ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
SCHOOL OF INFORMATION SCIENCE
AND
SCHOOL OF PUBLIC HEALTH

PRACTICES AND BARRIERS ON DEPLOYMENT OF ELECTRONIC MEDICAL RECORD (SMART CARE) IN ADDIS ABABA CITY ADMINISTRATION HOSPITALS, ADDIS ABABA, ETHIOPIA

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A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE IN HEALTH INFORMATICS

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BY
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Content

LIST OF TABLES vi
LIST OF FIGURES vii
CHAPTER ONE 1
INTRODUCTION 1
1.1 INTRODUCTION 1
1.2 Statement of the Problem 3
1.3 General objective of the Study 4
1.3.1Specific objectives 4
1.4 Rationale of the Study 4
1.5 Organization of the Thesis 5
1.6 Scope of the study 6
1.7 Study strengths and Limitations 6
1.7.1 Strengths 6
1.7.2Limitations 6
CHAPTER TWO 7
LITERATURE REVIEW 7
2.1. Information technology 7
2.2 Utilization on EMR 8
2.3 Barrier on sustainable implementation EMR 11
2.4 Perception of user's on EMR 11
2.5 Privacy and confidential issues of using EMR 12
CHAPTER THREE 15
METHODOLOGY 15
3.1Study area and period 15
3.2. Study design 15
3.2.1 Source population: 15
3.2.2 Study population/sample population: 15
3.3 Sample size and Sampling technique 16
3.4 Data collection procedure and instruments 17

3.4.1Quantitative 17
3.4.2 Qualitative method 17
3.5 Data management and analysis procedures 18
3.5.1 Quantitative data 18
3.5.2 Qualitative data 18
3.6 Data quality control 18
3.7 Operational Definitions 19
3.8 Ethical Considerations 19
3.9 Plan of Dissemination of Findings from the Research 20
CHAPTER FOUR 21
RESULTS 21
4.1 Description of Participants and socio-demographic data 21
4.2 Perception of user on smart care 23
4.3 Smart care confidentiality and privacy issues 24
4.4 Utilization of smart care 26
CHAPTER FIVE 30
DISCUSSION 30
5.2 Perception 31
5.3 Confidentiality and privacy 32
5.4 Barriers during implementation 33
6.1 Conclusions 35
6.2 Recommendations 36
8. ANNEX 41
ANNEX 8.1 participant's information sheet 41
ANNEX 8. 2 informed consent form 43
ANNEX 8.3 Questioners 47
ANNEX 8. 4 Hospitals IT professionals interview questioner 55

ACRONYMS AND ABBREVIATIONS

AAHBH-Addis Ababa Health Bureau Hospitals

AAU-Addis Ababa University

E- HEALTH-Electronic Health

EFY-Ethiopian Fiscal Year

EMR- Electronic Medical Record

FDRE-Federal Democratic Republic of Ethiopia

FMOH-Federal Ministry of Health

EHR-Electronic Health Record

HIV-Human Immune Virus

HSDP- Health service Development Program

IPD-In Patient Department

LAN- Local Area Network.

MDG-Millennium Developmental Goal

MOH-Ministry of Health

OPD-Out Patient Department

OR-Operation Room

ROI-Return on Investment

WHO-World Health Organization

ABSTRACT

Background

The deployment (implementation) of electronic medical record in Addis Ababa City Administration Health Bureau hospitals were done from in 2011. In five hospitals Practices such as utilization, perception, confidentiality and privacy and barriers during implementation are necessary to assess the deployment. Other studies gave emphasis on those.

Objectives: To assess the practices and barriers on deployment of electronic medical record (smart care) in Addis Ababa regional hospitals.

Methods

A cross sectional survey using self-administered questionnaires and complemented by a qualitative data using interviews was conducted in April 2013 at Addis Ababa city administration health bureau hospitals in Addis Ababa Ethiopia. 422 Study subjects were selected by random sampling method for quantitative and 5 study subjects selected by purposive sampling for interviews. The collected data was cleaned, coded and fed to SPSS 20.0. Descriptive statistics on their perception, utilization, barriers and privacy and confidentiality issues were calculated. Finally results were presented in text, tables and graphs.

Results: the study finding showed that users had good perception to use and the overall utilization of Smart Care was not good. Because the implementation practice was not similar in all hospitals means two of them interconnected and others used now for data entry.

Also qualitative findings indicate that work flow interference, simplicity, training and quality of work were in good position on user perspective and barriers that hinder the implementation process these are connection problems, lack of single responsible body, technical and financial support problem, follow up from health bureau and venders.

Conclusion and recommendation: from the finding perception is not a big problem in user's side. The major problem were; functionality of system, unable to generate monthly report, common securing mechanism, connection, follow-up and support from concerned body, continues and planned training and structured and organized culture of a practice. Thus, it is essential to improve handling the strength and overcoming those challenges to make practice sustainable and adhere the smart care through users.

LIST OF TABLES

Table 1 Frequency distribution of the socio demographic data of Smart Care users in AAHBHS, AA, Ethiopia, May, 2013…….....23

Ta**ble** 2 Frequency distribution of perception of Smart Care in AAHBHS, AA, Ethiopia, May, 2013.....…….……24

Table 3 Frequency distribution of confidentiality and privacy on Smart Care users in AAHBHS, AA, Ethiopia, May, 2013…….26

Table 4 Frequency distribution of Utilization of users on Smart Care in AAHBHS, AA, Ethiopia, May, 2013 …….27

Table 5 Frequency distribution of encountered of barriers on Smart Care users in AAHBHS, AA, Ethiopia, May, 2013 ……..……...29

LIST OF FIGURES

Figure 1 Organizational frame work of Addis Ababa health Bureau..... 3

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

The Health information technology is an innovative solution to improve the quality and access of health services as well as promoting the practice of evidence based decision making at lower cost by introducing health related technologies and practices. The overall goal of the e-Health/HIT initiative in Ethiopia is to bring about fully developed e-Health solutions that can improve the health sector and achieve the MDG and HSDP targets that is expected to satisfy the long-term strategy of Ministry of Health "improve accessibility and quality of health services"(1).

An EMR is a computerized medical record created in an organization that delivers care, such as a hospital or physician's office. Electronic medical records tend to be a part of a local stand alone health information system that allows storage, retrieval and modification of records (2).The electronic storage of clinical information will create the potential for computer-based tools to help clinicians significantly enhance the quality of medical care and increase the efficiency of medical practice. These tools may include reminder systems that identify patients who are due for preventative care interventions, alerting systems that detect contraindications among prescribed medications, and coding systems that facilitate the selection of correct billing codes for patient encounters. Numerous other "decision-support" tools have been developed and may soon facilitate the practice of clinical medicine (2).

"A health care facility which offers medical treatment including, as may be necessary, board and lodging and necessary incidents such as nursing care or use of technical equipment. Hospital is primarily a service facility. It may also be appropriately referred to as a service institution. It serves (primarily) three groups: its patients; its doctors and the public. It furnishes a place where the patient, rich or poor, can be treated under what is normally considered to be ideal conditions. It makes available to its patients, rooms, special diets, X-ray, laboratory, surgical, and a multitude of other services and equipment which increasingly increase through the advances of research and medical science. Essential to the administration of the services and techniques

employed in hospitals is the corps of highly trained nurses, student nurses, certified nursing assistants, technicians and others who are on duty for each of the twenty-four hours of each day. As well, all hospitals, large or small, must have administrative personnel to ensure that its services function properly and are co-ordinate so that the patients are received, and cared for, regardless of the hour or the patient's condition.

To ensure the proper functioning of hospitals nothing can be left to chance because an improperly functioning hospital may mean a life or lives. Such facilities are also available and ready to serve their community in times of epidemic or disaster." (3).

Currently, EMR has been implemented in 6 Addis Ababa Regional Health Bureau Hospitals (Ras Desta, Minilik, Yekatit 12, Gandi, Zewditu and Amanuel), Tigray (Ayder), and Oromia (Adama and Bishoftu). To enable the EMR/EHR smooth running and sustain the implementation process training was provided for relevant staff at the deployed sites (1).EFY 2003, it was planned to extend the EMR/Smart-care in three regions Tigray, Addis Ababa, and Oromia in 9 hospitals. To facilitate the implementation of the EMR/EHR, assessment has been undertaken and development of the ICT infrastructure has been completed and deployed 465 computers, 9 servers and other network equipment for the hospitals.

Issues related to EMR implementation are ;Integrated systems require consistent use of standards in e.g. medical terminologies and high quality data to support information sharing across wide networks, Ethical, legal and technical issues linked to accuracy, security confidentiality and access rights are set to increase as national EMR systems come online. These issues become more pressing with the current movement to promoting consumer empowerment and information ownership, championed by the European Commission for example, which is leading towards patient records accessible by patients (Personal Health Records) Such as; Common record architectures structures, clinical information standards and communications protocols, Security and confidentiality of information and Patient data quality; data sets, data dictionaries (4). The above implementation process barriers are mentioned but this was not studied in Addis Ababa hospitals so, this research is asses the practice and barriers during implementation process, give solution for the problems and give emphasis to program in the deployment process to the problems that are detected.

1.2 Statement of the Problem

For years, medical offices have struggled with medical record documentation, as well as filing and retention of volumes of paper records. They have been stored in costly medical record storage cabinets and when the volumes of records outgrow the office space, they are purged and sent to off-site storage. A major benefit of an electronic health record is that record maintenance and storage problems go away. All medical histories, medication lists, chart notes, reports, letters, and any other form held in a paper record is either documented directly into the EMR or scanned (4).

Along with saved space is reduction of paper needed by medical offices, hospitals or insurance companies. Computer medical records do not render paper obsolete, but they certainly do reduce needed paper significantly. Another advantage of electronic medical records is the ability for all in a health care team to coordinate care. This helps avoid duplication of testing and the ability for anyone on the medical team to understand the approaches taken to a condition new health worker not confused with what is done before and they have base line for their plan (5).

Even though EMR have many advantages researches show that Security Rule, according to Health and Human Services (HHS), establishes a security framework for small practices as well as large institutions. All covered entities must have a written security plan. The HHS identifies three components as necessary for the security plan: administrative safeguards, physical safeguards, and technical safeguards. However, medical and healthcare providers have experienced 767 security breaches resulting in the compromised confidential health information of 23,625,933 patients during the period of 2006-2012(6).

In other research, the National Health Service (NHS) in the UK reports specific examples of potential and actual EHR-caused unintended consequences in their 2009 document on the management of clinical risk relating to the deployment and use of health software (7). Several possible advantages to EHRs over paper records have been proposed, but there is debate about the degree to which these are achieved in practice (7). The 2009 National Ambulatory Medical

Care Survey of 5200 physicians (70% response rate) by the National Center for Health Statistics showed that 51.7% of office-based physicians did not use any EMR/EHR system (7).

In addition, data from an electronic system can be used anonymously for statistical reporting in matters such as quality improvement, resource management and public health communicable disease surveillance (8). One CEO of EHR company has argued if a physician performs tests in the office, it might reduce his or her income. "Given the ease at which information can be exchanged between health IT systems, patients whose physicians use them may feel that their privacy is more at risk than if paper records were used"(8). In this research also, Physician resistance to use of EMR systems is another issue. The authors believe that this resistance stems from physicians' perceptions that EMR usage negatively affects their workflows. For example, data entry may take extra time, and time is the most precious commodity to physicians (8).

1.3 General objective of the Study

- The purpose of this study was to explore the Practices and barriers on deployment of EMR (smart care) in Addis Ababa regional hospitals.

1.3.1Specific objectives

- To assess the level of utilization of smart care soft ware
- To assess the perception of users towards smart care soft ware
- To asses privacy and confidentiality issues on implementation
- To identify barriers on sustainable implementation of EMR in hospitals

1.4 Rationale of the Study

Tulane and Addis Ababa health bureau are assisting the hospitals in Addis Ababa to address the human resource crisis, poor documentation and good security mechanism of patient data in healthcare by focusing on improving the efficiency and effectiveness of the existing works through the deployment of reliable and easy to use electronic systems in Addis Ababa health bureau hospitals. So far these electronic medical systems have been deployed at five hospitals throughout Addis Ababa health bureau hospitals plans to scale up further. However, it is not clear how this smart care tool has been utilized, how is the perception of users, confidentiality

and privacy aspect of the practice and whether the implementation is had barrier or not. This study was conducted to address these questions from the Addis Ababa health bureau hospitals health professionals and focal person's barriers and practice of implementation. The research findings also contribute informational input for hospitals, health bureau and stakeholders to make informed decision and to develop future program in the area of EMR. Further researches can also baseline on this cross-sectional study finding. Recommendations given to the hospitals community based on the study findings are also relevant.

1.5 Organization of the Thesis

This thesis is organized in six chapters; the first is concerned with introducing the concept of EMR and hospital, introducing when smart care started and which types of barriers should be expected during implementation, statement of the problem, objectives of the study, and significance of the study and scope of the study.

In the second chapter of the study has discussed practices and barriers on implementation of EMR practice, utilization practices, perception, confidentiality and privacy and barriers on adoption and implementation used to attain the objectives of the research, some related works on EMR and health information with the need for using EMR.

The third chapter is used to describe the methodology i.e. study area and period, source and study population, sample size and sampling technique, data collection process, data collection, data analysis process like managing missing values and errors, data collection instrument, study limitation, assessing the quality of the data and study limitation were clearly stated.

Chapter four explains specific activities performed to understand the utilization, perception, confidentiality and privacy and barriers on the deployment practice. Activities performed in the study include simple descriptive statistical s of the selected variables.

In chapter five discussions carried out to compare finding with others research finding.

The last chapter, chapter six, shows conclusion and recommendation based on the finding results obtained from the participants about practices and barriers on implementation.

1.6 Scope of the study

The scope of this research is limited to smart care practice and barriers during deployment in Addis Ababa city administration governmental hospitals those were implement the smart care system. While the findings of this research can cover a way for similar undertakings in other hospitals and health centers, the scope of the study is limited to five hospitals those are found in the Addis Ababa health bureau. The study period is from December 9- May 31, 2013. The health professionals and IT persons worked in those hospitals only are considered for the study.

1.7 Study strengths and Limitations

1.7.1 Strengths

The strength of the study is both qualitative and quantitative study was used for triangulation.

1.7.2Limitations

This study had several limitations. These were work load observed in health bureau heads and Tulane focal persons and skilled staff keeps being transferred from one facility to the other or from one department to a different one and willingness of health professionals to fill the questioners was very low this lead to problem in sampling techniques. This is what led to the limited sample size, make sampling technique un efficient and made it difficult to get the study participants. Another limitation was Limited time and budget to cover five hospitals and to get responsible focal person in given period.

CHAPTER TWO

LITERATURE REVIEW

2.1. Information technology

Better use of information technology is essential to providing better care at lower cost(9).Despite it information-intensive nature, the health care industry invests only 2% of gross revenues in information technology, compared with 10% for other information-intensive industries(10). Increased investment in health care information technology is clearly needed. We believe that the federal government, as the largest purchaser of American health care, should be integral in financing the adoption of electronic records. In the U.S, of $1.3 trillion spent on health care in 2000, public funds (including state sources) accounted for $589.4 billion, or 45% (11).

survey done in USA July 31, 2012 indicate that Only 26 percent of respondents said they wanted to see their health information tracked electronically, and 85 percent expressed concerns over digital tracking of their health information. Despite respondents' higher levels of personal discomfort with EMR, 40 percent said they see digital record keeping as improving health care. That is the same percentage who gave that answer in 2010. In 2011, 42 percent said they saw EMR as improving health care (12).

Survey study was done in USA indicate the main purpose of this research is to advance the development of a technology acceptance theory specific to the unique traits and working environment of physicians and related medical personnel, the results of this study have considerable implications for practicing managers given the task of improving physician acceptance of the electronic medical record. Because doctors' attitudes (toward technology and what is appropriate when providing medical care) and their perceived control over the EMR significantly influence their acceptance, managers should consider these factors when promoting the advantages and potential uses of EMR technology (13).

2.2 Utilization on EMR

Studies based on in-depth interviews real-time, face-to-face or phone conversations—with patients and other clinicians, believed EMRs facilitated communication with patients in a variety of ways. In general, immediate access to EMR data was believed enabled them to focus on the patient rather than gathering information from a variety of paper sources during visits. As one physician explained, because "we do not have to call down the hall for a lab or test result, we spend more quality time [with the patient] in a more context-rich way." Similarly, because staff can pose questions to the physicians via the EMR's electronic instant messaging (IM) function, rather than opening the exam room door, doctor-patient communication during a visit can continue uninterrupted, at least physically (14).

Electronic medical records provide quick access to patient information, enabling real-time communication about patients when a physician responds to phone inquiries from other clinicians. As one primary care physician said, "I know I can now so easily and quickly give information to specialists who call." (14)

Overcoming EMR-related challenges to interpersonal communication will likely involve continued refinement of their design by vendors and use by clinicians to decrease the potential for distraction during the patient encounter. Efforts around health information technology implementation at the federal and clinical practice level might incorporate training to improve interpersonal communication skills for practitioners and medical trainees in the presence of an EMR. The modification of office processes and clinical workflows to maximize interpersonal communication while using an EMR is also likely to be helpful (14).

Based on literature assessment done on American Health Information Management Association researchers investigate that researchers and others involved in EHR implementations have found that people skills such as leadership, communication, and training are absolutely essential. Take for example a computerized physician order entry (CPOE) system. In a consensus statement outlining the considerations for a successful CPOE system, colleagues at a 2001 conference dealing with CPOE only listed technology once. Other considerations included motivation,

vision, leadership, personnel, value, workflow, project management, training, support, and evaluation (15)

EMR helps administrative staffs to access and retrieve information, and by activating communication with each others, users and medical researchers. EMR can be used in human resource departments, and in obtaining the patient billing information. Therefore, the users (hospital administrative staffs) can retrieve the information that is needed at anytime and anywhere. At the root of all people skills is communication at every level, whether it's from leadership to the organization about the vision, mission, plans, and support for the EHR implementation; between the project manager and leadership ensuring that leadership is aware of the status of the project and is not caught by surprise when problems arise; or between trainers and users regarding how the EHR fits into the users' work (15).

The study which conducted semi-structured private interviews with a convenience sample of physicians, nurses, and secretaries in the clinic Respondents were asked to comment about how the EMR affected their daily activities in United States. The majority of clinicians either agreed or strongly agreed that the EMR resulted in efficiency gains relative to the previous environment with computer-retrievable lab results, but chart-stored notes and other documents. Over 80% of respondents liked having outside access to the system. The use of message baskets improved communication among staff for 93% of the respondents. More than 85% of the respondents believed that messaging within the clinic was a more convenient and faster form of communication. The majority (84%) of respondents liked access to their message basket while away from clinic; however, 20% of all respondents believed that that the remote access capabilities intruded on their life while they were away from clinic (16).

The research was done in Haiti by linking information to health care providers in clinic. The HIV-EMR has been operational for over nine months and is accessible at the six sites in the central plateau. Doctors and nurses enter all clinical and drug data using a standard patient registration form. To speed up data entry, the form has a checklist to order patient management items, including investigations and standard sets of drugs. Once this form has been submitted, the subsequent page displays any drugs that were selected. Doctors can check the drugs, their doses, and the times of day to be administered.

Finally, when submitting this form, the user can print out an order for the pharmacy. As drugs are entered, they are cross checked for allergies, inappropriate doses, and incompatible drug combinations. The system displays warnings about any problems detected, such as prescribing zidovudine and stavudine together (17).

This research also indicates that the traditional approach to electronic data management in a remote location is to place servers in the clinic sites, and in some systems data are periodically transmitted to a central server. In rural Haiti this is problematic because of unstable electrical power, humidity, dust, security concerns, and difficulty in providing technical support. Implementing a secure, web based electronic medical record allows data collection and review to occur from many remote sites. Using a shared server in a secure environment with stable power and good data backup (including a duplicate machine off site) has the additional advantage that the most recent data are available to all users. Scaling up treatment also calls for training new health workers; using decision support tools may assist them to become familiar with the management of HIV (17).

According to a survey conducted in Nigeria by Self-structured pretested questionnaires that probe into the knowledge, attitudes and utilization of computers and IT were administered to a randomly selected group of 180 health care professionals and medical students. Fifty-nine respondents (39.9%) demonstrated a good attitude and good utilization habits, while in 50 respondents (33.8%) attitude and utilization habits were average and in 39 (26.4%) they were poor(18).

Survey study was conducted at an adult ambulatory primary care and urgent care clinic in an academic hospital. The clinic has 25 practicing physicians, with approximately 70 residents rotating through the clinic by semi structured interview. The clinic also employs approximately 17 nurses and 30 secretaries. Providers were satisfied with the number (69%) and location (62%) of computers, the reliability of the EMR (62%) and customer support (76%). However, 53% of respondents though the EMR was too slow. Most respondents (76%) believed they and their staff were adequately trained before the system was implemented. The majority of respondents used all of the EMR features listed, including updating medication (81%) and problem (81%) lists after visits, updating problem lists between visits (74%), using the computer in the exam room

(87%), and using the "new results" feature (93%). Only 41% of respondents used reminders to follow up on patient issues, and 46% customized the EMR to support the workflow. Computer-based documentation was used by 88% of respondents for more than 2/3 of their clinic notes, and by 93% of respondents to some extent (16).

2.3 Barrier on sustainable implementation EMR

Based on a qualitative survey was study taken by interviewing of physician practices that had implemented an EMR they found that Barrier to EMR use was the lack of adequate electronic data exchange between the EMR and other clinical data systems (such as lab, radiology, and referral systems). Having parallel electronic and paper-based systems forced physicians to switch between systems, thereby slowing workflow, requiring more time to manually enter data from external systems, and increasing physicians' resistance to EMR use. Furthermore, with fewer data in the EMR, there was less opportunity for intervening electronically to improve quality, and reduced ability to perform internal analyses or to report performance externally for quality report cards or performance incentive programs (19)

Framework done in Kenya by Dr Peter Drury indicate that Many Developing Countries suffer from health worker migration as doctors and nurses head to richer countries such as the UK, US and Canada. Hence, there is an urgent need to improve the skills of existing staff on a fast pace, at low cost and as close to their place of work as possible (20).

2.4 Perception of user's on EMR

A US study on Interviews with a group of primary care physicians and managers reported the perceptions of primary care physicians, nurses and physician assistants serving minority populations, following the implementation of a large-scale EHR system based on Vista (the EHR system used by the US Veterans Health Administration). The perceived barriers reported by this group were clinical productivity loss, technical limitations of computers and availability of technical support. Adoption predictors included increasing years since completion of clinical training and positive attitudes towards EHRs improving quality of care. The study suggests that clinicians support the use of IT to improve quality in underserved settings, but many felt that it was not currently fulfilling its potential, due to limited use of key functions within the HER(21).

Implementation of an EHR system suggests that a successful re-design of clinical workflow to accommodate the EHR and more intensive EHR use are associated with greater quality of care and financial benefits. Perceived barriers reported by this group were financial costs, disruption of clinical workflow, usability issues, lack of time and support to re-design clinical workflow, and lack of standardization and interoperability (21).

A survey of nurses' perceptions of standardized care plans in EHRs in Sweden revealed several positive attitudes. Nurses felt that standardized care plans could facilitate nursing practice by increasing nurses' ability to provide the same high-quality basic care to all patients and decreasing documentation time as well as redundant documentation. The authors also highlighted the importance of providing nurses with training that will increase their knowledge of standardized care plans and help them better understand evidence-based knowledge.

A survey of emergency nurses and physicians in the US suggests that the main adoption predictors in this healthcare setting were perceptions of training and support; perceptions of usefulness; effort expectancy; social influence; computer literacy and positive attitudes towards computers. The authors also reported that many perceptions of the EHR system at launch persisted through the first months of use, suggesting that early positive impressions of training, support, and belief and EHR usefulness can maximize EHR adoption (21).

2.5 Privacy and confidential issues of using EMR

In the European Union (EU), several Directives of the European Parliament and of the Council protect the processing and free movement of personal data, including for purposes of health care (22)

According to the American Medical Informatics Association "In light of 'modern medical practice' and the growth of third-party insurers, individuals no longer possess a reasonable expectation that their histories will remain completely confidential (Lichtblau, 2004)." In a 1993 survey, 80% of respondents believed that consumers had lost control over information about themselves. There are numerous other polls that reveal the same fear, even among the homeless (Barrows, 1996). The medical community, the primary user of identifiable health information, has a strong history of protecting medical records, but patients worry that banks, drug companies, employers, computer hackers, and the government can access their most intimate information if it is stored electronically. Patients' permanent medical records are already

routinely reviewed by insurance companies processing claims for payment. A banking or pharmaceutical company could target marketing efforts towards specific patients, or a potential employer or insurer could review one's genetic predisposition to disease. These secondary users have no obligation to respect the doctor-patient relationship characterized by trust and confidentiality, and have both the potential to profit and the resources to access electronic information (23)

Data generated, collected, and reported in support of clinical trials by a clinical investigator researcher analyze that electronic systems should enable the core security features of role-based access, passwords, and audit trails. It is also recommended that aliases or alternative account numbers be assigned to individuals undergoing special procedures or tests such as the ones listed here. The EHR must be able to connect the alias or alternative account number back to the patient's legal name and account number in a secure fashion to ensure the individual has a complete medical record and to enable accurate billing while still protecting the privacy of the patient(23).

There are serious privacy issues related to genetic testing. Individuals are faced with a fear of employment discrimination or loss of health and life insurance based on apparent or perceived genetic abnormality. Currently, the fear of discrimination and misuse of genetic information prevents people from obtaining genetic testing. The refusal to use effective genetic tests hurts individuals, researchers, and physicians. Lack of testing denies individuals important medical information they could otherwise use to proactively manage their health (24).

As the CBS(California broad cast services) news writer data from health records of Stanford Hospital patients, the sensitive personal information contained in medical records is becoming more accessible than ever as the United States embarks on a fast and unprecedented shift to electronic health records. Today, many of these records are stored in databases called health information exchanges, or HIEs, which are linked together online — making a treasure trove of data accessible to the myriad of hospital workers, insurance companies and government employees (25).

Unsurprisingly, social security numbers, health histories and other personal data from breached or stolen electronic health records are routinely used by identity thieves. Criminals can buy social security numbers online for about $5 each, but medical profiles can fetch $50 or more because they give identity thieves a much more nuanced look into a victim's life, said Dr. Deborah Peel, founder of the advocacy group Patient Privacy Rights, which researches data breaches and works for tighter security on people's personal health records(25).

Some privacy experts worry that current federal law will allow pharmaceutical companies, law enforcement, insurance providers and others to exploit these data without a patient's knowledge or consent. The pharmaceutical industry already uses medical data — for example, pregnant women who use certain medications often will fill out a voluntary questionnaire asking for more information — to market new products as the child grows (25).

Worse, when records contain errors, linked electronic systems only magnify the errors, privacy groups argue – giving insurance companies and employer's inaccurate ammunition to deny employment to candidates (25).

CHAPTER THREE

METHODOLOGY

3.1Study area and period

Addis Ababa is one of the city on city administration and capital city of Ethiopia. For administrative purpose it is divided in to the 10 Sub-city administration and corrosponding health departments that manage the (55) cities health centers, (759) clinics, (6) private health centers, (35) private hospitals, (237) stores, (307) pharmacies and health posts are directly answerable to their respective sub-city administrations and 6 hospitals directly answerable to regional health bureau**.** This study has focused on Addis Ababa health bureau governmental hospitals. The study period is from December 9- May 31, 2013

3.2. Study design

The study employed a cross sectional descriptive study design complimented with qualitative method methods.

3.2.1 Source population:

The source population was Addis Ababa health bureau hospital health workers and hospital smart care responsible person

3.2.2 Study population/sample population:

Sampled health workers and IT professional worked in governmental hospital of Addis Ababa.

Inclusion Criteria: health workers working in hospitals rendering service on smart care at the time of data collection period was included in the study.

Exclusion criteria: health professionals who were not present at the time of data collection, sick leave and annual leave at the data collection period were not included in the study.

3.3 Sample size and Sampling technique

The sample was selected based on formula. The total health professionals on practice or using have no information.

Which is n= (Zα/2)2(p(1-p)/d2 (Assume Where Zα/2 =95% CI= critical value of 1.96 (23).

(d)= 5% and p=50%, proportion of health professionals who use smart care; where, Zα/2 is at 95% confidence interval above or below the mean, ,d=Precision (margin of error) and

n= sample size

n= (1.96)2(0.5(1-0.5)/ (0.05)2

=3.8416(0.5*0.5)/0.0025

=3.8416*0.25/0.0025

=0.9604/0.0025

n=384.16

n=384, with 10% contingent (non response rate=38.4)

Total sample size =384+38.4=422

n =422

n= sample size (number of health professionals included on study.

For qualitative =5 samples was selected based on purposive sampling

Total sample size was =38+384+5 =427

3.4 Data collection procedure and instruments

3.4.1Quantitative

The questioner was distributed to the (422) health professional in closed and open ended form based on simple random sampling five hospitals equally. Questioners were done based on adoption of EHR practice profile questionnaire and EMR evaluation questionnaire for gathering information. The investigator was clarified for doubts and data collectors was collected (400) the questioner after filled by the respondents on (5) hospital. The investigator was trained one nurse for supervisors from Addis Ababa 2 hours on instruction and to supervise the whole activity for 15 days and 5 patient supporters was assigned to collect the data after filled by the health professionals. The supervisor was assigned to different sites of the hospitals. The supervisor was visited the hospital data collectors and gave information for the purpose of the visit.

3.4.2 Qualitative method

A purposive (non-random/non-probability) convenience sampling strategy was used to recruit smart care focal persons from the five hospitals. The study qualitative interviewing, conducted each 10-minute interview. Every participant orally consented to the interview and to being audio recorded.

Interviews were conducted by principal investigator from April 9/2012 to April 24/ 2013. The principal investigator used a semi structured interview instrument that ensured consistent coverage of key topics and allowed us to capture unanticipated issues and experiences in respondents' own words. Each interview consisted of briefing the subject(s) of the purpose of the interview (to ascertain their perceptions), followed by asking interviewees open-ended questions about their: current practice of smart care, access privileges on system, utilization and expectations regarding the implementation of a smart care system. During the interviews, verbatim notes were taken and later transcribed.

3.5 Data management and analysis procedures

3.5.1 Quantitative data

The quantitative data was cleaned, coded and fed to the Statistical Package for Social Sciences version 20.0 (SPSS version 20.0) and analyzed by SPSS version 20. The data was cleaned for inconsistencies and missing values. Simple descriptive frequencies were used to see the overall distribution of the study subject with the variables under study. Finally result was presented in text, tables and graphs and communicated to all concerned bodies

3.5.2 Qualitative data

The qualitative data was analyzed manually and the result was presented in narratives form.

3.6 Data quality control

The collected data was reviewed and checked for completeness and relevance by the supervisor and investigator within 4 day and was checked. Investigators audio taped interview was transcribed into hand written English transcript. The findings were triangulated with quantitative findings.

3.7 Operational Definitions

- **Perception**- assessment of health professionals attitude toward smart care practice with their departments
- **(Deployment)Implementation** is the carrying out, execution, or practice of, a method, or action that must follow any preliminary thinking
- **Practice** – assessment of respondents about utilization, perception and confidentiality and privacy issues.
- **Code of disease** –disease that are included in smart care
- **End users**-health professionals and smart care focal persons which were done in smart care soft ware
- **Confidentiality** is the practice of permitting only certain focal persons or health workers to access information with the understanding that they will not disclose it only to other authorized individuals as permitted by law
- **Privacy** is an individual's right to control his or her protected health information.
- **Utilization** is using of smart care by end users for report generating, prescribing or writing report, receiving report and utilizing smart care more than three years.
- **Electronic medical record (EMR)** is a digital version of a paper chart that contains all of a patient's medical history from one practice.
- **Barriers** are problems that decrease the full outcome or goal of smart care implementation.

3.8 Ethical Considerations

The participants in the study include the health professionals who were worked on smart care system implemented by the hospitals. Researches like this thesis need of their response on practice and barriers. So, the response of these health professionals and supporting staffs for researches and other varied purposes raises ethical issues such as: private or confidential hospital information and practices related to patient privacy and confidentiality. Improper disclosures of any health information affects the hospitals and country image negatively and dictate a way of practice since these responses reflect smart care information processing practice and problems. However, the research is for the purpose of professional contribution to assess practice and

barriers on implementation process and it will not attempt to harm and expose anybody response in any way.

Participant's personal information was removed from the study to protect the privacy and confidentiality of the participant's responses in the study. The additional justification for removing personal information is that they have no value for the development of research outcome.

Ethical clearance is obtained from the research and ethics committee of the School of Public Health of Addis Ababa University to carry out the study.

3.9 Plan of Dissemination of Findings from the Research

Findings of the research will be presented through annual students and staff research conference in the Addis Ababa University for Academia, and hard copy will be sent to Addis Ababa health bureau Hospital. The report will be placed in the libraries of the University for those who are interested in the area to make further investigation and for reference purpose.

CHAPTER FOUR

RESULTS

4.1 Description of Participants and socio-demographic data

The study had 422 participants and all gave written consent to participate but only 400 participants return back the questioner. Because, 22 participants said lose the questioner. Participants differed with respect to profession, experience, utilization of use of the EMR, perception to smart care, age, and barriers during implementation and were from five different regional hospital of Addis Ababa. The study took place in five City Administration Health Bureau Hospitals. These were using the EMR (smart care) which is run by the Addis Ababa City Administration Health Bureau and Tulane. Among 400 participants who respond the questioner, 79of them were from Ras desta, 84 from Zewditu, 79 from Gandi, 79 from Minilik and 80 from Yekatit 12 hospitals. For the qualitative analysis Investigator interviewed smart care focal person of five hospitals; Desta, Zewditu and Gandi but Yekatit and Minilik hospital focal persons were not interviewed because they are on annual vacation but their representatives were interviewed. Except Zewditu and Ras desta hospital recently all have no wireless connection.Table1 below summarize the demographic data of the study participants.

Table 1 Frequency distribution of the socio demographic data of Smart Care users in AAHBHS, AA, Ethiopia, May, 2013

Variables	Numbers	percent
Type of profession		
GP	30	7.5
Nurse	290	72.5
Radiology	20	5
Laboratorists	17	4.25
Pharmacist	25	6.25
Anesthetists	10	2.5
others	9	2.25
Gender		
Male	175	43.8
Female	225	56.2
Age in year		
20-25	160	40
26-35	173	43.2
36-45	51	12.8
46-55	14	3.5
>55	2	0.5

As we can see table 2 above majority of participants were female(56.2%),nurses are highest participant in the study(72.5%) because they are voluntary in participation, about 83% of the participants were in the age range of 20-35 years and participants under the age of 20years were not included.

4.2 Perception of user on smart care

Among 400 participants, 5.8% (n=23) indicated that they had satisfied excellent on EMR, 51.3% (n=205) showed they had good satisfaction on using smart care, 11.5%(n=46) indicated that they had fair satisfaction on using system, 21.5%(n=86) indicated that they had poor satisfaction on using system and 10%(n=40) indicated that they had no satisfaction on using system. Seventy four percent of participants indicated that they prefer using smart care, 25.8% of participants prefer using paper reporting or prescribing and 0.3 % of respondents prefer both jointly.94.8% of participants believe that implementation is necessary to their departments and only 5.3% were believe implementation is not necessary. The finding indicate that 64.5%of respondents believe that the smart care is slightly up to significantly easier in their department work and 36.5% of respondents expressed that smart care had no change and difficult for their department work.

These findings are summarized in table 2 and table 3 below.

Table 2 Frequency distribution of perception of Smart Care in AAHBHS, AA, Ethiopia, May, 2013

Variables	Numbers	percent
Rate of satisfaction(n=400)		
Non-exist	40	10
Poor	86	21.5
Fair	46	11.5
Good	205	51.3
Excellent	23	5.8
The smart care is necessary to hospital(n=400)		
Yes	379	94.8
No	21	5.2
The method preferred by respondents(n=400)		
Smart care	296	74
Requested and prescribed on paper	103	25.8
Both	1	0.2

The table 2 above shows that rate of perception on smart care is about 68% were fair and above and about 32% of respondents were satisfied poor and below. And showed that almost all respondents (94.8%) thought that implementation of smart care is necessary. Most of respondents said if the problems were resolved like, network, materials and responsible person to follow the work. And also about 74% of respondents were interested in using smart care but 25.8% of respondents were interested in using paper based one. Their reason is that the smart care in use is not functional at all time and it needs paper based work. So, this increase work load.

From qualitative finding majority of hospitals professionals had perceived smart care when the smart care is networked and fully functioned after times are gone follow up is decreased and the practice also became decreased. But now, many of health professionals perceive using smart care is important to their hospital.

The smart care implemented to Addis Ababa regional hospitals is intermittently functioned. So, two hospital respondents indicate that due to intermittent function. Their health professionals were not considering that using smart care can bring any change in the department work.

The problems such as age, increase work load because of using two methods and back ground history of using technology are main factor to use smart care.

4.3 Smart care confidentiality and privacy issues

The findings indicated that 8% (n=32) of participants thought that the confidentiality and privacy level was excellent, 52.5% (n=210) of participants thought that the confidentiality and privacy level had good, 15.8% (n=63) of participants thought that the confidentiality and privacy level had fair, 17.3% (n=69) of participants responds that the confidentiality and privacy level had poor and 6.5% (n=26) of participants thought that the confidentiality and privacy level was not exist.78.8% of respondents are indicated that they had review meeting on confidentiality and privacy issues in their departments while 21.3% of participants are indicated that they had no review meeting on confidentiality and privacy issues in their departments. These findings are summarized in table 3 below.

Table 3 Frequency distribution of confidentiality and privacy on Smart Care users in AAHBHS, AA, Ethiopia, May, 2013

Variables	Numbers	percent
Thoughts of user's smart care break confidentiality and privacy(n=400)		
yes	98	24.5
no	302	75.5
level confidentiality and privacy on using smart care in the department(n=400)		
non-existent	26	6.5
poor	69	17.3
fair	63	15.8
good	210	52.5
excellent	32	8.0

From the above table3 about 75.5% of the respondents thought that using smart care do not break confidentiality and privacy. And table indicates that; about 76.3% respondents respond that using smart care were fair and above confidentiality and privacy. But most of the respondents thought that smart care were good in privacy and confidentiality. About 23.8% of respondents thought poor and below confidentiality and privacy on using smart care

Information from qualitative study is that all five hospital respondents said that all departments have their own user name and pass word. This is one way for control patient information from unauthorized peoples. But all of the hospitals don't have individual user name and pass word. Except record room in hospital one and delivery room in hospital three; they have individual user name and pass word. The reason for not having individual user name and pass word were; rotation of health professionals and some departments reports done by single person like; OPD

All hospitals focal person and representative were not privileged to run the system except hospital one focal person; she has a mandate to run the system others run the system by using support of Tulane representatives.

Information given by respondents implies that; all hospitals were taken internal back up 2 times per month. Additionally hospital two also took external backup by using five cassettes prepared to do back up of data by hospital.

4.4 Utilization of smart care

The findings indicated that 61.8% (n=153) of participants can generate reports by using smart care while 38.2% of participants couldn't generate monthly reports. About 72.8%of respondents using smart care more than three months while 27.3% of participants were not use smart care more than three month. 84.5% of participants thought that smart care was not used as expected while 15.5% of participants thought that smart care could not be used as expected.

Table 4 Frequency distribution of Utilization of users on Smart Care in AAHBHS, AA, Ethiopia, May, 2013

Variables	Numbers	percent
Can generate report on smart care(n=400)		
Yes	153	38.2
No	247	61.8
Use the smart care more than three month(n=400)		
Yes	291	72.8
No	109	27.2

From the above table 4 about 61.8% of respondents were not able to generated report and 38.3 % were able to generate report on smart care. This result is small compared with peoples who get smart care training that were 68 % the people. This indicate that the respondent who took training also no able to generate report. And 72.8% of participants used smart care more than three months. This shows 4.5% respondents who do not get training but used the smart care more than three month.

Participants from interview also indicated that EMR a user can't generate lots of other reports like daily, weekly, monthly and quarterly reports within a very short. Participants also mentioned that all departments without EMR they can generate, weekly, monthly and quarterly and reports from paper based records. Because now EMR functioned is not well structured to generate reports rather than reports like; laboratory, bed, patient data and drug amount

Respondents from two hospitals expressed that technology is necessary to promote good health care service and they believe that utilization of smart care in their hospitals are important. but there are the following problems; to connection problem, lack of follow up from head, lack of space to write full character of operation history, not use for charging, not having one focal person to this process and not having special confidentiality to AIDS and STDS. Under this condition the system may stop to give function within short period of time. The respondent emphasized that utilization of smart care will become good when the above problems are solved.

Respondents at Zawditu hospital expressed that individual training has been given to new health professionals for 30 minutes and they give full technical support to departments when problems are coming from departments.

The respondents in the other two hospital said that connection is not working six month to one year. One hospital is not functioned at all except interconnection of departments. But all this three hospitals used for data entry only. All of them believed that when it functions they get many benefits like reduce chart lost, easily accessed patient information and increase security of patient information by using pass word user name.

4.5 Barriers on implementation

The finding indicated that 68.5%of participants were trained about smart care while 31.5% of participants were not trained about smart care. Among the participant who took smart care training, 26.3% thought that duration of training is enough while 73.8% thought that duration of training were not enough. 65.8% of participant believed that using smart care interfere work flow while 34.3% participants believed that using smart care could not interfere work flow. 85.8% of participant said that smart had simple to use while 14.3% of participants said that using smart care is not simple.

Table 5 **Frequency distribution of encountered** of barriers on Smart Care users **in AAHBHS, AA, Ethiopia, May, 2013**

Variables	Numbers	percent
Smart care interference on work flow(n=400)		
Yes	137	34.2
No	263	65.8
The length of training enough(n=281)		
Yes	74	26.2
No	207	73.8
The smart care is simple to use(n=400)		
Yes	343	85.8
No	57	14.2
By using smart care increase quality of work(n=400)		
Yes	363	90.8
No	37	9.2

From the above table 5 we can see that about 65.8% of respondents were respondents that using smart care didn't interfere with work flow. This show that using smart care not strong barrier for implementation. But it had negative impact on implementation that was about 34.3% of respondents smart care was interfere work flow, 51.8% of respondents were believe that length was not enough to work on smart care, about 85.8% of respondents thought that the smart care used by hospitals were simple to use it and 90.8% of respondents thought that using smart care increase quality of work. These results show that simplicity, workflow interference and quality of work on smart care is not barrier to sustain implementation. The above table shows that length of training is not enough to users. This is one barrier for implementation**.**

From the qualitative finding all the five hospitals give 3 consecutive half day training to users by the help of Tulane. Resistance of professional especially physicians are one of the most

important factor to maintain sustainable and accurate implementation .Influences of resistance to use the EMR were the perception of importance, weakness of implementation, and computer skills.

Other barriers to use the EMR were the lack of responsibility in venders and health bureaus on the implementation of the system, and computer skills. All interviewee emphasis lack of follow up of bureau, support of vender, health bureau, hospital heads and non function of system were main barriers. Because, connection is main barriers of implementation. Smart Care focal persons informed that to make implementation sustainable and to do quality work all concerned body should do on support of manpower, material and inform one focal person to do on smart care only.

The other factor impeding sustainability of implementation was the lack of electronic connectivity among all departments, for example, radiology results in all hospitals are not connected to other hospitals. Interviewer expressed that dissatisfaction with the lack of using wireless connection as well as challenges that occurred with existing connectivity because smart care is not able to transfer digital images. So, this forces participant's not to use smart care as they use the paper based one.

Variability in the use of the EMR among departments created difficulties. Because the departments used the EMR in different ways, full information was not always available in the smart care. Respondents expressed frustration when other departments were not using the EMR fully.

Lack of training to staffs; all five hospital interviewers said that there is no organized training after the first training had been given at starting of implementation.

CHAPTER FIVE

DISCUSSION

5.1 Utilization

Another study indicate that benefits of using a networked were; EMR Data are accessible and shared at multiple sites, multiple users can enter data simultaneously, Data can be backed up automatically at more than one site and Information can be communicated between multiple locations such as from laboratory to physician (26).

Qualitative approach study done in New York City show that they found that paper-based leaders prioritized the following: sufficient workstations and printers, a physician information technology (IT) champion at the practice, workflow education to ensure a successful transition to a paperless medical practice, and a high existing comfort level of practitioners and support staff with IT. In contrast, EHR-based leaders prioritized: improved technical training and ongoing technical support, sufficient protection of patient privacy, and open recognition of physician resistance, especially for those who were loyal to a legacy EHR. Unlike paper-based practices, EHR-based leadership believed that comfort level with IT and adjustments to workflow changes would not be difficult challenges to overcome (27).

The study shows that implementing an EMR without an understanding of the systemic effects and communication and the decision-making processes within an office practice and without methods for bringing to the surface and addressing conflicts limits the opportunities for improved care offered by EMRs. Understanding how these common issues manifest within unique practice settings can enhance the effective implementation and use of EMRs (28).The results in this study revealed in over all utilization indicate that the users only (38.3%) were could generate a report and 72.8% of respondents were use the smart care more than 3 months. This means there were participants that were not taken training but they are working on smart care and also very low number of participant can generate report. This is may be because of untrained participants were worked on smart care. Another important finding of my qualitative study is that focal persons had important concerns about decreased productivity in both paper- and smart care system; it appeared that health care providers were more worried. This is understandable, as implementation of a smart care system causes disruption to the paper based

practice, requiring changes at all levels (e.g. connection, function, support, monitoring and evaluation of program and training of users). I suggest that hospital heads and all health professionals take IT training and also have them visit smart care best practices. In this way, heads and users can observe a paperless practice in operation, gain deeper understanding about implementations that would had to be improve and alleviate undue concerns.

5.2 Perception

A US study on Interviews with a group of primary care physicians and managers reported the perceptions of primary care physicians, nurses and physician assistants serving minority populations, following the implementation of a large-scale EHR system based on Vista (the EHR system used by the US Veterans Health Administration). The perceived barriers reported by this group were clinical productivity loss, technical limitations of computers and availability of technical support. Adoption predictors included increasing years since completion of clinical training and positive attitudes towards EHRs improving quality of care. The study suggests that clinicians support the use of IT to improve quality in underserved settings, but many felt that it was not currently fulfilling its potential, due to limited use of key functions within the HER(21)
Descriptive study is done at University Health Network (UHN) in Toronto. Four themes have been elucidated that comprise a theoretical framework of patient-perceived information and communication technology usefulness: promotion of a sense of illness ownership, of patient-driven communication, of personalized support and of mutual trust (29).

Un similar to the above study perception barriers are investigated in the finding, among 400 participants, 5.8% (n=23) indicated that they had satisfied excellent on EMR, 51.3% (n=205) indicated they had good satisfaction on using smart care, 11.5%(n=46) indicated that they had fair satisfaction on using system, 21.5%(n=86) indicated that they had poor satisfaction on using system and 10%(n=40) indicated that they had no satisfaction on using system. Of 74% percent of participants indicated that they prefer using smart care, 25.8% of participants prefer using paper reporting or prescribing and 0.3 % of respondents prefer both jointly. About 94.8% of participants believe that implementation is necessary to their departments and only 5.3% were believed implementation is not necessary. However, respondents consider the Smart care less

helpful for performing functions such as decreasing user's time per encounter, reducing clinical errors, and billing for sustainable utilization. This suggests that full EMR capabilities are not been employed, or current EMR systems used in Addis Ababa regional hospitals are not yet sophisticated enough to perform the functions for which they were designed like; do give alarm for medical errors such as allergy. The non functionality state of the smart care system often makes it difficult for individual users to use these systems. This may result in users being exposed to less than adequate systems, which may in turn produce negative perceptions. so, perception is good in the hospitals.

5.3 Confidentiality and privacy

Data generated, collected, and reported in support of clinical trials by a clinical investigator researcher analyze that electronic systems should enable the core security features of role-based access, passwords, and audit trails. It is also recommended that aliases or alternative account numbers be assigned to individuals undergoing special procedures or tests such as the ones listed here. The EHR must be able to connect the alias or alternative account number back to the patient's legal name and account number in a secure fashion to ensure the individual has a complete medical record and to enable accurate billing while still protecting the privacy of the patient(23).

Similarly on this findings of the result indicate that almost all hospitals didn't have review meeting on privacy and confidentiality of using smart care (21.3%). But all departments had common user name and pass word. And about (76.3%) of respondent thought that confidentiality level of using smart care had fair and above. So, this indicate that confidentiality of smart care were in good but increase confidentiality by giving individual user name and pass word, to develop of special confidentiality for STI and continuous review meeting on smart care information release and usage. According to interview, all five hospital respondents said that all departments have their own user name and pass word. This is one way for control patient information from unauthorized peoples. But all of the hospitals don't have individual user name and pass word. Except record room in Ras desta and delivery room in Gandy hospitals; they have individual user name and pass word. The reason for not having individual user name and pass word was; rotation of health professionals and some departments reports done by single person like; OPD.

All hospital focal person and representative were not privileged for run the system except hospital two focal person; she have a mandate to run the system others run the system by using support of Tulane representatives. And also all hospitals were taken internal back up two times per month. Additionally Zewditu hospital took also external backup by using five castes prepared by hospital. Generally even though smart care is not networked with internet, the privacy and confidentiality is good in finding. Because they have their own pass word and user name to each departments.

5.4 Barriers during implementation

Cross-sectional analysis of data taken from the National Ambulatory Medical Care Survey the increasing utilization of EMRs in ambulatory otolaryngology is an important marker of progress in compliance with health care reform. Despite this upward trend, however, <50% of ambulatory offices had adopted EMRs in 2009 to 2010, and it remains to be seen how the field will adapt to the evolving challenge of EMR adoption and implementation (30). This indicates to make utilization effective the hospitals must work on the challenges such as support, functionality and etc mentioned in utilization part.

The study done in Nigeria indicate that Medicine is an ever-evolving and information-based discipline, and as such the provision of structured computer and IT training for all members of the health team would equip them with the skills they need to practice up-to-date and evidence-based medicine, which are essential to improving the quality of medical care. A total of 148 participants (82%) responded, which included 60 medical students, 41 medical doctors and 47 health records staff. Eighty respondents (54%) reportedly had received some form of computer training while the remaining 68 (46%) had no training. Fifty-nine respondents (39.9%) demonstrated a good attitude and good utilization habits, while in 50 respondents (33.8%) attitude and utilization habits were average and in 39 (26.4%) they were poor(18).

The finding in this study indicates that 68.5%of participants were trained about smart care while 31.5% of participants were not trained about smart care. Among those who took smart care training, 18.5% of participants were responds that duration of training is enough while 51.8% of participants were inform that duration of training were not enough. 65.8% of participant believed that using smart care interfere work flow while 34.3% participants believed that using smart care

could not interfere work flow. 85.8% of participant said that smart had simple to use while 14.3% of participants were said that using smart care is not simple. The finding of this research is better than that was done in Nigeria so; Addis Ababa hospitals had good training and have computer skill position to sustain the implementation other than technical and financial factors which were mentioned in the utilization part.

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

Although respondents and participants recognize highly the importance of the smart care, good perception and well privacy and confidentiality practice, this study demonstrates an overall practice and a noticeable problems on current EMR systems such as utilization practice and barriers on health bureau and hospitals side. Despite the positive effects from using EMRs in hospitals, the implementation practice of such smart care is still low and they meet resistance from health professionals due to lack of concerned body, lack of diagnosis in the system and absence of the system in all departments like; x-ray, charging and OR. In this study, based on a survey questioner on 400 respondents and interviews of IT focal persons practice and barriers on deployment of smart care have been identified. In each objective several questions were identified and analyzed.

The study analyzes the reasons behind the relatively low utilization of smart care among the hospitals such as lack of support, monitoring and evaluation, lack of connection, functionality of system and concerned responsible person to sustain the program. Implemented smart care system practiced well such as workflow, reporting, accessing patient information, confidentiality and privacy of patient data and perception toward smart care in Addis Ababa regional hospitals health professionals' perspective. however, an EMR implementation was a problems that was felt throughout the practice; it needs complementary adjustments in way of reporting, include all departments, user and pass word should be given individually and good connection, full follow-up and support from concerned body, need continues and planned training and it need to restructure and good and organized culture of a practice.

From the finding perception is not a big problem in user's side. The major problem were; functionality of system, unable to generate monthly report, common securing mechanism, connection, follow-up and support from concerned body, continues and planned training and structured and organized culture of a practice. Thus, it is essential to improve handling the strength and overcoming those challenges to make practice sustainable and adhere the smart care through users.

The study indicates that hospitals, health bureau and providers should be done of the reality that improving utilization, perception and confidentiality and privacy and removing barriers on sustainable implementation is not sufficient to ensure the practice and barriers on the deployment of smart care. A range of other measures, as suggested in this study, may be needed if physicians and others health professionals are to come to a positive decision over using these systems in their daily practices. The study also suggests full supports, monitoring and evaluation of the system with users that could be helpful to implementers in overcoming these barriers and to make practice sustainable and adhere the smart care through users. Hospitals and health bureaus have to make goal or plan and decide on relevant interventions based on their actual implementation practice and situation on practice and barriers of the deployment. At the same time, they should consider the smart care which they were implemented - an interesting and challenging task and need organized and targeted implementation. Further investigation needed on training content and development of training protocols for the users, extent of user involvement on approval and usability testing of smart care.

6.2 Recommendations

The following recommendations are warranted in order to attain good implementation practice and to overcome barriers.

a) While training has been iteratively improved with time, more work needs to be done, and creative ways of addressing training needs to be considered like making sure that the existing training curriculum is closely followed and adhered to at all times. All trainings on the EMR should be done outside hospital days since it affects patients' care and the learning process. Users need to be more empowered with knowledge and skills in order to use the EMR independently

b) City administration Health bureau Trust need to fully implement the EMR and all information in the departments captured in paper based system like, all laboratory findings results, radiology departments and diagnosis of all departments should be included

c) Health bureau and hospitals with other support groups work jointly, train and assign more people on EMR because of the huge staff turnover within the Health sector.

d) It is need to upgrade the EMR by adding different diagnosis like eye problems and neonatal and spaces to write long characters like OR departments by taking survey on users and special confidentiality for ADIS and for other STI.

e) There is need for the development of a guideline on support and follow up the system from top to bottom.

f) The health bureau and Ministry of Health should come up with a clear scale up plan of the EMR implementation. So, potential goals and implementation practice are well prepared in advance and should have a clear and realistic time frame.

g) Health bureau, venders and hospitals should consider that the system is important and necessary to give quality care. So that net worked, material, manpower and responsible work process should be addressed to make the implementation process effective.

h) The smart care should do planed to do for charging mechanism and other departments.

I) the health bureau and other concerned bodies should do more on continuity of the system and expand the implementation service to other hospitals on connection that was planned as focal persons indicates.

j) All supports done by health bureau and other venders should be uniform.

k) To improve the confidentiality and privacy among all health professionals in the departments should be done individually and health bureau should give support on backup services.

l) Health bureau, venders and hospitals should give special awareness on smart care to health professionals. To have good perception on using technology and smart care

m) Plan should be done when to use interconnection of hospitals by using smart card.

n) Concerned bodies should give reward to motivate practice between hospitals which have good performance and extend good practices to others.

o) Hospitals and health bureaus have to make goal or plan and decide on relevant interventions based on their actual implementation practice and situation on practice and challenges of the deployment.

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8. ANNEX

ANNEX 8.1 participant's information sheet

Title of the project: Practices and barriers on deployment of electronic medical record (smart care) in Addis Ababa health bureau hospitals

Principal Investigator: kamil shamil dari

Advisor: Dr. Abera Kumie and Dr.Solomon Teferra

Coordinating office: Addis Ababa University School of Public Health and information science department

Introduction: The Health information technology is an innovative solution to improve the quality and access of health services as well as promoting the practice of evidence based decision making at lower cost by introducing health related technologies and practices. An EMR is a computerized medical record created in an organization that delivers care, such as a hospital or physician's office. Currently EMR has been implemented in 6 Addis Ababa Regional Health Bureau Hospitals (Ras Desta, Minilik, Yekatit 12, Gandi, Zewditu and Amanuel), Tigray (Ayder), and Oromia (Adama and Bishoftu).

Purpose: The Objective of this research is to: explore Practices and barriers on deployment of electronic medical record (smart care). This research undertaking is a post graduate Masters of Health informatics partial fulfillment research thesis.

Procedure and Participation: The method of the research is a cross sectional descriptive study design will be used to investigate quantitative data through self-administered questionnaires complemented by a qualitative data using interviews and observation checklist. The expected duration of the participant's contact with the interviewer and questionnaire fill will be not more than 30 minutes for each. You asked to participate in this research because the trustful information which you will provide is important for the understanding of the smart care. Moreover, your particular participation is affirmed by the simple random sampling through the procedure of probability sampling technique which provides equal chance of selection. You will be asked about your socio-demography, your level of utilization, perception of smart care, privacy and confidentiality issues, and barriers on sustainable implementation.

Confidentiality: to establish secured safeguards of the confidentiality of research data, the investigator will use codes during data collection period instead of using names. The original data will be locked in

cabinets until the data analysis carryout and no person shall access except the principal investigator and the advisor for data checking and cleaning purpose. The use of information for any purpose other than that to which participants consented is unethical to the participants. The information you provide is not disclosed in the way it identified your personal characteristics and privacy. After the research defense and final work is approved by the school of public health, information science, academic commission and university senate, the original data questionnaire will be burn in secure manner after adopted by examiners.

Benefit: The research does not have a short term financial, health care and capacity building benefit to the research participant as an individual or as a group but in the long run it will help the concerned organization and direction based on the recommendations and the findings. Moreover the research work will help as a base line study in the smart care practice and barriers.

Risk: The proposed research does not have any inhumane treatment of research participants and any physical harm, social discrimination and economic loss.

Inducement, incentive and Compensation: This study process has no any form of incentive, coercion and the study does not bring any risks that earn compensation.

Results Dissemination: The researcher is responsible for dissemination of findings moreover fully accountable to provide feedback to the hospitals and regional health bureau.

Freedom to withdraw: If you want to participant in the study, you have full right to with draw from filling questionnaire. This would have no effect at all on your position or other administrative effect that you get from the hospital as routine moreover nobody will enforce you to fill the questionnaire.

Person to Contact: The participant has the right to ask information that is not clear about the research context and content before and or during the research work. You can contact the principal investigator and his advisor. Moreover this research undergone ethical reviewed and approved by Addis Ababa university ethical review board. The main task of this board is to make sure that the ethical principles is adhered or not and the research participants are protected from harm.

If you want more information and check about this project you can contact the following people

Addis Ababa University College of Health Sciences ethical review board Secretary Office Tel. 0115512876

Prinicipal Investigator: Mr.kamil shamil tel.+251911019940)

Advisor:

1. Dr. Abera Kume, School of Public Health, College of Health Science, Addis Ababa University; Mobile: 0911882912; Office: 011-5157701
2. Dr.solomon teferra, school of information science deparment head ;mobile:0911242544;office:0111229191

ANNEX 8. 2 informed consent form

Title of the project: Practices and barriers on deployment of electronic medical record (smart care) in Addis Ababa health bureau hospitals

Dear Respondent,

I am seeking your help in a survey on the analysis of the Practices and barriers on deployment of electronic medical record (smart care). I am interested in Practices and barriers on deployment of electronic medical record (smart care).The main purpose to explore the Practices and barriers on deployment of electronic medical record (smart care) and to analyze the perception, communication, security and privacy and barriers on deployment of smart care. The result is entirely used for academic purpose.

I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate principal investigator is Kamil Shamil. I have been fully informed in the language I understand about the research project objectives that are to explore Practices and barriers on deployment of electronic medical record (smart care) in Addis Ababa health bureau hospitals.

I have been informed that all the information I shall provide to the questionnaire and interview will be kept confidential. I understood that the research has no any risk and no composition. I also knew that I have the right to withhold information, skip questions to answer or to withdraw

from the study any time I have aware nobody will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the hospital or health bureau.

I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact.

Addis Ababa University College of Health Sciences ethical review board Secretary Office Tel. 0115512876

Prinicipal Investigator: Mr. Kamil Shamil Tel: 0911019940 (Mobile)

Advisor:

Dr. Abera Kume, School of Public Health, Addis Ababa University Mobile: 0911882912; Office: 011-5157701

Dr.Solomon Teferra, school of information science deparment head ;mobile:0911242544;office:0111229191

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Name of the participant _____

Agreed to participate in the study: Yes /No (mark one of them for verbal consent)

Signature _____ (if written consent)

Name of observer signature_____ (Data collector, supervisor,)

Signature _____

Date _____

To save your precious time, we presented most of the questions with the possible answers. Please choose one or more answer which best explains your situation by putting “X” mark in the

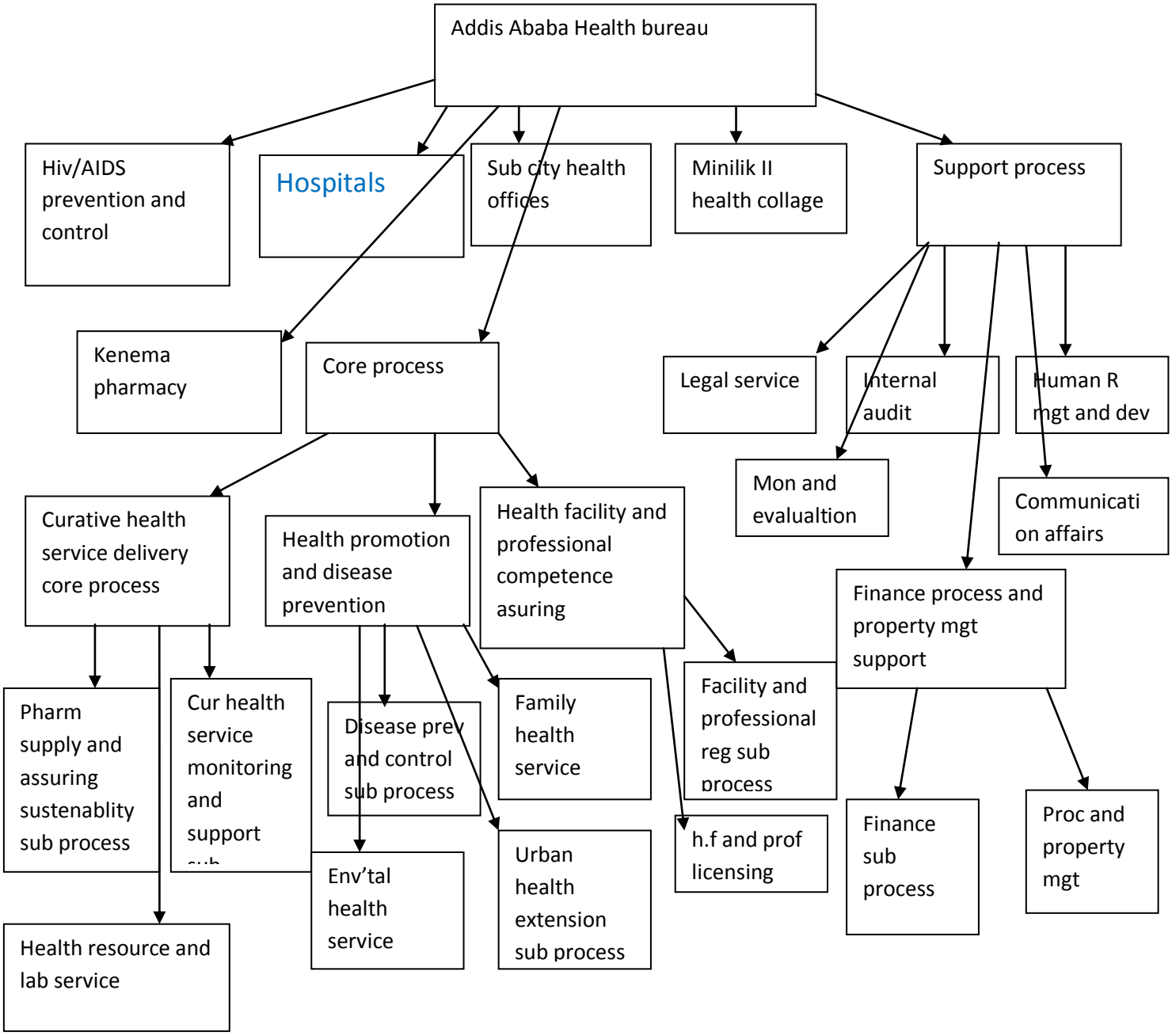
corresponding space, write your answer in the space provided for each question and answer according to instruction .

Your precious effort in completing this survey is greatly appreciated

Name of Hospital_____ Established in :_____(E.C)

Thank you!!

ANNEX 8.3 Organizational frame work of Addis Ababa health Bureau



ANNEX 8.4 Table1 Five hospitals human resource of AAHBH in 2004

Profession	Zewditu Memorial	Ras Desta	D/Menilik II Hospital	Gahndi Memorial	Yekatit Hospital
General Practitioners	2	27	16	24	5
Total Specialist	9	11	17	4	17
Dentalist	5	0	2		
Health Officers	11	4	10	5	14
Pharmacist	9	6	5	10	8
Pharmacy Technician	5	5	7	3	5
Nurse BSC	55	67	76	22	80
Clinical Nurse	83	29	103	113	86
Midwife Nurse	19	0	0	21	14
All nurses		108	179	135	
Laboratory Technologist	12	4	11	6	15
Laboratory Technician	5	8	7	4	3
Other Health Degree	7	0	12	0	3
Radiographer	6	1	4	1	4
X-ray Technician	7	7	8		5
Environmental Science	1	1	2	1	2
Anesthetics	9	5	9	10	11
Health Assistance	4	1	2	2	6
MPH			0	0	
MSC			0	0	
Optometrist		2			
Public health nurse		10			
Totals	256	296	481	361	278

Totally 1672 health care professionals were found in five regional hospitals in data from 2004(2012) from human resource of health bureau.

ANNEX 8.5 Questioners

Addis Ababa University College of Post Graduate

School of Public Health and Information Science

Department of Health Informatics

Title of the project: Practices and barriers on deployment of electronic medical record (smart care) in Addis Ababa health bureau hospitals

Dear Respondent,

I am seeking your help in a survey on the analysis of the Practices and barriers on deployment of electronic medical record (smart care). I am interested in Practices and barriers on deployment of electronic medical record (smart care).The main purpose to explore the Practices and barriers on deployment of electronic medical record (smart care) and to analyze the perception, communication, security and privacy and barriers on deployment of smart care. The result is entirely used for academic purpose.

I have been well aware of that this research undertaking is a post graduate degree partial fulfillment of research thesis which is fully supported and coordinated by AAU School of Public Health and the designate principal investigator is Kamil Shamil. I have been fully informed in the language I understand about the research project objectives that are to explore Practices and barriers on deployment of electronic medical record (smart care) in Addis Ababa health bureau hospitals.

I have been informed that all the information I shall provide to the questionnaire will be kept confidential. I understood that the research has no any risk and no composition. I also knew that I have the right to withhold information, skip questions to answer or to withdraw from the study any time I have aware nobody will impose me to explain the reason of withdrawal. It is also enlighten there would have no effect at all in my health benefit or other administrative effect that I get from the hospital or health bureau.

I have assured that the right to ask information that is not clear about the research before and or during the research work and to contact.

Addis Ababa University College of Health Sciences ethical review board Secretary Office Tel. 0115512876

Prinicipal Investigator: Mr. Kamil Shamil Tel: 0911019940 (Mobile)

I have read this form, or it has been read to me in the language I comprehend and understood the condition stated above, therefore, I am willing and confirm my participation by signing the consent.

Name of the participant _____

Agreed to participate in the study: Yes ___No___ (mark one of them for verbal consent)

Signature _____ (if written consent)

Name of observer signature_____ (Data collector, supervisor,)

Date _____

To save your precious time, we presented most of the questions with the possible answers. Please choose one or more answer which best explains your situation by putting "X" mark in the corresponding space, write your answer in the space provided for each question and answer according to instruction .

Your precious effort in completing this survey is greatly appreciated

Thank you!!

Name of Hospital in which you are working now_____
Department you are working_____
Your position in your department _____

Part 1- Socio demographic data

SN	Question	Response options	Skip	code
1.1	Type of profession	1. Specialist 2. GP 3. Nurse 4. Radiologic technologist 5. Lab technologist 6. Admin staffs 7. Pharmacist 8. Anesthetists 9. Health officer (HO) 10. Others		
1.2	Educational level	1. Postgraduate 2. Degree 3. Diploma		
1.3	Year of experiences	1. 0-5 2. 6-10 3. 11-15 4. 16-20 5. Above 20		
1.4	Gender	1. Male 2. Female		
1.5	Age in year	1. 20-25 2. 26-35 3. 36-45 4. 46-55 5. >55		

Part2. Perception of smart care

SN	Questions	Response options	Skip	code
2.1	All considered the deployment, how would you rate your satisfaction with smart care in your department?	1. Non-existent 2. Poor 3. Fair 4. Good 5. excellent		
2.2	All considered to what extent has a smart care changed aspect of your own department?	1. Significantly more difficult 2. More difficult 3. Slightly more difficult 4. No change 5. Slightly easier 6. Easier 7. Significantly easier		
2.3	How do you perceive the importance of the implemented smart care?	1. Very high importance 2. High importance 2. Medium importance 3. Low importance 4. Very low importance 5. Not important		
2.4	Any of the following applications were available to you, which methods would you be interested in using them?	1. Smart care System 2. Prescribing and requesting by paper 3. Other specify_____		
2.5	Do you believe the implementation of smart care is necessary to your hospital?	1. Yes 2. No		

Part3. Confidentiality and privacy Issues

SN	Questions	Response options	Skip	code
3.1	Does the smart care have any special confidentiality issues related to STD, AIDS, and Alcohol& Drug abuse?	1. Yes 2. No 3. I don't know		
3.2	Do you have your own pass word and user name which is not known by others?	1. Yes 2. No		
3.3	Have you access to the database of other department's?	1. Yes 2. No		
3.4	Do you believe that using smart care soft ware break confidentiality and privacy?	1. Yes 2. No		
3.5	If yes in Q.3.5, in what way?	List1._____ 2._____		
3.6	How do you level confidentiality and privacy on using smart care?	1. non-existent 2. poor\ 3. fair 4. good 5. excellent		
3.7	Is there monthly review of user activities on confidentiality and privacy?	1. Yes 2. No		
3.8	Is there any complaint related to privacy and confidentiality by using smart care?	1.Yes 2.No		

part4. Utilizing on smart care

SN	Questions	Response options	Skip	code
4.1	Is the smart care you use net worked with other departments?	1. Yes 2. No		
4.2	Who is responsible for assigning access and security privileges to staff?	1.Physician: 2. Nurse: 3. Office Manger: 4. All staffs 5.Others, (specify)_____		
4.3	Are the results reported to departments using smart care complete?	1. Yes 2. No		
4.4	If No, which results are not reported	1. Radiologic 2. Laboratory 3. Other specify__		
4.5	Do you use the electronic prescribing appropriately?	1. Yes 2. No		
4.6	If No inQ.4.9 why?	1. b/c time consuming 2. b/c Drug list are not complete 3. b/c mostly not functional 4. others, specify_____		
4.7	Do you generate monthly reports using smart care?	1. Yes 2. No		
4.8	Are there reminder /information given to the user in case of life threatening errors like allergy?	1. Yes 2. No 3. I don't know		
4.9	Have you been using smart care for more than three months?	1. Yes 2. No		
4.10	Do you think that smart care utilized as expected?	1. Yes 2. No		

Is there any issue you want to rise on smart care _____

part5. Barriers on implementation

SN	Questions	Response options	Skip	code
5.1	Does the smart care contain necessary codes/diagnosis?	1. Yes 2. No 3. I don't know		
5.2	If no Q5.1, mention ICD codes on smart care	1. _____ 2. ____		
5.2	Is smart care used for charge/fee checking mechanism in your department?	1. Yes 2. No		
5.3	Has smart care any problems to be raised which don't mentioned?	1. Yes 2. No	If No skip Q.5.4	
5.4	If yes, list the most significant problems?	1. _____ _____ 2. _____		
5.5	Are you trained about smart care skill?	1. Yes 2. No	If No skip Q.5.6	
5.6	Do you believe the length of training enough?	1. Yes 2. No 3. I don't know		
5.7	Are you trained about basic computer skill before using smart care?	1. Yes 2. No		
5.8	Do you believe that using smart care interfere work flow?	1. Yes 2. No 3. I don't know		
5.9	Do you believe the smart care you are using reduce medical errors?	1. Yes 2. No 3. I don't know		
5.10	Has the smart care simple to use?	1. Yes 2. No		
5.11	Do you believe using smart care increase quality of work?	1. Yes 2. No		

ANNEX 8. 6 Hospitals IT professionals interview questioner

Interview about smart care that is currently working the hospitals of the in Addis Ababa city administration

Your position in department _____

1. What were your privileges in smart care? mean can you install
2. Is there a disaster recovery plan?
3. How are medical records recovered under this plan?
4. How do you Support to practice – whom do you call, when things break or go wrong?
5. What are the strong points in the smart care (for It professionals in hospitals and health bureau)
6. How would you express the practice? Utilization, perception and privacy and confidentiality in your hospital.
7. Have you done any assessment on implementation?
8. Do you supervise the implementation process?
9. Do you provide supports for the users (health professionals and supportive team) in the use of the system?
10. What are the frequent supports that the users request for?
11. Would you get any support from any donor? who are supporters
12. What kind of support do you get from donors?
13. Are there any barriers to sustainable implementation?
14. Is there any point or issue that should be mentioned or discussed?
15. Do you have any question about my study?