E-HEALTH READINESS ASSESSMENT FROM EHR PERSPECTIVE IN THAI BINH GENERAL HOSPITAL, VIETNAM

NGUYEN TRUNG KIEN

A THEMATIC PAPER SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF SCIENCE (BIOMEDICAL AND HEALTH INFORMATICS) FACULTY OF GRADUATE STUDIES MAHIDOL UNIVERSITY 2014

Thematic Paper
entitled

E-HEALTH READINESS ASSESSMENT FROM EHR PERSPECTIVE IN THAI BINH GENERAL HOSPITAL, VIETNAM

……
Mr. Nguyen Trung Kien
Candidate

……
Asst. Prof. Jaranit Kaewkungwal, Ph.D.
Major advisor

……
Lect. Saranath Lawpoolsri, M.D., Ph.D.
Co-advisor

……
Lect. Ngamphol Soonthornworasiri, Ph.D.
Co-advisor

……
Prof. Banchong Mahaisavariya,
M.D., Dip Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

……
Assoc. Prof. Dr. Pratap Singhasivanon,
M.B.B.S., D.T.M.&H.(Bangkok),
Dr.P.H.(Epidemiology)
Program Director
Master of Science Program in
Biomedical and Health Informatics
Faculty of Tropical Medicine,
Mahidol University

Thematic Paper
entitled

E-HEALTH READINESS ASSESSMENT FROM EHR PERSPECTIVE IN THAI BINH GENERAL HOSPITAL, VIETNAM

was submitted to the Faculty of Graduate Studies, Mahidol University
for the degree of Master of Science (Biomedical and Health Informatics)
on
February 12, 2014

……
Mr. Nguyen Trung Kien
Candidate

……
Mr. Boonchai Kijsanayotin, M.D., Ph.D.
Chair

……
Asst. Prof. Jaranit Kaewkungwal, Ph.D.
Member

……
Lect. Ngamphol Soonthornworasiri, Ph.D.
Member

……
Lect. Saranath Lawpoolsri, M.D., Ph.D.
Member

……
Prof. Banchong Mahaisavariya, M.D., Dip Thai Board of Orthopedics
Dean
Faculty of Graduate Studies
Mahidol University

……
Assoc. Prof. Yaowalark Sukthana, M.D., D.V.M., D.T.M.& H.(Bangkok), M.C.T.M., Dip. Thai. Board in Oto-Rhino-Laryngology
Dean
Faculty of Tropical Medicine
Mahidol University

ACKNOWLEDGEMENTS

This thematic paper has been completed with the help and support of many people who contributed their time, efforts, cooperation and advices to my study.

I would like to express my sincere appreciation and gratitude to my thematic paper advisor Dr. Jaranit Kaewkungwal for his guiding me through the process to complete my thematic paper with invaluable guidance. I also would like to express my gratitude to Dr. Saranath Lawpoolsri, Dr. Ngamphol Soonthornworasiri and Dr. Boonchai Kijsanayotin for their useful comments to improve my thesis. I also express many thanks to all the staff of Tropical Medicine, Mahidol University.

I also express my gratitude to all colleagues in the Hanoi School of Public Health for their kindly help throughout my study.

I am also grateful to the Rockefeller Foundation for providing a scholarship for supporting me in this program.

I also would like to thank all my friends in Faculty of Tropical Medicine for your inspiration and encouragement.

Finally, I could not graduate the Master of Public Health degree without emotional support, love and encouragement from my parents and my dearest wife.

Nguyen Trung Kien

E-HEALTH READINESS ASSESSMENT FROM EHR PERSPECTIVE IN THAI BINH GENERAL HOSPITAL, VIETNAM

NGUYEN TRUNG KIEN 5538769 TMBI/M

M.Sc. (BIOMEDICAL AND HEALTH INFORMATICS)

THEMATIC PAPER ADVISORY COMMITTEE: JARANIT KAEWKUNGWAL, Ph.D., SARANATH LAWPOOLSRI, Ph.D, NGAMPHOL SOONTHORNWORASIRI, Ph.D.

ASTRACT

Objective: To describe the current electronic health for patient registry and insurance in the Thai Binh Hospital; to assess the opinions of system users in terms of current use of the e - health system within the hospital; to assess readiness for full-functioned electronic health record (EHR) application system in Thai Binh hospital.

Methods: A cross-sectional study was conducted at the Thai Binh Hospital, Vietnam. In-depth interviews were conducted to collect ideas from the director of the hospital and managers of departments at the hospital. The quantitative information was collected by using questionnaire to access e-health/EHR readiness among all health workers who work at hospital. The readiness in this study includes: core readiness, technological readiness, learning readiness and societal readiness. All items were measured on five-point Likert scale. The satisfaction of e-health/EHR was also assessed.

Results: The leaders realized the importance of information and communication technologies (ICT) in healthcare. IT skills of doctors and nurses are limited. The Internet system is slow and the performance quality was poor. The ICT infrastructure for the deployment of E-health/EHR applications generally is sufficient. However, to implement full-function EHR, the hospital needs to develop more software and improve its ICT infrastructure.

KEY WORDS: EHR, E-Health, ICT

83 pages

CONTENTS

CONTENTS (cont.)

CONTENTS (cont.)

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF ABBREVIATIONS

ABBREVIATIONS	TERM AND MEANING
DK	Don’t Know
E-Health	Electronic Health
EHR	Electronic Health Record
EU	European Union
HIMSS	Health Information Management Systems Society
H5N1	Influenza A virus subtype
ICT	Information and Communication Technologies
ID	Identification number
IT	Information Technologies
SARS	Severe acute respiratory syndrome
U.S.	United States
MOH	Ministry of Health
WHO	World Health Organization

CHAPTER I
INTRODUCTION

1.1 Status of IT application in the current health information system

Development in information and communication technologies (ICT) has promoted the socioeconomic worldwide in the 20th century. ICT "*is a general concept to highlight the function of merged communications and the combination of telecoms (phone line and wireless signals), developing management and audio systems for smart technology information."[1]*. The demand for health care is increasing. Using the ICT in health care so called "e-Health", is a rising area with a combination of health informatics, public health and trade. The e-Health as defined by the World Health Organization (WHO) is"*E-Health is the ICT using for health such as treatment, conducting research, training for health worker, tracking diseases and monitoring public health"*.[2] Besides, e-health is also defined by the European Union (EU) as "*instruments based on ICT used to support and increase the prevention, diagnosis, treatment, surveillance, and health management*"[3]. The E-Health application will change paper-based health and traditional health care. WHO recommended the transfer, sorted, search information on health system should apply e-health to support health facilities in both urban and rural, remote areas. In addition, e-health has also supported directly prevention, treatment and management patients. Hence, e-health has improved healthcare services support, delivery and training by using ICT.

E-Health includes many components such as: Electronic Health Records; Telemedicine, Health through the use of mobile devices; distance education or learning, continuing education in ICT; Standardization and interoperability. Electronic health record (EHR) is a basic component of any e-health system. In 2006, the National Institutes of Health National Center for Research Resources (NIHNCRR) identified six components of electronic medical records: Administrative systems,

Laboratory systems, X-ray systems, Pharmacy management systems, the Computerized Physician Order Entry[4].

Some form of EHR has been achieved in implementing in some countries in recent year. In Malaysia, two hospitals have already gone paperless. One health care facility also has an EHR and doesn't use paper record. In Korean, there are 11 hospitals implementing a full-function EHR. They include all impatient and outpatient healthcare information. Other countries such as Singapore, Taiwan, Hong Kong and Thailand are also developing EHR in one form or another with successfully implemented[5].

Researchers in Vietnam and other developing countries have concerns on the sustainability and the complexity of implementing health information systems. [6, 7]. It is recognized in the field of health care in the developing countries that, the health personnel should have a comprehensive view and knowledge about health information systems before system implementation and deployment. Accordingly, the information system should take in to consideration of requirements from various stakeholders in the different levels of health care and related organizations. Several assessment studies have been conducted the context of health information systems.

There should be an assessment study before developing e-health system especially for the system that will combine several functionalities[8]. In hospital, to carry out successful any health information system and have it accepted from all health workers, we need to have a suitable plan[9]. EHR implementation not only changes IT application in healthcare but also affects the mission/function of the health worker due to change of working activities. Therefore, hospitals need to restructure the system to deploy IT applications efficiently[10]. EHR implementations will create the large change in health information system.

1.2 Rationale of the study

This study was conducted a pilot study to assess readiness of e-Health in purposively selected setting with different reasons. The EHR system will help improve health care practices by providing health care evidence based and improve treatment efficacy[11]. However, some literatures show that EHR adoption is not always successful, even in developed countries such as the U.S and Japan[12]. For developing countries, the acceptance of using EHR tend to be low due to concerns on

insufficient infrastructure, unrecognized important of e-health and other poor resources. It is important to perform readiness assessment as a pre-implementation process with the aim to get information for decision making to develop the system[13]. Evaluation of e-readiness before implementing health is extremely important before applying e-health in health facilities [14]. Currently, the adoption of EHR in hospitals in Vietnam is limited by the inconsistency of the equipment system, health management system software, a media transmission between the level of information and in each unit.

Thai Binh hospital, the selected study site, has only applied software for management fees, health insurance payment system and hospitalization system. This software cannot interact with each other between departments. Thai Binh hospital has implemented the software programs speed up administrative procedures, such as Admission, Discharge and Transfer; Hospitalization Cost. However, these applications were only part of the EHR. Different departments couldn't exchange information with each other. This study on e-health readiness assessment will provide baseline information regarding readiness of healthcare organizations when applying e-health in the future. The results of this study would also serve as a model for development of e-health applications in health sector in Vietnam and it could be a good reference for next studies.

1.3 Research question

Pre-implementation EHR assessment has an important role in development and deployment of any EHR information system. This assessment helps to determine the strengths and weaknesses of the system before applying e-health. The research questions include:

– What is the current situation of health information system used at the Thai Binh hospital?

– Are the hospital staffs ready for full-functioned EHR system?

1.4 Objectives

- To describe the existing electronic health system used for hospitalization patient management and hospital fee at the Thai Binh hospital.
- To assess the opinions of system users regarding the current use of the existing e-health system within the hospital.
- To assess readiness for full-functioned EHR application system in Thai Binh general hospital.

CHAPTER II
LITERATURE REVIEW

2.1 Context of using e-health and EHR at global level

E-health application readiness was rather new concept and it was defined as "*the satisfaction of users, the healthcare organization and the health care system itself for participation and success in the carry out e-health* "[15]. On the side of health care organizations, the e-health application was ready to implement the program related to ICT using in delivery and manage health services. The readiness depended on a number of factors leading to success or failure of the e-health program, and thus increase or decrease the hope to achieve desired results[16]. It includes[17]:

– EHR: Health records are computerized, service exchange about patient data between physicians in treatment easily from the internet.

– Tele-health: Description providing health care services to patients remotely through the use of information technology.

– M-health: Using wireless technologies such as bluetooth, GSM/GPRS/3G, Wi-Fi to transmit data and implementing different electronic health services.

– E-learning: Using information technology to support teaching, distance learning through forums, chat, and email.

– Provide regularly short-term or long term courses for the health workers to help them improve their ability to use the information technology applications in healthcare. This is done through social networking, open approach to sharing scientific knowledge.

– Standardized and compatible devices for data sharing: Regarding the connect and share IT and software applications efficiently. To do this required standard (guidelines, the standard definition) to be able to combine and manage health information systems at all levels.

EHR was a basic component of any e-health system. It defined by HIMSS "*The Electronic Health Record is a longitudinal health record generated by one or more encounters in any hospital*."[18]

An EHR could been created, managed and advised by the supplier between health facilities through interoperability. These were the main features of the EHR. They may include information about the history of diseases and current conditions, schools and health clinics, pharmacies, laboratories[19].

Some form of EHR achieved in implementing in some countries over recent year. In Malaysia, 2 hospitals have already gone paperless. One health care facility also had EHR and didn't use paper record. In Korean, 11 hospitals implemented full-function EHR. They included all impatient and outpatient healthcare information. In China a number of hospitals introduced successfully some EHR form but as yet as far can be ascertained, none have been able to go paperless but some problems such as institutions could not share data due to the incompatibility of their system. Other countries such as Singapore, Taiwan, Hong Kong and Thailand were also developing EHR in one form or another with successfully implemented.[5]

Structure of EHR

There are 2 types of structured electronic medical records[4]: Silo system and integrated architecture. In the structured electronic medical records as Silo, such as test results, blood tests, X-rays and some other results obtained from electronic medical records. This information was usually not exchangeable with each other. Each silo system has a separate login ID and private patients.

An interoperable system for allowed to share information between facilities. Each system in Figure 2.2 showed the data stored separately. To share patient information, the system must allow other systems to access the database or could convert data to other systems.

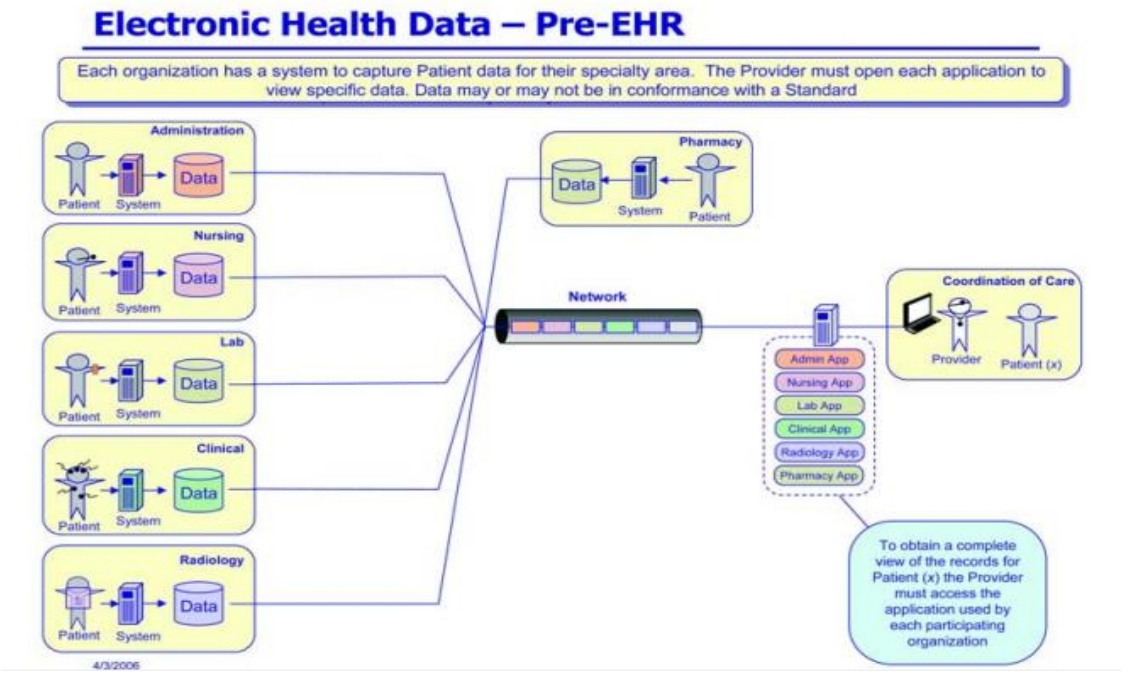


Figure 2.1: Electronic health data—Pre EHR[1]

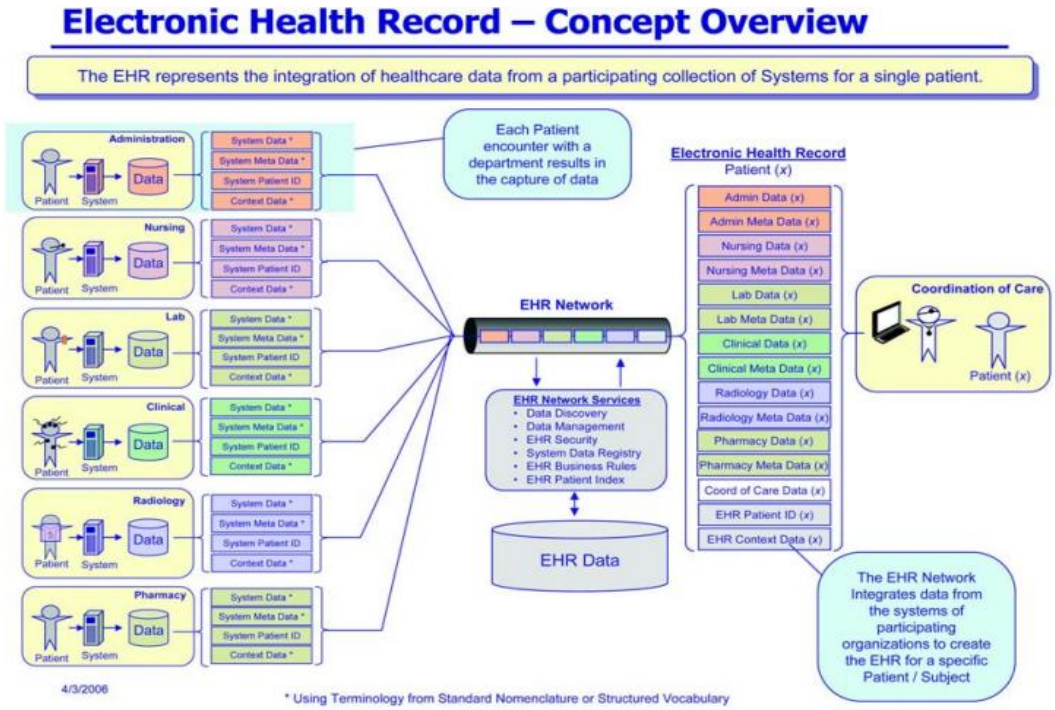


Figure 2.2: EHR Concept Overview

[1] NCRR, Electronic Health Overview Records. 2006

2.2 Context of using e-health and EHR in Vietnam

Vietnam was one of countries with growth rates of ICT leading worldwide should have a lot of potential to develop e-health/EHR. There were 30 million Internet subscribers and more than 150 million mobile subscribers are active across the country in 2011[20]. ICT application was present in all sectors of society. In recent years, the IT application in the hospital system received close guidance of the Prime Minister and Ministry of Health. The policy developed to create a complete legal framework to promoting this sector. Steering Committee was established under Decision No. 04/8/2009 dated 2794-MOH to act to strengthen the management and policy for the IT application in the health sector. The hospital was interested in investing in order to promote IT applications in the management and healthcare. The term e-health in Vietnam could be understood as a software system for the purpose of public health, mainly free software, provided free of charge or by government organizations/institutions to pay. E-health and ICT applications have been implemented in the health sector in Vietnam, but mainly in the big facilities, lack of information sharing between the health units. Compared with other industries, the level of applications in the health sector was lower and less effective[21]

The National Hospital of Pediatrics and Viet Duc Hospital were the leading in this field. The hospital conducted many seminars, remote training with the provincial general hospital and had more than 50 seminars, remote consultation with international experts. In addition, Viet Duc Hospital deployed periodically every two months online training model internationally. Doctors in Vietnam could directly followed up lecture on the medical problems by the top American professors. This model helped the doctors in Vietnam last updated knowledge from big medical center in the world.[22]

In addition, Cho Ray hospital information systems carried out in 1997 with the functions of hospitalization, development system to all clinical departments with the management module early 1998: Management of patients inpatient, emergency patient management, pharmacy management, hospital fees management, deployment program for the win 2.6 fox application, network RJ45 twisted pair and coaxial connected through the Hub of the system is used to adjust the additional

hardware software and network systems to meet the needs of hospital practice in the treatment. These programs discrete, yet interconnected[23]

National Hospital of Eye was one of the health units developed open source software that could be customized and extended. With the determination of the board of directors, the hospital has accomplished its objectives to build a hospital management software master only connects all the modules in the professional management of hospital[24]

For preventive health, the development and application of e-health in health information systems were essential, especially in the areas of collaboration technology to exchange information and co-operation of the science in domestic and international expertise in areas such as prevention, international health quarantine, environmental health, occupational health, injury prevention, vaccine production and supply, the biological medicine, especially in dealing with dangerous diseases such as SARS, Influenza A H5N1 in humans and other emerging diseases.[23]

Although the health information system in Vietnam has been many efforts to strengthen and enhance IT applications, however, the handling, storage and transfer of information, mainly by manual methods, partly due to the hospital not promote IT applications, partly due to investment funding for low system.

The Vietnam Health management system is now the multi-level reporting system. Reporting is transferred from commune to districts, from districts to province. All reports that are used papers reproduced. This paper reporting system wastes a lot of money and effort of typing text, printing, delivery by mail or self-sufficient, enter the data, the statistics. The disease statistics of Vietnam not according to a fixed standard and not adhere to almost no value to the world. At one time, the data was not accurate so long as the required data as not feasible. This leads to restrictions on the 2 aspects: quality reporting and information delivery.

The adoption of EHR in hospitals in Vietnam was limited by the inconsistency of the equipment system (hardware), health management system software, media transmission between the level of information and in each unit. The IT application in healthcare in Vietnam has been identified as a priority sector. Lack of independent health IT projects. The health information system was still the overall architecture of the ICT sector. The data standard, IT application has not been fully

synchronized so many units failed to deploy IT applications in healthcare. Besides, the IT professional workforce in the health facilities lacked imbalance, inconsistency. MOH didn't have the legal documents on the application and development of IT in healthcare. While telecommunications services are developing, internet applications were limited in health care, infrastructure did not ensure the basic conditions for health workers could access easily the internet to search information for their work. Need to have an EHR system applies relatively homogeneous in terms of design, the standard form as well as in hospitals at all levels the rapid pace of science and technology, particularly IT and before serving the information needs of the care and protection of people's health, the IT in application the healthcare sector still low[23]. There are many reasons for this situation include low application of policies, resources, people, or in other words "readiness" for e-health (e-health readiness) remained low. The ICT application requires not only financial resources, but also require the system to be ready to apply them, need to have a transparent policy, knowledge management and employees in the application effectively. Therefore, assessing readiness for e-health applications not only help us know the current status of ICT applications at the facility but also for the strategic planning, plan appropriate for e-health applications in the works the local health.

In general, e-health in general and in particular EHR was still a relatively new field and the report only exploratory, suggestive matter; there weren't any in-depth studies in Vietnam. Therefore, the study "E-health readiness assessment from the EHR perspective in Thai Binh general hospital, Vietnam "was built. With the design of specific studies, diverse research methods, this study would be a resource and a good evidence for the improve e-health applications in the health sector and was a good reference for the study the next study.

2.3 Context of using EHR in Thai Binh hospital

With the development of information technology, the leadership of Thai Binh hospital used a number of software applications for the management of health care. Specifically, Thai Binh hospital has applied "Admission, Discharge and Transfer" and "Hospitalization Cost" software. These softwares could not interact with

each other between departments. Besides, the MOH called for the application of IT in health care and EHR to modernizing the health care and protect health community. Currently, there were many software in the hospital management has been implemented in a number of large hospitals (typically medisoft-electronic medical records software developed by Dr. Vu Manh Tien). Hospital leaders were considering before applying for hospital reporting needs, treatment and diagnosis. The deployment of e-health readiness assessment helped hospital leader know the status infrastructure and manpower are ready to deploy or not.

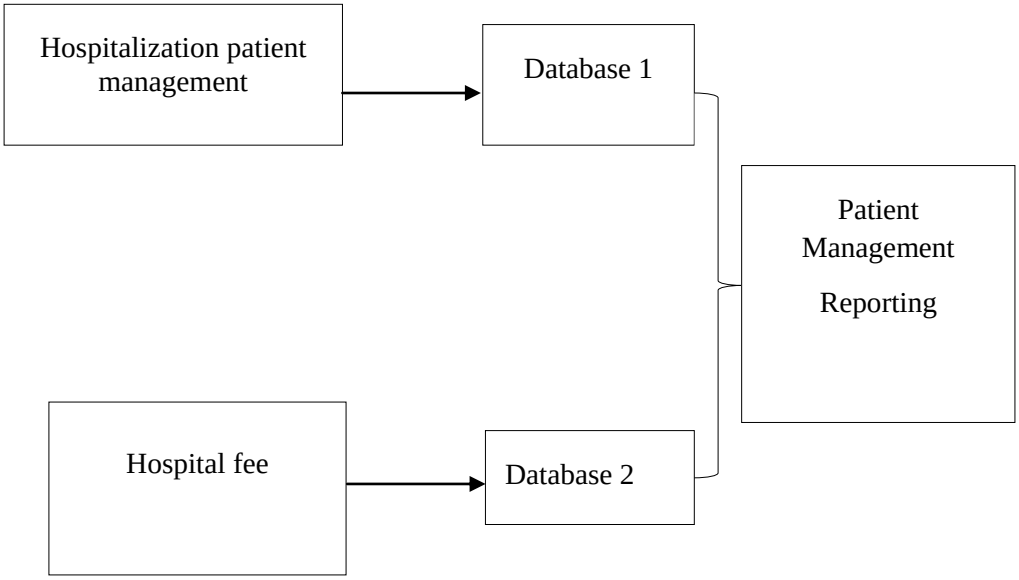


Figure 2.3: The existing ICT application at Thai Binh general hospital

2.4 Plan future for full-function EHR in Thai Binh general hospital

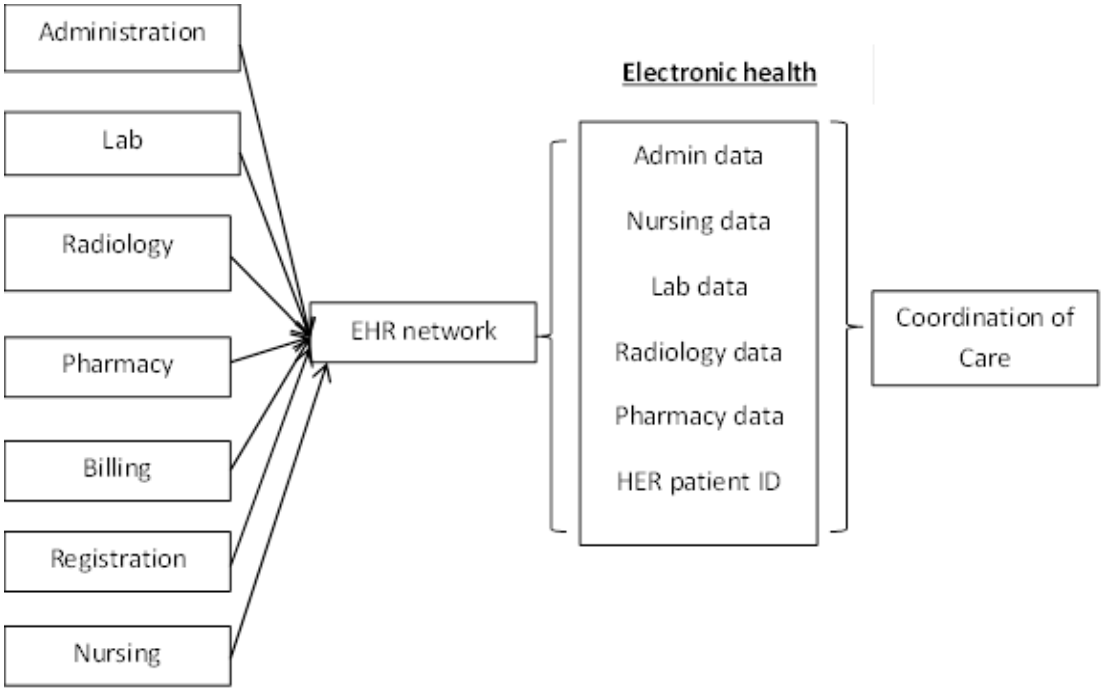


Figure 2.4: Overall architecture of the EHR system

2.5 Review of EHR studies in developed and developing countries

Studies on e-health readiness in the world were limited, particularly in developing countries. Some studies showed that the availability of e-health was assessed by the ability to meet government, healthcare organizations and people who used services in the acceptance and success of the application of information technology in healthcare. These steps in the planning process would not only be increase your chances of success, but also increase equity and the technology gap[25] such as: avoid huge losses of time, money, and energy, avoid the delay and disappointment between policy makers, staff and service users, and create favorable conditions for the process of organizational change and community participation[25].

A needs assessment study and e-health application readiness at two health care facilities in Afghanistan in 2011 showed that a picture of the readiness of those organizations for implementing e-health related to the lack and maintain intensive health manpower, capacity issues, lack infrastructure, coupled with the uncertainty of

policy and institutional organizations. Through this assessment, user could provide solutions specifically suitable to culture and promote the sustainability of e-health. Research in Afghanistan also revealed using assessment tools e-health application readiness was a key step in the process of changing. This step helped to promote the planning of e-health programs in health care facilities effectively and thus reduce the failure of these changes[26]. Another study was carried out with the objective of the design readiness assessment framework for e-health in Iran. This framework was designed based on the consideration of the assessment framework ready to meet e-health has been done previously and measurement tools available to meet e-health through the employee's perspective health in Iran, identify strengths and weaknesses of these institutions in the application of information technology and effective if applied technology[27].

In developed countries, Chew's study on identify strategies to facilitate internet use by family physicians at members of the local chapter of the American Academy of Family showed that 93% had computers available and had internet access at work[28]. Another study about the trend in EMR and CPOE adoption in Japan presented HIS adoption in Japanese medium and large hospitals was high compared to small hospitals and clinics. Actually, Japanese government placed the target for HIS adoption on key hospitals with a large number of beds and focused on budget investment in those hospitals. The small hospitals were supported financial by government less than big hospitals. Besides, in Japan, dissemination of EMR was deeply affected by attitudes of health staff. However, the purpose of training for health staff was necessary to improve positive attitudes about EMR, and build their confident in the benefits of the system.[29]

One study on implementing and using EHR within the Indian Health Service said that EHR would improve quality and clinicians felt that IT could potentially improve quality of care in rural and underserved settings through the use of tools such as online information sources, telemedicine programs, and electronic health records[30]

Physicians in the western region of the United States were more likely to use EHR. They had been positive effects of these systems on several dimensions of quality of care and high levels of satisfaction. Financial barriers were viewed as

having the greatest effect on decisions about the adoption of electronic health records[31]. In general, the trend of e-health application was increasing in the world. E-health readiness assessment were necessary in health facilities of each countries.

2.6 E-health Readiness Evaluation Frameworks

To evaluate e-health readiness of the group (patients, doctors, and community organizations), Jennett developed telehealth readiness assessment framework to examine the complexity of social systems, policies, institutions [14]. As a result, 4 component readinesses were found:

– Core Readiness: Identify needs and dissatisfaction with the current state of health.

– Engagement: Ability to answer questions and evaluate risk

– Structural Readiness: Building structure and effective support.

– Non-Readiness: Demand is limited or not recognize the demands

Besides, six well-known components were also shown in the data:

– Core Readiness: For this component, there is a fairly similar between all groups. This is the recognition service and not satisfied with the current situation at the place that successful implementation of Telehealth.

– Structural Readiness: A number of factors affect the success Telethealth as good infrastructure, human resources, policy and budget and appropriate equipment. Higher level of readiness if the member is aware of efficiently structure of Tele-health.

– Projection of Benefits: All hope that Tele-health reduces the geographical difficulties between urban and rural areas, improve the efficiency of access to quality services and enhance training for remote area's rural / mountain of e-learning.

– Assessment of Risk: These risks include responsibility problems, affecting privacy, lack of access to reliable information, eliminating the poor or uneducated.

– Awareness and Education: Improve the availability of community in the use of Telehealth. Education and awareness can be spread through information campaigns. True awareness of Telehealth related to the ready acceptance.

– Intra/Inter-Group Dynamics: Adoption of Telehealth using is emphasized by the sharing of information between community groups.

However, the reliability of this assessment framework has not been evaluated and this study provides small information about the demographic or practice of current technology.

In addition, Wickramasinghe's framework is affected by three groups' practitioner, organization and public. Assessment framework shows that 4 important components contributing to the initial success of e-health. It is the ICT infrastructure, standards, procedures, and user access policies of the Government allow access to infrastructure[32].

– ICT infrastructure
– Standards
– Procedures
– User access policies of the Government allow access to infrastructure

Wickramasinghe's assessment framework is based on some aspects such as ICT infrastructure, access user and public to evaluate the potential of a country when deployed e-health applications as well as ability to promote targeted e-health applications.

A recent study of Khoja checked the reliability of the assessment tool readiness for electronic health care managers and providers of health care with 5 ingredients in developing countries: Core readiness, learning readiness, technological readiness, societal readiness and policy readiness[25]

– Core readiness focuses on the needs, the planning aspects and decision factors for success such as the suitability of infrastructure and information technology and the combination of information technology with the existing services in the hospital.

– Technological readiness: This section includes tools for managers to evaluate the importance of information technology needs, the demand for hardware and software necessary to implement an electronic health program.

– Learning readiness: This section related tools for officials resolve problems related to the current IT applications training program for staff in hospital.

– Societal readiness: This section includes tools to solve the interoperability issues between health facilities in the region and beyond. The main issue here is to address the factors related to accessibility and content appropriate and socio-cultural factors, addressing gender equality issues.

– Policy readiness: Tools to address current policy issues such as government license, liability and indemnification. Specifically related to the specific policy decisions accessibility such as the legal framework.

E-health is a new definition, especially in the developing countries and it is difficult to apply all components proposed to evaluate all levels. Most of the assessment framework evaluates only the provider and health care organization perspective; however, these components have a difference.

Table 2.1 Difference between e-health readiness frameworks

Author and date	Patient	Provider	System	Organizational	Public
Jennett. 2003	x	x		x	x
Wickramasinghe, 2005		x		x	x
Khoja.2007		x		x	

CHAPTER III
MATERIALS AND METHODS

3.1 Study design

This study employed a cross sectional survey study collecting both quantitative and qualitative information.

3.2 Location of the study

This study was conducted at the Thai Binh general hospital, Thai Binh, Vietnam.

- From 1998 to 2006 Thai Binh hospital was health center. According to Ministry of Health decision on November, 2006, Thai Binh general hospital was separated from preventive medical center: It includes 100 beds scale.
- At the time of this study, the Thai Binh hospital consist of:
    - Hospital leadership: 01 director, 02 deputy director
    - Total of staffs: 280
    - Functions department: 04
    - Department of specialization: 09

3.3 Study period

The study was conducted from March 2013 to December 2013.

3.4 Population and sample

The populations included all leaders, health worker who were working at the Thai Binh hospital. For this study the sample included 280 health workers at the Thai Binh hospital. A health worker were selected using the following criteria.

Inclusion criteria:

- The health worker who is working full-time at the hospital.
- Willing to participate and able to answer questionnaire.

Exclusion criteria:

- Drivers
- Cleaner

3.5 Measurement Tool

3.5.1 Document review

Review documents related to the design, develop and implement e-health/EHR applications in Thai Binh general hospital.

3.5.2 Quantitative component

Evaluation framework was built through a combination of the components of assessment of readiness in several previous research frameworks. The tool was designed to collect relevant information from hospital staff with different positions, release and responsibilities.(see Table 3.1)

Table 3.1 Selection criteria for qualitative interview objects

Group	Number of staff	Core (Readiness)	Engagement	Technological	Societal
Health supporting staffs	118				Communication links and connected Diagnosis facilities
IT staffs	8			Provided ICT applications; Hardware; Network; Software; IT support personnel	
Health professionals	47 doctors 87 nurses 14 pharmacists 6 technicians	Generating records; Storing and Retrieving records	Exposure to EHR; Self-assessment	Past IT experience	Communication

As shown in Table 3.1, the information contents in the quantitative questionnaire (see details in Appendix A, B). composed of 4 components including:

Core Readiness

1) Generating records

- Means of recording
- Responsible staff : Who is responsible for the recording
- Standard format for collecting information
- Average time taken to record patient

2) Storing & retrieval

- Responsible staff: Who is responsible for maintaining records
- Means of storage
- Standard format for storage

- Accessibility/confidentiality (Who can access patient records)
- Average time for a record retrieval per patient
- Degree of complete and accurate records (checking of the quality of patients recorded)
- Satisfactory of sharing patient records (checking of the quality of patients recorded)

Engagement Readiness

1) Exposure to EHR

- Potential benefits
- Limitations
- Expectations
- Potential impacts
- Anticipated problems

2) Self-assessment

- Need training for EHR user
- How much time (No data)

Technological Readiness

1) Provided ICT applications

- EHR
- Other ICT applications

2) Hardware

- Computer
- Monitor
- Printer
- Document scanner
- Photocopier

3) Network

- Internet access

4) Software

- Maintenance of EHR
- E-health short-courses training
- Email
- Standard software

5) IT support personnel

- Users of computer for E-Health
- Provision of technical support
- Technical support personnel

6) Past experience

- Frequency of using PC
- Purpose for using PC
- The number of electronic media
- Purpose for using e-media
- Participated the EHR training course or have experience using EHR.

Societal Readiness

1) Existing health care delivery network

- Social network (Hospitals and health facilities cooperate in sharing information)

2) Communication

- Medium
- Frequency to communicate with others
- The component details for each component are presented in detail in Appendix A,B

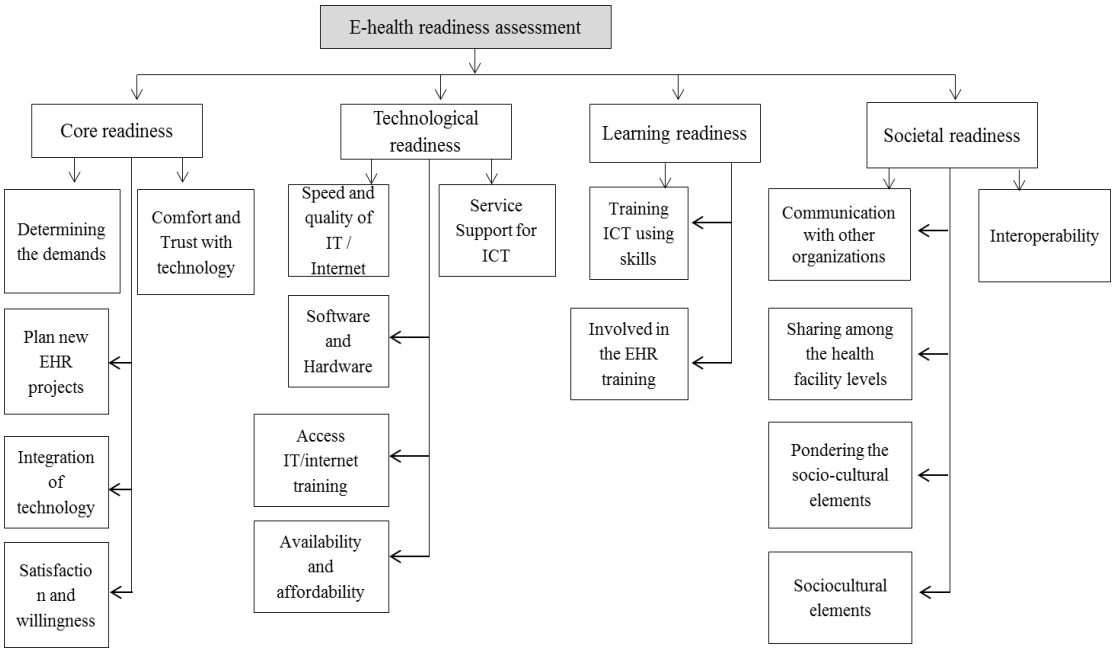


Figure 3.1: E-health readiness framework model

3.5.3 Qualitative component

In-depth interviews were carried out for director of the hospital, manager of departments at Thai Binh general hospitals. The content interview included:

– Environmental organizations and policies for health informatics

– Technical infrastructures and human resources health informatics

– Current status of e-health applications

– Demand for health IT applications

– The adoption of user-feasibility and cost

– Ability to interoperability and sharing

– Barriers, the proposed to promote health informatics applications at Thai Binh hospital.

Table 3.2 List of in-depth interview at Thai Binh hospital

No	Those who in-depth interview	Total
1	Director of Hospital	1
2	Head of functions departments	4
3	Head of specialization departments	9
	Total	14

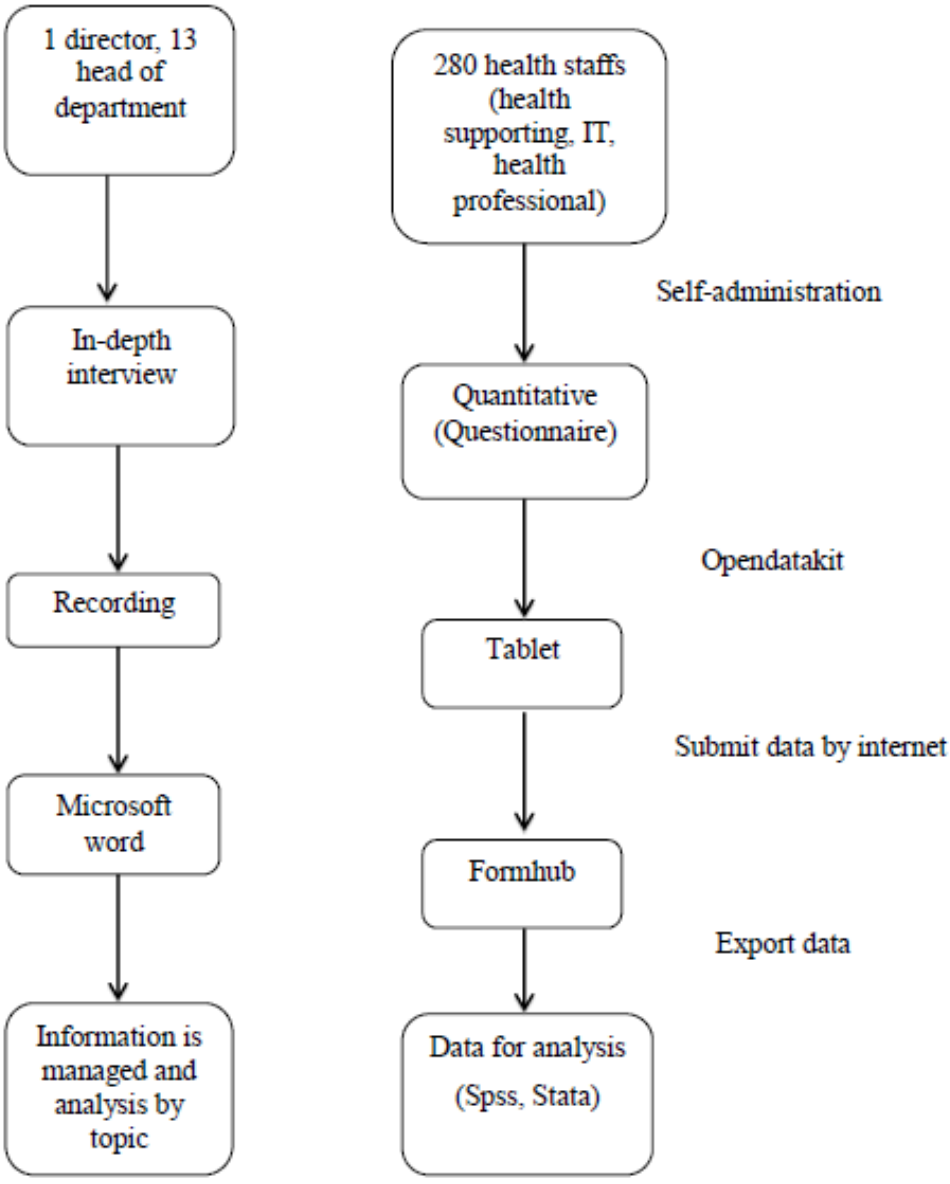


Figure 3.2: Data collection processing

3.6 Statistical analysis

The quantitative component: Quantitative data was collected by the Opendatakit software on tablet run Android (see Figure 3.3) and use SPSS software version 18 for analysis.

The qualitative component: The whole in-depth interviews was recorded and transcribed using Word software. Data was managed and analysis by topic.

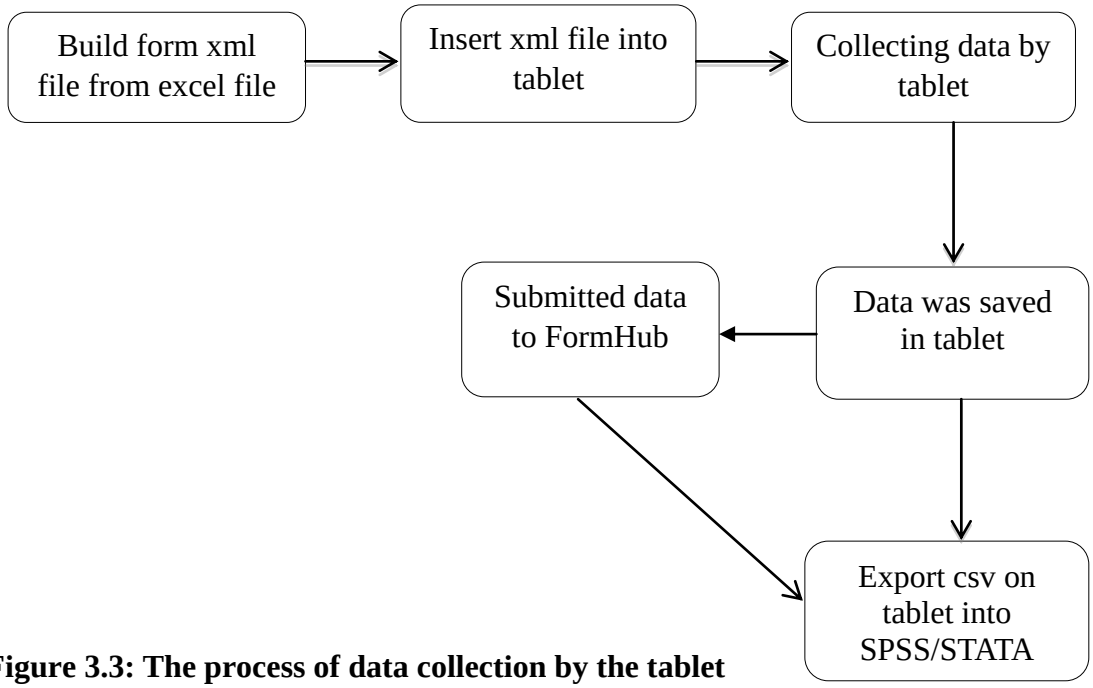


Figure 3.3: The process of data collection by the tablet

3.7 Ethics committee approval

The study was implemented with highly ethical consideration:

- The study was reviewed and approved by Mahidol University and Hanoi school of Public Health.
- Respondents provided an informed consent with clear information regarding objectives of the research. They had freedom in deciding whether or not to participate in this research.
- The participant received a souvenir for participating in this study.

CHAPTER IV
RESULTS

This chapter presented a detailed description of the results of this research. It included 5 parts, as follows:

1. Description of existing e-health system at Thai Binh general hospital.
2. Characteristics of study participants
3. Opinions about the existing health care system implementing in hospital.
4. Readiness for full-functioned e-health/EHR applications.
5. Perspective and attitude on implementing e-health/EHR

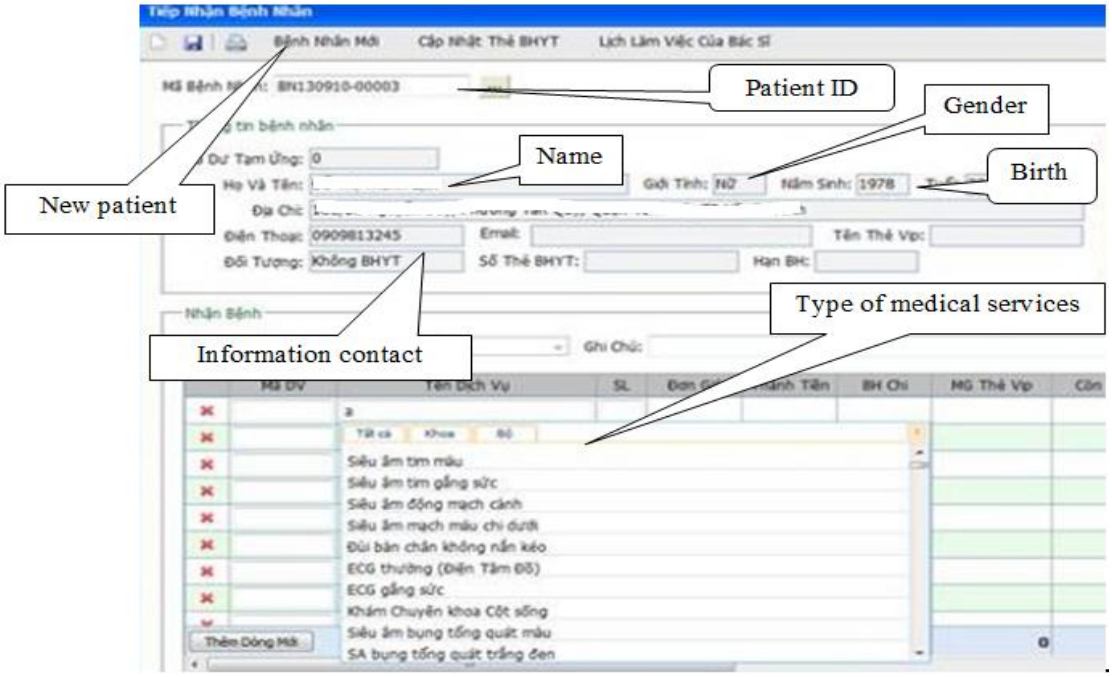
4.1 Description of existing e-health system at Thai Binh general hospital

Currently, Thai Binh hospital has 4 functional departments and 9 departments of specialization. It was fully equipped ICT infrastructure serving medical diagnosis, treatment and health information management in hospital. There were all 22 desktop computers, 1 IBM server, 4 projectors, 5 printers, 2 photocopiers and 2 softwares (Admission, Discharge and Transfer; Hospitalization Cost) using in the hospital.

4.1.1 Admission, Discharge and Transfer

The software was designed based on Medisoft software. It helps manage the administrative information of patients in the hospital easily. Patient need only to provide information such as patient ID, name, year of birth, address, health insurance number, date values, medical services when the first time they visit hospital. For those who visit before, they were identified quickly by ID code or health insurance number (if have). After registration complete, the software will print a examination voucher

for patient . In addition, it also has other functions: search patient by patient ID, health insurance number, name and run frequency medical examination by each patient, types of services used. System run fully independent and didn't share with other software system.



Figures 4.1: Admission, Discharge and Transfer

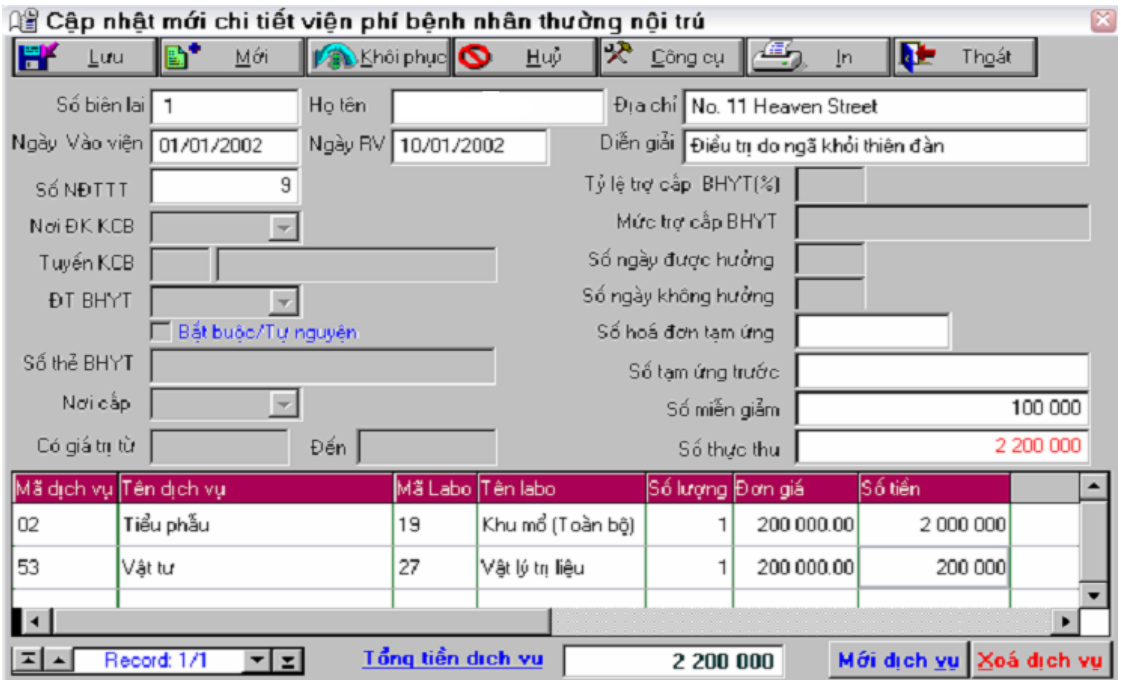
4.1.2 Hospitalization cost

Hospitalization cost software designed to assist health staff in receipt-payment hospital fee management quickly , ensuring correctly, safety. Simultaneously, it avoids some cumbersome procedures take time in the process of examination and treatment. System has also run fully independent. It includes some functions:

- Hospital fee management software has many functions. First, it includes some general information patient such as name, year of birth, gender, health insurance number. Fee groups was divided by tests, surgery, inpatient beds, care. Besides, hospital payment designed by date and amount payment. Finally, health insurance payment list was managed by household, student, company, urban and rural areas. Health staff depend on it to create report to submit health insurance company and report on receive-payment at the hospital for director.

- Category management functions included: group cost (health insurance or not), type of health insurance, type of diseases, faculty-department, list of drug. These lists will be decentralized details for each group of users, ensuring reminiscent principles.

- System administration: Manage user information, authorized users, change passwords, data backup and recovery.



Figures 4.2: Hospitalization cost software

4.2 Characteristics of study participants

The research was conducted in the Thai Binh General Hospital, Thai Binh province, Vietnam. Two hundred and eighty health worker (except for the guard, driver and sanitation worker) were consented to complete the questionnaire. The data collection process was collected by six data collectors belong to the Hanoi school of Public Health.

Table 4.1 Demographic characteristics of participants

Characteristics	Doctor & pharmacist	Nurses & Technicians	Health Supporting	IT	Total
No. of respondents	61(21.8%)	93(33.2%)	118(42.1%)	8(2.9%)	280(100%)
Age					
Under 30 years	7(11.5%)	48(51.6%)	42(35.6%)	1(12.5%)	98(35%)
30-39 years	42(68.8%)	29(31.2%)	59(50%)	2(25%)	132(47.1%)
40-49 years	11(18%)	15(16.1%)	14(11.9%)	5(62.5%)	45(16.1%)
50-59 years	1(1.6%)	1(1.1%)	3(2.5%)	0(0%)	5(1.8%)
Sex					
Male	14(22.9%)	35(37.6%)	69(58.5%)	8(100%)	126(45%)
Female	47(77%)	58(62.4%)	49(41.5%)	0%	154(55%)
Experience (years)					
Mean duration in current institution	8 (6.2-9.9)	6.9 (5.6-8.2)	7.2 (6.1-8.3)	18.2 (10.8-25.7)	7.6 (6.8-8.4)
Mean duration in current job position	5.4 (4.1-6.7)	4 (3.3-4.8)	4.8 (4.0-5.6)	5.4 (1.7-9)	4.7 (4.2-5.2)

Table 4.1 showed the demographic characteristics of the study participants. There were 154 health professionals : Among all participants, 21.8% were pharmacist and doctor whereas nurses and technicians make up 33.2%. The health supporting staff was the highest proportion group(42.1%) and the IT staff was the least only 2.9%.

Almost all participants were in the age ranges under 39 years old (82.1%) while those whose ages over 50 years old was 1.8%.

The average time working time at the Thai Binh Hospital of medical staff was 8 years whereas the average time in current position was 5 years. In conctrast, the average time working at hospital of nurse and technician was relatively shorter (mean

score =6.9 years) and the current position was 4 years. The IT groups had the longest average time working at the hospital.

4.3 Opinions about the existing health care system implementing in the hospital.

At present, Thai Binh General Hospital has implemented software systems to support for hospitalized patients, hospital fees and medical insurance billing managing. Currently, there were only 47 staff using the existing e-health system, 12 (25.5%) doctors and pharmacist and 35 (75.5%) nurses and technicians.(see Table 4.2)

Almost all doctor and nurse (91.5%) spent more than fifteen minutes to complete one record on the computer, there were only 8.5% spend ten minutes to complete record (see Table 4.2).

In terms of current procedures for standard format of storing record, about 51.1% used the system mainly combining all activities including: copy number and typing, department and alphabetic and date wise. The rate of department storing was 23.4% and copies number and type was 19.1%. Alphabetic and date wise had the lowest rate (6.4%). For storage and retrieval of information, the majority of doctors spent more than fifteen minutes for record storage and retrieval (95.7%) while 4.3% spent ten minutes for record storage and retrieval.

Incomplete and inaccurate of this software were mainly posed as an issue among the Thai Binh hospital staff. About 63.8% of doctors interviewed in the Thai Binh General Hospital rated medium or even expressed not satisfacting with software while there were only 36.2% participant felt satisfied with it.

Table 4.2 Responsible for health record generation

Characteristics	Doctor & pharmacist (n=12)	Nurses & Technicians (n=35)	Total (n=47)
Time for record generation (minute)			
10	1 (8.3%)	3 (8.6%)	4 (8.5%)
15	4 (33.3%)	11 (31.4%)	15 (31.9%)
20	1 (8.3%)	5 (14.3%)	6 (12.8%)
>=30	6 (50%)	16 (45.7%)	22 (46.8%)
Storage types			
Copy number and type	1 (8.3%)	8 (22.9%)	9 (19.1%)
By department	5 (41.7%)	6 (17.1%)	11 (23.4%)
Alphabetic and date wise	0 (0%)	3 (8.6%)	3 (6.4%)
All above	6 (50%)	18 (51.4%)	24 (51.1%)
Time for record storage and retrieval (minute)			
10	1 (8.3%)	1 (2.9%)	2 (4.3%)
15	6 (50%)	8 (22.9%)	14 (29.8%)
>=20	5 (41.7%)	26 (74.3%)	31 (65.9%)
Degree of completeness and accuracy of health records			
Not satisfied	0 (0%)	4 (11.4%)	4 (8.5%)
Medium	9 (75%)	17 (48.6)	26 (55.3%)
Quite satisfied	3 (25%)	14 (40%)	17 (36.2%)
Satisfaction of sharing health records			
Not satisfied at all	11 (91.7%)	29 (82.9%)	40 (85.1%)
Quite satisfied	1 (8.3%)	6 (17.1%)	7 (14.9%)

The satisfaction with sharing patient records in the software (hospitalized patient and hospital fee) was relative low (14.9%); in which, there was 91.7% doctors didn't feel satisfied at all while among the nurses was 82.9%.

4.4 The readiness for full-functioned e-health/EHR applications in Thai Binh General Hospital

In this study, a checklist to assess the readiness of health worker when applying e-Health/EHR was developed; the checklist was based on references from other countries. The readiness measures included: core readiness, technological readiness, learning readiness and societal readiness. All items are measured based on a five point Likert scale.

4.4.1 Core readiness

This readiness related to needs, the planning aspects and decision factors for success such as the suitability of infrastructure and information technology and the combination of information technology with the existing services in the hospital.

Determining the future demands for E-health/EHR projects in hospital

Table 4.3 showed that all the medical staff in the hospital was aware of the importance of E-Health/EHR in diagnosis or treatment. In addition, they also realized that it also helps solve the reporting activities in hospital (mean score = 4.4).

Table 4.3 Determining the future demands for e-health/EHR and comfort with technology

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Determining the demands for e-health/EHR project					
Hospital correctly identifies the current demands	4.3 (4.0-4.6)	4.5 (4.3-4.6)	4.3 (4.1-4.5)	5	4.4 (4.3-4.5)
Hospital properly prioritizes its needs	4.4 (4.1-4.8)	4.5 (4.3-4.7)	4.3 (4.2-4.6)	4.9 (4.6-5)	4.4 (4.3-4.5)
Comfort with technology					
Hospital staffs feel comfortable using ICT when the EHR/e-health project is proposed	2.5 (2.3-2.7)	2.4 (2.3-2.5)	3 (2.8-3.2)	2.1 (1.9-2.4)	2.6 (2.6-2.8)
Hospital staffs feel comfortable with storing health record by using IT	2.8 (2.5-3.1)	2.9 (2.78-3.13)	3.3 (3.1-3.5)	2.1 (1.7-2.6)	3 (2.9-3.2)
Hospital staffs feels comfortable in using ICT for care treatment and education	2.7 (2.4-3.0)	3 (2.82-3.17)	2.9 (2.8-3.1)	2.7 (1.9-3.6)	2.9 (2.8-3.0)

However, they were not satisfied about using ICT applications in hospital. Regarding the item related to the difficulty to find a health record by using IT or information stored on a computer, the mean score was less than or equal to 3.

Trust in using ICT in EHR

Regarding ICT applications in E-health/ EHR project, most health workers believed that it will solve the problems in the hospital (mean score = 4.3). Besides, the improve of IT level for medical staff was also planned in the next time with mean score=4.5 (see table 4.4)

Planning for new E-health/EHR project at the hospital

At present, there were differences in participation in the planning of projects between doctor, nurse and other groups in the hospital. Table 4.4 illustrated that the majority of IT staff, health supporting took part in planning for e-health/EHR projects (mean score> 4) whereas doctors and nurses did not know the detailed progress of this planning (mean score <3.3).

On the other hand, two group doctor and the nurse said that the implementation of this plan was not really suitable (mean score<3.3) while IT staff and health supporting staff said that plan was suitable (mean score>4)

Table 4.4 True in ICT and plan for new e-health/EHR project

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Trust in ICT uses					
Hospital policy makers and the director believe that ICT will address the identified problems	4.3 (4.1-4.6)	4.4 (4.2-4.5)	4.3 (4.1-4.5)	4.4 (3.6-5.1)	4.3 (4.2-4.4)
There are plans to increase the confidence and trust of employees in the use of new tools for health	4.5 (4.2-4.7)	4.4 (4.2-4.6)	4.5 (4.4-4.7)	4.6 (4.3-5.0)	4.5 (4.4-4.6)
New EHR projects are planned					
Health care workers at the hospital is responsible for the planning of EHR projects	2.3 (2.2-2.5)	3.2 (3.1-3.3)	4.4 (4.2-4.7)	5	3.6 (3.5-3.7)
The initiative EHR / e-health are made of a suitable plan	2.6 (2.5-2.8)	3.2 (3.2-3.4)	4.1 (3.9-4.3)	4.9 (4.1-4.9)	3.5 (3.4-3.6)

Overall satisfaction and willingness using E-Health/EHR

Table 4.5 displayed that most medical staff at the Thai Binh hospital completely satisfied with E-health/EHR project. It was suitable to the context of a hospital. Thus, they were willing to take part in when carry out E-health/EHR applications (mean score>= 4).

Table 4.5 The satisfaction ICT and integrating ICT into health system at hospital

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Overall satisfaction and willingness					
The e-Health/EHR project is proposed to fit the context of the hospital	4 (3.9-4.0)	4 (3.9-4.1)	4 (3.9-4.0)	4.0 (4.0-4.1)	4.0 (4.0-4.1)
The health workers at the hospital are ready for implementing e-Health/EHR project	4.7 (4.5-4.8)	4.6 (4.5-4.7)	4.7 (4.6-4.7)	4.6 (4.6-4.7)	4.6 (4.6-4.7)
Integration of technology					
There is an integration of ICT into different facility services (pharmacy, treatment) in planning process	4.3 (4.1-4.6)	4.5 (4.4-4.7)	4.4 (4.2-4.6)	4.4 (4.3-4.5)	4.4 (4.3-4.5)
The integrated EHR / e-health in the current health system in hospitals have been planned	4.5 (4.3-4.8)	4.5 (4.4-4.6)	4.5 (4.4-4.7)	4.5 (4.4-4.6)	4.5 (4.4-4.6)

In addition, ICT applications were rated as suitable with current planning process in hospitals. The combination new ICT applications with health information systems in hospital have been planned (mean score > 4.2).

4.4.2 Technological readiness

This section includes issues on the importance of information technology needs, the demand for hardware and software necessary to implement an electronic health program. It includes: Transmission speed, quality of IT and Support for ICT; Software and Hardware; Availability and affordability of the desired ICT; The health facilities access IT/internet training.

Table 4.6 described internet connection speed and internet quality under assessed by medical staff at the Thai Binh General Hospital. The mean score for the satisfaction level of internet speed and quality of most health care workers in hospital was relatively low (mean score <3).

Support services for IT, communications

There were differences in the level of satisfaction of assistance services while implementing e-health/ EHR applications. The mean score for the satisfaction level of ICT support services of physicians (mean score < 3) was lower than the IT staff and health supporting (mean score > 4). (See table 4.6)

The doctor wasn't almost satisfied with the technical support services at the Thai Binh hospital when deploying applications in e-health/EHR whereas IT personnel said that assistance services were quite adequate.

Software and Hardware for E-health/EHR project

Table 4.6 showed that the majority of medical staff in hospital evaluates software and hardware in E-health/ EHR project is temporary sufficient in applying the current 2 software: Hospital fee and registration patient (mean score>4).

Table 4.6 Mean score of technological readiness in Implementing e-health/EHR

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Transmission speed and quality of IT / Internet at the health facility					
Connection speed is appropriate with need to use.	2.4 (2.3-2.6)	2.3 (2.2-2.4)	2.5 (2.4-2.6)	2.2 (1.9-2.6)	2.4 (2.4-2.5)
The quality connections is appropriate with need to use	2.4 (2.2-2.7)	2.4 (2.2-2.6)	2.5 (2.3-2.6)	2.7 (2.0-3.5)	2.4 (2.3-2.6)
Service/Support for ICT					
There is available support services for proposed project	2.1 (2.0-2.2)	2.6 (2.4-2.8)	4.0 (3.9-4.1)	4.1 (3.5-4.7)	3.1 (3.0-3.3)
Support local health facilities is one of the addressing issues involved in the e-Health/EHR project	2.5 (2.3-2.8)	2.3 (2.2-2.5)	4.5 (4.4-4.7)	4.7 (4.4-5.1)	3.4 (3.2-3.5)
Software and Hardware					
Software and Hardware for the proposed e-Health/EHR project are available	4.1 (4-4.1)	4.2 (4.1-4.3)	4.1 (4.1-4.2)	4.6 (4.3-5.0)	4.2 (4.1-4.2)
The software and hardware for the proposed project are affordable	4.1 (3.8-4.3)	4.1 (3.9-4.3)	4.1 (3.9-4.3)	4.7 (4.4-5.1)	4.1 (4.0-4.3)

Availability and affordability of the desired ICT

There were differences in ability to access ICT as telephone, internet among health care workers. The mean score of ability to access ICT of physicians (mean score = 3.1) was lower than IT staff in the hospital (mean score = 4.2) (see table 4.7)

The health facilities access IT/internet training

Training programs and support for user when deploying E-health/EHR applications showed as not yet ready(mean score <3.2). In addition, there were differences in local human resources availablity to participate in training how to use E-health/EHR applications between doctor and other groups. Health supporting and IT staff were always willing to participate in ICT training (mean score> 4) while doctor and nurse didn't take part in any training course (mean score <3)

Table 4.7 Availability and affordability of the desired ICT and access training

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Availability and affordability of the desired ICT					
Current ICT facilities (such as telephone, internet, broadband) are easy to access when they have demand	3.1 (3.1-3.3)	3.1 (2.9-3.4)	4.3 (4.2-4.4)	4.8 (4.6-5.1)	3.7 (3.6-3.8)
The ICT facilities(e.g., phone/internet/line) can be easily requested	3.1 (3.0-3.1)	3.1 (2.8-3.3)	4.2 (4.1-4.3)	4.7 (4.4-5.1)	3.6 (3.5-3.7)
The health facilities access IT/ internet training					
The program launched at the hospital has always been trained for the project staff	3.2 (2.9-3.6)	3.1 (2.9-3.4)	3.1 (2.9-3.4)	3.7 (3.0-4.5)	3.1 (3.0-3.3)
Human resources involving in the project are trained directly at the department where they are working	2.1 (2.0-2.3)	2.3 (2.1-2.4)	4.1 (3.8-4.3)	4 (3.5-4.5)	3.0 (2.9-3.2)

4.4.3 Learning readiness

This section related to the current IT application training program for staff in hospital. It includes: ICT using skill training for health worker and health worker involved in EHR project.

Training ICT using the skill for health worker

The table 4.8 described about short-term training and long-term use of IT applications in health care, there were differences in mean scores between doctors and other staff. Most nurses/technician, IT staff participated in courses on IT application (mean score>4), whereas the doctor was not participating (mean score = 2.4)

The ongoing training course on using E-health/EHR applications in hospital almost didn't have. ICT applications don't apply in any continuous training course at the hospital. The mean score is relatively low (mean score <3).

Table 4.8 Training ICT or internet using skills for health workers and involved in the EHR / e-health project

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Training ICT or internet using skills for health workers					
The health workers at the hospital were sent to different kinds of training	2.4 (2.2-2.7)	4.4 (4.2-4.6)	4.6 (4.4-4.7)	4.5 (3.8-5.1)	4.0 (3.9-4.2)
There were regular training programs at the hospitals	2.5 (2.2-2.9)	2.7 (2.4-2.9)	2.5 (2.3-2.7)	2.7 (2.2-3.2)	2.5 (2.5-2.7)
I always attend ICT / internet training courses	2.0 (2.0-2.2)	2.6 (2.4-2.9)	2.8 (2.5-3.0)	2.5 (2.1-2.9)	2.6 (2.4-2.7)
ICT/internet is provided for continuous training programs at the hospital	2.4 (2.2-2.6)	2.4 (2.2-2.6)	2.4 (2.3-2.6)	2.2 (1.9-2.6)	2.4 (2.3-2.5)
The health workers involved in the EHR / e-health project					
Health care staff have been involved in planning new EHR / e-health project	2.0 (1.9-2.2)	2.1 (2.0-2.2)	4.1 (3.9-4.3)	4.9 (4.6-5.1)	3.0 (2.9-3.2)
There is a plan related to the health care at different department when carrying out EHR / e-health project	2.0 (1.9-2.1)	2.1 (2.0-2.2)	4.0 (3.8-4.3)	4.5 (4.1-4.9)	3 (2.8-3.1)

The health workers involved training courses in the EHR / e-health project

There was a large difference between groups about involve training courses in the EHR / e-health project at the hospital. The assessment results show that most IT staff, health supporting took part in the planning and implementation of new projects on EHR (mean score >= 4) whereas doctors and nurse only supported in planning and implementation a little bit. (Mean score <3).

4.4.4 Societal readiness

This section includes issues related to interoperability issues between health facilities in the region and beyond. The main issue here is to address the factors related to accessibility and content appropriate and socio-cultural factors, addressing gender equality issues. It includes: communication with other organizations, shared

health information, interoperability of health care facilities, sociocultural elements between health worker and patients and public.

Communication with other organizations and shared health information among the health facility levels

As shown in Table 4.9, it reveals that the level of exchange information with other organizations by email was still limited. Most IT staff sometime used email (mean score = 3.1) while others never used email at the hospital (mean score <2).

Mean scores on assessment of the exchange and sharing medical documents by using an online repository of health staffs was very low (mean score < 3).

On the issue regarding, there was no exchange of information between health care facilities, the mean score was less than 3.

Mean scores on access and use of ICT in hospital relatively equal between two genders was 4.5. In addition, both rich and poor people get benefits when applying E-health/EHR application in diagnosis and treatment, the mean score was more 4.3.

Table 4.9 Some characteristics of societal readiness

Characteristics	Mean scores				
	Doctor & Pharmactist (n=61)	Nurses & Technicians (n=93)	Health supporting (n=118)	IT (n=8)	General
Communication with other organizations					
Health worker often uses ICT such as the Internet (e-mail) to communicate with other health facilities in the region	1.6 (1.5-1.8)	1.8 (1.8-1.9)	2.4 (2.4-2.5)	3.1 (2.7-3.6)	2.1 (2.0-2.2)
Health workers often use ICT such as telephone, internet to communicate regularly with their patients and public	2.6 (2.5-2.9)	2.6 (2.5-2.8)	2.7 (2.6-2.8)	3.1 (2.5-3.7)	2.7 (2.6-2.8)
Sharing among the health facility levels					
Documentation of the local health problems are shared between the base through ICT	2.8 (2.6-3.0)	2.7 (2.5-2.9)	2.8 (2.6-2.9)	2.6 (1.7-3.5)	2.7 (2.6-2.8)
The medical literature is easily accessible with the same language to all other health facilities	2.8 (2.6-3.0)	2.9 (2.7-3.2)	2.8 (2.6-2.9)	2.5 (2.0-3.0)	2.8 (2.7-2.9)
Interoperability of health care facilities in the care of patients and communities					
A value system that allows interaction between medical facilities with other health facilities in the care of patients	2.9 (2.7-3.0)	2.7 (2.6-2.9)	2.7 (2.6-2.9)	2.7 (2.2-3.2)	2.8 (2.7-2.9)
IT make the exchange of information between health facilities with other health facilities are easy	2.2 (1.8-2.5)	2.1 (1.9-2.3)	2.0 (1.8-2.3)	2.5 (1.8-3.1)	2.1 (2.0-2.2)
Sociocultural elements between health worker and patients and public					
Gender equality in accessing technology	4.9 (4.8-5.0)	4.9 (4.8-4.9)	4.9 (4.8-4.9)	5	4.9 (4.9-4.9)
All health workers directly benefit from the use of IT in healthcare	4.7 (4.5-4.8)	4.7 (4.6-4.8)	4.6 (4.5-4.8)	4.6 (4.3-5.0)	4.6 (4.6-4.7)
Use of ICT will benefit for all (men or women) in health facilities	4.8 (4.8-4.9)	4.8 (4.7-4.9)	4.8 (4.7-4.9)	4.7 (4.4-5.1)	4.8 (4.8-4.9)
All people (rich and poor) will benefit directly from the ICT	4.7 (4.6-4.8)	4.7 (4.6-4.8)	4.7 (4.5-4.8)	4.7 (4.4-5.1)	4.7 (4.6-4.8)

4.5 Perspective and attitude on implementing e-health/EHR

At present, Thai Binh general hospital has implemented hospitalized patients, hospital fees and medical insurance billing managing software. Almost, the

only doctors and nurse are responsible for this software. They had the ages group were relatively young. This was extremely convenient when applying IT in hospital.

"*Nowadays, medical staff in the hospital is relatively young. Many doctors, nurses after graduated Thai Binh Medical University or Hanoi Medical University usually apply for working in a hospital, they have good computer skills and could be able to study more quickly than older people here. It was also an advantage when applying electronic health..''(Leader)*

The working time in current position was relatively low; nurse sometime must change to another room.

"*Technicians and nurses regularly rotate, sometimes they move into administration room, when they moved to accounting department to support in making report. They don't even have time to hand over job due to the need of hospital" (Leader)*

".. The software will be default patient when calculating the cost, computer will calculate availability for each object, the cashiers just see patient information how much they paid and don't need to calculate anything..." (*IT staff*)

Software system operates independently, couldn't connect together to share information.

"... Two softwares (hospitalized patient management, hospital fees and medical insurance billing) only served to report the number of patients, receipt and payment voucher management and hospital still use paper medical records for examination and diagnosis. They do not use a computer to connect to hospitalized patients and the hospital fees department."(*IT staff*)

"Most of the computer using skill not good, leading to difficulty in manipulating on computer" (*IT staff*)

Incomplete and inaccurate of this software were mainly posed as an issue among hospital staff.

"It is very difficult to get information about patients between different departments due to not have share information between departments. A LAN network system established but could not connect because they didn't set up parameter."(Leader)

Overall, leader of these departments said that this software was very important and necessary.

"Hospital fees and medical insurance billing software are very important hospitalized. Information on software accurately and quickly will help solve the job faster and simplified procedures in health care" (Leader)

The e-health software not only served to improve quality, ensure the accuracy and cost savings in hospital management, but also in management, planning in hospital.

"The role of hospital fees and medical insurance billing software is very important in financial management at the hospital, it helps the procedure quick, timely, accurate, cost-effective and helps them manage their work effectively...
…. It is very important in the hospitalized patient's management, from assessment to plan" (Director)

The limitations

The use and exploit the utility of electronic health software were current more attention than the previous year. However, the evaluation from leaders showed that the exploit and using software were still limited.

"The design of the software is only for reporting, revenue and expenditure management purposes in hospital" (Leader)

The information includes examination and treatment and information about the activities of the facility was collected very much. However, the exploitation and sharing this information for research or specialization activities were still limited.

"The doctor get information of patients, test mainly by the examination book, they could not get information via computer. Although department have also each computer."(Leader)

The data collected from software mostly served the operations of the hospital (mainly financial information, equipment, hospitalized patients monthly). The software that supports doctor run test result such as X-rays, blood test, models of disease is not exploited and using.

".. According to my observation, software using could do well in some departments but others not very effectively. They don't see the importance and don't

mind it effectively. They mainly collect information for the financial report is much than share information support for doctors in diagnosing patients, we have not seen this

....The software has not been used efficiently for activities of diagnosing and treatment."(Leader)

In the view of leader of departments showed that using software had also heavy on financial reporting and hospitalized patient management submit to leader. The connecting and sharing information were not really serving well for the examination and treatment and care for the community.

"Most health worker runs reporting on the number of hospitalized patients, the hospital's total revenues and expenditures to print and submit to the director. Mostly, it is done by hospital fees and medical insurance billing software. However, some older people are not good at using computers and they are afraid to do this. For this reason, sometime they calculate by hand and don't use software" (Leader)

Quality of software was not fully reliable, especially the difference between the report by paper and software. Thereby it made the user feel complex and do not want to use.

"Certainly the level of accuracy just only relative ... to have good data and consistency, we need to pilot very much between report by software and report by paper, compare and evaluate the effectiveness between them" (Leader)

Health workers didn't have skills how to exploit and use the software. lthough they work directly, but they still do not understand the usefulness of using software to exploit health information.

"The main problem there I think that people are not aware of the role and usefulness of storing, preserving and exploiting information by software. They don't believe that it is one property. It is intangible property for a lot of the problem as I said such as planning; develop strategy, advice and many other things"(Doctor)

Satisfaction assessment about electronic health records applications from leaders

According to leadership's view, the demand for EHR application was very large because it was encouraged the development and building EHR by MOH.

"Actually, many hospitals have implemented electronic medical records before, but stopped because the efficiency is not high. The first, health staff do not have much computer skill when applying information technology in health care. The second, there are not an electronic health record form that unified from the Ministry of Health. Finally, software is very difficult to use and manipulate, besides many other factors"(Nurse)

Many leaders were very interested in developing short/long course training for staff that could "do the job" and meet the needs of the hospital. These staffs were both medical and IT skill.

"If we could organize training course about skill how to use software for doctors, nurses and one course about basic health care such as health indicators for IT staff. That is wonderful if can open training like that"(Leader)

They were not satisfied about using ICT applications in hospital. Actually, it was very difficult to find health record stored on that computer.

"I think with the growing of ICT today, most the health workers have found the usefulness of ICT application in health care. Such as exchange via email, create reports quickly with EHR software, search quickly information on patients between departments via LAN network. However, they said that these applications are not synchronized, don't have detailed instructions and the level of using the computer is still limited."(Director)

In addition, they believed in using ICT in E-Health/EHR will solve the problems in hospital and also have plans for implementing E-Health/EHR in hospital.

*"If hospital applies email to exchange information, electronic medical records, it will solve a large volume of work at the hospital (reduce the overload), especially good support for physicians in diagnosis and treatment, support and assist the director know the financial situation of the hospital and many others, actually, it is very good"(*Doctor)

".. We are also planning to open training in Thai Binh general hospital when implementing electronic medical records applications. The doctors and nurses will be more familiar with the diagnostic software support, reporting, searching for medical information of patients..." (Leader)

At present, there were different from participating in the planning project between doctor, nurse and other groups in the hospital. Doctors and nurses did not know the detailed progress of this planning.

"..Director only sends plan direct to administrative department and medical specialist room in implementing and deploying E-health/EHR project in the next time and we don't know more detail about that plan..."(Doctor)

On the other hand, two group doctor and the nurse said that the implementation of this plan is not really suitable.

"We are only informed that have plans like this. However, the medical specialist room doesn't provide any specific plan for comments. Actually, we saw that it is important because when carrying out EHR/e-health, we are the people who work directly on applications many times ... if they do not provide detailed instructions, I could not do it, or they design software that very difficult to manipulation on it, perhaps I will not use. So it is very wasteful. We would have a simple software just presses a button that can run the report, such as that."(Doctor)

..." Even the current hospital fee and registration patient software, we feel difficult to use it, need to do multiple tasks to run a report. Besides, it takes much time to entry data into this software. Actually, it is very difficult for older people in hospital. Before implementing this software, IT staff and those who design software only guides us very fast and asked us if have any problem, please ask them..."(Nurse)

Most medical staff at the Thai Binh hospital completely satisfied with e-health/EHR project. It is suitable to the context of hospital. In addition, ICT applications were suitable with current planning process in hospital.

"Hospital plans to purchase new equipment. In addition to group information also review the quality of each computer, ICT equipment of each department in the hospital. If the device is not used, or too old, is also on the list for replacement in next time when implementing E-health/EHR applications."(IT staff)

Actually, it wasn't appropriate to implement e-health/ EHR application.

".. About the current internet connection, Thai Binh general hospital doesn't use the fiber optic internet but only use normal internet package. In addition, the old machinery has not been renewed; it affects the quality of the internet. With a current internet line plus need to share with multiple departments within the hospital. So the internet is flatter too casual. In addition, in some department, internet line broke down, still have not repaired."(IT staff)

The doctor wasn't almost satisfied with the technical support services at the Thai Binh hospital when deploying applications in e-health/EHR whereas IT personnel said that assistance services were quite adequate.

"When we have technical problems due to use EHR applications, to call people to support very hard. If we call IT staffs in hospitals often slow solve. In addition, if IT staff in the hospital could not do that, they must call on companies outside support, take a lot of time."(Doctor)

A health worker said that IT infrastructure for the deployment of e-health/EHR applications generally is sufficient and can afford to buy more software, hardware as requested. However, to implement full-function EHR, Thai Binh hospital needs to develop more software and improve ICT infrastructure.

"In general, ICT equipment such as desktops, projectors, printers, phones in hospital is enough for the implementation of electronic medical records. However, to have the system do well, follow me hospital need to improve internet connection speed to fiber optic cable. This is also not expensive now. So data sharing can do quickly, especially image data...

About LAN network at the hospital has installed all the departments but have not yet set up parameters to operate

The server system is too old, if there are about 10 computer access at the same time, maybe server must be stopped. So it needs to replace or by new ones that have high configure."(IT staff)

Accessing IT as telephone, internet has a limit. Sometime, the internet doesn't have a signal.

".. The Internet connection is not good in our room, flickered. Sometimes, I cannot access the internet to check email. Besides, some departments also do not

have the internet. But I saw IT room and some administrative offices can still access internet."(Doctor)

There wasn't any training course for user when deploying E-health/EHR applications.

"At present, there isn't any training course about how to use e-health/EHR applications. If it has, we will be ready to participate"(Nurse)

In some training about ICT using skill, almost doctor didn't participate.

"When short courses open, doctors will not participate in this due to busyness. It is the reason why they ask nurse take part in this course. Almost like this ..."(Leader)

"Or the courses about using software, the people who take part in this course are mainly IT staff in hospital."

The ongoing training course on using electronic medical records applications in hospital almost don't have.

"Hospitals often have a training course for doctors about specialized in some field such as heart, liver, almost, they don't have courses about ICT applications in e-health/EHR.".

"Besides, some courses on creating a report, how to use software in hospital, maybe the only IT staff will participate in this course

During the training course, they don't have much ICT delivery that supports in training. It has only computer and projector..."(Nurse)

They didn't take part in the processing of ICT application planning due to busy for diagnosis and treatment at the hospital.

"Doctors and nurses often very busy for the professional activities about medical care at hospital. They do not have many times to participate in planning for the new projects on ICT application. In addition, they only provide health supporting staff and IT staffs their desire about E-Health/EHR before implementing at hospital".

They are afraid of asking anything related to technology due to not good at IT skills. Their only advice for IT staff, health supporting staff such as how to creating a report, how to obtain information about patients, something like this,"

"... Some people in departments are elder people so that ICT application in administrative activities is limited because they don't want to change the traditional

way . It makes staff submit a dishonest report to the leader. Besides, they are not good at using some software such as analyze and synthesize data. Normally, they don't use data on computer; they have only use information on document…"(IT staff)

Communication with other organizations by email is still limited. They only use the phone or mobile to contact other hospitals.

*"Some elder doctor doesn't know how to use email and how to assess internet while young people can use email but only do individually, most using the telephone to contact with other hospitals"(*IT staff)

Actually, there is no exchange information between health care facilities here.

"Most they send an email that attach with a text. They couldn't attach image due to the internet connection is very slow at hospital"

*"If speed network improve in the next time, we will propose to develop database online to share information with other hospital and medical centers"(*IT staff*)*

Using ICT in both two genders was relatively equally. Everybody could use ICT. Besides, they said that E-Health/EHR could remove gaps between urban and rural by distance diagnosis and treatment.

*".. The use of ICT applications in hospitals completely equality between two genders. There is no matter female can use ICT many time whereas male cannot and contrary..."(*Leader).

CHAPTER V
DISCUSSION

5.1 Opinions of system users in terms of current use of the E-health/EHR system within the hospital

There were only 2 groups directly working on software (hospital fee and hospitalized patient): Doctors and nurses. Most leaders and health staff were aware of the importance of this software. Due to limitations IT skills, 91.5% doctor and nurse spent more than 15 minutes to complete documents on the computer. On the other hand, these software didn't have a standardized for storage on the computer. Thus, health worker need to combine many types of storage. It took many times to retrieve information patient.

Quality of software was not fully reliable, especially the difference between the report by hand and software. Therefore, the accuracy of software was asscessd lower by the user. They felt it complex and didn’t want to use. The satisfaction with sharing patient records in the software was not high. There were 91.7% doctors and pharmacists weren’t satisfied at all while a nurse and technician are 82.9%. They said that it mainly used for some report at the hospital and could not share information with other rooms directly by computer.

“It is very difficult to get information about patients between different departments due to not have share information between departments. A LAN network system established but could not connect because they didn't set up parameter.”

An IT project implemented successfully and efficiently to meet six criteria: system quality, information quality, use, user satisfaction, individual impact and organization impact. However, Thai Binh hospital didn't evaluate satisfaction from health staff and the quality of software before deploying. Software was not really stable, there was not uniform reporting results between computer and by hand. The health staff manipulated slowly due to limited computer skills.

On the other hand, health staff in some developed countries such as US, Australia, Japan were quite satisfied with ICT application in medical examination and treatment. They always use computer and access internet at their office[28, 29]. However, for developing countries like Vietnam, IT approaching as well as computer skills of health workers were still quite limited. It made system implementing inefficient.

5.2. Readiness for full-functioned EHR application system in Thai Binh general hospital.

5.2.1 Core readiness

All health workers in Thai Binh hospital determine the importance of e-health/EHR in diagnosis or treatment and trust in using ICT would solve the problems in the hospital.

"I think with the growing of ICT today, most the health workers have found the usefulness of ICT application in health care. Such as exchange via email, create reports quickly with EHR software, search quickly information on patients between departments via LAN network. However, they said that these applications are not synchronized, don't have detailed instructions and the level of using the computer is still limited."

In addition, Doctors and nurse were not satisfied about using ICT applications in hospital, especially, planning for EHR/e-health projects. Because only IT staff and health supporting known it but doctors and nurses didn't not know except detailed planning.

Most medical staff at the Thai Binh hospital completely satisfied with e-health/EHR project. It was suitable to the context of a hospital. Thus, they willing to took part in when carrying out E-health/EHR applications. In addition, ICT applications were suitable with current planning process in hospital.

"Hospital plans to purchase new equipment. In addition to group information also review the quality of each computer, ICT equipment of each department in the hospital"

5.2.2 Technology readiness

Internet connection speed and internet quality in hospital is relatively low. The doctor and pharmacist aren't satisfied with the technical support services at the Thai Binh hospital when deploying applications in e-health/EHR.

"..About the current internet connection, Thai Binh general hospital doesn't use fiber optic internet but only use normal internet package. In addition, the old machinery has not been renewed; it affects the quality of the internet"

"If we call IT staffs in hospitals often slow solve. In addition, if IT staff in the hospital could not do that, they must call on companies outside support, take a lot of time"

To implement full-function EHR, Thai Binh hospital needs to develop more software and improve ICT infrastructure.

"In general, ICT equipment such as desktops, projectors, printers, phones at hospital is enough for the implementation of electronic medical records. However, to have the system do well, follow me hospital need to improve internet connection speed to fiber optic cable

The ability to access ICT by physicians lower than IT staff in the hospital. In addition, nurse, technician and IT staff always willing to participate in ICT training while doctor don't take part in any training course.

5.2.3 Learning readiness

Most nurses/technician, IT staff participates in courses on IT application whereas the doctor was not participating.

"When short courses open, doctors will not participate in this due to busyness. It is the reason why they ask nurse take part in this course. Almost like this."

In the process of teaching, they don't use ICT applications in continuous training course at the hospital. Besides, most IT staff, health supporting take part in the planning and implementation of new projects on EHR while doctors and nurse only support in planning and implementation a little bit

5.2.4 Society readiness

Exchange information with other organizations by email is limited. They only use the phone or mobile to contact other hospitals. IT staff sometime use email while others never use email for their work at the hospital. There is no exchange information here. Exchange and sharing medical documents by using an online repository of health staffs is very low

"Most they send an email that attach with a text. They couldn't attach image due to the internet connection is very slow at hospital"

Both rich and poor people get benefits when applying E-health/EHR application in diagnosis and treatment.

The studies of readiness E-Health/EHR at Thai Binh General Hospital showed that lack and maintain intensive health manpower, capacity issues, and lack infrastructure and policy, lack of standardized e-health applications, deployment costs, training costs, educational issues, resistance to change, and pilot projects or small implementations with limited numbers of patients in healthcare organizations.

In particular, this study indicated that physicians who almost did not have ICT skills. In addition, they didn't involve in any ICT training course (although they are people who work with it many times). Eventually, they weren't involved in the process for E-health/EHR planning at the hospital. These plans are mostly the collaboration between IT staff and health supporting.

This result reflects the true state of the health facilities in the developing countries that want to apply E-Health/EHR. It's quite the same to the results e-health application readiness at two health care facilities in Afghanistan in 2011 and an implementation study E-health challenges in Iranian medical centers.

The lack of investment in ICT infrastructure (such as the internet system, hardware and software) was one reason for dissatisfaction on the quality and service of health workers in Thai Binh general hospital. Most big hospitals in Hanoi such as Bach Mai, Viet Duc hospital had much modern equipment for the healthcare, telemedicine, e-learning. A study on EMR and CPOE adoption in Japan showed that the small hospitals were supported financial by government less than big hospitals. Besides, in Japan, dissemination of EMR was deeply affected by attitudes of health staff.

Medical staff didn’t believe in using the existing system and its benefits due to training on ICT application in the hospital for employees working directly were limited. It was true because the purpose of training for health staff was necessary to improve positive attitudes about EMR, and build their confident in the benefits of the system.[29]

CHAPTER VI
CONCLUSION

6.1 Conclusion

Board of Directors recognizes the importance when implementing E-health/EHR applications. Thus, they have changed from the old system to the new management system, implemented in accordance with the direction of the MOH using new IT applications in examination and patient treatment.

The hospital was planning to build an overall plan for the whole system in which identifies long-term goals of stability and sustainability of the hospital.

Medical staffs known more the mechanism from do by hand replace do by computer. Besides, they also took part in the process of system development, supporting the plan.

6.2 Recommendations

6.2.1 ICT infrastructure

Upgrade network equipment and transmission line have high speed such as fiber optic. In addition, we need to set up Data Centre room to manage networks and large databases and share information. These modules include: Information management, patient medical records, personnel salaries, financial accounting, medical equipment, pharmaceutical management, materials management, medical equipment management economic and administrative related.

Develop IT infrastructure to ensure the application of modern technology could operations well, reliability, meeting the requirements of the exchange of information, safety, and security.

Setting up a LAN system at all departments in hospital to share information. The system will provide information from the most general to the most

detailed, efficient support for the management and administration of hospitals, helping hospitals manage information. Besides, users actively search for images and documents directly on the network. Doctor could find information, pictures related to patients, disease patterns that they are treating quickly.

Building EHR is not only merely administrative information but also information for treating for treatment and examination. It helps to exchange information with other hospital over the world; improve the efficiency in the diagnosis and treatment of patients.

Electronic prescription: Doctors can type information on drugs directly on the computer and sent direct it to the relevant departments for further processing, such as pharmacies, pharmaceutical costs.

6.2.2 Policy

Hospital need to be suggested to MOH to develop a legal framework and the appropriate criteria for the development of ICT in hospitals and guides issued policies, regulations on the application of IT in healthcare.

In addition, they should also orient and organize the implementation of standardization health indicators when design e-health software.

6.2.3 Human resources

IT staff in the hospital is enough. However, we need to enhance the participation of physicians, nurses in planning for health informatics projects. Besides, the hospital should open ICT training courses for all health professional follow suitable topics at the hospital. During the training, we should use IT devices so that the trainee could do immediately after studying.

In addition, we need to create a bridge between IT staff and the medical staff in the hospital so that they can understand each other better and share information together.

Before deploying software in whole hospital, the hospital should be piloted firstly and have been assessed by all staff in hospital.

6.3 Limitations

This study only collected at 1 hospital. Thus, we couldn't compare this hospital with other hospitals to find out the difference between systems. Thus, the sample didn’t represent all hospitals in Vietnam and result was not representative for all hospitals in Vietnam.

The concept of E-health/EHR was relatively new. Currently, there were not any studies on this issue in Vietnam.

Toolkit qualitative interviews have been compiled from a some of studies around the world, some items were not suitable for context in Vietnam.

REFERENCES

1 Wikipedia. Information and communications technology. 2013 [cited 2013 31]; Availablefrom:http://en.wikipedia.org/wiki/Information_and_communications_technology.

2 WHO. *E-Health*. 2013 [cited 2013 16]; Available from:http://www.who.int/topics/ehealth/en.

3 Health-Europe. *eHealth*. 2013 [cited 2013 29]; Available from: http://ec.europa.eu/health -eu/care_for_me/e-health/.

4 NCRR, *Electronic Health Overview Records*. 2006.

5 WHO, *Electronic Health Records: Manual for Developing Countries*. 2006.

6 Miscione, G., *Telemedicine in the upper amazon: interplay with local health care practices.* 2007. 31.

7 Jørn Braa, E.M.a.S.S., *Networks of Action: Sustainable health information systems across developing countries.* 2004. 28.

8 Committee, B.e.S., *BC eHealth Conceptual System Architecture* 2005.

9 Tanner, J.S.O.S., *Successful Change Management.* 2007. 18.

10 Ford, E.W., N. Menachemi, and M.T. Phillips, *Predicting the adoption of electronic health records by physicians: when will health care be paperless?* J Am Med Inform Assoc, 2006. 13(1): p. 106-12.

11 Overhage, J.M., et al., *Controlled trial of direct physician order entry: effects on physicians' time utilization in ambulatory primary care internal medicine practices.* J Am Med Inform Assoc, 2001. 8(4): p. 361-71.

12 Accenture, *Overview of International EMR/EHR Markets Results from a Survey of Leading Health Care Companies.* 2010: p. 13.

13 Wyatt, C.P.F.J., *Evaluation Methods in Biomedical Informatics (Health Informatics)*, ed. 2. 2006.

14 Jennett, P., et al., *A study of a rural community's readiness for telehealth.* J Telemed Telecare, 2003. 9(5): p. 259-63.

15 CANARIE, *Framework for Rural and Remote Readiness in Telehealth.* 2002.

16 Khoja, S., R. Scott, and S. Gilani, *E-health readiness assessment: promoting "hope" in the health-care institutions of Pakistan.* World Hosp Health Serv, 2008. 44(1): p. 36-8.

17 PAHO. *eHealth Components*. 2013 [cited 2013 19]; Available from: http://www.paho.org/ict4health/index.php?option=com_content&view=article&id=8 &Itemid=53&lang=en.

18 HIMSS. *Electronic Health Records*. 2013 [cited 2013 19]; Available from: http://www.himss.org/library/ehr/?navItemNumber=13261.

19 HealthIT.gov. *Learn EHR Basics*. 2013 [cited 2013 19]; Available from: http://www.healthit. gov/providers-professionals/learn-ehr-basics.

20 MIC, N., *Viet Nam Information and Communication Technology*. 2012. 163.

21 JAHR, *Joint annual Health Review* 2012.

22 Newspapers, H.a.L. *Potential for development electronic health in Vietnam is very large*. 2010; Available from: http://suckhoedoisong.vn/2010111094549950 p30c86/tiem-nang-phat-trien-y-te-dien tu-tai-viet-nam-rat-lon.htm.

23 Health, V.M.o., *National conference on the application of information technology in the health sector 6th.* 2012.

24 Hiep Xuan Nguyen, H.T.T., *Developing Information technology system at National Hospital Eye report.* 2012.

25 Khoja, S., et al., *e-Health readiness assessment tools for healthcare institutions in developing countries.* Telemed J E Health, 2007. 13(4): p. 425-31.

26 Durrani, H., et al., *Health needs and eHealth readiness assessment of health care organizations in Kabul and Bamyan, Afghanistan.* East Mediterr Health J, 2012. 18(6): p. 663-70.

27 Rezai-Rad, M., R. Vaezi, and F. Nattagh, *E-health readiness assessment framework in iran.* Iran J Public Health, 2012. 41(10): p. 43-51.

28 Chew, F., W. Grant, and R. Tote, *Doctors on-line: using diffusion of innovations theory to understand internet use.* Fam Med, 2004. 36(9): p. 645-50.

29 Ochieng, O.G. and R. Hosoi, *Factors influencing diffusion of electronic medical records: a case study in three healthcare institutions in Japan.* HIM J, 2006. 34(4): p. 120-9.

30 Sequist, T.D., et al., *Implementation and use of an electronic health record within the Indian Health Service.* J Am Med Inform Assoc, 2007. 14(2): p. 191-7.

31 DesRoches, C.M., et al., *Electronic health records in ambulatory care--a national survey of physicians.* N Engl J Med, 2008. 359(1): p. 50-60.

32 Wickramasinghe, N.S., et al., *A framework for assessing e-health preparedness.* Int J Electron Healthc, 2005. 1(3): p. 316-34.

APPENDICES

APPENDIX A

E-HEALTH READINESS ASSESSMENT FROM EHR PERSPECTIVE IN THAI BINH GENERAL HOSPITAL, VIETNAM HEALTH PROFESSIONAL

Demographic

Age: ……..…..Gender: Male/Female. Offices / units: …….

Position… Specialized training ……

The main professional areas: ……

Duration in current institution……...

Duration in current job position.....

Part I: The current of EHR system in hospital

1. Responsible for health record generation: 1. Yes 2. No
2. Time for record generation... (Minutes)
3. Standard Format for storing:
    - ⊙ Copies Number and Type
    - ⊙ By Department
    - ⊙ Alphabetic and Date wise
4. Time for record storage and retrieval... (Minutes)
5. Degree of completeness and accuracy of health records
    - ⊙ Not satisfied at all
    - ⊙ Not satisfied
    - ⊙ Medium
    - ⊙ Quite satisfied
6. Satisfaction of sharing health records:
    - ⊙ Not satisfied at all
    - ⊙ Medium
    - ⊙ Quite satisfied

Please circle one of the cells, respectively (from 1 to 5) that you believe that your facility has taken in relation to e-Health application in the health system. The higher the score the more the level of implementation. If you do not know or are not sure, circle "do not know" (DK)

I. CORE-READINESS (EHEALTH)

	Statements	**Score**					
		1	2	3	4	5	DK
1	Determining the demands for e-health/EHR project						
	Hospital correctly identifies the current demands	1	2	3	4	5	DK
2	Comfort with technology						
	Hospital staffs feel comfortable using ICT / internet when the EHR/e-health project is proposed	1	2	3	4	5	DK
	Hospital staffs feel comfortable with storing health record by using IT	1	2	3	4	5	DK
	Hospital staffs feels comfortable in using ICT for care treatment and education	1	2	3	4	5	DK
3	Trust in ICT uses						
	Hospital policy makers and the director believe that ICT will address the identified problems	1	2	3	4	5	DK
	There are plans to increase the confidence and trust of employees in the use of new tools for health	1	2	3	4	5	DK
4	New EHR projects are planned						
	Health care workers at the hospital is responsible for the planning of EHR projects	1	2	3	4	5	DK
	The initiative EHR / e-health are made of a suitable plan	1	2	3	4	5	DK
6	Overall satisfaction and willingness						
	The e-Health/EHR project is proposed to fit the context of the hospital	1	2	3	4	5	DK
	The health workers at the hospital are ready for implementing e-Health/EHR project	1	2	3	4	5	DK
7	Integration of technology						
	There is an integration of ICT into different facility services (pharmacy, treatment) in planning process	1	2	3	4	5	DK
	The integrated EHR / e-health in the current health system in hospitals have been planned	1	2	3	4	5	DK

II. TECHNOLOGICAL READINESS (EHEALTH)

	Statements	Score					
		1	2	3	4	5	DK
1	Transmission speed and quality of IT / Internet at the health facility						
	Connection speed is appropriate with need to use.	1	2	3	4	5	DK
	The quality connections is appropriate with need to use	1	2	3	4	5	DK
2	Service/Support for ICT						
	There is available support services for proposed project	1	2	3	4	5	DK
	Support local health facilities is one of the addressing issues involved in the e-Health/EHR project	1	2	3	4	5	DK
3	Software and Hardware						
	Software and Hardware for the proposed e-Health/EHR project are available	1	2	3	4	5	DK
	The software and hardware for the proposed project are affordable	1	2	3	4	5	DK
4	Availability and affordability of the desired ICT						
	Current ICT facilities (such as telephone, internet, broadband) are easy to access when they have demand	1	2	3	4	5	DK
	TheICT facilities(e.g., phone/internet/line) can be easily requested	1	2	3	4	5	DK
5	The health facilities access IT/internet training						
	The program launched at the hospital has always been trained for the project staff	1	2	3	4	5	DK
	Human resources involving in the project are trained directly at the department where they are working	1	2	3	4	5	DK

III. LEARNING READINESS

	Statements	Score					
		1	2	3	4	5	DK
1	Training ICT or internet using skills for health workers						
	The health workers at the hospital were sent to different kinds of training	1	2	3	4	5	DK
	There were regular training programs at the hospitals	1	2	3	4	5	DK
	I always attend ICT / internet training courses	1	2	3	4	5	DK
	ICT/internet is provided for continuous training programs at the hospital	1	2	3	4	5	DK
2	The health workers involved in the EHR / e-health project						
	Health care staff have been involved in planning new EHR / e-health project	1	2	3	4	5	DK
	There is a plan related to the health care at different department when carrying out EHR / e-health project	1	2	3	4	5	DK

IV. SOCIETAL READINESS

	Statements	Score					
		1	2	3	4	5	DK
1	Communication with other organizations						
	Health worker often uses ICT such as the Internet (e-mail) to communicate with other health facilities in the region	1	2	3	4	5	DK
	Health workers often use ICT such as telephone, internet to communicate regularly with their patients and public	1	2	3	4	5	DK
2	Sharing among the health facility levels						
	Documentation of the local health problems are shared between the base through ICT	1	2	3	4	5	DK
	The medical literature is easily accessible with the same language to all other health facilities	1	2	3	4	5	DK
3	Interoperability of health care facilities in the care of patients and communities						
	There is a system that allows interaction between medical facilities with other health facilities in the care of patients	1	2	3	4	5	DK
	Exchange of information between health facilities with other health facilities are easy	1	2	3	4	5	DK

IV. SOCIETAL READINESS (cont.)

	Statements	Score					
		1	2	3	4	5	DK
4	Considering sociocultural elements between health worker						
	Gender equality in accessing technology has been mentioned	1	2	3	4	5	DK
	All level of health workers at the hospital will get directly benefit from the use of e-Health/EHR project	1	2	3	4	5	DK
5	Pondering the socio-cultural elements between patients and public						
	Use of ICT will benefit for all (men or women) involving in accessing to the health facilities	1	2	3	4	5	DK
	All people (rich and poor) involving in the health facility utilization will benefit directly from the ICT	1	2	3	4	5	DK

APPENDIX B

E-HEALTH READINESS ASSESSMENT FROM EHR PERSPECTIVE IN THAI BINH GENERAL HOSPITAL, VIETNAM IT TECHNICIANS, HEALTH SUPPORTING STAFF

Demographic
Age: …….. Gender: Male/Female.
Offices / units: ……..……
Position… Specialized training ……
The main professional areas: ……
Duration in current institution...
Duration in current job position.....

Part I: The current ICT **infrastructure in hospital**

1. The name of the electronic medical records software is used**:**
2. Number of Hardware**:**

- Desktop: .....
- Projector...
- Printer...

3. Can Software connect to the internet? 1. Yes 2. No
4. Have you been trained on the use of ICT applications in medicine? 1. Yes 2.No
5. The number of computers used for electronic health
6. The number of technical support

Please circle one of the cells, respectively (from 1 to 5) that you believe that your facility has taken in relation to e-Health application in the health system. The higher the score the more the level of implementation. If you do not know or are not sure, circle “do not know”

I. CORE-READINESS (E-HEALTH)

	Statements	Score					
		1	2	3	4	5	DK
1	Determining the demands for e-health/EHR project						
	Hospital correctly identifies the current demands	1	2	3	4	5	DK
2	Comfort with technology						
	Hospital staffs feel comfortable using ICT / internet when the EHR/e-health project is proposed	1	2	3	4	5	DK
	Hospital staffs feel comfortable with storing health record by using IT	1	2	3	4	5	DK
	Hospital staffs feels comfortable in using ICT for care treatment and education	1	2	3	4	5	DK
3	Trust in ICT uses						
	Hospital policy makers and the director believe that ICT will address the identified problems	1	2	3	4	5	DK
	There are plans to increase the confidence and trust of employees in the use of new tools for health	1	2	3	4	5	DK
4	New EHR projects are planned						
	Health care workers at the hospital is responsible for the planning of EHR projects	1	2	3	4	5	DK
	The initiative EHR / e-health are made of a suitable plan	1	2	3	4	5	DK
6	Overall satisfaction and willingness						
	The e-Health/EHR project is proposed to fit the context of the hospital	1	2	3	4	5	DK
	The health workers at the hospital are ready for implementing e-Health/EHR project	1	2	3	4	5	DK
7	Integration of technology						
	There is an integration of ICT into different facility services (pharmacy, treatment) in planning process	1	2	3	4	5	DK
	The integrated EHR / e-health in the current health system in hospitals have been planned	1	2	3	4	5	DK

II. TECHNOLOGICAL READINESS (E-HEALTH)

	Statements	Score					
		1	2	3	4	5	DK
1	Transmission speed and quality of IT / Internet at the health facility						
	Connection speed is appropriate with need to use.	1	2	3	4	5	DK
	The quality connections is appropriate with need to use	1	2	3	4	5	DK
2	Service/Support for ICT						
	There is available support services for proposed project	1	2	3	4	5	DK
	Support local health facilities is one of the addressing issues involved in the e-Health/EHR project	1	2	3	4	5	DK
3	Software and Hardware						
	Software and Hardware for the proposed e-Health/EHR project are available	1	2	3	4	5	DK
	The software and hardware for the proposed project are affordable	1	2	3	4	5	DK
4	Availability and affordability of the desired ICT						
	Current ICT facilities (such as telephone, internet, broadband) are easy to access when they have demand	1	2	3	4	5	DK
	TheICT facilities(e.g., phone/internet/line) can be easily requested	1	2	3	4	5	DK
5	The health facilities access IT/internet training						
	The program launched at the hospital has always been trained for the project staff	1	2	3	4	5	DK
	Human resources involving in the project are trained directly at the department where they are working	1	2	3	4	5	DK

III. LEARNING READINESS

	Statements	Score					
		1	2	3	4	5	DK
1	Training ICT or internet using skills for health workers						
	The health workers at the hospital were sent to different kinds of training	1	2	3	4	5	DK
	There were regular training programs at the hospitals	1	2	3	4	5	DK
	I always attend ICT / internet training courses	1	2	3	4	5	DK
	ICT/internet is provided for continuous training programs at the hospital	1	2	3	4	5	DK
2	The health workers involved in the EHR / e-health project						
	Health care staff have been involved in planning new EHR / e-health project	1	2	3	4	5	DK
	There is a plan related to the health care at different department when carrying out EHR / e-health project	1	2	3	4	5	DK

IV. SOCIETAL READINESS

	Statements	Score					
		1	2	3	4	5	DK
1	Communication with other organizations						
	Health worker often uses ICT such as the Internet (e-mail) to communicate with other health facilities in the region	1	2	3	4	5	DK
	Health workers often use ICT such as telephone, internet to communicate regularly with their patients and public	1	2	3	4	5	DK
2	Sharing among the health facility levels						
	Documentation of the local health problems are shared between the base through ICT	1	2	3	4	5	DK
	The medical literature is easily accessible with the same language to all other health facilities	1	2	3	4	5	DK
3	Interoperability of health care facilities in the care of patients and communities						
	There is a system that allows interaction between medical facilities with other health facilities in the care of patients	1	2	3	4	5	DK
	Exchange of information between health facilities with other health facilities are easy	1	2	3	4	5	DK

IV. SOCIETAL READINESS (cont.)

	Statements	**Score**					
		1	2	3	4	5	DK
4	Considering sociocultural elements between health worker						
	Gender equality in accessing technology has been mentioned	1	2	3	4	5	DK
	All level of health workers at the hospital will get directly benefit from the use of e-Health/EHR project	1	2	3	4	5	DK
5	Pondering the socio-cultural elements between patients and public						
	Use of ICT will benefit for all (men or women) involving in accessing to the health facilities	1	2	3	4	5	DK
	All people (rich and poor) involving in the health facility utilization will benefit directly from the ICT	1	2	3	4	5	DK

APPENDIX C
INDEPTH INTERVIEW GUIDELINE - DIRECTOR OF HOSPITAL, MANAGER OF DEPARTMENTS AT THAI BINH GENERAL HOSPITAL

Notes before interview:

- Explanation assessment purpose. The reason why interviewee was selected for the interview.
- Inform interviewee on the confidentiality issues.
- Sharing with interviewee that there is no true and false answers, expected them to share opinions and experiences of themselves.
- Sharing with interviewee that they could ask questions again if it is not clear, cannot answer or make comments or any ideas that they find that is important to training needs assessment
- The interviewer has to introduce: name, job, employer and related information.
- Ask the interviewee to record the conversation and explain why must recorded
- Date of interview: (1) _____
- Name of interviewers: (1) _____
- Information about the key informant
    - Title and roles in or involved with the health informatics/health information management (present and past if relevant)
    - How long has the informant been working/involved in this hospital
    - How long has the informant been working/involved in this current position?

Some of questions for informant:

- Environmental organizations and policies for health informatics
- Technical infrastructures and human resources health informatics
- Current status of e-health applications
- Demand for health IT applications
- The adoption of user-feasibility and cost
- Ability to interoperability and sharing
- Barriers, the proposed to promote health informatics applications.

APPENDIX D
QUESTIONAIRE FOR HEALTH PROFESSIONAL
(VIETNAM VERSION)

THÔNG TIN CHI TIẾT
Tuổi: …….. Giới tính: Nam/Nữ. Cơ quan/đơn vị: ……..…
Vị trí công tác… Chuyên ngành đào tạo ……
Lĩnh vực chuyên môn chính: ……..……
Số năm công tác của cán bộ y tế... Số năm công tác trong ngành y tế
Số năm công tác trong vị trí hiện tại...

Phần 1: Thực trạng hệ thống EHR trong bệnh viện

Anh (chị) có thường xuyên làm việc với hồ sơ bệnh án: 1. Có 2. Không

Thời gian hoàn thành một bệnh án... (Phút)

Chuẩn định dạng cho việc lưu trữ hồ sơ:

- Sao chép số và các kiểu
- Theo khoa phòng
- Theo chữ cái A,B,C

Thời gian để lưu trữ và tìm một hồ sơ bệnh án... (phút)

Mức độ đầy đủ và chính xác của hồ sơ bệnh án

- Không hài lòng tất cả
- Không hài lòng 1 chút
- Hài lòng mức trung bình
- Khá hài lòng

Mức độ hài lòng của việc chia sẻ dữ liệu trong hồ sơ bệnh án:

- Không hài lòng tất cả
- Không hài lòng 1 chút
- Hài lòng mức trung bình
- Khá hài lòng

Anh/chị hãy khoanh tròn vào một trong các ô tương ứng (từ 1 đến 5) với ***mức độ mà anh/chị cho rằng cơ quan/tổ chức của anh/chị đã thực hiện*** liên quan tới việc áp dụng Y tế điện tử (eHealth) trong hệ thống y tế (CỘT I). Nếu anh chị không biết hoặc không chắc chắn, khoanh vào "không biết" (KB)

I. MỨC ĐỘ SẴN SÀNG CHUNG

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Cơ quan xác định được những nhu cầu thay đổi trong tương lai mà Y tế điện tử/ Y tế từ xa đang hướng tới						
	Cơ quan đã xác định được các nhu cầu của mình	1	2	3	4	5	KB
	Cơ quan đã đặt ưu tiên cho các nhu cầu của mình	1	2	3	4	5	KB
2	Nhận thức về Y tế điện tử/ Y tế từ xa trong tổ chức						
	Nhận thức được vai trò của ICT và Internet trong chăm sóc sức khỏe	1	2	3	4	5	KB
	Nhận thức được vai trò của ICT và Internet trong giải quyết các nhu cầu ưu tiên	1	2	3	4	5	KB
3	Sự hài lòng về mặt công nghệ						
	Có hài lòng chung trong việc sử dụng ICT/ Internet trong tổ chức	1	2	3	4	5	KB
	Có hài lòng trong việc sử dụng ICT/Internet cho việc lưu trữ thông tin bệnh nhân	1	2	3	4	5	KB
	Có hài lòng trong việc sử dụng ICT/Internet cho việc hướng dẫn và chăm sóc bệnh nhân	1	2	3	4	5	KB
4	Niềm tin vào việc sử dụng ICT						
	Tin rằng các công nghệ mới là một giải pháp cho các vấn đề trong y tế	1	2	3	4	5	KB
	Có những kế hoạch được đặt ra để cải thiện niềm tin và sự tự tin về công nghệ trong đội ngũ nhân viên	1	2	3	4	5	KB
5	Lập kế hoạch cho dự án về Y tế điện tử/ Y tế từ xa						
	Có cá nhân (hoặc tổ chức) giữ nhiệm vụ lập kế hoạch	1	2	3	4	5	KB
	Tất cả các thành viên tham gia lập kế hoạch	1	2	3	4	5	KB
	Có kế hoạch phù hợp cho việc thực hiện sáng kiến Y tế điện tử/Y tế từ xa	1	2	3	4	5	KB
	Kế hoạch thực hiện bao gồm việc lên ngân sách và xác định các nguồn lực phù hợp	1	2	3	4	5	KB
	Có kế hoạch phù hợp cho việc đánh giá sáng kiến Y tế điện tử/Y tế từ xa bao gồm các ý kiến đánh giá chuyên môn	1	2	3	4	5	KB

I. MỨC ĐỘ SẴN SÀNG CHUNG

	Nội dung	Điểm					
		1	2	3	4	5	KB
6	Mức độ hài lòng và sẵn sàng						
	Các dự án công nghệ phù hợp với các điều kiện trong tổ chức	1	2	3	4	5	KB
	Hài lòng khi thực hiện công nghệ cho các mục đích có chủ đích	1	2	3	4	5	KB
7	Việc tích hợp công nghệ						
	Tích hợp công nghệ với các dịch vụ hiện tại được xem xét trong quá trình lập kế hoach	1	2	3	4	5	KB
	Có kế hoạch đưa ra để tích hợp Y tế điện tử/Y tế từ xa với các dịch vụ	1	2	3	4	5	KB

II. MỨC ĐỘ SẴN SÀNG VỀ MẶT CÔNG NGHỆ

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Tốc độ và chất lượng của ICT/Internet tại tổ chức						
	Tốc độ các kết nối phù hợp cho việc áp dụng eHealth	1	2	3	4	5	KB
	Chất lượng các kết nối phù hợp cho việc áp dụng eHealth	1	2	3	4	5	KB
2	Dịch vụ hỗ trợ cho ICT						
	Có dịch vụ hỗ trợ có sẵn trong một khung thời gian hợp lý	1	2	3	4	5	KB
	Có sự hỗ trợ của địa phương trong việc giải quyết các vấn đề liên quan đến ứng dụng	1	2	3	4	5	KB
3	Phần cứng và phần mềm						
	Phần cứng và phần mềm yêu cầu cho đề xuất eHealth luôn có sẵn	1	2	3	4	5	KB
	Phần cứng và phần mềm yêu cầu cho đề xuất eHealth có khả năng chi trả	1	2	3	4	5	KB
4	Ích lợi và khả năng chi trả của ICT						
	ICT được yêu cầu (điện thoại/internet/sóng vô tuyến) dễ dàng có sẵn cho cơ quan	1	2	3	4	5	KB
	ICT được yêu cầu (điện thoại/internet/sóng vô tuyến) dễ dàng có sẵn cho các cơ quan liên quan	1	2	3	4	5	KB
5	Sự tiếp cận về đào tạo ICT/Internet						
	Có chương trình đào tạo cho người sử dụng ứng dụng eHealth	1	2	3	4	5	KB
	Có nguồn nhân lực tại chỗ để đào tạo người sử dụng ứng dụng eHealth	1	2	3	4	5	KB

III. MỨC ĐỘ SẴN SÀNG VỀ MẶT ĐÀO TẠO

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Đào tạo ICT/Internet						
	Có nhân sự và chương trình tại chỗ cho việc đào tạo	1	2	3	4	5	KB
	Các chương trình hiện có cho đào tạo liên tục	1	2	3	4	5	KB
	ICT/Internet được sẵn sàng sử dụng cho đào tạo liên tục	1	2	3	4	5	KB
	Các chương trình đưa ra để sử dụng ICT/Internet cho đào tạo liên tục	1	2	3	4	5	KB
2	Sự tham gia của các nhà cung cấp dịch vụ CSSK trong các dự án Y tế điện tử/ Y tế từ xa						
	Có kế hoạch đưa ra bao gồm các nhà cung cấp dịch vụ CSSK trong việc lên kế hoạch các can thiệp Y tế điện tử/ Y tế từ xa mới	1	2	3	4	5	KB
	Có kế hoạch đưa ra bao gồm các nhà cung cấp dịch vụ CSSK trong việc thực hiện các can thiệp Y tế điện tử/ Y tế từ xa mới	1	2	3	4	5	KB

IV. MỨC ĐỘ SẴN SÀNG VỀ MẶT XÃ HỘI

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Giao tiếp với các tổ chức khác						
	Cán bộ thường xuyên sử dụng ICT/internet để giao tiếp với các đồng nghiệp trong các đơn vị y tế khác	1	2	3	4	5	KB
	Các tổ chức khác tham gia vào dự án cũng lập kế hoạch đánh giá mức độ sẵn sàng áp dụng eHealth	1	2	3	4	5	KB
2	[Với các dự án eLearning) Chia sẻ các nội dung phù hợp giữa các đơn vị chăm sóc sức khỏe						
	Tài liệu về các vấn đề y tế địa phương được chia sẻ giữa tổ chức này với các tổ chức khác	1	2	3	4	5	KB
	Tài liệu liên quan có thể sử dụng bằng các ngoại ngữ mà tất cả nhân viên và những người sử dụng thông tin liên quan có thể dễ dàng hiểu được	1	2	3	4	5	KB
3	[Với các dự án liên quan đến dịch vụ] Cung cấp các dịch vụ chăm sóc cho bệnh nhân với sự hợp tác với các cơ sở y tế khác						
	Có hệ thống chuyển giao (chuyển viện) với các cơ sở y tế khác để cung cấp sự chăm sóc bệnh nhân với những yêu cầu nhất định	1	2	3	4	5	KB
	ICT hiện được sử dụng cho các chuyển giao với các tổ chức y tế khác	1	2	3	4	5	KB

IV. MỨC ĐỘ SẴN SÀNG VỀ MẶT XÃ HỘI

	Nội dung	Điểm					
		1	2	3	4	5	KB
4	Các yếu tố văn hóa xã hội trong đội ngũ nhân viên						
	Cả 2 giới (nam, nữ) đều truy cập công nghệ bình đẳng và không giới hạn	1	2	3	4	5	KB
	Nhân viên từ tất cả các cấp nhận lợi ích trực tiếp từ việc sử dụng công nghệ	1	2	3	4	5	KB
5	Các yếu tố văn hóa xã hội trong khách hàng và cộng đồng						
	Việc sử dụng ICT sẽ mang lại lợi ích cho 2 giới (nam, nữ) trong xã hội một cách bình đẳng	1	2	3	4	5	KB
	Mọi người từ tất cả các tầng lớp xã hội nhận được lợi ích trực tiếp từ việc sử dụng công nghệ	1	2	3	4	5	KB

Xin cảm ơn sự hợp tác của anh/chị!

APPENDIX E
QUESTIONAIRE FOR IT STAFF HEALTH SUPPORTING STAFF (VIETNAM VERSION)

THÔNG TIN CHI TIẾT

Tuổi: …….. Giới tính: Nam/Nữ

Cơ quan/đơn vị: ……..……

Vị trí công tác… Chuyên ngành đào tạo ……

Lĩnh vực chuyên môn chính: ……

Số năm công tác của cán bộ y tế... Số năm công tác trong ngành y tế

Số năm công tác trong vị trí hiện tại...

Phần 1: Hệ thống cơ sở hạ tầng ICT hiện tại trong bệnh viện

1. Tên của phần mềm bệnh án điện tử hiện đang sử dụng:
2. Số lượng Phần cứng:
3. Máy desktop: ..... (chiếc)
4. Projector... (chiếc)
5. Máy in... (chiếc)
6. Phần mềm có kết nối được với internet không? 1. Có 2. Không
7. Có được tập huấn về sử dụng ứng dụng ICT trong y tế không?

   1. Có 2. Không
8. Số lượng sử dụng máy tính cho y tế điện tử
9. Số người hỗ trợ kỹ thuật
10. Tên của phần mềm bệnh án điện tử hiện đang sử dụng:

Anh/chị hãy khoanh tròn vào một trong các ô tương ứng (từ 1 đến 5) với ***mức độ mà anh/chị cho rằng cơ quan/tổ chức của anh/chị đã thực hiện*** liên quan tới việc áp dụng Y tế điện tử (eHealth) trong hệ thống y tế (CỘT I). Nếu anh chị không biết hoặc không chắc chắn, khoanh vào "không biết" (KB)

I. MỨC ĐỘ SẴN SÀNG CHUNG

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Cơ quan xác định được những nhu cầu thay đổi trong tương lai mà Y tế điện tử/ Y tế từ xa đang hướng tới						
	Cơ quan đã xác định được các nhu cầu của mình	1	2	3	4	5	KB
	Cơ quan đã đặt ưu tiên cho các nhu cầu của mình	1	2	3	4	5	KB
2	Nhận thức về Y tế điện tử/ Y tế từ xa trong tổ chức						
	Nhận thức được vai trò của ICT và Internet trong chăm sóc sức khỏe	1	2	3	4	5	KB
	Nhận thức được vai trò của ICT và Internet trong giải quyết các nhu cầu ưu tiên	1	2	3	4	5	KB
3	Sự hài lòng về mặt công nghệ						
	Có hài lòng chung trong việc sử dụng ICT/ Internet trong tổ chức	1	2	3	4	5	KB
	Có hài lòng trong việc sử dụng ICT/Internet cho việc lưu trữ thông tin bệnh nhân	1	2	3	4	5	KB
	Có hài lòng trong việc sử dụng ICT/Internet cho việc hướng dẫn và chăm sóc bệnh nhân	1	2	3	4	5	KB
4	Niềm tin vào việc sử dụng ICT						
	Tin rằng các công nghệ mới là một giải pháp cho các vấn đề trong y tế	1	2	3	4	5	KB
	Có những kế hoạch được đặt ra để cải thiện niềm tin và sự tự tin về công nghệ trong đội ngũ nhân viên	1	2	3	4	5	KB
5	Lập kế hoạch cho dự án về Y tế điện tử/ Y tế từ xa						
	Có cá nhân (hoặc tổ chức) giữ nhiệm vụ lập kế hoạch	1	2	3	4	5	KB
	Tất cả các thành viên tham gia lập kế hoạch	1	2	3	4	5	KB
	Có kế hoạch phù hợp cho việc thực hiện sáng kiến Y tế điện tử/Y tế từ xa	1	2	3	4	5	KB
	Kế hoạch thực hiện bao gồm việc lên ngân sách và xác định các nguồn lực phù hợp	1	2	3	4	5	KB
	Có kế hoạch phù hợp cho việc đánh giá sáng kiến Y tế điện tử/Y tế từ xa bao gồm các ý kiến đánh giá chuyên môn	1	2	3	4	5	KB
6	Mức độ hài lòng và sẵn sàng						
	Các dự án công nghệ phù hợp với các điều kiện trong tổ chức	1	2	3	4	5	KB
	Hài lòng khi thực hiện công nghệ cho các mục đích có chủ đích	1	2	3	4	5	KB

I. MỨC ĐỘ SẴN SÀNG CHUNG

	Nội dung	Điểm					
		1	2	3	4	5	KB
7	Việc tích hợp công nghệ						
	Tích hợp công nghệ với các dịch vụ hiện tại được xem xét trong quá trình lập kế hoach	1	2	3	4	5	KB
	Có kế hoạch đưa ra để tích hợp Y tế điện tử/Y tế từ xa với các dịch vụ	1	2	3	4	5	KB

II. MỨC ĐỘ SẴN SÀNG VỀ MẶT CÔNG NGHỆ

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Tốc độ và chất lượng của ICT/Internet tại tổ chức						
	Tốc độ các kết nối phù hợp cho việc áp dụng eHealth	1	2	3	4	5	KB
	Chất lượng các kết nối phù hợp cho việc áp dụng eHealth	1	2	3	4	5	KB
2	Dịch vụ hỗ trợ cho ICT						
	Có dịch vụ hỗ trợ có sẵn trong một khung thời gian hợp lý	1	2	3	4	5	KB
	Có sự hỗ trợ của địa phương trong việc giải quyết các vấn đề liên quan đến ứng dụng	1	2	3	4	5	KB
3	Phần cứng và phần mềm						
	Phần cứng và phần mềm yêu cầu cho đề xuất eHealth luôn có sẵn	1	2	3	4	5	KB
	Phần cứng và phần mềm yêu cầu cho đề xuất eHealth có khả năng chi trả	1	2	3	4	5	KB
4	Ích lợi và khả năng chi trả của ICT						
	ICT được yêu cầu (điện thoại/internet/sóng vô tuyến) dễ dàng có sẵn cho cơ quan	1	2	3	4	5	KB
	ICT được yêu cầu (điện thoại/internet/sóng vô tuyến) dễ dàng có sẵn cho các cơ quan liên quan	1	2	3	4	5	KB
5	Sự tiếp cận về đào tạo ICT/Internet						
	Có chương trình đào tạo cho người sử dụng ứng dụng eHealth	1	2	3	4	5	KB
	Có nguồn nhân lực tại chỗ để đào tạo người sử dụng ứng dụng eHealth	1	2	3	4	5	KB

III. MỨC ĐỘ SẴN SÀNG VỀ MẶT ĐÀO TẠO

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Đào tạo ICT/Internet						
	Có nhân sự và chương trình tại chỗ cho việc đào tạo	1	2	3	4	5	KB
	Các chương trình hiện có cho đào tạo liên tục	1	2	3	4	5	KB
	ICT/Internet được sẵn sàng sử dụng cho đào tạo liên tục	1	2	3	4	5	KB
	Các chương trình đưa ra để sử dụng ICT/Internet cho đào tạo liên tục	1	2	3	4	5	KB
2	Sự tham gia của các nhà cung cấp dịch vụ CSSK trong các dự án Y tế điện tử/ Y tế từ xa						
	Có kế hoạch đưa ra bao gồm các nhà cung cấp dịch vụ CSSK trong việc lên kế hoạch các can thiệp Y tế điện tử/ Y tế từ xa mới	1	2	3	4	5	KB
	Có kế hoạch đưa ra bao gồm các nhà cung cấp dịch vụ CSSK trong việc thực hiện các can thiệp Y tế điện tử/ Y tế từ xa mới	1	2	3	4	5	KB

IV. MỨC ĐỘ SẴN SÀNG VỀ MẶT XÃ HỘI

	Nội dung	Điểm					
		1	2	3	4	5	KB
1	Giao tiếp với các tổ chức khác	1	2	3	4	5	KB
	Cán bộ thường xuyên sử dụng ICT/internet để giao tiếp với các đồng nghiệp trong các đơn vị y tế khác	1	2	3	4	5	KB
	Các tổ chức khác tham gia vào dự án cũng lập kế hoạch đánh giá mức độ sẵn sàng áp dụng eHealth	1	2	3	4	5	KB
2	[Với các dự án eLearning) Chia sẻ các nội dung phù hợp giữa các đơn vị chăm sóc sức khỏe						
	Tài liệu về các vấn đề y tế địa phương được chia sẻ giữa tổ chức này với các tổ chức khác	1	2	3	4	5	KB
	Tài liệu liên quan có thể sử dụng bằng các ngoại ngữ mà tất cả nhân viên và những người sử dụng thông tin liên quan có thể dễ dàng hiểu được	1	2	3	4	5	KB
3	[Với các dự án liên quan đến dịch vụ] Cung cấp các dịch vụ chăm sóc cho bệnh nhân với sự hợp tác với các cơ sở y tế khác						
	Có hệ thống chuyển giao (chuyển viện) với các cơ sở y tế khác để cung cấp sự chăm sóc bệnh nhân với những yêu cầu nhất định	1	2	3	4	5	KB
	ICT hiện được sử dụng cho các chuyển giao với các tổ chức y tế khác	1	2	3	4	5	KB

IV. MỨC ĐỘ SẴN SÀNG VỀ MẶT XÃ HỘI

	Nội dung	Điểm					
		1	2	3	4	5	KB
4	Các yếu tố văn hóa xã hội trong đội ngũ nhân viên						
	Cả 2 giới (nam, nữ) đều truy cập công nghệ bình đẳng và không giới hạn	1	2	3	4	5	KB
	Nhân viên từ tất cả các cấp nhận lợi ích trực tiếp từ việc sử dụng công nghệ	1	2	3	4	5	KB
5	Các yếu tố văn hóa xã hội trong khách hàng và cộng đồng						
	Việc sử dụng ICT sẽ mang lại lợi ích cho 2 giới (nam, nữ) trong xã hội một cách bình đẳng	1	2	3	4	5	KB
	Mọi người từ tất cả các tầng lớp xã hội nhận được lợi ích trực tiếp từ việc sử dụng công nghệ	1	2	3	4	5	KB

Xin cảm ơn sự hợp tác của anh/chị!

APPENDIX F
INDEPTH INTERVIEW GUIDELINE DIRECTOR OF HOSPITAL, MANAGER OF DEPARTMENTS AT THAI BINH GENERAL HOSPITALS STAFF (VIETNAM VERSION)

Trước khi phỏng vấn cần chú ý:

- Giải thích mục đính của cuộc đánh giá. Giải thích cho đối tượng phỏng vấn tại sao lại được chọn cho nghiên cứu
- Nói cho đối tượng về tính cấp thiết của vấn đề.
- Chia sẻ với người được phỏng vấn là không có câu trả lời đúng hay sai mà chỉ là chia sẻ quan điểm.
- Chia sẻ với người phỏng vấn là họ có thể hỏi nếu câu hỏi không rõ ràng trong quá trình phỏng vấn, họ có thể hỏi lại hoặc đưa ra bất cứ ý kiến nào là rất quan trọng cho đánh giá
- Người phỏng vấn tự giới thiệu: Tên, nghề nghiệp, chức vụ và các thông tin liên quan.
- Xin phép người phỏng vấn cho ghi âm
- Ngày phỏng vấn: (1) _____
- Tên người được phỏng vấn: (1) _____
- Một số thông tin chính
  - Vai trò của các yếu tố liên quan
  - Làm việc bao lâu tại bệnh viện
  - Làm việc bao lâu tại vị trí hiện tại?

Một số câu hỏi chính:

- Môi trường tổ chức và chính sách cho y tế điện tử
- Cơ sở hạ tầng công nghệ và nguồn nhân lực cho y tế điện tử
- Thực trạng các ứng dụng y tế điện tử hiện nay

- Các nhu cầu cho ứng dụng y tế điện tử
- Sự thừa nhận của người dùng và chi phí hiệu quả
- Khả năng tương tác và chia sẻ

BIOGRAPHY

NAME	Mr. Nguyen Trung Kien
DATE OF BIRTH	28 September 1986
PLACE OF BIRTH	Hanoi city, Viet Nam
INSTITUTION ATTENDED	Hanoi school of Public Health,2005-2009 Bachelor of Science (Public Health) Mahidol University, 2013 Student of Master of Science (Biomedical and Health Informatics)
SCHOLARSHIP RECEIVED	The Rockefeller Foundation
HOME ADDRESS	No. 2 hem 354/99/7 Truong Chinh, Dong Da, Hanoi Tel: +841686958552 E-mail: ntk2@hsph.edu.vn
EMPLOYMENT ADDRESS	138 Giang Vo, Ba Dinh, Hanoi Tel: +841686958552 E-mail: ntk2@hsph.edu.vn