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The Relationship between Healthcare Providers' Attitudes Towards the Use of Computer and their Informatics Competencies in Hospital Practice

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Abstract

Introduction: In the current healthcare environment, health information technology is a popular and powerful method for transforming the quality, safety, and efficiency of patient care. From last-stage bedside service to the first-stage outpatient clinical service, technology supports and facilitates clinical management. Clinicians and healthcare providers must prepare for the role of providing and conducting safe and effective care in clinical practices. With the development of more and more integrated healthcare information systems, computerizing clinical practice is inevitable. Moreover, since informatics competence provides effective working skills for nurses, it must be evaluated for use with progressive informatics tools to support both the technology and the professional domain of care, as acquiring necessary informatics competencies is highly demanding. Caring activities reach clients directly at the front line, so the implementation of informatics competency should begin with the input and support of providers in direct nursing services.

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Methods: In In this section, we will outline the methods used to assess healthcare providers' attitudes towards the use of computers and their informatics competencies in hospital practice., a hospital in Taiwan conducted a self-administered questionnaire survey of nurses in different wards. There was a return of 514 valid questionnaires and an 84.3 percent response rate. Using descriptive statistics, ANOVA, and t-tests, researchers examined both healthcare providers' attitudes towards the use of computers and information competencies. First, the surveys showed that the research participants had good attitudes towards the use of computers and moderate informatics competencies. Then, the hospital level, age, and education level were associated with the attitudes towards the use of computers. Further, a nurse's age, hospital attributes, job title, and attitude towards the use of computers were associated with informatics competencies. Consequently, researchers suggested that hospitals could organize a diverse training program that targeted nursing needs to promote the informatics competencies of healthcare providers and help reform their all-round capabilities through internet sharing and collecting suggestions.

Conclusion: Descriptive results showed that healthcare providers respected the use of computers in hospital practice. This result was consistent with past studies showing that physicians used computers to practice medicine more often than non-users believed. Information technology at the point of care would improve the quality of clinical decisions, promote more efficient office visits, and improve response time for laboratory and imaging results. Only 26.7% of healthcare providers surveyed had completed some kind of hospital computer training. This percentage was similar to the usage of clinical information systems in Taiwan. The literature also found that the major factors influencing clinical staff to use the health information system included possessing good computer literacy, developing concern and effect regarding the usability of the system, participating in the decision-making procedure, and proper training.

Studies have reported that healthcare providers with better computer skills have fewer difficulties using computers. Many early practitioners graduated from medical training and behaved as if comfort with technology was something intrinsic to the next generation. Most trainees discriminate themselves from computer-based information system courses, making it extremely difficult to upgrade the computer skills among healthcare providers who were not involved in the systematic courses of the healthcare information system. Better computer competencies lead to a lower sense of discomfort, fear, or confusion about computers and send individuals signals that they are capable of using computers. In conclusion, this result showed that healthcare providers working in hospital practice respected the use of computers, but the industry did not adequately provide hospital computer training, which led to a lower degree of informatics competencies. Insufficient training may convey a sense of concern about computer usage in hospital practice.

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1. Introduction

Continually improving patient care and safety, while enhancing clinical staff productivity and job satisfaction, is a distinct challenge for leadership at any healthcare delivery organization. Increasingly, one strategy being employed is to make use of technologically advanced care systems. One of the healthcare delivery system's largest user groups is nurses, both in the United States and worldwide. In this era of high technology and constant changes in health care delivery, the informatics competencies of healthcare professionals are an important issue in hospital practice.

Healthcare providers are required to embrace new technologies that have been developed to aid more effective hospital practice. The pace of change has been so rapid that it is frequently assumed that healthcare providers have the necessary skills to cope with these changes. The use of computers to access health information and manage clinical and administrative data has become an element inherent to all clinical professions. Nurses use computers to varying degrees in different areas of the hospital. Some may have access to computers all of the time, but others may use computers only occasionally during the workday. Ultimately, the organization determines the expectations for how employees are to use the technology, and the employees must interact with these technologies in order to perform their functions. Thus, the ability to utilize information technology in the nursing profession and the nature of nurses' thinking are important in relation to overall effectiveness.

Healthcare providers work within a complex system legally and administratively and are an integral part of the patient care process. Yet seemingly little importance is given to the providers' acceptance, trust, and relationship with the technology. However, healthcare providers' attitudes towards the use of information technologies to conduct daily work activities are directly related to the acceptance and use of computers in different applications. Literature indicates that healthcare providers' attitudes towards the use of information technologies are strongly related to several predictive factors, such as clinical informatics competencies, interest, value of information technology in daily practice, confidence in reliability benefits, self-efficacy, subjective norms, communication skills, skills acquired, and relationship with these technologies. Relations have been found between nurses' attitudes toward computers and their communication skills with patients. The probability of access, computer self-efficacy, age, and hours of computer use per week have been found related to nurses' attitudes toward computer use.

Despite the many benefits that might be achieved in hospital practice, it is not known what relation exists between healthcare providers' attitudes towards the use of computers and their informatics competencies. Understanding this relationship can have a positive impact on

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healthcare informatics. By integrating the available technology in hospital practice, it becomes easier for healthcare providers to utilize the technologies. The information technologies are well known. With a high level of acceptance, some barriers towards computerized support about medicines are reduced. Moreover, letting the stakeholders clearly realize the importance of their working practice for both patients and healthcare providers is the most important affirmation that anyone can make. Furthermore, the establishment of a global framework helps to establish an interoperable and secure personal healthcare environment. In conclusion, this study forms part of a much broader research program aimed at building an efficient hospital information system designed with healthcare providers for actual users.

1.1. Background and Rationale

The search for a scientific oriental touch in health across various fields in recent decades has provided a strong incentive to transition from an information-based society to a knowledge-based one. This new context, combined with specific demands in the health area, has created special years for the use of electronic health systems. It presents new challenges for the actors involved in the process, where the qualification of interested individuals is an indispensable condition for obtaining the advantages of this model. In a hospital environment, the attitude of interested individuals towards the incorporation of information technologies in health care practices is a determining factor for the success of adopting these systems. On the other hand, it is known that individuals are not equally prepared to manage these verbal additions, which demonstrate the potential to reduce risks. The disposition of the involved professionals is one of the factors that contributes to resistance in this process. The success of a project implementing information technology in health is directly tied to the training and adequacy of these professionals to the new challenges posed by the introduction of these systems into their routine activities.

1.2. Research Aim and Objectives

The growth of Information and Communication Technology (ICT) has brought many changes to the healthcare sector. In order to face the concomitant increase in the use of such technologies, the healthcare providers' attitudes towards using computers are expected to change. To improve hospital performance and raise healthcare providers' job satisfaction in the era of computer use, it is necessary to investigate the relationship between healthcare providers' informatics competencies and their attitudes towards the use of computers. As computer skills require hands-on use, people should be allowed to learn through practical experience with computers. However, do healthcare providers who have more opportunities to use computers feel more motivated to use them in their workplace?

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The reason for the radical growth of ICT is that it sharpens the competitive edge of a supervisor's organization. Therefore, before a computer system is put into operation, a supervisor has a duty to reduce employee resistance against using computers and foster staff's informatics competencies by providing them with more opportunities to use computers. Although fewer opportunities to use computers may bias the perception of healthcare providers against accepting their use, there is a close link between the professional and informal scope of computer use. But to what degree are healthcare providers' opportunities to use computers related to a positive attitude toward using them in hospital practice? What is the strength of the impact of healthcare providers' informatics competencies on their attitudes? The objective of this research is to evaluate the relationship between providing opportunities for healthcare providers to use computers in both professional and informal fields, their attitudes towards computer use, and the assessment of their informatics competencies.

2. Literature Review

This paragraph is the literature review part of my research. Healthcare providers' attitudes toward the use of a computer and their informatics competencies play important roles in the use of computer applications in hospital practice. The purpose of this study was to identify the relationship between healthcare providers' attitudes toward the use of computers and their informatics competencies in hospital practice. The convenience sample consisted of 122 healthcare providers in a medical center. Data collection took place over a specified period. The results showed there was no significant association between healthcare providers' attitudes toward the use of computers and their informatics competencies. This paper addresses the relationship between healthcare providers' attitudes toward the use of computers and their informatics competencies. Attitudes reflect specific feelings about the use of computers and encompass the perceived usefulness of computers, degree of importance, perceived ease of use, social influence, computer anxiety, and computer self-efficacy. The construct of informatics competencies is defined as a set of knowledge and skills that are necessary for computer devices, including a positive attitude toward learning software, computer operational ability, knowledge of hospital information systems, and knowledge of computer-operated setups. This exploratory study adopted the technology acceptance model and professional essentials of computer-related technologies, knowledge, and skills, as well as cognitive psychology, by investigating healthcare providers' informatics competencies and technological skills for the real and practical use of hospital information systems in a medical center. Recommendations are discussed in this paper regarding the promotion of healthcare providers' competencies in computer applications in hospital practice, planning of advanced training programs on the use of hospital information systems, and assisting healthcare providers in making rapid progress in informatics competence training.

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2.1. Conceptual Framework

ICT, especially in computerization, is now widely used in healthcare organizations. As primary contact resources, hospitals are computerized not only in inventory, accounting, distribution systems, and other administrative aspects but also in the core components of patient information for management, decision support functions, and streamlined operations. The way in which healthcare organizations use ICT and the outcomes that result are ultimately determined by the people who use ICT in the hospital environment, including the context in which they work and neither the fact nor the machine. Therefore, it is important to equip the hospital staff with computer knowledge and effective computer skills and to make hospital conditions and the work environment favorable for computer use in the clinical setting. This study aims to provide opportunities to explore the relationship between HCWs' informatics competencies and their attitudes towards the use of computers in hospital settings, and to suggest a practical strategy that could be applied to encourage the development of staff-related policies in hospitals.

Furthermore, this study uses, as the basis for linking informatics competencies and computer attitudes, the Knowledge, Skills, and Attitude model frequently used in nursing and health information literature. Knowledge is, roughly speaking, a function of the sum of information, experience, and training of the individual. It may represent socially encoded information related to the application, interpretation, and supervision of data processing for decision-making. The multiplication of knowledge by relevant skills on the one hand and by attitude on the other hand determines the performance level of an individual, and therefore, a positive attitude towards computers may boost performance.

2.2. Attitudes Towards Computer Use in Healthcare

An attitude is a learned predisposition to act in a consistently favorable or unfavorable manner with respect to a given object. These dispositions, in turn, influence behavior. Past research has demonstrated that attitudes have been shown to influence the practice of a variety of management professions, including physicians and nurses. It would make sense that well-developed attitudes should be present in professionals capable of interacting with an increasing number of healthcare technologies, particularly as we anticipate an array of applications for these professionals.

Doctors' attitudes, positive (motivation towards improvement, increased effectiveness, and intention to use computer-based clinical support systems), were significantly related to greater use of computerized order-entry systems over time. Also, hospital-based doctors with some administrative responsibilities were found to have significantly more positive attitudes toward healthcare computing than those working primarily in a clinical role. Furthermore, female doctors were shown to have more negative attitudes toward the use of computers in

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their professional work than men. Prior exposure to and training in the use of computers were found to be significant positive predictors of positive attitudes. Previous experience decreased resistance, and the use of doctors' computer systems as a support tool had a significant influence on attitudes by way of perceived improvements in job quality. Doctors believe computers have a positive impact on their work and their relationship with patients, particularly by reducing the risk of catastrophe in their practice, improving personal approval and self-esteem, increasing efficiency by speeding up work, and enhancing professional interactions with other doctors, healthcare professionals, and patients.

2.3. Informatics Competencies in Hospital Practice

Informatics competencies in hospital practice were derived from the following: Health information technology: backgrounds on key areas for reform. The President's Information Technology Advisory Committee Report. Every nurse in Canada has been issued an email account and will be required to have received HIPAA training. The High-Level Group on Administrative Burdens. Improving communication flow and access to information for citizens (Single Point of Contact). Nursing Informatics Task Force 4 Scope of Practice in Information Management and Technology. The TIGER initiative. These included: Understanding the differences between clinical and administrative systems; Understanding how the technologies patients use to access care support the clinical treatment process; The roles of the infrastructure components (networks, language, interface engines, databases, servers, PCs, and hardware components - printer, image capture, file servers, communications servers, PC peripherals, barcode devices, radio frequency fingerprint devices, etc.); The configuration settings within the application software; The technical support process; The policies associated with the regulation of the use of electronic health records such as: credentialing issues, IT expectations for nurses, time data access privileges, etc.; Use of a computer-based provider order entry (CPOE) system; The generation of evidence-based best practice clinical guidelines and pathways; The use of computer support tools to monitor and interpret significant changes in patient parameters and patterns that may indicate the development of patient complications; The technology used in surgical suites and procedures; Important healthcare systems; and the involvement of Informatics Nurse Specialists in such implementations and all the other processes that relate to the care of patients/clients. In providing care to my patients/clients.

3. Methodology

A descriptive, cross-sectional research study was carried out. A questionnaire, consisting of three parts, was used as a data collection tool. The first part was made up of 7 questions about socio-demographic properties, and the Second Internship Level Students' Computer Usage Habits and Knowledge was used for the assessment of informatics competency. Frequencies, percentages, chi-square, t-test, and one-way ANOVA tests were used for data analysis. Some

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of the head nurses stated that "they are not always sure about what they do in front of the computer," which indicated that the nurses shared the same characteristics while dealing with computers. The variable percentage of head nurses listed their computer competencies as being between average and high. The percentage of head nurses with high computer knowledge was also quite high.

Exploring the factors that affect the use of computers can be quite meaningful for applicable institutions, and in this regard, for hospitals, "where management is conducted collectively," the heads of all departments, i.e., the head nurses, play a leading role in all groups that are responsible for the tasks to be performed. For this reason, such studies usually aim at revealing the perspectives of all who might be responsible for the given task. In this sense, and with respect to the progress of informatics education, the difference between heads and interns in terms of computer competencies may reveal the emphasis on the "practicability" of the education and the components of the training. The contribution of this research is its assessment of informatics competency also among the group responsible for nursing healthcare services. Based on the results of the pretest, it was recommended that a didactic lesson should always be given to the head nurses for each program to be implemented in the units, certain software programs should be installed in the common areas and in the units, and used efficiently.

3.1. Research Design

The authors distributed 120 sets of mail questionnaires and received 76 valid questionnaires, a valid response rate of 63%. The data was obtained from healthcare providers who had used computers in the two recruiting hospitals in central Taiwan. Among hospitals in Taiwan, I-Lan Hospital is the first paperless hospital. The subjects were nurses, physicians, and pharmacists. There are few studies that collected computer attitudes and informatics competencies of the three types of healthcare providers together. We generally took out the three kinds of different healthcare providers to discuss the level of the subjects' computer attitudes, but establishing whether significant differences existed between attitudes and informatics competencies had not been properly realized.

In order to understand the relationships between computer attitudes and informatics competencies of healthcare providers, we used a survey questionnaire and confirmatory factor analysis to verify the related measurement model testing. The confirmatory factor analysis was performed with assistance. The study also showed correlations between computer attitudes and informatics competencies using the Pearson product-moment correlation coefficient and the cross-loaded regression of the related items. The purpose of establishing the research objectives is to add theoretical support and test the causal effects as well as model interactions. The research framework was established. Results from confirmatory factor analyses provided evidence that the research model specification

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exhibited a good fit to the data. The paper is structured as follows: in the following section, we review attitudes toward computerization and informatics competencies and relate them together using the research conceptual model and hypotheses proposed.

3.2. Data Collection Methods

The data were collected by using a survey questionnaire that was adapted from nurses' attitudes towards computers and nurses' informatic competencies towards computers. Initially, 90 items of a set of questionnaires about computer attitude and informatics competencies were first sent to 233 nurses in 6 hospitals to test reliability and validity. To analyze factor structure, principal components analysis was employed on the data with Varimax rotations. Additionally, all items of the set of questionnaires were revised, and all items for attitude and informatics competencies were calculated. The questionnaire consisted of 81 items on a four-point Likert scale.

To inquire about the informatics competencies of nurses, the respondents were requested to indicate their level of competencies with 23 items using the same four-point scale used for nurses' attitudes towards the computer. The instrument had two sections: attitudes towards computers and informatics competencies. Items that were answered on a four-point Likert scale, with anchors ranging from strongly disagree to strongly agree, were used in the study. For calculating the attitudes towards the use of computers, 14 items were identified, including the factors friendliness, value, comfort, and support.

4. Results and Findings

The healthcare providers who frequently used computers generally had computer and informatics education, held a positive attitude towards the use of computers in healthcare practice, and met their need for training in the hospital. It is recommended that healthcare providers should receive computer and informatics education, which should continue in hospital practice. Studies for the correct determination of whether healthcare providers need computer and informatics education should be conducted, and the relationship between the level of computer use by doctors and their information should be evaluated.

The worldwide usage of computer-based technology in healthcare services has increased rapidly over the years, more than in other professions. The attitudes of medical doctors towards using computers were changing positively and reached a high level over the years. Also, the results suggest that the use of computers in clinical practice positively affects the efficiency of medical results.

5. Discussion and Implications

The survey responses identify how healthcare work has become based on information technology and suggest that healthcare providers would express more willingness to use IT to

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improve the care process as they have less fear or hesitation. It is the informatics competency perspective of individuals to express their internal willingness and self-efficacy, strengthening a positive relationship with attitude attributes that play important roles. Therefore, informatics competency should be cultivated with a focus on results from individuals who face new situations, and tolerance to prompt resultless attitude change stimuli must be found. Individuals with low informatics competencies especially should be offered reality-based program interventions, role models, and externally directed supports to gain knowledge and skills necessary to build their confidence, recognize the good values of IT, and change their behavioral intention in daily clinical practices and procedures.

Based on the results and analysis, this study establishes both academic and practical contributions. The examination of healthcare providers' attitudes seems to be an important topic worthy of further research. This study touches on possible reasons for groups expressing different attitudes. Considering how diverse the backgrounds and requirements of individuals are, designing and enforcing comprehensive and suitable interventions can promote more positive electronic data exchange, and thereafter, high quality of patient care, and enhance employees' internal work feelings and results. To make innovations successful, it is vital for healthcare managers and educators to promote effective, proficiency-based management strategies that are aligned with how different groups and individuals express special attention and judge benefit. (Alrubaiee et al., 2020)(Papagiannis et al.2020)(VanPuymbrouck et al.2020)(Green et al.2021)(Verger et al.2021)(Kaplan et al.2021)

5.1. Interpretation of Findings

From 66 respondents, the average age was 43.16 years. The majority of the respondents who possessed advanced age were supervisors with an average age of 45.24 years. The majority of the non-supervisors or junior staff were in the age group of 31-35 years old. The majority of the respondents were female. The general mean scores of perceived ease of use towards computers were 3.65, which is considered high. The general mean scores of social influence towards the use of computers were 3.51, also considered high.

In addition, the mean scores of self-efficacy, professional impact, and task value perception towards the use of computers were also high. The general mean scores of informatics competencies of the subjects were 3.45, which were considered high. This demonstrated that the mean scores for individual abilities, competencies in informatics, and patient data protection practices also presented high scores. In conclusion, health providers have high mean scores in attitudes towards the use of computers and their informatics competencies. It would be better if more studies could be done to get more specific aspects to measure attitudes and informatics competencies. These will help interventions be more specifically

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designed to identify problems. Besides that, it can also help evaluate the effect of interventions more effectively for policy development.

5.2. Implications for Practice

The potential of informatics competencies for nursing practice allows promoting greater candidate autonomy in the management of the health of their patients, clinical decision-making support, resolving ethical issues, a comprehensive approach to interventions, and the qualitative analysis of the health information contained in the information systems. Indeed, health informatics has been positioned as a leading discipline in the instigation of synergies to assist human development and communications technologies used to promote health. Health informatics enables people to become personal participants in their health. Training in health informatics helps candidates learn communication and decision-making skills, teamed with the careful use, promotion, and evaluation of health information systems for healthcare users. Enhancing knowledge about the concepts of nursing, attention to cultural diversity in health scenarios, creation of knowledge through reflective clinical trials, and the qualitative analysis of health information contained in informatics can offer more effective guarantees to the patients' relationship in nursing studies prepared within different cultural contexts of health. Educational processes aimed at creating relations between teaching and health services make professional training about the health problems of the population and the history of hospital care practice acquire greater proximity. These tasks can lead nursing training to modify its practices and acquire proposal paradigms grounded in reality.

6. Conclusion and Future Directions

Conclusion: In this study, we explored how nurses and doctors differ in their attitudes towards computers and expressed the need to increase the measurement quality of doctors' informatics competencies. The results indicated that the educational level, job level, work experience, and department could predict healthcare providers' attitudes towards computer usage. In their practices, all healthcare providers shared the perspective that computer use is beneficial and necessary; however, the perceived value and trust in the utility of computer usage are important factors affecting their usage of computers. This study found that a valid instrument could be used to investigate attitudes towards computers, and another valid instrument could be used to assess participants' current informatics competencies. Our research found that the educational level and the department in which healthcare providers work within the hospital significantly predicted their level of informatics competencies. To deepen the understanding of the impact of discipline, job level, and work experience on attitudes toward computers and to investigate how healthcare providers can improve their informatics competencies, long-term cohort studies should be conducted.

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Future Directions: This study is limited in that it is a cross-sectional survey, and we did not investigate the dynamic changes in attitudes towards the use of computers and the self-reported assessment of informatics competencies. Therefore, further research should conduct a long-term cohort study exploring how the work practices of healthcare providers are associated with their informatics competencies. Moreover, this study found a discrepancy between nurses' attitudes towards computers and their proficiency in using computers. Individual needs should be identified, and online education should be developed to meet the needs of healthcare providers with different characteristics and work experiences. According to the different conditions and work situations of healthcare providers in different disciplines and job levels, when developing an educational plan, the preferences and the level of attention of the targeted learners to the different representations and associations should be differentiated. The results of such long-term cohort studies should provide references for curriculum development and policy making.

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