Electronic medical record system avoidance in a turbulent environment

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A B S T R A C T

We attempt to understand why and when physicians avoid electronic medical record (EMR) systems in a turbulent environment. Set in the context of the United States military's combat operations, we develop a research model based on theories of ambivalence in organizations and our particular context. We test our model with 30,677 data points collected from an EMR system. Our results show that avoidance is lower when the potential for information reusability is strong, yet avoidance is higher in urgent care situations. Our study has implications for research, practice, and policy in the area of turbulent health-care environments.

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1. Introduction

Physician use of electronic medical record (EMR) systems can improve continuity of care, reduce medical errors, enhance quality of patient care, cut costs, and facilitate availability of complete patient health information [33,72]. This is especially true in turbulent health-care environments, where knowing almost immediately whether a patient is receiving a particular medication, has visited three different medical facilities in the last week, or is undergoing psychiatric care would be very useful [8]. Yet despite the potential for EMR systems to generate substantial value in dynamic health-care settings, evidence to date of information technology's (IT's) impact on health-care outcomes is mixed [40,43]. One challenge to realizing benefits of health IT is overcoming end-user resistance or avoidance to EMR systems [61]. Although scholars have paid significant attention to the consequences of resistance to information systems (IS) in general [44,49,69] and IS avoidance in particular [39], we know little concerning why physicians avoid IS in the post-adoption stage, particularly in turbulent environments. The extent to which physicians avoid working with an IS may negatively affect quality of care [39]. Thus, it is important to understand antecedents of IS avoidance in a health IT setting.

Prior work on IS avoidance (and resistance in general) has been conducted mostly in stable environments, for example, community hospitals [45]. Yet physicians work in a wide variety of dynamic and complex settings (e.g., post-disaster triage stations and war zones). EMR systems have the potential to provide numerous benefits in turbulent health-care environments [13]. Physicians could access patient-specific clinical information, such as previous hospital encounters, triage results, and discharge summaries. Timely knowledge of a patient's medications, allergies, and test results can help physicians make more appropriate and better-informed clinical decisions [59]. Prompt access to patients' past clinical information is especially crucial for those with extensive medical histories who are unable to communicate their clinical history. EMR systems can also increase awareness of what others are doing within and outside the focal unit to help ensure that physicians' actions relating to patient care are coordinated [23]. However, these benefits cannot be achieved if physicians avoid EMR systems.

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We seek to understand why and when physicians avoid EMR systems in a turbulent environment. We undertake our study in the context of the United States (U.S.) military's operations in a combat environment. EMR systems can play a valuable role in this setting. Consider the patient evacuation process as an illustration. During evacuation, patients may be transported to multiple medical facilities, some of which are located in hostile environments. For example, a military service member who suffers an injury from a roadside bomb in Afghanistan may be evacuated to the nearest hospital, then to Landstuhl Regional Medical Center in Germany, and possibly to the U.S. for further care. In theory, key patient information is collected during this evacuation process and recorded on paper and/or electronically in an EMR system. However, research shows that physicians in our context may avoid these EMR systems [51]. Effective treatment depends partly on medical staff having access to a patient's up-to-date medical history. This historical documentation is incomplete when physicians avoid EMR systems. When this happens, the quality of patient care and availability of patient health information at the point-of-care delivery can be jeopardized.

Environmental turbulence often creates ambivalence in organizational actors [73]. Furthermore, recent case studies show that physicians may be ambivalent toward clinical systems [35]. Thus, we concentrate on ambivalence as a major reason why physicians might avoid EMR systems. When ambivalent, physicians experience simultaneously positive and negative orientations toward an EMR system at their disposal. Resting firmly on recent theories of ambivalence in organizations [2] and organizational context [38], we identify two contextual conditions that tip the "ambivalence pendulum" toward or away from IS avoidance. First, we argue that information reusability – the likelihood that patient information will be accessed in future – will be negatively related to IS avoidance. Specifically, physicians will be less likely to avoid EMR systems when a patient is diagnosed with a chronic condition. Second, we posit that situation urgency will be positively related to IS avoidance: physicians will be more likely to avoid EMR systems during urgent care situations. Taken together, our formal objective is *to understand how information reusability and situation urgency are related to physicians' avoidance of EMR systems in a turbulent environment*. We test our model with 30,677 patient–physician encounter data points collected from an EMR system.

Our study makes several contributions. First, we directly incorporate health-care contextual influences to inform our empirical analysis and extend IS theory with regard to IS avoidance in turbulent environments. Second, we introduce ambivalence and situational conditions as antecedents of IS avoidance. Finally, we test our research model with objective data collected from a unique setting – a military combat environment. Our manuscript proceeds as follows: First, we discuss the nature of IS avoidance and environmental turbulence. Second, we describe a theory of ambivalence and develop our research hypotheses that we then test with secondary data collected from an EMR system. We discuss our findings, study limitations, implications for research and practice, and suggestions for future research.

2. Theoretical background and research model

2.1. Literature review: IS avoidance in health care

The IS field has recently witnessed a greater focus on understanding EMR use and implementation [1,27,61]. Most recently, the U.S. government has instituted a push driven by tax credits[1] to health-care organizations to adopt these types of

systems. Understanding the implementation process and key factors in the success or failure of these projects is imperative for the success of these organizations. Table 1 summarizes the findings of a literature review focused on identifying such factors. These articles are a subset of the 218 health IT articles recently identified by Romanow et al. [61]. We only included in our review those papers which identified key factors related to IT use, resistance, or avoidance of clinical health-care systems. We also restricted our search to studies that investigated health-care provider use/resistance to IT (e.g., we did not include studies that examined patient use of health IT).

Resistance to health IT has emerged as a research theme in the IS field [61]; however, Table 1 shows that there is a lack of consideration of how contextual factors may influence IT resistance, particularly avoidance. Table 1 demonstrates that many individual-level, group-level, and to a lesser extent organizational-level factors have been identified in this body of literature. Interestingly, we found these studies to be less focused on contextual factors. In our study, we focus on IS avoidance and factors relevant to a turbulent environment.

While there are various types of IS resistance behaviors [44], we follow Kane and Labianca [39] and conceptualize IS avoidance as a specific type of post-adoption IS resistance. *IS avoidance* is defined as the extent to which an individual avoids working with an IS despite the need and opportunity to do so. We note three differences between IS avoidance and other types of IS resistance [39]: (1) avoidance suggests that resistance occurs after system implementation; (2) avoidance is a relatively mild response compared with extreme behaviors (e.g., sabotage, destruction); and (3) avoidance implies that while an individual has the opportunity and even the need to use the system, he/she consciously circumvents the system. We focus on IS avoidance for two reasons: (1) the EMR systems in our context (the U.S. military) have been implemented for a number of years, thus positioning our work in a post-adoption stage; and (2) evidence suggests that physicians in our context are avoiding EMR systems at their disposal [51]. Health-care-related research on IS avoidance has mostly been conducted in stable environments, for example, community hospitals, [45] health-care groups, [39] and large private hospitals [69]. We extend this research by investigating the nature of IS avoidance in turbulent health-care environments.

2.2. Turbulent health-care environments

Generally speaking, a turbulent environment is a dynamic, unpredictable, expanding, fluctuating setting in which the components are marked by change (See Ref. [42], p. 333). Turbulent environments are also characterized by increased complexity, greater uncertainty, unexpected directionality of occurrences, and continuous transition [3]. Much of the research in this area describes environmental turbulence as having two dimensions – dynamism and complexity [11,24,71]. Dynamism describes the extent to which elements of environmental components remain essentially the same over time or are in a continual process of change. For instance, in a dynamic health-care environment, we may find a rapid pace of work, fluctuations in workload demand, or a continuous turnover of physicians. Complexity refers to the number of elements within an environmental component and their relatedness. A health-care system that offers a broad range of services, is confronted with a diverse mix of consumers, and is active in a variety of geographic areas functions in a complex environment. We apply the concepts of dynamism and complexity to our study context – the U.S. military's operations in a combat environment.

Physicians working in a combat environment face dynamic and strenuous conditions. Hospitals are located on forward operating

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