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

HEALTH INFORMATICS PROGRAM

PROJECT ON

**REVITALIZING THE SMARTCARE SYSTEM OF
SURGERY INPATIENT DEPARTMENT IN SAINT PAUL
HOSPITAL MILLENNIUM MEDICAL COLLEGE**

BY

YESHIMEBET KASSAHUN

JUNE /2014

ADDIS ABABA ETHIOPIA

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SURGERY INPATIENT DEPARTMENT IN SAINT PAUL
HOSPITAL MILLENNIUM MEDICAL COLLEGE**

**A Project Report submitted to the School of Graduate studies of Addis Ababa
University in partial fulfillment of the requirements for the
Degree of Masters of Science in Health Informatics**

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YESHIMEBET KASSAHUN

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_____	Examiner	_____	_____

DEDICATION

I dedicate my project paper to my family and friends. A special feeling of gratitude, to my loving parents; Mestawot W/meskel and col. Kassahun Belachew, for their tireless support throughout my life. My special tanks to my husband Zewdu Abayneh, has never left my side and was very special supporter of me.

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I dedicate this work and give special thanks to my wonderful children Tigest, Amanuel and Mussie for being there for me.

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Acronyms and Aberrations

ART	Anti Retroviral Therapy
CDC	Centers for Disease Control
CPRI	Computer-based Patient Record Institute
EHR	Electronic Health Record
EMR	Electronic Medical Record
EPR	Electronic Patient Record
FMOH	Federal Ministry of Health
HIS	Health Information System
HIT	Health Information Technology
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
ICT	Information Communication Technology
IT	Information Technology
LAN	Large Area Network
LIS	Laboratory Information System
PASS	Picture Archiving and Storing System
RIS	Radiography Information System
SPHMMC	Saint Paul Hospital Millennium Medical College
TUTAPE	TUTAPE Technical Assistance program Ethiopia
WAN	Wide Area Network
WHO	World Health Organization

Abstract

Introduction:-Medical records are a collection of information about a patient's health care and are essential for present and future continuation of care. While EMR systems can improve completeness and availability of medical record information, Ethiopia lacks the needed information because of different barriers for the implementation and widespread utilization of electronic medical record system.

Objectives:- To identify barriers and propose solution for initiation of the SmartCare system of surgery inpatient department in Saint Paul Hospital Millennium Medical College

Methodology: - The project used descriptive study design with quantitative and qualitative methods. The tools used for data collection were structured questionnaire and semi structured interview. Pre tested questioner was administered to 42 health professionals and interview was conducted (3) higher management officials and (1) information communication technology department head.

Result: - From identified barriers lack of awareness, disconnection of the SmartCare system, non- integration of other information systems, incapability of the system to generate report and ICT supporting staff shortage were the major ones. After barriers identified possible solutions were proposed and interventions made.

Conclusion: - The absence of continuous training resulted in a large number of new respondents with knowledge gap. Data incompleteness reflected the negative impact of paper based system and it also indicates the requirement of the paper based system to be replaced by electronic medical records system. Initiation and commitment of the hospital management obtained to made interventions. Based on the proposed solution baseline assessment made to reinstall wireless connection and incorporate those relocated and new opened clinical areas and the awareness buildup training on the benefits of the SmartCare system was given. After the training awareness and attitude change was illustrated among the trainees.

CHAPTER ONE

1. Introduction

Electronic Medical Records System (EMRs) is a computerized patient tracking and patient caring system (1). Medical records are collections of information about patient's health care and are essential for present and future continuation of care (2).

The SmartCare is a nationwide electronic medical record system designed by the initiative of US Center for Disease Control (CDC) specifically for low resource countries (3). In every health facility where the SmartCare software is deployed, softcopy of patient's health record will be saved (4). The saved data will easily be pulled and reused whenever necessary (5). In 2005 the SmartCare began in Zambia Kafue district as a pilot project, supported by Jhpiego, to address uniquely African health care challenges in a resource-poor country with a mobile patient population (2).

The SmartCare software development in Ethiopia is conducted by Tulane University Technical Assistance Program to Ethiopia (TUTAPE's) and Ethiopian software developers in collaborations with Federal Ministry of Health (FMOH), and consultants from the United States of America (US) (5). The application was adapted according to the recent Ethiopian Health Management Information System (HMIS) reform conducted by the FMOH. (2). Dire Dawa was nominated for the initial phase and chosen as a pilot site. Over 100 clinics and hospitals in the Dire Dawa region have successfully deployed this system. Lately in (2009) the SmartCare is adopted in St Paul Hospital Millennium Medical College in Addis Ababa (6). The system was practical until 2010 then abandoned for unknown reasons. Since then, the hospital has returned to the previous paper based state.

1.1. Background information of the Hospital

St. Paul Hospital Millennium Medical College is found in Addis Ababa and is administered by Federal Ministry of Health (FMOH) it was built in 1969 G.C. Since, 2007 G.C. It has become a medical college by opening a medical school with the initiative of the Federal Ministry of Health. Currently the name of the hospital changed to St. Paul's Hospital Millennium Medical College and its core services are medical care as well as teaching and research. The college currently has more than 950 clinical and administrative staffs. Physicians and students of the college besides their teaching learning process they are serving in clinical areas. An average of 700 patients and clients visit the hospital daily in emergency and regular bases. Inpatient services are also given with a total of 345 beds (7).

1.2. Statement of the problem

Health information that produced from health facilities is useful to make sound decisions that could help to solve problems related to the health care (1). Delivering such information also requires the use of appropriate system of recording. Therefore, Ethiopia determined to replace the paper-based record system with electronic record system by implementing the SmartCare System (5).

While using the SmartCare system data are accessible and shared at multiple sites, multiple users can enter data simultaneously, and can be backed up automatically at different sites. Integration of other information systems also facilitated (2).

Despite adopting the SmartCare system, the St. Paul Hospital has failed to operate it fully. For example, currently the surgical department has abandoned the SmartCare and back slide to use the traditional paper-based medical recording system.

Thus, this project is basically aimed at assessing the knowledge gap, attitudes and practices of the health professionals and identifying the factors that discouraged them for utilizing the SmartCare system. Moreover, the study results can serve as a base line for further studies in health care system by answering the following project questions.

1. Do health professionals have knowledge on the SmartCare system?
2. What is the perception of health professionals towards the SmartCare system?
3. How is the practice of health professionals on the existing practical system?
4. What are the major factors that hinder the SmartCare system utilization?

1.3. Project Objectives

1.3.1. General Objective

- To identify barriers and propose solution for initiation of the SmartCare system of surgery inpatient department in Saint Paul Hospital Millennium Medical College

1.3.2. Specific Objectives

- To assess the knowledge of health professionals on the SmartCare system
- To assess the attitude of health professionals towards the SmartCare system
- To evaluate the practice of health professionals on the existing practical system.
- To identify the barriers for the utilization of the SmartCare system by health professionals.
- To propose possible solutions for the identified barriers.

1.4. Significance of the project

The presence of electronic medical recoding system increased the accessibility of the patient health information and makes it easily available whenever need arises. It also helps to have updated patient information that enables to make timely and genuine decisions.

The redeployment and proper utilization of the SmartCare system enables St. Paul Hospital to increase the efficiency and effectiveness of healthcare delivery systems by keeping structured information, minimizing medical errors, reducing costs, and supporting interoperability across information systems, and improve the legibility of medical records.

1.5. Scope and limitation of the Project

The scope of this project is revitalizing the SmartCare system of surgery inpatient department in St Paul Hospital Millennium Medical College. The project is focused on assessing the information gap of health professionals and identifying their barriers to utilize the system. The project limited with proposing possible solutions to avoid the barriers, increasing the awareness of health professionals' and initiating higher management officials to the process of revitalizing the SmartCare system. The timeframe for the project was from January to May 2014

1.6. Deliverables and Expected Outputs

- Assessment results of the existing system problems and proposed solutions.
 - Health professional's knowledge and attitude towards the SmartCare system
 - Health professional's practice on the existing practical system
 - Factors hinders the functionality of the SmartCare system
 - Possible solutions which helps to revitalize the system
- Intervention to revitalize the system
 - Initiation of higher management officials and health professionals to revitalize the SmartCare system

1.7. Beneficiaries of the project

Health professionals would be beneficiary due to improved and efficient data access, Patients who are getting quality health service and the hospital which is the owner of the system would be beneficiary by delivering quality health service.

CHAPTER TWO

LITERATURE REVIEW

2.1. General literature

2.1.1. Health Information Technology

Health Information Technology (HIT) is the area where processes of health information system design, maintenance of the system, health information systems development and use of the system takes place (8). Automated and interoperable healthcare information systems are anticipated to decrease the cost of health services by decreasing both the paper work and idle work time of the health professionals (3).

A wide range of products and services included in the HIT are collecting, storing and exchange patient data with other health care providers, government and quality entities, insurers and health organizations(9). Health information technology (HIT) is in general increasingly viewed as the most promising tool for improving the overall quality, safety and efficiency of the health delivery system (10).

2.1.2. Managing Hospital Records

The medical record is a compilation of facts about a patient's life and health. It includes documented data on past and present illnesses and treatment written by the health care professional caring for the patient (8). In many hospitals each department has its autonomy to keep its own records. Destruction of necessary information, unnecessary resource wastage and also redundancy of information could occur with this decentralized record keeping (11).

Therefore, the centralized and effective keeping of records could certainly overcome problems of document abuses and destruction resulted from the inherent weakness of decentralization. If effective and accurate patient information is easily available, quality health care's provision will not be affected (13). In addition to this, some hospitals have the tradition of producing a new document at the arrival of a patient in every time (14).

Such document replication affects the success of medical service delivery because an efficient patient care, effective treatment and proper follow-up can only be achieved by the principle of single medical record for each patient. Similarly, to enrich efficacy of the medical service delivery using electronic medical record keeping system is unavoidable reality (15).

2.1.3. Computerized medical record systems

The main aim of having electronic medical records system in many health organizations is to retrieve patient information for the purposes of patient care, statistics, research and teaching (16). Using an automated medical recording system improves the efficiency of health care delivery and availability of health information at any time. Thus, currently Health Information System has become the most widely and intensely used management system of hospitals everywhere (12).

2.1.4. Hospital information system

The World Health Organization (WHO) defines the Health Information System (HIS) as “A system that integrates data-collection, processing, reporting and using the information necessary for improving health service effectiveness and efficiency through better management at all levels of health services” (17). It also puts designing and developing the information system of hospitals as an important indicator of quality service. It was since a decade and half that different health organization throughout the world started to practice Health Information System (18).

Furthermore, the word Health Information System recommends the use of information communication technology as vital to manage patient health information, logistics, and finance of various departments in any hospital (19). As WHIS indicated, activities like gathering, storing, treating, retrieving, transporting, aggregating, and processing patient data in various stages ought to be managed in the hospital (11).

Accordingly, in any hospital the entire patient information management activities should always be the main concern of the hospital and establish a center for organizing the

patient information gathered through electronic medical records system (17). Finally, as a health professional one has to be aware of the terms Electronic Health Record (EHR), Electronic Patient Record (EPR) and Electronic Medical Record (EMR) that are often used interchangeably, although differences among them can be defined (20).

2.1.5. Electronic health record system (EHRs)

Electronic Health Record system (EHRs) is defined as “A systematic collection of electronic health information about individual patients or populations” (12). Likewise, the World Health Organization’s Declaration of the Year 2000 “Health for All” emphasized on the need for better healthcare services, starting from community health services up to the hospital (secondary) level (23)

It is also believed that there must be a global change of focus in the healthcare delivery sector to ensure better medical services and implement an electronic health recording system across a broad spectrum of healthcare (18). EHRs, is generally accepted as a longitudinal health record with entries by healthcare practitioners in multiple sites where care is provided (21).

As researches, which assessed the experiences of many hospitals indicate, the presence of electronic health records made the availability of patient health information at any time and place very simple. It also helped to have updated patient information to make timely and credible decision (3). Adoption of EHRs has been able to reduce costs and increase efficiencies in an effort to improve the quality and access to health services. It has the potential to improve clinical management, point of care and support; maximize patient safety; minimize medical errors; make patient’s records easily accessible, and increase efficacy of healthcare delivery systems (18).

Moreover, EHRs tools have the potential to help clinicians provide safer, more effective care than is possible by relying on the traditional memory and paper-based systems. This is because EHRs tools help the clinicians to capture, store, retrieve, link, and employ patient’s health data to provide better healthcare services (22). Finally, EHRs can help

hospitals to monitor, update, report and share data on health care quality and safety. Sharing data can be managed through network-connection, enterprise-wide web systems and other information networks or exchanges (9). This implies that, health professionals, managers and researchers are the main beneficiaries of the system (23).

All information produced and kept through the traditional system, for example, patient's health profile, behavioral and environmental information should be organized in EHRs. This is because it helps to improve the efficiency and quality of healthcare service delivery by reducing the burden of health professionals (19). It also gives an opportunity to refer a range of data like demographics, medical history, medication, all information about patient health condition and billing information (18). Such accessibility of patient information is very crucial to minimize errors and maximize support functions (24).

2.1.6. Electronic medical records system

The EMR can, be defined as “The patient record created in hospitals and ambulatory environments, and which can serve as a data source for the EHR” (25). As the Computer-based Patient Record Institute (CPRI) has defined it in 1997, “EMR contains all paper based information, but it is not only the transport of paper based information into computer based information, but also the transfer of the word, image, and voice from paper based medical records into data format that can be scanned, stored, processed and inquired by the computer” (26).

Besides, EMRs are composed of clinical data repository, clinical decision support, controlled medical vocabulary, computerized provider order entry, pharmacy, and clinical documentation applications (25). They also contain comprehensive processing of the text, image, and voice by using multi-media information technology (12). EMRs include patient's follow-up, treatment information and government policy that indicates the hospital's quality medical care activity (28)

In this case, one has to be aware of the fact that EMRs are not a single system rather a collection of inter-locking systems. Several types of information systems widely used in

hospitals like Picture Archiving and Storing System (PASS), Radiography Information System (RIS) and Laboratory Information System (LIS) (26). The integration of all kind of medical information that is related to patient's health within EMR is a central part for the construction of hospital information system. This setting supports patients medical records both inpatient and outpatient environment and used by health professionals to manage health care delivery in health organizations (11).

Finally, it is also believed that record management and accountability is the cornerstone of good clinical practices. Information quality generated and maintained from the medical recording system is a reflection of quality of healthcare provided by the health organizations (23). This alerts healthcare providers to prepare and make explicit rationale for decisions making and justify service in the context of evidence-based practices (21).

In general, the EMR system reduces the incident of data replication as there is only one modifiable medical record. It also correctly captures the state of the patient data at all times. Thus, extraction of medical data for assessment of a patient or follow up will be much easier since there is a single medical record all the time (19).

2.1.7. The SmartCare system

The SmartCare is a nationwide electronic medical Record System designed by the initiative of US Center for Disease Control (CDC) specifically for low resource countries (3). According to the SmartCare mission statement, "the goal of this electronic health record system is to enable the delivery of cost-effective, confidential, high-quality health care for everyone, everywhere, every time, by improving health records. Where existing paper systems are failing to preserve a longitudinal data view, and where health care facilities may often have no telecommunications" (2).

Therefore, in every health facility where the SmartCare software is deployed, softcopy of patient's health record will be saved (4). The saved data easily will be pulled and reused whenever necessary. Since all data is saved there would be no data loss even the patient

losses his medical records. By searching the name of the patient it is possible to continue the treatment and follow up easily (5).

2.1.8. The SmartCare features

“Smart cards are small plastic cards about credit card size; embedded with an electronic memory chip they are capable of storing Patient’s information” (4). The main use of smart card is to store patient’s health information. it also used as patients identification card in order to filter and retrieve medical record and history during the follow-up sessions or visiting different point of health services(2).

The SmartCare system acts as a distributed (standalone) or as centralized (client/server) mode. The distributed mode is used in the absence of online communication infrastructure. Were smart cards are used to transport Patient data between different points of services (6).In the centralized mode, the SmartCare hosts the database on a central server and using online communications infrastructures Local Area Network, Wide Area Network(LAN, WAN), enables all points of services to obtain real time access to Patient’s information(2).

In 2005 the SmartCare began in Kafue District as a pilot project, supported by Jhpiego, to address uniquely African health care challenges in a resource-poor country with a mobile patient population (2). Since 2005, the SmartCare has been deployed in more than 550 clinics and hospitals, in all nine provinces and 72 districts in Zambia. Sites include public, private and military health facilities making it the largest system of its kind in Africa (4).Today, more than 600 users, support staff, managers and trainers are the SmartCare certified. Eventually, all personnel who teach, support or use the SmartCare will undergo this strict and demanding certification process (10). The SmartCare is now also required for any facility in Zambia desiring accreditation to dispense Anti Retro Viral (ARV) drugs for Human Immunodeficiency Virus (HIV) clients(2).

2.1.8.1. Benefits of Electronic medical record

EMR and EHR improve patient safety by improving clinical management (27). Reduce medical errors, lower costs, and improving efficiency and effectiveness of healthcare delivery systems (3). Health professionals, Public health authorities, healthcare managers, researchers, and patients are the main beneficiaries of EHRs (28).

Some of the advantages of EMRs some are easy access to medical records, improved patient and physician relationship, increased patient medical information confidentiality and so on(29). It would be easy to access patient's previous data, possible to investigate any problems associated with drug incompatibility. Additionally accessibility of patient data will facilitate the research studies (18).

For the small amount of patients it is possible to perform the above functions easily but when the number of patients became more it will be time consuming and difficult to perform manually (30). Networked electronic medical system will facilitate staff communication with patients which look for medical advice from expert physician and also it will be easily to access patient laboratory and image data (29). Additionally it can be used rapidly to generate aggregate reports, which should be more complete and accurate (9).

To ensure accessibility of patient's medical information generated by different health institutions, globally having a common medical language and unique medical data exchange protocol is necessary (23). Portability and interoperability of medical data are the key factors for this process. Medical records are considered as a national asset and are valuable sources for medical science researchers (30).

Incorporating multiple functions into the same information system allows reuse of data and help to justify the basic costs of set-up and technical support (15). Health care administrators and managers will have the opportunity to the supervision and evaluation control of their effective healthcare delivery services with the help of the portability and interoperability of EMR system (30).

2.1.8.2. Barriers to Electronic medical records adoption

Key surface barriers to EMR use that emerged as persistent themes from researches data included high initial financial costs, slow and uncertain financial benefits, and high initial physician time costs (8). Underlying barriers included difficulties with technology, complementary changes and support, electronic data exchange, financial incentives, lack or insufficient training and physicians' attitudes are the most common (18).

Implementation of EMR is highly dependent on finance, time and energy. The penetration of EMR is less when compared with other application areas as less than 20% in the US and Canada and also the failure rates are consistently high around 50%"(23) .

Using both paper based and electronic system, slowing workflow, requiring more time enforced physicians to easily shift and increasing physicians' resistance to EMR use (8). Insufficient training or ill-suited classroom training was identified as a barrier. Technical complexity of EMR requires users to have a high level of technical competence (18).

Research output from (31) reported that there is lack of EMR awareness and training in public hospitals. An EMR implementation would not be very effective if not accompanied by necessary training. There is increasing recognition that training, effective change support and stakeholder education are key to a successful transition to an EMR (32). Another 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 (18).

2.2. Review of related literature

PIH-EMR, Peru:-The PIH-EMR is a web based electronic medical record system developed and implemented in 2001 to support the two-year treatment regimen for drug-resistant tuberculosis in the slums of Lima, Peru (33). There were three sites with a total number of 4300 patients in Peru and one site in Philippines with 2900 patients, have received treatment. The system also used to create monthly reports (34).

The system also included all Multi Drug Resistant (MDR-TB) patients and linked to the main laboratories. In addition drug inventory and analysis executed with the help of pharmacy management system. “The medication order entry system has showed significantly fewer error than the previous paper and spreadsheet approaches (17.4% to 3.3%, $P < 0.0075$)” (35).

Drug requirements analysis tools are based on the medications prescribed, and have been shown to match the usage data in the pharmacy to within 3%. The PIH-EMR demonstrates strength and flexibility of a web-based approach when internet connectivity is available (29). The PIH-EMR is also used to create monthly reports for the Global Fund and the Health Ministry. There is an extensive suite of web-based analysis tools for reporting and outcome monitoring (34).

The HIV-EMR system, Haiti: - In seven public health clinics where there are no roads, electricity or telephone service in Haiti, Partners in Health PIH Since 1999 has run a community based HIV treatment program. Based on the system, Satellite-based internet access at each site supports email and web communication (33). From total 4000 patients there was 2000 full patient record. When there is no network connection data entry were available with the help of off line EMR. It is proven to be reliable and popular with health professionals’ .with almost no infrastructure and limited technical expertise the HIV-EMR demonstrate feasibility of medical records system implementation in remote areas and clinics (35).

Care ware, Uganda:-With stand alone database 350 sits in America and 2 in Africa a system developed to support HIV treatment through the Care ware system. Thousands of patients from America and hundreds from Africa found in the program (34). The system provides tracing for Human Immune Virus (HIV) patients and their treatment it is widely used in America hospitals and health centers it provides pharmacy management and inventory services (33).

Lilongwe EMR, Malawi:-Since 2001, in Lilongwe, Malawi a touch screen patient management information system has been used for a wide range of clinical problems in the 216-bed pediatrics department (36).The system being run over a local area network for the client programs in one site. 160 000 patients getting service from the system from them 6000patients are with HIV (37).

SICLOM, Brazil:-Computerized System for the Control of Drug Logistics (SICLOM) used to deliver ARV treatment for over than 100 000 patients by the Brazilian public health system (38).To update patients records separate EMR databases connected on each physician's desktop to the central server by dial-up (36). To deliver these services a number of sites are widespread through the country. It is used to support prescribing and track medication supplies for more than 100, 000.patients.and also believed to be a solution for the challenges of antiretroviral delivery (33).

Botswana:-Highly Active Antiretroviral Therapy (HAART) outpatient clinic in Botswana used optical character recognition technology for seven months to manage 3000 patients in HAART. The pilot run concluded with encouraging remarks for such an information system (34).

FUCHIA: - “Developed by Epicenter, the epidemiology group of Me´decins Sans Frontie`res, to support their HIV treatment projects” (36). FUCHA “developed as a standalone system using MS Access and the Delphi programming language” from its activities performs patient scheduling, report generation and for treatment and follow-up of patients in the health organizations (35).

In Botswana to support the TB program an information system was developed it was built using EpiInfo. (A free stand-alone program from the US Centers for Disease Control [CDC] designed for data collection and analysis in developing countries). In many countries it is deployed in order to support reporting and analysis of their medical services (36).

PDA/Palm systems “In Kwa Zulu Natal, South Africa, a Palm-based system allows secure access to HIV results in remote clinics” (33). Due to their lower cost and outstanding battery life palm-based devices are preferable. Besides their economical advantages these devices are also preferable because they are handled easily by their users (36).

From the researches done in the rural area of Ethiopia, the new patient registration and medical records intervention was implemented on April 2009. Before the implementation there was no master patient index system at the hospital (5). The absence of index card resulted in the duplication of patient medical record number. Moreover there was the disappearance of patient medical records since most medical information was written on pieces of paper. And also the medical records were kept in physicians’ offices (14).

Researches done on 2008 at a rural hospital Amhara region in Ethiopia described a context in which patient registration numbers were replicated, records were lost and patients were assigned new registration numbers (39). Clinical information was recorded on loose scraps of paper and medical records were poorly archived. The authors of the study emphasized the importance of articulating the link between accessible medical records and quality health care (36).

Electronic medical records system in Kenya with the name of Mosoroit Medical Record System (MMRS), has implemented at rural health center (33). Patient registration and patient visit records management activities performed and 60, 000 patient’s information maintained by this system (37). And over 150 000 visits in four years for HIV care, 8000 patients, 3300 of who are currently receiving anti-retroviral drugs (ARVs). In November 2001, the MMRS software was adapted to support the Academic Model for the Prevention and Treatment of HIV/AIDS (AMPATH) project and renamed to AMRS (35).

In Hong Kong Hospital authority manages all public hospitals. Since 1995, they have had electronic patient record sharing between 43 hospitals and 22 home care organizations (33). (Elderly Homes (4,000 MDs)).with the help of the system medical information can

be shared via web based technology to or by a medical doctors. The system has an auto feedback reply feature to notify physicians when patient has been seen by another facility or doctor (37). In remote villages of India to store health records, nurses have been used pocket PC-based system for community visiting. The system can be easily set up for offline view from a web-based EMR (33).

Satellife is using the mobile phone network in Uganda to link PDA-based medical records to a central site. Local healthcare workers collect data on Palm Pilots TM and then connect to a local battery-powered server that connects to a central database via a mobile phone modem (14).

Web-based collaboration and telemedicine systems

For remote diagnosis and treatment decisions by experts and also for consultation and data sharing purpose, several projects have established systems that can be used to support diagnosis and treatment decisions in remote sites with limited bandwidth (37). In South Africa and Peru there is an email the so called **Teemedmail** which is a secure email and web-based telemedicine system under evaluation (35).

Pan-African e-Network Project is a joint initiative of the Government of India and African Union and is funded by the Government of India. It connects 53 PAN African countries and its heads of state primarily provide Tele-medicine, Tele-education, Internet and Voice-Over IP Services. The countries are connected as a one network through Satellite, Fiber optics and Wireless links (2).

Ethiopia Pilot project was initiated to provide Tele-education Services from IGNOU at New Delhi and Tele-medicine services from CARE Hospital, Hyderabad. whereas Black Lion Hospital of Addis Ababa and the Nekemte Hospital in Ethiopia are receiving on-line medical consultation from medical specialists of CARE Hospital, Hyderabad(2).

Adoption of the SmartCare in Ethiopia

The SmartCare software development in Ethiopia is conducted by Tulane University Technical Assistance Program to Ethiopia (TUTAPE's) and Ethiopian software developers in collaborations with Federal Ministry of Health FMOH, Zambia's the SmartCare team and consultants from the United States of America (US) (5). The application was adapted according to the recent Ethiopian Health Management Information System (HMIS) reform conducted by the FMOH. As of 2008, a comprehensive electronic HMIS has been developed and is now being deployed to health facilities in several regions of the country (2).

From Ethiopia Dire Dawa was nominated for the initial phase and chosen as a pilot site. Over 100 clinics and hospitals in the Dire Dawa region have successfully deployed this system. Lately the SmartCare is adopted in St Paul Hospital Millennium Medical College Millennium Medical College in Addis Ababa (6).

The SmartCare deployment in Ethiopia

The deployment of the SmartCare includes building/strengthening information communication technology (ICT) infrastructure (Hardware, Software, & Networking components) and the installation and training of the SmartCare software application at the health Facilities(5). The SmartCare is installed and introduced in phases. The initial installation/introduction phase starts at the medical record room where the bulk of data encoding takes place followed by other Clinical areas (2).

Clinicians or data entry clerks are the responsible persons to encode patient information into the SmartCare. While the patient is in hospital or after the patient left the hospital Data encoding or viewing could take place (4). Some of the SmartCare system screenshots are shown on figures 1 through 6.

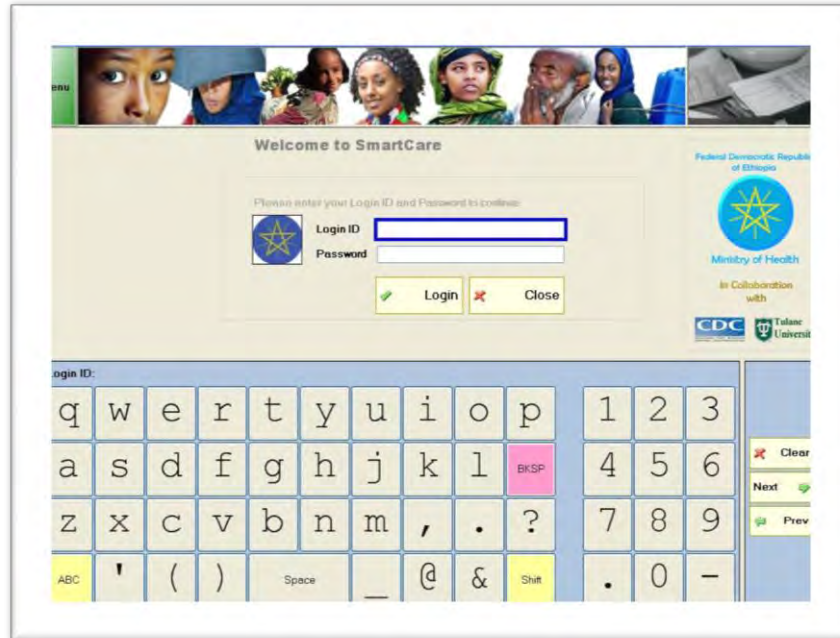


Fig 1. Login screen. This is the main page for users’ login. Inputs can be entered h touch screen, mouse and keyboard

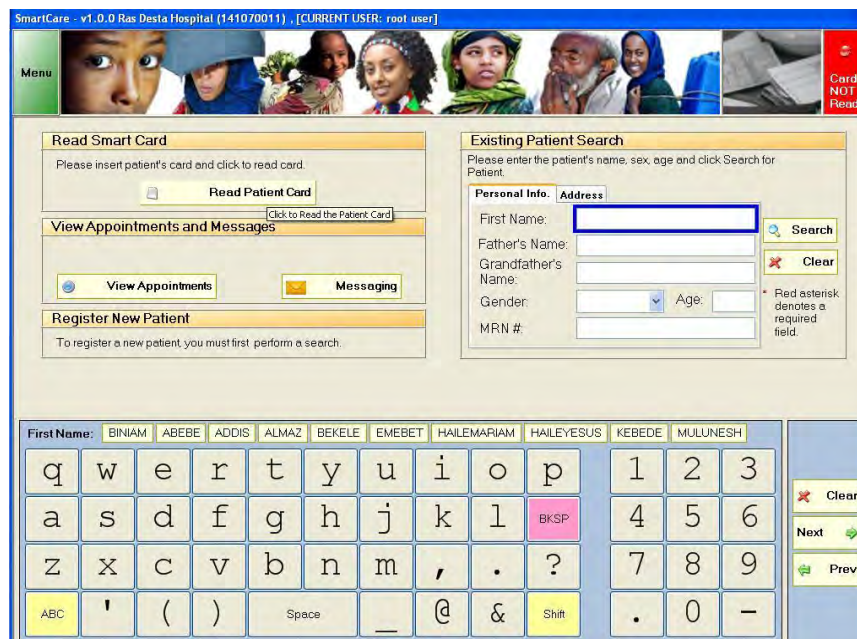


Fig2 Search/Register Patient form. This window helps to search existing patient either with their smartcard or using name as a search term. The other tab is designed to register a new patient.

Fig 3.Diagnosis. This window is for viewing patient’s history, physical examination, visit information, and clinical symptoms

Fig 4.Laboratory Order Entry Form. This module is used by doctors to order for laboratory. This is one logical bridge between doctor and laboratory technician.

Fig 5. Prescription Form. This helps for doctors to order medicine for their patients. They can find list of drugs from the dropdown menu, they can decide the prescription information like dose, duration, frequency and so on.

Fig6. PDX Form. Diagnosis and Treatment form

CHAPTER THREE

3. Methodology

Descriptive quantitative and qualitative research method used for this study

3.1. Study setting

The study has been conducted in Saint Paul Hospital Millennium Medical College (SPHMMC) particularly in surgery inpatient department where inpatient medical service is provided; from April 2014 up to May 2014. .

St. Paul Hospital Millennium Medical College is found in Addis Ababa and is administered by Federal Ministry of Health (FMOH) it was built in 1969 G.C. Since , 2007 G.C. It has become a medical college by opening a medical school with the initiative of the Federal Ministry of Health. and its core services are medical care, teaching and research .The college currently has 449 medical and 40 Nursing specialization students peculiar in the country because of its new and integrated curriculum It has more than 950 clinical and non clinical staffs (out of which 68 are academic staffs) that provide medical specialty services to an estimated 110,000 – 115,000 people annually who are referred from all over the country with its 345 beds and an average of 700 patients and clients visit the hospital as outpatient and emergency daily.

The hospital provides health care through its different clinical departments which are departments of General surgery, Internal Medicine, Obstetrics and Gynecology, Pediatrics, Emergency, Urology, Neurology, Orthopedics, Psychiatry, Ophthalmology, ENT, Dentistry and Maxillofacial surgery, Radiology, Anesthesiology, ICU (Intensive care unit), ART (HIV care), Endoscopy, Physiotherapy, Laboratory and pharmacy (7).

The surgery department covers 37 %(3) of inpatient wards and 33 %(114) of beds found in the hospital. This number made the surgery inpatient department the biggest inpatient department in the hospital. Even though the problem existed in every department it was infeasible to include all of them in this project due to time constraints. That is the reason why the surgery inpatient department is selected for this project. The college gives both

the medical and teaching services .So that, the patient data in the department manipulated for the patient treatment, teaching and research purposes.

3.2. Study population

For the quantitative Study

All of 42 staffs (Health Professionals) working in the surgery inpatient department of St Paul Hospital Millennium Medical College (SPHMMC) who were present at work during the data collection period.

For the qualitative Study

Higher management officials (3) they were ; medical service vice provost, administrative & development vice provost and nursing directorate. And also from Information technology professional (1) the head of the department has been included. The reason why the above interviewees included in the project was, the medical service vice provost is in charge of the medical services takes place in the hospital. The administrative & development vice provost is responsible for financial conditions related to the SmartCare.

The nursing directorate is included in the study because most of the respondents working in the department who are expected to utilize the SmartCare were nurses. So that nursing directorate is in charge of the nurses' activity in the department. Regarding information communication technology department they are in charge of any activities related to the SmartCare system.

3.3. Data collection tools

In the study all health professionals in the department are included. In order to make the conclusion valid and reliable and also the number of respondents was small, complete enumeration of respondents was chosen.

The data collection instrument for the quantitative method was structured questioner and some of the questions were adopted from HER manual for developing countries and modified accordingly. The rest questions were self developed and to obtain the validity pilot test in medical department performed and some correction made. The questioner was prepared with the response options of multiple choice and write short responses, which used as a control questions to indicate the reliability of the respondents answer (Annex I). These types of response options are easy to fill out, takes little time, keeps the respondents on the subject is relatively objective, and quite easier to tabulate and analyze.

After having their verbal consent data on health professional's knowledge, attitude, practice and their barriers for the utilization of the SmartCare system collected by administering a pretested structured questionnaire. Each health professional filled one questioner. Also information of the health professional's sex, age, profession, educational level and year of service has been collected.

For qualitative study the data collection tool was in-depth interview, with the use of open-ended questions the type of interview was semi structured. After having their verbal consent the interview is conducted to 4 respondents

3.4. Data management and analysis

After data collection process, the data was checked for completeness, consistency and clearance. Data has been entered with the help of Statistical Package for Social Science (SPSSv.20). Descriptive statistics has been computed to determine the frequency distribution of the responses which was presented in tabular form. The frequency distribution of each variable was discussed as in parallel with the objective, in comparison with each other.

The Data obtained from qualitative methods using the interview was organized by question, transcribed and coded after looking how all the respondents responded to each questions. The analysis was done focusing on the whole interview for common themes. Data were reviewed within the themes or categories as; Interview of higher management

officials organized in to four thematic areas which were; knowledge, attitude, barriers and solutions and the third one was organizational support and activity.

The interview with information communication technology professional also organized into four thematic areas like; knowledge, attitude, barriers and solutions and deployment of the SmartCare system. Selected quotes were included in the analysis (discussion) to illustrate the meaning of the category.

3.5. Intervention and method for problem solving

3.5.1. Organizing a team

There was a need of organizing a team to achieve the objective of this project. So that, members who were directly or indirectly involved in the utilization of the SmartCare system including the higher management officials are incorporated. Medical service vice provost, Administrative and development vice provost, Nursing directorate, Policy and Plan officer, head of information communication technology department, and the head of surgery inpatient department were the members of the team.

The team is organized in order to initiate higher management officials and to make them to be active participants of this project. Their initiation would be very encouraging on the revitalization of the SmartCare system. In addition, it will facilitate the redeployment of the system in order to make the department as well as, the hospital for enabling to deliver quality health service.

3.5.2. Training on the benefits of the SmartCare system

The assessment result of the project is presented and discussions on the results made for (13) trainees in the first day and (14) trainees in the second day to a total of (27) trainees those who don't have knowledge on the SmartCare system. In addition to that in order to increase their awareness level half day awareness buildup training on the benefits of the SmartCare system is given for two days. Pre and post test is given in order to evaluate the knowledge and attitude change of the respondents.

3.6. Methods of dissemination of results

The results found from this project will be disseminated to Addis Ababa University School of Information Science and School of Public Health, Department of Health Informatics. The method of dissemination will be through hard and softcopy of the project report. The hard copy of the assessment results and proposed solution of the barriers is given to Saint Paul hospital millennium medical college.

3.7. Operational definition

Inpatient department: A place where patients admitted and get treatment

Medical records: A repository of patients' health information.

Patient: people who get service from health facilities

Project: is a temporary, non-repetitive, goal-oriented activity that has measurable outputs and a particular set of constraints.

3.8. Ethical clearance

The project was conducted after getting permission from the Ethical Clearance Committee of Addis Ababa University School of Public Health and Institutional Review Board (IRB) of Saint Paul hospital on April 21/2014. Protection of the rights of the respondents ensured by giving them due freedom to participate/not participate in the project assessment. Privacy and confidentiality maintained during data collection process. The purpose, general content and nature of the project explained to each respondent to obtain a verbal consent before inclusion into the project assessment.

CHAPTER FOUR

4. Results and Discussion

4.1. Results

In this project an attempt was made to assess the knowledge, attitude and practice of health professionals towards the utilization of the current medical recording system and their barriers to utilize the system in surgery inpatient department of Saint Paul Hospital. The system was installed and functional until its gradual abandonment. The assessment result of the project is presented as follows.

4.2. Socio-demographic characteristics of the respondents

Among the respondents 20(47.6%) were males and 22(52.4%) were females. regarding age of the respondents 27 (64.3%) were between the age group of 20-30, 10 (23.8%) respondents between 31- 40 age group, 4 of them between 41-50 and 1 was 50-60.

From the health professionals 3 out of 42 were physicians (case team leaders), 36 (85.7%) were nurses, and 3 were health officers. The respondents educational background was 4 were 2nd degree graduates, 21(50%) 1st degree holders and 17(40.5%) had diploma. Regarding their work experience 36(85.6%) has served for less than 5 years in St Paul Hospital Millennium Medical College, 2of them between 6-10 years, and the rest 4 have served above 11 years. This all presented as follows on table-1

Table 1 Socio demographic characteristics of respondents in surgery inpatient department of SPHMMC, AA, Ethiopia, April, 2014

Variable	Category	Frequency	Percent
Sex (n=42)	Male	20	47.6
	Female	22	52.4
	Total	42	100.0
Age (n=42)	20-30	27	64.3
	31-40	10	23.8
	41-50	4	9.5
	50-60	1	2.4
	Total	42	100.0
Profession (n=42)	Physician	3	7.1
	Nurse	36	85.7
	Health officer	3	7.1
	Total	42	100.0
Educational level (n=42)	2 nd degree	4	9.5
	1 st degree	21	50.0
	Diploma	17	40.5
	Total	42	100
Year of service in St Paul Hospital Millennium Medical College (n=42)	<5	36	85.6
	6-10	2	4.8
	11-15	2	4.8
	20+	2	4.8
	Total	42	100.0

4.3. Knowledge of health professional on the SmartCare system

Of the total 42 respondents only 10 asserted to have knowhow on the SmartCare system. Among this 5 of them said their source of information was St. Paul Hospital, the other 3 from the internet and the rest two got the information from different areas. From those (10) with knowledge of the SmartCare only five has been trained on the SmartCare system organized by St. Paul hospital. 4 of them explained the training prepared them to utilize the system.

Table 2 Knowledge of respondents about the SmartCare system in surgery inpatient department of SPHMMC, AA, Ethiopia, April, 2014

Variable	Category	Frequency	Percent
Knowledge on the SmartCare(n=42)	yes	10	23.8
	No	32	76.2
	Total	42	100.0
What knowledge			
Source of information (n=42)	My hospital	5	11.9
	internet web	3	7.1
	others	2	4.8
	Total	10	23.8
Training on the SmartCare (n=42)	yes	5	11.9
	Total	5	11.9
Training given by (n=42)	St Paul Hospital Millennium Medical College	5	11.9
	Total	5	11.9
Joining the training (n=42)	Training given to all staffs	5	11.9
Adequacy of training (n=42)	Fully prepared	2	4.8
	Mostly prepared	2	4.8
	Somewhat prepared	1	2.3
	Total	5	11.9
Training for new health professionals (n=42)	No	42	100.0

From the qualitative findings all of the interviewee answered that they have knowledge on the SmartCare system and gave explanation on what the SmartCare system. For instance one of the higher management officials explains the SmartCare as;

“The SmartCare is a data base which is used to put all systems found in the hospital from the card room up to the inpatient department”

The knowledge gap of the health professionals for the utilization of the SmartCare system explained as one of the barrier from one of the interviewees.

4.4. Attitude of health professionals on the SmartCare system

Regarding the attitude of health professionals 10 out of 42 respondents viewed the SmartCare systems as important input. They also agreed on the need for using the SmartCare system in their daily activities, described benefit of the SmartCare system and drawbacks of paper based system by contrasting them. For example, as to advantages of the SmartCare system they cited computerized system improves patient information accesses, using electronic medical recording system avoids illegibility of hand writing and computer needs small area.

On the other hand, as they enumerated disadvantages of the paper based recording system are: patient record loss is common, incompleteness of patient medical data, illegibility of hand writing, paper based system needs large area for medical records storage. The rest of the result presented on table -3

Table 3 Attitude of respondents towards the SmartCare system in surgery inpatient department of SPHMMC, AA, Ethiopia, April, 2014

variable	Category	Frequency	Percent
importance of the SmartCare system (n=42)	Yes	10	23.8
Advantages of the SmartCare system (10)	needs small area, Improve information accesses Avoid illegibility problem		
disadvantage/s of paper based recording system (10)	Patient record loss, Data in completeness, Illegibility of hand writing, holds large area		
Utilizing the SmartCare system in daily health care activity (42)	agree	10	23.8

From the qualitative findings of interview regarding their attitudes towards the utilization of the SmartCare system; four of the respondents agreed with the idea of “SmartCare

system improve provision of quality health care service”. One of the interviewees explained the above idea as;

“SmartCare system improves health care delivery in many ways some of them are it saves time , maintains data accuracy, the system prevents data replication, card loss protected even if the patient loses his index it is possible to find patient information from the system by his name” .

4.5. Practice of health professionals on existing medical records system

Only (5) respondents who are trained on the SmartCare system explained the system was deployed previously. All respondents working in the surgery inpatient department 42 (100%) explained that currently the SmartCare system is not utilized in the department. Some of them listed lack of training, disconnection of disconnection of the system and work load of health professionals were the reasons for the non utilization of the system. The availability of a computer in their department is explained by all respondents 42 (100%). About their current computer skill 36(85.7%) explained their computer skill is fair and above and the rest (6) said their computer skill is poor.

All respondents 42 (100%) agreed with that the current available recording system in the department is fully paper based. They gave a list of patient information recorded in the paper based medical record system; patient treatment and investigation results recorded completely, socio demographic data of the patient, past medical history, physical examination and discharge summery recorded partially. About the patient information utilization; it is explained that the information utilized by health professionals for treatment and statistics purpose.

Table 4 Practice of respondents on the SmartCare system in surgery inpatient department of SPHMMC AA, Ethiopia, April, 2014

Variable	Category	Frequency	Percent
previous deployment of SmartCare in the department (n=42)	Yes	5	11.9
	No	18	42.9
	I don't know	19	45.2
	Total	42	100.0
Utilization of the SmartCare by health professionals (n=42)	Not at all used	42	100.0
	Total	42	100.0
Reason for non utilization	Lack of training, disconnection of the system and work load of health professionals.		
Availability of computer in the department (n=42)	Yes	42	100.0
	Total	42	100.0
Current computer skills (n=42)	Very good	3	7.1
	Good	9	21.4
	Fair	24	57.1
	Poor	6	14.3
	Total	42	100.0
Currently available medical recording system (n=42)	Paper based	42	100.0
	Total	42	100.0
Kind of patient information recorded in currently available system	Treatment and test results recorded fully Socio demographic data and Past and present medical history recorded partially		
For what purpose patient information used(n=42)	For treatment and statistics	42	100.0
	Total	42	100.0

The above finding was further strengthened with the finding from the interview as that explained, the current utilization of the SmartCare system as interviewees;

“Except card room the SmartCare system is fully disconnected. Apart from the relocated and the new opened clinical areas the hospital is networked. The connection type is star topology and the medium is both wired and wireless connection”.

4.6. Barriers related to the utilization of the SmartCare system

Regarding the barriers in the utilization of the SmartCare system 35(83.3.1%) of health professionals responded that lack of training affects the utilization of the system at a very high level, only 7 respondents stated it affects highly. Concerning lack of ICD codes/diagnosis in the system from those who have got training 4 out of 5 respondents showed it has low effect on the utilization and 1 responded it has a moderate effect.

Assessment result showed that 5 (all) of respondents who took the SmartCare training explained that, Problems related with system connection has very high effect on the utilization of the SmartCare in the department. Regarding the effect of increased work load on health professionals, from the total respondents; 28(66.7%) of them responded that it has very high effect, 12 (28.6%) said has high effect.

Concerning the complexity of the system on the utilization of the SmartCare system from those who have got training (4)of the respondents responded that the complexity of the SmartCare system has moderate/ low effect and the rest 1respondent rated that it has very low effect on the system utilization.

Table 5 Barriers in the utilization of the SmartCare system in surgery inpatient department of SPHMMC AA, Ethiopia, April , 2014

Variable	Category	Frequency	Percent
Lack of training on EMR system (n=42)	High	7	16.6
	Very high	35	83.4
	Total	42	100.0
Lack of codes/ diagnosis (n=42) (responded only trained)	Low	4	9.5
	Moderate	1	2.4
	Total	5	11.9
Problem related with connection (n=42)	Very high	5	11.9
	Total	5	11.9
Increase work load for health professionals (n=42)	Moderate	2	4.7
	High	12	28.6
	Very High	28	66.7
	Total	42	100.0

One of the interviewees is explained about the assessment which was done previously by the organization which pinpointed barriers;

“Assessment was done 2 years back by the hospital and the barriers found from the assessment were, power backup problem, electric power interruption, incapability of the system to generate individual report. Its incapability to generate a report made the system not to be implemented in Anti Retroviral Therapy (ART) clinic. The other problem was physicians’ resistance to enter patient data especially in outpatient department. Concerning the solution Tulane donated server for backup problem but the other problems kept unresolved“. Even though it is associated with the system incapability to generate a report, using non integrated information systems also explained as a barrier from one of the interviewees.

Also one of the higher management officials stated that lack of training and high turnover of health professionals in the hospital affected the utilization of the SmartCare system at a very high level.

“It has been 4 years since training on the SmartCare system given to all hospital staffs. There is a high turnover of health professionals in the hospital, related to that most of the hospital staffs are new and they are not familiar with the system. Incorporating the use of EMR in the curriculum of medical educations would be the best solution to increase the awareness of all health professionals about EMR benefits”.

Again work load, lack of enough familiarity with the technology and shortage of ICT professionals explained by one of the higher management official as a barrier;

“Using both paper based and the SmartCare system creates high work load and time constraint for doctors. Because of that it became difficult to continue using the SmartCare system. The second challenge was lack of enough familiarity with the technology and the system became discouraging for some staffs”. “The number of Information Communication Technology (ICT) supporting staffs in the hospital is so small. It is so difficult to address each problem related to the SmartCare system in the hospital only with three professionals’ additional information communication technology professionals needed to overcome the problem.”

The reason of system disconnection explained by one of the interviewees as: - “The installation of wired network connection made the SmartCare system is to be disconnected.”

4.7. Discussion

Knowledge

From the above result Knowledge gap and lack of training on the SmartCare system clearly observed. Most of the health professionals found in the department gave service less than 5 years and training was given around 4 years back. The high turnover of health professionals is also explained. This high turnover in addition with absence of continuous training resulted with the large number of new health professionals with knowledge gap.

It is also prevailed that utilization of technology without technical training is unlikely. Consequently, lack of training became one of the barriers for the health professionals to utilize the system. This assessment result is in line with the systematic literature review conducted Poor follow-up with technical issues, general lack of training and support for problems associated with the EMR are major barriers to system utilization (32).

There is increasing recognition that training, effective change support and stakeholder education are key to a successful transition to an EMR (18). Training is considered central to any healthcare delivery system. The use of computers and IT by health science will result in more effective medical training (32). While, in developing countries among healthcare professionals little information is available on the level of training and utilization of IT (8).

Attitude

The attitude of respondents towards the use of the SmartCare system only those who have knowledge agreed with its importance and the idea of utilizing the system in their daily activity. As well, they explained some of the advantages of the SmartCare system and disadvantages of paper based recording system. Because of their awareness they demonstrated positive attitude towards the SmartCare system. But those who don't aware of the system answered that they don't know about its importance or the idea of its daily utilization.

Findings from other studies conducted on the utilization of electronic medical recording system stated; Quality training can help significantly in reducing anxieties about using a new system (18). lack of skills leads the health professionals to view the EMR system as extremely complicated system (32).

Practice

From the respondents' explanation, currently the paper based medical records system utilized in the department exclusively. The patient information not fully recorded on the existing system. From this project finding in the department, the paper based system was not handled in a way patient information should be handled.

Poor handling of patient data resulted in data incompleteness and provision of poor quality health care service. Additionally it proves the negative impact of paper based recording system. In order to overcome this data incompleteness and have quality patient information, the replacement of paper based system by electronic medical records system is mandatory.

This result is supported with other study results: information quality generated and maintained from the medical recording system is a reflection of healthcare quality provided by the health organizations (23). This alerts healthcare providers to prepare and make clear justification for decisions making and justify service in the context of evidence-based practices (21). The inefficiency of paper based system observed repeatedly and also continuously failing to meet the care provider's needs. In order to provide quality health care the basic paper-based medical record keeping is not sufficient and needs to be replaced by more efficient electronic medical records (EMRs) systems (42).

Other research results expressed that quality health service could only provided if there is a good medical records' keeping system as well as the availability and accessibility of effective and quality patient information(41). The other finding explained that the main

aim of having electronic medical records system in many health organizations is to be able to retrieve patient information for the purposes of patient care, statistics, research and teaching (25).

Barriers

From this project finding, lack of training and disconnection of the system rated as they affect the utilization of the SmartCare system at a very high level. As it was discussed previously having training is required to be successful in the utilization of any technology.

According to the study conducted deficient of training was often identified as a barrier, either because there was not enough training or classroom training was ill-suited to the trainees (18). There is increasing recognition that training, effective change support and stakeholder education are key to a successful transition to an EMR. An EMR implementation would not be effective if not accompanied by necessary training (8).

The incapability of the system to generate individual patient report is related with the work load on the users. It is explained that 1 physician expected to see 40 patients with in a day. Seeing 40 patients and recording information with both the SmartCare and paper based systems resulted in increased work load on the user. Consequently, work load increased and productivity decrease.

Besides the guarantee to improve the quality, safety and efficiency of healthcare, in parallel electronic medical recording system has rich potential to improve integration between information systems (20). But in this project, the non integration of laboratory, imaging department and ART information systems explained by the respondents as a barrier. Again the incapability of the system to generate individual report enforces to deploy other information systems in different departments.

Lack of adequate electronic data exchange between the EMR and other clinical data systems became a barrier (such as lab, radiology, and referral systems (8). Other studies

conducted on 2004 showed that in nine of the eighteen clinical areas where the study took place, Physicians could not view any electronic lab results within their EMR (18).

High turnover of health professionals and shortage of information communication technology (ICT) supporting professionals were other stated barriers. ICT professionals are the focal persons concerning the SmartCare system utilization .But; the number of these supporting staff in the hospital is small. It is so difficult to address each problems related to the SmartCare system with only three professionals. Thus, in order to achieve the utilization of the SmartCare system increasing their number is crucial.

Regarding the organizational support for the fulfillment of materials three of the higher management officials agreed on that. The hospital management officials explained their commitment to support and take a sense of duty for the fulfillment of necessary materials and equipment shortage. And also to solve problems related to connection failure for the utilization of the SmartCare system.

4.8. Proposed solutions to avoid the barriers and revitalize the system

In order to revitalize the SmartCare system the barriers which hinder its utilization has to be identified and avoided. To come up with the solutions on this project, the knowledge gap, attitude and practice on the existing medical records system of health professionals assessed. And the barriers which affected the system utilization identified. In the mean time, some points are raised by the users of the system how to overcome the existing barriers to utilize the SmartCare system in the department. The raised points and the proposed solution are as follows.

- Knowledge gap illustrated among the respondents at a very high level so that; a preliminary awareness build up training on the benefits of the SmartCare should be given to increase their awareness level.

- The connection problems are identified. So that the hospital management has to follow strictly the process of reinstallation of new wireless connection also the relocated and new clinical areas have to get connected.
- The incapability to generate individual report is explained. This problem might be associated with the poor requirement analysis done before the system deployment. Thus, requirement analysis before upgrading the system would be helpful to meet users need.
- From the project assessment result lack of training and high turnover of health professionals exhibited. Thus, initial and ongoing training would be helpful to overcome lack of training with in both previous and new health professionals. The ongoing practice serves as an update for the previous ones and as an initial for the new ones.
- Increasing the number of supporting staffs of information communication technology professionals' is crucial in order to achieve the utilization of the SmartCare system.
- While the SmartCare system starts over maintaining the integration of other information systems in different departments would be helpful in order to get timely information for decision making.

4.9. Interventions

4.9.1. Intervention on connection problem

Wireless connection was installed previously by TUTAPE only for the clinical areas for the SmartCare system implementation. Before two years wired network connection installed to connect all clinical and administrative departments by the hospital. During this process the previous wireless connection disconnected. Consequently, the SmartCare system activity totally discontinued.

After being a college St Paul Hospital Millennium Medical College is started to open new departments and relocate some clinical areas to expand the medical services provided by

the hospital. Those new and relocated areas were not networked with the previous connection.

Based on the proposed solutions, the organized committee took responsibility to enable the hospital management to communicate with TUTAPes'. After their communication, the technical group from Tulane and ICT professionals of St Paul Hospital made an analysis to install new wireless connection. Since, all the material and financial support regarding the SmartCare system found from TUTAPes', the technical group submitted the request of needed wireless devices and waiting for the response of the TUTAPes' management.

4.9.2. Training

To solve issues of knowledge gap, preliminary awareness buildup training was given to (27) respondents with knowledge gap and also Pre and post test given to evaluate their awareness and attitude change after the training. On the pretest assessment it is seen that they could not differentiate the advantage and disadvantage of SmartCare system and paper based systems. However, according to the post test result they could able to indicate advantages of SmartCare systems and disadvantages of paper based system also the Positive attitude towards the SmartCare system is exhibited by their acceptance to the importance of SmartCare system and the agreement with the idea of utilizing SmartCare in their daily activity .The motivated attitude of health professionals is a promising factor for the utilization of the system in the department after its redeployment.

4.10. Strength and limitation of the project

4.10.1.Strengths

The strength of this project is: Barriers which affect the utilization of the system identified and possible solutions to overcome the barriers proposed. Higher management officials are initiated to be active participant of the project. Knowledge and attitude of respondents increased after the training and also an intervention taken to start resolving connection problems. In addition it is believed that the identified project results can be

used as base line information to conduct post implementation assessment and other related projects/researches

4.10.2.Limitations

This project was limited to surgery inpatient department shortage of time was a big constraint during this project work. The most of all was lack of similar project work in the area made it difficult to compare the achievement made.

CHAPTER FIVE

5. Conclusion and Recommendation

5.1. Conclusion

In this project assessment the information gap of the knowledge, attitude, practice of health professionals and their barriers to utilize the SmartCare system identified. For the identified barriers possible was solutions proposed and some interventions made. The conclusion of the project presented as follows.

From the project assessment result Knowledge gap of the respondents and lack of training for new health professionals on the SmartCare system was illustrated. That indicates the absence of continuous training resulted in a large number of new respondents with knowledge gap. Regarding the attitude of respondents' health professionals who were aware of the SmartCare system exhibited positive attitude towards the utilization of the system.

Concerning the practice of existing medical records system data incompleteness and poor handling of medical records illustrated. Data incompleteness reflected the negative impact of paper based system and it also indicates the requirement of the paper based system to be replaced by electronic medical records system.

Other than the above explained, the other barriers found to be affecting the utilization of SmartCare system were the incapacity of the system to generate individual patient report, workload on health professionals, non integration of the information systems, the presence of non connected areas, the small number of information communication technology professionals and high turnover of health professionals were the major ones.

The hospital management is initiated and committed to made interventions for the accomplishment of this project objective. Concerning the network problem, baseline assessment made to reinstall wireless connection and incorporate those relocated and new opened clinical areas. The awareness buildup training on the benefits of the SmartCare

system was given based on the proposed solution was changed the awareness and attitude of the trainees.

5.2.Recommendation

Based on the project assessment findings, the following recommendations forwarded to St Paul Hospital Millennium Medical college;

- Poor handling of patient data is illustrated by data incompleteness. Redeployment of the SmartCare system is the better mechanism to protect patient information from poor handling.
- The initiation and commitment of the hospital management should be continued to avoid the barriers and to accomplish the redeployment of the SmartCare system.
- Having strong relation with donors working on EMR such as TUTAPE, can help to sustain and improve the acceptance, implementation and usage of the SmartCare system.
- Continuously assessing the impact of the SmartCare systems utilization on users by the hospital management after its redeployment can provide information which will serve to detect and prevent utilization failure.
- Problems associated to the software are not explained by the health professionals, which might be associated with unfamiliarity to the system. The problems associated with the system should be investigated when the system restarts by other investigator.
- A good start is seen to resolve the connection problem the project should be continued to resolve all the barriers and to implement the proposed solutions.

Based on the project assessment findings, the following recommendation forwarded to Addis Ababa University Medical faculty;

- In order to eliminate the awareness gap of health professionals the importance of EMRs and their applications should be an integral part of the curriculum of medical education programs at all levels.

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Annex I

Addis Ababa University School of Information Science and School of Public Health

Title of the project: Strengthening electronic medical records system Department of Surgery in Saint Paul Hospital Millennium Medical College.

Dear respondents

I am undertaking a project on electronic medical records system for partial fulfillment of the requirement of master's degree in health informatics at AAU. I am kindly request you to participate in this survey which focuses on assessing the knowledge, attitude, practice related to EMR and identifying barriers on utilization of Smart care (EMR) system. The proposed project doesn't have any in human treatment of research participants and any physical harm, social discrimination, psychological trauma and economic loss. The result of this project assessment will entirely used to solve the problems in the system utilization and also for academic purpose.

I assure you that all the information you will provide during data collection process will kept confidential. Your participation in this project is entirely voluntary. You have the right to with hold information, skip question to answer or to withdraw from the study any time. You have the right to ask information at any time in the process of project work.

To save your precious time, I presented most of the questions with the possible answers. Please choose the answer which best explains your situation by putting “√” mark in the corresponding space. Your precious effort in completing this survey questionnaire is greatly appreciated

Thank you

Part I Socio demographic data of health professionals

No	questions	Response option	code	Remark
1	Sex	a. Male b. Female		
2	Age	a. 20-30 b. 31-40 c. 41-50 d. 51-60		
3	Profession	a.. Physician b.. Nurse c.. Health officer		
4	Educational level	a. 2 nd degree b. 1 st degree c. diploma		
5	Year of service in St Paul hospital	a. <5 b. 6-10 c. 11-15 d. 16-20 d. > 20		

PART II Knowledge of health professionals on Smart care (EMR) system

No	Question	Response option	Code	Remark
1	Do you know about Smart care system?	a. Yes b. No		
2	If yes what do you know about Smart care?			
3	What was your source of information?	a. My hospital b. Internet web site c. From School d. Others specify		
4	Have you got training on Smart care system	a. Yes b. No		
5	Who gave you the training?	a. St Paul hospital b. FMOH c. Others		
6	How did you join the training?	a. Chosen by the organization b. Training given to all staffs c. Other way specify		
7	Could you explain how adequately the training prepared you to utilize the smart care system?			
8	Did your organization give training on Smart care system for new health professionals	a. Yes b. No c. I don't know		

PART III Attitude of health professionals on Smart care (EMR) system

No	Question	Response option	Code	Remark
1	Do you think that Smart care system important	a. Yes b. No c. I don't know		
2	Could you list some advantages of Smart care system?			
3	Could you list some disadvantages of paper based recording system?			
4	Do you agree with the idea of utilizing smart care system in your daily health care activity?	a. Strongly agree b. Agree c. Moderately agree d. Disagree e. Strongly agree		

PART IV Practice of health professionals on Smart care system

No	Question	Response option	Code	Remark
1	Does Smart care system deployed in your department	a. Yes b. No c. I don't know		
2	If deployed, is it currently utilized by health professionals as expected?	a. Yes b. Below expected c. Not at all used		
3	If not what are the reasons for non utilization?			
4	Is there a computer in your department?	a. Yes b. No		
5	How do you rate your current computer skill?	a. Excellent b. Very good c. Good d. Fair e. poor		
6	What kind of medical records system are you currently using in your department?	a. Paper based b. Smart care system c. Both		
7	What kind of patient information recorded within currently available system? Does it recorded completely?			
8	For what purpose does the patient information used by health professionals?			

PART V Barriers for the utilization of Smart care system

There are many factors which affects usage of electronic medical records system. In order to identify the barriers, rank the following factors at what degree they affect the utilization of Smart care system in your organization

SN	Factors	Rank				
		Very Low	Low	Moderate	High	Very High
1	Lack of training on Smart care system					
2.	lack of ICD codes/ diagnosis in the system					
3	Problems related with network connection					
4	Increase work load for health professionals					
5	Lack of belief in Smart care system reliability					
6	Complexity of the Smart care system					
7	What can be done to increase usage and fulfill the promises of Smart care system- _____ _____ _____ _____					

Annex II

Interview for management officials

1. Do you know about Smart care system?
2. Could you explain about smart care system?
3. Does smart care system ever deployed in your hospital?
4. Does it currently utilized in the hospital?
5. Do you think that Smart care system might improve provision of quality health care service?
6. How could it improve quality health care service?
7. For what propose does the patient information used by health care managers?
8. Does the hospital management committed to support and fulfill the necessary equipments, hardware and infrastructure for the utilization of the smart care system?
9. What was the success of Smart care system in St Paul hospital?
10. Are there any barriers for sustainable implementation of Smart care system?
11. If any, what are the common barriers for the Smart care system utilization?
12. What have been made organizationally to alleviate them?
13. What can be done to increase usage and fulfill the promises of Smart care system?

Interview for information technology professionals

1. Do you know about Smart care system?
2. Could you explain about smart care system?
3. Does smart care system ever deployed in your facility?
4. Does the facility fully networked with all clinical support areas?
5. What was the type of connection?
6. Do you think that Smart care system might improve provision of quality health service?
7. How could it improve quality health care service?
8. Does it currently utilized in the organization?
9. Are there any barriers for sustainable implementation of Smart care system in the organization?
10. If any what are the common barriers for Smart care system utilization?
11. What have been made organizationally to alleviate them?
12. What can be done to increase usage and fulfill the promises of Smart care system?

Annex IV

Saint Paul Hospital Millennium Medical College

Vice Provost for Medical service

Subject: Training of surgery inpatient department health professionals on the benefits of smart care system

First of all I would like to thank for the continuous support that the hospital is providing me to study my postgraduate program in health informatics in Addis Ababa University School of Information Science and School of Public Health. As the requirement for the partial fulfillment of the postgraduate I have been accepted to work on the title of **“Revitalizing the use of Smart care system of surgery inpatient department in St Paul hospital Millennium Medical College”**

I have completed the project assessment to identify the existing barriers that hinder the utilization of Smart care system in surgery inpatient department. According to the assessment result the majority of the health professionals working in surgery inpatient department are not aware of Smart care system, but they all are interested to know about this system. To achieve the objectives of the project I am preparing training on the benefits of Smart care system

Hence, I kindly request your permission in order to give the training for the health professionals. The proposal for this training is attached with this application

In addition I earnestly request your esteemed organization to arrange the training hall to conduct the training.

I would like to thank so much in advance for your support!

Yeshimebet Kassahun

Approved by _____

Signature _____

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

HEALTH INFORMATICS PROGRAM

Project Identification Brief:

**TRAINING OF SURGERY INPATIENT WARD HEALTH
PROFESSIONALS ON THE BENEFITS OF SMART CARE
SYSTEM**

By Yeshimebet Kassahun

May/2014

1. Background

Smart Care is a nationwide electronic medical Record System designed by the initiative of US Center for Disease Control (CDC) specifically for low resource countries. According to a Smart Care mission statement, “the goal of this electronic health record system is to enable the delivery of cost-effective, confidential, high-quality health care for everyone, everywhere, every time, by improving health records. Where existing paper systems are failing to preserve a longitudinal data view, and where health care facilities may often have no telecommunications.”

In every health facility where the Smart care soft ware is deployed, soft copy of patient’s health record will be saved. The saved data easily will be pulled and reused whenever necessary. Since all data is saved there would be no data loss even the patient losses his medical records. By searching the name of the patient it is possible to continue the treatment and follow up easily.

Smart Care software development in Ethiopia is conducted by Tulane University Technical Assistance Program to Ethiopia (TUTAPE’s) and Ethiopian software developers in collaborations with federal ministry of health FMOH, Zambia’s smart care team and consultants from the United States of America (US) . The application was adapted according to the recent Ethiopian health management information system (HMIS) reform conducted by the FMOH. As of 2008, a comprehensive electronic HMIS has been developed and is now being deployed to health facilities in several regions of the country.

For the deployment of Smart care Dire Dawa was nominated for the initial phase and chosen as a pilot site. Over 100 clinics and hospitals in the Dire Dawa region have successfully deployed this system. Lately smart care is adopted in St Paul Hospital in Addis Ababa.

The deployment of smart care includes building/strengthening information communication technology (ICT) infrastructure (Hardware, Software, & Networking components) and the Installation and Training of smart care software application at the health Facilities. Smart care is installed and introduced in phases. The initial installation/introduction phase starts at the

medical record room were the bulk of data encoding takes place followed by other Clinical areas.

2. Objectives of the training

2.1. General objective

- To increase the awareness of surgery inpatient department health professionals on the benefits of smart care system

2.2. Specific objectives

- To explain for the health professionals about what smart care system is
- To clarify for the health professionals about the benefits of Smart care system

3. Training participants

- The participants of this training will be all health professionals found in surgery department who did not get training on Smart care system.

4. Activities carried out by the trainer the results

- Presentation of the assessment result
- Discussion on the results of the assessment
- Pre test
- Explanation about the Smart care system
- Clarification about the benefits and applications of Smart care system
- Post test

5. Duration

The training session will take half a day

6. Project organization and management

Monitoring and evaluation

The monitoring and evaluation of this proposed project will be handled by trainer in the form of pre test and post test of Smart care system. Moreover, the trainer will hand over the training report to the concerned bodies. I believe that the trainees who will participate will also train other health professionals, so do the sustainability.

Annex V Pre and Post test about the benefits of Smart Care

The questions hear under are presented to assess the knowledge and attitude of health professionals towards Smart care system and their benefits. Dear trainees choose the best answer from the given alternatives and circle your choice. Please write your code on the space provided

Code_____

1. What is Smart care system?
 - a. Health system
 - b. Paper based recording system
 - c. Automated recording system
 - d. No of the above
2. Which of the following is/are the benefits of Smart care system?
 - a. Improve information quality
 - b. Avoid medical error
 - c. Decrease cost
 - d. All
 - e. None of the above
3. Do you think that Smart care system important?
 - a. Yes
 - b. No
 - c. I don't know
4. Did you think using the system in your daily activity is a good idea?
 - a. Yes
 - b. No
 - c. I don't know
5. In your opinion which one is faster and easier to complete between the Smart care system and paper based medical records?
 - a. Smart care
 - b. Paper based
 - c. Both are the same
6. In which is the information about patients more accurate?
 - a. Smart care
 - b. Paper based
 - c. Both are the same
7. In which is information about patients' safer (privacy)?
 - a. Smart care
 - b. Paper based
 - c. Both are the same
8. In which is the information about patients more completes (no missing data)?
 - a. Smart care
 - b. Paper based
 - c. Both are the same
9. Do you believe that using smart care interfere work flow?
 - a. Yes
 - b. No
 - c. I don't know
10. Do you believe using smart care increases quality of work?
 - a. Yes
 - b. No
 - c. I don't know

