ADDIS ABABA UNIVERSITY
SCHOOL OF INFORMATION SCIENCE

AND

SCHOOL OF PUBLIC HEALTH
DEPARTMENT OF HEALTH INFORMATICS

ASSESSMENT OFTHE CURRENT PAPER BASED MEDICAL RECORD SYSTEM AT MULTI-DRUG RESISTANCE TUBERCULOSIS DEPARTMENT IN SAINT PETER HOSPITAL FOR INTRODUCING ELECTRONIC MEDICAL RECORD SYSTEM.

BY: ZENEBECH MELAKU

May, 2014
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SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES OF ADDIS ABABA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN HEALTH INFORMATICS

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_____	External Examiner	_____	_____
_____	External Examiner	_____	_____

DEDICATION

This work is dedicated to my beloved mother Askale Tesema who wanted to see changes in my life but could not see ,my beloved father Melaku Mekonen ,my brothers Zewede Melaku,Tekele Melaku and my sister Hiwot Melaku.

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ACRONYMS

BSC	Balanced Score Card
BPR	Business Process Re-engineering
CDC	Center for Disease Control
CDS	Clinical Decision Support
CEO	Chief Executive Officer
CPOE	Computerized Physician Order Entry
EHR	Electronic Health Recorder
E MR	Electronic Medical Record
FMOH	Federal Ministry of Health
LOS	length of staying
GIS	Geographical Information systems
HI	Health Information
MDR-TB	Multi Drug Resistance- Tuberculosis
HMIS	Health Management Information System
HIFIS	Health Integrated Financial Information System
HIS	Health Information system
HIT	Health Information Technology
ICT	Information and communication Technology
IT	Information Technology
MDR	Multi Drug Resistance

MRU	Medical Record Unit
VCT	Voluntary Counseling and Testing
V/S	Vital Sign
TB	Tuberculosis Bacillus
WBS	Work Breakdown Structure

ABSTRACT

Introduction: Health care is one of the critical components of basic social services that have a direct linkage to the growth and development of a country as well as to the wellbeing of society. In response to this, the Federal Ministry of Health, supported by its technical partners, is involved in a number of ICT projects and services. And one of these projects is electronic medical record (EMR) which is computerized medical information systems that collect, store and display patient information. It is a means to create legible and organized recordings and to access clinical information about individual patients. As the medical recorded system of Ethiopia had been entangled with a number of problems, this study tried to assess the problem of paper based medical record for introducing EMR at MDR TB department in St. Peter hospital.

Objective: the general objective of this study is assessment of the current paper based medical record for introducing EMR at MDR TB department in St. Peter Hospital.

Methodology: Across-section study design with quantitative and qualitative methods of collecting data was conducted at MDR TB department in St. Peter TB Hospital from April/2014 to May/2014. All the 27 health professionals (physicians ,nurses and health officers) staff working in the MDR department including head of laboratory, pharmacy, imaging, MDRTB department and head nurse of the department were selected purposive sampling technique was utilized for the selection. Moreover, all the 182 MDR TB patients were included in the study. Self administered questionnaires, Interviews and observation techniques were utilized SPSS version 20 was utilized to analyze quantitative data, frequency and percentages were used to describe the study population.

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Findings: gaps or problems identified in the paper based medical record system were illegibility, incompleteness, redundancy of data, difficulty in accessing data, inefficient communication system with different departments about patient issues, and shortage of storage space, digital x-ray machine shortage of computer and misplacing of patient card.

Conclusion and Recommendations: Most of the problems identified with the paper based medical system at MDR-TB are typical of those problems faced in any paper based system. Therefore, Introduction of EMR would help to reduce problems associated with legibility, completeness, redundancy and other problems and foster good communication of patient data among the departments. Moreover, it would relieve storage space problems. The Hospital plans to adopt Smart care developed by Tulane University. But it would be important to analyze the actual situation in the department and study the software so as to make it adaptable.

CHAPTER ONE

INTRODUCTION

1.1. Background

Most medical records are still paper-based, which means it is difficult to be used to properly and consistently coordinate care, routinely measure quality in hospitals, or reduce medical errors due to challenges with storage and difficulties to easily access or retrieve information when its needed Consumers of health care generally lack the information they need about costs or quality to make informed decisions about their health care (1).

Health care is one of the major components of basic social services that have a direct linkage to the growth and development of a country as well as to the wellbeing of society. In response to this, the Federal Ministry of Health, supported by its technical partners, is involved in a number of ICT projects and services. And one of these projects is electronic medical record (EMR) which is computerized medical information systems that collect, store and display patient information. It is a means to create legible and organized recordings and to access clinical information about individual patients (2).

Information and communication Technology (ICT) is a key area for improving health care service delivery, promoting easier information exchange, assisting in decision making processes, and improving the effectiveness of operations. Governments and organizations around the world are mainstreaming ICT as a tool in all sectors of activities. In this regard, organizations need to invest a lot of resources to use ICT as a supportive tool for the effective and efficient delivery of services. ICT is a cross cutting area which supports all function and operation areas by facilitating the automation of various processes. The Ministry of Health (MOH) has recognized the benefits of Information and Communication Technology (ICT) as a tool to support the health sector by its promotion of HMIS, EMR, GIS, Health Net and other ICT related endeavors.

The Electronic Medical Record (EMR) is a computerized patient tracking and patient caring system. In health informatics, the benefits of using an EMR includes increasing the quality and speed of access to Health Information and the effectiveness of the Health System (3).It also improves workflow efficiency, eliminates medical errors, improves patient qatisfaction improves faculty/staff satisfaction, improves community image, improves patient safety and the quality of care for patients, standardizes patient care pelivery process and enables Instant access to Information (4).

1.2. EMR System in Ethiopia

The desires to have efficient health information technology (HIT) systems have defined the need for Electronic Medical Record (EMR) system in Ethiopia. EMR system could improve the process of data collection resulting in better quality and more reliable health information. The Federal Ministry of Health, supported by its technical partners, is involved in a number of ICT projects and services which could improve the quality of care for patients and decision support systems.

In Ethiopia, the implementation of EMR is made through software called Smarcare . Tulane University's technical assistance program for Ethiopia (TUTAPE) is developing the SmartCare software in partnership with Tulane University, CDC and Federal Ministry of Health. Ethiopia thus adopted Smart Care as the preferred EMR application, since 2010 (2).

SmartCare gained recognition as the Electronic Health System Application for Ethiopia followed by a presentation and live demo of the customized SmartCare EMR. The presentation was to the FMOH officials including Ministers, State Minister, Department/Agency Heads, Regional Health Bureau Heads, and other relevant stake holders. 28Ministry of Health decided SmartCare to be an official EMR System in Ethiopia is for the reasons that it provides simultaneous remote access to patient data, legibility of records, safer and confidential patient data, flexible data layout, integrated

information from other sources, interconnected electronic data, continuous data processing, greater range of data output modalities, tailored paper output, and up to date data (5).

St. Peter TB specialized hospital was established in 1963 G.C. At that time, it was entitled as demonstration and training and sanatorium. Based on an assessment done in 2008, it was upgraded to a full service delivery hospital.The hospital is serving as a Centre of Excellence for the management of MDR-TB patients in the country starting from February 2009.Currently all activities in this hospital are still paper based. But now, it is planned that the hospitals will introduce EMR system in the near future. The strategic plan also include for Saint Peter TB Specialized hospital.

MDR-TB is a form of TB that is resistant to the two main first line drugs ,Isoniazid and Rifampicin which are more expensive and requires careful and often prolonged treatment and care. Drug-resistant TB (DR-TB) is all too often a risk of death for many given the in-adequate access to treatment, including for people living with HIV where TB is responsible for one in four HIV-related deaths, but it does not have to be this way there is a means to cure it. There are 440,000 new cases of MDR-TB each year, with almost 80,000 cases occurring in Europe, and only around 15 % of people have access to diagnosis and treatment. The cost difference to treat these resistant strains is staggering, not to mention the difficulty in obtaining and administering medicines for up to two years, many of which have extreme and toxic side effects for the patient (6).

Treatment success rate of cases with MDR-TB laboratory-confirmed that MDR-TB can be successfully treated. With an appropriate and timely treatment with second line anti-TB drugs, MDR-TB is curable. However, treatment of MDR-TB requires strict adherence to treatment (7).

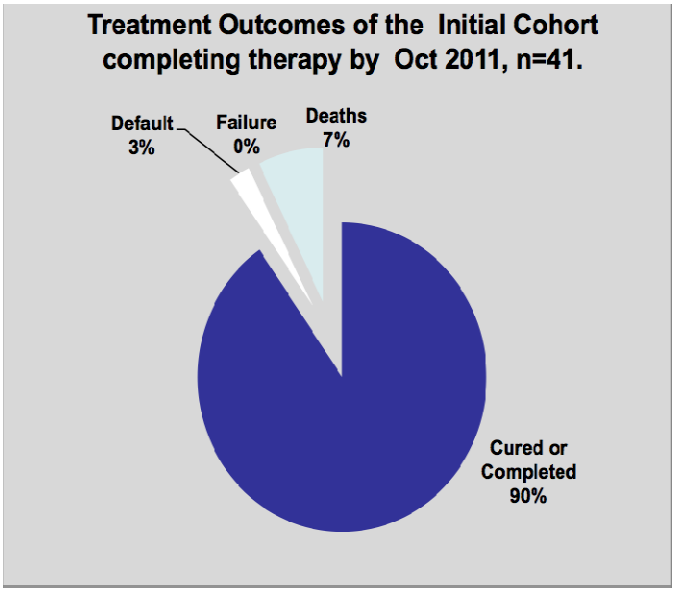

Figure 1. A Successful Model for MDR-TB treatment[1]

1.3. Statement of the problem

Electronic systems of personal health information offer many benefits to practitioners and patients. In general, paper-based records are incomplete, spread over a range of health-care provider locations, and difficult to locate and read. There is high data burden, poor privacy and security mechanism, with highest vulnerability of files to damage and lost, difficulty to analyze and integrate. Patients go around all the departments to collect and provide information, to get services, while they are not strong enough to do so, struggling with their illness.

While this is true to all medical facilities, it is more difficult for the MDR-TB positive patients. It is known that the MDR-TB department is one of the healthcare or medical service providing departments in hospitals. The status of MDR-TB in the Ethiopia shows that it ranks in the top 7 among the 22 highest TB-burdened countries, and 15th among the 27 highest MDR-TB-burdened

[1] Source: PC-765-29: A Successful Model for MDR-TB treatment and Scale-up in Ethiopia with a community-based program, presented at the 41stIUATLD Conference, Lille, France, October 2011

countries in the world. There are 129,000 new TB cases per year. Moreover, the percentage of MDR-TB was 1.6% and 11.8% among new and re-treatment cases respectively (8).

Because of the above mentioned situations, the FMOH has established independent MDR-TB hospital, that is St. Peter TB specialized hospital. This hospital renders nationwide MDR-TB services, which is becoming most challenging health issue in the world, specifically in developing countries such as Ethiopia. The MDR-TB curative and prevention services have inherent challenges and difficulties, like high allergy cases, high disease reoccurrence or relapse possibilities, drug dose burden due to repeated seat in certain medications and strict follow up need, and treatment failure. All these need special data documentation, regular data analysis and integration for emergent decision making. Allergic reactions and treatment failures desire frequent documentation and integration of data and inter-professional communication so that to minimize the burden of transmission and case fatality. Hence EMR is in more need than other services in the Hospital.

Therefore, in light of the discussions made above, the very sensitive nature of the task, MDR-TB requires a more efficient medical record management system and this can be served best by introducing EMR. However, before embarking on the actual introduction of the technology, through assessment of the actual situation on the ground is crucial. Therefore, it is with this sense that this study was conducted.

1.4. Objective of the project

1.4.1 General Objective

The general objective of this study is to assess current paper based medical record system at MDR-TB department in St. Peter Hospital in order to introduce EMR system.

1.4.2 Specific objective

The specific objectives of this project were

- assessing issues related to record completeness, consistency, legibility and storage ,and investigate status of patient data communication across departments
- To assess patient's satisfaction of health care services provided by MDR TB department in Saint Peter hospital .
- To determine the proportion of health care workers who had training on EMR at MDR TB department.
- To recommend ways of approaching the introduction of EMR at MDR TB department.

1.5. Significance of the project

The Information Technology is very important nowadays because it has much potential which make our life easier. The effects of IT are increasingly recognized as an important tool for improving patient safety and quality of care, especially by promoting the practice of evidence-based medicine (9). Of all the health information technology (IT) in current use, the Electronic Medical Record (EMR) has the most wide-ranging capabilities and thus the greatest potential for improving quality.

Research in this filed has shown The Electronic Medical Record (EMR) is an enabling technology that allows physicians to apply and practice more effective quality improvement programs than possible with paper-based records. On the financial side quality improvement through EMR use is not cheap and also not easy (10). however, experience and literature highly recommend that the benefits of applying ICT in healthcare record management outweighs the difficulties it imposes in form of costs.

According to Aniza Ismail,Ahmed Toufik, et al an electronic record requires less space and fewer administrative resources. It supports improved clinical decision-making leading to more effective

diagnosis and treatment, greater patient safety, increased efficiency and improved access to services. With electronic records of personal health information, there is the potential for automating, structuring and streamlining clinical workflow and integrating a wide range of discrete health-care services including decision support, patient monitoring, electronic prescribing, electronic referrals, radiology, laboratory ordering and results display. Electronic health information systems can also provide a data trail that can be readily used for the purposes of medical audit, health research, quality assurance, epidemiological monitoring and disease surveillance (11).

Experience and literature shows that failure of ICT projects is highly related to the failure of conducting extensive study on gaps related to existing systems so as to produce detailed specifications on what a new system should accomplish. This research would help the hospital's MDR-TB department to identify its problems in a concrete way and provide it with much needed specifications and guidelines for introducing EMR.

1.6. Scope

The MDR department and the MRU of the MDR were the sections that were covered by the project work.

1.7. Limitation

- This study is limited to only MDR TB department due to time and financial constrain.

- Due to time shortage sufficient qualitative data, like group discussion, was not collected from the laboratory, pharmacy, and imaging.

- Moderating effect of variables was not done since the longitudinal study was very costly, to do by.

CHAPTER TWO

LITERATURE REVIEW

2.1 General Literature

2.1.1 Information Communication Technology

Introduction of Information and Communication Technology (ICT) is an important step to be taken by the Ministry of Health toward the establishment of the future health care system. (11) Literatures have identified the benefits that may be attributable to using electronic medical record (EMR) information and communication technology (ICT) systems (10).

As Aniza I et al, quoted that automated and interoperable healthcare information systems are anticipated that they are able to decrease the cost of health services decreasing paper work, decreasing idle work time by health professionals. (11)"Healthcare efficiency and effectiveness is becoming increasingly dependent on information and communication technologies" (12).

Now while IT can be used in theory to improve patient safety, it will fail to do so if it is poorly designed. (5)this idea was more clarified by Ibid E as to realize the full benefits of an EMR, the ICT system's functionalities should be implemented integrally (9) Health information technology (HIT) is in general increasingly viewed as the most promising tool for improving the overall quality, safety and efficiency of the health delivery system (10).

2.1.2 The Electronic Medical Record

The major goal of the medical record is to serve as a repository of the clinician's observations and analysis of the patient. "The Electronic Medical Record is a computerized patient tracking and Patient caring system". Even though EMR as considered as part of EHR but they differ in some features when EMR is used mainly to track information of patients in one area or organization. (12)

An EHRs (electronic health records) serves as a longitudinal patient information tracking system in one organization as well as different areas. (11) Aniza I Et al compared them that in general usage EMR and EHR are synonymous. Other systems as well included in the term, such as the practice management system which supports the electronic medical record. EHR is an essential technology for health care and a necessary tool for improving patient safety and the quality of care (9).

Information's Included in EMR are patient demographics, progress notes, problems, medications, vital signs, current and past medical information, immunizations, laboratory data and radiology reports. (14) EMR documents all relevant patient's information electronically during a hospital stay.(10) Also it includes business and clinical element that are used for registering a patient/client and a collection of clinical parts that support the services provided by the hospital (10).

"EMR systems promise to improve health care quality to advance inter-organizational integration and data sharing across different health care providers, and to empower patients through greater access to personal data."(12) Yung Y Et al, for example put the requirement of EMR by each stakeholder (physicians, patients, office staff, payers and administrators) that they have a different need for information and demonstration of value (15).
"In developing countries, healthcare information systems have been driven mainly by the need to report aggregate statistics for government or funding agencies." (16) Individual patient data that are collected and accessible at the point of care can support clinical management (13).Clinicians can easily access previous records, and simple tools can be incorporated to warn of potential problems such as incompatible drugs (10) .

"Many of these functions will work well on paper or with simple spreadsheets for up to 100 patients but become very time-consuming and potentially unreliable with more than 1000 records, and exceed than that" (16).

According to AOHC Project Association of Ontario recommendation conducting a detailed business and technical needs analysis including network requirements of EMR implementing centre

is main point. (13) Information gathered at this stage will be used to evaluate gaps in business processes or technology, inform the EMR implementation budget and support development of the Project Scope of Work and funding agreement among actors in the EMR implementation (17).

As per to William M, the design of the database tables and their relationships, the data model, is the core of any EMR system, but unfortunately its analysis, design, and implementation do not always receive enough attention.(18) Computerization of physician practices is increasing. Stakeholders are demanding demonstrated value for their Electronic Medical Record (EMR) implementations (15).

A study by Greta showed that a growing use of Electronic Medical Record (EMR) system in Europe and the United States has been driven by the belief that these systems can help to improve the quality of health care.(14) Most medical records are still paper-based, which means it is difficult to be used properly and consistently. Coordinate care, routinely measure quality, or reduce medical errors due to challenges with storage and difficulties to easily access or retrieve information when it’s needed (18) .

Another EMR importance are Decision support systems, particularly for drug order entry, are becoming important tools in reducing medical errors. Email is important and widely used in healthcare systems, and access to medical data including online journals is expanding. (15). Consumers of health care generally lack the information they need about costs or quality to make informed decisions about their health care (19).

"This information would easily be accessible and available with an Electronic Medical Record (EMR) system. An Electronic Medical Record is a longitudinal electronic record of patient health information generated by one or more encounters in any care delivery setting." (11) Included in this information are patient demographics, progress notes, problems, medications, vital signs, current and past medical information, immunizations, laboratory data and radiology reports (14).

According to AOHC, measuring the success of EMR provided one of the first systematic evaluations of the effect of EMR implementation on workflow and practice efficiency in health care. (19) Individual patient data that are collected and accessible at the point of care can support clinical management (18).

2.1.3 Benefits of the Electronic Medical Record (EMR)

"Using an EMR enables continuous improvement in healthcare delivery by capturing structured information, supporting interoperability across systems." (20) "From the potential benefits, Complete and accurate information; universal and timely access to a patient's lifetime health information; knowledgeable sources to direct a patient to the appropriate care and substantially fewer medical errors are some of the advantages of using EMR." (14) .

Findings on users' perception on the effectiveness and efficiency of EMR clearly indicate that users felt that the EMR is more effective and more efficient compared to paper based records.(21).It saves time, improves record keeping, increases accuracy, enhances the flow of information, improves the quality of clinical data available, and reduces paperwork (18).

The benefits of using an EMR includes, increasing the quality and speed of access to Health Information and the effectiveness of the Health System (17).An EMR system is recognized as a toolkit that enables clinical transformation becomes the source of truth for a patient's journey within hospitals and provides a framework for patient-centered healthcare delivery (14)

"The EMR may exist in a distributed database, accessible from anywhere through a networked environment or a mobile smart card that a patient carries with him/her." (11) Networked electronic medical system will facilitate staff communication with patients which look for medical advice from expert physician and also possible access patient laboratory and image data easily. (22) If, for example, as William M wrote, appropriate security measures are adopted, computerization also provides greater protection of confidential information via sophisticated keys and access controls.

(18)Additionally, the EMR system helps improve the quality of patient visit documentation and data, free up facility storage space, improve efficiency by eliminating time spent hunting down lost charts and provide immediate, simultaneous access to patient records (20).

Freeman M deduced that now while IT can be used in theory to improve patient safety, it will fail to do so if it is poorly designed, is unsuited to the clinical task at hand, or uses unnecessarily complex technology for its own sake these can all lead to increased error. Hence, it is important to evaluate whether EMR could reduce medical errors and/or overcome barriers (23).

"Key surface barriers to EMR use that emerged as persistent themes included high initial financial costs, slow and uncertain financial payoffs, and high initial physician time costs. the development of EMR systems is still an uncertain and challenging task, calling for a sensitive matching of local needs to available technologies and resources" (18).

Difficulties with technology, complementary changes and support, electronic data exchange, financial incentives, and physicians' attitudes are included with in the underlying barriers. (22).Compared to other industries, the acceptance of information technology in health care has been slow (37).

2.2 Related work

In 1995, Newton performed a study titled "The first implementation of a computerized care planning system in the UK". The implementation included both a new way of structuring work, using the nursing process and a new technology which was the use of computers. The results showed that it took more than a year after implementation until the nurses' negative attitudes towards the system shifted to positive attitudes. The study also showed a significant improvement in the quality of care planning (31).

In United States of America the implementation of computer based patient record system was begun since the early (1970s) use of computers in the health care President Bush noted: "By health records, we can avoid dangerous medical mistakes, reduce costs, and improve care".(36)

Findings by Martin K in Malawi indicated that 94% of users found the EMR system faster and much easier to use than the paper based recording system and that this enabled users to see patients in a much shorter time than before (32).

Performed a randomized controlled trial of a complete order entry system that included innovations such as displaying the cost of the test or medication. Showing a list of pending tests, and directly linking with an online drug reference manual. Those randomized to use the system were found to generate 12.7% less charges without compromise in patient care. Their patients also spent nearly one day less in the hospital. The authors estimated that implementing this system hospital-wide could save as much as $300,000.

Another site of studies documenting the benefits of the EMR has been Brigham and Women's Hospital (BWH) in Boston. Cost savings in several areas have been documented due to display of less expensive but equally efficacious alternatives. For example, the medication accounting for the largest cost of any single medication in this hospital is the drug used to control nausea in cancer chemotherapy patients. By programming the order entry system to use as a default an equally effective but less costly dose, the hospital was able to save $100,000 over a one-year period (33).

There are many potential benefits of the EMR. Unlike the paper record, it can potentially be used by anyone who needs it at any time. It can also be accessed easily from remote sites. Such as a clinic across town or even across the country. It is unlikely that data will be lost or misplaced. With an appropriate back-up mechanism, it should serve as a permanent record of an individual's interaction with the health care system. Furthermore, with the availability of the entire patient's data, new views and other summaries can be generated instantaneously. Finally, with the potential for the incorporation of reminders and decision support, the likelihood of mistakes and omissions should decrease (34).

The electronic record system used in Zambia is called Smart Care system since 2005 with the objective of improving patient care and improves health management information for improving

health services by: increasing the privacy of sensitive medical information, reducing the burden of paperwork on health clinic staffs and improving the quality of information and decision support at the patient level, with inputs into HMIS (35).

Smart care was rolled out in 2006 to each of Zambian's nine provinces and 72 districts, starting from the national level down to the health facility level. And it was chosen in 2006 as the national ART reporting standard for facilities capable of supporting computer. One of the facilities implementing Smart Care system was the Main Soko Military Hospital which implements this system in the early 2007 to streamline HIV case management (36).

Since EMR Systems are an integral part of HealthCare systems generally, the risk of incidents due to medical errors can be mitigated by correct identification of initial system requirements. Moreover, the safety aspects of EHRs can be fulfilled by: identification, system security, privacy, confidentiality, consent, disaster recovery, storage, back up, retention period, data standards, data interoperability, data integrity, medication, alerts, data entry, attributes of data quality, system quality (25).

Imagine the day when EMR systems will warn the caregiver when a patient being treated is allergic to medication prescribed, will provide the latest research on treatment modalities, and will organize volumes of information about a patient's chronic condition. When linked to the World Wide Web (e.g. via web services), EMRs can provide customized patient-related information retrieval via push technology. (26) This capability will enable access to data from anywhere in the world. EMR has the ability to generate a complete record of a clinical patient encounter as well as supporting other care-related activities directly or indirectly via interface including evidence-based decision support, quality management and outcomes reporting (27).

The implementation of an EMR to reduce preventable in-hospital complications, patient length of stay in hospital (18 to 30 percents). One study identified the reduction of errors (76 percent) in discharge summaries that could be attributable to an EMR medication management resulting in

decreased reduction of human errors in prescribing treatment reduction of errors by providing active decision support to clinicians reduction of errors in primary source data, as it is entered immediately at the point of care by the health professional, or automatically by clinical monitoring tools reduction of poor quality data from hospital services due to reporting through provision of primary source data, eliminating need for potentially adapted aggregated data Of the 153 papers reviewed, 40 papers provided identifiable benefits, of which four papers presented quantitative benefits that can be attributed to the implementation of health ICT systems. Three studies quantified benefits attributable to the implementation of clinical pathways and medication management using (10).

A qualitative study done by Aniza and et al in three hospitals to obtain views on information system revealed that. The system can work effectively and efficiently, quality human resource, good support system, user-friendly and adequate training of the end-user will determine the success of implementation of HIS (9).

In South Africa National Electronic TB Register which was a nationwide system was developed with about 200 users over nine provinces. More than 1 million patients from 2003 to 2005 are in the system, which is based on SQL Server. There are also other systems like Patient Administration and Billing (PAAB) system, Personal Assistance Digital System (PADS), a web-based patient registration and billing systems are available in the country (30). Other study which computerizes all the records about patient, staff, drug suppliers and report production of St. Francis Hospital Namibia in Uganda was carried out by IMO20-09. This study follows iterative waterfall approach to automate health information system of the hospital. It also uses data flow diagram and logical entity relationship diagram to show the data flow and relationship between entities of the system (31).

Findings on users' perception on the effectiveness and efficiency of EMR clearly indicate that users felt that the EMR is more effective and more efficient compared to paper based records. Freeman et.al in their patient and user satisfaction survey conducted in a headache specialty clinic

documented that health care computerization is promoted on the basis of its numerous benefits. It saves time, improves record keeping, increases accuracy, enhances the flow of information, improves the quality of clinical data available, and reduces paperwork (Freeman M, Taylor. A, and Adelman 2007)

Another study by Kaplan in 2001 also indicated that the introduction of Electronic Medical Records in a health care system helped to achieve efficiency mainly through the elimination of routine tasks, such as pulling paper-based charts, flipping through numerous files and papers to get patients' medical and drug history (29).

A study done by Martin K in Malawi showed that the EMR was faster and much easier to complete compared to the use of paper based records and this helped save a lot of time to concentrate on the provision of 'real' physical care to the patient. The majority of participants (97%) in his study indicated that quality of patient care improved significantly with the introduction of EMR and would prefer using EMR than paper based records (25).

Most hospitals in Malaysia are adopting information systems that provide more accurate and timely information related to patient care. In Malaysia, several hospitals have adopted the information technology (IT) tools (25). Research done in Kenya found that patients spent substantially less time waiting to consult a care provider, and their total time per visit to the Mosoriot Rural Health Centre (MRHC) was marginally shorter after implementation of the Mosoriot Medical Record System (MMRS). Health care providers (nurses and clinical officers) also spent less time with patients and had substantially more time to concentrate on physical examination and history taking than spending time filling in paper based records. It was concluded in their study that, for health care providers, the MMRS also saved time, creating a resource that the managers of the MRHC could harness for additional activities (e.g., patient education)(33)

In Kenya, the Mosoriot Medical Record System (MMRS) was developed; Patients register in the system on their arrival to the clinic and travel through the clinic with a paper visit form, in 2001. In comparison with the clinic before and after the system was implemented, there were great

improvements. Patients visits were 22% shorter, provider time per patient was reduced by 58%, patients spent 38% less time waiting in the clinic, clinic personnel spent 50% less time interacting with patients, 67% less time interacting with each other, and more time in personal activities9(32). The EHR has been adopted and used in the country with the aim of facilitating clinical data sharing, protect health information privacy and security, and quickly identify emerging public health threats. (32)

A study delivered in China in 2005 launch a web-based, case-based electronic reporting and recording system for tuberculosis (TB) information management system of the country (33). This study delivers the system with capability of holding TB patients detailed treatment data and treatment outcomes, including demographic information, clinical data and drug susceptibility testing results that are stored using Oracle database (26).

Another study by Kaplan in 2001 also indicated that the introduction of Electronic Medical Records in a health care system helped to achieve efficiency mainly through the elimination of routine tasks, such as pulling paper-based charts, flipping through numerous files and papers to get patients' medical and drug history (24). A study made in Kenya found that patients spent substantially less time waiting to consult a care provider, and their total time per visit to the Mosoriot Rural Health Centre (MRHC) was marginally shorter after implementation of the Mosoriot Medical Record System (MMRS) (29) .

The EMR called care ware was adapted from US and deployed in Uganda in 2003 to support HIV treatment.(34) In China the recording system is automated in the hospitals. Seventy percent of the hospitals in the county level or above implemented an HIS. There is also a Web-based disease surveillance system that provides real-time reports on 37 diseases across the country which was developed in 2003 (35).

In seven public health clinics where there are no roads, electricity or telephone service in Haiti, Partners in health since 1999 has run a community based HIV treatment program. (20) From total

4000 patients there was 2000 full patient record. When there is no network connection data entry were available with the help of off line EMR. It is proven to be reliable and popular with health professionals' .with almost no infrastructure and limited technical expertise the HIV-EMR demonstrate feasibility of medical records system implementation in remote areas and clinics (9).

Other developing country implementing the Electronic recording system was Malawi. In this country a Touch screen patient management information system used since 2001.Then the extensive use of this system directly by health care workers in a poor country with limited IT skills is a convincing demonstration of the potential of EMRs with user friendly data entry mechanism (34).

In Ethiopia, an action research was done to adapt the health statistical system, in Tigray region. (37) Other study related to patient record system development was a qualitative study which focuses on assessing and pointing out the problems the current recording system of the country faces. (32) According to Dr. Rosemary review Smart care Ethiopia an electronic health record system that supports longitudinal recordkeeping for a clinical care, especially for HIV/AIDS treatment, TB care, VCT, and antenatal care. The system is being rolled out nationally and provides clinical decision support and data portability via the use of smart cards. Over 100 clinics and hospitals in the Dire Dawa region, covering the entire area, have successfully deployed this system (42) .

Generally, availing quality and timely Health Information at various levels of decision points throughout the country's Health system is very essential for the improvement of Health Care and overall Health System in Ethiopia. The results of this assessment of current paper based medical record identified the problem of paper based medical record and showed recommend ways of approaching the introduction of EMR at MDR -TB department.

2.3. Electronic Medical Record in the future

With the increased incentive to document and scrutinize the delivery of medical care, the use of the EMR should continue to increase. While this article has identified many of its benefits, it has also

listed some of the drawbacks and impediments which need to be addressed for the EMR to achieve its full potential. What are the challenges to developing the effective EMR? First, the system must be beneficial to the user, the individual clinician who will be entering the data and using the results for patient care decisions. Thus, data entry must not be excessively time-consuming or otherwise difficult, while obtaining information out must be similarly fast and easy.

Clinician involvement is crucial for successful implementation of EMR's On the other hand; the system must not compromise patient confidentiality. Reasonable mechanisms must be implemented to insure patient information is not viewed by inappropriate viewers and those who breach security are appropriately punished. However, the security must not be so restrictive as to impede use of the system by clinicians. It is likely that the clinician of the future will interact heavily with computers. Not only will various processes of health care delivery become increasingly automated, but larger amounts of non-patient information, such as the medical literature, will also be accessed electronically. This future clinician will likely use a computer to enter findings and diagnoses, take advantage of links this future clinician will likely use a computer to enter findings and diagnoses, take advantage of links that connect these with decision support modules and the medical literature, and communicate with colleagues and others taking care of the patient (43).

CHAPTER THREE

METHODOLOGY

3.1 The Study Setting and Design

The study was conducted at MDR TB department in St. Peter TB Specialized Hospital .St. Peter TB Specialized Hospital was established in June 1953G.C. At that time, it was called as TB Demonstration and Training Centre and Sanatorium. It is a government hospital under the Federal Democratic Republic of Ethiopia, Ministry of Health. The Hospital is located at Entoto which is 12 Km away from the outpatient department. Based on an assessment done in 2008, it was upgraded to a full service delivery hospital. The hospital provides various services which include: Tuberculosis diagnosis and treatment and additionally Internal medicine, pediatrics, mother and child health, anti-retroviral therapy, voluntary counseling and testing, laboratory services, regular and special Pharmacy services, and admission with 200 bed capacity. It also started providing other services of which management of MDR-TB, PMTCT, and gynecology and obstetrics are the main ones recently it incorporates other services like surgery, dermatology and dentistry. The hospital has different professionals: 1 Chief Executive Officer, 1 Medical director, 1 medical director, 1 Internist, 1 Pediatrician, 1 Public Health Specialist, 1 Microbiologist, 18 physicians, 4 Health Officers, 2 Dentists, 5 Psychiatric nurses, 59 nurses, 13 Lab Technologists, 2 Laboratory technicians, 4 Pharmacists, 7 Druggists, 8 Radiographers, 5 environmental professionals, 1 occupational and safety officer, 4 midwife nurses, 210 administrative staff. The Hospital laboratory is well equipped and furnished with different instruments. The hospital is serving as a Centre of Excellence for the management of MDR-TB patients in the country starting from February 2009. The project was designed to be a cross sectional descriptive study.

3.2. Source and Study Population

3.2.1 Source of Population

The source of population of this study was employees of Saint Peter TB Specialized Hospital.

3.2 .2 Study Population

The study population include all the 27 health professionals including physicians and nurses working in the MDR department, head of laboratory, pharmacy, imaging, HMIS, MRU, head of MDR-TB department and head nurse of the department and the 182 MDR -TB patients.

3.2.3 Sample size and sampling technique

For interviewing purpose, the purposive sampling technique was used accordingly the head of laboratory, head of pharmacy, head of imaging, HMIS focal person, head of MRU, head of MDR -TB department, and head nurse of the department of MDR-TB. Since the number of health professionals in the department and the number of patients being treated in the time of research was small, all of them were included to fill in the questionnaires.

3.2.4 Quantitative Study

A total of 219 questionnaires were used to get the required sample size. Out of these, 27 questionnaires were administered to the health workers, while the remaining 192 questionnaires were distributed among patients. From the distributed questionnaires 209 were returned and ten questionnaires were discarded.

3.2.5 Qualitative Study

Qualitative method was used in addition to the quantitative technique in order to get further insight to the problem. Therefore, interviews were made with selected participants. Moreover as part of

observation, random investigation of patient's cards from OPD and MDR ward was made, in addition to that, it was attempted to see the arrangement and storage of patient records at the MRU.

3.3. Data collection tool

3.3.1 Questionnaire

The data was collected by using questionnaires to assess the statues of current paper based medical record, which consists of four main categories : assessing professional knowledge, professional attitude , professional practice and patient satisfaction. The English version of questionnaires was used for health professionals and Amharic questionnaire was used for patients Amharic questionnaires were translated to English for reporting.

The questionnaire was pre-tested prior to the actual study period. Two data collectors were selected from MDR TB since there work is related to medical record systems in the department, the data collectors were responsible to distribute the questionnaire as well as help the subjects, fill the form. The data collectors were trained on how to help the subjects while filling the questionnaires and responsible for collecting back the questionnaires that were distributed.

`3.3.2 Interview

Interview for four department heads were conducted after the questionnaire were collected and analyzed. Interviewewes were requested to give further searching about the results obtained.Challenges and prevailing situations of medical record system in those departments were addressed through the interview. The interviews were conducted face to face and were recorded and transcribed for the purpose of analysis. Investigator was doing the qualitative analysis based on the interview, literatures, personal observation and judgments.

3.3.3. Observation

Systematic observation of the MRU storage , certain patient's document, MDR TB data reporting format, visits processes checking for the structure, activities patterns of information flow working

environment, a check list was used for recording information obtained from the personal observation and requirement for EMR.

3.4. Data management and analysis

Data was checked for completeness and incompleted questionnaires were discarded. The data was analyzed using IBM SPSS Statistics version 20. Transcription of recordings and typing notes were done soon after each data collection event.The assessment of current medical record system components has been described using tables, figures and frequencies.

Qualitative data were described and explained manually. Responses of each key informant were initially categorized based on systematic issues addressed; then similar issues were merged to the selected area. Finally ,the responses of the interview were summarized.

3.5. Method of dissemination of results

The findings of the study will be communicated to all relevant organizations and bodies who can make use of the study including Addis Ababa University, Department of Public Health, Addis Ababa University, Department of Health Informatics, Ministry of Health and St .Peter TB specialized hospital in both hard and soft copies.

3.6 Definition of terms

- **Data quality**: refers to the following:
  - Reliability – data are consistent and information generated is understandable;
  - Completeness – all required data are present;
  - Legibility – data are readable;
  - Currency and timeliness – data are recorded at the time of observation;

- Accessibility – data are available to authorized persons when and where needed;

- **Efficiency** includes impacts on the level of efficiency of internal processes which the application of the electronic medical record system has produced or will produce in the future in terms of time and cost savings and quality of information

- **Effectiveness** includes impacts in terms of improvement of the organisation as a whole measured as process integration, organizational effectiveness, risk management and better care processes;

- **Quality of service** includes impacts on the overall care process, taking into account its performance, the continuity of care and the degree of empowerment of the patients

- **Electronic medical record (EMR)** is a computerized system of accessing in real time the history of a patient's care within a single practice. The content of an EMR is analogous to the paper record, but the electronic format creates usable data in medical outcome studies, improves the efficiency of care, and makes for more efficient communication among providers and easier management of health plans.

- **Satisfaction:** the degree of gratification or feeling of pleasure that comes when a need or desire is fulfilled.

3.7. Ethical Clearance

The study was carried out after getting clearance from the Ethical Clearance Committee of the Addis2 Ababa University, School of public health. Department. Data were collected after getting formal letter from in St Peter TB specialized hospital MDR TB department and informed verbal consent obtained from all study participants. Each respondent were informed about the purpose of the study and privacy during data collection. To increase confidentiality the questionnaires was self-administered. Verbal consent was obtained from the respondents before administering.

CHAPTER FOUR

RESULT AND DISCUSSION

4.1 Result

4.1.1 Characteristics of the respondents

A total of 219 questionnaires were distributed and two hundred nine were returned, the remaining 10 were discarded because of inconsistence and missed values. Total MDR TB patients under treatments were 190; out of the 190 patients 182 (95%) patients were included in the study. A Total 30of professional were working for MDR TB department of Saint Peter Hospital but 2 nurses and one health officer were didn't participated because they were away on annual leave. So out of the 30 professionals 27(90%) participated in the study. The overall response rate was 94%

As shown in Table 1, health care professionals who were working in the MDR department 21(77.8%) respondents nurse, 4(14.8%) were physician ,2(7.4%) were health officer, 182(%) MDR TB patients who were on treatment during data collection.

Participants	Frequency	Percentage
Nurse	21	77.8
Physician	4	14.8
health officer	2	7.4
MDR TB patients Participants	182	95.8
MDR TB patients participants discarded	10	4.2

Table 1 category of participants in this study at MDR TB department in St. Peter Hospital

4.1.2. The Statues of Current Paper Based Medical Record.

This dimension includes easily accessibility of medical records, the availability of friendly format and the use of appropriate technology at **MDR-TB** department.

Table 2 shows the variables on the current medical record status and result. It summarized the response of study participants on status of current medical record. Regarding the easily accessibility of medical records, 4 (14.8%) of the 27 study participants replied are strongly agree for easily accessibility of medical records, . Besides to this 9(33.3%) of the 27 study participants also agree somehow. A considerable number 14(51.9%) were disagree to ease of current medical record system at MDRTB department. Regarding the availability of friendly format to a respondents in order to analyze status of medical record, 9(33.3%) 27 of the study participants replied strongly agree and 11(40.7%) agree to this7 (25.9%) replied disagree.

Concerning the availability of that appropriate technology to data handling, only 4(14.8%) strongly agrees on its availability and 7(25.9%) respondents agreed the availability of appropriate technology. The majority of the respondents (59.2%) disagree about the availability of appropriate technology in their department. Out of 27 professional respondents 25 of them (92.6 %) believe that there is redundancy on patients' medical data records. Only 2 of them (7.4%) responded that there is no medical data record redundancy in MDR TB department.

Regarding of communication, according to the respondents, about 2 of them (7.4%) of them tried to make daily communication without modern communication tools regarding availability of drug and other patient's issue. 6 of them (22.2%) said they had communication sometimes. Most of the respondents, 19 (70.4%) said they couldn't communicate since there is no modern communication technology.

Variable	Response	Frequency	Percentage
Paper based medical record can easy of accessibility (retrievably) for the appropriate staffs.	strongly agree	4	14.8
	Agree	9	33.3
	disagree	14	51.9
The MDR TB department uses friendly formats.	Strongly Agree	9	33.4
	Agree	11	40.7
	Disagree	7	25.9
MDR-TB department uses the appropriate technology to data processing.	Strongly Agree	4	14.8
	Agree	7	25.9
	Disagree	16	59.2
Is there Record redundancy?	Yes	25	92.6
	No	1	7.4
Do you think the availability of efficacy Communication about of drugs and reagents on daily basis?	Yes	2	7.4
	Sometimes	6	22.22
	NO	19	70.38

Table 2 Status of Current Medical Record current at MDR TB department in St. Peter Hospital ,Addis Ababa, 2014.

4.1.3 Experience of Doctors, Health officers and Nurses in the current medical record system

As shown in Table 3 below, this section presents the health professionals experience with respect to The average time need for fill the format , readability and accessibility.

concerning the average time it would take to fill in a format (laboratory, imaging request and prescription), 12 out of 27 respondents of health care workers (44.4%) need 5 to15 minutes to fill

the patients health data, 4(14.8%) need 16 to 30 minutes and most of the respondents 11(40.7) were responded they need more than 30 minutes

The minimum number of respondents (18.5% of them) said they get patients information easily from other department and the majority of respondents, i.e., 22 of them (81.5%) said that they could not get the information easily. Regarding problems faced in relation to patient data, 15 out of 27 respondents (55.6%) said they faced problems such as incompleteness, retrieval delay, illegibility, missing cards, missing attachments of results with the cards and others. the rest 12(44.4%) said they rarely face such problems.

Variable	**Response**	**Frequency**	**Percentage**
Average Need of time to fill a format.	5-15 minutes	12	44.5
	16-30 minutes	4	14.8
	greater than 30 minutes	11	40.7
Is it Easy possibility to get patient health information from other department	Yes	5	18.5%
	No	22	81.5%
How often Face problem associated with patient data	Usually	15	55.6
	Rarely	12	44.4

Table 3. The Health care workers' response about current medical record system practice at MDR-department in St. Peter Hospital, Addis Ababa, 2014.

Figure 2, shows formats filling compilation and readable

Most of the professional respondents (55.5% of them) responded that they have problems regarding readability and completeness of filled formats in their department. Only 5 of them (18.5%) said the recording was going correctly and readable and the remaining 7(26.0%) responded the documents are partially readable and complete.

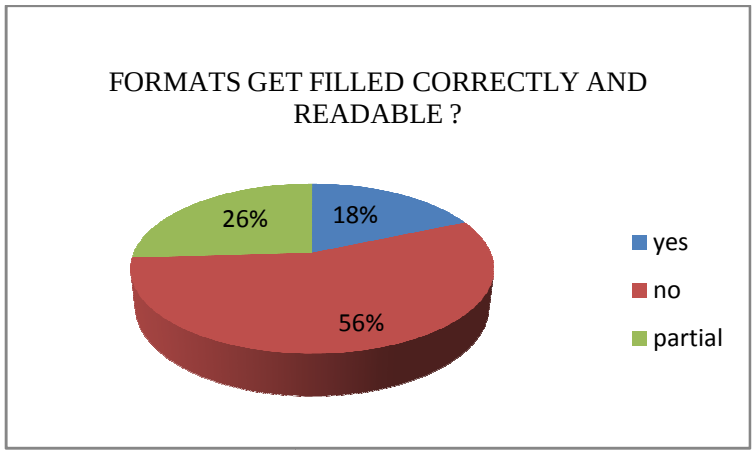

Figure 2 formats get filled correctly and readable at MDR TB department in Saint Peter Hospital, 2014

4.1.4 The attitude and knowledge of existing medical record system

Another objective of the project was to assess the opinions of professionals about the existing medical record system. Only 6 of them (22.2%) said that the current system is easy to handle, most of them (77.8%) responded that the current medical record system was time taking because MDR TB department fill a lot of forms.

About 23(85.2%) respondents said that not all of the services they provide are recorded. only 4(14.8%) said otherwise.

In relation to the respondent's knowledge of ICT and EMR, 18 respondents (66.6%) indicated they have basic computer skills. 9 of them (33.3%) had no computer skill.

As shown in the table below, 10 (37%) of health professionals at MDR TB department of Saint Peter TB specialized Hospital had introductory training on electronic medical records while the rest 17(63%) of participants had no training about EMR.

Variable	**Response**	**Frequency**	**Percentage**
Opinion about current medical recording system	Easy to handle	6	22.2
	Time Taking	21	77.8
Is there gap between the service and report with availability of data	Yes	23	85.2
	No	4	14.8
DO you believe EMR can solve problems related to data ?	Yes	26	96.3
	No	1	3.7
Do you Recommend the EMRS is implemented?	Must be	17	63.0
	Maybe	8	29.6
	Not need	2	7.4
Do have Computer skill?	Yes	18	66.6
	No	9	33.3
Did you get training to introduce EMR?	Yes	10	37.0
	No	17	63.0

Table 4. Staffs' attitude and knowledge about existing medical record system and EMR system .

Out of 27 respondents, 26 (96.3%) hope that the current medical record problems will be solved when electronic medical record is implemented in their department. One respondent did not believe

in electronic medical record system's ability to solve the problem. All health professionals working for the MDR department were asked express their opinion on the need EMR for their department..

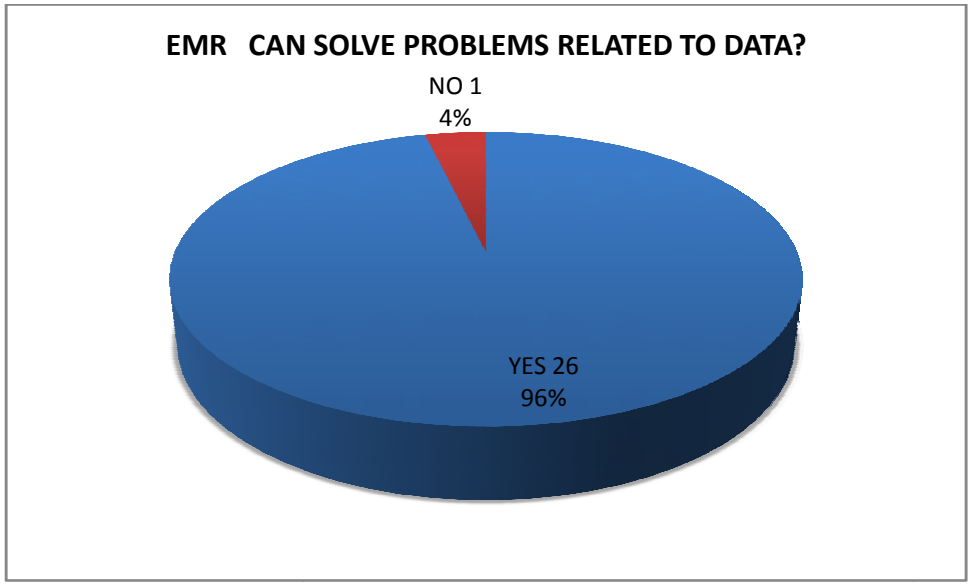

Figure 3: EMR can solve current paper based problems At MDR TB department, in Saint Peter Hospital Addis Ababa, 2014.

Most of them (63%) said the electronic medical record system must be implemented in their department while 8 of them (29.6%) said the EMR may be the solution if it is implemented in their department. The remaining 2(7.4%) believe there is no need of implementing it in the MDR department.

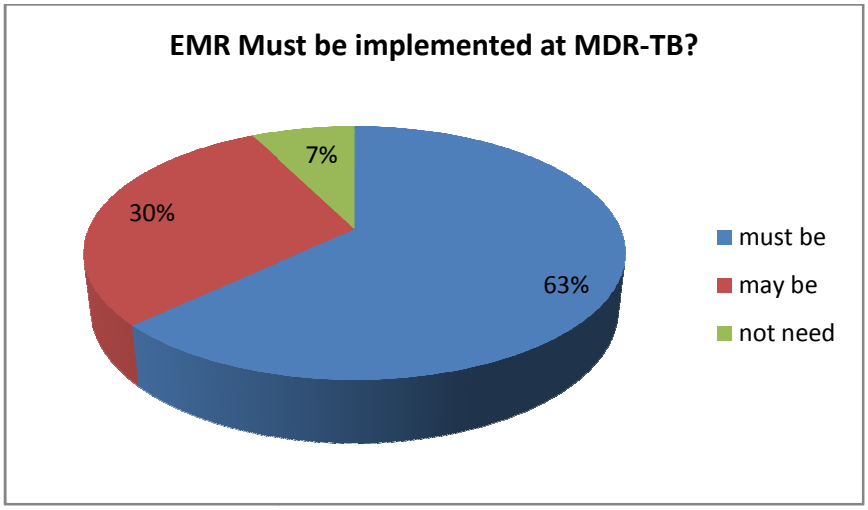

Figure 4 Pie chart presentation of respondents' recommendation of EMR to be implemented at the MDR department, in Saint Peter Hospital, Addis Ababa, 2014

4.1.5 Patient Satisfaction on treatment at MDR-TB

The dependent variable has binary responses which are satisfied and unsatisfied MDR TB patients. 182 MDR TB patients were appropriately responded. The following table 6 shows that 76(41.8%) participant patients were satisfied by the department services and the majority of them, 106(58.2), were not satisfied. This was due to many reasons, such waiting time for card retrieval for about 20 minutes and above, dalliance of laboratory results, and waiting for x-ray results for more than half a day are the main factors that made patients dissatisfied. As shown in the table 7 below, 84.1% of respondents answered that they wait for more than half a day to per one x-ray result, while 57.7% of the total respondents were disappointed by dalliance of laboratory result.

Satisfaction	**Frequency**	**Percent**
Satisfied	76	41.8
Unsatisfied	106	58.2
Total	182	95.8

Table 5 satisfaction of MDR patients. At MDR TB department, in Saint Peter Hospital Addis Ababa, 2014 Addis Ababa,201

Variable	Response	Frequency	Percentage
How long you Wait for your chart retrieval ?	5-15 minutes	50	27.5%
	11-20 minutes	59	32.4%
	Above 20 minutes	73	40.1%
Did you turn back to the doctor because of the prescription is unreadable?	Yes	54	29.7%
	No	128	70.3%
Have you lost your x-ray result ?	Yes	51	28.0%
	No	131	72.0%
How long do you Wait for x-ray result done?	1-2 hours	5	2.7%
	3 hours to half day	24	13.2%
	above Half day	153	84.1%
Have you disappointed because of the delay of laboratory results?	Yes	105	57.7%
	No	77	42.3

Table 6. Factors affecting Patients' Satisfaction. At MDR-TB Department in Saint Peter Hospital Addis Ababa, 2014.

4.1.6. Result of interviews: The opinion on current paper based medical record in pharmacy, laboratory and imaging department.

The other way of qualitative data source used was using key informants for interview which were four in number drawn from different departments in St. Peter Hospital. The informants were heads of x-ray department, pharmacy department, laboratory department, and MDR TB department.

In x-ray department head: there were many problems from x-ray department such as the x-ray machine was not automatic or digital. Without automatic machines some procedures were done

manually and caused delay in the results from x-ray a day to provide long time and patients were repeatedly required for x-ray diagnosis because of misplacement of film. There were no proper storage and x-ray film was not easily readable. In addition to this, the manual x- ray request was not readable and not completely filled. The respondent suggested that the solution would be updated technology, friendly software computerized system, and digitalized x-ray machine would be best solutions of the above problems.

Pharmacy department head: The problems in the pharmacy department were prescription's information were not complete and not readable. Because of the absence of modem communication system the pharmacies were poor communication system between the staff of MDR TB department about the availability of drugs, whether or not patients stop medication.. So if the modern communication systems were available some problems would be solved.

Laboratory department head: The main reason of need for updated technology were to minimize the illegible, incomplete paper based laboratory requests, loss of laboratory results, and communication gap between the staff MDR TB department.

MDR department head: The department head responded that patient's document were often damaged and lost. Another main problem of MDR TB department was the presence of communication gap among different departments such as laboratory, pharmacy, and imagining laboratory. Cause of the above problem , especially for the last two years, was attributed to the huge pile of documents produced on patients and their follow-ups. Moreover, unreadable prescription requests and the long time it takes to fill forms has fostered the communication gap.

4. 1.7 Result of observation

Observation of MDR TB department functional units including OPD, ward, and MRU was made. The results of the observation are detailed below.

MDR TB OPD and ward: space problem was observed with patient cards. Because of this, lots of patient cards were located on the floor .The MDR TB patients card were in separate location from other case patients card. MDR TB patient cards needed very big space to the extent that a single patient's folder is so big that by itself requires a big space. As a random observation of five patients' cards has shown, some information formats were incomplete and non-readable. Moreover, data redundancy and misplacement of patient's card were among the problems.

Shortage of computers: All functional units of MDR department didn't have any computer for any uses except data clerk office which is used only for reporting

4.2. Discussion

Automated and interoperable health care information system is important in healthcare sector. According to Aniza Ismail, Ahmod Tofick and et al(11) This institution based cross sectional study was conduct to assess challenges associated with current paper based medical records at MDR -TB department in St. Peter Hospital for introduce EMR. Which can solve problems of medical records that can affect the provision of quality health care? The study included all health professionals working in MDR TB department and all MDR TB patients who were taking treatments at that time of data collection. The response rate of the study participants was 95.4%.

The study assessed the situation in the current paper based medical records so as to find the gaps and ultimately propose a solution. Data obtained from professionals showed some gaps that exist in the current paper based medical record systems; they have also given their opinions on how to fill the gap. Regarding the easily accessibility of the medical records, 51 percent of the respondents don't think the medical records are easily accessible. 59.2 percent of them also added that there was not modern technology for data management, processing, and reporting. In addition to this, majority of respondents have cited record redundancy as other problem. The highest percent of respondents mentioned that communication gap between departments was the main cause for

physician’s gap of information about the availability of drug or reagent. as the result of this, patient's are subjected to unnecessary time and money loss. Thus, according to most of the participants, record ineligibility, incompleteness of patient data, loss of records and deterioration of records are major problems at MDR-TB.

A 2005 study published in the Journal of the American Medical Association found that clinical information is missing in the records of almost 14 percent of visits to primary care physicians.76 Missing information included laboratory results, letters, radiology results, medical history, results of physical examinations, and medications.(49)

The study also assessed the opinion of professionals about current medical recording system, computer knowhow, problem associated with currently used paper based recording systems, showed that the current medical record system was time taking. And about 18 (66.6%) of them had basic computer skill while the rest had no computer skill. Regarding the perception of availability of appropriate technology, majority of professionals did not perceive that the hospital has appropriate technology. In general, 96.3 percent respondents believed that EMR can solve these problems. 63 percent say EMRS must be implemented at the department, Majority of respondent of health care workers for MDR TB department of Saint Peter TB specialized Hospital were not trained for electronic medical record 17(63%).

A study identified the reduction of errors (76%) in discharge summaries that could be attributable to an EMR medication management resulting in decreased reduction of human errors in prescribing treatment. (10) The long time it takes to fill different forms, and the overall difficulty of managing the medical records were the main causative agents of the paper based medical record .

while another study of physicians who participated a survey reported that their use of an EMR improved health-care delivery without significantly impacting long term productivity. Improvements were noted in the following areas: Continuity of care (64 per cent); Quality of care (57 per cent); Patient safety (68 per cent); Security and privacy of patient information (40 per cent);

Productivity (46 per cent); Practice revenues (34 per cent); Ease of recording and keeping track of patient data (64 per cent) (43).

The findings on Patient Satisfaction on health care service at MDR-TB.

76(41.8%) participant patients were satisfied by the department services and the majority of them, 106(58.2), were not satisfied. This was due to many reasons, such waiting time for card retrieval for about 20 minutes and above, delay of laboratory results, and waiting for x-ray results for more than half a day are the main factors that made patients dissatisfied. As shown in the table 7 , 84.1% of respondents answered that they wait for more than half a day to per one x-ray result, while 57.7% of the total respondents were disappointed by delay of laboratory result

The qualitative data source, on the other hand, showed the following result.

This particular study indicated professional practice affected current paper based medical records, with lots of problems and miscommunications among departments. In the imaging department, the x-ray machine was not automatic or digital without automatic machines some procedures were done manually and be the cause for the patients to obtain the results after half a day or a long time and patients repeatedly require for x-ray diagnosis because lose of the film. There were no storage **(**not even one) for x-ray film stored in the hospital and x-ray film were not readable easily because of the manual process . In addition to this, the manual x- ray request were not readable and not completely filled. So the respondent suggested that the solution would be updated technology, friendly software, computerized system, and if digitalized x-ray machine it could solve problems in imaging room.

The pharmacy was another victim of the paper based system, were prescription's information were not complete and not readable and poor communication system between MDR TB departments about the availability of drugs, whether or not patients stop medication. So if the communication system available some problems would be solved. The main reason of need for updated technology

were to minimize the un readable, incomplete paper based laboratory requests, lost of laboratory results, and communication gap between MDR TB department.

Another especial reason for patient dissatisfaction was miss communication between doctors and laboratories, between doctors and pharmacies for the availability of reagents and medications. For example previously unavailable reagent or medication remains as if it is unavailable for the doctor, even if it was purchased. So the doctor could not get updated for timely availability of previously missed reagents or medication. Due to these reasons patients got perused for unnecessary expenses to get services in private health facilities before starting of MDR-TB treatment.

From site observation lot of patients' cards were located on the floor. The MDR TB patient card were in separate location from other case patients card. MDR TB patient card needed very big space and inside big folder that required more place. As a random observation of five patients' cards has shown same patient information formats did no filled completely ,not readable, data redundancy and patient's card were not easily retrieved because the cards were not arranged properly.

All functional units of MDR department didn't have any computer for any uses except data clerk office which used only for reporting.

Study done on the benefit of EMR showed that an "EMR improved health-care delivery without significantly impacting long term productivity"(43) The result will be an opportunity to continuously optimise our healthcare, significantly reduce preventable in-hospital complications and thereby achieve reduction in loss, improve patient outcomes and release value to treat more patients with the same fixed resources(12)."This was directly attributed to using the EMR"(44). another study at Indiana University Most of the documented benefits of the EMR have emerged from settings where clinicians use the system highly interactively as opposed to a passive replacement for the paper record(47),

As primary benefits for EMR systems in developing countries: The ability to get laboratory results to remote clinics in a timely fashion and the ability to track drug supplies and expected drug usage, particularly for HIV and MDR-TB. The use of EMR systems to reduce medical errors and improve quality of care is still in its infancy, but initial evaluations are promising despite the chalenges. Improvement of clinical management by physicians and other healthcare workers has the greatest potential to benefit patients(48)

CHAPTER FIVE

CONCLUSSION AND RECOMMENDATIONS

5.1 Conclusion

The main problem of pharmacy, Laboratory, and imaging were poor communication system between MDR TB departments about the availability of drugs, reagents, whether or not patients were following or stopped medication, and missing laboratory results, and communication gap between MDR TB departments. Main problems identified were data redundancy, illegibility, incompleteness, card loss, missed attachment of results, poor communication of patient data among units, shortage of computers and computer skills, shortage of storage space.

Most respondents believe that introduction of modern record management system like EMR would solve the problems. Utilization of advanced technologies such as digital x-ray machine would help in reducing the need of paper based records. Therefore in line with the EMR, this was the recommendation obtained from respondents.

Therefore, Introduction of EMR would help to eliminate problems associated with legibility, completeness, redundancy and other problems and foster good communication of patient data among the department. Moreover, it would relieve storage space problems. The hospital plans to adopt Smart car developed by Tulane University. But it would be important to analyze the actual situation in the department and study the software so as to make it adaptable.

5.2 Recommendations

Based on the research, extensive literature review made and from the opinions obtained from the respondents, the following recommendations would be important for approaching introduction of EMR at MDR-TB.

- There should be smooth communication system available among the departments, which could mainly be solved through EMR.

- All functional units of MDR department don't have any computer for any uses except data clerk office which are used only for reporting **.** more computers are needed to introduce a simple (user friendly) computerized system .

- Continuous and strict involvement and training of staff on the EMRS implementation is mandatory for smooth adoption and usage of EMR.

- Digitized equipments like x-ray machine and sufficient computers are mandatory to implement EMR.

- Stakeholders, like Tulane university, FMOH, and the Hospital itself have to be committed to follow up to the final goal of full EMR acceptance and usage.

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ANNEXES

Annex I. Information sheet and consent form

Addis Ababa University School of Information Science and school of Public Health Department of Health Informatics.

Title of the project: Assessment of the current paper based medical record system at multiple drug resistance departments in saint peter hospital for introducing electronic medical record system.May, 2014.

Principal investigator: Zenebech Melaku Tel; 09-13-10-79-30

Introduction

I am doing a project in partial fulfillment of the requirement of master degree in health informatics at Addis Ababa university, school of information scenic and public health. the project is on assessment of existence paper based medical record to identify the problems and find solutions for introduce electronics medical recode system at St. peter hospital in MDR TB department for give quality healthcare service.

I asked you kindly to fill this questionnaire that will help in investigating the issues. Your co-operation is very helpful. Your name will not be written on the questionnaire and all the information you provide will be kept strictly confidential. Since the study is non experimental project, there is no risk to happen to you participating in this study and you are also not obliged to answer any question you don't wish to answer. To fill the questionnaire 25-30 minutes will be required. If you wish to comment feel free to use the contact address.

Thank you for allowing us to share your precious time.

signature _____ ,Date ----------

Annex II: Self administered Questionnaire for Health Professionals

Part1: Department's medical record status.

NS	Question	Response option	cod	remark
101	How do you rate the easy of accessibility (retrievably) of the medical records for the appropriate staffs?	A. strongly agree B .Agree C. Disagree		
102	Do you think the data sources (records) are collected as redundancies (vast) in MDR department?	A. Yes B. No C. don't know		
103	Do you communicate about available and those not available drugs and reagents on daily basis? (physicians, nurses, and pharmacists ,lab)	A .Yes B. No C .Sometimes		
104	Do you agree that the presence of appropriate technology for data analysis, transfer and presentation?	A. Strongly Agree B .Disagree c .Agree		
201	Do you get All formats completely fill and readable?	A. Yes B. No C. Partially		
202	Is it possible to get patient health information easily from other departments?	A. Yes B. No		
203	How often do you face problem associated with patient health data?	A. Usually B. Rarely		
204	How much time do you take to fill a format/ requests and prescriptions for Single patient?	A.5-15minutes B.15-30 minutes C. greater than 30 minutes		

Part III Attitudes of Doctors, Health officers and Nurses on EMR

SN	Questionnaire	Response Option	Cod	Remark
301	What is your opinion about the convenience of current medical recording system in your department?	A. Easy to handle B .Tim taking.		
302	Are you thinking any gap between the services you provide and the report you generate with the available data?	A. Yes B. NO		
303	Are you thinking the computerization of medical recording system brings change in the generation and utilization of health information?	A. yes B. No		
304	Are you thinking that the EMR can solve problems related to data collection, recording, reporting, and communication mechanisms?	A .yes B. No		
305	Are you thinking that the EMR can solve problems related to data collection, recording, reporting, and communication mechanisms?	A .yes B. No		
306	What do you recommend if EMR system is to be implemented in your department?	A. Must be B. NO		

Part IV Knowledge of Doctors, Health officer and Nurse on EMR

SN	Questionnaire	Response Option	Cod	Remark
401	Are you have enough computer skill	A. Yes B. No		
402	Did you receive training to introduce use of EMR?	A. Yes B. No		

Self Administrative Questionnaire For Information Technology				
SN	**Questionnaire**	**Response Option**	**Cod**	**Remark**
404	Does your facility have an IT structural unit?	A. Yes B. No		
404	Does the infrastructure functional?	A. Yes B. No		
405	How many computers does the department have in all the service units?	A. Yes B. No		
406	How many of them (the computers) are functional?	A. One B. Two C. Three		

Annex III: Observation Checklist

Department/facility.....

Observing filled formats tally sheets, and registers, their legibility, integrity, and Completeness of data----------

Observe the shortage of space for patient's card and document over lode

_____

Availability IT /Communication equipment (computer. Printer, telephone internet, network, etc) _____

Backup system_____

Software used for data capturing, Reporting_____

Annex IV: Interview guide Line

Interview guide Line for MDR department head, x-ray department head, pharmacy department head, laboratory department head

x-ray department head

1. What is your opinion on current paper based medical record system in your x-ray department?
2. What are the existing challenges/problems in connection with the current (medical record system) IN MDR department?
3. why this problems are happen and why not solve?
4. How can solve these problems?

For pharmacy department head

1. What is your opinion on current paper based medical record system in your pharmacy department?
2. What are the existing challenges/problems in connection with the current (medical record system) IN MDR department?
3. why this problems are happen and why not solve?
4. How can solve these problems?

laboratory department head

1. What is your opinion on current paper based medical record system in your laboratory department?
2. What are the existing challenges/problems in connection with the current (medical record system) IN MDR department?
3. Why these problems are happen and why not solve?
4. How can solve these problems?

Thank you for taking the time to participate in this interview!

Annex: V <u>ለሕሙማን የተዘጋጀ መጠይቅ</u>

ተ.ቁ		Response Option	Cod	Remark
101	መዳኒትን በተለማመደ ቲቢ ክፍል በሚሰጦት የሕክምና አገልግሎት ረክተዋል ?	ሀ. አዎ ለ አይደለም		
102	ካረኩ ምክንያቱን ይግለጹልን	.....		
	<u>ካርዱን በተመልከተ</u>			
103	.የሚታከሙበት ካርድ እስኪወጣ ምን ያህል ጊዜ ይቆያሉ?	ሀ. ከ 5 እስከ 10 ደቂቃ ለ.ከ10-20 ደቂቃ ሐ.ከ30 ደቂቃ በኋላ		
104	. በሆስፒታሉ ያለው የሕክምና ካርድዎ ጠፍቶ ያውቃል ?	ሀ.አዎ ለ. አይደለም		
	<u>መድሐኒትን በተመልከተ</u>			
105	የሚሰጠዎት የመድሐኒት መውሰጃ ወረቀት ላይ መጻፍ የሚገባው ነገር ባለመጻፉ ወደ ሐኪሙ ተመልሰው ያዉቃሉ ?	ሀ.አዎ ለ. አይደለም		
106	የታዘዘልዎት መድሐኒት በፋርማሲው የለም ተብለዉ ተመልሰው ያውቃሉ?	ሀ አዎ ለ .አይደለም		
	<u>ራጅን በተመለከተ</u>			
107	የታዘዘልዎት የራጅ ውጤት የሚደርስልዎት በምን ያህል ጊዜ ነው?	ሀ. አንድ ሰዓት በኋላ ለ. ከሁለት ሰዓት በኋላ ሐ . ከግማሽ ቀን በኋላ		

108	የታዘዘልዎት የራጅ ምርመራ ከተነሱ በኋላ በተለያዬ ምክንያት እንደገና እንዲነሱ ተጠይቀው ያውቃሉ ?	ሀ. አዎ ለ. አይደለም		
109	የታዘዘልዎት የራጅ ውጤት ጠፍቶ ያውቃል ?	ሀ.አዎ ለ አይደለም		
	<u>ላብራቶሪን በተመለከተ</u>			
110	የታዘዘልዎት የላብራቶሪ ማዘዣ አልነበብ ብሎ ወደ ሐኪምዎ ተመልሰው ያውቃሉ?	ሀ . አዎ አይደለም		
111	የሰጡት የላብራቶሪ ውጤት በምን ያህል ጊዜ ይደርስልዎታል?	ሀ. ከ10-20 ደቂቃ ለ . ከ 20-40 ደቂቃ ሐ. ከ ግ ማሽ ቀን በ ኋላ		
112	.የ ታዘ ዘ ልዎት የ ምር መራ ውጤቶች በ ተቀ ጠሩ በ ት ቀን ያ ገ ኛ ሉ?	ሀ .አ ዎ ለ . አ ይ ደ ለ ም		
113	ወደ ላ ብራ ቶ ሪ የ ተ ላ ከ ው የ ምር መራ ውጤት በ መዘ ግ የ ቱ ምክ ን ያ ት ተ ጉ ላ ል ተ ው ያ ውቃሉ?	**ሀ** . አ ዎ ለ . አ ይ ደ ለ ም		
114	የ ታዘ ዘ ል ዎት የ ምር መራ ውጤቶች በ መዘ ግ የ ቱ ተ ጉ ላ ል ተ ው ያ ውቃሉ?	ሀ . አ ዎ ለ . አ ይ ደ ለ ም		

አ መሰ ግ ና ለ ሁ

Annex: VI Questionnaires belongs to patients translated from Amharic to English

SN	Questionnaire	Response Option	Cod	Remark
101	Are you satisfied on the services given at MDR TB department (multi drug resistance)?	A. YES B. NO		
102	If you are not satisfied explain your reason concerning the card	.....		
CONCERNINGTHE MRU				
103	After you give your ID number, how long you wait for your chart retrieve	A, from 5-10 min B. from 10-20 C. more than 30 minutes		
104	Had you been told that your chart is lost	A. yes B. no		

CONCERNING THE MEDICATION

105	Did you turn back to your doctor because your prescription is illegible	A. Yes B. No		
106	Did you return back to your doctor because the prescription is not written completely?	A. by replacing new card B, by waiting until they find it		
107	Had you been told that prescribed drug is out of stock?	A. Yes B .No		

CONCERNING THE IMAJINIG				
109	Have you lost your x-ray result at home or damage because of wetness or some other reasons?	A. YES B. No		
110	How long do you wait for x-ray result done ?	A. One hour or more B. More than 2 hours C. After half a day D. Other		
111	After you get x-ray checked were you asked to check again because of different reasons?	A. Yes B. No		
CONCERNINGTHE LABORATORY EXAMINATIONS				
112	Did you return back to your doctor because the lab requisition paper is illegible?	A. Yes B. No		
113	How long do you wait for laboratory result.?	A.10-20minutes B.20-40minutes C .half a day		
114	Do you get your result on your appointment day?	A. Yes B. No		
115	Have you disappointed because of the delay of lab result	A. Yes B. No		

THANK YOU

Declaration

I, the under singed, declare that this is my original work and has never been presented in this or any other Universities. All the source materials used for the thesis have been duly acknowledged.

Name: Zenebech Melaku

signature_____

Place: School of public health and school of information science Addis Ababa University

Date of submission_____

This thesis has been submitted for examination with our approval as university advisors.

Name of adviser: Dr. Martha yifiru Name of adviser Dr. Assefa seme

Signature_____ Signature _____

Date_____ Date __ _____