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UNDERSTANDING THE EFFECT OF PHYSICIANS' PRACTICE ON THE USE OF HEALTHCARE IS

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Abstract

Healthcare information systems (IS) such as Computerized Physician Order Entry (CPOE) systems have the potential to improve efficiency of healthcare, lower costs, and reduce medication errors. However, previous studies have also described various issues arising from the use of these systems. A key issue pertains to physician resistance to CPOE, causing low usage or the abandonment of system implementations. Despite considerable research on CPOE, there is still a lack of understanding about the acceptance and use of these systems by physicians. This paper aims to address this gap by applying the theoretical perspective of professionalism, a type of institutional logic to understand this phenomenon. We thereby develop a model to explain the impact of physicians' professional practice arrangements and seniority on their usage of CPOE. The model will be tested using the survey method by collecting data from physicians on their use of CPOE. Objective measures to determine system usage will be utilized if available. In this manner, this study intends to contribute to research and practice on the use of healthcare IS.

Keywords: Healthcare IS, CPOE, Physician's system acceptance and use, Institutional theory, Professionalism, Practice arrangements

1 INTRODUCTION

Healthcare information systems (IS) such as Computerized Physician Order Entry (CPOE) systems have the potential to improve efficiency of healthcare, lower costs, and reduce medication errors (Anderson et al., 2002). CPOE, commonly defined as a class of computer-based systems for automating the medication ordering process (Eslami et al., 2008), affects the work of physicians of all specialties in the healthcare industry. At the point of ordering by physicians, it is where medication errors can be first prevented, where decisions about the type of medicine to order can be influenced, and standardization of orders can be enforced. However, despite its benefits, implementation of CPOE in hospitals has proved to be challenging primarily due to physician resistance (Bhattacherjee and Hikmet, 2007). In explaining the reasons behind the low adoption rate of CPOE by physicians, prior literature has highlighted the effects of poor system usability (Ash et al., 2003), power shifts between physicians and nurses (Bartos et al., 2008), and unwillingness of hospital administrators to respond to feedback (Sittic et al., 2005). However, physicians' professional practice is a possible determinant of their acceptance of healthcare IS such as CPOE that has not been examined.

This is despite the recognition that institutional theory may be a fruitful perspective to understand phenomena revolving around the use of IS in the healthcare industry (Currie, 2009). The healthcare sector is characterized by its institutional nature and is governed by prevailing rationalized rules enacted by the industry. Unique to this industry is the existence of strong normative forces exercised by the physician profession against the coercive pressures from governments, healthcare administrators, and the public (Scott, 2001). As part of their profession, physicians possess a strong sense of professional identity, and are assigned the role of life-saving, which is socially expected and legally obligatory (Meyer and Rowan, 1977). As a result of the importance of their role, physicians occupy a special position in the healthcare industry.

However, although the physician profession enjoys considerable power, their position is gradually being weakened by the demands of competition and efficiency (Scott, 2001). One of the reasons for this trend includes the shift away from private practice towards salaried employment motivated by factors such as increased healthcare equipment cost and protection from malpractice claims (Randall and Williams, 2009). This has caused the erosion of professional values as work is mediated by organizations (Suddaby et al., 2009). In particular, as a salaried employee, the long standing belief of autonomy of physicians' work is often compromised across different dimensions of autonomy i.e., political, economic, and clinical (Rastegar, 2004). The rise of salaried employment has also reduced membership in medical associations and weakened their power to influence the development of the healthcare sector and protect the professional autonomy of physicians (Pont, 2000). Moreover, as salaried physicians progress up the organizational hierarchy over time, their professional norms may become subordinated to managerial concerns e.g., cost efficiency, due to heightened demands from hospital administrators (Leicht and Fennel, 2001).

It is plausible that shifts in institutional forces and the de-professionalism of physicians' values when moving to salaried employment positions and occupying senior positions could influence physicians' usage of CPOE. As salaried physicians are likely to be less sensitive to autonomy needs, they may be more receptive to the use of CPOE. Moreover, physicians' seniority may also influence their perception of the system. In view of the above gap, this study aims to understand the effect of physicians' practice arrangements e.g., salaried vs. non-salaried, on the usage of CPOE system. Based on the institutional and professionalism perspectives, this paper thus develops a model to answer the following research questions: (1) Do differences in physicians' practice arrangement (i.e., salaried vs. non-salaried employee) influence their usage of CPOE? (2) Does the seniority of salaried physicians' employment affect their usage of CPOE? The model will be tested using the survey method by collecting data about and from physicians in different practice arrangements on their use of CPOE. Objective measures reflecting CPOE usage from sources such as archival data will be utilized if available.

This study aims to contribute to healthcare IS research by using the alternative perspectives of institutional theory and professionalism to trace and explain the effects of physicians' practice

arrangement and seniority on the usage of CPOE systems. It also expects to inform management implementing CPOE systems about the perceptions that physicians may have about system use based on their professional practice.

2 LITERATURE REVIEW

In this section, CPOE systems are first described for a better appreciation of the benefits and issues of their implementation and use. Next, a brief review of the institutional perspective in IS is presented. Subsequently, the de-professionalization of the physician profession is described that will guide the development of our model.

2.1 CPOE Systems

CPOE is commonly defined as a class of computer-based systems that share the common features of automating the medication ordering process and ensuring standardized, legible, and complete orders (Eslami et al., 2008). Physicians use this system to order medicines for patients thus initiating the medication delivery that is critical for downstream processes such as medication serving by nurses. CPOE affects the work of physicians of all specialties in the healthcare industry and is thus considered suitable for our study on the effect of physicians' profession on the use of healthcare IS.

The motivations of introducing CPOE include the ability to reduce medication errors (Beuscart-Zephir et al., 2005), reduce medical costs through better decision making (Mekhjian et al., 2002), and improve cooperation between health care professionals (Wentzer et al., 2007). With CPOE, issues of illegible handwriting, incomplete documentation, and loss of documents should be eliminated (Hwang et al., 2002). Besides the reduction of medication errors, CPOE has also been suggested to increase physician compliance (Cunninghan et al., 2008), produce time savings (Anderson et al., 2002), and increase physician satisfaction (Eslami et al., 2008). Overall, CPOE can improve the quality of healthcare provision if carefully implemented (Beuscart-Zephir et al., 2007).

However, despite its benefits, implementation of CPOE in hospitals has proved to be challenging due to various issues. Usability problems due to poor technical implementation (Ash et al., 2003) and changes to existing work processes (Aarts et al., 2007) have hindered CPOE uptake by physicians (Ash et al., 2007). In the initial period of usage, many CPOE systems slow down work processes such as clinical documentation and ordering due to system unfamiliarity (Aarts et al., 2007). While CPOE is expected to reduce medication errors, in some instances, implementation of the IS instead increased medication errors as a result of system errors or the absence of automated safeguards in some systems (Horsky et al., 2005). As a result, frustrated physicians have reverted to the use of paper medication records in some cases that led to non-usage of CPOE (Poon et al., 2004).

With these issues, a major challenge faced by hospital administrators is the resistance by physicians to the implementation and use of CPOE (Sittic et al., 2005). Instances have been reported where, even when hospital administrators tried to mandate the use of CPOE, although they could see an increase in system usage, the figures were still low (Whiting and Gale, 2008). Resistance is commonly defined as an opposition, challenge or disruption to initiatives, and a hindrance to designers in meeting the objectives of a system (Ferneley and Sobreperez, 2006). Lapointe and Rivard (2005) further suggest a continuum of resistance levels by physicians in the implementation of healthcare IS. The different resistance behaviors that can occur range from lack of cooperation or workarounds at one end to aggressive lobbying for abandonment at the other. Indeed, the issues highlighted above have forced the abandonment of CPOE implementations (Bartos et al., 2008).

In response to physician resistance, hospital administrators have often reasoned that the intention of implementing CPOE is to enhance the safety of patients. Since CPOE facilitates the flow of accurate information among healthcare professionals, patients could receive faster, better care, and importantly, this should result in lesser medication errors. However, some physicians have argued that the use of CPOE would instead prevent them from providing the high quality of care they did before, and accused hospital administrators and IT professionals for attempting to be "physicians" and dictating how they should conduct their practice through these systems (Lapointe and Rivard, 2005).

As physicians are the sole content providers for the medication cycle, lack of cooperation by them in using CPOE would stifle the chain of workflow. This implies that pharmacists and nurses who require information from physicians would be compelled to fall back on previous i.e., paper based arrangements. However, it is noted that such negative reactions have not been seen across the board in CPOE implementations. Examples are reported of hospitals where CPOE implementation was observed to fail, but a portion of physicians felt that the system was indeed useful for their work and it was unfortunate that the implementation was resisted by other physicians (Sittic et al., 2005). This illustrates that within the physician profession, there are differing opinions about CPOE use.

2.2 Institutional Perspective in IS

While usage of IS (including healthcare IS) has often been examined through theories of technology acceptance (Burton-Jones and Gallivan, 2007), the institutional perspective is an alternative lens that can add to the understanding of the use of healthcare IS such as CPOE. According to the institutional perspective, organizations are embedded in an environment of social values, norms, beliefs, and taken-for-granted assumptions that guide and constrain their actions. Therefore, institutions are social structures that have attained a high degree of resilience, composed of cultural-cognitive, normative, and regulative elements that, together with associated activities and resources, provide stability and meaning to social life (Scott, 2001). This perspective has been used by researchers to study the external and internal influences on organizational patterns and explain why certain organizational structures and ideals endure (Weerakkody et al., 2009).

A central underlying assumption of institutional theory is that rationalized myths exist within an institutional context for organizations to pursue legitimacy in the environment that leads to external support and increased survival capabilities (Meyer and Rowan, 1977). Therefore, legitimacy is an important concept in institutional theory. Further, the environment, also known as the institutional field, refers to those organizations that, in the aggregate, constitute a recognized area of institutional life e.g., key suppliers, resource and product consumers, regulatory agencies, and competitors (DiMaggio and Powell, 1983). Depending on how each organizational field is constructed, a firm may be influenced by others within the field by virtue of their connectedness. DiMaggio and Powell (1983) further suggest that as a result of coercive, mimetic, and normative institutional pressures, isomorphism will occur where firms such as those in the same industry will adopt a common form.

However, in recent times, the focus has shifted from isomorphism where acquiescence is implied, to the effects of drastic changes in core values on institutional change in organizations. These core values, termed as institutional logics, are belief systems that guide organizing principles and give actors vocabularies of motive and identity (Friedland and Alford, 1991). Institutional logics such as professionalism shape rational and mindful behavior of individuals in an organization but importantly, there is an acknowledgement that individual actors can shape and change these logics (Thornton and Ocasio, 2008). Therefore, there has been increasing research on changes in institutional logics that enable reinstitutionalization and deinstitutionalization (e.g., Suddaby et al., 2009).

Other than commonly used technology adoption theories, institutional theory has been utilized to examine IS-related phenomena such as IT adoption, innovation, and development (Mignerat and Rivard, 2009). In the context of healthcare IS, the theory has been applied to understand the effect of local institutional beliefs. In a study of a telemedicine system introduction, Miscione (2007) described the importance of considering the local institutional context in its design and implementation, as failure to do so would reduce the effectiveness of the system. By integrating the institutional and sensemaking theories, Jensen et al. (2009) showed how the rationalized myth of an efficient patient record system was translated from top management to physicians. The study found that even though the expectations of the value and purpose of the system were understood by the physicians, they also had separate interpretations of their usage of the system. Therefore, individual interpretations could play a role in shaping the institutional beliefs in an organization.

While institutional theory is now being applied in more novel ways, Mignerat and Rivard (2009) noted that IS researchers have most often used it to study the effect of the three kinds of institutional pressures on IS-related phenomena within organizations (i.e., coercive, normative and mimetic) with

the assumption that acquiescence is a definite. However, this does not align with more recent work in institutional theory that organizations are not 'cultural dopes' and may need to perform balancing to combine the changing expectations of multiple pressures and stake holders (Suddaby, 2010). Specifically, there is growing awareness that institutional change is facilitated by shifts in core values of constituents (Suddaby et al., 2009). Suddaby (2010) has also argued that studies based on institutional theory have too readily analyzed the outcome of institutional processes and have overlooked the "institutional story" of how organizations attend to meaning systems or myths. Therefore, a fruitful avenue for research is to investigate the effects of shifts in the beliefs of stakeholders (in this case the physician's profession) on the acceptance and usage of IS such as CPOE introduced by hospital administrators.

2.3 Physician De-professionalization

Professionalism refers to the institutional circumstances in which the members of occupations make a living through their own control of work rather than control by consumers or administrators (Friedson, 2001). It is an institutional logic or a set of belief systems that gives meaning to activities, which is used as a counterbalance between the market and bureaucracy (Suddaby et al., 2009). The idea of market is when consumers e.g., patients in healthcare, are able to entirely control the work people do, while bureaucracy implies the other extreme where managers or administrators are in total control. In the past, the physician profession exerted a strong normative institutional pressure against coercive forces from the public and hospital administrators. As representatives of the profession, physician associations had immense power that ensured little governance by other parties within the healthcare industry (Pont, 2000).

Accordingly, physicians' work as a profession has been conducted based on the long standing belief of autonomy in deciding the best form of patient care. This has been reiterated regularly by professional bodies such as the World Medical Association (WMA, 2008). Professional autonomy of physicians refers to their discretionary ability to make decisions based on the clinical needs of the patient in contrast to the interests of hospital regulators or patients (Randall and Williams, 2009). Prior research on physician autonomy has identified three key dimensions i.e., clinical autonomy, economic autonomy, and political autonomy (Reinertsen, 2003). Clinical autonomy is defined as the ability of physicians to control clinical decision-making based on medical knowledge and the needs of patients, and is considered to be the most fundamental aspect of the profession. Economic autonomy is defined as their ability to determine prices and incomes independently without external control. Political autonomy refers to their ability to control the broader context in which professional work takes place, such as scheduling of work and decisions on when and where work should be performed.

Changes in physicians' practice arrangements over the past few decades have negatively influenced their professional autonomy. This has resulted in de-professionalization and reduction in the influence of medical associations on physicians' work. Mainly since the 1980s, more physicians have opted to be employed directly by healthcare institutions as salaried physicians (Rastegar, 2004). Several reasons have been attributed to this shift towards salaried practice (Casalino et al. 2008; Kocher and Sahni, 2011). First, increased cost of delivering healthcare both in terms of medication and high costs of medical equipment have deterred physicians from entering private practice e.g., solo practice, specialty groups. Second, the increased competition among healthcare providers has persuaded some physicians to switch to employee positions, in which they can work regular hours and have an ensured salary. Third, as a salaried employee, the institution will protect the physician against malpractice claims that are common in the industry.

The impact of the increased number of salaried physicians on the profession is evident (Reinertsen, 2003). First, as more physicians became employed in organizational settings, membership of medical associations dwindled. Much fewer salaried physicians than non-salaried physicians joined medical associations that were championing physicians' right to professional autonomy, which led to an overall drop in membership. This drop in membership undermined the power and centrality of these associations, which had lesser clout in influencing and controlling the development of the healthcare sector (Krause, 1997; Pont 2000). Consequently, this allowed bureaucrats (e.g., hospital

administrators) to exert pressure on the physician profession, compelling them to adhere to new rules that focused on cost efficiency and standardization.

Second, the three dimensions of autonomy i.e., political, economic, clinical, have also been impacted by the change in physician practice arrangements. As an employee, physicians' political autonomy will likely be threatened. Salaried physicians often face pressures from hospital administrators to increase productivity and consequently have less discretion in determining for how long and which patient to attend to. Economic autonomy is also relinquished as salaried physicians have little say about how much to charge a patient. This autonomy is increasingly challenged by the application of pay-for-performance standards and required conformity to practice guidelines (Larriviere and Bernat, 2008). Salaried physicians also face reduced clinical autonomy. A case study on rehabilitation professionals in a Community Care Centre indicated that physicians had to wait for approval from the centre before visiting a patient (Randall and Williams, 2009). In addition, clinical autonomy is impacted as the public becomes more aware via the Internet and may question the ability of physicians to deliver the most suitable medication (Reinertsen, 2003). On the contrary, physicians under non-salaried employment are less susceptible to face bureaucratic pressures or the erosion of autonomy, which allows them to uphold the long standing beliefs of the profession.

Apart from the effects of the change in practice arrangements on the three dimensions of autonomy, it has also been posited that professional norms can become more subordinated (de-professionalized) to managerial concerns as an individual progresses up the organizational hierarchy (Aranya and Ferris, 1984; Leicht and Fennel, 2001). This originates from the research of organizational professional conflict that explains the tension professionals experience when their values and goals are incompatible with the organization's objectives (Shafer et al., 2002; Kippist and Fitzgerald, 2009). Although research has mainly focused on the effect of different professional and bureaucratic conditions on the professionals' level of conflict (e.g., Lait and Wallace, 2002), the literature also highlights that professionals higher in the organization hierarchy have lesser levels of organizational professional conflict as they are better able to reconcile conflicting demands (e.g., Aranya and Ferris 1984). For example, physicians can rise up the hierarchy in hospitals to hold more managerial-oriented positions. Previously, the role of the physician focused solely on medical practice and specialization along the different dimensions of this practice (e.g., surgery or pediatrics). However, the authority conferred by managerial roles has attracted some physicians to such jobs (Falcone and Satiani, 2008). Therefore, physicians can now hold managerial positions, such as Chief Executive Officer (CEO) or Clinical IT Head, which divert them away from their practice.

As a result, the conflict between organizational and professional commitment may decrease as professionals' rank and seniority increases in an organization. In the case of physicians, this may be due to senior ranked professionals having a greater stake in their organization, which can lead to greater individual commitment to the firm (Suddaby et al., 2009). For example, pressures to reduce costs have led high-ranked physicians (e.g., head clinicians) to champion the standardization of drug usage to gain economies of scale, which is largely against the norms of the profession. Thus, as the seniority of physicians in a hospital increase, they may be more amenable to organizational norms (e.g., of new IS use) rather than professional norms.

3 EXPLAINING PHYSICIAN USAGE OF CPOE

By tracing several critical changes in physicians' profession over the past few decades, as a result of de-professionalization we posit that salaried physicians will be more receptive to the implementation and usage of CPOE than non-salaried ones. Salaried physicians can be employees in large multispecialty groups or hospitals, while non-salaried physicians are in private practices who are either owners of solo practices, co-owners or partners of group practice i.e., single-specialty or multispecialty, or as independent contractors to group practices or hospitals (Crosson and Tollen, 2010). With the increase in the number of salaried physicians, prior literature has highlighted that this has led to an erosion of the professional values of physicians as they have less control over their work (e.g., Rastegar, 2004). This is because by virtue of being salaried employees, the three dimensions of autonomy (i.e., clinical, political, and economic) are often compromised. For example, McKinlay and

Marceau (2008) noted that as salaried physicians' performance is judged partly on their adherence to organizational norms, they offered little resistance against practice guidelines mandated by administrators despite the potential loss of their professional autonomy. This suggests that different practice arrangements may be able to explain the level of physician resistance towards initiatives that can reduce physicians' autonomy, such as the introduction of CPOE.

Masked behind the main objective of reducing medication errors, CPOE introduces several features that can compromise the autonomy of physicians. An investigation into the features of CPOE provides insights into how physicians may react towards the system. First, CPOE could provide decision support to physicians by suggesting certain types of medication for specific conditions, their dosage level and serving times (Miller et al., 2005). Administrators often see it as an opportunity to standardize the type of medicine prescribed to achieve economies of scale. Second, administrators could use CPOE to influence the choice of lab tests physicians should perform by listing price information. Implicitly, this exerts pressure on the physician to select the option that benefits the hospital most. Third, CPOE systems often include a feature to prompt physicians through clinical reminders. More often than not, although this feature is perceived to be useful to hospital administrators, physicians feel overwhelmed by these reminders (Ko et al., 2007).

However, as explained previously, physicians who are salaried employees are likely to be less sensitive to the loss of autonomy as per their choice of employment, which should lead to less resistance and higher intention to use the system. On the other hand, if physicians have chosen non-salaried employment where they are subject to fewer controls on their autonomy, they may not accept these restrictions. For example, in large multi-specialty groups where the essence is for non-salaried physicians to retain autonomy while reaping the benefits of efficiency of a group practice, they may be less receptive to senior management attempts to implement CPOE for cost control. Non-salaried physicians in solo practices or small multi-specialty groups having affiliations with hospitals may also be asked to use these systems by hospital administrators. However, as non-salaried physicians are more likely to be sensitive to loss of autonomy through the introduction of CPOE, they may not be inclined to use it. Therefore, we hypothesize

Hypothesis 1 (H1): Salaried physicians will demonstrate a higher use of CPOE system as compared to those that are non-salaried.

Besides changes in physicians' practice arrangements being a source of the erosion of professional values, the seniority of the physician in the organization is also suggested to be another source. Prior research has suggested that the longer the duration of an individual's employment in a firm, the more likely the individual will be able to reconcile the conflict between organizational and professional beliefs (Seruya and Hinojosa, 2010). Implicit to this argument is the assumption that as professionals continue to work in an organization, they would generally rise to higher positions in the hierarchy and be exposed to more managerial concerns, such as cost efficiency and standardization, which are often in conflict with professional beliefs. Therefore, as senior physicians are faced with pressures on reducing costs and increasing standardization of medication from administrators, it is likely they will be more willing to relinquish their professional beliefs to accept usage of CPOE.

Thus, we hypothesize that physicians who are under direct employment and with a higher rank will be able to accept the use of CPOE systems more readily due to their ability to better reconcile the conflicts between professional beliefs and managerial concerns.

Hypothesis 2 (H2): Salaried physicians of higher seniority will demonstrate a higher use of CPOE system as compared to those of lower seniority.

4 RESEARCH METHOD & FUTURE PLAN

To test the hypotheses, we intend to collect data on physicians' practice arrangements and CPOE use from hospitals or clinics that have implemented similar CPOE systems. We will compare physicians' use of the common features found in CPOE systems i.e., the ability to enter different types of orders such as medications, labs, radiology (Ash et al., 2012). The study will be conducted in the Asia-Pacific region in a country such as Singapore where physicians are employed in a range of different

practice settings e.g., private group practice, hospital, in salaried and non-salaried options (Qian and Lim, 2008). Singapore is considered suitable for our study because CPOE has been implemented in major healthcare groups and private specialist clinics, yet there are issues with the acceptance of these systems by physicians (Yang et al., 2012).

In each organization, the survey sample will include physicians at various positions in the hierarchy with the unit of analysis being the physician. To establish that there exists a mix of salaried and non-salaried physicians across the sample, a short interview with management will be conducted. Every respondent will be asked to fill in a survey to be administered by the researchers. Each survey will consist of a set of questions i.e., general questions about the organization such as the level of medical care it provides, questions about the respondent's position in the organization, and their length and type of employment. In addition, to factor in variations in CPOE systems, questions about the system will be included in the survey such as how long has the CPOE system been active, what types of orders do providers enter e.g., medications, labs, radiology. To gauge the respondent's usage of the system, we strive to use objective measures from various sources such as archival data on usage if possible. In the absence of these measures, a 5-point Likert scale will be used to solicit the percentage of different types of orders (in intervals of 25%) they enter through CPOE (Ash et al., 2012). After data collection is complete, the instrument and hypotheses will be tested.

The independent variables are the practice arrangement of the physician, and the seniority level of the salaried physician. The dependent variable is the physician's usage of the CPOE system (Ash et al., 2012). In addition, several control variables such as the physician's age, gender, specialization, organizational size, and CEO background are included into the model. Prior literature has highlighted that younger doctors were in general less ideologically committed to professional autonomy (Pont, 2000). This may confound our findings as younger doctors may inherently be less resistant to CPOE use. Therefore, we include age as a control variable. Gender is also included as a control variable because females are more likely to choose direct employment, which may suggest their higher receptivity to autonomy loss (Kane, 2009). In addition, as prior studies have highlighted potential differences among physicians of different specializations (e.g., Qian and Lim, 2008), physicians' specialization will be a suitable control variable. Moreover, we include hospital size (measured by the number of beds) as a control variable because it is generally perceived to be harder to introduce new systems due to the higher number of physicians involved in the implementation (Thakkar and Davis, 2006). The CEO background of a hospital is also expected to have an effect on physicians' propensity to use CPOE. If the CEO is previously from the physician profession, he/she is likely to have more clout in influencing physicians' decision to use CPOE as a result of his/her higher clinical credibility (Falcone and Satiani, 2008). It is also important to determine the extent to which the usage of the CPOE system is voluntary since this can influence the response for the dependent variable. Consistent with IS literature on technology acceptance (Burton-Jones and Gallivan, 2007), the model will also incorporate both perceived ease of use and perceived usefulness as control variables.

In future, we plan to extend the study to other systems that may impact a broad range of all physicians' work such as electronic healthcare records (EHR) and to other countries such as the U.S. where CPOE implementation started yet still has not been adopted across the board (HIMSS Analytics, 2013). In addition, we intend to extend this study by conducting a multi-level analysis to explain how institutional, organizational and individual factors interact to influence usage.

The trend towards implementing new healthcare IS such as CPOE has been increasing as healthcare institutions face immense pressure from institutional forces to act against medication errors. However, although administrators are wary of the obstacles they may face during implementation of such systems, this paper suggests that the underlying tension between the physician and administrators is an important issue even after the implementation. In particular, the differences in physicians' practice arrangements and seniority of salaried physicians may explain usage of CPOE in addition to the antecedents previously studied. Thus, this research potentially has significant implications for both healthcare IS researchers and practitioners in gaining acceptance of such systems.

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