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The relationship between usage intention and adoption of electronic health records at primary care clinics

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ABSTRACT

Objective: Despite of emerging evidence that electronic health records (EHRs) can improve the clinical quality, enhances patient safety and efficiency. Most physicians in primary health care clinics in the Taiwan do not currently adopt EHR at their clinic practices. We aim to measure the relationship between usage intention and adoption behavior.

Study design and methods: We used structured questionnaires distributed both EHRs adopter and non-adopter group to the primary health care physicians which participated in the DOH project to establish the information exchange environment across Taiwan. The response rate of adopter and non-adopter is 54.7% and 55.0% respectively.

Measurements: EHRs adoption behavior.

Results: The EHRs adopter group has higher intention than non-adopter ($p = 0.003$). From the result of logistic regression analyses, we found the key factors affecting physicians' adoption pattern were intention to use (OR: 2.85; 95% CI: 2.30–3.54). In addition, higher perceived usefulness (OR: 1.29; 95% CI: 1.06–1.56) and perceived ease to use (OR: 1.48; 95% CI: 1.22–1.79) increase adoption of EHR found.

Conclusion: The intention to use EHR, perceived usefulness and ease to use of primary care physicians were found as key factors influencing EHRs adoption. Thus, we suggest that government should promote the potential benefits of EHR and enhance physicians' willingness to adopt the EHRs at their clinic practices.

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1. Introduction

The health information technology is important and has potential to improve patient safety and quality of care [1].

In US, the Health Information Technology for Economic and Clinical Health (HITECH) Act of 2009, part of the stimulus bill, allocates approximately \$44000 for each practicing clinician and between \$2 million and \$10 million for each hospital that

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qualifies as a “meaningful” user of electronic health records (EHRs) [2]. The objectives of meaningful use include improved quality, safety and efficiency in patient care that engages both patients and their families, improved care coordination among hospitals, private practices and other health facilities to improve the health [3]. The meaningful use of the EHRs can achieve specific health and efficiency goals [2].

In last few years, the Department of Health Taiwan had National Healthcare Information Project (NHIP) to promote adoption of the EHRs and to enhance health information exchange [4]. The researchers developed Taiwan Electronic Medical Record Template (TMT) followed by HL7 Clinical Document Architecture (CDA) international standards for interoperability infrastructure of health information with in the healthcare systems in Taiwan [5]. This research would help to provide a fully interoperable nationwide EHRs system in Taiwan [6]. The electronic prescribing, electronic data exchange, including process and outcomes, coordination of care through the transmission of clinical summaries must be connected to a health information exchange [7] to improve quality of care as shown in information exchange flow chart (Fig. 1).

Moreover, in Taiwan it is more convenient for physicians at clinics to process EHR by doing electronic signature and the information automatically send to the National Health Insurance (NHI) and could retrieve patient’s information immediately at any time as shown in Fig. 2.

The mission of Taiwan’s mandatory National Health Insurance system providing universal coverage and guaranteed equal access to health care services. Therefore, patients are free to visit any suitable hospital or clinic or any appropriate doctor as they prefer. For that, it is important to have universal standards for improving quality, safety, efficiency and reducing health disparities and improving care coordination [5]. The EHRs with digital signatures could help for retrieving patient’s medical history on time with all necessary patient information when they visit to different primary health care clinics. Thus Taiwan is providing favorable platform to take maximum advantages of the EHRs systems.

To date, there have been no definitive nationwide study that provide estimates about the EHRs adoption by Taiwan Physicians at PHCs. Jamoon et al. [8] in 2011 estimated in US about the physician’s adoption found about 9–29%. Hillestad et al. [9] in 2005 studied that EHRs not just help in improving patient care but it might also help in reducing costs [9,10]. Despite of many other countries, some are far behind in adoption, and some have almost complete adoption like Germany, which in 1993 became the first country to begin investing in HIT and Canada, whose efforts date back to 1997, expects to have electronic health records in 2010. On the meanwhile, Norway and Australia have at least a six-year jump on the U.S. [11]. Advancing electronic medical record (EMR) technology is also a high priority for governments in the U.S., U.K. and Australia, with investment over the next five years totaling \$100 billion USD [12]. In 2003, nationwide representative survey at United States shown only 17.6% but recently in 2011, 55% of physicians in office based practices are using EHRs [8,13]. Hillestad, Miller and Chang reported that public policies are increasingly encouraging to

be focused on EHRs implementation and adoption completely [4,7,12]. The Physicians crucial influence has also been highlighted regarding their service-generating role in health care [14–16].

Physicians continue to be reluctant to integrate health information technologies such as electronic health records (EHRs) into health care settings [17]. The resistance from the physicians has identified as a key barrier for the implementation of health IT systems [18]. The lack of time, confidentiality and privacy issues and interoperability problems between older and newer systems, absence of clear standards or rigorous evidence on the effectiveness of various eHealth applications, or low familiarity of certain professionals with technology which limits them to adopt it [19,20]. Regardless of these obstacles, a literature review reveals that further research is necessary to clarify the role of trust and risk perceptions in physician’s acceptance of health information systems [10,20,21]. Curry, Bitner, and Davis evaluated physician intention toward EHRs adoption at primary health care centers prior to implementation that based on information systems theory, marketing, social psychology and health care literature [19,22,23]. Not only EHRs adoption but its meaningful use by providers also plays an important role to achieve significant improvements in care [24,25]. Therefore, the aim of this study to investigate the factors physicians EHRs adoption behavior at PHCs. In this study, we try to gather information on current levels of adoption and to provide the survey items that could be used to generate similar data on the diffusion of electronic health records over time and on physician’s adoption perceptions both solo or in a group, the effect of such systems on their practices at primary health care centers.

2. Research methods

2.1. Model of the study

We used Technology Acceptance Model (TAM), [26] which is a core model to examine the original structure for dimensions and casual relationships of the physicians perception about EHRs adoption. In health information technology projects implementation, the TAM has been extensively used to evaluate, which is based on a theory that explains the perceptions and adoptions behavior [22]. The aim of using TAM because it evaluates the technology acceptance together with Theory of Planned Behavior (TPB) that focuses on factors that determines users’ behavior and intention toward new technology adoption and considered to be one of the well-studied and tested theories [27]. In our study, we considered TAM scale of Davis [23], Social norm questionnaire of Venkatesh et al. [28] and self-computer effectiveness scale from Murphy, Coover and Owen [29] and security and privacy from the Jian et al. [30] in the questionnaire.

According to TAM and TPB integration that suggested by Venkatesh and his colleagues, the model includes adoption behavior (AB) and behavior intention (BI) with variables (PE) ease to use, perceived usefulness (PU), computer self-efficacy (CSE), subjective norm (SN), security (S), privacy (P), and intention to use (I) [31]. However, ease to use defined as “the degree to which a person believes that using particular

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