Understanding the barriers to Knowledge sharing in the French healthcare system: A conceptual model and research propositions

Completed Research

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Abstract

The ability to share EHR's (Electronic Health Record) underlying knowledge both internally and externally within healthcare organizations has been accepted as a method to improve the quality and delivery of care. It has also raised important questions related to legal and privacy issues. This paper aims to explore the critical factors that impact knowledge sharing in the French healthcare sector. A qualitative exploratory design was used to study EHRs underlying Knowledge sharing in French hospitals. Three major issues were identified, namely the need for: a common healthcare terminology, interoperability among healthcare information systems and patient's informed consents before sharing his/her sensitive data. This paper proposes a conceptual model to explain the factors that impact knowledge sharing in the French healthcare system.

Keywords
Electronic Health Record, Knowledge sharing, privacy.

Introduction

Electronic health records (EHR) are increasingly being adopted by healthcare systems worldwide. The French Ministry of Health launched the national “Hôpital numérique 2012–2018” program in 2012. This is a strategic development plan for the modernization of health information technology (HIT) (Darmon et al., 2014). One of the priorities of this national program is the promotion of the use of EHRs in French hospitals. Initiated in 2004 and put in place in 2011, this EHR gathering all the information on the patient did not meet the expected success. The Health Insurance intends to bring it up to date by 2017 and proposes several avenues of improvement.

Despite significant upfront investment costs as well as ongoing operational expenses to promote the use of electronic health records (EHR), there was no comprehensive studies, to our knowledge, that assess this system in terms of its ability to result in improvements in the healthcare practice.

The aim of this study was to explore the barriers of sharing EHR’s underlying knowledge in the French public hospitals. This research focuses on understanding the physician’s perceptions of the factors that may impact future EHR usage in the French context. Our research question is the following: What are the main barriers to knowledge sharing in the French healthcare system?
The paper begins by presenting the related works regarding the factors influencing EHR implementation. Then, we describe the research method used to answer our questions followed by the presentation of the results. We conclude by underlining the limits of our research, and we present the future research directions.

**Background**

Scholars have stressed the role of knowledge sharing in the healthcare sector as a way to improve performance by providing qualified services. Expanding healthcare technologies encourage professionals to become more active participants in this sector (Ivanov et al., 2015). For some researchers, developing information technologies have an extreme effect on the facilitation of knowledge sharing. Technology and difficulty to apply it to share on healthcare section is the other controversial issue (Choi et al. 2008; Witherspoon et al., 2013).

Many researchers agree that the use of computerized EHRs is an issue that may have a negative effect on patient privacy (Jha et al., 2009)(Earnest et al., 2004). Physicians doubt whether EHRs are a secure store for patients' information and records, and fear that data in the system may be accessible to those who are not authorized to obtain it. The consequent inappropriate disclosure of patient information might lead to legal problems. Furthermore, there is, in some countries, a lack of clear security regulations that could help ensure patient privacy and confidentiality. According to (Simon et al.,2007), physicians are more concerned about this issue than the patients themselves. Even among the physicians who do use EHR, most believe that there are more security and confidentiality risks involved with EHRs than with paper records (Loomis et al., 2002). This shows that concerns about the privacy and security of patient data are experienced as a barrier to EHR usage.

(Perera et al.,2011) studied patients and found that although the majority of their patient target was interested about computerized healthcare information, the larger part where concerned about privacy issues and did not want to share their record outside of healthcare circles. (Davis et al.,2014) showed that by considering the benefit role of sharing psychological electronic records on care cancer, yet patient was unwilling to share them. Concerns about privacy are divided into: the type of information stored (e.g., medical, biometric, financial, behavioral, and biographical) and which sector would use the shared information (Smith et al. 2011). (Glass et al.,2011) discussed how encouraging the attitude to share knowledge about patients leads to greater decision making in healthcare, and subsequently enhances treatment services. (Borgman,2015) analysed how to guard the confidentiality of data: “what type of data to share and with whom”.

Various factors affect the decisions about knowledge sharing among employees and other organizational participants; however, previous research divides these factors into two categories:

- Most previous studies emphasize the role of attitude and behaviors on knowledge sharing because they depend heavily on human choices and tendency. They have described knowledge sharability, knowledge sharing, and their correlates in intra organizational in intra organizational setting (Bock et al., 2005)(Wang and Noe, 2010)(Chennamaneni et al., 2012)(Boughzala and Briggs, 2012). Individual perceptions of knowledge shareability (Cabrera and Cabrera, 2002)( Boughzala and Briggs, 2012) have been shown to correlate with a number of factors, among them: intrinsic and extrinsic motivation (Osterloh and Frey, 2000); awareness of conflicts of interest or vulnerability (Argote et al., 2001); physical capability to share (Argote and al., 2003), and certain personality traits including self-interest and investment and a personal disposition (propensity) to share knowledge (Matzler and al., 2008)
- The ability of information technology to facilitate the knowledge sharing process from storing to generating knowledge is critical as well. Technology empowers the individual, and significantly impresses the attitude of knowledge sharing (Tampoe, 1996) (Hinds and al., 2001). (Cabrera, 2005) stresses the impact of information technology on the reduction of the perceived cost of sharing knowledge which is important for managements and cause investing more productions or services. Cabrera stresses on well-designed technologies and user-friendly applications as important factors that simplify tasks reduce completion time, and the perceptions of cost. (Jarvenpaa and Staples, 2000) discusses: “ergonomic technologies influence people tendencies to engage in knowledge sharing within an electronic information exchange”. Sophisticated tools like groupware, backup databases, communicating networks, knowledge management systems, workflow technology, and
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more-recently social network-based systems, support the knowledge exchange process (Ruggles, 1998)(Robertson and O’Malley, 2000)(Cabrera, 2005)(Kankanhalli and al. 2005) (Bock and al. 2005)(Hung and al. 2011). Although information technology has a considerable impact on developing knowledge sharing, in many instances presenting new technology has failed because of inadequate attention to the existing organizational culture, insufficient adoption and untrained personnel (Cabrera and al., 2001). (Cabrera,2005) discusses that although technology is critical to facilitate knowledge sharing, project teams, for instance, prefer to share data and knowledge face-to-face rather than via network communications. As well, (Robertson and O’Malley, 2000) explain that usage of information and telecommunications technology in firms are less than expectation which states barriers on applying technology for sharing.

Many physicians complain of poor service from the vendor, such as poor follow-up with technical issues and a general lack of training and support for problems associated with the EHRs (Randeree, 2007). As physicians are not technical experts and the systems are inherently complicated, physicians perceive a need for proper technical training and support, and are reluctant to use EHRs without it (Ludwick et al., 2009).

Complexity of the system (Miller and Sim,2004) argue that most physicians “consider EHRs to be challenging to use because of the multiplicity of screens, options and navigational aids” (Ludwick et al., 2009). The complexity and usability problem associated with EHRs results in physicians having to allocate time and effort if they are to master them.

Lack of customizability According to (Randeree, 2007) “customizability refers to the ability to be adapted of the technology system that fails to conform to specific needs of the user applications”. Many physicians explain that one reason why they do not adopt EHRs is that they cannot find a system that meets their special needs or that they can utilize to meet their requirements. However, it does seem that more effort is required from the vendors of EHRs to increase their customizability.

Lack of Reliability “Reliability is the dependability of the technology systems that comprise the EHRs” (Randeree, 2007). High reliability is very important for a system dealing with patient information, and many physicians are concerned about the temporary loss of access to patient records if computers crash, viruses attack or the power fails (Kemper et al., 2006).

Methodology

A qualitative study was adopted to explore participants’ perceptions and experiences of the benefits, barriers and disadvantages of using an electronic health record to sharing knowledge in healthcare institutions in France.

We conducted non-directive, face-to-face, interviews with physicians working in different healthcare institutions. The guide of interview consisted of four themes: (1) usage of EHR, (2) the barriers to the adoption of EHR, (3), Privacy and access to EHR, and (4) the benefits of EHR. It was tested and refined with a physician, a department head of resuscitation and intensive care, who participated in several projects involving the EHRs implementation. The data analysis was performed by using the qualitative content analysis method (Berelson, 1952) supported by NVivo 10 computer software.

Our sample consists of 17 physicians who were requested to participate in our study from our personal networks. Their profiles were in a variety of disciplines (general practitioner, anesthetist - resuscitator, specialist in vascular medicine, internal medicine specialist, oncologists, cardiac surgeon, etc.) and all of them have participated in implementing of EHRs in healthcare institutions in France. Twelve physicians were occupying department chair positions, and seven are professors of medicine. We transcribed the audio recordings into a verbatim transcript. Interviews lasted about 75 minutes.

We labeled transcripts, with a date and specialty of each physician, but no name. The senior researcher divided the transcripts into text passages (i.e. text fragments, in other words, independent statements). Each text passage corresponded to a single topic or meaning.

To manipulate the open-coding according to the theme of the interview, three of the authors who were trained in the content analysis methodology, worked independently to determinate enablers (positive) or inhibitors (negative) factors of using an electronic health record. They used open coding to cluster practitioner statements into themes (nodes). The senior researcher manages the discussion for presenting
results. Moreover, two other researchers, who were not involved in this research, started from scratch working independently to code the passages using NVivo10 software. The coders agreed on 90% of the passages, demonstrating inter-coder reliability. Coders discussed and resolved their disagreements. Before the final approval of senior researcher the quotes of physicians were then translated into English and validated by a native English speaker.

**Results**

This section presents an analysis of the transcriptions in the light of studied objectives.

**Attitude and Behavior**

The first physician explained the attitudes of certain practitioners which “don’t write anything in files, rather often surgeons who don’t write anything in paper files still don’t write anything in the computer files”. For him, “there are those who do not want to share certain technical and very specialized skills in order to protect their position.” The second physician has the same opinion. He indicated that “information is powerful in general ... If you share more information, you would be more likely to lose your position and power”.

The third physician expressed that the medical staff does not want to share because: “They are megalomaniacs, or are just a little bit egocentric. The problem is when they judge that their level of knowledge is just a little bit of universal science”. For the fourth physician, the sharing depends on personality and relationship of physicians. He explained that “many physicians are not educated for this type of sharing. It is sometimes an attitude which is a little instilled in us.” He continued: “we are willing to share but it depend on our relationship. These are questions of the personalities of people. If you talk with a physician with whom you do not manage to have a dialogue, you share nothing.”

**Information Technology and knowledge sharing**

For the first physician, the problem is that the EHRs do not meet the expectations of professionals: “it is a big problem because often management provides a very general IT tool... And if we do not personalize it, we do not use it properly”. He noted that the information technology program is not successful or optimal enough. The second one emphasized the same problems with this tool: “the concept of EHRs causes enormous difficulties because it cannot respond to executives’ and physicians' wishes.”

For the third physician, following the dematerialization of medical records, he noticed that the words of the medical staff were standardized and consequently the contents of the patient file were reduced with often limited detail “It is true that information is a sort of mechanical data of the individual at the first moment, which makes the patient a summarized concept of biomedical dimensions. Then we share this information by use of EHRs. To sum it up, all of the mechanisms simply provide biomedical dimensions”.

The fourth physician noticed that the medical staff is not trained to use the computerized patient file “The software won’t be used as it’s not always the most practical. You see, certain data is missing as we do not manage to include it in the system ... Thus the tool is not adapted enough and the staff is not trained, which we could say, would be helpful.” He suggests making the software more useful for medical activities which can improve the physician’s knowledge: “I think that it would be interesting to have studies and statistics.”

**Privacy-access**

According to the first physician, certain data must not be shared or distributed within the organization “it is not very easy to put up protection barriers for data security. How to implement them? According to the profile of each one? That can be made, completely. Because it almost impossible to control medical staff participants, who comes for long time or for a temporary moment, and setting privacy rules is complicated”.

For the second physician, the decision about classification of medical data returns to the patient which is the owner of his/her data: “it is the patient who must choose what is available to the general public and what is not.” He explained that “Even when you have security systems with access controls, generally the passwords are hung on the wall, like everywhere. If you want the hospital is the place of ‘3*8’ (shifting
work time), there is always a team which comes after the previous one, it is a place where there are temporary employees.”

The third physician defined the information which is not shareable and the people who can share them: “This information relates to personal patient life, for instance, psychic elements...because we ask a patient about choosing which information is confidential and which one is private. Sometimes we are involved in a huge flood of information, and don’t know how much of it should be shared.”

**Discussion and model proposal**

The results of our research show that the majority of surveyed healthcare personnel agree on the absolute need to collect and share information relevant only to effective taking in charge of the patient. This information is either medical or personal order. Among the shared medical information, we note the information on the patient’s health, suffered and/or current treatments, prescriptions, medical examination, physician’s observations, analysis results etc. The information concerning for example the seropositivity of the patient, evoked by seven interviewed physicians, is delicate and very private information. It is nevertheless necessary to have knowledge of it to take care well.

Despite the variety of shared information, it remains nevertheless always delicate to define what recovers the "useful" character of information. The results of our analysis show that the information must be precise in order to be shared effectively and improve consequently the process as well as the quality of care. In this regard, we must emphasize the importance of provided information formulation in order not to be misunderstood. For this it is necessary that the information is very medical. In this way, whatever function or position of interlocutor, there will be no prejudices on a patient at the rate of a little precise or subjective information.

For the personal information going beyond the medical domain, they must be used in an objective way because they may improve the interpretation of diverse factual raw data. According to our interviewees, to make efficient sharing, it must be much targeted. Indeed, the information must reach key people so that patient care is effective and complete.

However, the majority of respondents believe that knowledge is purely practical or theoretical. The knowledge, potentially subject to change, so should not be worn in the medical record, which should remain quite factual. The information contained in the EHRs is of a practical nature.

**Proposition 1: Knowledge characteristics can influence knowledge sharing.**

In healthcare sector the transmission of explicit or implicit knowledge and know-how is a part of the job. It is about a natural reflex. The training of physicians is based on this principle where the oldest have to train the youngest. Therefore, the knowledge has vocation to circulate between the members of the profession where the teamwork is the only way of working and which presents a real added value.

We noticed that the interviewees sometimes share their implicit knowledge by spirit of curiosity and discovery of other knowledge in the contact of their peers. For them, knowledge calls it another one. With knowledge sharing, they can have in return on behalf of their interlocutor another knowledge, which is going to help them to grow rich mutually. They also share their knowledge to improve the care quality and the patient management.

However, the attitude towards knowledge sharing is influenced by various factors. Our results show, that sometimes physicians are reluctant to share their implicit knowledge with other parties or colleagues in order to save their professional position within the healthcare system. Indeed, the implicit knowledge contains power itself, when it spreads, others can use it. Therefore, physicians prefer not to share their tacit or implicit knowledge in order to save their reputation in the healthcare system. Sometimes, physicians do not share their observations, because they are not sure of the diagnosis, so they do not share tacit knowledge.

Our results show that the unwillingness to share knowledge is in line with the healthcare system culture. The physicians did not learn to communicate through electronic networks and prefer to discuss medical issues verbally. According to certain physicians, the sharing depends on personality, attitude towards sharing, and culture. Other factors explain the willingness to avoid sharing, for example, lack of time, oversight, and need to maintain personal relations with the patient.
Proposition 2: Motivational factors (pleasure obtained from helping other, anticipated reciprocal relationship...) can influence attitude toward knowledge sharing.

Proposition 3: Individual characteristics can influence attitude toward knowledge sharing.

Proposition 4: Attitude toward knowledge sharing can improve knowledge sharing.

Proposition 5: The relationship between sharing knowledge and attitude toward knowledge sharing can be moderated by self-confidence.

Interviewed physicians stressed the problems associated with adapting to a new technology for knowledge sharing, which slows the process down or in some cases, is totally ignored by the medical staff. The lack of skills and knowledge to operate a technology create a dilemma. The medical staffs were not trained to use information technologies. Interviewed physicians noticed that the computerized patient file is not adequate to characteristics of their activities. They underlined that the technology is only a storage place but not integrates statistics studies, reporting or other elements to improve upon the reflection.

The other difficulty involving the use of technology is about the massive amount of data recorded which is generally unrelated, confusing, and medical staff have a problem finding meaningful knowledge from computerized records. The participants, in our research, emphasized that without the personalization of shared information in databases, it is not possible to take advantage of recorded files and it just wastes the physicians’ time. Expanding on this, finding useful knowledge is another dilemma. The physicians stated that although shared electronic records provide access to various information, without converting it to qualified knowledge and intelligence, technologies do not improve treatment services. In this case, technology causes a reduction in knowledge sharing attitude.

Proposition 6: Facilitating tools and technology have a positive effect attitude and the knowledge sharing

The security issue is the one of the main concerns that was discussed by participants. Patients have various concerns about their personal data and are sometimes reluctant to share their information. Theoretically, the information is not accessible to everyone, but in practice, it is the complete opposite. Access to these files requires a password, and frequently these passwords are hung on the wall and everyone can access these databases. The professional secrecy principal is not able to cover all privacy issues in the healthcare system, because in certain cases there is no distinct rule to describe which knowledge is shareable and which is not. However, security concerns represent a predicament in determining what should be shared and what should be private. The patients determine decisions about shareable information. Currently there are no principles to classify information as confidential, or sensitive, this causes physicians to block access and consequently blocks sharing too. Furthermore, information technology does not propose qualified solutions for considering both privacy issues and shareability processes.

Proposition 7: The relationship between knowledge characteristics and knowledge sharing is moderated by knowledge classification (public knowledge, private knowledge and confidential knowledge).

The hospital organization is characterized by very complex activities and is subjected to strong pressures to integrate technological innovations. The interviewed physicians cited some characteristics of this organization, which can occasionally limit sharing. In regards to the security of data and information they explained that, in hospitals, security systems are not standardized. They indicated that the communication of medical information in hospital could sometimes damage the private life of some patients. In the hospital, there is always a team which comes after the previous one; it is a place where there are temporary employees and where physicians and interns change all of the time.
Proposition 8: Contextual factors (organizational context, interpersonal and team characteristics, sharing culture...) can improve knowledge sharing.

Figure 1 presents a conceptual model of knowledge sharing deducted from these propositions.

![Figure 1. Model proposal](image)

In the Table 1, we listed all the definition of our concepts and references.

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<tr>
<th>Concepts</th>
<th>Definitions/dimensions</th>
<th>References</th>
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<tbody>
<tr>
<td>Motivational factors</td>
<td>- Beliefs of knowledge ownership</td>
<td>Jarvenpaa and Staples (2000)</td>
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<td></td>
<td>- Perceived benefits and costs</td>
<td>Siemsen et al. (2007)</td>
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<td></td>
<td>- Interpersonal trust and justice</td>
<td>Sondergaard et al. (2007)</td>
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<td>- Individual attitudes</td>
<td>Bock et al., (2005)</td>
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<td>Individual characteristics</td>
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<td>- Work experience</td>
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<td>- Personality</td>
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<td>- Self efficacy</td>
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<td>Knowledge characteristics</td>
<td>Usefulness of knowledge: Usefulness of knowledge as an employee’s perception that his/her knowledge is of value to the coworker.</td>
<td>Siemsen et al. (2007)</td>
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<td></td>
<td>Quality of shared knowledge: The essential and usefulness of content and knowledge shared.</td>
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Facilitating tools and technology | Information and communication technologies facilitate collaborative work and promote knowledge sharing. A well-designed, user friendly technological tool can simplify the knowledge sharing processes and reduce the time necessary for engaging in knowledge sharing behaviors. Consequently, many organizations expect their employees to utilize these systems for knowledge sharing, without forcing them to do so. | Ruggles (1998); Choi et al. (2008); (Assar and Boughzala, 2017)

| Contextual Factors | Organizational context:  
- Organizational culture and climate  
- Management support  
- Rewards and incentives  
- Organizational structure  

Interpersonal and team characteristics:  
- Diversity  
- Team characteristics and processes  
- Social networks  

Cultural characteristics:  
- Collectivism  
- In-group/out-group | Kankanhalli et al. (2005)  
Cabrera et al. (2005)  
Kim and Lee (2006)  
Chang and Chuang (2011)  
Hwang and Kim (2007)

| Attitude toward knowledge sharing | ‘The degree of one’s positive feelings about sharing one’s knowledge’ | Bock et al. (2005)

| Knowledge sharing | Knowledge sharing is ‘basically the act of making knowledge available to others within the organization. Knowledge sharing between individuals is the process by which knowledge held by an individual is converted into a form that can be understood, absorbed, and used by other individuals’ | Ipe (2003)

| Self-confidence | Self-confidence is considered one of the most influential motivators and regulators of behavior in people’s everyday lives. Self-confidence is defined as a set of beliefs that an individual has in his/her own skills. | Bandura (1986)

| Knowledge classification | The privacy dimension needs to ‘ensure an appropriate level of protection to information. It is appropriate to classify the information to indicate the need, priorities and desired degree of protection when handling them.’ | ISO 27002 standard

| Table 1. Concept definition and references |

**Conclusion**

This paper has for objective to explore mechanisms allowing the improvement of knowledge sharing in the healthcare sector. Our study underlines the role of the classification in knowledge sharing. However, security concerns represent a predicament in determining what should be shared and what should be private. Decisions about shareable data are determined by the patients. Currently there are no principles
for classifying information as confidential, or sensitive, this causes physicians to block access and consequently blocks sharing too. Furthermore, information technology does not propose qualified solutions for considering both privacy issues and shareability processes in the healthcare system, because in certain cases there is no distinct rule to describe which knowledge is shareable and which is not.

One of limitations of this study is that the sample size of interviewees is small. The exploitation of collected data is difficult to act upon, and we cannot generalize our results at this stage. Notwithstanding the above, this study proposes a conceptual model that explains the determinants of knowledge sharing. Our results show that physicians share their explicit knowledge and they don’t share their tacit knowledge. It’s depends to the self confidence. A quantitative research using Structural Equations Modeling can be launched to validate the causal relationships between constructs. Actually, smartphones, social networks, sensors, smart meters, Internet of things (IoT), Cloud computing, etc., are all new technologies that make life much easier, by collecting a maximum of data about the patients, in order to conceive services fully adapted to their needs. Massive data is, therefore, being produced on an exponential rate worldwide. All these elements motivate the use of a comprehensive ontology and semantic technologies to address these new challenges on data privacy.

REFERENCES


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