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Understanding Healthcare Professionals' Adoption and Use of IT

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ABSTRACT

To reduce injury and death caused by medical errors, healthcare organization must integrate information systems with clinical processes. This research in progress seeks to understand the adoption behaviors of healthcare professionals while developing a healthcare specific IT adoption model to help foster IT acceptance and clinical systems integration.

Keywords

IT Adoption, Integration of Clinical Information Systems, Social Network Analysis, Persuasion & Social Influence

INTRODUCTION

Prominent Columbia businessman Bob Andrews obeyed doctor's orders, took new pills after he'd taken his usual heart medicine and - within hours - dropped dead. Richland County Coroner, Gary Watts found Andrews' death was caused by a drug interaction (taking Viscicol and Quinaglute together). He ruled it an accident after his investigator located a doctor's order saying the 69-year-old Andrews should take both medicines. Mistakes by doctors, nurses, pharmacies and hospital staffs kill and injure more Americans than those reported each year (Monk, 2002).

In 1999, the Institute of Medicine (IOM) published, "*To Err is Human: Building a Safer Health System,*" which indicated that medical errors kill between 44,000 and 98,000 people in American hospitals each year. According to the (1999) National Vital Statistics Report, more people die in a given year from medical errors than from motor vehicle accidents (43,548), breast cancer (42,297) or AIDS (16,516). Also more than 8.8 million adverse drug events (ADEs) occur in ambulatory care each year (Center for Information Technology Leadership, 2003). To err is human; however, medical errors maybe decreased and prevented by integrating clinical processes with information technology (Bates, Leape and Cullen, 1998; Leapfrog Group, 2000). According to a statement issued by the IOM of the National Academies, "To significantly reduce the tens of thousands of deaths and injuries caused by medical errors every year, healthcare organizations must adopt information technology systems that are capable of collecting and sharing essential health information on patients and their care". Such systems should be national and integrative in nature and conform to a national health data standard in order to improve the quality and reduce the cost of healthcare for Americans (2003).

The dilemma facing healthcare organizations is the lack of integration between clinical processes and information technology. More specifically, the problem involves healthcare professionals' resistance toward the adoption and use of information systems and information management technologies. A computerized physician order entry (CPOE) system is used by clinicians to capture prescriptions and other medication information directly in computer systems. Such systems have been shown to reduce medication errors by more than 50% in inpatient settings. The e-Health Initiative reports that while progress has been made toward physician adoption of electronic tools, such as CPOEs, electronic medical record systems (EMR), electronic prescription (e-prescribing) systems, personal digital assistants (PDAs), Tablet PCs, widespread use remains modest (2004).

Prior information systems (IS) research found that many doctors do not widely use Internet-based health applications in their clinical practices and general acceptance of information technology (IT) has been low (Chismar and Wiley-Patton, 2002). The majority of clinical information is still stored in paper form and only a fraction of clinicians offer e-mail as a communication option to patients (Hoffman, 1997). Chau and Hu (2002) contend that the attitudes of physicians play a pivotal role in the adoption and ultimate use of IT. IT continues to be a critical but underused component of healthcare despite seemingly obvious benefits. Despite potential benefits of the application of IT in healthcare, they cannot be effective

unless they are used (Mathieson, 1991). IS researchers have long sought to understand factors that influence IT acceptance behavior, as well as identifying why people do not adopt and use systems that could potentially increase their productivity, and in this case, improve the quality of healthcare.

Purpose of Study

Many factors contribute to the inconsistent adoption of IT. The current research in progress intends to advance the understanding of healthcare professionals' adoption, use and diffusion of information systems and information management technologies for clinical purposes. The primary motivation for this research includes: 1) the urgent need to understand factors that influence or inhibit healthcare professionals' acceptance, diffusion and use of IT for clinical purposes 2) the need for information systems research specifically targeting healthcare professionals and; 3) exploring the value of adding a social influence, persuasion and social network perspective to existing IT adoption theory to better explain and reduce barriers in healthcare professionals' adoption and usage of IT.

Objectives

Our objective is to address the following research questions:

1) What characteristics/variables impact the diffusion of innovation process among healthcare providers?
2) Based on the determined characteristics/variables will a healthcare IT adoption model enhance/increase the implementation of integrated clinical systems?
3) How will this model differ from existing IT/IS adoption models?

THEORETICAL FOUNDATION

Our review of the relevant literature failed to identify any single theoretical perspective that would provide a comprehensive framework to investigate healthcare professionals' adoption of and use of IT for clinical purposes. Therefore we draw upon three theoretical approaches to guide our study: (1) existing IT adoption models; (2) social network analysis and (3) persuasion and social influence theory. Figure 1 represents the literature consulted and the proposed integration to develop a healthcare specific theoretical model.
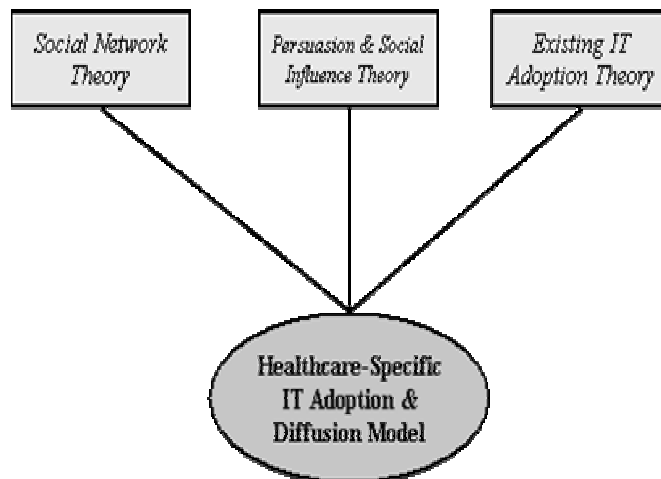

Figure 1. Healthcare-IT-Adoption Model © Wiley-Patton & Malloy, 2004

Existing IT Adoption Models

Researchers have investigated the phenomenon of user acceptance, adoption and use of technology. Empirical support has favored the likes of intention models such as the Theory of Reasoned Action, (Davis, Bagozzi and Warshaw, 1989, 1994; Ajzen and Fishbein, 1980; Ajzen, 1988, 1991); the Theory of Planned Behavior, (Taylor and Todd, 1995); the Task-

Technology Fit Model (Goodhue and Thompson, 1995); and the Technology Acceptance Models I and II (Davis, 1989; Davis, et al., 1989; Venkatesh and Davis, 2000; Venkatesh, Morris, Davis and Davis, 2003). These models have reportedly explained a substantial proportion of the (approximately 40 percent) variances in usage intentions and behavior.

Most IS research has been conducted with individuals and organizations dissimilar to physicians and the health care industry. Prior research notes that physicians are characteristically different from the traditional subjects used in IT adoption studies (e.g., students, clerical, administrative and corporate-types). This observation creates an interesting phenomenon regarding the formation of physicians' attitudes toward IT adoption and usage in clinical settings. Venkatesh et al. (2003) developed a more unified technology adoption model by adding a many constructs, including social influence. Although the predictive ability was good (explaining 70 percent of variance in intention behavior) the target audience was not healthcare professionals. Few studies have evaluated IS and IT theoretical models in the health care environment (Dixon and Stewart, 2000; Lee, 2000; Hu, et al., 1999; Chau and Hu, 2002; Chismar and Wiley-Patton, 2002; Wiley-Patton, 2002). For this study we pursue the understanding of healthcare professionals' intentions to adopt IT by integrating social network theory, social influence and persuasion theory with constructs from existing IT adoption models.

Social Network Analysis

Upon examining the literature of social networks and observing the interactions and social integration among healthcare professionals, we deem that social network theory and analysis have a particular relevance in understanding the IT adoption and diffusion process of healthcare professionals nationwide. Social network theory is a branch of social science that applies to a wide range of human organizations, from small groups of people to entire nations. The term network refers to a set of objects, or nodes, and the mapping or description of the relationship between the objects (Freeman, White and Romney, 1989). Social network theory is studied as a means of understanding the connection of one individual (e.g., an IT-savvy physician) to others (e.g., other physicians, nurses or support staff). One can evaluate the "social capital" of that individual by the number of links stemming from their node. According to (Kadushin, 2003) social capital refers to the network position of the object or node and consists of the ability to draw on the resources contained by members of the network. In essence the more mappings a person has in the social network and the more mappings that connected relations have, the more knowledge, influence, and power the original person will control. Social capital can have substantial influence on a person's life as well as influence on the lives within the social network.
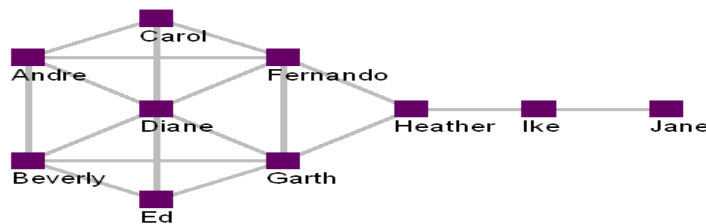

Figure 2. Kite Network (Krackhardt, 1988)

Social network analysis (SNA) consists of the mapping and measuring of relationships and flows between people, organizations, computers or other information processing entities. One of the methods used to understand networks and their participants is to examine the location of the actors, in this case physicians and other healthcare personnel in the network; in relation to the adoption, use and diffusion of IT. Figure 2 illustrates the "Kite Network", first developed by David Krackhardt (1988), who pioneered the concept of cognitive social structures. SNA can provide visual, qualitative and quantitative analyses of the importance of healthcare professionals' network position in the social structure of the organization to determine when and if they begin using an innovation.

Social Influence and Persuasion Theories

By combining social influence/persuasion theories (Wood, 2000) with SNA and IT adoption theories we will be able to examine the rich qualitative social process in IT diffusion among healthcare professionals. Social influence is the process whereby words or actions of other people directly or indirectly influence our behavior. Persuasion is the process of social influence. Rogers (1995) explains that potential adopters of a technology progress over time through five stages in the diffusion process. First, they must learn about the innovation (knowledge); second, they must be **persuaded** of the value of

the innovation (**persuasion**); they then must decide to adopt it (decision); the innovation must then be implemented (implementation); and finally, the decision must be reaffirmed or rejected (confirmation).

METHODOLOGY: DESIGN AND SETTING

In order to address our research objectives and questions we have structured a "**staged approach**" methodology utilizing both qualitative and quantitative techniques. Stage one consists of in-depth interviews and case study analysis applying SNA and social influence/persuasion theories. Stage two will produce a survey for pilot testing; constructs will derive from the qualitative data of stage one. In stage three we will conduct "test and re-test" analyses of the survey and ultimately administer the IT adoption in Healthcare questionnaire on local, regional and national levels.

Population and Sample

Our Lady of the Lake Regional Medical Center (OLOL) and Louisiana State University Health Sciences Center (LSUHSC) have agreed to serve as test environments for the development of our theorized healthcare IT adoption model, primarily with the pilot and testing of OLOL's computerized physician order entry system (CPOE), which has been a hot topic for patient safety initiatives. We expect the results of our study to be generalized and transferable to the larger population of healthcare professionals nationwide. Our sample will consist of a randomized selection of physicians, physician assistants, nurses, laboratory, and radiology technicians, administrative personal and executive level managers/directors. We will sample from the over 900 medical staff and 3500 employees/support staff available at OLOL. Moreover, we will randomly sample from more than 3,900 appointees, including physicians, dentists, and nurses within the LSUHSC which encompasses six professional schools.

Expected Outcome and Significance

Our findings will advance the understanding of factors that influence IT adoption by healthcare professionals. Our intentions are to develop a healthcare-specific IT adoption model and 'Best Practices' guideline. The results will help to facilitate the integration of clinical processes and IT in healthcare, consequently reducing errors and improving the quality of care.

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