Conceptualising social media support for tacit knowledge sharing: physicians' perspectives and experiences

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Abstract

Purpose – *This paper aims to explore the potential contributions of social media in supporting tacit knowledge sharing, according to the physicians' perspectives and experiences.*

Design/methodology/approach – *Adopting a qualitative survey design, 24 physicians were interviewed. Purposive and snowball sampling were used to select the participants. Thematic analysis approach was used for data analysis.*

Findings – *The study revealed five major themes and over 20 sub-themes as potential contributions of social media to tacit knowledge flow among physicians. The themes included socialising, practising, networking, storytelling and encountering. In addition, with the help of the literature and the supporting data, the study proposed a conceptual model that explains the potential contribution of social media to tacit knowledge sharing.*

Research limitations/implications – *The study had both theoretical (the difficulty of distinguishing tacit and explicit knowledge in practice) and practical limitations (small sample size). The study findings have implications for the healthcare industry whose clinical teams are not always physically co-located but must exchange their critical experiential and tacit knowledge.*

Originality/value – *The study has opened up a new discussion of this area by demonstrating and conceptualising how social media tools may facilitate tacit knowledge sharing.*

Keywords *Information technology, Knowledge sharing, Social media, Health care, Physicians, Tacit knowledge*

Paper type *Research paper*

1. Introduction

Knowledge sharing among medical practitioners is considered to be critical for improving the quality of patient care. In particular, tacit knowledge sharing among physicians, such as the sharing of clinical experiences, skills, know-how or know-who, is known to have a significant impact on the quality of medical diagnosis and decisions (Steininger *et al.*, 2010; Henry, 2006; Abidi *et al.*, 2005; Burgess and Currie, 2013). The tacit knowledge of healthcare professionals is the most valuable source of their "experiential know-how" and is related to their clinical experiences in vital situations – it is about "what really works and how to make it work" rather than explicit knowledge of "how things should work" (Abidi *et al.*, 2005). From a healthcare knowledge management (KM) perspective, it is vital to harness and facilitate tacit knowledge sharing among clinical teams (Abidi *et al.*, 2005).

Information and communication technology (ICT) has been regarded as one of the main enablers of knowledge sharing activities. However, in terms of tacit knowledge sharing, researchers still debate whether it can be actually shared through using ICT (Panahi *et al.*, 2013). This is mostly because most of the traditional ICT have been found to be unsuccessful in facilitating tacit knowledge sharing among individuals (Abidi *et al.*, 2009). It has been argued that traditional ICT was more focused on information management than facilitating interaction among knowledge holders, which is necessary for tacit knowledge sharing (Huysman and Wulf, 2005, Marwick, 2001). Tacit knowledge sharing requires the

support of technologies that provide free-form, real-time, interactive and collaborative communication platforms (Mitri, 2003, Marwick, 2001).

The debate on whether ICT can facilitate tacit knowledge sharing is ongoing, which can be considered as a major gap of KM literature (Panahi *et al.*, 2013). However, with the advent of social media tools such as blogs, online social networks and wikis, several studies have argued that these new technologies provide new opportunities for facilitating tacit and experiential knowledge sharing among experts (Hsia *et al.*, 2006; Abidi *et al.*, 2009; Steininger *et al.*, 2010; Cao *et al.*, 2013; Wagner *et al.*, 2014). Despite the sporadic arguments in the literature, it was noticed that there is still a lack of empirical studies supporting the arguments and a lack of understanding of how social media may facilitate tacit knowledge sharing. In addition, social media platforms and their affordances have changed significantly even over the comparatively short timeframe during which they emerged. There is a need to re-investigate users' opinions of these recent Web technologies in terms of their efficacy and capacity for tacit knowledge sharing.

Furthermore, social media sites are currently very popular and attracting increasing interest of physicians and healthcare organisations for knowledge sharing, and this requires further investigation. Therefore, this study aims to explore the potential contributions of social media in supporting tacit knowledge sharing among physicians. The study seeks to re-conceptualise tacit knowledge sharing concepts in the social media era by exploring physicians' experiences with and perspectives on using social media for tacit knowledge sharing.

2. Delimitation and research scope

The scope of the study was defined as follows. First, the study adopted an organisational rather than a philosophical definition of tacit knowledge. Tacit knowledge is a debatable concept in terms of whether it can actually be researched, observed and operationalised. The early definition of tacit knowledge, found in Polanyi's view of "tacit knowing", defines tacit knowledge as an inexpressible knowledge residing in human minds (Polanyi, 1966). However, this may not easily be accessible and transferable through information technology, as has been argued by some researchers (Johannessen *et al.*, 2001; Hislop, 2001; Haldin-Herrgard, 2000) in the past.

Polanyi's philosophical view of tacit knowledge has been slightly changed in organisational KM studies, particularly by work of Nonaka and Takeuchi (1995), to a knowledge that is to some extent articulable and expressible in certain situations, and is classified into different types of tacit knowledge based on the degree of its tacitness and its expressibility (Oguz and Sengün, 2011). Therefore, for the purpose of this study, the organisational definition of "tacit knowledge" seems more applicable and adoptable (Oguz and Sengün, 2011). This definition allows for a better understanding of the phenomenon of tacit knowledge sharing using ICT than Polanyi's view, which seemingly does not see a role for ICT in tacit knowledge sharing.

Therefore, by adopting an organisational definition of tacit knowledge, this study mainly explored the types of tacit knowledge that physicians acquired personally or as a group at their workplace, and it could be shared to some degree through chatting and conversing or it could be demonstrated through the use of multimedia tools. In other words, the main focus of the study was on the physicians' experiential knowledge relating to their practical skills, expertise, personal professional opinions and perspectives and other job-specific knowledge and experiences. Inexpressible and less-articulable types of tacit knowledge in the forms of mental models, gut feelings, hunches, intuitions and some physical and hands-on experiences which may not be transferred through ICT were excluded for the study.

Second, the distinction between tacit and explicit knowledge is not as clear in reality as in the theoretical definitions. In other words, determining whether the knowledge shared

between two people is really tacit or explicit is not easy in many cases, because the nature of tacitness always changes according to the level of the person's knowledge and expertise (novice or expert), the time and the context in which the knowledge is obtained and shared. That is why, a group of researchers viewed tacit and explicit knowledge along a continuum rather than as two very distinct categories (Jasimuddin *et al.*, 2005; Chennamaneni and Teng, 2011; Haldin-Herrgard, 2000; Virtanen, 2013). The study also adopted a tacit–explicit continuum (Figure 1) in analysing the data to explore the contributions of social media to tacit knowledge sharing. This not only enabled an investigation of pure tacit or explicit knowledge sharing but also an examination of the knowledge that is placed in between, that is, the knowledge that is just converted from tacit to explicit, but still has components of the tacit dimension.

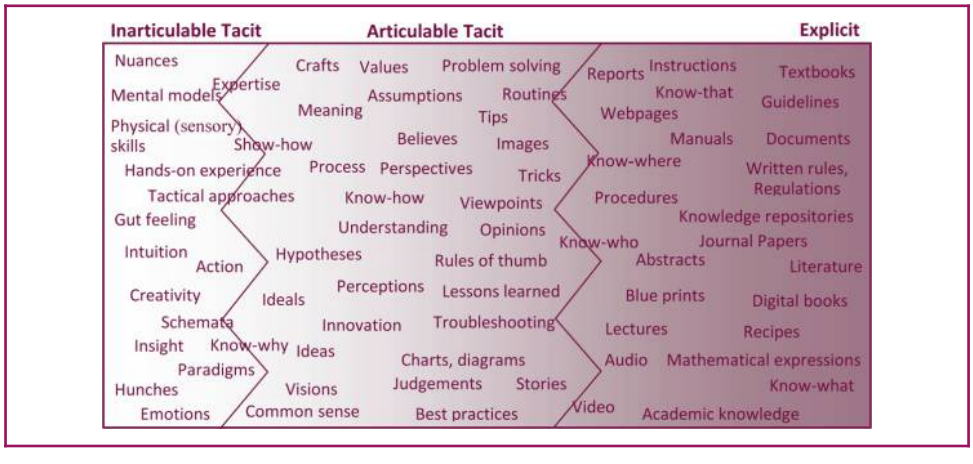
In addition, based on Nonaka and Takeuchi's (1995) knowledge creation theory, the study viewed tacit knowledge sharing as not only including tacit-to-tacit conversions (socialisation) but also tacit-to-explicit (externalisation) and explicit-to-tacit conversions (internalisation) (Marwick, 2001; Lopez-Nicolas and Soto-Acosta, 2010; Sarkiunaite and Kriksciuniene, 2005). This is because tacit and explicit knowledge have an interactive and dynamic relationship with one another, and discussing one inevitably necessitates discussing the other as well. In addition, considering the spiral movement of the knowledge creation process in Nonaka and Takeuchi's theory, tacit knowledge eventually needs to be externalised and also internalised to be communicated.

Third, the study initially approached investigating social media as a whole rather than limiting it to one specific group of social media sites (for example, social networks, wikis or blogs). The reason was that the study sought to obtain a holistic view of the social media's contribution to tacit knowledge sharing, and such an overarching view might not be achievable by examining only one or two types of social media tools. However, after the data collection, it was found that the study participants mainly used Twitter, blogs and multimedia sharing sites (such as YouTube and Vimeo) as part of their everyday professional knowledge seeking and sharing activity. Therefore, the discussions in this study mostly cover the support of these three platforms of social media in facilitating tacit knowledge sharing among physicians.

3. Methods

The study was an exploratory study which adopted an interpretive paradigm. A qualitative survey design with a semi-structured interview was used to collect data. The study participants were physicians (general practitioners, specialists and surgeons) who were selected based on three pre-defined criteria: having a minimum of five years clinical

Figure 1 The tacit–explicit continuum with examples collected from the literature



experiences, being a regular user of social media and being accessible for the study. This ensured that the participants have sufficient experience to comment about tacit knowledge sharing on social media.

The participants were approached by disseminating announcements on Twitter and also by contacting several active medical bloggers and contributors on medical wiki pages or Twitter. Finally, a total of 24 participants were selected using purposive and snowball sampling techniques. Only a small number of participants (2/24) were female, while the majority was male (22/24). Female participants were less available, and this might need further studies to understand. The majority of the participants were in age groups from 31 to 40 years (13/24) and from 41 to 50 years (7//24). The largest percentage of participants was from Australia (13/24), followed by the USA (9/24) and Europe (2/24). In terms of clinical specialty, emergency physicians (14/24) and general practitioners (5/24) also constituted the majority of the participants.

Using semi-structured interviews, the participants' perspectives and experiences were sought in relation to the viability of social media tools for tacit knowledge sharing. A series of open-ended as well as probing questions were asked. Examples include:

Q1. What kind of social media tools do you usually use for professional purposes?

Q2. What kind of information you usually share or you can find in social media?

Q3. Can you describe a time when you used social media to share your personal professional knowledge?

Q4. Do you ever share your personal clinical experiences or opinions on social media?

Q5. Have you ever obtained a new idea, clinical tips and insights while using social media?

Q6. What potentials do you see in social media that enable you to share your knowledge?

The interviews were mainly conducted via Skype. A few also were conducted over the telephone. Interview sessions last approximately 40 to 60 min and audio recorded with the permission of the interviewees. The process of interviewing was continued until it was noticed that nothing new emerged in the past interviews and relative data saturation had been achieved.

The interviews were then transcribed, coded and analysed using a thematic data analysis approach. Adhering to the guides suggested by several authors such as Braun and Clarke (2006), Ryan and Bernard (2003) and Bazeley (2007), specific steps were followed to perform the thematic analysis in the study:

- *Preparation*: Transcribing the interviews and familiarisation with the data by listening to the interviews and also by reading the transcripts multiple times.
- *Coding*: Initial open coding, initial organisation of the codes and reviewing the codes multiple times.
- *Themes identification*: Searching for themes and making decisions on key themes based on content similarities, theoretical link and also repetition.
- *Reporting findings and discussions*: To facilitate the data analysis process, the qualitative data analysis program, NVivo, was also used.

Trustworthiness of the findings was also obtained by submitting copies of transcripts to the participants for verification and comment and by systematically reviewing the detailed records of the data analysis process including decisions made throughout the project; finally, the appropriateness and the transparency of the data collection and analysis processes were discussed with the supervisory team and colleagues in various meetings.

4. Findings

The thematic analysis revealed five primary themes that depict how the participants experienced tacit knowledge sharing in social media, in particular, Twitter, blogs and multimedia sharing sites such as YouTube and Vimeo, which were the main tools used by the participants. A detailed description and discussion of each theme is provided in the following sections.

4.1 Theme one: socialising

Creating a space for socialising (to talk, discuss and interact with peers) was one of the most frequently reported contributions of social media in helping physicians to share their tacit knowledge and experiences. The participants who used social media had regularly found it a social place where they could easily interact with their peers in a global setting. They could ask their clinical questions and crowd source a response. They could express their opinion freely about a clinical case posted by colleagues, and they could engage in a live discussion with peers on social media.

Socialisation and dialogue are essential for tacit knowledge sharing (Nonaka and Takeuchi, 1995; Yang and Farn, 2009; McAdam *et al.*, 2007; Souto, 2015). The data analysis revealed that social media enabled the participants to socialise with each other by providing opportunities for dynamic conversations, discussions, questions and answers, commenting, instant communication and open participation. For example, engaging in dynamic conversations and discussions was found to be one of the most common ways of socialisation on social media. According to the participants, most of the discussions occurred among them on social media (particularly on Twitter and blogs) were about job-specific issues and challenges, particularly about clinical problems they encountered in the workplace where there was normally not much clinical evidence and best practice to solve the problem. People just share their personal professional experiences about "what really works" in challenging situations. These conversations are usually great sources of tacit knowledge. The following is an example of participants' statements regarding their engagement in professional discussions on social media:

> There was a Twitter conversation that took place where we all shared our experience in an area where there isn't really a lot of solid evidence [. . .] there's no best practice and it's just people saying what they do and what they've found works for them (Participant no. 18).

Asking clinical questions and seeking help or crowd sourcing for an answer on social media was also common particularly among junior physicians as well as physicians who were working in remote areas. They found social media providing great opportunities to connect with senior physicians around the world and ask for help. They were usually asking questions on social media when they, for example, faced a bizarre problem at their clinical work or when they were just seeking to obtain re-assurance from their colleagues in regard to their own clinical practice. Physicians who participated in the study stated that they shared numerous practical tips or know-how on social media when peers asked them to help. As an example, a participant stated:

> There is a lot of cases where you put up for a clinical question [. . .] and you'll get the response from four or five different people [. . .] where they give you a little rule of thumbs which you wouldn't normally find [. . .] in the literature (Participant no. 1).

A question and answer session is one of the most appropriate ways to develop a discussion and to reveal the tacit knowledge of senior experts (Marwick, 2001; Joia and Lemos, 2010; Souto, 2015). The question and answer approach is particularly helpful to disclose types of tacit knowledge that is easily accessible and articulable if an appropriate question is asked.

Instant communication with peers to obtain or provide immediate feedback was also revealed as another aspect of online socialisation on social media. The ubiquitousness and high accessibility of social media sites and the possibility of using social media tools on mobile phones and tablets allow conversations to occur in a more natural and social way.

It then facilitates dialogue and conversations to happen on a regular basis, fosters a sense of belonging to a community and lays the foundation for mutual relationships and networking, which are essential for ongoing tacit knowledge sharing.

Individual commentary on recent topics and issues posted on weblogs, Twitter or shared podcasts/vodcasts was found as another aspect of socialisation on social media. Commenting on social media is mainly asynchronous communication where people read a blog post, listen to a podcast or watch a video on social media platforms and then reflect upon them based on their personal knowledge and experience through commenting. Reflection on explicit material with individuals' own experience and knowledge is one of the most effective ways to externalise and share tacit knowledge (Stover, 2004; Haldin-Herrgard, 2000; Joia and Lemos, 2010). Therefore, it can be argued that the possibility to comment on social media may facilitate externalisation of tacit knowledge by providing opportunities for reflecting on the contents presented.

Finally, tacit knowledge requires a climate of freedom and openness to be shared (Brink, 2003). People are likely to be motivated to share their tacit knowledge in environments that foster openness and freedom and allow people to open up and express their ideas freely. It was found that social media, according to the study participants, provides such an open space for every individual physician to have a voice, exchange personal opinions and experiences and communicate freely with colleagues with minimum barriers. According to the participants, social media is a great leveller, allowing physicians of different professional backgrounds and levels to interact with each other. The authenticity of people's voices on social media is more important than their age, location and their position in organisations.

In summary, the combination of synchronous and asynchronous communication, and also the existence of a large audience and open participation on social media, provides better opportunities for online socialisation among physicians. The socialisation on social media occurs mainly in a text format which is useful for sharing knowledge with a low-to-medium degree of tacitness. However, social media is still unable to support the non-verbal and social cues that are also critical for knowledge with a high degree of tacitness.

4.2 Theme two: practising

Watching and observing a practice of other people is regarded as a conventional and effective way to transfer tacit knowledge, particularly to transfer technical know-how and skills. Creating such a space to watch, observe, demonstrate and imitate best practices through social media and using multimedia components was one of the main themes that emerged from the data.

The physicians who participated in the study believed that direct face-to-face demonstration and observation, followed by supervised "hands-on" experience, is still the best way to share and learn practical skills. However, the face-to-face demonstration is not always available due to the fact that senior physicians in hospitals, or most importantly, the required clinical cases for teaching, are not always available. In addition, it is usually one-off experience and may not happen for a long time. Therefore, the study participants considered sharing online videos of clinical practical skills on an appropriate social platform as necessary for the ongoing education of medical practitioners. Participants acknowledged that they obtain "more tacit learning from podcasts and YouTube than [. . .] simply writing blogs" (Participant no. 1).

The ability of audio-video materials to facilitate tacit knowledge sharing was already known prior to social media (Raisanen and Oinas-Kukkonen, 2008; Sarkiunaite and Kriksciuniene, 2005; Nilmanat, 2011). However, social media channels such as YouTube and Vimeo removed most of the barriers of traditional video formats and eased the process of sharing multimedia content generated by users. The possibility of developing ongoing discussions, commenting, providing feedback, tagging using personal keywords, rating and searching

were all mentioned as some of the advantages of videos shared on social media channels which amplify the learning experience.

The study participants provided several examples of when they had videotaped their own particular practical skills and shared them with the clinical community on social media. Some examples of these videos were about demonstrating skills needed to accomplish an ultrasound on an aircraft, performing a cervical surgery on a rarely seen case and shoulder replacement techniques. As an example, a participant stated:

> We have actually got a published YouTube channel that we put [. . .] video demonstrations of actual procedures done during clinical work [. . .] it's quite powerful in terms of being able to share people's clinical experience [. . .] (Participant no. 6).

The participants believed that educational videos shared on social media provide a multi-sensory learning experience and are great sources for learning practical skills. They asserted that videos shared on social media channels enabled them to learn different ways of performing a given procedure and adopting the best ones to their practice. As one of the study participants said:

> Today for example I was on YouTube and I was looking at a video of how to put in a particular type of chest tube and watching somebody do it and I learned several things by listening to their commentary and watching their techniques (Participant no. 21).

As the above examples show, social media has a high potential to expose physicians, particularly remotely located physicians, to current best practices and enable them to deliver high quality services. According to the participants, if physicians do not see a particular case for several months or years, their experience will probably be lost over that time. This is where online videos can play an essential role in refreshing physicians' memory to perform a procedure more confidently and accurately.

In summary, creating educational videos of rare clinical cases or procedures, with patient consent and ethical clearance, and sharing them on social media channels such as YouTube, Vimeo and HQMedED was mentioned as one of the best methods to transfer knowledge and expertise to medical students as well as junior physicians. However, the study participants did not recommend referring to online videos without first acquiring introductory or basic medical knowledge about the topics shared.

Sharing clinical images is also popular among physicians who use social media, according to the study participants. Physicians usually share clinical images with their colleagues on social media when they encounter an unusual CT scan, abnormal findings in ultrasound, X-ray and ECG images or any images that they think might serve as a learning point for the benefit of others. According to Nilmanat (2011), sharing images in online discussion forums facilitate tacit knowledge sharing. Therefore, it can be argued that social media also may increase the chances of sharing tacit knowledge among physicians by enabling them to easily share clinical images.

Despite the advantages of social media for practising, it still lacks the richness required for transferring highly tacit skills in which people prefer physical proximity and using multiple senses to learn. However, based on the evidence presented in this study, it can be argued that videos shared on social media channels not only can easily facilitate sharing of articulable tacit knowledge but can also partially facilitate sharing of inarticulable tacit knowledge.

4.3 Theme three: networking

Developing mutual relationships and networking have been regarded as the basis for tacit knowledge sharing. Social media is also well known for connecting people in a global setting, and its potential for opening up networks for like-minded people has been adequately addressed in the literature. This potential of social media was also acknowledged by all 24 participants of the study who admitted that through social media,

they had developed relationships with like-minded peers that they would probably not have been able to establish using traditional means of communication. Indeed, one of the tangible benefits of using social media, according to the participants, is to locate eminent experts and pioneers in the field from all over the world. Social media tools such as Twitter, blogs, LinkedIn and Google+ enable physicians to share their professional profiles online. They also allow them to extend their existing network through friends-of-friends relationships, friends' suggestions and establishing relationships with people who have joined in online professional groups. Therefore, social media has a strong potential to locate experts beyond the physicians' immediate access in their local departments, and hence to initiate dialogue or collaboration with them. As one of the participants mentioned:

> As you begin to engage in conversation you become aware of those people who are able to help you professionally in the social media setting, you become aware of those people who are producing good quality peer-reviewed information (Participant no. 1).

Having access to experts is especially critical for junior physicians as well as those who work in remote areas where they usually have limited formal learning opportunities, as well as limited access and interaction with senior experts. Social media enables such physicians to easily find and communicate with senior physicians and specialists who are eager to help others. As an example, a perspective of a remotely located physician who participated in the study is provided below:

> I believe I have access to a greater pool of expertise than I would if [. . .] I'm [. . .] much more sense that I work in a sort of global community with certain standards [. . .] and I think that's got to be a benefit to my patients (Participant no. 12).

Access to experts in terms of "who knows what" and "who can do what" is important in the tacit knowledge sharing process. However, for effective tacit knowledge sharing to occur, depending on the degree of tacitness, a stronger relationship level and a regular communication exchange on social media are also necessary.

The other aspect and advantage of networking on social media, as mentioned by a large number of study participants, is that it facilitates cross-organisational and cross-disciplinary interaction and collaboration by providing opportunities for physicians as well as other healthcare professionals from different organisational settings to interact with each other, to participate in the discussions, to network on social media space and maybe to extend it to a real-time interaction. A large number of participants viewed this is as a key benefit of joining discussions on social media in which you can obtain a range of opinions and experiences from people with different backgrounds working in different organisational systems and geographical locations. One of the study participants described this well:

> Obviously I do interact with far greater range of people by terms of geographical location [. . .] and also different professional background [. . .] a lot of teaching face-to-face is mono disciplinary [. . .] whereas on some of the blogs you can get perspectives of other disciplines (Participant no. 20).

This inter-sectoral and inter-professional networking on social media encourages tacit knowledge creation and sharing as a result of seeing other ways of doing things and hearing a diversity of experiences and opinions about healthcare from people within and outside of their specialisation and from across systems, places and time zones. This multi-level, multi-layer interaction helps them obtain much broader knowledge and understanding about a particular issue or controversy, and this may increase the chance of creating new knowledge.

Another aspect of networking on social media, according to the study participants, is about providing opportunities for professional collaborations. A considerable number of participants had developed relationships with other colleagues to create knowledge products such as collaborative writing of papers, essays or blog posts; creating podcasts and vodcasts and sharing projects and grant proposals. There were also examples of a group of physicians collaborating with each other to work out a treatment plan for a specific

clinical problem. Such patient-specific discussions mostly happen in a secured social network or through private messages on Twitter.

Instances of collaboration among physicians on social media are still few and far between and only occur when there is regular communication and mutual trust between participants. However, according to the participants, it is much more productive than traditional networking and collaboration due to the potential of being available on social media regardless of time and place and opportunities for instant communication and developing discussions on a global basis.

In summary, the theme of "networking" argues that social media has enormous potential to build global network(s) of healthcare professionals with similar interests that might have not been possible before. It maximises the ability to find new people by expanding both the breadth and the reach of the network that a person can participate in. It allows to track and follow others people's experiences and opinions. It overcomes the traditional boundaries between different organisations, departments and professionals and provides opportunities for cross-organisational as well as cross-disciplinary communication and collaboration. Such networking on social media establishes a basis for fostering strong relationships, either online or offline, for mutual learning, and also for tacit knowledge sharing.

4.4 Theme four: storytelling

Another theme that emerged from the data related to creating a space for interactive "storytelling". Storytelling has been regarded as one of the conventional methods for tacit knowledge sharing. Stories carry rich contextual information along with personal opinions and experiences which are central to tacit knowledge sharing (Swap *et al.*, 2001; Sole and Wilson, 2002; Linde, 2001; Williams, 2014).

The ability of social media, particularly blogs, in creating an interactive space for storytelling was also acknowledged by the majority of the study participants. According to the participants, social media has significant potential for storytelling, such as providing opportunities for case reporting and developing discussions about challenging cases, sharing personal experiences and lessons learned and presenting stories in a multimedia format.

Storytelling on social media begins with sharing a clinical conundrum that happens at times in the workplace, according to the participants. Reporting clinical cases, particularly unusual cases, and developing discussions about them was one of the most common interests of physicians using social media. Sharing the technical details of a case or a problem was usually followed by providing other colleagues' input on possible causes of the disease, what they thought the diagnosis might be and what they would do and how they would manage the problem according to their past experiences. An example of participants' use of social media for sharing clinical cases is provided below:

> I'm really constantly talking about cases that have come up in interesting conversations [. . .] I'm talking about my own patients, experiences of patients who did unusually well or poorly that might be instructive for other people (Participant no. 5).

The main social media tool used for storytelling was blogs, followed by the delivery of announcements on Twitter about the story. In addition, the participants mentioned cases in which they used podcasts and vodcasts in their storytelling approach where they recorded their discussions about challenging cases and shared them online for everybody to use.

Reporting sheer technical details of a clinical case may not necessarily result in tacit knowledge sharing, unless there is interaction between people who listen to/read the story with each other. Indeed, having a dynamic space where physicians can develop deeper discussions on reported stories by making comments is one of the advantages of writing stories on social media. Despite the advantages, the participants cited protecting patient's

privacy as one of the main issues that sometimes prevented them from sharing patient related stories on social media. Therefore, adhering to the same patient privacy principles and codes of conduct that are required in the workplace was believed by the study participants as the best way to keep patient confidentiality on social media too.

Providing opportunities to share personal experiences and lessons learned from the management of particular clinical conditions or rare findings was mentioned by the study participants as another important aspect of storytelling on social media. In the participants' opinion, medical practitioners are more interested in practical knowledge and experience than the scientific knowledge published in journals and textbooks. Relaying the knowledge acquired in critical clinical encounters is more important than re-stating the facts from the relevant literature. This is done best when it is supplemented by real-life stories and experiences from the workplace.

The participants mentioned several examples of sharing their stories of how they had applied a special technique and what the outcomes were, explained learning points, shared mistakes, failures and successes on social media tools such as blogs, Twitter, YouTube and podcasts/vodcasts. Such workplace stories are usually great sources of tacit knowledge. As an example a participant stated:

> An example would be how I personally manage atrial fibrillation [. . .] it's done differently around the world [. . .] I've shared how I have managed patients, the experiences that I have had with doing it in particular ways and then I've put that on my podcast (Participant no. 21).

Supporting multimedia components was mentioned as another advantage of storytelling on social media, as it allows for the possibility of integrating other media elements such as images, audio and video formats to support the story. The participants reported that several times they had posted clinical images such as an ECG, a picture of a rash, X-ray images or video presentations of clinical procedures to explain or demonstrate something very efficiently. The possibility of using multiple media enables the storyteller to frame the story effectively and illustrate the experiences in a useful way. In addition, multimedia-oriented storytelling on social media suits some people's preferred way of learning.

The multimedia feature of social media is not only useful for practice demonstration and learning, which was already discussed above, but also a bonus for storytelling, as stated by the participants of the study. Life in the Fast Line, for example, which was said by the participants to be one of the famous medical blogs, has collected more than 2,000 podcasts and vodcasts related to clinical practice that have been shared by many enthusiastic physicians on various medical blogs. Most of these podcasts and vodcasts contain stories from the workplace that are great sources of job-specific tacit knowledge. Physicians usually share their unique approaches and experiences in diagnosing, critically evaluating and managing challenging clinical situations in these podcasts and vodcasts.

In summary, the theme of "storytelling" argues that social media sites, particularly blogs as well as podcasts/vodcasts, easily enable physicians to talk about or write down their clinical stories and experiences more effectively than can be done with other written formats of storytelling. Social media platforms provide a rich media for storytelling and therefore, for tacit knowledge sharing, by enabling the users to support stories with multimedia elements such as pictures, audio-video components and presentations. There is also the possibility to engage in conversations about the stories shared on social media. Readers do not just simply read or listen to a story on social media; they are also able to communicate with the storyteller or any other colleagues talking about the story. In other words, disconnection with the storyteller is not a major issue any more in stories being told on social media.

4.5 Theme five: encountering

Encountering new knowledge and information was another theme that emerged from the data. Information encountering has been defined in the literature as a process of finding

useful and interesting information while seeking or browsing for some other information (Erdelez, 1999). Accordingly, encountering in this study is defined as the extent to which the participants encountered new knowledge and information as a result of interacting with peers, reviewing Twitter or blog updates or while searching for specific information on social media sites. This also covers mechanisms that enhance the visibility and availability of existing knowledge which then increases the participants' encountering more knowledge.

Information encountering is mostly about explicit rather than tacit knowledge sharing. However, as Nonaka and Takeuchi's (1995) knowledge creation model and Polanyi's (1966) argument of interaction between focal (explicit) and subsidiary (tacit) awareness also implied, tacit and explicit knowledge have an interactive relationship such that the creation of one depends on the other. That is, interaction with existing explicit knowledge and exposure to information from various perspectives and sources are essential for creating and capturing new tacit knowledge (Raisanen and Oinas-Kukkonen, 2008; Dinur, 2011; Marwick, 2001). Increased interaction with existing explicit knowledge may then facilitate the internalisation and creation of new tacit knowledge. In other words, the more existing knowledge is available and visible for knowledge seekers, the more cutting-edge ideas and tacit knowledge might be created and shared. Therefore, this theme was also deemed important in the process of tacit knowledge sharing.

The study found that, as acknowledged by the majority of the study participants, social media has a much greater ability to increase knowledge encountering in comparison to any other traditional media. The data showed that social media facilitated participants' encountering existing knowledge in a number of ways: broadcasting and publicising information to a wider audience, faster dissemination of information, personalised and filtered information feed, keeping up-to-date, documentation of knowledge and experiences and retrievability. All these processes help existing knowledge to become more available to the clinical communities, hence increasing the chance of creating and sharing new tacit knowledge.

Broadcasting blog posts, presentations, journal papers and live tweeting of conference highlights via Twitter were common among the participating physicians. According to the study participants, social media provides easy access to the print world. It is a good place to advertise and highlight studies or works that have been published somewhere else. As an example a participant said:

> I try to use social media sometimes to highlight these articles and drive traffic toward them so that we can foster a discussion (Participant no. 13).

The majority of the participants viewed this as one of the great advantages of social media in that it brings information to you that you perhaps would not have known about or found otherwise. According to the participants, faster dissemination of information is vital in the medical field. If you hear about a solution in a week versus two years from now, several patients' lives potentially might be saved in the interim. Unlike a journal that comes out once a month, social media is updated 24/7, 365 days a year, which means that it almost provides real-time information. The majority of the participants appreciated this immediacy of social media, the immediate availability of comments and tweets and also the ability to view articles even before they get published as a result of discussion with the authors of the articles. For example, a participant said:

> The main thing [. . .] is the immediacy of the social media world. So the fact that I can see an article that's not yet in print and immediately read it (Participant no. 12).

In addition, the participants believed that social media serves like a journal club for physicians who participate in social media in which everyone who has read something new and important shares it with other colleagues immediately. Indeed, it works as a platform for a collective reading and evaluation of the literature. The following interview excerpt

illustrates how social media helps physicians by providing personalised and filtered information feeds:

> I kind of use Twitter as a filtering device to see what people are talking about and which articles I should pay closer attention to (Participant no. 17).

Keeping abreast of what is happening internationally in the field was another dimension of encountering which was mentioned by majority of the participants. They acknowledged that prior to the use of social media, their ability to obtain new knowledge was limited to local colleagues and a few journals if they could find the time to read them. However, their ability to incorporate new knowledge had exploded since entering the social media world. For example, a participant stated that:

> I just flick through my Twitter all the time [. . .] Just pick out individual things and it can take me five minutes to read [. . .] I am always up-to-date with the latest stuff [. . .] It's not because I spend lots of time studying and reading it, because I'm just now awash with this conversation going on (Participant no. 11).

Documentation of knowledge and experiences was observed by a number of participants as another aspect of encountering on social media. Indeed, one of the main reasons of using social media tools by physicians was to document and store their professional experiences, lessons learned or some important information they found in the literature. They mentioned that they were using social media tools, mainly blogs, like a personal notebook to write down and store their particular findings or thoughts to use them in the future by themselves or to share with other physicians to develop discussions about them. For example, a participant mentioned that:

> We mainly use it [blog] to sort of document our own stories and to keep it as a base for what we've learnt and experienced and found (Participant no. 23).

Retrievability of articulated tacit knowledge was also mentioned as another advantage of social media. Once tacit knowledge is codified and converted to a written format it is easily possible to retrieve it on social media. Social media tools provide opportunities to search articulated tacit knowledge on a specific topic either by employing personalised tags or through popular search engines such as Google, Yahoo and Bing. As a result, the chance of encountering new information and knowledge increases among users.

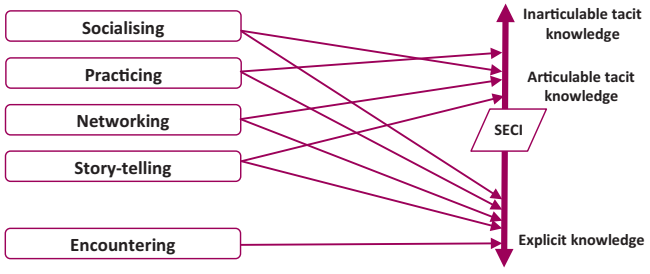
In summary, tacit knowledge creation relies not only on personal experiences and knowledge acquired at the workplace but also depends on the availability and adequate consumption of existing knowledge and information. The increased interaction with existing knowledge provides more possibilities for internalising the assimilated knowledge which then establishes more opportunities for creating new tacit knowledge.

5. Towards a conceptual model

The main findings of the study can be illustrated via a conceptual model that explains the major contributions of social media to facilitate tacit knowledge sharing, as experienced by the participants of the study (physicians). Figure 2 shows the potential conceptual model of the study. The model is based on the thematic analysis of the data and the supporting literature. The themes of the study have also been connected to the continuum of tacit-to-explicit knowledge in the model. Each theme supports knowledge with a different degree of tacitness or explicitness.

For example, socialising, practising, networking and storytelling mainly facilitate knowledge with a low-to-medium degree of tacitness (in other words, articulable tacit knowledge). Practising might even support knowledge with a fairly high degree of tacitness (or inarticulable tacit knowledge), using multimedia components in which people can pick up subtle things directly from the videos or images shared on social media. On the other hand, encountering mostly facilitates knowledge with a low degree of tacitness. That is, it mainly facilitates explicit knowledge sharing first, and then during the process of internalisation

Figure 2 Conceptual model of tacit knowledge sharing over social media: Physicians' perspectives and experience



Note: SECI (socialisation, externalisation, combination and internalisation)

(conversion of explicit to tacit) (Nonaka and Takeuchi, 1995), the assimilated knowledge might be converted to tacit knowledge.

Tacit and explicit knowledge have a more interactive relationship in that the creation of one relies on the other (Roberts, 2000; Nonaka and Takeuchi, 1995; Virtanen, 2013). As explained by Nonaka and Takeuchi's knowledge creation theory [socialisation, externalisation, combination and internalisation (SECI)], explicit knowledge might always be combined, internalised and converted to tacit form, and vice versa, tacit knowledge might also be socialised, externalised and converted to explicit form. Therefore, it can be expected that in every step of socialising, practising, networking, storytelling and encountering on social media, there might be instances of both tacit-to-explicit and explicit-to-tacit knowledge conversions and sharing. Accordingly, SECI theory was also integrated in the model to indicate that tacit and explicit knowledge always have an interactive and dynamic relationship, that is, discussing one inevitably necessitates discussing the other as well.

Finally, it is worth mentioning that although the themes in the model are shown as distinct from each other, they still have intertwined relations with each other. Examples of these relationships are discussed below.

5.1 Socialising and networking

The first example might be of the relationship between socialising and networking. Socialising and networking seem to have a close relationship. Socialisation fosters bonding and mutual trust, and therefore, it encourages the development and strengthening of new interpersonal relationships (Chen *et al.*, 2009; Cousins *et al.*, 2006; Kim, 2013). Therefore, it can be argued that the primary socialisation and conversations on social media may provide the basis for future professional networking. People who have a regular conversation and dialogue on social media are more likely to develop a strong mutual relationship in the future. Accordingly, it can also be argued that true socialisation on social media might occur mostly and frequently between people who have already networked with each other either in real-time or in an online space.

5.2 Socialising and storytelling

Socialising may also link theoretically with storytelling. People are more likely to reveal of themselves and tell their stories when they socialise with each other (Chung, 2006). Therefore, socialisation on social media may also encourage people to tell and share their everyday workplace stories. Similarly, storytelling may also promote dialogue and socialisation among individuals (Sole and Wilson, 2002; Pässilä *et al.*, 2013). Hence, it can

be concluded that socialisation and storytelling on social media are strongly associated with each other.

5.3 Networking and other facilitators

Networking also seems to be associated with other facilitators of tacit knowledge sharing. Indeed, it can be argued that any effort of socialisation, storytelling, practising and information encountering on social media might foster professional networking among participants. Networking requires mutual trust (Peroune, 2007; Willem *et al.*, 2006), and this mostly occurs through both formal and informal socialisation (Anderson-Gough *et al.*, 2006; Kim, 2013). On the other hand, storytelling, practising and information encountering may encourage socialisation and trust among users of social media.

For example, storytelling establishes mutual trust (Sole and Wilson, 2002; Gill, 2011) and encourages conversation about the matter of the story or other relevant experiences (Sole and Wilson, 2002; Pässilä *et al.*, 2013). Similarly, demonstrating practical skills on social media may also inspire socialisation and encourage participants to comment, discuss and exchange their idea, opinions and experiences. This socialisation may then, as discussed above, foster mutual relationships between participants and lead to professional networking (Chen *et al.*, 2009; Cousins *et al.*, 2006; Kim, 2013).

5.4 Encountering and other facilitators

Encountering may also be associated with other facilitators of tacit knowledge sharing. It can be argued that in every step of socialisation, storytelling, networking and practising on social media, participants may encounter new knowledge and information. As shown in the study findings, the participants always received updated medical information or new sources, and links to further information were recommended to them by trusted people as a result of discussions in social media space. In addition, knowledge encountering on social media may also encourage people to contact the authors for further information or discussion, and this may also lay the foundation for future networking among them.

6. Discussion

Many studies have examined and conceptualised the role of ICT in KM processes. Nevertheless, there has been limited research conducted in the area of the contributions of ICT, in particular social media contributions, to facilitate tacit knowledge sharing exclusively. In fact, there have been contradictory views in the literature on whether ICT can actually facilitate tacit knowledge sharing, and very few studies have conceptualised ICT contributions to tacit knowledge sharing (Panahi *et al.*, 2013).

Consistent with the researchers who argued that ICT may mediate tacit knowledge sharing (Harris and Lecturer, 2009; Hildrum, 2009; Marwick, 2001; Murray and Peyrefitte, 2007; Wagner *et al.*, 2014), this study also posited that ICT, in particular, emerging social media tools, have the potential to facilitate tacit knowledge sharing. The current study revealed five major themes and over 20 sub-themes that were found to be effective in facilitating tacit knowledge sharing on social media. The themes identified in the study not only highlighted and organised some of the isolated arguments in the literature in regard to technological support for facilitating tacit knowledge sharing but also explored and identified new concepts and meaning while investigating tacit knowledge sharing over social media space. In addition, the study supported those arguments with empirical data collected from the healthcare context, while most previous studies lacked empirical data support.

Some of the themes identified in the study were strongly aligned with the literature findings related to face-to-face tacit knowledge sharing. These themes were revisited in a social media context, and the sub-dimensions revealed for each were mostly unique. The study demonstrated that socialisation, networking, practising, storytelling and information encountering on social media could facilitate tacit knowledge sharing differently, compared to face-to-face interactions.

For example, socialisation and storytelling have been regarded in the literature as effective ways to exchange tacit knowledge in a face-to-face context (Nonaka, 1994; Yang and Farn, 2009; McAdam *et al.*, 2007). However, to the best knowledge of the researcher, almost no study revealed and discussed dimensions of socialisation and storytelling, in particular in ICT-mediated tacit knowledge sharing. The current study revealed that socialisation on social media facilitates tacit knowledge sharing through enabling people to participate in conversations and discussions, by offering opportunities for question and answer, instant communicating and commenting. These can be regarded as new dimensions of socialisation on social media context.

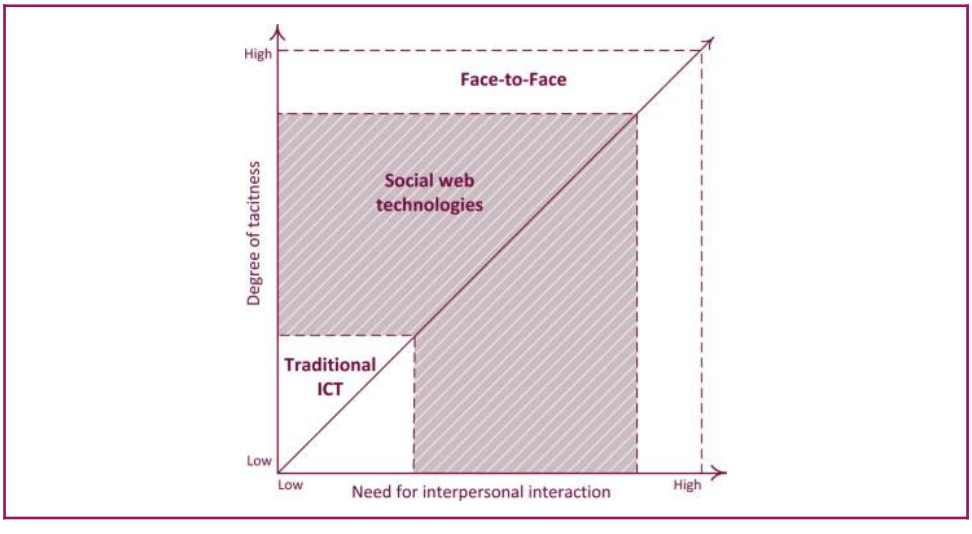
Furthermore, as illustrated in Figure 3, while the study argues that compared to traditional ICT, social media facilitates tacit knowledge sharing (particularly knowledge with a low-to-medium degree of tacitness) effectively, it also acknowledges that it is still far from supporting knowledge with a high degree of tacitness in which people prefer more close and face-to-face contact. Although current advances in multimedia and video-conferencing technology are all promising for facilitating knowledge with a high degree of tacitness, they still cannot replace face-to-face communication which provides a richer and more multi-sensory learning experience.

7. Conclusion

The purpose of the study was to examine the potential contributions of social media in facilitating tacit knowledge sharing among physicians. The current study conceptualised and demonstrated social media tools as one of the recent enablers of tacit knowledge sharing. In summary, the findings implied that social media can provide a space where physicians can socialise and discuss their clinical issues freely; watch, imitate, learn and benchmark best practices shared by peers; locate and build trusted relationships with like-minded people across the globe; write and share their clinical stories in an interactive way that can also be supported by multimedia components; increase their interaction with existing knowledge and information; reach out to or obtain knowledge from much wider audiences and resources; and document and retrieve the articulated and shared tacit knowledge on social media.

Based on the thematic findings and the supporting literature, the study also proposed a conceptual model that shows the potential patterns and relationships between the themes identified in the study and the continuum of tacit-to-explicit knowledge. The model is unique

Figure 3 Social media versus traditional ICT versus face-to-face communication in supporting tacit knowledge sharing



in terms of contributing and updating the existing literature in the area of information technology support for tacit knowledge sharing, in particular, by demonstrating the potential contribution of social media to facilitating tacit knowledge sharing.

Researching tacit knowledge is problematic from both theoretical and methodological perspectives (Ambrosini and Bowman, 2001; Rebernik and Sirec, 2007). The current study also had both theoretical and practical limitations.

Theoretically, the aim of the study was to study only tacit knowledge sharing, and explicit knowledge was supposed to be excluded from the study. However, as discussed earlier, the distinction between tacit and explicit knowledge in reality is not as clear as in the theoretical definitions. Although the tacit-explicit continuum (Jasimuddin *et al.*, 2005; Chennamaneni and Teng, 2011; Haldin-Herrgard, 2000) was adopted for the purpose of the study, making decisions about the type, quality and relevancy of knowledge shared among physicians on social media and interpreting them within tacit knowledge definitions was not always a simple task. Therefore, the codes chosen and the decisions made are subject to criticism.

In addition, the sample used in the study was small and did not include all groups of physicians with different types of specialisations. Therefore, the findings of the study might be tentative and require further research with a larger worldwide representative sample of physicians. Finally, as it was qualitative research, the study findings might be influenced by the researcher's personal interpretations and bias. To reduce this bias, the data analysis process and the study findings were discussed with the supervisory team and colleagues continuously.

The study developed an important connection between social media communities and tacit knowledge sharing which has implications for the healthcare industry, whose clinical teams are not always physically co-located but must exchange their critical experiential knowledge. Despite the importance of tacit knowledge in clinical work and despite the growing interest of physicians in joining online social communities, very few studies were found to be focusing on tacit knowledge sharing among healthcare professionals in online social space. The study can be regarded as one of the first studies that specifically concentrated on physicians' tacit knowledge sharing through the use of social media.

The study findings may provide an opportunity for healthcare professionals to better understand the potential of using social media platforms for knowledge sharing. In summary, obtaining insights into how social media contributes to medical tacit knowledge sharing may help physicians as well as healthcare providers, administrators and IT managers to discover new opportunities to facilitate knowledge and experience sharing among the clinical community, and therefore, assisting healthcare organisations to provide the highest quality of patient care. In addition, the result of the study might also be applicable to other contexts in which facilitating tacit knowledge among employees is important.

The study also acknowledges the need for further research in several areas. First, although the study contributes to bridging the gap of knowledge in the area of tacit knowledge sharing through information technology, the debate on whether ICT can actually facilitate tacit knowledge sharing is still ongoing, and there is still a need for further empirical studies to do so adequately. For example, the study viewed tacit knowledge more broadly as consisting of different types of experiential, personal, implicit, practical know-how and other types of tacit knowledge. Investigating each of these dimensions or types of tacit knowledge sharing through social media is a potential theme for future research.

Operationalising the findings of the study to conduct quantitative research to validate the model and generalise the findings could be also a major theme for future research. Furthermore, future business models require more tele-working in which employees work more often remotely. There is always a need to re-examine recent Web initiatives in terms of their efficacy and capacity for tacit knowledge sharing. Therefore, examining different types of social platforms

against different types of tacit knowledge and also seeking the perspectives and experiences of different professional online communities could be also interesting.

Finally, although the study positioned itself within studies that consider that there is a role for ICT in facilitating tacit knowledge sharing, the study still believes that for an effective transfer of tacit knowledge, technology alone is not sufficient, as also suggested by socio-technical theory (Parker, 2011). The need for human and social dimensions is always stronger than any other dimension required for tacit knowledge sharing. Thus, social media can only be regarded as complementary rather than a substitute for traditional mechanisms of tacit knowledge sharing.

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Further reading

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