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How to Influence Physicians to Use Electronic Medical Records (EMR)? Social Influence Tactics and Their Effects on EMR Implementation Effectiveness

Virginia Ilie
University of Kansas Main Campus, vilie@ku.edu

HOW TO INFLUENCE PHYSICIANS TO USE ELECTRONIC MEDICAL RECORDS (EMR)? SOCIAL INFLUENCE TACTICS AND THEIR EFFECTS ON EMR IMPLEMENTATION EFFECTIVENESS.

Research-in-Progress

Virginia Ilie, Ph.D.
Accounting and Information Systems Department
School of Business, University of Kansas
vilie@ku.edu

Abstract

Theoretical and practical knowledge of the important role of social influence tactics as a managerial tool used by system implementers to persuade individuals to make use of an information system (IS) is very limited. I integrate elements from the theory of interpersonal influence and leadership with the theory of attitude change and innovation implementation to investigate the role of various leadership tactics that could be used in IS implementations to persuade physicians to use EMR in large hospitals. I define three types of behavioral responses to IS implementations: compliance, commitment and resistance. I show how different leadership tactics could be used during IS implementations in order to impact behavioral change (foster compliant or committed use) and avoid resistance. I propose hypotheses to investigate direct and interaction effects of these tactics on EMR implementation effectiveness. This research contributes to the IS field by "doing IT research that matters."

Keywords: Social influence, leadership tactics, EMR implementation, healthcare, medical informatics.

Introduction

The challenges underlying implementation of complex IT systems in healthcare are many. Research suggests that physicians are reluctant to use EMR because such systems are perceived as being time consuming (Ilie et al. 2009) and they do not smoothly align with physicians' work processes (Hennington et al. 2007). Furthermore, incentives are misaligned in healthcare (Middleton et al. 2005). Hospital management is more concerned with cost savings and improved efficiencies in the healthcare supply chain, while physicians are more concerned with patient care and their own workflow (Hennington et al. 2007). Under these circumstances, hospital administrators are facing great challenges to implement EMR and promote them to physicians. As physicians hold considerable power in a typical US hospital, administrators may not simply mandate use of EMR (LaPointe and Rivard 2005).

Although many studies investigated individual acceptance of IT systems (as reviewed by Venkatesh et al. 2003), very little is known about EMR implementation strategies that could be used to foster EMR acceptance and use by physicians. In fact, innovation implementation remains a challenge (Klein and Sorra 1996; Klein et al. 2001) especially in complex environments such as healthcare, where IT systems are not easy to use and do not directly benefit physicians (Hennington et al. 2007; Ilie et al. 2009).

In this study, I start with Rogers' (1995) premise that *"IT acceptance is fundamentally a problem of social influence"* (Rogers 1995). The focus of this study is thus on social influence tactics that management could use in hospital settings to better promote EMR systems to the physician group and foster positive attitudes. IS research is scarce in investigating the role of social influences in the diffusion and implementation of IT. Most IS research with a focus on IT acceptance and use focused on system-related factors such as ease of use, usefulness (Davis 1989; Davis et al. 1989), system quality factors (DeLone and McLean 1992; 2003) or individual-related factors such as computer self-efficacy (Compeau and Higgins 1995; Compeau et al. 1999). The role of social influences remains unclear in IS research due to mixed results obtained across studies (Venkatesh et al. 2003). Whenever IS researchers included social influences as a construct in IT adoption models, this construct has been narrowly defined as "the degree to which an individual perceives that important others believe he or she should use the new system" (Venkatesh et al. 2003, p.451). Theoretical and practical knowledge of the important role of social influence as a managerial tool used by system implementers to persuade individuals to make use of a system is thus very limited. Thus, the following research questions are posed: (1) *"What kind of influence tactics could be used by hospital leaders to persuade physicians to make use of EMR?"* and (2) *"What are the effects of different managerial influence tactics on EMR implementation effectiveness?"* In order to answer these research questions, I integrate elements from the theory of interpersonal influence and leadership with the theory of attitude change and innovation implementation which are described in the next sections. After I present the theoretical background for the study, I offer a research model and hypotheses then propose a methodology to conduct this study. The paper concludes with contributions to both theory and practice.

The Theory of Interpersonal Influence and Leadership

The current study focuses on investigating various influence tactics hospital administrators could use in order to influence physicians to make use of complex technologies such as EMR. I ground this study in the theory of interpersonal influence and leadership (Yukl and Tracy 1992; Falbe and Yukl 1992; Yukl et al. 2005; Yukl et al. 2008). This theoretical lens was chosen as it provides important insights into influence mechanisms and leadership tactics that could be used in a healthcare setting in order to impact physicians' attitudes and behavior towards EMR. Several social influence tactics have been defined in leadership theories as being important in influencing behavior, especially in situations where managers have little or formal authority over employees (Yukl et al. 2005), which is the case in a healthcare environment. An influence tactic is defined as "a type of behavior one person (e.g. agent) uses to influence the attitudes and behavior of another person (e.g. the target)" (Yukl et al. 2005, p.705).

Various tactics such as pressure and legitimating (hard tactics), consultation, collaboration, coalition, inspirational appeals, ingratiation, apprising and personal appeals (soft tactics) and rational persuasion have been proposed in the leadership literature (Yukl and Tracey 1992; Yukl et al. 2008). Hard tactics involve use of power and authority while soft tactics involve power sharing and use of personal power (Falbe and Yukl 1992). When an agent uses a *"pressure"* tactic to influence the target individual to perform a behavior, the agent uses demands, threats or persistent reminders consistent with the power base and role expectations (Yukl and Tracey 1992). An agent can also employ *"legitimating"* tactics where he or she seeks to establish the legitimacy of a request by claiming authority or, by verifying that the behavior in question is consistent with organizational policies, rules, practices or

traditions (Yukl and Tracey 1992). For instance, if hospital management and EMR implementation teams use these two tactics, they would demand physicians to use EMR directly or by use of communication media (e.g. pressure) and verify that use of EMR is consistent with hospital bylaws (e.g. legitimating).

"Rational persuasion" involves the use of explanations and logical arguments to show why a proposed change is important and presents factual evidence that the proposal is feasible (Yukl et al. 2005). In a healthcare context, this tactic could be used by hospital management to provide physicians with factual evidence that using EMR would result in improved clinical performance or improved patient care. For instance, management and EMR implementation teams could point to reference articles from the literature (or conduct test trials in the hospital) to provide factual arguments and make a convincing case for EMR use based on research evidence. With *"apprising,"* an agent explains why a proposed change is likely to benefit the target person as an individual (Yukl et al. 2005). This tactic requires the agent to understand target individual's personal needs and how the change (e.g. EMR) may be relevant for satisfying those (Yukl et al. 2005). In a healthcare context, hospital administrators could use this tactic to explain physicians why using EMR could result in advancement of their career (for medical residents) or generally, reduce the personal risk of medical malpractice for attending physicians.

When an agent uses *"coalition"* as a tactic, he or she presents the target individual with endorsement of other people who have committed to the specific behavior in order to influence the target to do what the agent wants (Falbe and Yukl 1992). In healthcare, hospital administrators could employ this tactic and mention the names of other important physicians who have already endorsed EMR at a hospital in order to promote EMR to other physicians. This tactic thus, is related to using peer support in diffusion of EMR in hospital settings. *"Collaboration"* involves offering to provide resources and assistance in carrying out a request, and offering help to circumvent obstacles that would prevent the target person from performing a behavior successfully (Yukl et al. 2005). For instance, adequate support for EMR use should be provided to physicians such as training, support and easy accessibility to computers (e.g. remove obstacles to use). With *"consultation"* tactics, an agent seeks a target individual's participation in planning a strategy, activity or change for which the target's support and assistance are desired, or the agent is willing to modify a proposal to deal with target's concerns and suggestions (Falbe and Yukl 1992). In EMR implementation, this tactic would translate in encouraging physicians to express any concerns about their EMR use, invite them to suggest ways to improve EMR implementation and use in the hospital or involve physicians in EMR design and customization. When an agent uses an *"inspirational appeal"* tactic, the agent appeals to the individuals' values, ideals and aspirations or acts to increase target's confidence that he or she can perform the required action (Falbe and Yukl 1992). This tactic also entails the use charisma (Conger and Kanungo 1987) and could be used by healthcare transformational leaders (Barling and Weber 1996) via an inspiring presentation or speech that sets a clear vision for EMR implementation such that to arouse physicians' interest in EMR.

Various other tactics have been proposed in the literature such as exchange, ingratiation and personal appeals. The *"exchange"* tactic involves an exchange of favors (or benefits), with the change agent promising to reciprocate at a later time with the target individual if the target agrees to perform a specific behavior (Yukl and Tracey 1992). *"Ingratiation"* as a tactic used in interpersonal influence involves an agent seeking to convince a target individual to adopt a course of action by getting the target in a good mood or trying to get the target to think favorably about the agent before the request is made (Yukl et al. 2008). *"Personal appeals"* could be used by change agents by appealing to target individuals' feelings of loyalty or friendship when seeking to influence behavior change (Yukl and Tracey 1992). While I do not discount the importance of these tactics, research in interpersonal influence showed inconsistent results for these tactics (Falbe and Yukl 1992). Further, these tactics may not be suitable with influencing physicians regarding EMR use. For instance, it may be unlikely that a physician will use EMR as a personal favor to another physician. A physician may not also use EMR as a favor exchange or simply because he or she is in a good mood at one particular moment. These are some reasons why, I choose not to investigate the role of these last three tactics in an EMR implementation context.

Attitude Change and Innovation Implementation

Social influence tactics can result in different processes of attitudes change, although the underlying behavior may appear the same (Kelman 1958). The processes whereby an individual accepts various influences (as described above) can translate in commitment, compliance or resistance to an innovation (Falbe and Yukl 1992; Yukl et al. 2005). Similar outcomes have been proposed in the management literature related to innovation implementation (Klein and Sorra 1996; Klein et al. 2001; Kostova and Roth 2002). These outcomes were deemed to encompass the "implementation effectiveness" of an innovation (Klein and Sorra 1996) which reflects the consistency and quality

of targeted organizational members' use of an innovation. Based on these theories, I posit that use of various influence tactics during EMR implementation, could translate in compliant use, committed use or resistance to EMR, depending on the tactics used.

"***Compliant use"*** of an innovation (e.g. EMR) occurs when the target individual (e.g. physician) is willing to do what the agent asks (e.g. hospital administrator) but is apathetic about the innovation, makes only minimal or average effort in using it and does not show any initiative (Yukl et al. 2005). Other authors provided evidence of compliant use of innovations. Such outcome is detrimental to an organization because the innovation is minimally used. For instance, Kostova and Roth (2002) discuss compliant use at an organizational level as "ceremonial" adoption of a TQM innovation. They found that subsidiaries of a multinational organization adopted the TQM practice ceremonially as a response to strong pressures to adopt from the parent corporation but without much belief that the practice was useful or valuable to the subsidiary itself. Compliant use may also lead to users working around the technology in question (Azad and King 2008). Compliant users don't believe in the value of the system and are trying to bypass it by enacting new work practices such that to avoid using EMR. In some cases however, compliant use may be preferable to resistance. On the other hand, ***"committed use"*** of an innovation occurs when the target person agrees internally with the agent's request (e.g. internalizes the value of the innovation), is enthusiastic about it and demonstrates unusual effort and persistence in order to carry out the request or supporting the proposal (Kelman 1958; O'Reilly and Chatman 1986; Yukl et al. 2005). Committed use of an innovation occurs when there is an innovation-value fit (Klein and Sorra 1996) and individuals internalize the value of the innovation and they see it consistent with their values (Kelman 1958). Under this scenario, the innovation is used to the fullest extent and the use may be deep-level (Burton-Jones and Straub 2006). Committed innovation use may require a state of cognitive absorption which is a "state of deep involvement with software" (Agarwal and Karahanna 2000, p.665). ***"Resistance"*** occurs when the target person is opposed to the requested action and tries to avoid it by refusing, arguing or seeking to have the request nullified (Yukl et al. 2005). Resistance may occur when the innovation-value fit is very low (Klein and Sorra 1996). In hospital environments, LaPointe and Rivard (2005) presented some evidence of active resistance to EMR implementations where physicians opposed EMR and rebelled against its use. Compliant use it less successful than committed use but still preferable to resistance. Over time, depending on the tactics used, I anticipate changes in EMR innovation effectiveness as evidenced by changes from compliant to committed use or from resistance to compliant use or other combinations thereof.

Research Model and Hypotheses

Based on the theory of interpersonal influence and leadership (Yukl and Tracy 1992; Falbe and Yukl 1992; Yukl et al. 2005; Yukl et al. 2008) and innovation implementation theories (Klein and Sorra 1996; Klein et al. 2001; Kostova and Roth 2002), I propose hypotheses regarding the role of the various influence tactics on EMR innovation effectiveness. The full elaboration of a theoretical argument on hypotheses formulation is part of a complete research paper. At this stage, I only provide a short description of our hypotheses and the logic leading to their formulation. Figure 1 summarizes the research model.

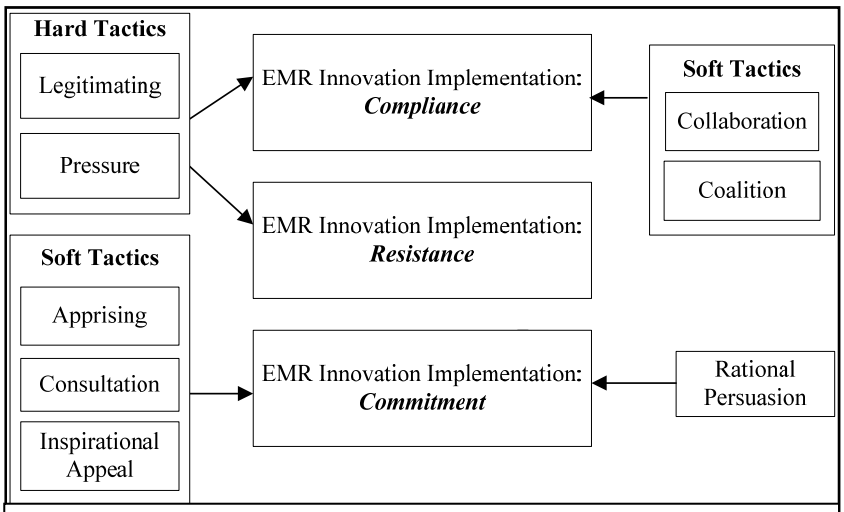

Figure 1: Influence Tactics and EMR Implementation Effectiveness.

Impact of Individual Influence Tactics on EMR Effectiveness

If management solely uses hard tactics (such as pressure and legitimacy) in order to influence physicians to use EMR, physicians are likely to develop negative attitudes towards EMR. Physicians are independent contractors in a hospital and as such, they are not likely to respond well to pressure. This logic is also supported by Klein and Sorra (1996) who theorized that in the absence of individuals forming positive attitudes about an innovation (innovation-value fit or internalization); the outcome is resistance or compliant use at best. On the other hand, rational persuasion, apprising, consultation and inspirational appeals are more likely to foster committed use. To the extent physicians are given compelling factual evidence demonstrating positive benefits from EMR use or if they are explained how they can benefit personally from using EMR, their attitudes could be impacted in a positive manner. Rational persuasion and apprising could lead physicians to internalize the value of using EMR (Kelman 1958) and become more committed to its use. Further, if physicians feel they are consulted with regards to EMR implementation and use, they may develop a sense of "psychological ownership" towards the system (Barki et al. 2008) with the end result of becoming committed to EMR. Inspirational appeals can set the stage for formation of positive attitudes towards EMR by arousing physicians to see a clear vision for successful EMR implementation and getting physicians on-board with EMR. Transformational leaders (Yukl 1999) could use this tactic to foster commitment to EMR (Falbe and Yukl 1992). I believe that tactics such as collaboration and coalition can only lead to compliant use. The simple provision of an implementation climate that provides resources for EMR use (e.g. training) and removes obstacles (e.g. accessibility to computers) is not sufficient to determine commitment (Klein and Sorra 1996). One important condition for ensuring commitment is internalization or innovation-value fit (Kostova and Roth 2002). Similarly, coalition tactics alone can only lead to compliance (Falbe and Yukl 1992). Other studies found similar results with regard to use of hard tactics, rational persuasion and soft tactics on outcomes such as compliance, commitment or resistance (Falbe and Yukl 1992; Enns et al. 2003). Thus, the following hypotheses are proposed:

H1: Hard tactics (such as pressure and legitimating) are each likely to result in resistance to EMR or, compliant EMR use at best.

H2: The rational persuasion tactic is likely to result in committed EMR use.

H3: Apprising, consultation and inspirational appeal tactics are each likely to result in committed EMR use.

H4: Collaboration and coalition tactics are each likely to result in compliant EMR use.

Interaction Effects among Influence tactics and their Effect on EMR Effectiveness

It is plausible to believe that combination of tactics can have a more favorable impact in fostering compliant or committed use (depending on the combination). If managers combine rational persuasion and any of the soft tactics, they could actually foster more committed use than any tactic used alone (Falbe and Yukl 1992). Provision of rational arguments for EMR used in conjunction with consultation, collaboration or inspirational appeals should further enhance the value of the rational persuasion tactic and foster a better innovation-value fit and thus committed EMR use. On the other hand, hard tactics could be effective to some extent in eliciting compliant or committed use (rather than resistance) if they are used in combination with rational persuasion or soft tactics (Falbe and Yukl 1992). For instance, the use of EMR may be legitimated according to hospital policies but at the same time physicians are consulted with regards to EMR implementation or they are provided with logical evidence regarding EMR (rational persuasion) or they are shown how EMR would benefit them personally (apprising technique), the final outcome would be more positive. These are some reasons why, various combinations among hard tactics and rational persuasion, consultation or apprising may foster more committed use (rather than compliant use). This logic is in line with existing IS research findings that user involvement and outcome expectations (both performance-based such as usefulness and personal expectations) are sustainable determinants of use and continued use (Hartwick and Barki 1994; Karahanna et al. 1999; Compeau et al. 1999; Venkatesh et al. 2003). In other words, committed use is a response to influence tactics that involve provision of certain personal benefits to physicians or their involvement in the EMR implementation. On the other hand, combination of hard tactics and soft tactics that involve collaboration or coalition may lead to compliant use at best. The "soft" elements could work to diminish the effects of the "hard" elements such as pressure however, in the absence of any commitment element, the outcome cannot be any better than compliance. Other authors have provided evidence that the use of hard influence tactics was associated with lower resistance when they were used in conjunction with soft tactics (Tepper et al. 1998).

Lastly, combination of soft tactics could in fact prove more beneficial in eliciting committed use than the use of single soft tactics alone due to a synergistic effect. Such combinations of soft tactics that involve elements of collaboration, consultation, inspirational appeals and apprising may signal the target physicians that hospital management respects and recognizes their opinions, involves them in important decisions such as EMR and, at the same time inspire a vision for a smooth EMR implementation. This logic is also supported by initial evidence found in a study of managerial influence using critical incidents. The combination of soft tactics was more effective than the combination of hard tactics (Falbe and Yukl 1992). Studies that investigated the interaction effects among various influence tactics and their effects on IT implementation effectiveness are non-existent. Such interaction effects are exciting and worth pursuing. Thus, the final set of hypotheses is presented below:

H5: Combination of rational persuasion and any of the soft tactics would be more effective in impacting committed use than either tactic used alone.

H6: Combination of hard tactics and rational persuasion would be more effective in eliciting compliant use than hard tactics used alone.

H7: Combination of hard tactics and soft tactics (collaboration, coalition or inspirational appeals) would be more effective in eliciting compliant use than hard tactics used alone.

H8: Combination of hard tactics and soft tactics (apprising or consultation) would be more effective in eliciting committed use than hard tactics used alone.

H9: Combination of soft tactics would be more efficient in eliciting committed use than either tactic used alone.

Method

In order to test the proposed model, a survey instrument will be used. The survey will be administered to a sample of physicians and medical residents at a large hospital in the Midwestern part of the US. The hospital is a large academic center that employs about 900 physicians and medical residents. The survey will target this population. The hospital started implementing EMR in 2007. The EMR is a commercial system that was purchased from a specialized EMR vendor. Approval for this study was obtained from Human Subject Committee and the hospital's management is actively assisting with data collection efforts. I will use a paper format for distributing the survey. Based on past experiences, physicians are more compelled to respond to paper surveys (rather than online surveys).

All questionnaire items will be drawn from existent literature. The questionnaire items for social influence tactics as independent variables in this study are adapted from the "Influence Behavior Questionnaire" as developed and validated by Yukl et al. (2008). A confirmatory factor analysis will be conducted to establish validity of the instrument. Smart PLS 2.0 will be used to run this analysis (and also to estimate the path model). I will follow the method recommended by Gefen and Straub (2005) for assessing the convergent and discriminant validity. In order to establish convergent validity, I will examine the t-values for the paths from each indicator variable to its latent variable and also examine composite reliability as an assessment of internal consistency for all scales (Gefen et al. 2000). Discriminant validity will be assessed by (1) comparing the average variance explained (AVE) by each latent variable with inter-latent variable correlations, and (2) examining the loading of each indicator variable on each latent variable. If the square root of the AVE for a latent variable is larger than the highest inter-scale correlation, discriminant validity is supported (Fornell and Larcker 1981). The measurement of the dependent variable (EMR innovation implementation in terms of compliance, commitment and resistance) follows Enns et al. (2003). This is a 5-item scale that has been previously validated in IS research. A low overall score on this scale indicates resistance, a middle score indicates compliance and a high score indicates commitment (Enns et al. 2003).

As recommended by recent research (Marcoulides and Saunders 2006), a sample estimation test was conducted in order to approximate the required sample size for this study. A power analysis was performed according to procedures recommended by Cohen (1988). Power is the probability that the researcher will find a statistically significant relationship, when the relationship is actually there (Goodhue et al. 2006). In this context, estimating the minimum sample size is important as the power of a statistical test may be reduced by a too small sample size (Goodhue et al. 2006). A commonly accepted standard for conducting the power analysis was used: a desired medium effect size (R^2=0.10), a defined α level of 0.05 and a specified power level ($1-\beta = 0.80$). The power analysis indicated that the minimum required sample size for the analysis was 108 participants. Recent research however questions the power of PLS to produce accurate estimates with small sample sizes (Goodhue et al. 2006). This study

found that at sample sizes of 150 and above, the power of PLS is generally similar to the other techniques (e.g. LISREL). In this context, efforts will be made to obtain a sample size of at least 150 observations. Various survey reminders will be sent to physicians in order to foster a higher response rate (Dilman 2007).

Significance of this Research

This research has both theoretical and practical implications. From a theoretical standpoint, results from this research would provide a significantly different perspective on how IT can be diffused within a social setting. With the exception of inclusion of the "subjective norm" construct in investigating IT adoption and usage, IS literature is rather silent with regards to the role of social influences in managing IS implementations and usage. This research is a starting point in exploring the role of various influence tactics in IS implementations.

Various objects of resistance to IT implementations in healthcare have been documented in the literature such as resistance to system's features, resistance to system's significance and resistance towards the implementers of the system (LaPointe and Rivard 2005). This study proposes a roadmap of social influence tactics that could be used to avoid or mitigate such resistance. This research also aims to show that even if IT implementations are approached with a mandate, the perceived negative effects of the mandate could be mitigated by the use of other soft tactics. Overall, this research can set the basis of a comprehensive theory that that could be used to foster various types of user responses to IT implementations (e.g. compliant or committed use) while at the same time, mitigate resistance to IT implementations.

This research project has important contributions to practice. Despite the great potential of EMR in making the healthcare sector more efficient, physicians tend to resist IT-enabled changes (LaPointe and Rivard 2005). This lack of acceptance of IT in healthcare inhibits realization of benefits such as reduced costs and better quality of care (Davidson and Heineke 2007). Hospital managers can use this research to formulate interventions in order to achieve the desired behavior change. Results from this research would also guide managers in their efforts to minimize resistance to EMR, which was documented as a major cause of EMR implementation failure in healthcare (LaPointe and Rivard 2005).

Potential Limitations

One potential limitation from this study is non-response bias. Response rates in a clinical setting are rather low. Non-response can take two forms. Total non-response bias refers to individuals failing to return the survey at all, while unit or item non-response bias suggests that the survey was returned incomplete (Fraenkel and Wallen 1993). In order to mitigate total non-response bias, various reminders will be sent to clinicians such that to ensure a good response rate (Dillman 2007). Statistical analyses will be conducted to compare early and late responses on variables of interest in order to establish whether this form of non-response bias is a concern (Armstrong and Overton, 1977). Item non-response bias refers to missing data. Handling missing data appropriately is important as it can decrease statistical power. There are various approaches to deal with missing data, depending on the amount of data missing (Roth 1994). If the amount of missing data is rather low (e.g. less than 10%), simple methods such as mean substitution could be used to handle missing data (Donner 1982). In addition, it will be important to consider whether data are missing completely at random or missing at random (Roth 1994). Either of these cases will require specific techniques to handle missing data such as regression imputation or hot-deck (Roth 1994).

Another limitation may emerge from the fact that the investigation is focused within a teaching hospital environment. Results from this study may not entirely hold in other hospitals with significantly different organizational structures and characteristics (e.g. community hospitals). Results from this study may also not hold in small private practices where clinicians may be subject to other influence sources in their decision to use EMR

Conclusion

Meeting both rigor and relevance has been a long quest in IS research (Benbasat and Zmud 1999). Researchers were encouraged to successfully marry rigor and relevance such that research is not only academically rigorous but also applicable in managing IS in organizational settings (Davenport and Markus 1999). I deem this research project is both rigorous as evidenced by the strong theoretical bases used to assemble this study and also very practical. Hospital administrators can benefit from this research to guide their EMR implementation efforts, foster system use and avoid resistance. Overall, this study contributes to the IS field by "doing IT research that matters."

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