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INFORMING THE DESIGN OF A HEALTH VIRTUAL COMMUNITY OF PRACTICE: A KNOWLEDGE TRANSLATION APPROACH

Research in Progress

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Abstract

Access to knowledge forms an integral part of the continuous learning processes of medical and other health professionals throughout their career. Modern technologies have become instrumental in extending learning processes to the online realm, particularly through the use of social media technologies. Health Practitioners' (HPs) exploitation of online social media technologies for online learning and knowledge sharing purposes has evolved into Virtual Communities of Practice (VCoP). However, there is limited research on the types of knowledge being shared to fulfil the notion of 'knowledge-into-action' in the healthcare domain. In addition, little is known of the use of online social media technologies as a catalyst to achieve 'knowledge-into-action'. This research in progress paper extends the conceptual model from our previous work and draws on current literature that identifies the types of knowledge being shared in a Health VCoP. We discuss some of our data using our conceptual lens as a preliminary analysis of our work. Expected outcomes are a new extended conceptual model that fulfils the notion of 'knowledge-into-action' that informs the design of an IT artefact based on types of knowledge being shared in a Health VCoP.

Keywords: Knowledge Management, Knowledge Translation, Virtual Community of Practice, Health Practitioners Learning.

1 Introduction

Online social networking sites have become invaluable tools for knowledge sharing purposes with exemplars of these tools being labelled ‘electronic networks of practice’ (Wasko and Faraj, 2005) and ‘knowledge networks’ (Newell, 2015; Grant, 2016). As technological advances in social media networking platforms (i.e. Facebook, Twitter, WhatsApp, etc.) increase our social networking with others in our daily lives (Kaske et al., 2012; Pawlowski et al., 2014), the healthcare sector adoption and knowledge sharing facilitated through online social networking sites have similarly witnessed a steep rise in the past decade (Newell, 2015; Rolls et al., 2016). Essentially, health practitioners (HPs) have begun forming a variety of virtual communities for learning and knowledge-sharing purposes which have evolved into virtual communities of HPs (Eysenbach et al., 2004; Snyder and Wenger, 2010).

Current literature aiming to understand the types of knowledge shared in a Health Virtual Community of Practice (VCoP) is from a medical viewpoint that focusses on tacit and explicit knowledge exclusively (Rolls et al., 2016). Furthermore, recent studies do not expand on how ‘knowledge translation’ works in the health field as there is no real framework or model that has empirically been tested that focuses on a ‘knowledge translation’ perspective (Straus et al., 2011). We situate our definition of tacit and explicit knowledge sharing on Newell’s (2015) perspective that the type of knowledge that is being shared differs depending on the context involved and what is appropriate for learning and knowledge sharing (Newell, 2015). Thus, there is a need to investigate and understand the types of knowledge that are being shared from an information systems (IS) knowledge management (KM) perspective for context-specific environments (Alavi and Leidner, 2001; Newell, 2015).

In our previous publication (Murad et al., 2016), we discussed how we formulated a set of design considerations to design a Health VCoP based on the current literature. However, we did not discuss the evaluation method by which we would inform the design. Hence, the evaluation method we propose in this research-in-progress (RIP) paper is a KM lens to evaluate a set of design considerations from our previous publications (Murad et al., 2017a; Murad et al., 2017b). The proposed KM lens will help us in informing the design of the Health VCoP, based on Alavi and Leidner’s (2001) argument that tacit and explicit knowledge have in-depth characteristics. This approach will help us to effective knowledge translation competencies with empirical evidence.

This RIP paper does not focus on tacit and explicit knowledge exclusively but rather on other types of knowledge being shared as derived from the literature, to better facilitate the ensuing learning and knowledge-sharing processes in a Health VCoP. The main research question is: *How does the learning and knowledge-sharing activity inform a set of design considerations for a Health VCoP?*

To answer this question, this RIP paper will use the proposed conceptual model as a lens to: 1) analyse what types of knowledge are being shared in a Health VCoP from two pre-implementation focus group session and individual interview sessions for a Health VCoP; 2) examine online discussion forum transcripts throughout the lifecycle of a Health VCoP and 3) conduct a number of post-use individual interview sessions with HPs involved in a Health VCoP. A re-evaluation of the proposed conceptual model and validation will follow.

2 Brief Background Literature, Lens, and Model

2.1 Knowledge Translation and Health VCoPs

The *knowledge-into-action* process has been described using many terms in the literature (Graham et al., 2006). Knowledge-into-action refers to the translation of knowledge into rational/effective use of the gained knowledge (Straus et al., 2011). Knowledge Translation (KT) has been the recurring term used for the *knowledge-into-action* process by The Canadian Institutes of Health Research (CIHR), US National Centre for Dissemination of Disability Research, the World Health Organization (WHO), and many other prominent health organisations (Straus et al., 2011). Hence, we define KT as “the synthesis, exchange, and application of knowledge by relevant stakeholders to accelerate the benefits of glob-

al and local innovation in strengthening health systems and improving people's health" (World Health Organisation). The mutual element in using almost the same definition by healthcare institutions is the movement towards the use of knowledge and not simply the dissemination of said knowledge (Straus et al., 2011). KT in health can encompass a multitude of terms such as knowledge transfer, evidence-based decision making, innovation diffusion, research dissemination, research uptake, research utilization, and research implementation (Estabrooks et al., 2006). In essence, KT in health ensures all decision makers in the healthcare system (practitioners, patients, consumers, managers, and policy makers) are cognizant of, able to access, and use evidence-based research to inform any kind of health-related decision-making process (Straus et al., 2011).

In Information Systems (IS), Newell (2015) posits that knowledge is constantly being (re)produced rather than transferred, so that certain elements of that knowledge will be changed and/or take on a different meaning altogether depending on associated actors (human and non-human) in the environment (Newell, 2015). Furthermore to make evidence-informed decisions, knowledge distillation, creation, and dissemination are not sufficient on their own to assist health decision makers (Straus et al., 2011). Hence, the nature of knowledge in the healthcare system changes based on specific actors involved in specific contexts of the environment.

Online social networks often do have a diversity of professionals and non-professionals in the network, however, they are all contributing to multiple topics of different interests (Newell, 2015). A group of professionals or practitioners involved in a network of peers for learning and knowledge sharing is called a Community of Practice (CoP) (Wenger et al., 2002). When established online a CoP evolves into a virtual community of practice (VCoP) (Wenger et al., 2002). VCoPs provide an opportunity for knowledge management (KM) practitioners to study the methods and mechanisms for people involved in learning and knowledge-sharing behaviours, resulting in understanding how to better maximise the learning and knowledge-sharing outcomes for the people involved (Wenger et al., 2002). Generally, KM promotes learning, improves decision-making processes, enables collaboration and networking, and stimulates and encourages innovation (Liyanage et al., 2009). In the health literature, managing knowledge has been one of the main goals for an effective and efficient use of Health VCoPs (Rolls et al., 2016), as a health community model postulates that knowledge exists in practice and is shared through continuous participation in these practices (Trusson et al., 2014).

In the healthcare environment, tacit and explicit knowledge sharing is of utmost importance in VCoPs (Newell and Swan, 2000; Rolls et al., 2016). Health VCoPs become knowledge-sharing networks that, in time, transcend into a knowledge repository for a group of HPs (Milne and Lalonde, 2007) and can incentivise researchers into developing and building a knowledge repository for specific needs for a specific group of HPs (Fan et al., 2014b).

From the literature, there is a focus on two types of knowledge being shared: tacit and explicit with various interpretations for both when examined from a medical view-point (Rolls et al 2016) and not from a KM perspective. Hara and Hew (2007) made the effort in using *three categories of knowledge*, based on Hara's (2007) previous work for a VCoP of public defenders, for a nursing and midwifery VCoP: i.e. i) practical, ii) book, and iii) cultural knowledge. Hara and Hew's (2007) study led to the conclusion that HPs involved in a VCoP, utilised practical and book knowledge but not cultural knowledge.

From the literature, we will classify the types of knowledge being shared by relying on the interpretations of taxonomy of knowledge by Alavi and Leidner (2001) and Arthur's (2009) analysis of the technological nature of knowledge. We have derived three types of knowledge that extend the definitions of tacit and explicit knowledge by anchoring our work in Alavi and Leidner's (2001) proposition. We bring examples ranging from 2006-2017 to display what types of knowledge shared by participants are managed in a Health VCoP as outlined in Table 1.

Type of Knowledge	Example References
Sharing of tacit medical knowledge	(Brooks and Scott, 2006; Norman and Huerta, 2006; Sharma et al., 2006; Milne and Lalonde, 2007; Rolls et al., 2008; Curran et al., 2009; Thomas et al., 2010; Valaitis et al., 2011; Mendizabal et al., 2013; Barnett et al., 2014).
Sharing of tacit and/or explicit local organisational/cultural knowledge	(Brooks and Scott, 2006; Sharma et al., 2006; Curran et al., 2009; Thomas et al., 2010; Valaitis et al., 2011; Mendizabal et al., 2013)
Sharing of explicit evidence-based knowledge	(Milne and Lalonde, 2007; Rolls et al., 2008; Curran et al., 2009; Mendizabal et al., 2013; Barnett et al., 2014; Lara et al., 2016)

Table 1. Type of knowledge being shared in a Health VCoP

In the Health VCoP space, a shift of sharing and adopting explicit evidence-based knowledge into work practices has ensued (Ranmuthugala et al., 2011; Rolls et al., 2016). This movement had already been explained for KM in the business realm by having decision makers indicating they favour explicit knowledge, at the expense of inconsistent tacit knowledge, because explicit knowledge may be viewed as more legitimised and thus, justifiable (Alavi and Leidner, 2001).

From Table 1, the first type of knowledge is tacit medical knowledge. This type of knowledge is already in the HPs mind from previous continuing experiences of operationalising their work in the field. The second type is tacit and/or explicit local organisational/cultural knowledge. This type is a mixture of tacit/explicit knowledge gained from experience that has been effected by the local environment in terms of the organisation that HPs are working in and the culture of using medicine that justify their decision making for patients. The third type is explicit evidence-based knowledge. This type focuses more on sharing evidence-based research from peer-reviewed sources such as journals, articles, conferences, etc.

2.2 Extending Our Conceptual Model for a Health VCoP

Our prior work (Murad et al., 2016) produced a conceptual model from the literature built on Snyder and Wenger (2010) conceptual framework of VCoPs to realise social constructivism learning events in work processes. Social constructivism learning theory suggests that over a period of time, participants as learners would develop an understanding of common practices, languages, values, and tools of the professional culture associated with their current learning environment (i.e. Health VCoP) (Soloway et al., 1996). Thus, we situate our argument around the work of Leidner and Jarvenpaa (1995) in seeking well-established learning theories for educational, learning, and knowledge-sharing research as IS researchers.

Snyder and Wenger's (2010) conceptual framework encapsulates three elements that explain the efficiency and effectiveness of social constructivism learning for a community: 1) domain (not providing identity and meaning for participants, can lead to uninterested and abstract experiences); 2) community (a diverse range of participants would assist in increasing the knowledge provided for innovative ideas in a collaborative learning environment); 3) practices (any action or process made by the participants to increase the learning and innovation that enhances the Health VCoP's knowledge base).

We extrapolated four design and one role consideration to sustain learning and knowledge sharing required for a Health VCoP (see Figure1). *Sustain* is incentivising and motivating participants to be engaged in the VCoP to contribute towards discussions (Wenger et al., 2002). The five elements of considerations are: rich profile information (individual representation for each Health VCoP participant); platform navigation (allowing individuals easy access inside the Health VCoP); a diverse community (a mixture of different HPs in the Health VCoP), rich contextual content (providing a range of rich content to participants for sustainment of the Health VCoP); and human roles (overall facilitation of the Health VCoP) (Murad et al., 2016; Murad et al., 2017a).

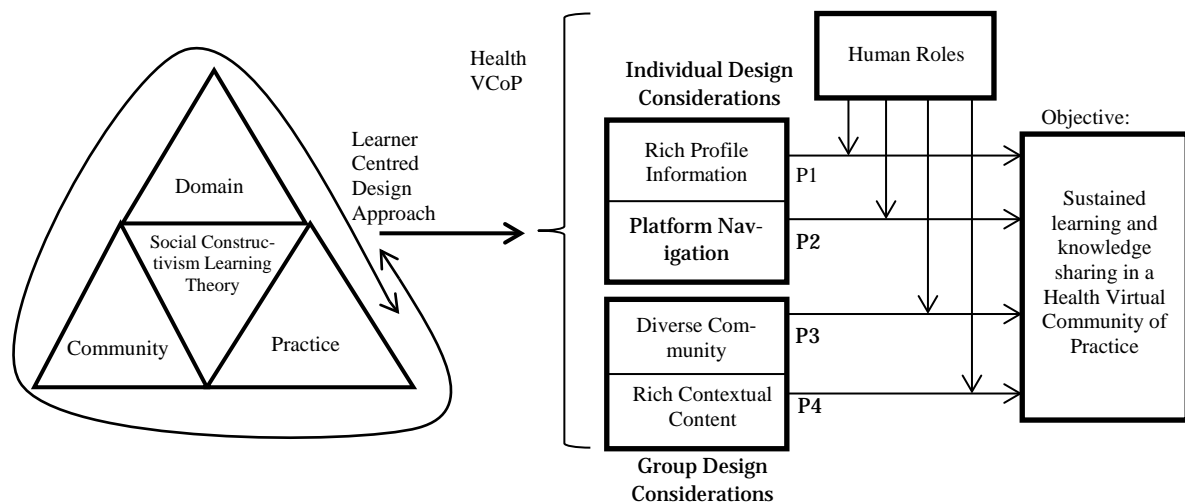


Figure 1. Old Conceptual Model by Murad et al. (2016)

We relied on the Learner Centred Design (LCD) approach to extract the necessary literature in forming our conceptual model. Soloway et al. (1994) states that the LCD approach aims to “support individuals and groups of individuals in developing expertise in their professions, in developing richer and deeper understandings of content and practices.” The LCD approach complements our social constructivism learning theory as it helps in integrating assisting tools to scaffold the learning process for participants involved (Murad et al., 2016). Facilitators serve as a scaffold for participants to assist in the learning and knowledge-sharing process, and can incentivise and motivate participants in more interactions and participation as facilitator’s activity and tasks in any scaffold process is considered important since the early 1990s (Orlikowski et al., 1995), hence, our Human Role consideration.

We then formulated four main propositions to answer our previous research question (Murad et al., 2016):

- **Proposition 1:** *A rich profile increases the participant’s interaction in a Health VCoP, moderated by human roles, which may lead to a sustained learning community.* A customisable profile enables empowering an individual’s identity (Toma, 2010), such as adding first and last names leads to increasing trust among participants due to knowing that each identity is a real person (Ardichvili et al., 2003; Lederman et al., 2014; Fan et al., 2014a; Fan and Lederman, 2018). This notion increases participation in the social network (Merolli et al., 2013) due to participants willingly embedding themselves in the network (Wasko and Faraj, 2005) and leads towards learning and knowledge-sharing opportunities (Wenger et al., 2002).
- **Proposition 2:** *An easily-navigable platform increases the participant’s interaction in a Health VCoP, moderated by human roles, which may lead to a sustained learning community.* Involving participants in testing and assessing the Health VCoP would gauge the technical skills for an easy-to-use platform (Guldberg and Mackness, 2009) and receiving feedback from participants would help in increasing participation for the targeted participants (Munro et al., 2012). Hence, increasing participation via an easy-to-use platform would lead to increased learning and knowledge-sharing competencies for HPs (Barnett et al., 2012).
- **Proposition 3:** *A diverse online learning community increases the participants’ interaction in a Health VCoP, moderated by human roles, which may lead to a sustained learning community.* The networking incentive in having non-competing HPs in one Health VCoP that share the same notion of learning and sharing knowledge amongst themselves would increase their participation (Barnett et al., 2014). Having a group of professionals bonding over a shared concern, a set of problems, or passion about a subject would increase interaction amongst themselves and is key to deepening a participant’s knowledge and expertise (Wenger et al., 2002).

- **Proposition 4:** *Rich contextual content increases the participants' interaction in a Health VCoP, moderated by human roles, which may lead to a sustained learning community. Providing HPs with high quality of content is needed to incentivise and motivate them to maintain and increase participation for learning and knowledge sharing processes (Wenger et al., 2002; Snyder and Wenger, 2010). HPs are usually time-poor due to their work structure and environment (Rolls et al., 2008; Yee et al., 2014) and providing high-quality content with easy access is an incentive on its own (Sandars et al., 2007).*

We then produced our first case study research (Murad et al., 2017a) in testing our design considerations with two focus groups of HPs. We concluded with contributions to theory and practice for Health VCoPs, and identified a new construct termed “Patient Information Anonymisation”. Hence, we will extend our conceptual model in this RIP paper with our new construct into a new conceptual model and a new proposition. Furthermore, we will extend our conceptual model with a knowledge analytical lens to analyse the Health VCoP with the three types of knowledge mentioned in the previous section.

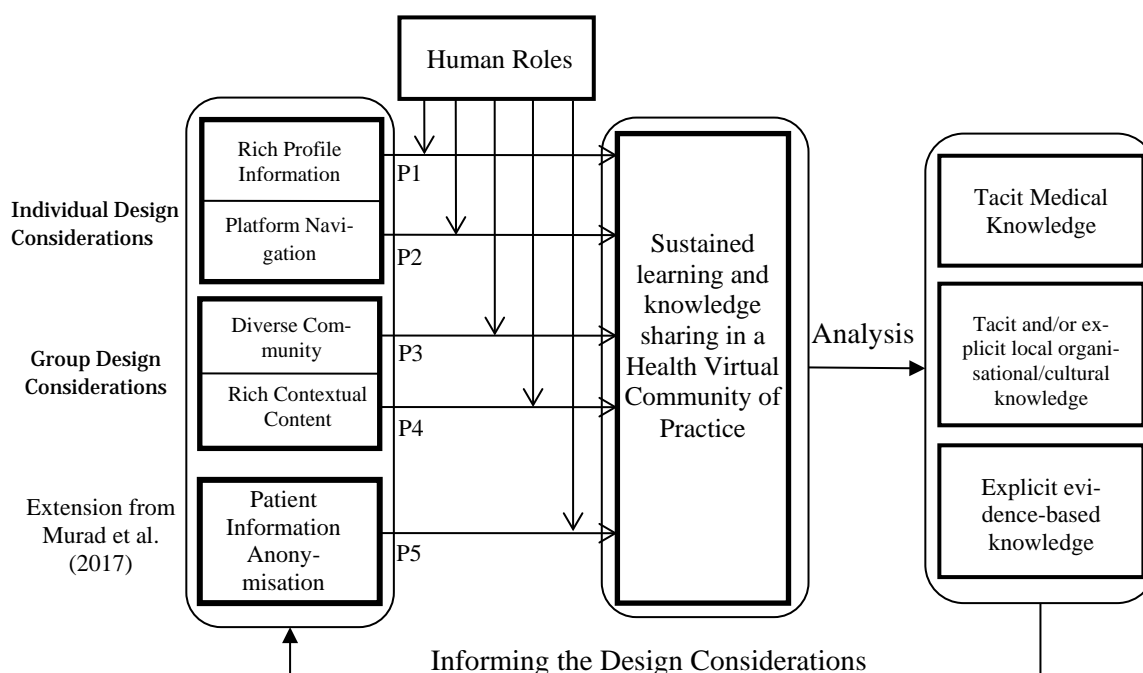


Figure 2. New Extended Conceptual Model

From Figure 2, we add the following proposition based on our findings from our previous work (Murad et al., 2017a):

- **Proposition 5:** *Patient Information Anonymisation increases participants' interaction in a Health VCoP, moderated by human roles, which may lead to a sustained learning community. Having a mechanism in anonymising patient information to be shared to the group would incentivise HPs in protecting the privacy of the patient and would give confidence to the HPs that their cohort needs assistance in treating a patient (Sharma et al., 2006; Murad et al., 2017a). The ability to ask for help in a shared Health VCoP safe space would increase learning and knowledge sharing interactions in regards to diagnoses of patients without the fear of recognising said patient (Wenger et al., 2002; Barnett et al., 2014).*

3 Research Methodology

This RIP paper follows a qualitative research methodology consisting of three major phases: 1) A brief literature review on the knowledge translation literature; 2) Synthesis of a new extended conceptual model by adding our previous finding (Murad et al., 2017a) and adding the analysis method by using a

KM approach in informing the conceptual model's design constructs; 3) Testing of the new extended conceptual model as part of case study work of past interview sessions to understand the types of knowledge being shared. Having completed phase 1, this RIP is currently in its second phase and reports on this phase in this paper with a brief mention of phase 3. Therefore, in phase 2, by reviewing the literature for knowledge translation and Health VCoPs, the synthesis of three types of knowledge being shared in Health VCoPs, and adding our previous finding as a new construct, we synthesised and extended our previous conceptual model into a new conceptual model to inform a set of design considerations by using a KM approach.

For phase 3, a qualitative data collection and a case study method were used in our previous work (Murad et al., 2017a; Murad et al., 2017b). However, we did not analyse the learning and knowledge sharing needs from an IS KM perspective but only the aspects associated with the design of the Health VCoP. We are analysing and are reporting here on some insights on what types of knowledge would incentivise and motivate HPs in sustaining their participation in a Health VCoP as it is still under way. Thus, data were gathered using two focus groups (12 HPs in each group, mixture of General Practitioners, Specialist, and Nurse) in a semi-structured session, individual questionnaires sent by the researcher to participants in both focus groups to answer in case they were not able to answer in a group setting, and three interview sessions were conducted with GPs in testing a prototype Health VCoP. Interview transcripts have been analysed to identify themes and were further analysed via discourse analysis (Fairclough, 2013). All data were validated by the GP Chair and Specialist involved in both focus group sessions. All data gathered were from Melbourne, Australia.

4 Preliminary analysis and findings

As discussed previously, we have published our work with data that have been analysed and contributed to theory and practice (Murad et al., 2017a; Murad et al., 2017b). We have taken excerpts from the interview sessions and used our conceptual lens to identify what types of knowledge HPs want to share when engaged in a learning and knowledge-sharing Health VCoP. This is currently an ongoing process as we need more time to validate our analysis and findings for contributions. Some of the excerpts have already been used for our design considerations in our previous work.

4.1 Sharing of Tacit Medical Knowledge

In terms of sharing tacit medical knowledge with peers, either through face-to-face or via online technologies, GPs would first contact their closest peers then would start searching online for relevant information to make informed medical decisions for their patients.

“If a colleague is available I will check with him/her first, I may go [searching] online but try to avoid it during a consultation [with patients]. I would look a bit amateurish I think...” - GP

A more experienced GP mentioned that the issue was not the actual medical problem itself, but the way questions were asked by other GPs.

“The first issue is to define the problem- better the question, better answer. If the history does not give you a clue- ask better questions...” - GP

As can be examined from our preliminary analysis and findings, the sharing amongst GPs differs based on their experience of tacit medical knowledge stored in their minds. This also suggests that the more senior GPs recommend that their peers need to ask clear and precise questions for a particular condition.

4.2 Sharing of Tacit and/or Explicit Local Organisational/Cultural Knowledge

A GP Trainee mentioned that in terms of following guidelines on how to treat patients, sometimes the patients themselves do not follow said guidelines due to unique factors. An example was given where

the guidelines directed the GP to make a scan on a patient; however, the scan procedure might affect the patient. Thus, the GP trainee had to ask colleagues for their experience in handling such a condition.

“There are a lot of guidelines out there on what to do on the standard [medical] case... but sometimes you have a patient not adhering to the exact guidelines... it would be worthwhile to have an online forum to discuss [about] it with your colleagues and how to manage the patient.... The patient might have a few other conditions, like a heart failure, that make him not follow the necessary guidelines....so in that sense what do you do in those sort of situations...for myself, I would ask another colleague if I should take further steps where the exact guidelines don't really help”- GP

A Senior GP mentions what type of questions rural GPs ask in an online social network that is dedicated to GPs in Australia.

“There is a group of GPs on Facebook...most of the GPs are likely from rural areas...most of them are there because of their isolation...if they talk about a process, like how do you organise care planning in your practice? That's something you have to get from other GPs”- GP

The sharing of a combination of tacit/explicit local organisational/cultural knowledge affects standardised content for treatment plans and GPs sometimes would ask their colleagues for advice when in doubt. For rural area GPs, the tendency in questioning planning care mechanisms from other GPs in similar situations is a good indication of utilising online social media technologies.

4.3 Sharing Explicit Evidence-Based Knowledge

GPs mention that they go through a series of content online for evidence-based knowledge.

“I go to professional education sites e.g. GP learning, think GP, web MD, urotoday. I also access scholarly articles for academic research e.g. google scholar, pubmed... Then I would Email [my] colleagues for professional communication. Sharing of articles etc.” - GP

The searching and sharing of evidence-based knowledge between GPs would go through a series of professional education sites, to articles from academic research, and emailing colleagues to share their evidence-based research findings.

5 Conclusion and Future Work

This research has proposed an extension of our initial conceptual model with: 1) an additional construct not identified in previous work on this topic (Murad et al., 2017a); 2) an extension of the types of knowledge being shared in Health VCoPs. The extended model shown in this RIP paper will be used to assist us in informing our design considerations to increase participation and interaction among practitioners to sustain the learning and knowledge sharing in a newly-designed Health VCoP. Furthermore, this paper presents some preliminary analysis and findings from our gathered data.

Currently, a pilot study has been initiated to design and develop a prototype for a group of GPs in using a Health VCoP for their learning and knowledge sharing in a specialised environment. The specialised environment is Secondary Fractures in Osteoporosis. Human Ethics approval had already been granted from a public entity, Melbourne Health in Melbourne, Australia. In terms of developing the Health VCoP prototype, we have already used our previous findings (Murad et al., 2017a; Murad et al., 2017b) to design and develop the prototype. We finished data gathering from online transcripts and are in the process of analysing them. Furthermore, we have finished conducting semi-structured interviews with participants from our Health VCoP prototype in regards to the design considerations and are in the process of analysing them as well.

Next steps for our future work will be to analyse the types of knowledge being shared from: 1) the continuation of this RIP analysis and findings section; 2) post-use of the Health VCoP prototype in semi-structured interview fashion with each participant; 3) online transcripts posted by HPs in the Health VCoP. We will employ open, selective, and axial coding for online transcripts to understand the types of knowledge that are being shared, as well as thematic analysis for semi-structured interviews, and then we will cross compare both to finalise and validate our types of knowledge conceptual lens. After more than six months, we will again contact GPs and ask specific KM questions to validate, evaluate, and inform the design considerations for our Health VCoP in the form of a longitudinal study.

With a new age of online social networks that are integrated in our current lives, HPs are steadily using these networks to enhance their individual learning and knowledge-sharing habits. We as IS researchers have an opportunity to harness these technologies and try to understand the implications to theory and practice for HPs using VCoPs. Ultimately, these design considerations that are informed by the types of knowledge being shared can be extended into other areas of practice and finally help in solving knowledge-into-action strategies phenomenon.

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