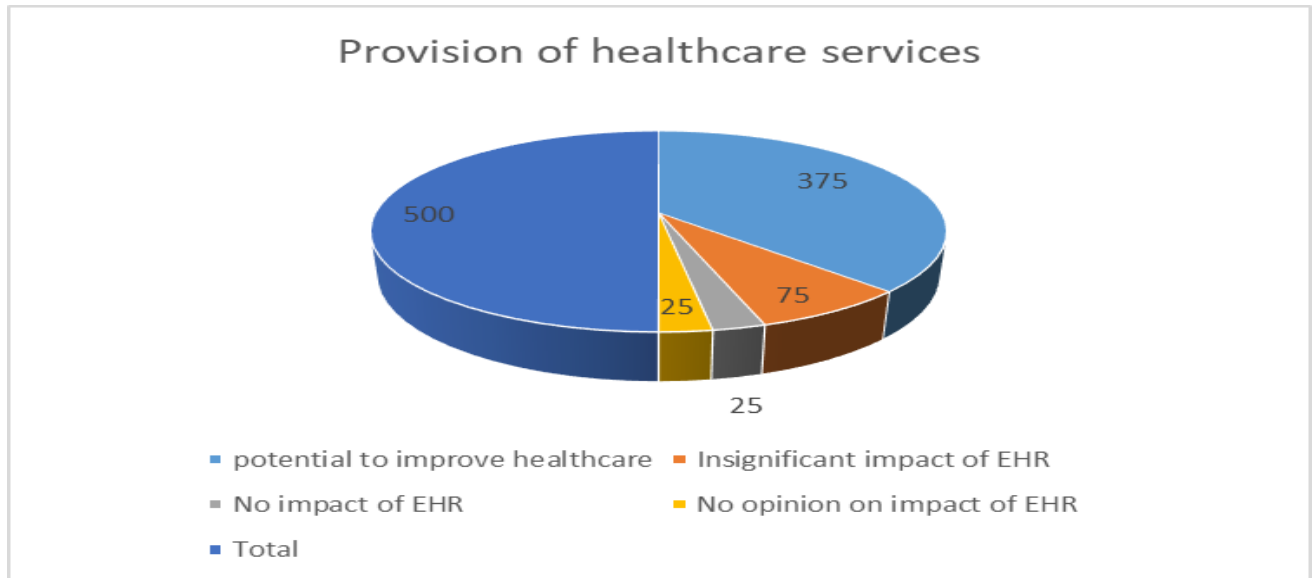
The study had shown that the implementation of EHR is bound to benefiting greatly the Ministry of Health in Luapula Province as stated by 65% of the respondents. National Health Insurance Management Authority (NHIMA) as pointed out by 20.42% of the respondents followed this. The other beneficiaries pointed out by respondents were health care providers such as doctors and nurses represented by 9.36% of the responses. Private hospitals and insurance companies as beneficiaries were indicated by only 2.23% and 1.68% of respondents respectively. Only a few respondents suggested that Zambia Revenue Authority charged with tax collections will profit from EHR as represented by 1.31% of the respondents. This is shown in the pie chart below

Benefits in provisions of healthcare
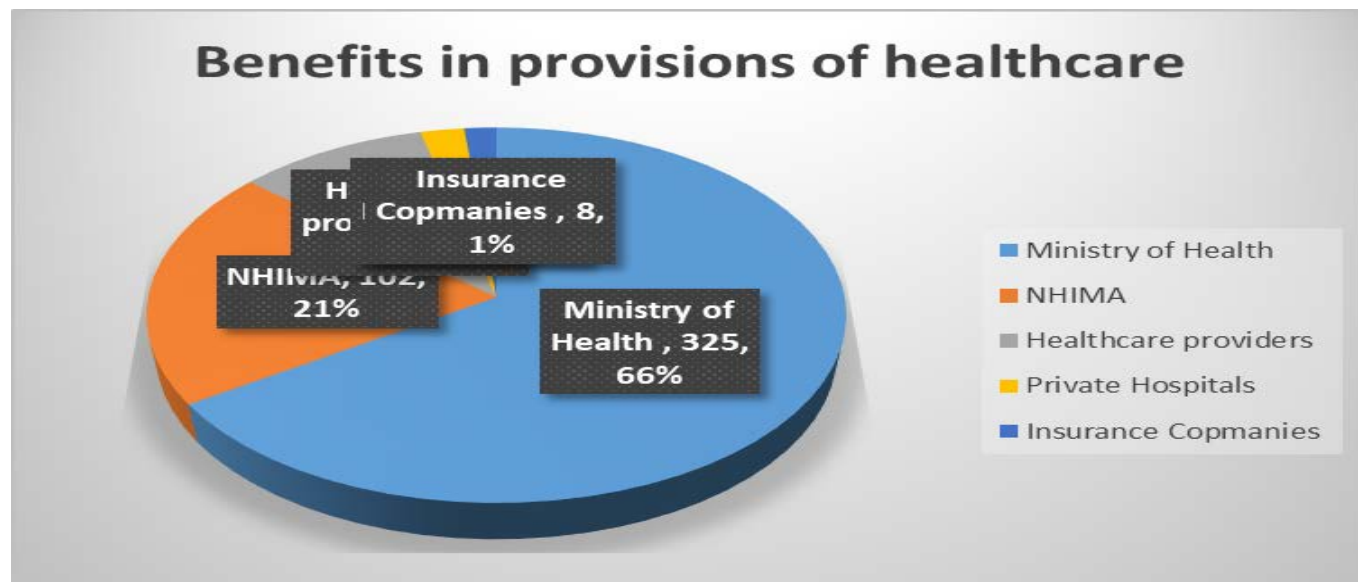
Respondents highlighted huge costs associated with implementation of EHR in provisions of health care services as a very serious obstacle as evidenced from SmartCare already in place at MGH. About 60% of the respondents indicated that this was a very big challenge as shown in (Table 1). The costs tied to implementation of EHR included the following; training of health care providers (15%), protection of medical data from unauthorized access (10%), internet connectivity challenges (8%), bidding for IT providers (5%), time pressure in relation to implementation (3%).

Table 1

Costs associated with implementation of EHR	# of respondents	% responses
Provisions of healthcare	300	60%
Training HCP challenges	75	15%
Protection of medical data	50	10%
Internet connectivity challenges	40	8%
Bidding for IT providers	25	5%
Time pressure	15	3%

Regarding the question of challenges associated with implementation of EHR in provisions of health care services, respondents were given a chance to express their

views about the entire process. Health care providers had shown dissatisfaction with processes associated with obtaining of user rights in the Ministry of Health as presented by 40% of the respondents. The frequent changes in legal provisions werenot positively viewed by health care providers, represented by 30% of the respondents. In addition, respondents indicated that legal provisions despite various legislative changes, medical documentation particularly EHR have not been succinctly defined, as stated by 20% of the respondents. Furthermore, 5% of the respondents pointed out that EHR apply to a lesser extent in provisions of health care services in patient homes and this information is not sufficiently known. The remaining 5% stated that capturing data in EHR in an ideal situation is difficult especially during patient examinations.

Table 2

Challenges of implementing EHR in provisions of Healthcare	# of respondents	% respondents
Dissatisfaction with user rights	200	40%
Frequent changes in legal provisions	150	30%
Medical documentation not defined	100	20%
Insufficient information in patient homes	25	5%
Data capturing	25	5%

The other challenge identified by respondents associated with EHR implementation was IT connectivity difficulties. The Zambian ICT market is characterized as slow and does not accommodate many users at a time. Therefore, choosing a provider to address these IT connectivity challenges may prove to be difficult and impossible to a greater extent. This was indicted by 45% of the respondents, while the other 35% of the respondents in group discussions even pointed out that IT connectivity challenges even pose a threat of software constant upgrades ultimately translating into additional costs. The other respondents represented by 20% stated that internet security is bound to compromise and this is a very serious challenge associated with implementation of EHR in provisions of health care services.

Table 3

Challenges of implementing EHR in relation to IT	# of	% respondents

connectivity	responses	
Slow ICT market with limited bandwidth challenges	225	45%
software constant upgrade challenges	175	35%
Internet security challenges	100	20%

Another challenge identified was lack of interest and unwillingness by staff like doctors, nurses and other employees in managing EHR in provisions of health services. This implementation difficulty was cited to impact EHR to a lesser extent and 30.12% of the respondents after thorough thematic analysis pointed to this challenge. The other challenge stated was infrastructure in facilities with smaller rooms to accommodate more computers and 28.64% of the respondents mentioned this as a very big problem. Respondents also indicated that when patients request for generation of paper based copies, EHR in provisions of health care services may apply to a lesser extent and 21.22% respondents stated this. It is worth noting that 18.10% respondents also indicated that EHR may extend time needed for visits and can lead to more patient waiting time leading to reduction in overall number of patients seen in a day and lowering the quality in provisions of healthcare services. The study also revealed that EHR will double works at MGH as using paper documentation is inevitable when providing health care services to patients as expressed by 1.92% of respondents.

Table 4

Other cross-cutting challenges of implementing EHR	# of respondents	% respondents
Lack of interest and unwillingness by staff	151	30.12%
Lack/Inadequate Infrastructure	143	28.64%
Request for paper-based copies by patients	106	21.22%
Extended time for visits	91	18.10%
Double works at the hospital	10	1.92%

Health care providers also gave positive opinions on the impact of EHR in provisions of healthcare services in their responses. Healthcare providers at MGH indicated that

implementation of EHR at the hospital is a very good development. It is worth stating that 59.71% of the respondents clearly indicated that EHR in provisions of healthcare services is an avenue for better communication between patients and healthcare providers ultimately improving provisions of health care services. Another 15.11% of the respondents stated that transferring medical information through the system is easy, faster and cost-effective. Some of the respondents (13.27% and 11.91%) respectively indicated that EHR will raise awareness of physicians on cost effectiveness of treatment making it possible for physicians to have full information on patient's history, making it possible for authorities to use information for EHR in decision making.

Table 5

Positive impact of EHR in provisions of healthcare	# of respondents	% respondents
Better communication for patients and providers	299	59.71%
Easy, faster and cost-effective information transfer	76	15.11%
Raising awareness on treatment cost-effectiveness	66	13.27%
Information use for decision making	60	11.91%

The other positive aspect respondents pointed out was impact of EHR on provisions of healthcare services at MGH was the aspect of efficiency and effectiveness. This was attributed by 91% of the respondents who believed that EHR are vital in improving quality of health services especially that Zambia as a country was phasing out use of paper-based approach to electronization. The study had shown that EHR is powerful engine in promoting quality of health services, affordability and is a cost-effective mechanism in ensuring cost-effectiveness in provision of health care services. The other 9% of the respondents believed that by implementing EHR, MGH is bound to doing the right thing, at the right time and in the right place eventually yielding positive results without compromise on quality.

Table 6

Positive impact of EHR based on efficiency and effectiveness	# of respondents	% respondents
Affordability, cost-effective/efficient mechanisms	455	91%
Quality improvement	45	9%

The study assessed all the 287 referring facilities in the province and the study had shown that 207 facilities were already using EHR and referring to MGH while 80 health facilities were at the stage of implementing EHR. The study had shown that, significant improvement was noticed with introduction of EHR in timely reporting, patient feedback and attending to clients as opposed to paper-based documentation in provisions of healthcare services. Therefore, all respondents concluded that EHR in provisions of healthcare services at MGH is an efficient and cost-effective way ideal in attending to clients at MGH.

Table 7

Positive impact of EHR based on timely reporting and feedback for facilities referring to the hospital	# of referring facilities	% referring facilities
Timely reporting	207	72%
Patient feedback	80	28%

The study used a chi-squared test of independence, and had shown positive impact of EHR in provisions of healthcare services at MGH ($chi^2=45.64$; $p=3*10–9$, $\alpha=0.05$). Respondents at MGH stated that use of EHR is far much better than paper based format in capturing patient related data and the best avenue in provisions of quality healthcare. However, respondents had stated that what is needed is enough time to orient healthcare workers on the benefits associated with use of EHR at MGH

Table 8

Implementation of E H R compared to papar-					

Implementation of E H R stages vs paper-based stages	Use by entreprises	use by independent public healthcare	Research Institute	private hospitals	Total
based					
preparation stage	122	32	23	33	210
Implementation stage	70	21	7	10	108
Post-Implementation stage	81	13	7	19	120
Total	273	66	37	62	438

The study had also shown that what is usually kept in electronic format includes patients admission books where background information of patients is entered. The study had shown that 88.12% of patients history is kept in EHR but it was unfortunate to note that medical certificates and electronic referrals at MGH are not issued. This makes it difficult to identify lost to follow-up patients particularly under TB and HIV and calls for urgent attention. The study also touched on time the patient or client is attended to as a way of systems strengthening and impact associated with EHR. The study had shown that there was statistical significance between systems strengthening and impact of EHR as represented by (chi^2=22.16; p=3.6*103 , α=0.05).

The study had evaluated implementation of EHR at MGH in line with experiences encountered thus far and no correlation was shown (chi^2=12.70 p=0.11, α=0.05). another parameter analyzed was impact of EHR in provisions of healthcare services in relation to health facilities using EHR and referring to MGH and a positive association was found represented by (chi^2=22.18; p=3.5*103 α=0.05). Respondents had indicated that EHR are positive avenues in improving health service delivery between the referring and receiving facility compounded by improved referral feedback.

CHAPTER FIVE

5.0 DISCUSSION

SmartCare is a form EHR developed and implemented by Ministry of Health in Zambia were all key performance indicators in provisions of healthcare services are embedded.

A study conducted by SMART-Zambia in 2018 revealed that over 50% of tertiary hospitals in Zambia including MGH were implementing EHR using SmartCare whose impact was positively viewed. Concerning medical patient information recording and information management administratively, the Ministry of Health (MOH) was ranked as the best countrywide. The study had revealed that introduction of EHR by MOH contributed significantly to improvements in EHR tele-monitoring and electronic prescriptions, improved information exchange and medical data safety (SMART-Zambia, 2018).   This resonates well with findings of this study, which indicated that EHR are powerful tools in provisions of healthcare services at MGH as the following subsequent details depict:

This study had shown that EHR have potential to contribute to an improvement in delivery of healthcare services at MGH and met stipulated national standards by going beyond the 50% threshold. Findings of this study clearly shows that EHR are powerful mechanisms in healthcare provisions. The study clearly shows that implementation of electronic health record is vital in improving patient safety, improved communication for patients and healthcare providers and that EHR are engines for faster, easy and cost-effective information transfer. The study had also shown positive impact of EHR in provisions of healthcare services based on quality: the three quality related benefits of EHR included increased adherence to guideline-based care, enhancing monitoring and surveillance and that EHR lead to a reduction in medical errors. The study also revealed that EHR are powerful engines in utilization of healthcare services and raising awareness on treatment cost-effectiveness and efficiency. EHR also reduce barriers associated with waiting time and this is a major efficiency benefit.

A similar study conducted by the American Medical Informatics Association's College of Medical Informatics(AMIACMI), identified challenges associated with use of EHR that ought to be taken into consideration to make it possible for EHR to succeed. Identified challenges including; IT connectivity, lack of interest in using EHR by healthcare providers, challenges of user rights, information management risks. Findings of the study by AMIACMI also resonates well with some of the findings of this study. This

study revealed that much as EHR are powerful tools in provisions of healthcare, some challenges are worth taking into consideration. Some of the challenges identified by this study includes the following; the cost of implementing EHR based on healthcare provisions, training of healthcare providers, protection of medical data, internet connectivity, bidding for IT providers and time pressure. The other challenge the study had shown was dissatisfaction with user rights, frequent changes in legal provisions, medical documentation not defined, data capturing, and insufficient information in patient homes. In addition, the study had shown that slow ICT market with limited bandwidth, software upgrade challenges and internet security challenges are worth taking into consideration. Furthermore, lack of interest and unwillingness by staff, inadequate infrastructure, extended time for visits and double work at MGH are among the challenges identified. Thus, implementation of EHR in provisions of healthcare services at MGH ought not to be seen not only as a technology related endeavor, but generally as a big behavioral change endeavor, that requires also putting in place social tools appropriately.

CHAPTER SIX

6.0 CONCLUSION

The study looked at the impact of EHR management particularly SmartCarein provisions of healthcare at MGH. The study revealed some challenges worth taking into consideration towards implementation of EHR including; costs connected with informatization, difficulties in choosing the right software, user rights challenges and the pressure of time. The IT market is also worth mentioning as it faces challenges of demand from health care providers. The study also evaluated the positive impact of EHRs on patients in provisions of healthcare. It is worth noting that very few studies of this nature have been done in the context of MGH. However, significant benefits were found on impact of EHR in healthcare provisions based on bettering communication for patients and providers, easy, faster and cost-effective information transfer, raising treatment awareness, information use for decision making, quality improvement, timely reporting and improved referrals with MGH. Therefore, without appropriate legislation, clearly defined guidelines regarding informatization of individual sectors of services, it will not be possible to develop an information society in an economy-constrained hospital like MGH.

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