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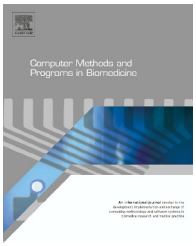

Building a National Electronic Medical Record Exchange System – Experiences in Taiwan

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ABSTRACT

There are currently 501 hospitals and about 20,000 clinics in Taiwan. The National Health Insurance (NHI) system, which is operated by the NHI Administration, uses a single-payer system and covers 99.9% of the nation's total population of 23,000,000. Taiwan's NHI provides people with a high degree of freedom in choosing their medical care options. However, there is the potential concern that the available medical resources will be overused. The number of doctor consultations per person per year is about 15. Duplication of laboratory tests and prescriptions are not rare either. Building an electronic medical record exchange system is a good method of solving these problems and of improving continuity in health care.

In November 2009, Taiwan's Executive Yuan passed the 'Plan for accelerating the implementation of electronic medical record systems in medical institutions' (2010–2012; a 3-year plan). According to this plan, a patient can, at any hospital in Taiwan, by using his/her health insurance IC card and physician's medical professional IC card, upon signing a written agreement, retrieve all important medical records for the past 6 months from other participating hospitals. The focus of this plan is to establish the National Electronic Medical Record Exchange Centre (EEC). A hospital's information system will be connected to the EEC through an electronic medical record (EMR) gateway. The hospital will convert the medical records for the past 6 months in its EMR system into standardized files and save them on the EMR gateway. The most important functions of the EEC are to generate an index of all the XML files on the EMR gateways of all hospitals, and to provide search and retrieval services for hospitals and clinics. The EEC provides four standard inter-institution EMR retrieval services covering medical imaging reports, laboratory test reports, discharge summaries, and outpatient records. In this system, we adopted the Health Level 7 (HL7) Clinical Document Architecture (CDA) standards to generate clinical documents and Integrating the Healthcare Enterprise (IHE) Cross-enterprise Document Sharing (XDS) profile for the communication infrastructure.

By December of 2014, the number of hospitals that provide an inter-institution EMR exchange service had reached 321. Hospitals that had not joined the service were all smaller ones with less than 100 beds.

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Inter-institution EMR exchange can make it much easier for people to access their own medical records, reduce the waste of medical resources, and improve the quality of medical care. The implementation of an inter-institution EMR exchange system faces many challenges. This article provides Taiwan's experiences as a reference.

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1. Introduction

The WHO defines eHealth as "the use of information and communication technologies (ICT) for health" [1]. Examples include treating patients, conducting research, educating the health workforce, tracking diseases and monitoring public health. Because eHealth can increase the accessibility of medical care and reduce costs, it can have a far-reaching impact, particularly for developing countries and disadvantaged ethnic groups [2]. The WHA held on May 23, 2005 in Geneva passed a eHealth Resolution (WHA 2005) urging member countries to create eHealth development plans and an implementation focus [3].

Electronic medical records constitute a critical component of eHealth. As governments commit to national EMR systems, there is increasing international interest in developing effective implementation strategies. Coiera identifies three approaches to national EMR implementations, which he categorizes as 'top-down', 'bottom-up' and 'middle-out' [4,5]. A top-down approach is directed by government, with the central procurement of standardized healthcare IT systems to replace existing diverse systems and the aim of centrally stored and shared EMRs. He gave England's National Programme for Information Technology (NPfIT) as an exemplar of this approach [6]. In contrast, the bottom-up model relies on local healthcare organizations taking responsibility for making their existing and any newly acquired healthcare IT systems compliant with interoperability standards. Multiple EMRs are held locally, but the intention is that data will become accessible from other settings as diverse local systems become integrated over time. Coiera presented the USA as an example of this approach. The middle-out approach has elements of both the top-down and bottom-up strategies. It combines local consultation, systems choice and investment with central government support and nationally agreed interoperability standards and goals. Local healthcare providers retain responsibility for choosing their EHR systems and for complying with national standards in order to exchange information with other healthcare providers. Coiera identified the Australian strategy of focusing on standards rather than government implementations of IT as an example of the middle-out approach [7].

Jha examined rates of electronic health record (EHR) use in ambulatory care and hospital settings, along with activities in health information exchange (HIE) in seven countries: the United States (U.S.), Canada, United Kingdom (UK), Germany, Netherlands, Australia, and New Zealand (NZ). They found that many countries have achieved high levels of ambulatory EHR adoption but lagged with respect to inpatient EHR and HIE [8].

In recent years, Taiwan's government has aggressively developed various forms of eHealth, including tele-health [9], HIE, and other services. HIE is one of the core components of eHealth. It can help a medical team make better and more appropriate clinical decisions by utilizing the ICT technology to transmit, in real time, patient's health care information to any medical team that requires it. Past research indicated that an EMR system can help to increase the quality of medical care, enhance patient safety, lower medical costs, and so on [10,11].

This article will share Taiwan's implementation experiences through its development strategies and current achievements in promoting a nationwide EMR exchange system.

2. Background

There are currently 501 hospitals and about 20,000 clinics in Taiwan. Medical expenses account for about 6–7% of the country's GDP, which is lower than the levels of OECD and regional countries. The National Health Insurance system, which is operated by the National Health Insurance Administration, uses a single-payer system and covers 99.9% of the nation's total population of 23,000,000 [12]. Taiwan's National Health Insurance provides people with a high degree of freedom in choosing their medical care options, low medical service costs, and excellent quality. It has received a higher than 80% satisfaction rate from the people, and is well praised by other countries [13,14]. However, the fast aging population, increased demands on medical services and medicinal supplies, as well as rising medical costs, have presented huge challenges to the long-term operation of the National Health Insurance system. Because the system has no gate keeper, the number of doctor consultations per person per year is about 15. Duplication of laboratory tests and prescriptions are not rare either [15]. Building an electronic medical record exchange system is a good method to solve these problems and to improve the continuity in providing medical care.

The promotion of eHealth in Taiwan and the launch of National Health Insurance are closely related. The electronic insurance claiming system was the first step for many medical institutions in going electronic. Because of the National Health Insurance Administration's active promotion efforts, electronic claims quickly reached 100% in 2000, the sixth year after the launch of the National Health Insurance program. Moreover, because of the catalytic effect of the electronic claiming, many medical institutions started to digitize other functions as well. The promotion of the Health Insurance IC card (Health Smart Card) is another important milestone of eHealth in Taiwan [16]. At the start of the National Health

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