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Chapter 11

Exploring the Impact of Online Clinical Guidelines on Individual Knowledge Management Behaviors and Individual Net Benefits

Shofang Chang, Tain-Junn Cheng and Chung-Hsien Chan

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Abstract

Health care is an industry of high knowledge intensity; the knowledge and skills of the medical staff are the key advantages for hospital competitiveness. This research aims to explore how the use of online clinical guidelines influences individual KM behaviors and the net benefits. It investigates the users, including 120 physicians and 80 physician assistants (PAs) who used the online clinical guidelines in a medical center of southern Taiwan. A total of 195 of the 200 questionnaires surveyed including 111 physicians and 70 PA are effective, leading to 97.5% effective response rate.This research uses a structural equation model, partial least squares (PLSs) to verify the research model and hypotheses. The R^2 of the overall model is 0.68, which implies good reliability and validity of this model. The results reveal that the use of online clinical guidelines and user satisfactions has positive effects on individual KM behaviors and individual net benefits. Individual KM behaviors have partial effects on the individual net benefits. In addition, there are mediating effects of the individual KM behaviors and user satisfactions on the use of online clinical guidelines and the individual net benefits.

Keywords: online clinical guidelines, individual knowledge management (KM) behavior, partial least squares (PLSs)

1. Introduction

In the era of knowledge economy, knowledge has gradually become one of the most important assets for most enterprises. In the health-care industry, clinical knowledge, especially physicians' knowledge, has been recognized as an important asset and a core competence

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area for hospitals. Information technology's rapid transformation and the rise of the Internet have resulted in rapid changes in data and knowledge. The establishment of knowledge portals in a health-care management system could lower health-care costs and foster diagnostic accuracy, thus improving the quality of patient care. Hence, within the knowledge-intensive health-care industry, the management of clinical knowledge is evidently the hospital's most important challenge.

In 1990, the Institute of Medicine proposed the clinical practice guideline as a systematic operational guide to help clinical researchers or patients select suitable treatment strategies when experiencing specific clinical conditions [1]. These clinical guidelines serve to improve the quality of treatment, decrease health-care costs, and reduce medical heterogeneity [2–5].

In this information and cloud-computing age, online clinical guideline may improve the accessibility, reliability, validity, and velocity for searching best practice, thus enhancing the efficiency and effectiveness of medical practice. The implementation of an online clinical guideline system is an important way to promote medical knowledge management, develop knowledge management ability, and improve individual net benefit. Future users of the online clinical guideline system will be able to break through traditional space and time restrictions to enhance medical expertise and technology, change knowledge management behaviors, and improve health-care quality and capability to maintain their core competences.

2. Research objectives

The research objectives were as follows: (1) to explore the interactions among the satisfaction level of medical professionals who use the online clinical guideline system, individual knowledge management behavior, and net benefit; (2) to compare disparities between all aspects of various modes of interactions across different medical professionals; and (3) to provide relevant suggestions regarding the online clinical guideline system's infrastructure and implementation.

3. Literature review

3.1. Online clinical guideline

Isern and Moreno [6] pointed out that an online clinical guideline system benefits clinical physicians and patients but remains an area of ongoing research with insufficient implementation and has yet to be integrated into existing management systems of health-care protocols and used in routine medical infrastructures. Isabelle et al. [7] noted that the integration of clinical guidelines into the online network will solve problems faced by physicians in patient care and will increase the likelihood that these guidelines will be used by physicians.

Isern and Moreno [6] also proposed that the compilation of the clinical guidelines database should include a web-based version. Moreover, collaborative features are very helpful in

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improving and creating various systems of clinical guidelines for different medical professionals. Studies have stated that, when computerized, a clinical decision support systems combine decisive strategies and clinical protocols and can provide concrete support for patients, improving clinical practice guideline compliance and treatment results for patients [8].

3.2. Individual knowledge management behavior

Nonaka and Takeuchi [9] argued that only individuals can create knowledge, and, through interactions with one another, individuals can develop organizational knowledge. Knowledge internalization and socialization should be the major knowledge management behavior of individuals. Rogers [10] categorized employees' knowledge behavioral conducts into three types regarding measurement of various aspects of cooperative knowledge behavior between employees, including knowledge acquisition, knowledge creating, knowledge sharing, knowledge hoarding, knowledge shirking, and knowledge appropriation. This study used knowledge socialization and internalization as the measuring variables of individual knowledge management behaviors.

3.3. Information system success model

Many studies use academics Delone and Mclean's [11] Information System (IS) success model for information system importing and effectiveness evaluation. This study focused on evaluating the effectiveness of an online clinical guideline system. The variables include system use, user satisfaction, user intention, and net benefits. Thus, we chose Delone and Mclean IS success model to evaluate the system, since they [11] have divided the actual system use and use intention. This study used two variables to measure the construct of system use.

4. Research methodology

4.1. Research hypothesis

This study's main focus was to investigate the satisfaction and usage levels associated with the online clinical diagnosis and treatment guideline system and the relationship between medical professional employees' knowledge management behavior and net benefit and to further explore relationships between various dimensions.

This study presented the following hypotheses:

H1: An online clinical guideline system use has a significant positive impact on its user satisfaction.

H2: An online clinical guideline system use has a significant positive impact on individual knowledge management behavior.

H3: An online clinical guideline system use has a significant positive impact on individual net benefit.

H4: An online clinical guideline system's user satisfaction has a significant positive impact on individual knowledge management behavior.

H5: An online clinical guideline system's user satisfaction has a significant positive impact on individual net benefit.

H6: Individual knowledge management behavior has a significant positive impact on individual net benefit.

4.2. Research design

This study investigated a medical center in Tainan, primarily focusing on some of the center's resident physicians, part-time physicians, practicing physicians, medical interns, and specialist assistants, and conducted questionnaire-based surveys and investigation. It investigates the users, including 120 physicians and 80 physician assistants (PAs) who used the online clinical guidelines in a medical center of southern Taiwan. A total of 195 of the 200 questionnaires surveyed including 111 physicians and 70 PA are effective, leading to 97.5% effective response rate.

5. Research results

5.1. Model reliability and validity test

In every dimension of the physicians and specialist assistant category, advertising value equivalency (AVE) values were all greater than the standard value of 0.5; CR values in all cases were greater than the standard value of 0.7. The overall model regression analysis R^2-value was 0.68, and Cronbach's α falls above 0.84, exceeding Fornell and Larcker's [12] recommended high reliability index value (>0.7). This suggests that this study's structural model has good reliability and validity (**Table 1**).

	AVE	CR	R^2	Cronbach's α
User intention	0.81	0.92		0.88
Actual system use	0.68	0.89		0.84
User satisfaction	0.80	0.96		0.95
Knowledge socialization	0.64	0.91		0.89
Knowledge internalization	0.69	0.91		0.88
Individual net benefit	0.76	0.96	0.68	0.96

Table 1. Reliability and validity.

5.2. Path analysis

This study utilized partial least squares (PLSs) to evaluate the study. Using covariance structure as a basis, structural equation modeling (SEM) recommended that sample size must be at least 200 or above or 10 times the parameter [13]. Second, using covariance structure as a basis, SEM's predicted value must comply with the norm; otherwise, a disassociation with reality effect will ensue [14, 15]. In addition, a covariance-based SEM can only process reflective indicators and is unable to process formative indicators. As this study was conducted with a sample size of 195, which did not meet the standard 10 times of the parameter, PLS was selected as the method for analysis (**Figure 1**, **Table 2**).

This study found that online clinical guideline system usage had a significant positive impact on the system's user satisfaction ($\beta = 0.228$, $p < 0.05$). Additionally, regarding the relationship between individual knowledge management behavior and individual net benefit, only a small portion had a significant positive impact. Knowledge internalization has a significant impact on individual net benefit ($\beta = 0.183$, $p < 0.05$), while knowledge socialization reveals no impact on individual net benefit ($\beta = 0.05$, $p > 0.1$). The online clinical guideline system's user satisfaction had a significant positive impact on both individual knowledge management behavior (user satisfaction→knowledge socialization, $\beta = 0.191$, $p < 0.1$; user satisfaction→knowledge internalization, $\beta = 0.306$, $p < 0.05$) and individual net benefit ($\beta = 0.549$, $p < 0.05$), and individual knowledge management behavior had a partial significant positive impact on individual net benefit (knowledge socialization→individual net benefit, $\beta = 0.05$, $p > 0.1$; knowledge internalization→individual net benefit, $\beta = 0.183$, $p < 0.05$).

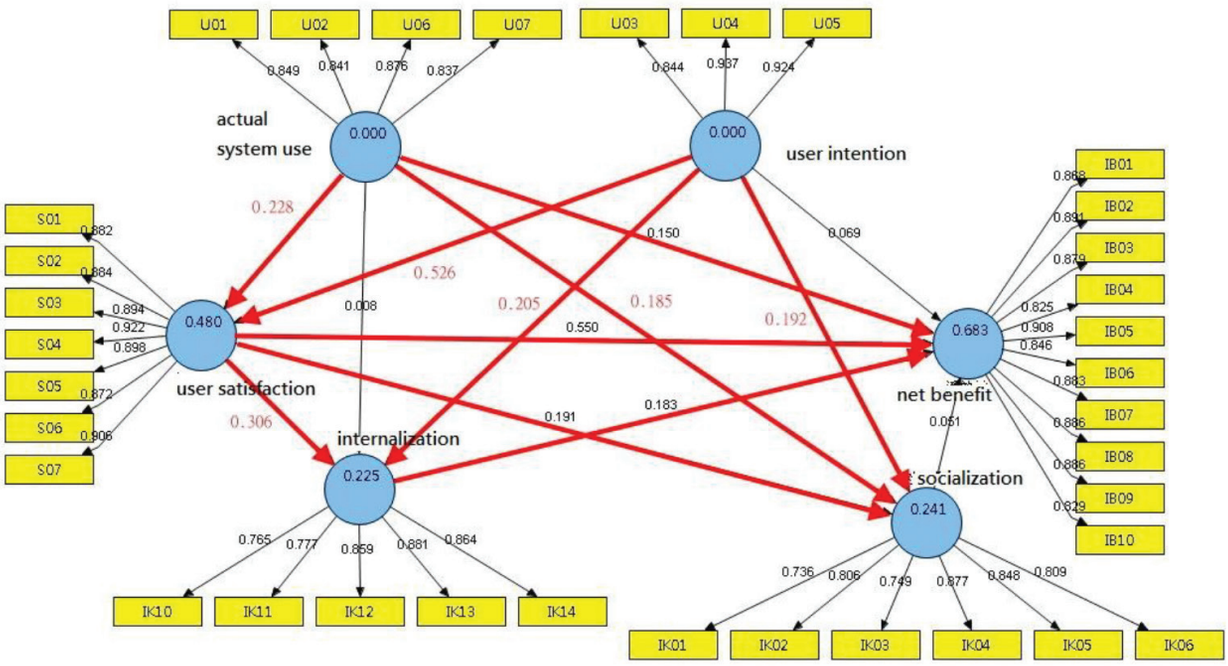


Figure 1. PLS model.

	Path coefficient	*t*-Value
User intention→ user satisfaction	0.526	7.45**
Actual system use →user satisfaction	0.228	3.06**
User intention→knowledge socialization	0.192	2.21*
Actual system use →knowledge socialization	0.185	2.29*
User intention→knowledge internalization	0.205	2.35*
Actual system use→knowledge internalization	0.008	0.11
User intention→individual net benefit	0.068	1.2
Actual system use→individual net benefit	0.149	2.90**
User satisfaction→knowledge socialization	0.191	1.80*
User satisfaction→knowledge internalization	0.306	3.48**
User satisfaction→individual net benefit	0.549	8.27**
Knowledge socialization→individual net benefit	0.050	0.83
Knowledge internalization→individual net benefit	0.183	2.83**

Remarks: path coefficient's statistical significance testing utilized BT method to redraw.
Sample size: 500 *$p < 0.05$; **$p < 0.01$.

Table 2. Structural method's path coefficient testing result.

Thus, hypotheses H1, H4, and H5 are supported. However, system use did not significantly influence knowledge internalization, user intention did not significantly influence individual net benefits, and individual knowledge socialization did not have a significant impact on individual net benefit. As a result, hypotheses H2, H3, and H6 are partially supported.

6. Conclusions and discussions

The results of this study showed that medical professionals had a certain tendency toward supportive systems that help their own fields and concurred that this type of system will always increase usage frequency but will also create dependence on the system to assist their medical strategies. It is evident, then, that medical professionals view usage of the online clinical guideline system as important to provide support and guidance for health-care work,

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which corresponds the viewpoints of Isern and Moreno [6] and Dongwen et al. [8]. On the other hand, with regard to medical decisions, they will still depend on their own professional knowledge.

This study also found that medical professionals have a certain degree of satisfaction with the online clinical guideline system. Online clinical guidance system's user satisfaction with the user's conscious satisfaction has successfully increased the functionality and practicality of using the system and indirectly assisted professional health-care employees to improve individual work performance. Simultaneously, users' satisfaction with the system is also an important factor determining continual usage of the system.

Regarding individual knowledge management behavior, this study developed two dimensions, "Knowledge Socialization" and "Knowledge Internalization," measuring personal knowledge management behaviors. Analysis of the results indicated that medical professionals expressed a higher degree of individual knowledge internalization related to socialization. When agreeing with individual knowledge internalization through "browsing of related professional websites," "obtaining expert knowledge," "educational training," "working," "observation," and related methods, individual knowledge can be increased. In individual knowledge socialization, through methods such as "internal and external department meetings," "sharing of ideas with colleagues," "team exchange of ideas," "discussion," and "seminars," a knowledge socialization effect can be achieved.

For individual net benefit, this study showed that medical professionals view the online clinical guideline system's usage to have a considerable impact on individuals' work and decision-making performance; notably, they expressed, "Using online clinical guideline system allowed for the quality of health-care strategies to improve," and "An online clinical guideline system can increase my work efficiency." From this, it is evident that the usage of the online clinical guideline system has a positive effect on medical professionals' work performance.

Based on this study's results, the usage of the online clinical guideline system has a positive impact on individual knowledge management behavior and individual net benefit; moreover, individual knowledge management behavior has a positive impact on individual net benefit. In addition, the online clinical guideline system's satisfaction level has an impact on individual net benefit that is greater than that of the online guidance clinical system or individual knowledge management behavior.

This study uses PLS and constructs a full model of online clinical guideline behaviors. Besides, the integration of the clinical guidance system into the Internet allowed us to know medical professionals' level of acceptance of the system by measuring their degree of satisfaction with using the system. This subsequently proved that medical professionals' acceptance level of the online clinical guideline system was recognized. Additionally, medical professionals, through the system's practical operation and usage, discovered that employees strongly value the practicality and reliability of data systems.

This study utilized a survey method focusing on only one medical center to investigate online clinical behavior and individual net benefit. Future research would be suggested to conduct the survey in multiple hospitals so as to improve the generalization of the research.

In addition, due to the time restriction, this study fails to further explore the impact of online clinical guideline on patient satisfaction and health-care quality. Future research is suggested to extend the effect on patient level so as to build a more comprehensive model toward the effectiveness of online clinical guidelines.

Author details

Shofang Chang[1]*, Tain-Junn Cheng[2] and Chung-Hsien Chan[3]

*Address all correspondence to: ctpaul@ms10.hinet.net

1 Department of Hospital and Health Care Administration, Chia-Nan University of Pharmacy & Science, Tainan, Taiwan, ROC

2 Department of Medical Information Management, Chi Mei Medical Center, Tainan, Taiwan, ROC

3 Continuing and Extension Education Division, National Pingtung University, Pingtung, Taiwan, ROC

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