Understanding the barriers
to Knowledge sharing in the French healthcare system:

An exploratory assessment of
physician's perspectives"

Research-in-progress

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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, but 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.

This paper proposes a conceptual model to explain the factors that impact knowledge sharing in the French healthcare hospitals.

Keywords: Knowledge sharing, EHR, French healthcare system.

1   Introduction

Electronic health records (EHR) are increasingly being adopted by healthcare systems worldwide. The French Ministry of Health launched the national "Hôpital numérique 2012–2017" 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 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 about the factors influencing EHR implementation. Then, we describe the research methodology 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.

2   Background

This section presents a comprehensive synthesis of users perceptions about EHR implementation in the literature. The related works aimed to synthesize current knowledge of the barriers and facilitators influencing shared EHR implementation among its various users in other countries in order to compare them to the French context.

Many barriers to EHR use have been documented in the literature. Research suggests that physicians are reluctant to adopt EHR for a variety of reasons, including relatively high upfront costs and ongoing costs of maintenance.

- **Financial and technical barriers**

The questions commonly facing physicians are whether the costs of implementing and running an EHR system are affordable and whether they can gain a benefit from it. Electronic Medical Records are hi-tech systems and, as such, include complex hardware and software. A certain level of computer skills by users (the physicians) is required. Further, there are still some technical problems with EHRs, which lead to complaints from physicians, and they need to be improved.

We can conclude that physicians have insufficient technical knowledge and skills to deal with EHRs, and that this results in resistance. Further, good typing skills are needed to enter patient medical information, notes and

prescriptions into the EHRs, and some physicians lack them. Shachak et al. (2009) found that EHR use introduces a new type of medical errors: typos. This general lack of skills hinders the wide adoption of EHRs.

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 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, p.120). 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, "customizability refers to the ability to be adapted of the technology system that fails to conform to specific needs of the user applications" (Randeree, 2007, p.494). Many physicians show 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, pp.493-494). 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).

Interconnectivity/Standardization EHR hardware and software cannot be used straight "out of the box", it has to interconnect with other devices that "complement" the EHR system and help to generate benefits. Among physicians in medical practices that have implemented EHRs, such interconnectivity problems are a well-recognized obstacle to the wide adoption of EHRs. In essence, EHRs are not compatible with the existing practice systems, and physicians are reluctant to get rid of functional systems in order to have an integrated system including EHRs (Davidson et al., 2007 ; Kemper et al. 2006).

- **Time**

A fluent workflow is very important to the work of physicians. The introduction of HER will slow a physician's workflow, as it will always lead to additional time being required to select, implement and learn how to use EHRs, and then to enter data into the system. As a result, their productivity will be reduced and their workload will be increased. This can cause financial problems, such as a loss of revenue. It is perhaps surprising that many researchers conclude that data entry is a problem for physicians using EHRs (Ludwick et al., 2009 ; Kemper et al. 2006). In Meinert's (2005) research, more than half of the EHR users stated that data entry was both cumbersome and time-consuming. As such, data-entry is a widely experienced barrier among physicians.

More time per patient Many physicians report that using EHRs will take more time for each patient than using paper as, in some situations, it might be more convenient and efficient to use paper records during the clinical encounter (Laerum et al., 2001).

- **Privacy or security concerns**

Electronic Medical Records deal with medical information on patients, and this should be treated as private and confidential. Physicians believe that keeping such information safe is very important because otherwise it could create legal issues. However, there is a lack of clear security standards which can be followed by those who are involved in the use of EHRs.

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.

3   Methodology

A qualitative study was adopted to explore participants' perceptions and experiences of the benefits, barriers and disadvantages of using an electronic health record 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 transcripted the audio recordings into a verbtim transcript. Interviews lasted about 75 minutes.

We labelled 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. Be the final approval of senior researcher the quotes of physicians were then translated into English and validated by a native English speaker.

4   Results

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

- *Attitude and Behaviour*

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."

The sixth physician specifies that the absence of knowledge sharing can be as faulty due to omissions of healthcare professionals. He indicates that: "they see many patients. I think that they forget, really." It is the opinion also of the seventh physician, who considers that: "due to the lack of time sometimes we can be brought to forget important information from a service to the other one." He adds that the sharing depends on personality "it is about personality's problem on behalf of certain physicians, who do not appreciate the contact with the patients and do not wish to be attuned."

- ***Problems concerning Medical Knowledge sharing***

The first physician explained the complexity of sensitive data sharing: "… people were affected by HIV; accessing their file was impossible. For these types of patients, stricter accessibility rules have to be defined for other physicians, moreover, which physicians can access the file should be based off of the patient's agreement" He considers that it is necessary to include in the computerized medical record only an accomplished synthesis of the diagnoses. He explains "when we take care of somebody there are ideas that come to your mind, we are not necessarily certain of the diagnosis and things evolve in time. And it is after some observations that we are made the real idea. Then all this draft, I would say initial, sometimes one does not want to share it because they are only ideas noted on a scrap of paper, and that does not stay necessarily, that should not have a forensic role. It is necessary to be very careful in what we write."

According to the second interviewee, creating information is in itself an obstacle to share. Indeed, to share the results of a consultation or hospitalization, you must prepare a corresponding report. This is additional work that nobody wants to be the one who fills the information machine for the benefit of others."

For the third interviewed physician: "there are questions about which knowledge and information should be shared and in which way it should be done?" The choice of the information to share is difficult in consideration given the forensic obligations. He explains that: "we are a little flooded by the sum of information that we have to give, with always can be in ulterior motive, always a forensic aspect." The fourth interviewee specifies that the sharing does not concern certain sensitive information: "certain practitioners who did not want to put it, in particular in the cases of AIDS."

The fifth interviewee emphasizes the fact that sharing requires complete information. He explains: "there are physician who send us an outside patient and for example they have given us no quarter useful information but it is very often that ... we have to collect them ... " He estimated that the medical record must not conceal tacit knowledge as they are subject to change. Only explicit knowledge should be highlighted in a medical record. He mentions this point as follows: "the knowledge they change every day so all we have written yesterday, it is potentially more valid today as it will not evolve in the folder so for me a case should be fairly factual… knowledge are not necessarily factual."

The seventh interviewed emphasizes the fact that some information may appear to be secondary to some while yet they are important for patient care. He says: "there is sometimes underestimate the importance of things and then sometimes neglect also ... also because they do not always realize the importance of the information in question."

- ***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."

The fifth physician puts forward the absence of communication between the software internally "we have just added a software which is more known who is called "DAYSCARE" who is a prescription software and thus we have the immense luck to have things which are not connected between them "DAYSCARE" and "SIMBAD" does not talk at the moment."

The seventh physician returns to the question of information communication with independent professionals "It's obviously a huge problem because when it comes to transmitting information whether to the patient himself but especially to the Liberals or hospital health professionals, it is much more obviously difficult to get a paper file, to make photocopies, to fax as sending email …".

- *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 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."

The fourth physician explained that medical staffs may have access to very private and highly confidential information, and should respect professional secrecy "I don't want to note the name of disease at all, because it is so private. Some patients ask me not to note it on their file. This can be, I'll give you some examples, a voluntary interruption of a pregnancy, or this can be sexual assault". He noted that the patient file sometimes contains information that is not useful or relevant to ensuring the consistency of care.

The fifth physician considers that the patient has to know his file in its entirety and that it comes down to him to manage it and to empower. So, he notices: "for me it is the patient who has to manage these data...".

The sixth physician explains that some information must be kept discretely and / or anonymous. He notes that, "For HIV, the computerized record was blood results so it is written in the blood test but it is not re-reported roughly in red "PATIENT AFFECTED BY the HIV"".

The seventh physician interviewed acknowledges that remains vague with regard to the information that can be shared "we share information if they are relevant to the care of the patient and if the patient agrees…Thus, everybody is entitled to the respect for its private life. It is things actually that can be psychiatric diseases, sexually transmitted disease."

5   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 pa-

tient'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.

Certain physicians considered that it would be necessary to include the electronic health record only an accomplished synthesis of diagnoses. Only the factual elements must be highlighted within electronic record. The reflections and the subjective information must not be shared in consideration by the forensic role of a sketch of not accomplished reflection. According to some physicians, the medical record must not conceal knowledge as they are subject to change. Knowledge sharing is happening outside of the file with patient or other physicians.

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 electronic records shared with them can 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.

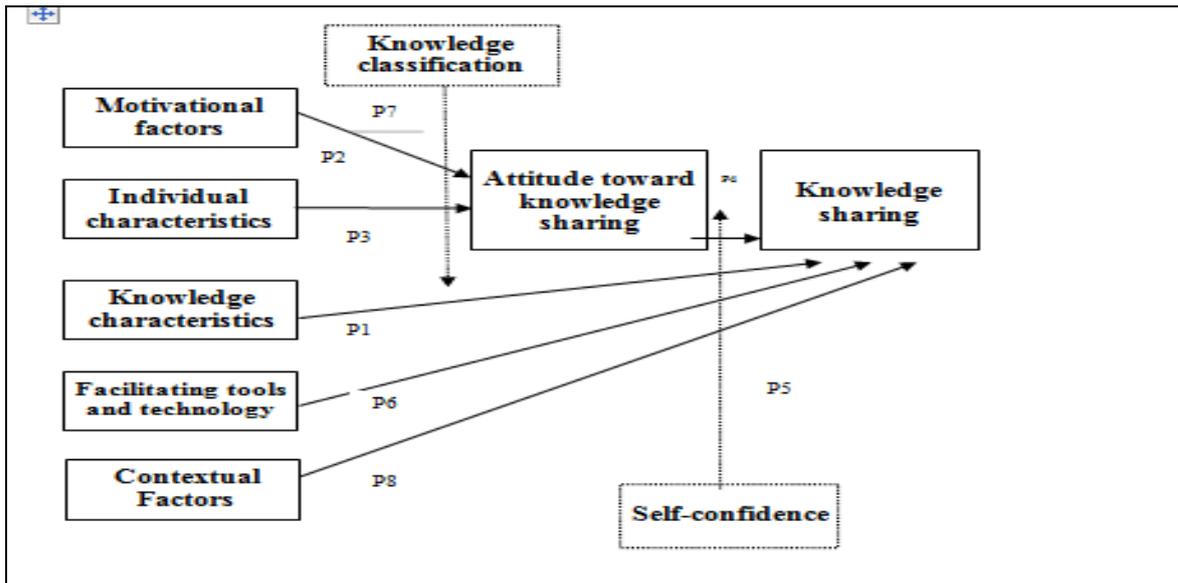Figure 1 presents a conceptual model of knowledge sharing deducted from these propositions.

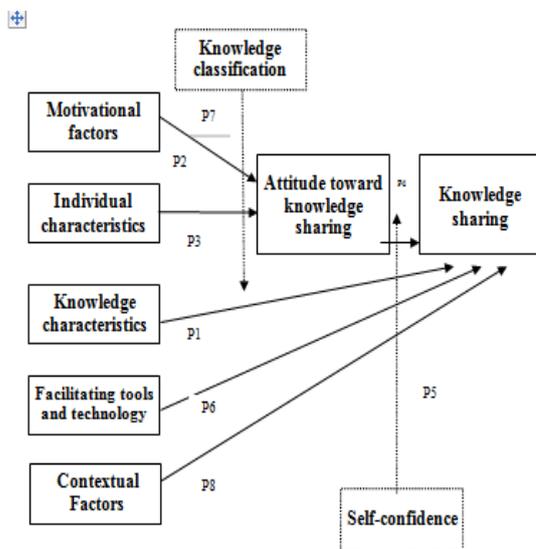Figure 1. Conceptual model : Knowledge sharing with EHR

Figure 1. Conceptual model : Knowledge sharing trough HER

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

Concepts	Definitions/dimensions	References
Motivational factors	-Beliefs of knowledge ownership	Kolekofski and Heminger (2003); Jarvenpaa and Staples (2000)
	-Perceived benefits and costs	Hew and Hara (2007); Wasko and Faraj (2000, 2005) Chiu et al. (2006); Siemsen et al. (2007)
		Wu et al. (2007); Mooradian et al. (2006); Sondergaard et al. (2007)
	-Interpersonal trust and justice	Bock et al., (2005); Bock and Kim (2002); Lin (2007c)
	-Individual attitudes	
Individual characteristics	-Education -Work experience -Personality -Self efficacy	Cabrera et al. (2006); Jarvenpaa and Staples (2000); Wasko and Faraj (2005); Lee et al. (2011)
Knowledge characteristics	Usefulness of knowledge: Usefulness of knowledge as an employee's perception that his knowledge is of value to the coworker. Quality of shared knowledge: The essential and usefulness of content and knowledge shared.	Siemsen et al. (2007) Chui et al. (2006); Chang and Chuang (2011)
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); Song (2002), Choi et al. (2010); Buckley and Giannakopoulos (2011)
	Organizational context : -Organizational culture and climate	Kankanhalli et al. (2005); Chiu et al. (2006); Collins and Smith, (2006); Willem and Scarbrough (2006); Bock et al.(2005); Wasko and Faraj (2005)

Contextual Factors	-Management support	Connelly et Kelloway, (2003); Cabrera et al. (2006); Kulkarni et al. (2006); King and Marks (2008)
	-Rewards and incentives	Yao et al. (2007); Nelson et al. (2006); Kim and Lee (2006); Kankanhalli et al. (2005); Bock et al.(2005); Lin (2007). Chang et al. (2007)
	-Organizational structure	Kim and Lee (2006); Jones (2005); Yang and Chen (2007)
	Interpersonal and team characteristics : -Diversity	Bakker et al. (2006); De Vries et al. (2006), Srivastava et al. (2006)
	-Team characteristics and processes	Ojha (2005); Sawng et al. (2006)
	-Social networks	Chiu et al. (2006); Wasko and Faraj (2005); Chang and Chuang (2011)
	Cultural characteristics : -Collectivism -In-group/out-group	Chow et al. (1999; 2000); 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 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. The information may have varying degrees of sensitivity and criticality. Some	ISO 27002 standard

	information may require a special level of protection or special handling. It should develop an information classification plan for prioritizing protection levels and inform stakeholders of the need for special handling'.	

Table 1 Definition of concepts and references

6.   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 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 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 is small. The exploitation of collected data is difficult to act upon, and we cannot generalize our results. 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 maxi mum 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.

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