ANTECEDENTS AND CONSEQUENCES OF CONCERN FOR ELECTRONIC MEDICAL RECORDS PRIVACY

Hsin-Ginn Hwang, Department of Information Management, National Chiao Tung University, 1001 University Road, Hsinchu, Taiwan 300, R.O.C.
hghmis@gmail.com, 886-3-5712121 ext.57084

Ju-Ling Hsiao, Department of Hospital and Health Care Administration, Chia Nan University of Pharmacy & Science, 60, Section 1, Erh-Jen Road, Jen-Te Hsiang, Tainan, Taiwan 71701, R.O.C.
mayo5012@gmail.com, 886-6-2664911 ext.5200

Kuang-Ming Kuo, Department of Healthcare Administration, I-Shou University, No.8, Yida Rd., Jiaosu Village Yanhao District, Kaohsiung City 82445, Taiwan, R.O.C.
kmkuo@isu.edu.tw, 886-7-6151100 ext. 7622

Chuang-Chun Liu, Department of Information Management, National Chiao Tung University, 1001 University Road, Hsinchu, Taiwan 300, R.O.C.
ccliu0406@mis.ccu.edu.tw, 886-3-5712121 ext.57428

ABSTRACT

This study investigates factors affecting behavioral intentions of patients to provide health information. PLS method was used to validate the proposed model. The findings show past experience of privacy invasions, concern for information privacy, risk and trust significantly influenced willingness to provide personal health information in electronic medical records context.

Keywords: Electronic medical records, Information privacy concern, Trust, Perceived risk

INTRODUCTION

As the use of electronic medical records (EMR) systems to improve efficiency and reduce error to increase the social and other aspects of the interests, $142~371 billion USD can be saved for hospitals. Moreover, the annual medical cost of the country can be reduced by $813 billion USD and the medical cost of the people can also be reduced (Venkatraman et al., 2008). The promotion of EMR is an important core work of many countries around the world in order to save the limited medical resources and improve the quality of medical care. Notably, using IT, a variety of systems of EMR have been developed. Although these systems are convenient, due to the lack of information security protection mechanism, there are doubts on the leakage of medical records that may affect personal privacy of the patients.
(Angst & Agarwal, 2009; Barrows & Clayton, 1996; Health Privacy Project, 2007). The issue of personal information privacy is highlighted due to the “rapid transmission” and “information sharing” of EMR.

Many studies have focused on the information privacy concerns of marketing or e-commerce (Dinev & Hart 2006a, 2006b; Junglas et al., 2008; Liao et al., 2011; Malhotra et al., 2004), while few studies have explored people personal health information privacy, and considered the interference effects of demographic variables. Agarwal et al. (2010) argued the PHI privacy is one of the future research topics, suggesting that health information privacy issues are still insufficient in academic research. Thus, in-depth discussion is needed on information privacy concerns of the health care industry to accumulate more research findings of information privacy concerns.

People have serious concerns for privacy regarding how the hospitals may use, protect and control their medical records, which may further affect their willingness to provide personal health information. Therefore, it is necessary to understand in EMR context whether individuals’ Concern for Information Privacy (CFIP) and other related factors would affect their willingness to provide complete PHI in medical treatments. This study attempts to explore how people’s Previous Privacy-Invasion Experience (PPIE) affecting their health information privacy concerns, thereby affecting the trust, perceived risk and willingness to provide PHI.

LITERATURE REVIEW

Electronic Medical Records

According to the CPRI (Computer-based Patient Record Institute), EMR is defined as: “EMR is electronic information of personal life long health status and health care” (CPRI, 1996). Based on the medical record informatization degree, the kinds of data (medical records and health information), and medical history liquidity level (hospital or inter-hospital wide), according to MRI (Medical Records Institute), the course of the development of EMR is divided into five stages (Waegemann, 1996): Automated Medical Records, Computerized Medical Records, Electronic Medical Records, Electronic Patient Records and Electronic Health Records. From the fourth stage on, the different hospitals can achieve the purpose of the EMR exchange. Regarding the development of EMR of all medical institutions in Taiwan, up to the present (December, 2010), the range of EMR exchange as announced covers: 1) Medical Imaging and Reports; 2) Lab Reports; 3) Out-patient drugs; 4) medical records of inpatients; in the respect of inter-hospital exchange, medical imaging report is the priority for implementation.
Privacy, Information Privacy and Health Information Privacy

Westin (1967) argued that “privacy” is the right of a person, group or organization that can decide for themselves when, how and the extent to which to convey their own information to other people. Regarding information privacy, the public may define as the unwillingness to let others to access to personal information, or the level of control of the exchange of information with others is not as expected to result in negative personal experience.

According to The Health Insurance Portability and Accountability Act (HIPAA, Congress of United States of America, 1996), the term “health information” is defined as: any information, whether oral or recorded in any form or medium, that is created or received by a health care provider, health plan, public health authority, employer, life insurer, school or university, or health care clearinghouse; and relates to the past, present, or future physical or mental health or condition of an individual, the provision of health care to an individual, or the past, present, or future payment for the provision of health care to an individual”, containing information such as age, sex, blood type, height, weight or publicly sensitive information, such as fertility, abortion, mental illness, sexual behavior, AIDS, drug abuse, and genetic-related diseases. Such information involves high degree of personal privacy.

Trust

Early psychology and sociology-related studies regarded trust as the composition of the different personal beliefs, trust in others to keep the expected beneficial commitments (Blau, 1964), or personal willingness to trust others’ good intentions as well as the level of confidence in others’ behaviors and words (Cook & Wall, 1980). Wilson (1995) suggested that trust as a belief, and at the same time, believed that the partners will take the action most in line with their own interests. To people seeking medical care, as the concept of medical information privacy rights are from the ethical principles of autonomy and fidelity, which comes from the mutual “trust” of the physician and the patient, it is thus a kind of intimate relationship and trust between the care provider and the patient (Barrows & Paul, 1996).

Perceived Risk

E-business environment may lead to under perceived risk, including: economic risk, personal risk and privacy risk (Pavlou, 2003, p. 109). In the e-commerce environment, personal information is mainly transmitted via Internet, and such personal information is stored in the database of the website servers. If the firms have no appropriate management mechanisms to ensure the safety of the servers and database or have no regulations on the use of the data, it may result in leakage of personal data to trigger the information privacy problem. The digitalization of PHI can bring the information transmission convenience and provide
Hwang, et.al. Antecedents and Consequences of Concern for Electronic Medical

effective medical care while causing new threat to privacy of the patient (Mercuri, 2004). Due to lack of sufficient information security protection measures, a large number of data has been compromised, making patients suffer from the economic threats, mental anguish and social alienation (Health Privacy Project, 2007).

RESEARCH METHOD

Research Model and Hypothesis

This study discussed how personal tendencies and experience (PPIE) affecting their health information privacy concerns, and further affecting trust, perceived risk and willingness to provide PHI. The research model is as shown in Figure 1.

Privacy-invasion is related to psychological contract violation. If the consumers perceive of privacy invasion by trusted parties, they may regard it as the violation of psychological contract to result in an enhanced negative effect (Bansal et al., 2010). Smith et al. (1996) found that victims of personal information abuse should have stronger information privacy concerns, and personal PPIE may affect personal privacy concerns (Smith et al., 1996). PPIE may lead to increase risk perceptions and enhanced willingness to provide PHI as well as enhanced personal concerns for privacy invasion.

H1: PPIE has a positive effect on an individual’s CFIP in EMR context

H2: PPIE has a positive effect on an individual’s perceived risk in EMR context

H3: PPIE has a negative effect on an individual’s intention to provide PHI in EMR context
When the network users have a high level of CFIP, they may have lower level risk perception and higher level of risk perception (Malhotra et al., 2004). As trust is determined by the feedback of experience (Mayer et al., 1995), if the concerns for privacy are a negative experience and therefore, the trust should be reduced and the negative risk will increase accordingly. Therefore, privacy concerns and trust perceptions are negatively correlated (Bansal et al., 2010; Malhotra et al., 2004), while privacy concerns and perceived risk are positively correlated (Pavlou et al., 2007). When people are more concerned about the possible abuse of their personal EMR by the hospitals, the level of their perception of possible personal losses caused by hospitals relating to PHI is higher, while the trust in the protection of PHI is reduced. Therefore, the following hypotheses are proposed:

H4: CFIP has a positive effect on Perceived Risk in EMR context

H5: CFIP has a negative effect on Trust in EMR context

Mayer et al. (1995) explain that the overall assessment of risk that it entails determine trust. A higher level of perceived privacy risk is associated with a lower level of trust in the other party’s reliability, competence, and safekeeping of personal information (Dinev and Hart, 2006a). This study argues that risk perceptions related to providing PHI to the hospital impact trust the hospital.

According to both Trust and Risk relevant literature, perceptions of trusting/risk are expected to exert a significant influence on behavioral intention (Malhotra et al., 2004). Trusting/risk perceptions are likely to have a direct influence on behavioral intention. The hospital is honest encourages individuals to provide PHI because trust “can positively influence willingness to disclose personal information” (Dinev and Hart, 2006a, p. 66). Extrapolating to the context of the current study, if an individual trusts a hospital, then trust adds to the relationship because the individual “knows” it can rely on the hospital to care about the individual and its well-being, a positive aspect of the relationship. Therefore, the following hypotheses are proposed:

H6: Concern for electronic medical records privacy has a negative effect on willingness to provide health information.

H7: Perceived risk has a negative effect on Trust in EMR context.

H8: Perceived risk has a negative effect on an individual’s willingness to provide PHI in EMR context

H9: Trust has a positive effect on willingness to provide PHI
Measurement Development

The questionnaire was designed by referring to the scales of good reliability and validity as provided in relevant literature with modifications according to the research purposes. The items are measured by a 7-point Likert scale, ranging from 1 (strongly disagree) to 7 (strongly agree). Items for Concern for Information Privacy (CFIP) were adapted from Smith et al. (1996), Stewart & Segards (2002), and Malhotra et al. (2004). Scales for Previous privacy-invasion experience (PPIE) were adapted from Bansal et al. (2010). Measures for Trust (TR), Perceived Risk (PR), and Willingness to provide Personal Health Information (PHI) were adapted from Malhotra et al. (2004).

Data Collection

In order to improve content validity four scholars and experts were invited for pretest to review the appropriateness of the research framework and questionnaire content in this study. After the questionnaire draft was modified by the experts and scholars, a pilot test was conducted to re-confirm the appropriateness of the modified questionnaire and test whether the reliability of the questionnaire has satisfied a guideline of Cronbach’s $\alpha$ being above 0.7 as suggested by Nunnally (1978). The pilot test was conducted by testing people seeking medical care in a hospital. A total of 40 questionnaires were distributed and 30 valid samples were retrieved. Cronbach’s $\alpha$ values in various dimensions are above 0.7, suggesting that the reliability of the question is good. Afterwards, the samples were divided into groups of northern, central, southern and eastern Taiwan by the distributions of population, age and gender in Taiwan. By means of stratified sampling, the researcher randomly distributed questionnaires in regional hospitals, local hospitals and medical centers to allow the sample attributes to approach the demographic distribution of Taiwan. A total of 320 valid samples were retrieved.

RESULTS

Demographics

50.9% of respondents were male, and 49.1% were female. 18.4% of respondents were between age 18 and 30, 44.7% of respondents were between age 31 and 50, 25.3% of respondents were between age 51 and 65, and 11.6% of respondents were above age 65. Most subjects held bachelor’s degrees (32.2%). The largest group of subjects earned income from NT$20,001 to NT$ 40,000 per month (40.0%). The education, public administration, social and individual service jobs accounted for the largest percentage of occupation (30.9%). 30.0% of respondents came from north region, 27.2% of respondents
came from central region, 38.1% of respondents came from south region, and 4.7% of respondents came from east region.

Measurement Model

The measurement model was assessed for the reliability of individual items, internal consistency between items and the model’s convergent and discriminant validity. The composite reliability (CR) values between 0.88 and 0.97 were greater than the acceptable cut-off point of 0.70 recommended by previous studies, indicating an adequate level of internal consistency (Bagozzi & Yi, 2012). Convergent validity is achieved in that the AVE values for all constructs were much higher the recommended threshold value of 0.50 (Fornell & Larcker, 1981), as shown in the Table 1. Discriminant validity is supported when the square root of each construct’s AVE is larger than its correlations with other constructs (Fornell & Larcker, 1981). The square root of AVE for each construct is much larger than its correlations with the other constructs, and thus discriminant validity was achieved, as shown in the Table 2.

Table 1 Reliability and Validity

<table>
<thead>
<tr>
<th>No.</th>
<th>Construct</th>
<th>Mean(S.D.)</th>
<th>Composite Reliability</th>
<th>AVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Concern for Information Privacy (CFIP)</td>
<td>5.78(0.85)</td>
<td>0.96</td>
<td>0.60</td>
</tr>
<tr>
<td>2</td>
<td>Trust (TR)</td>
<td>4.64(1.11)</td>
<td>0.94</td>
<td>0.82</td>
</tr>
<tr>
<td>3</td>
<td>Perceived Risk (PR)</td>
<td>4.73(1.08)</td>
<td>0.95</td>
<td>0.81</td>
</tr>
<tr>
<td>4</td>
<td>Previous privacy-invasion experience (PPIE)</td>
<td>5.21(1.52)</td>
<td>0.88</td>
<td>0.72</td>
</tr>
<tr>
<td>5</td>
<td>Willingness to provide PHI</td>
<td>4.45(1.83)</td>
<td>0.97</td>
<td>0.93</td>
</tr>
</tbody>
</table>

Table 2 Correlations between Constructs

<table>
<thead>
<tr>
<th></th>
<th>CFIP</th>
<th>TR</th>
<th>PR</th>
<th>PPIE</th>
<th>PHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>CFIP</td>
<td></td>
<td>-0.08</td>
<td>-0.42</td>
<td>0.33</td>
<td>-0.20</td>
</tr>
<tr>
<td>TR</td>
<td>0.77</td>
<td></td>
<td>0.91</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PR</td>
<td>-0.08</td>
<td></td>
<td></td>
<td>0.90</td>
<td></td>
</tr>
<tr>
<td>PPIE</td>
<td>0.42</td>
<td>-0.24</td>
<td></td>
<td></td>
<td>0.85</td>
</tr>
<tr>
<td>PHI</td>
<td>-0.20</td>
<td>0.45</td>
<td>-0.36</td>
<td>-0.03</td>
<td></td>
</tr>
</tbody>
</table>

Structural Model

After satisfying the requirements of the measurement model, the structural equation analysis was conducted to identify the links between variables. The standardized PLS path coefficients for examining the structural model are shown in Figure 2. Nine hypotheses were supported, whereas only one hypothesis did not reach a 5% level of significance.
Hwang, et.al. Antecedents and Consequences of Concern for Electronic Medical

***p<0.001  **p<0.01  *p<0.05       insignificant

Figure 2. Results of PLS analysis

DISCUSSION AND IMPLICATIONS

This study provides insight on how previous privacy-invasion experiences influence concern for information privacy in EMR context, which in turn influences perceived risk, trust and willingness to provide personal health information. Previous privacy-invasion experiences have positive influence on CFIP and perceived risk, but negative influence on the intention to provide PHI. The results indicate that having previously experienced privacy invasions are antecedents of both disutility enhancers and disutility reducers - increasing CFIP and Perceived Risk, and decreasing the intention to provide PHI. These findings are corroborated empirical evidence that previously experienced privacy invasions enhance individual’s CFIP and risk perception as well as holdback his/her intention on health information disclosure (Bansal et al., 2010; Ward et al., 2005). This study suggested hospitals need to establish tougher rules and regulations to protect EMR and against privacy violations so that individuals will be more willing to provide PHI.

Perceived risk has a negative effect on both Trust and intention to provide PHI. The impacts of perceived risk on willingness to provide PHI are direct and indirect through trust. The results show that both perceived risk and trust determine the intention to provide PHI. This study indicates that the influence of CFIP on the intention to provide PHI is indirect through perceived risk and trust.

This initial study shed light on regarding the intention to provide personal health information and how it relates to concerns for privacy, trust and perceived risk. Privacy related studies in the IS work has paid little attention to peoples’ perceptions specific to a particular context (Malhotra et al., 2004; Smith et al., 1996, Stewart and Segars, 2002). However, the results
of this study clearly reveal that to have a better understanding of individuals’ reactions to personal privacy in EMR context - related issues in a particular context of health care. Findings of this study confirm the importance of CFIP on the intention provide PHI (Direct effect is not significant, but all indirect effects are significant) in EMR setting. CFIP was found to be the key factor determining individuals’ perceptions of risk/trust and the intention to provide PHI to hospitals.

Acknowledgement

This research was supported by the National Science Council, Taiwan, R.O.C., under grant number NSC100-2410-H-009-012-MY2. The authors deeply appreciate their financial support and encouragement.

REFERENCES


