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Promoting Electronic Health Record (eHR) Sharing System in Hong Kong – What Can We Learn from Taiwan

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ABSTRACT

Technology grows fast in recent decades and has contributed to the development of health information system. The Government has established the eHR sharing system to bring about a host of benefits to the community through more efficient health care services, reduction on medical costs as a result of more effective and early treatment. The system would also enhance the availability and transparency of information through sharing of patient records between healthcare providers in both the public and private sectors, with the objectives to reduce the frequency of consultations, to improve the accuracy of diagnosis and patient management, to avoid duplicate investigations and errors associated with paper records, and to enable disease surveillance and public health research leading more effective policy formulation. In this essay, the authors suggest that there is much to be learned from the development and implementation of their electronic medical record system in Taiwan. A social marketing approach is recommended in order to improve and promote the electronic health record project in Hong Kong.

KEYWORDS: Electronic health record, Social marketing, Health care system

1 INTRODUCTION

Technology grows fast in recent decades. People rely on its benefits to improve living quality. Technology also contributes to the development of health information system. The government is establishing a web-based electronic patient health system with public and private health service sectors for ensuring real-time and integrated storage system. However, challenges of privacy and security in sharing information are under consideration by the public. This paper will outline the development of electronic health record in Hong Kong, discuss its effectiveness, and raise example of the Taiwan's experience as a reference to improve the system.

2 DEVELOPMENT IN HONG KONG

Electronic health record (eHR) is defined by the Government of the Hong Kong Special Administrative Region (HKSAR) as “a record in electronic format containing health-related data of an individual, stored and retrieved by different healthcare providers including doctors and other healthcare professionals for healthcare-related purposes” (eHealth Record Office, 2014a).

A centralized information technology (IT) system, namely, the clinical management system (CMS) for clinical care has been developed before 2000. It lowered the IT cost and increased the overall compatibility for public health services delivery in the Hospital Authority (HA) (Sek et al., 2007). After the year of 2000, the electronic patient record (ePR), a web-based system of patient life-time record in public was developed. The ePR has a function to “reduce cost by minimizing repetition of investigations and administrative cost and delay in obtaining patient's information for continuation of care from another hospital”, and to “reduce risk by having a complete, up-to-date medical history at the point of care” (Sek et al., 2007).

Further to the development of IT system, the introduction of Public Private Interface-Electronic Patient Record (PPI-ePR) in mid-2005 enhanced the co-ordination of the public and private health service sectors as a way to promote continuity of care of patients, with the aim to facilitate a free flow of patients between the public and private sectors, in providing on time access to patient information (Sek et al., 2007). Later on, a territory-wide patient-oriented system, the eHR Sharing System, was implemented in response to the healthcare reform in 2008, as part of the Public Private Partnership (PPP) initiative (Hospital Authority, 2010). Then in July 2009, the eHealth Record Office was established to monitor the complex and multi-faceted development of eHR. The Office developed the first stage of the eHR Programme from 2009 to 2015. This programme tried to integrate with PPP Programmes as a way to strengthen the delivery of service in both the public and private sectors. The eHR is now entering the legislation process on patient privacy and security of eHR (eHealth Record Office, 2014b).

2.1 Advantages of eHR

The proposed eHR system will satisfy two aims: (i) To enhance the continuity of care as well as better the integration of different healthcare services for the benefits of individual patients; (ii) To advance the integration of the electronic health record system in terms of the public-private sector. There are three components of the Hong Kong eHR: (i) sharing infrastructure, (ii) adaption and extension, and (iii) standardization and interfacing components. The sharing infrastructure component mainly focuses on the establishing of consent sharing includes data exchange and data storage. Secondly, the eHR system should be adopted and extended to both public and private hospitals with minimum investment. Thirdly, sufficiency of technology, such as a validation online platform and Information Technology specialists, should be provided to technical support in the private healthcare sectors (eHealth Record Office, 2014c).

It is no doubt that eHR benefits the society as a whole. The eHR brings clinician benefits, patient benefits, healthcare system benefits, and community benefits (Legislative Council, 2014). For clinicians, an online comprehensive health record improves the availability and transparency of information shared between the public and private sectors. The efficiency of healthcare interventions and the quality clinical practice are therefore enhanced. Moreover, efficiency gains by avoiding the need for storage, the collage and transfer of paper records, and the record transportation costs.

For patients, the eHR enhances the quality of care and the acquired health information. Other benefits include the reduction of the medication errors, the provision of more efficient and more effective use of diagnostic tests, the increase in the speed of treatment, and the improvement of efficiency and accuracy of diagnosis and disease management. For the whole health care system, the eHR achieves a more efficient and better quality healthcare because of the decrease in duplicate investigations and paper-work errors. The new system reduces the extra time from administering paper medical records, the duplicated laboratory tests, the stay duration of patients or unplanned re-admissions, the medication or prescription errors and the documentation.

For the whole community, the eHR enhances the efficiency and quality of care and better collaboration and seamless interface between the public and private healthcare sectors. Moreover, from the viewpoints of the Government, not only it can gain efficiency in total healthcare expenditure, but also can gather more comprehensive statistics to support policy formulation, public health research, disease surveillance and monitoring of public health.

2.2 Current situation

Today, most of public and private hospitals in Hong Kong are using electronic systems to record medical and patient information. However, these health-related data are usually produced and stored by various organisations, health professionals, and sometimes by individual patients in different locations and storage patterns or formats. On the other hand, electronic health records in private clinics are rarely used since many doctors still record the health status in the written paper format. In order to facilitate the wider use of patient's records, especially between public and private hospitals, eHR is used to transfer patient records in both directions. In this regard, the Government has criticized the ineffectiveness of outdated electronic health record and the small scale of data sharing, resulting in delay in patient treatment. Therefore, further improvement should be made in the electronic health record system (eHealth Record Office, 2014d).

The electronic health record sharing is on a voluntary basis, in which medical professions and patients are given choices to decide whether to participate in such health record sharing system (eHealth Record Office, 2014e). If they choose to join, various consent or regulations should be agreed and promised. Therefore, the authorized parties such as doctors or healthcare service providers can review and have access to patient's health records. The eHR mainly include diagnosis, adverse reactions toward medicine, vaccination records, and history of medication (eHealth Record Office, 2014e). Records are important to health service providers, especially doctors, in deciding the most appropriate treatments.

3 SITUATION IN TAIWAN

The Taiwanese government had started to promote and adopt the Electronic Medical Record (EMR) System since the year of 2000 in the aspects of standards, legislation, safety and promotion.

3.1 Standards

The development of the EMR System has involved the computerisation of medical records in hospitals and the exchange system of EMRs across different healthcare organisations and hospitals. The Ministry of Health and Welfare (MOHW) of Taiwan has established and supervised the EMR Exchange Center (EEC) as a system platform to promote inter-hospital medical records exchange and integration. Hospitals and healthcare organisations are required to create accounts in connecting to the system of EEC. Since 2014, 342 public and private hospitals have been interfaced with EEC (MOHW, 2015). Registered hospitals and healthcare organisations could access and update the integrated medical records in the database of EEC.

Apart from establishing an EMR sharing platform, MOHW is also responsible for standardising and unifying the medical record format among hospitals. MOHW has proposed several basic format templates of EMR for medical imaging and reporting, patient medical records, outpatient drug record, blood tests and abstract discharged disease. These templates serve as references for all healthcare organisations (MOHW, 2014). Such standardisation is the foundation of EEC and helps to advance the process of integrating EMRs among different hospitals and healthcare organisations throughout Taiwan.

3.2 Legislation

In order to implement EMR system effectively, the government in Taiwan has formulated a solid legal foundation. According to the 26th clause of Medical Care Act, MOHW shall be responsible to audit medical care institutions, which have adopted and implemented the EMR system, in accordance with the guideline of electronic medical record regulation (Law and Regulations Database of The Republic of China, 2014).

On the other hand, in response to the wide public concern for the issue of privacy, the Taiwanese government has enacted relevant laws regarding the disclosure of personal data of patients under the Medical Care Act and Personal Information Protection Act (Law and Regulations Database of The Republic of China, 2014). The Medical Care Act shall ensure the comprehensive development of the medical care industry with a purpose to protect the rights of the patients. In accordance to the 72th clause of Medical Care Act, medical care institutions and their staff must not reveal any patient's information without reasonable cause. In addition, MOHW has also specifically enacted a series of laws for the production and management of EMRs, based on the 69th clause of Medical Care Act. At the same time, the Personal Information Protection Act, a law against the disclosure of patient's personal data, aims to facilitate the appropriate use of personal information and prevent violation on personal information rights.

3.3 Promotional aspect

The National EMR Development Committee (NEDC) plays an important role in the promotion of the EMR system. The main purpose of setting up the NEDC is to “establish policies and infrastructure layouts for adoption of EMR systems”. NEDC organizes guidelines for sharing and exchanging information and plans of managing and accessing for continuous projects. There are four working groups under the NEDC, namely the Clinical Work Group (CWG), Information Systems and Standards Work Group (ISWG), Patient Safety Work Group (PSWG) and Project Review Work Group (PRWG), responsible for different aspects (Ni et al., 2013).

On the other hand, the Department of Health provides a series of professional training courses for hospital staffs and other healthcare institutions (Department of Health, 2008). The aim of these training courses is to educate medical practitioners to operate certification of ISO 27001:2005 and strengthen the safety of EMR System. After that, these staffs became the core members to manage information security in their hospitals. The Department of Health has organised about 80 lessons of educational training of information security for hospitals'

staffs to increase their knowledge about information security and protection of privacy (MOHW, 2015).

Furthermore, in order to encourage more medical institutions to support the EMR System, MOHW has created a subsidy programme for hospitals which have adapted to EMR. Simultaneously, those hospitals are required to share the EMRs with four work groups. In addition, the number of average outpatient visits and beds of hospital determine the amount of subsidy. Normally, the range of amount is about US\$80,000 to US\$400,000. The amount of subsidy also depends on the operation size of hospital. For instance, small-sized hospitals could receive more because they have limited resources and need more supports to set up the EMR systems (Ni et al., 2013).

3.4 Safety aspect

The Department of Health established the Healthcare Certification Authority (HCA) in 2004 with the purposes to strengthen the security and privacy of medical information, and to promote the application of electronic medical information. HCA had issued 149,782 medical certificate IC cards by 2007 (MOHW, 2015).

In practice, accessing EMR requires the use of the medical certificate IC card. The IC card provides signature and encryption to ensure the sources and completeness of EMR. It helps to avoid counterfeit records and denial of delivery of records. There are two types of medical certificate IC cards, which are used by medical institutions and medical personnel respectively. Moreover, the Department of Health has noticed that removing people's concerns about information security and privacy protection is essential in the promotion of the EMR System (Department of Health, 2008). Certification of ISO 27001:2005 is the current comprehensive information safety certification system for testing the information system among hospitals. Hence, hospitals information system approved by this ISO Certification can increase the public's confidence in the EMR system (MOHW, 2015).

In order to ensure the safety and legality of the EMR System, some laws had been revised. The Department of Health revised the 69th clause of Medical Care Act in 2004 which endows the EMR System a legal status. The Department of Health announced an ordinance in 2005 and noted that production and storage of EMRs should be regulated. For example, doctors must make their electronic signature in patients' health record. Correction and deletion of EMR should be kept in record. This means that historical records can be traced back if there have been any modifications on electronic records. Hence it is more likely to reduce the rate of the EMR modification abuse. On the other hand, the EMR System shall back up all the records and set an emergency protection system to ensure the safety and privacy. In addition, EMR system needs to be certificated by government institutions to confirm the authenticity of health records (MOHW, 2015).

4 EVALUATION OF EHR SHARING SYSTEM IN HONG KONG

From the perspective of the eHealth Record Office, there are benefits for HA to operate the eHR Sharing System. However, there are shortcomings of the eHR Sharing System and have hindered the popularisation of eHR in Hong Kong. Furthermore, the Government does not have good skills and thus does not have performance in social marketing of eHR. The situation is worse off by the lack of rules and regulations, nor strategies for implementation of the eHR Sharing System in terms of privacy and security, standards of technology, and promotion.

The absence of legislation to manage the operation of the eHR is the major problem. Starting from the second Quarter in 2012, the Hong Kong Government started to emphasize the importance of legislation. The drafting of "the Electronic Health Record Sharing System Bill" (Bill) has been proceeded to verify the legal validity of electric documents and the liabilities and obligations of certification authority and users (Legislative Council, 2014).

However, up to now in 2015, the Bill has not been passed in the Legislative Council and is still under the stage of the clause-by-clause examination.

Without the presence of the formulations of legal regulation or criminal offense, there are problems concerning the privacy and reliability issues. Privacy issues include the tampering of personal medical data and information arbitrarily, modification and deleting of patients' data maliciously, the malicious invasion to the network, and the hierarchical control of sensitivity information. It may lead to modification abuse, particularly in the public sector. These issues not only amplify the discussion of privacy protection, but may also potentially endanger the patients' life. Furthermore, the legal controversy among the eHR is another concern since the reliability of eHR system is being questioned. HA can use passwords to make any amendments on the personal data and information at any time. These actions are without any strict control and regulation. Consequently, the accuracy and trustworthiness of personal health information saved in the eHR is doubtful.

5 PROMOTING THE EHR SHARING SYSTEM BY SOCIAL MARKETING

Although the eHR Sharing System was established around 10 years ago, the utilization by Hong Kong residents is still not extensive. There are only 447,000 patients enrolled to the eHR Sharing System (Hospital Authority, 2015). The inadequate promotion is the main factor of the insufficient of participation rate. Application of the social marketing approach, comprising the concept of marketing mix, and the 4Ps, i.e. product, price, place and promotion, will be explored.

5.1 Social marketing approach

The social marketing approach can be applied in public health for designing and implementing the programme that promote changes of social behaviour of the public in the community. However, social marketing is being considered the way to narrow the communication activity in many health promoters' perception (Hill, 2001). Therefore, the government may not organise well in social marketing, leading to the low participation rate of the eHR Sharing System.

According to Andreasen (2002), "social marketing" refers to applying commercial marketing techniques and concepts to promote and enhance the social behavioural change. The features include marketing mix and consumer orientation etc. Marketing mix includes the 4Ps, namely, "product", "price", "place" and "promotion". Within the concept of social marketing, the term "competition" refers to the option of behaviour which competes with promoted public health services. Therefore, the basic strategy is to maximise the benefits of alternative behaviour for encouraging public health (Hastings, 2003).

5.2 Product and Price

The product is a set of the benefits related to the desired behaviour or service usage. To make it successful, the product should provide feasible and effective solutions to customers (Grier & Bryant, 2005). The "product" stated here is the service of eHR Sharing System. Apart from the product, the price is the cost which is evaluated by customers' feeling (Grier & Bryant, 2005). The feeling includes time cost, diminishing pleasure and hassle of behaviour change. Therefore, in deciding the price of eHR Sharing System, the Government should maximize the benefits to the customers. The combination of benefits should be significantly greater than the cost. It has been found that many patients and healthcare providers had not made use of the system to access patient records since enrolment (Audit Commission, 2012). The eHR Sharing System, i.e. product, may not have been designed comprehensively since the customers are still concerned about the privacy and technological issues. The Government appears to emphasise only on the benefits for the public and private providers but not the customers. Thus, the privacy and security measures, and standard of technology should be

improved to enhance the quality of products, with decreasing price to the users, in order to make the eHR Sharing System appealing to the community.

5.3 Privacy and security measures

Private information in the eHR Sharing System includes both medical records and personal information, such as the identity (ID) card number. These records are used for getting more accurate and appropriate treatments, and for reducing the frequency of follow-up consultations. However, the use and disclosure of private information is an essential problem. It may lead to criminal offences such as the information embezzlement of other party.

The absence of an encryption system has been criticized by the society. The medical community and patient organisations have stated that the incomplete eHR impedes the medical professionals to provide appropriate medical treatment. In view of sensitive information, such as Acquired Immunodeficiency Syndrome (AIDS), mental illness or genetic diseases, patients may be deterred, and are not willing to join the scheme voluntarily. They may even be unwilling to receive any medical treatments. Such labeling effect may affect the life of patients seriously. Therefore, an encryption system is necessary.

On the other hand, the eHR Sharing System may encroach on doctors' professional privacy. The medical record would be shared among doctors in both of the public and private practice. Some of the doctors, especially those in the private sector, may worry about commercial secrets being available to the others, and the "unique" treatment would be prescribed by other doctors after the sharing of such information.

The system involves storing a large number of image records and electronic signature. Hence, a high level of technology is a necessary component to protect the privacy of patients and to ensure the security of the system because leakage of personal information is an essential issue in the eHR Sharing System. Records may be modified without permission and personnel information may be sold or invaded by the hackers. As a result, patients may not trust the reliability of the system.

A majority of people do not accept the eHR Sharing System because the product is not well designed and the price suffers from the privacy and security issues.

5.4 Place

Place refers to the location where customer receives service (Kotler, Roberto & Lee, 2002). The features of place include attractiveness, accessibility and comfort etc. However, not all private clinics can provide the eHR Sharing System due to technological, operational and other reasons. Many healthcare providers in private clinics usually keep the health record in written form on paper, and only 20% of private clinics, 800 out of 4000, have access to her (ehealth, 2014d). As a result, patients served by most private clinics cannot receive the eHR service.

5.5 Promotion

Promotion is an essential strategy that the Government lacks in this project. Promotion embraces the persuasive communication to convey the benefits of service or product (Kotler, Roberto & Lee, 2002). In 2008, an HA evaluation found that patients and private medical practitioners had low satisfaction with the publicity of the PPI-ePR (Audit Commission, 2012). Firstly, the Government does not organize the promotion activities widely and continuously. For instance, advertising, public relations, promotional items, special events and displays are scantily organized. Television and Broadcasting station advertisement or programmes seldom introduce the eHR Sharing System.

Secondly, the promotions of large and special activities are rarely seen. The propaganda level is hence inadequate. The message should be designed to be attention-seeking and to be

effective with appropriate communication channels. Nevertheless, the message of promoting participation in eHR Sharing System is not effective enough. It cannot contribute to memorable message for Hong Kong citizens and the related benefits to them. As a result, the public may be less motivated to participate in the registration because they do not consider the necessity of the eHR facilities. Thirdly, professional training, policy change and skill building, as they do in Taiwan, should be combined with the communication activities in the promotion. Nonetheless, the Government seldom trains and educates the providers and customers to overcome the operational difficulties. The Audit Commission has noted that there are private medical practitioners, who have not attended training and have not updated electronic patient records on a timely basis (Audit Commission, 2012).

6 CONCLUSION

It is not unreasonable to expect a capability in developing electronic health record in the dual public-private healthcare sectors in Hong Kong. This is more so in view of the widespread utilization of IT and mobile devices in the community. However, without appropriate and sufficient promotion within health service sectors and the society, and the widely-used safe technological system, the eHR would be more difficult to gain popularity in Hong Kong.

Taiwan has developed its electronic medical record system holistically and strategically. The Hong Kong government can learn from it as a model for implementing the local eHR and its Sharing System. By referring to Taiwan's situation, the legislation of eHR would be of top priority. It is essential and fundamental to protect the privacy of patients' information and to avoid corruption of concerned stakeholders. Comprehensive promotion strategies may increase the popularization rate of eHR in Hong Kong. In this regard, Hong Kong could copy the practice of subsidies provided and professional training courses offered to Taiwan hospitals have enhanced the development of EMR that provide a practical framework.

The eHR sharing system should become a widely-used electronic healthcare system in the public and private health sectors in Hong Kong. The implementation of a comprehensive electronic medical record system would be a possible solution in eliminating the potential obstacles. The HA has initiated a few pilot projects since 2006 to facilitate better collaboration on sharing of electronic records between the two sectors (Food and Health Bureau, 2011). Nonetheless, social marketing and promotion of the system is equally vital for its success. The Audit commission has recommended a strategy for stepping up publicity of electronic patient records (Audit Commission, 2012).

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