ABSTRACT

Outcomes from EHR use have been mixed perhaps due to the high levels of interdependence in healthcare delivery processes, and independence of physicians. Social capital and agency theories are tested using two data sets from 302 hospitals to explain how the use of EHR might be associated with improved physician performance.

KEYWORDS: Hospital Operations, Electronic Health Record use, Social Capital, and Agency

INTRODUCTION

Given the information intensive and complex nature of healthcare processes (Chen et al., 2013), the adoption and use of electronic health records (EHR) represents a key to improving healthcare services delivery by helping physicians improve their performance and services (e.g. Nembhard et al., 2009). This expectation has driven a call for increased use of health Information Technology (IT) to improve inefficiencies and care quality problems plaguing healthcare delivery (GAO, 2005). However, the impacts from health IT, and specifically EHR use by physicians, nurses, and hospital staff (hereafter referred to as healthcare delivery actors) have been mixed and inconclusive (McCullough, 2010; Chen et al., 2013). Research studies report positive impacts in the form of reduced costs (Li and Benton, 2006) and patient satisfaction (Queenan et al., 2011), negative impacts such as increase in physicians' documentation time and workload, and reduced reporting flexibility (Poissant et al., 2005; Lahiri and Seidmann, 2012), as well as large variations in the extent of use (Dobrzykowski, 2012). While some studies show negative associations between EHR use and inpatient mortality and length of stay, others show little impact (Goh et al., 2011). In terms of practice-based evidence, healthcare organizations struggle to understand how, or if, the use of EHR systems by healthcare actors leads to overall positive impacts on healthcare services. Cedars Sinai Medical Center invested $34 million in an EHR system only to find that “physicians found that it took much, much longer to use the new computer system than did the same ordering with pen and
paper... [and placed] severe limitations on their ability to make medical judgments,” (Smelcer et al., 2009: p. 70). Similarly, Kaiser experienced that clinicians were taking 30 to 75 minutes longer per day to do their work with an EHR system (Scott et al., 2005).

These mixed results could exist because the benefits of EHR use are contingent upon the context of use. IT usage results in positive impacts when there is a match between use and requirements of the context. In general, the impact of information technology use on beneficial performance outcomes is mediated by variables that appropriately characterize the context of use and depends on complementary and supporting activities associated with use (Markus and Tanis, 2000). Thus far however, research looking at the relationship between EHR use and performance outcomes has focused on the broad association between them in a black box fashion, without much contextual explication of the characteristics of healthcare processes (Poissant et al., 2005; Dobrzykowski et al., 2014). Little is known therefore, about how the use of EHR can improve the services provided by physicians (Jha et al., 2009). Thus, the objective of this paper is to examine how, and under what conditions, the use of EHR by healthcare delivery actors in a hospital can be linked with improved physician performance.

Noting key distinctive aspects of the healthcare context, we bring to bear two theoretical views to our study objective. First, we note that healthcare actors accomplish healthcare delivery through an inter-dependent set of clinical care processes (e.g. testing, consultation, diagnosis, bedside procedures), executed by independent actors (e.g. physicians, nurses, staff), and occurring in a fragmented set of providers (e.g. hospital beds, laboratories, radiology departments). Industry studies observe that as a consequence of inadequate communication among healthcare actors, important medical information is not available at the time of treatment, test results need to be replicated, protocols are not always followed, and contradicting procedures and medicines may be prescribed leading to poor clinical outcomes. Recent literature observations (e.g. Boyer and Pronovost, 2010, Devaraj et al., 2013) suggest that, but do not explain why, lack of synchronization among actors in the healthcare delivery process may be an underlying reason why EHR systems have not yielded unqualified benefits.

Next, we note that an important category of healthcare actors, that is, physicians, are often independent of the hospital (Fredendall et al., 2009), yet have substantial influence on activities which take place in and the performance of the hospital (Schneller and Smeltzer, 2006). Traditionally, a physician functions as an “…owner-operator of his own ongoing firm” when providing services to patients in a hospital setting (McLean, 1989: p. 67). Indeed today, with only about 20% of all physicians being employed by the hospitals within which they provide services (Bush 2012), a majority of physicians may be considered to function as independent owner-operators. As such, physicians are considered to have a higher professional than organizational loyalty (Nembhard et. al., 2009). Under these conditions, the social capital that resides in the fabric of the relationships between the hospital staff/nurses and physicians may be useful in improving communication between these professionals. Social capital is referred to as the resources that an individual or a social unit has access to by virtue of their network of social relationships, (Nahapient and Ghoshal, 1998), and aids in aligning individuals and units (He et al., 2009). Thus, we draw from the social capital lens to theorize mechanisms through which information exchange can be enhanced.

Third, many hospitals are addressing the issue of independence and autonomy of physicians through an increased focus on physician employment (Fink and Hartzell, 2010; Bush, 2012). In the absence of physician employment, and hence of a contractual agreement between the
physician and hospital bearing financial consequences, there is often little incentive for healthcare delivery actors to align their activities (Shah et al., 2008; Fredendall et al., 2009). One reason for this is that the presence of agency prevents the alignment of goals and objectives between the hospital and attending physicians (Schneller and Smeltzer, 2006). Physician employment is intended to address this issue. We draw from the agency lens to examine how the extent of physician employment can influence the relationship between EHR use and information exchange mechanisms, and between EHR use and social capital (Eisenhardt, 1989).

We address our study objective through three research questions, namely, (1) Do information exchange mechanisms between physicians and hospital staff mediate the relationship between their EHR use and physician performance?, (2) What is the impact of the social capital between the physician and the hospital staff on these mechanisms?, and (3) What is the impact of physician employment on the relationship between EHR use, and information exchange and social capital? We examine our research questions by framing hypotheses among variables of interest. We test the hypotheses by applying Structural Equation Modeling to constructs measured through survey items from hospital-level survey data collected from 302 hospitals in 47 states in the USA. Two models are analyzed; one examining the hypotheses for employed physicians, and a second for non-employed physicians.

The paper examines pathways through which use of EHR systems by healthcare delivery actors leads to improved physician performance and makes three theoretical contributions. It shows that, information exchange mechanisms between healthcare delivery actors mediate the relationship between EHR use and physician performance, thus opening the somewhat intractable EHR – performance black box (Poissant et al., 2005). We thus suggest that a key role of EHR use is to facilitate collaboration among healthcare delivery actors through information exchange, and that improved physician performance is a consequence of such actions. Second, we examine the difficulties in achieving information exchange and highlight the impact of social capital between the hospital and physician in enhancing it, extending current studies that studies focus on the role of social capital among supply chain partners in primarily industrial settings (e.g., Carey et al., 2011; Villena et al., 2011). Third, our study reveals a role for physician employment on the extent to which EHR use begets benefits, by identifying a two-fold effect of physician employment. We find that while physician employment attenuates the relationship between EHR use and information exchange, it can positively moderate the link between EHR use and social capital, leading to improved healthcare delivery. In doing so, we provide theoretical explanation for a particularly current and somewhat knotty issue for hospitals which are struggling to deal with the implications of physician autonomy (Boyer and Pronovost, 2010) for EHR use.

THEORETICAL DEVELOPMENT

Barriers to Information Exchange and Social Capital

The healthcare delivery context poses a number of barriers to information sharing between healthcare delivery actors. First, given the risk of patient mortality, clinician discretion is important. Second, inter-professional interactions between different kinds of actors (e.g., between physicians and nurses) are governed by an established hierarchy and often limited to routine-based sharing of information such as test results and medical charts (Nembhard et al 2009). Third, physicians have a strong professional identification and a relatively weak
organizational identification (Schneller, 2001). They prefer autonomy to collaborative approaches and have scant interest in participating in collective processes since changes in behavior are perceived as threats to their authority and autonomy (Leape 2005; Boyer and Pronovost, 2010). These conditions of professional specialization, a well-entrenched hierarchical authority structure and a tradition of individualism form a significant barrier to creating the habits of communication and teamwork required for successfully managing interdependence and prevent ongoing exchange of information.

We draw from the idea of social capital to theorize factors that can aid in information exchange. Social capital is referred to as the resources that an individual or social unit has access to, by virtue of their network of social relationships. It has three dimensions. The structural aspect describes the configuration of linkages between people or units; the relational aspect focuses on the particulars of these relations such as trust; and the cognitive aspect refers to shared interpretations and systems of meaning that provides a shared vision regarding collective goals and aspirations (Nahapiet and Ghoshal; 1998). The theoretical appropriateness of this lens is two-fold. One, social capital is associated with pro-social behaviors such as collective or communal action (Wasko and Faraj, 2005), giving reason to expect that it might aid in information exchange (Nahapient and Ghoshal, 1998; He et al., 2009). Two, since social capital is lower in contexts where individuals have low organizational identification (Nahapiet and Ghoshal, 1998), it is expected that the level of social capital residing in the fabric of relationships between the hospital and doctors is relatively low, making it important to consider its effects.

In the context of healthcare operations, we define social capital as the resources available to the hospital staff/nurses that are embedded in the hospital’s relationship with attending physicians, and draw upon key characteristics of this context in describing its three aspects. First, we note that physicians may not share the same goals as that of the hospital. For instance, while bettering patient service is an important goal for a hospital, physicians may find it more important to minimize the time to see each patient. Indeed the hospital has been described as a “foster parent who has adopted fully formed adults committed to different religions,” implying that there could be a lack of unity of purpose between the physician and the hospital (Ramanujam and Rosseau, 2006; Nembhard et al., 2009: p. 30). Second, physicians are mostly directly involved only in patient care related processes and not in the day-to-day processes that operate in the hospital (Schneller, 2001), implying relatively low incentive and commitment to proactively and collaboratively work with hospital staff. Third, physicians undertake critical and uncertain tasks that require high levels of skill. As such it is important that hospitals are confident of and trust in the physicians’ skills, integrity and practices, with respect to both the profession and the hospital (Nembhard et al., 2009, Schneller, 2001). Accordingly, we delineate “shared vision”, “social interaction ties” and “trust” as the three aspects of social capital between the physician and hospital.

Agency in the Healthcare Context

The idea of agency provides another relevant lens for understanding the relationship between the hospital and physicians (McLean, 1989; Dranove and White, 1989; Schneller and Smeltzer, 2006). An agent’s actions may not align with the principal’s goals when “… a) the desires or goals of the principal and agent conflict and b) it is difficult or expensive for the principal to verify what the agent is actually doing,” (Eisenhardt, 1989: p. 58). Both conditions are present in the healthcare delivery context. With respect to the first, for many years, the relationship between a physician (i.e., agent) and a hospital (i.e., principal) involved the physician being granted
privileges to admit and treat patients in the hospital, but receiving compensation for services from entities such as insurers who are outside of the downstream healthcare delivery supply chain (Ford and Scanlon, 2007). This method of third-party payment results in separate billing and reimbursement for the hospital and the physician, positioning the physician as independent of the hospital (McLean, 1989; Fredendall et al., 2009). As a result, an agency dilemma arises as the physician’s financial goals may be in conflict with those of the hospital (Schneller and Epstein, 2006). For example, under a fee-for-service payment method the physician may desire to increase the number of tests and treatments, whereas the hospital, typically under a per case payment model may want to minimize costs (McLean, 1989; Forgione et al., 2005; Trybou et al., 2011). In addition, physicians often have entrenched relationships with EHR vendors, stemming from their exposure in their training institutions, which might result in EHR product preferences and resistance to competing alternatives (Schneller and Smeltzer, 2006).

To summarize, healthcare delivery actors need to engage in information exchange processes to address these interdependencies. Social capital in the relationship between the physician and the hospital has the potential to aid information exchange. Problems of agency in the relationship between the physician and hospital can hinder such communication. While we understand how adoption of EHR can influence hospital performance measures such as reduced costs through process standardization and reduced data errors (Li and Benton, 2006), the literature does not adequately address the relationship between EHR use, information exchange among healthcare delivery actors, and physician performance. These observations form the basis of the relationships among our variables of interest and research hypotheses.

HYPOTHESES

Figure 1 shows our research hypotheses. The first set (H1 through H4) examines relationships among EHR use by healthcare delivery actors, information sharing and information exchange quality, and physician performance. The second set (H5 through H8) describes the role of social capital in influencing information sharing, information exchange quality, and physician performance. The third set (H9 and H10) suggests a moderating role of physician employment on the relationship between EHR use, and information sharing and social capital.
H1. EHR Use is positively associated with Information Sharing.

H2. Information Sharing is positively associated with Information Exchange Quality.

H3. Information Sharing is positively associated with Physician Performance.

H4. Information Exchange Quality is positively associated with Physician Performance.

H5. EHR Use is positively associated with Social Capital.


H7. Social Capital is positively associated with Information Exchange Quality.


H9. The higher the level of physician employment, the lower the strength of the relationship between EHR Use and Information Sharing.

H10. The higher the level of physician employment, the higher the strength of the relationship between EHR Use and Social Capital.

METHODS AND DISCUSSION

Primary data was collected to test the hypotheses using survey method. We employ structural equation modeling to test our hypotheses. Results will be presented and discussed at the conference.

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