IT-enabled Knowledge Management in Primary Care: An Absorptive Capacity Perspective

Research-in-Progress

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Abstract

Primary care medical practices have made sizable IT investments in recent years, primarily deploying electronic medical record (EMR) systems as well as Web-based e-learning applications. The basic assumption here is that developing IT-enabled knowledge management capabilities may significantly improve the innovation and clinical performance of these organizations. Increasing uncertainty in their environment requires them to develop greater absorptive capacity (ACAP), i.e. an organizational learning capability to deal with the external sources of this uncertainty. In applying ACAP theory to primary care settings, this study seeks to answer the following research questions: What are the e-learning and EMR capabilities developed by primary care medical practices in response to increasing environmental uncertainty? To what extent does the development of an e-learning capability influence the development of an EMR capability? To what extent does building ACAP contribute to positive outcomes in terms of medical practices' innovation and clinical performance?

Keywords: Absorptive capacity, organizational learning, IT capabilities, knowledge management, electronic medical records, e-learning, environmental uncertainty.

Introduction

Public and private organizations in every industry encounter increased environmental uncertainty and rapid changes in their external environments and the healthcare sector is no exception. In the face of rapidly increasing healthcare costs, associated with an aging population and the concomitant rise of chronic illnesses (Bodenheimer et al. 2002; Paré et al. 2007), governments in countries with national healthcare systems have undertaken major reforms. In Canada, important transformations to the national healthcare system have been made to strengthen the primary healthcare sector so as to improve access to care, patient and provider satisfaction, care quality, and healthcare system efficiency and sustainability (Pineault et al. 2014; Hutchison and Glazier 2013). More precisely, new modes of primary healthcare

delivery, including Family Medicine Groups and Primary Care Network Clinics, as well as new payment models have been introduced in several Canadian provinces.

To cope with environmental uncertainty, organizations are investing in information technology (IT) to increase their information processing capacity and their flexibility to adapt to environmental changes (Karimi et al. 2004). In this regard, to lower their operating costs, increase the efficiency and quality of healthcare services provided to their patients, and respond to the increased requirements of governments and other key stakeholders, primary care medical practices in several countries have made sizable investments in healthcare IT. Medical practices have primarily deployed electronic medical record (EMR) systems (Ludwick and Doucette 2009; Schoen et al. 2012; Shen 2012), as well as Web-based e-healthcare applications (Romanow et al. 2012) mostly in the form of clinical knowledge management systems (CKMS) (Wills et al. 2010) and clinical decision support systems (CDSS) (Berner 2009).

In primary care settings, EMR systems are viewed as the backbone infrastructure supporting the integration of various tools that can improve the uptake of evidence into clinical decisions. These systems are meant to support patient-centered care, the coordination of such care, and the exchange of clinical information to improve the quality of care (Lau et al. 2012; Holroyd-Leduc et al. 2011). For their part, e-healthcare applications such as CKMS and CDSS are meant to improve physicians' knowledge management skills (Reed et al. 2008) and support their decision making; allowing them to make clinical decisions that are more consistent, sound and evidence-based (Lobach et al. 2012). Yet, there are remaining problems with regard to the extent to with which EMR systems and e-healthcare applications are used in an effective and mindful manner in primary care settings, and with the attainment of clinical value or benefits from such use (Venkatesh et al. 2011; Paré et al. 2014). This situation may simply be related to a "lack of awareness", as an important gap has been found between the functionalities available in EMR systems and those actually being used by family physicians (Raymond et al. 2015)). But it may also be attributed to governments, medical associations and software vendors that emphasize the automational effects of healthcare IT solutions (Mooney et al. 1996), seeking the "paperless" medical practice (Price et al. 2013) rather than the informational and transformational effects that enable the "smart" medical practice (Gianchandani 2011; OECD 2013).

Medical practices also face a high level of environmental uncertainty as they go through "a transitional experience that is changing the way medicine is practiced" (Skolnik et al. 2011, p. 16). Here again, healthcare IT solutions of various types can provide family physicians with a dynamic organizational learning capability in the face of such uncertainty, that is, with the ability to identify external knowledge, assimilate it, and apply it to innovate in their clinical processes and improve their performance (Reardon and Davidson 2007). This capability can significantly affect key clinical processes and relationships such as relating to patients and collaborating with other healthcare providers (Kothari et al. 2011). We may thus assume that the development of IT-enabled knowledge management capabilities in primary care medical practices is essential to their innovation and clinical performance (Nicolini et al. 2008; Paul 2006). This development is also considered to be strongly influenced by the uncertainty that exists in the environment of these organizations (Begun and Kaissi 2004; Siegel Sommers 2013). Increasing uncertainty thus requires medical practices to develop a greater absorptive capacity, that is, a dynamic organizational learning capability to deal with the external sources of this uncertainty (Van den Bosch et al. 1999).

The development of absorptive capacity in primary care settings may also be viewed as a way to lessen the difficulties of translating clinical knowledge into practice (Grimshaw et al. 2012). Developing an IT-enabled clinical learning capability should thus support evidence-based practice, that is, the effective and efficient translation of empirical research evidence into improved clinical performance (Dadich and Hosseinzadeh 2013). And the IT infrastructure to be developed for and by medical practices in this regard principally includes primary care knowledge networks (Armstrong and Kendal, 2010) and electronic medical records (Menear et al. 2011).

The preceding considerations give rise to the following research questions: What are the main e-learning and EMR capabilities developed by primary care medical practices in response to environmental uncertainty? To what extent does the development of an e-learning capability influence the development of an EMR capability? To what extent does building absorptive capacity in medical practices contribute to positive outcomes in terms of innovation and clinical performance? In addressing these questions we follow Zahra and George's (2002a) assumption that knowledge management may be enabled by IT, and

Sun and Anderson's (2010) view of absorptive capacity as a dynamic organizational learning capability. We also respond to Roberts et al.'s (2012) call for further conceptualization and clearer description of the role of IT in building absorptive capacity, doing so in the institutionally unique context of primary care settings (Chiasson et al. 2007) and thus contributing to healthcare IS research and practice.

Theoretical Background

The basic premise of this research is that a potential role of IT in primary care settings lies in its enablement of knowledge management and organizational learning. This implies that primary care medical practices should be encouraged to develop the organizational IT capabilities that support their clinical knowledge management and learning (Gold et al. 2001; Reardon and Davidson 2007) and help physicians and nurses to internalize such knowledge in their practice (de Lusignan et al. 2002b).

The issue of developing an IT-enabled knowledge management capability is tackled in the present study by using the concept of absorptive capacity (ACAP) proposed by Zahra and George (2002b). This theoretical lens will be used to investigate the effect of primary care medical practices' e-learning and EMR capabilities upon their innovation and clinical performance. From this perspective, we view the e-learning capability as a dynamic IT capability that is developed by medical practices to acquire and assimilate clinical knowledge (Pavlou and El Sawy 2011), whereas the EMR capability is an operational IT capability that is developed to exploit and transform this knowledge (Pavlou and El Sawy 2006; Tarafdar and Gordon 2007). Moreover, ACAP theory may be applied in primary care organizational contexts to further understand the clinical knowledge translation problem, and in particular to understand the role of IT in helping to solve this problem (Golstein et al. 2004). For instance, clinical knowledge exploitation and transformation capabilities may be developed through the implementation of EMR-based clinical guidelines for the improved caring of patients with chronic diseases (Licskai et al. 2012) and terminal illnesses (Lau et al. 2015).

Emanating from the resource-based and dynamic capabilities perspectives of the competitive advantage of firms, ACAP theory has demonstrated its validity and utility in defining and conceptualizing IT-enabled organizational learning, in identifying the external and internal drivers as well as the individual and organizational outcomes of this dynamic learning capability, and in observing and understanding the role of IT within the learning process, both for IS research in general (e.g. Joshi et al. 2010) and for healthcare IS research in particular (e.g. Kash et al. 2013). As shown in Figure 1, a conceptual framework for the study of IT-enabled knowledge management in primary care settings can be elaborated by applying and adapting ACAP theory to this particular context. The first proposition emanating from this framework is that the acquisitive, assimilative, transformative and exploitative learning processes of ACAP have complementary effects on the innovation and clinical performance of the primary care medical practice (Lichtenthaler 2009). Given the importance of dynamic capabilities in the face of high environmental uncertainty, the second proposition is that increased ACAP is an outcome of the medical practice's actions and developments in response to a more demanding and uncertain knowledge environment (Van den Bosch et al. 1999).

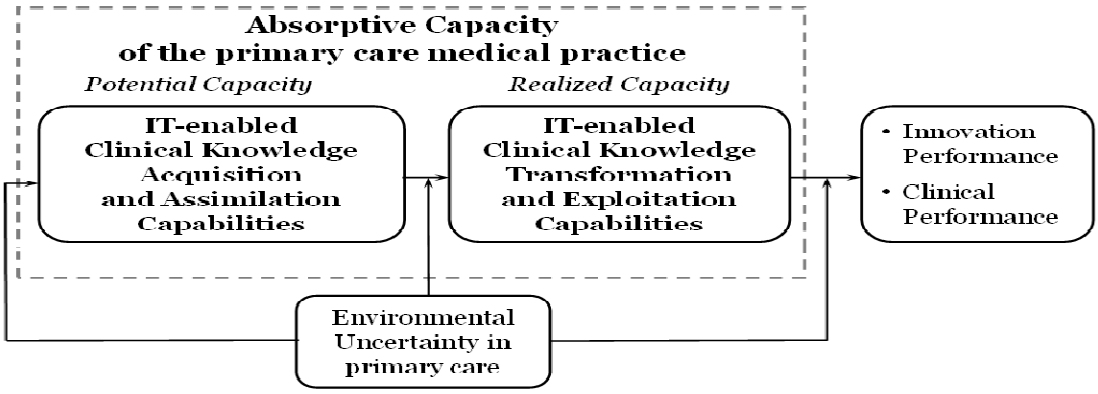

Figure 1. Theoretical Framework for IT-enabled Knowledge Management in Primary Care Settings
(adapted from Zahra and George, 2002b)

Absorptive Capacity in Primary Care Settings

The absorptive capacity concept has its origins in the resource-based view, having emerged through Cohen and Levinthal's (1990) attempt to describe and understand how organizations internalize new knowledge obtained from external sources. ACAP was later re-conceptualized by Zahra and George (2002b) from a dynamic capabilities perspective as an organizational learning capability, sequentially composed of both a "potential" and a "realized" absorptive capacity. In healthcare settings, this concept has been primarily used to understand inter-organizational variation in the success of transformational initiatives such as the implementation of EMR systems (Kash et al. 2013; Harvey et al. 2015).

On the one hand, potential ACAP is made-up of clinical knowledge acquisition and assimilation capabilities; acquisition being the medical practice's "capability to identify and acquire external knowledge that is critical to its operations", and assimilation referring to the medical practice's "routines and processes that allow it to analyze, process, interpret, and understand the information obtained from external sources" (Zahra and George 2002b, p. 189). These capabilities are "dynamic" in nature as they enable primary care medical practices to adapt to rapid changes in their external environments (Helfat and Winter 2011). On the other hand, realized ACAP is made-up of clinical knowledge transformation and exploitation capabilities; transformation being the medical practice's "capability to develop and refine the routines that facilitate combining existing knowledge and the newly acquired and assimilated knowledge", and exploitation referring to the routines that enable the organization "to refine, extend, and leverage existing competences or to create new ones by incorporating acquired and transformed knowledge into its operations" (Zahra and George 2002b, p. 190). These realized capabilities are more "operational" in nature as they involve performing a clinical activity by employing a set of routines that execute and coordinate the medical tasks required to perform this activity (Helfat and Peterhaf 2003).

Note that both the dynamic and operational capabilities of primary care medical practices are enabled by their IT infrastructure capabilities, that is, by their awareness of the IT functionalities offered, their understanding of when and how to use these functionalities, and their ability to extract clinical value from IT functionality configurations (El Sawy and Pavlou 2008).

Primary Care Medical Practices' Environmental Uncertainty

Medical practices' environmental uncertainty relates to the level and unpredictability of change in external factors such as patients' expectations, governments' regulatory behavior, medical and information technology, and sources of clinical supply and knowledge (Duncan 1972; Miller and Dröge 1986; Oldham and Rutter 1999). As the healthcare environment has become more volatile and unpredictable, the different ways in which this environment is characterized (objectively) by medical practices, and perceived (subjectively) by physicians and nurses, determine different responses with regard to IT capability-building for knowledge management purposes (Makadok 2001; Pavlou and El Sawy 2011); in turn, such responses have a different effect upon the performance of these organizations (Begun and Kaissi 2004). Moreover, as clinical uncertainty in primary care "borders the edges of knowledge" (Gerrity et al. 1992, p. 1022), an understanding of its impact on organizational learning should translate to clinical practice (Han et al. 2011), and to "evidence-based practice" in particular (Ghosh 2004; Schoenfeld et al. 2014).

Innovation and Clinical Performance in Primary Care Settings

In the face of environmental uncertainty, knowledge management is deemed to be a critical success factor for innovation in organizations (Tarafdar and Gordon 2007), and healthcare organizations are no exception (Williams 2011). In this regard, ACAP theory stipulates that the primary care medical practice's knowledge transformation and exploitation capabilities influence its performance through service and process innovation (Joshi et al. 2010; Kash et al. 2013; Zahra and George 2002b). Service innovation refers to the development of new healthcare services that favor proactive, preventive and personalized primary care services (e.g. vaccination, genetic testing) and focuses on the patient's quality of life and well-being (e.g. Chen et al. 2014). For its part, process innovation refers to the transfer of newly-generated knowledge (e.g. medical practice guidelines) and new medical technology from biomedical research to clinical practice through evidence-based medicine (e.g. Geibert 2006).

Given its origins in the resource-based view and the dynamic capabilities perspective, ACAP theory assumes that the complementarity of the firm's IT-enabled learning capabilities creates added business value and thus improves organizational performance (Gold et al. 2001; Lichtenthaler 2009). For primary care medical practices, the added clinical value obtained from an enhanced organizational learning capability mainly translates into improved clinical performance (Kothari et al. 2011; Reed et al. 2008; Reardon and Davidson 2007). In such healthcare settings, clinical effectiveness refers to the quality of care provided by physicians and registered nurses (e.g. Crosson et al. 2007) as well as the quality of their clinical decision making (e.g. McGinn et al. 2013). For its part, clinical efficiency refers to the optimal allocation of resources and competences in clinical processes (e.g. Andersen and Vedsted 2015; Schade et al. 2006) and to the cost, time and workflow constraints of these processes (e.g. Wagholikar et al. 2015).

Research Model and Hypotheses

Emanating from the conceptual framework upon which this study is founded, and as presented in Figure 2, our research model posits that in responding to environmental uncertainty and to improve their innovation and clinical performance, primary care medical practices build their clinical learning capability by mainly developing two complementary IT-enabled capabilities, that is, an e-learning capability and an EMR capability.

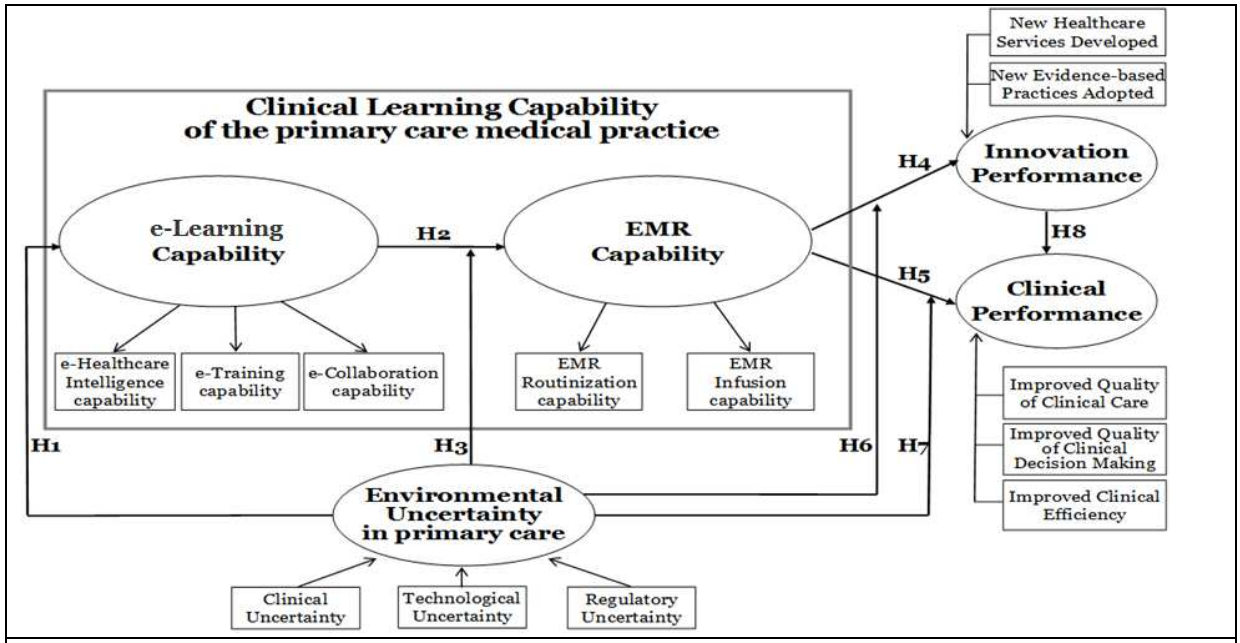

Figure 2. Research Model on IT-enabled Knowledge Management in Primary Care Medical Practices

Conceptualization of Variables

The e-learning capability is viewed here as enabling medical practices to use Web-based IT "mindfully" (Fichman 2004), that is, to acquire and assimilate clinical knowledge. It is operationalized as a second-order construct whose three related yet distinct facets include e-healthcare intelligence, e-training and e-collaboration. These capabilities are not embedded in most EMR systems presently available on the market (Sairamesh et al. 2011; Price et al. 2013; Raymond et al. 2015), but rather originate in external sources of clinical knowledge and learning available through the Internet such as electronic libraries (e.g. de Lusignan et al. 2002a), health information exchange systems (e.g. Myers et al. 2012) and virtual communities (e.g. Barnett et al. 2013).

A first form of e-learning capability is called e-healthcare intelligence. It mainly refers to the depth and breadth of knowledge available on the Internet, especially through Web 2.0 technologies which enable the medical practice to scan its knowledge environment for ways and means to improve its clinical processes

and performance (Sairamesh et al. 2011; Shen 2012; Skinner 2008). Importantly, e-healthcare intelligence solutions enable medical practices to acquire evidence-based medical information (Metzger and Flanagin 2011; Pittler et al. 2011; Weng et al. 2013) such as clinical guidance systems for supportive care in diabetes (Sağlam and Temizel 2014) and cancer (Van Eerps et al. 2010). A second form of e-learning capability is called e-training, that is, the ability of the medical practice to provide Web-based support for the continuing medical education of its physicians and nurses (Chu and Robey 2008; Samuelson et al. 2014; Stoner et al. 2014; Baker et al. 2009; Casebeer et al. 2010; Robson 2009). The third and final form is called e-collaboration, which consists in the ability to use Web-based applications to create, integrate and share clinical knowledge with other primary care providers and stakeholders (Bassi et al. 2013; Paul 2006; Quinn 2014), including the ability to participate in Web 2.0 virtual communities of practice (Mendizabal et al. 2013).

Conceptualized as an IT infrastructural capability (Bhatt and Grover 2005) and as an operational capability for performance improvement (Wu et al. 2010), the EMR capability enables the primary care medical practice to use its EMR system effectively and mindfully so it can transform and exploit its clinical knowledge. In line with the IT adoption/assimilation literature, this capability is also operationalized as a second-order construct whose two distinct yet related facets are defined as EMR routinization and EMR infusion. These capabilities are realized by interweaving primary care pathways with information technology through the various functionalities that are embedded in the EMR system (Davidson and Chismar 2007), including clinical knowledge management and decision support functionalities such as medical guidelines for the caring of chronic patients (e.g. Crosson et al. 2007) and e-prescribing problem detection and alert with regard to drug dosages and interactions (e.g. Schade et al. 2006).

On the one hand, the EMR routinization capability encourages the medical practice to view EMR usage as a routine activity, i.e. an activity that is seamlessly embedded in its clinical and administrative processes (Goh et al. 2011) and follows regular and recurrent patterns in supporting clinical and administrative work (Banerjee and Ma 2012). On the other hand, the EMR infusion capability allows the medical practice to use its EMR system in an extended, integrative and innovative manner in order to consolidate and enhance clinical and administrative tasks and processes (Saga and Zmud 1994; Ng and Kim 2009; Raymond et al. 2015).

Environmental uncertainty is operationalized as a second-order formative construct whose three components include clinical, technological and regulatory uncertainty. Clinical uncertainty is associated with insufficient or inadequate clinical knowledge available to physicians and nurses (Schoenfeld et al. 2014; Siegel Sommers 2013). For its part, technological uncertainty refers to the frequency and intensity of change in the primary care medical practice's technological environment (McClellan 1995). Last, regulatory uncertainty refers to expected changes to be made by governments or healthcare authorities with regard to the regulatory environment (Goldman 2007). These anticipated changes are often perceived as "threats" which require significant adaptation on the part of medical practices and clinicians (Carter 1990).

In terms of the dependent variables, innovation performance is conceptualized as a formative construct having both a service and a process innovation component, that is, the extent to which the medical practice has developed new healthcare services for its patients (e.g. OECD 2010) and has adopted evidence-based clinical practices (e.g. OECD 2013). For its part, clinical performance is also modeled as a formative construct whose three components include improved quality of clinical care (e.g. Herrin et al. 2015), improved clinical decision making (e.g. Farmer 2014), and improved clinical efficiency (e.g. Cauldwell et al. 2007).

Development of Research Hypotheses

Information processing theory assumed early on that a more uncertain environment increases the information requirements of an organization, and in turn leads it to match these requirements by increasing its information processing capability (Galbraith 1973; Tushman and Nadler 1978). It has also been assumed and empirically demonstrated that this capability must "fit" these requirements in order to achieve optimal organizational performance (Dutot et al. 2014; Premkumar et al. 2005). Following prior empirical studies in the IS domain (e.g. Kearns and Lederer 2004; Zhang et al. 2008), one would expect primary care medical practices to develop IT-enabled knowledge acquisition and assimilation capabilities

as a response to increased uncertainty in their environment. Thus follows the initial hypothesis derived from our research model:

H1: Greater environmental uncertainty is associated with a greater e-learning capability.

In their re-conceptualization of absorptive capacity, Zahra and George's (2002b) basic assumption was that the knowledge acquired and assimilated by the firm must be transformed and exploited "by incorporating it into the firm's operations, thereby improving its performance" (p.191). In the present context, the clinical value to be obtained from the e-learning capability would thus depend upon a concomitant and coherent deployment of the EMR capability (Helfat and Peterhaf 2003). Hence, our second research hypothesis is as follows:

H2: A greater e-learning capability is associated with a greater EMR capability.

Dynamic capabilities are meant to provide firms with the ability to reconfigure their operational capabilities in environments characterized by rapid or discontinuous change (Helfat and Winter 2011). In line with this assumption, Pavlou and El Sawy (2011) found that environmental turbulence reinforces the positive impact of dynamic capabilities on operational capabilities. Given a rise in uncertainty due to important and rapid changes in the medical practice's knowledge environment, and the e-learning capability's conceptualization as a dynamic capability, our third hypothesis follows:

H3: Environmental uncertainty positively moderates the positive relationship between the e-learning (dynamic) capability and the EMR (operational) capability.

In line with the hypothesized relationship between the e-learning and EMR capabilities, Zahra and George's (2002b) conceptualization of absorptive capacity also suggests that the e-learning capability of primary care medical practices indirectly influences innovation and clinical performance by enabling the EMR capability to be reconfigured so that it better responds to increases in environmental uncertainty. From the resource-based and dynamic capabilities perspectives, innovation and clinical performance improvements would be obtained by the leverage effect of "complementary" e-learning and EMR capabilities (Hitt et al. 2006; Zhu 2004). Hence, applying ACAP theory here leads us to postulate the following hypotheses:

H4: A greater EMR capability is associated with higher innovation performance.
H5: A greater EMR capability is associated with higher clinical performance.

Note that no direct relationship is hypothesized between the e-learning capability and organizational performance, in line with ACAP theory. Conversely, an implicit hypothesis is made that the EMR capability of primary care medical practices fully mediates the relationship between their e-learning capability and their innovation and clinical performance.

In contrast to dynamic capabilities, operational capabilities may constitute "rigidities" that place the firm at a competitive disadvantage when its environment is in constant change (Leonard-Barton 1992). In line with this assumption, Pavlou and El Sawy (2011) found that environmental turbulence attenuates the positive impact of operational capabilities on firm performance. Given the uncertainty created by the dynamism of the healthcare environment, and the EMR capability's conceptualization as an operational capability, two additional hypotheses follow:

H6: Environmental uncertainty negatively moderates the positive relationship between the EMR capability and innovation performance.
H7: Environmental uncertainty negatively moderates the positive relationship between the EMR capability and clinical performance.

Given the crucial role of organizational innovation in creating a sustainable competitive advantage for business enterprises, its impact upon organizational performance has been previously identified in strategic management research (e.g. Terziovski 2010) and IS research in the case of IT-based innovation (e.g. López-Nicolás and Meroño-Cerdán 2011; Ordanini and Rubera 2010). In primary care settings, service and process innovations such as e-prescribing and clinical decision support have been linked to improvements in clinical effectiveness and efficiency (e.g. Schade et al. 2006; Wagholikar et al. 2015). Consequently, we formulate our last hypothesis as follows:

H8: Higher innovation performance is associated to higher clinical performance.

Methodology

In order to empirically test our research model, we propose to conduct a mixed-methods study using a sequential design (Venkatesh et al. 2013). First, we will conduct a single case study (Yin 2013; Dubé and Paré 2003) in a large medical practice in Canada which has long been recognized as a leader in terms of health IT usage and assimilation. Though well situated in the extant literature, we acknowledge that our research model may appear highly abstract. For this reason, the main goal pursued in the exploratory case study phase will be to bring some "real life" to our research model. In-depth interviews with key actors (e.g. medical director, administrative coordinator, physicians, nurses, etc.) and on-site observation will allow us to assess how realistically the well-defined constructs and hypothesized relationships included in our research model represent what is happening in primary care settings. Results of the case study investigation shall then inform the development and validation of a survey instrument. An invitation to respond to the pre-tested and validated questionnaire will be emailed to the medical directors of a random sample of private medical practices in Canada. Indeed, following prior "key informant" survey research (Pavlou and El Sawy 2011; Sethi et al. 2001) and in line with our research model, medical directors will be targeted as the key respondents as they are the most knowledgeable of their medical practice's knowledge management capability and performance. The questionnaire instrument will be developed on the Qualtrics online survey platform. The potential for non-response bias will be assessed by comparing the answers of the early and late respondents. Measures will be either adapted from existing ones (e.g. environmental uncertainty, clinical performance) or will be developed for the purpose of this study (e.g. e-learning capabilities). Once the psychometric properties (reliability and validity) of the scales have been properly examined, hypothesis testing will be performed using a component-based structural equation modeling approach.

While our research model seeks theoretical clarity, parsimony and utility (Bacharach 1989; Daft 1983), ACAP theory postulates the existence of organizational learning moderators other than environmental uncertainty (Lane et al. 2006), including social interactions (Hotho et al. 2012). Such moderators may be detected in the case study, and thus incorporated into our research model and survey instrument. Individual cognition, i.e. the individual or shared mental models of physicians and nurses, may also play an important role in the success with which a medical practice builds its absorptive capacity (Gabbay and le May 2004). And while empirically validating this model in primary care settings may help us better understand the role of IT in enabling knowledge management, future research should also aim to better understand "how" e-learning and EMR capabilities emerge and lead to performance improvements.

Expected Contributions to Healthcare IS Research and Practice

This research aims to contribute to healthcare IS research in a number of ways. A first potential contribution lies in identifying both the determining and moderating roles of environmental uncertainty with regard to the primary care medical practice's development of e-learning and EMR capabilities for performance improvement purposes. As applied in primary care settings, Zahra and George's (2002b) re-conceptualization of absorptive capacity should constitute a valid and useful theoretical lens to explain and predict the impact of the e-learning capability upon organizational performance. In applying the ACAP theory, we thus expect that primary care medical practices will respond to environmental uncertainty by developing an IT-enabled clinical learning capability which, in turn, will drive innovation and clinical performance.

Second, the absorptive capacity theoretical lens should be successfully applied to relate e-learning and EMR capabilities to innovation and clinical performance in primary care settings. This is in light of Fichman et al.'s (2011) call for theory-driven research that explores the role of information systems in the delivery of care services in diverse organizational and regulatory settings, as well as Robert et al.'s (2012) plea for more research on the relationship between IS and absorptive capacity. Also followed is Zahra and George's (2002a) assumption that the role played by ACAP in achieving innovation and improving clinical performance would be further understood by applying this concept from an IS perspective.

Third, integrating the potential and realized elements of ACAP in terms of organizational learning may provide a clearer explanation of the IT-enabled knowledge strategy of primary care medical practices (Denford and Chan 2011), and a truer evaluation of the clinical value to be obtained from the

implementation of health IT solutions. Eventually, a more strategic and better-planned choice of healthcare IT projects, including EMR systems, should enable medical practices to become "smarter" and more "agile" in facing environmental change, and thus improve their innovation and clinical performance.

This study shall also contribute to practice by indicating how primary care medical practices can use IT-based solutions in order to build a dynamic learning capability that enables them to improve their performance. With regard to their IT capabilities, applying ACAP theory might allow medical practices to distinguish their potential capacity from their realized capacity, and thus help them in developing and deploying a coherent IT capability configuration. The absorptive capacity concept may thus constitute a strategic foundation on which to plan the development of IT-enabled knowledge management capabilities in primary care settings, founded upon a two-level analytical approach. In building its potential ACAP, a medical practice should first consider developing e-learning capabilities in order to make discriminating choices, that is, by determining the order of importance of e-healthcare intelligence, e-training and e-collaboration capabilities for purposes of clinical knowledge acquisition and assimilation. These capabilities constitute in turn a learning configuration onto which the medical practice can develop its realized ACAP, considering the deployment of a befitting EMR capability for purposes of knowledge transformation and exploitation, that is, by developing the capacity to use EMR systems "effectively" (Burton-Jones and Grange 2013).

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