Collaboration Healthcare System between Clinics and Hospitals in Malaysia

En. Abdurrahman Ahmad Dahlan[1], Zaidoon Kh. Abdulatif[2], Ismail Mahmoud[3], Muhammed Aydin[4]
Information System Department International Islamic University of Malaysia (IIUM)
arad@kict.iiu.edu.my, zaidoonkhalil@yahoo.com, alhanglawe@yahoo.com,
muhammed.aydin@gmail.com

Abstract

Healthcare organizations in over the world had dynamic changes. They have contributed to intensify competitive activity between healthcare providers. These changes have forced the organizations to consider wide improvement of their activities and to adopt the use of new technologies in all the organizations' operations. Recently, there have been high demands for collaborative medical services between clinics and hospital medicines in the world. This paper proposes a model; diagrams are enabled collaboration in medicine systems between hospitals and clinics with attaching that system under the ministry of health in Malaysia.

Keywords: Collaborative Systems, Healthcare, Collaborative Medical Services, e-health

1. INTRODUCTION

As an important component of social security system, health care system plays a vital role in promoting social stability and reflecting the fairness of the system [20]. Across the world collaboration has been in fashion in the business community over the past two decades. Inter-organizational systems (IOS) have been said to play an important enabling role in many cases. [21]

Collaborative medical application initiatives arising from the Internet explosion are too various [22, 23]. Currently, many nations are creating their own infrastructures for modernizing their collaborative healthcare systems by taking advantage of the advances in network based telecommunication implementations [22].

Malaysia is rapidly changing. The nation is moving in the direction of a developed nation status by year 2020. This entails a vast change among others in terms of services and infrastructure. The nation will offer more as the people will expect more as the standard that prevails will be higher.[25]

The healthcare sector demands high quality patient care services in a continuously changing environment. This is challenged by the new customers expectation, emergence of new risk factors, charges in medical technology and application of new information technology. [24]

In this paper, we will explore the current issues of collaborative medical application in Malaysia and to propose a conceptual framework. The structure of this paper is as follow: in the second section will discuss about background of current situation of collaborative medical system in Malaysia. In the third section we will discuss the ideal model also we will discuss the proposed framework for the collaborative medical system derive from combination three-degree approach existing framework as the flexibility and concrete concept.

2. BACKGROUND

The introduction of the Internet and the advancement of information technology (IT) and telecommunications have in many ways made transfer of data possible in a split second. The applications of the Internet technology have contributed in the advancements in many fields including education, business, and entertainment. In the field of medicine, new concepts like telemedicine, e-medicine and health informatics have been introduced to optimize healthcare services. The data that can be shared among entities across wireless internet connection can be made beneficial through connectivity and portability of the devices. With the use of tablet-like personal computer (PC) and bed-side personal digital assistant (PDA), radio frequency identification (RFID) technology for easy user logon combined with real-time access, patient data can be captured directly into a central data repository [1].

The implementation of health information technology (HIT) is becoming more prominent worldwide. This is indicated by the global move towards increased implementation of Electronic Health Records (EHR) such that most American hospitals surveyed had either implemented or were planning to implement EHR [2]. Driven by the needs to facilitate the administrative process and reduce medical errors, a healthcare institution may decide to use new technology and as a result will most likely undergo changes in its clinical work processes [1]. By the use of electronic records, the methods and ways of clinical practices such as referrals to diagnostic tests as well as issuances of prescription of medication to patients will be altered [3].

The use of EHR offers significant amount of benefits in healthcare such as improved efficiency, reliability and system security. The system improves efficiency through easy access to patient records, results of patient investigation, lab tests, and imaging works from the single point of care. This capability eliminates the time required for the medical attendants to dispatch and retrieve physical records located at various distant physical locations. It improves reliability in patient records by ensuring integrity and security of patient data through authentication and various level of access authority. Loss and misplacement of patient records and x-ray films, which commonly happen with physical paper folders, can be drastically alleviated [4].The system improves safety in healthcare by supporting for better decision making in patient treatments. The ability to countercheck interaction between drugs, allergies, as well as abnormal result of investigation can alert the doctors to alleviate life-threatening situations [5]. The use of EHR applications, like Clinical Decision Support Systems (CDSS), can facilitate clinical decision-making and minimise the potential for mistakes due to the inaccuracy and incompleteness of paper records [6].

2.1 Electronic Health Records

According to Waegerman (2003), EHR is the generic term for all electronic patient care systems in digital format which co-ordinate the storage and retrieval of individual records with the aid of computers via a network that enables storage and availability of information to authorized health personnel. It is usually comprises of electronic medical records (EMRs) from many locations and/or sources. A variety of types of healthcare-related information, such as demographic information, medical history, allergies, lab results, radiology images such as X-Ray, MRI and CT scans, appointment records, referrals and authorization documents, billing and insurance records may be stored and accessed via telecommunication. In other words, with the use of EHR, the healthcare practitioners could get their laboratory results and reports from radiology clinics or issue discharge summaries from hospitals electronically. In the event of emergencies, such as when a patient is unconscious or unable to speak, the pertinent information could be accessed from the host computer from the hospital where the patient was treated earlier [7]. Ultimately, an ideal system would allow for connections and the sharing of records over the telecommunication networks with other healthcare organizations such that patients can move across healthcare facilities with convenience.

3. LITERATURE REVIEW

3.1 IT Applications in Health and Medical Industry

Medical Informatics and Health Informatics are new branches of knowledge and technology in the past three decades which seek to use IT to improve human health. The primary purpose of EHR is to improve and enhance patient care. Among the improvements offered by the use EHR from the use of paper-based records include efficiency, reliability, and safety and alleviation of loss and misplacement of patient records and x-ray films which commonly happen with physical paper folders [4]. The application of Information and Communication Technology (ICT) in healthcare has been growing exponentially over the last decade and its growth is attributed potentially to its ability to improve effectiveness and efficiency in healthcare services worldwide. These applications have to be governed and integrated using internationally recognized standards, like HL7. Applications like Computerized Provider Order Entry (CPOE) and Clinical Decision Support System (CDSS) are now widely viewed as a critical component of the modern technologically advanced hospitals, allowing healthcare providers to directly enter orders for patient care into a computerized system equipped with automatic alerts for drug—drug interactions, dosing and allergies [5].

The use of system called picture archiving and communication system (PACS) enables the handling, storing, printing, and transmitting of medical imaging from remote stations in a hospital [8]. The technology is supported by use of the standard for imaging, Digital Imaging and Communications in Medicine (IMCOM) using TCP/IP file format and communication protocol which enables the integration of various types of network hardware such as scanners, servers, workstations, and printers from multiple manufacturers. The different devices in the market come with DICOM conformance statements which clearly state the DICOM classes they support. Widely adopted by hospitals, DICOM is now making smaller applications to cater for dentists' and doctors' offices.

The Radiology Information System (RIS), integrated with PACS services, has reduced the time needed for image interpretation and reporting as compared with older generation film-based radiological activity [8], thus improve productivity in the radiology department and was able to cut costs for the purchase of dedicated standalone image processing workstations. This integration has been widely adopted in radiological practice, allowing substantial acceleration of workflow with greater ease of work. The recent evolution of digital radiology which includes cross-sectional imaging modalities, such as CT scans and MRI, has been paralleled by the development of integrated RIS—PACS systems with advanced image processing tools [8].

3.2 Issues in Implementing of HER

Among organizational issues brought forth by the implementation process of an MIS are due to technical and organizational aspects, which' involve higher complexity for larger systems. Zmud and Cox (1979) described the technical complexities to include, among others, processing environment, data structure, integration with and security considerations, while organizational complexities include issues such as dependence of the organization on

the system and impact upon duties and responsibilities of members of the organization. As such, issues of acceptance in EHR can be linked to the technology itself which can be incompatible with the existing patient care routine of doctors, difficult to use and migrate from the existing routine, and perceived as not useful [9].

Medical officers may look at the system as a hindrance to their effective clinical work during patient consultation due to the inconvenience of having to type in the data and carrying their laptops to inappropriate places [10], [11], [12]. Other acceptance issues can be related to attitudinal and managerial aspects of the hospital administration [13]. These previous researches in user acceptance provide good guidance for healthcare institutions in understanding factors that can contribute to the success of EHR implementation.

3.3 HER System Implementation

Implementation of IT in an organization can be defined as the hardware, software, telecommunications and office equipment that transform raw data to useful information and adding new value in the process [14]. The EHR technology is one type of IT application in healthcare in this context which requires attention in its successful design, implementation and use.

The new technology can lead to process improvements that produce tangible market advantages [15]. It was found that implementation of EHR in some institutions was able to run smoothly while others struggle with difficulty [16]. In his review, Adler (2007) has categorized the main factors of the success of implementation into "The Three T's" as Team, Tactics and Technology. Team comprises of the people involved in the implementation process from the leadership to the employees. Leadership plays the biggest role in ensuring its success and the three types of leaders that are essential in an EHR implementation: one or more champion among the doctors, a CEO and a skilled project manager. Tactics represent the strategy of the implementation and Technology represents the system infrastructure comprising of the hardware and software functionalities [16].

3.4 (HER) Implementation in Malaysia

The Malaysian Health Flagship Application is one of the components introduced with the launch of the Multimedia Super Corridor (MSC) in the year 2000. The Tele-health application targeted to provide a seamless availability of health information and virtual health services to all Malaysian residents through integration of information, telecommunication, human-machine interface technologies and health technologies to deliver healthcare to promote health status of the people. Four pilot projects included in the MSC telemedicine model are Customized/Personalized Health Information and Education, Continuing Medical Education, Tele-consultation and Lifetime Health Plan (LHP) [17].

According to LHP, each resident is to have a smart card that contains a subset of the data in the LHR by which he or she receives "seamless continuous quality care" across a range of health facilities and healthcare providers in Malaysia. This patient health information is to be stored in the standard identification card or a special health smart card [18]. The objective of this is to achieve the goal of a nation of "healthy individuals, families and communities" [18].The success of the implementation depends on the availability of electronic medical record to cover an individual's life-span [17].

Under the same Malaysian Health Flagship, the Ministry of Health also introduced the Total Hospital Information System (T.H.I.S.) concept, which is adopted to run and manage several new government hospitals around the country. Using the T.H.I.S. concept, all functionalities in a hospital from the clinical functions to administration and infrastructure is incorporated to achieve a fully integrated system. However, Wong et al. (2007) pointed out that medical record sharing in the healthcare industry is a daunting task since different clinics or hospitals might use difference types of data standards, methods, algorithms or procedures to process their patients' medical data. [19].

3.4.1 University Malaya Medical Centre (UMMC)

The EHR implementation process began in the year 2008 as part of the PPUM iCARE project implemented at PPUM called the iSOFT Clinical Manager (iCM) which also included modules for an electronic medical record system. Even though the IT Department, called Nadi IT, has developed most of the modules in-house, external consultants were also engaged to supervise the implementation processes.

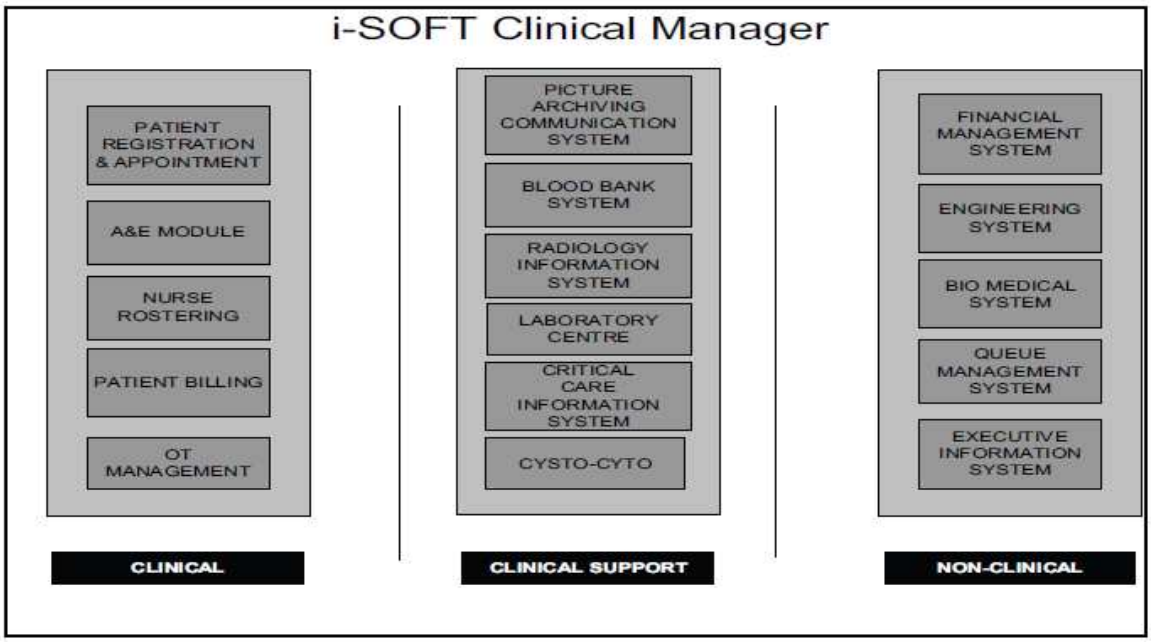

Figure 1: UMMC System Framework

The project comprises of three main components called Clinical System, Clinical Support System and the Non-clinical System. The clinical system encompassed the functions for administration of patients. The clinical support contains modules like PACS, Radiology Information System (RIS), Lab Centre, Blood Bank System, Cysto-Cyto, and Neurosurgery ICU system. The non-clinical system included the Engineering system, biomedical system, Finance and the Queue Management System.

The implementation of the system was launched in stages, according to modules. The first module launched was the PACS component with the staff of the Radiology Department as the main users. During the time when the interviews were conducted, the paper folders were still in use, and the pilot run of the complete EMR was scheduled to take place within the next few months. The implementation process faced some resistance from doctors, especially senior ones.

The management of the hospital plays a significant role in ensuring the success of the EHR implementation process by issuing policies enforcing the use of EHR among the medical doctors. The management was adamant on the use of the PACS system by discontinuing the purchase of radiography films after a given deadline. They also impeded the availability of the log books previously used for reservations of operation rooms to compel the use of the online reservation system. While EHR may be perceived as improving the speed and efficiency in work routines among some doctors, this change was also perceived as imposing difficulty and hardship on others. Since they had to key in notes of each consultation into the system, more clinical time could be consumed. Lack of computer skills among senior doctors could cause anxiety and stress when they had to perform the task beyond their ordinary routines, such as performing complicated searches, updating records, and keying in the data into the computers. This, however, is less apparent among younger doctors who have had more exposures to computers during their medical training. This phenomenon is similar to the findings of the study by Ghahramani et al., (2009)[5] on the job performance and perceived stress levels, which revealed that the level of satisfaction using the system decreases with years of medical training.

Being attached to a teaching and research university, another positive impact of the EHR implementation is that it encouraged medical doctors to do research; hence further develop their careers. The ability of accessing aggregate data across the healthcare facility also encouraged doctors to engage in studies in their area of specializations. Ease of communication also facilitates sharing of findings among colleagues. However, limitation still persists among doctors of different hospitals, though, due to systems' incompatibility and the differences in governance and policies on record confidentiality and information sharing.

It was observed that even though the EHR system was implemented throughout the hospital, the physical paper folders were still in use for references to patient medical histories. Since this hospital has not completely integrated the system to accommodate electronic patient history record, this discrepancy might cause inconsistency, confusion and inconvenience to health care practitioners.

3.4.2 Putrajaya Hospital

The EHR implementation process began almost instantaneously after the hospital started operating in year 2006. A local vendor, Kompakar, was employed to develop the system. All the modules, which covered clinical and administrative scope of the hospital, were launched simultaneously.

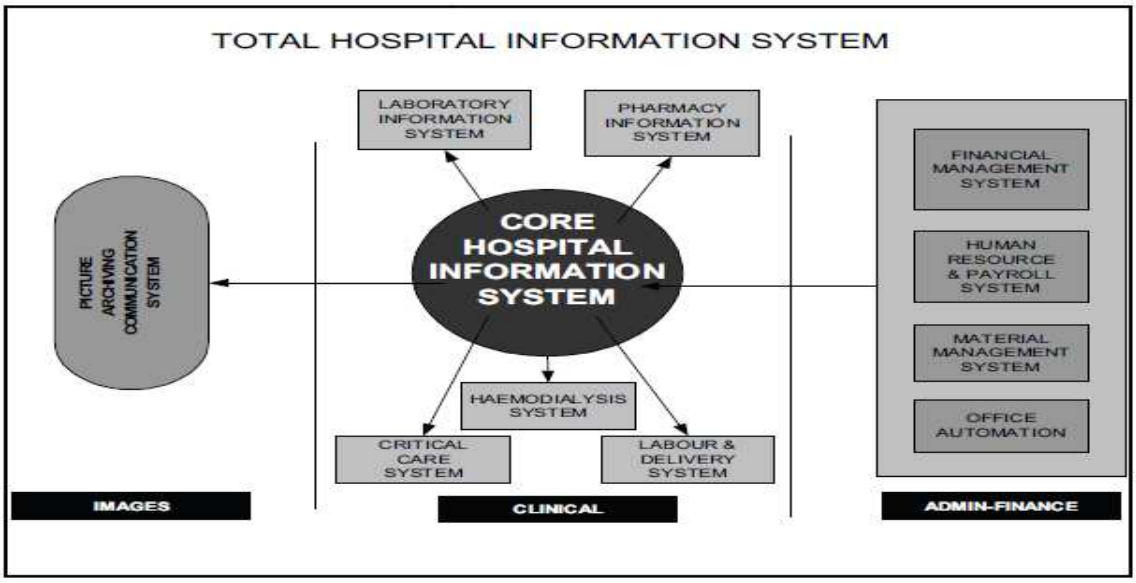

Figure 2: Putrajaya Hospital System Framework

The EHR modules, using total hospital information system framework (THISF), were divided into three major components, i.e. images, clinical, and admin finance. The images component was comprised of PACS module. The clinical component, which made up the core component of the system, was comprised of laboratory information system, pharmacy information system, critical care system, haemodialysis system, and labour and delivery system. The admin-finance component was made up of financial management system, human resource and payroll system, material management system, and office system (See Figure 2).

The IT administrator observed minimal resistance among doctors to use the system. Trainings for doctors were continuously conducted from time to time to support evolving upgrades of the EHR system. The IT administrator also reported about the tedious upgrading procedures and red-tapes commonly found in regular government hospitals causing some difficulties in the EHR implementation. The hospital was also affected by frequent changes in the government policies regarding vendors or acquisition of infrastructure. Change management was perceived to be more challenging with the frequent change in the top management itself.

Difficulty in keeping up with the technology frequently creates other problems like frequent down-time or unstable systems. Some doctors complained about the slow response of the system during peak hours. An incident occurred where the computer mainframe broke down for seven days forcing doctors to take all notes during appointments manually. When the system was operating again, all the manually recorded notes had to be entered into the system. The high dependency on the electronic information services and process flow might prevent the hospital services from running smoothly during down time.

3.4.3 Comparison between the Two Institutions

When the two hospitals are compared, several similarities and differences can be recognized. Even though the two hospitals are governed by two different ministries of the Malaysian government, both hospital are operating as

government hospitals. As such, the nature of service at both hospitals is that of public healthcare institutions and the volume of patients in both hospitals is high. The main difference found in the two hospitals with regards to EHR implementation is the fact that Putrajaya Hospital, in keeping with its location in the MSC hub, was one of the hospitals that has been strategically built by the Malaysian Health Ministry to fulfil the goals of the Malaysian Health Flagship. The UMMC, on the other hand is not subjected to the Ministry directive to implement T.H.I.S in its operations. Its top management has decided to implement the EHR technology to improve the quality of healthcare services and to develop computerization in its daily operations to be at par with other government hospitals. Being an old hospital, the implementation of EHR requires massive migration from the previous system to the newly developed one; not to mention the heavy duty work on the conversion of retrospective records that existed in old printed files. The daily operations include on-going migration and the use of both manual files as well as electronic records.

Although the concept of EHR is well understood in both institutions, the models used are somewhat different. This can be observed in terms of the modules provided and the implementation stage involved. In other words, the implementation of EHR in the Putrajaya Hospital can be described as strategically driven while the one in UMMC is operationally driven. This assumption is supported by the fact that the EHR infrastructure was built in together with the construction of the hospital. All the modules went live all at once from the beginning of its operation while covering all scopes of the hospital functionalities. In contrast, the implementation in UMMC was only recently expedited and the modules were launched in stages according to modules. Additionally, the fact that the paper folders were still widely used in the hospital indicates that the reliance on the EHR at UMMC is not total and complete. This could be interpreted as low level of readiness to accept the technology or indicate a certain degree of resistance from the healthcare practitioners towards the implementation.

4. DISSECTION

The purpose of a collaborative diagram is to identify the participating domains and their collaborative relationships in terms of the core competence. Core competencies in each health sector are the sources of sustainable competitive advantage and are valuable capabilities. They are collective, unique, non-imitable, and strategically flexible. These core competences have to be aligned with the medical collaboration strategy.

Fig1 illustrates the collaborative between the clinics and hospitals in one system with the higher level that can keep and share the information of the patinas at the special department in the ministry of health so will be monitoring from the ministry regarding to the secure patients' information. Furthermore, expert people in health care and consultants will are involving in this concept what experience that they own. They can share to the clinics and the hospitals in order to be aware of new diseases that face the world or complex matter or other problems may face the clinic and hospitals not aware of it. After the system gets the feedback from both sides will send back the idol information.

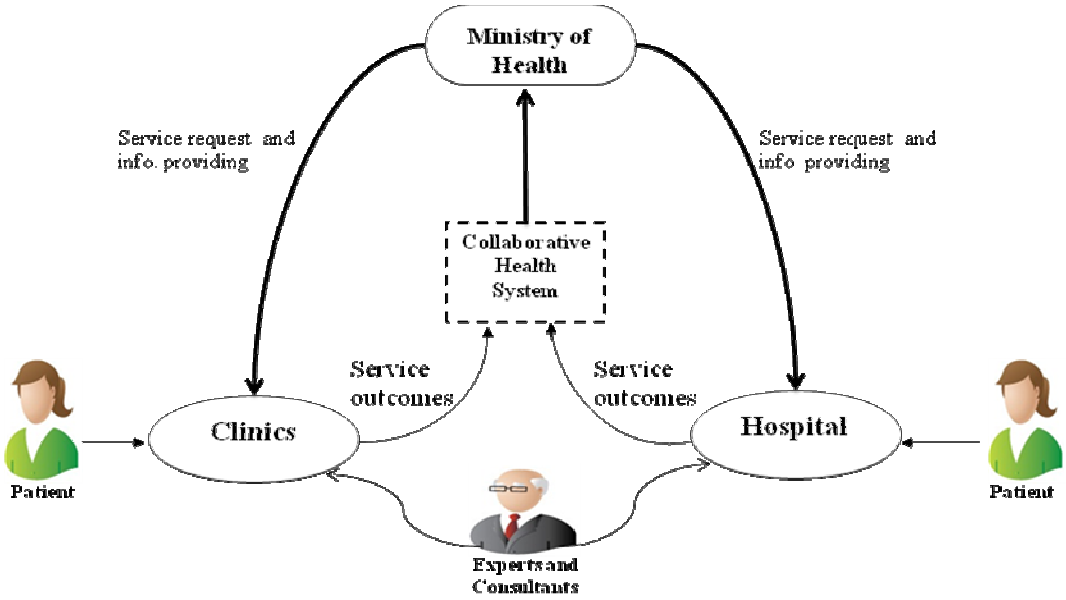

Figure 3: proposed Collaborative system diagram

This diagram fig. 3 illustrates the relationship between the experts and the consultants in the health sector will be attached with the clinics and the hospitals, secondly each organization, whether clinics or hospitals will connect to the collaborative system to provide the data and the information of the patients. The third action this information it will at the ministry of health from both clinics and hospitals as history for the patients once any side request any information of the patients it will be available.

5. CONCLUSION

With implementing such a system in the ministry of health in Malaysia under full control of the government, which is include the collaborative between the physicians in each clinic and hospitals we find this kind of Collaboration system it will serve the patient in Malaysia with reduction of cost and time. Moreover this work can assist to health care institution to learn this experience.

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