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Knowledge Flows in Health Communities of Practice

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This article will examine a case study of an outpatient's clinic in an Australian public hospital with the objective of gaining a better understanding of the issues related to knowledge dynamics in communities of practice within a health care environment. This case study research approach was considered to provide a fine-grained approach recommended for improved understanding of nuances, detail, and the forces underlying the phenomena under observation. Focus on detail was an important attribute of this study notwithstanding possible shortcomings in not being able to externalize the research findings. Of the four modes of knowledge exchange observed to take place in this public hospital community of practice, Mode C (tacit to explicit) stands out as a key finding. Here, the release of each individual's tacit knowledge is forthcoming and free flowing given the established culture of trust in this clinic. The informal communication environment in the luminal space of their workplace corridor provided a conducive environment that enabled a free-flowing exchange of community knowledge. Healthcare managers are increasingly required to guide the use and flow of knowledge within their organizations. The insights gained from this project will provide them with a better understanding of knowledge dynamics within a health-care community of practice, which is a microcosm of the larger organization.

KEYWORDS clinic knowledge dynamics model, health clinic communities, organizational behavior, knowledge in health communities of practice, knowledge management, tacit and explicit knowledge flows

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INTRODUCTION

There has been an increased interest by practitioners and academics on knowledge dynamics and flows within organizations. Much of the literature and recent research looks at knowledge management at the overall organization perspective. However, like layers of an onion, an organization is made up of numerous subunits, which can be described as communities of practice. The objective of this article is to gain insights into knowledge dynamics in communities of practice by conducting case study research into a public health care organization's community of practice. From these early observations it is proposed to use a tentative conceptual model that examines and attempts to explain how knowledge flows in one such community of practice. Such a model could stimulate future academic research and discussion on the role of communities of practice in organizational knowledge management. The model would also assist practitioners in better understanding the role that communities of practice may play in the management of organizational knowledge.

Research Approach

As a contribution to the debate on knowledge management in health, this article will review the results of a case study. The objective is to gain insights of knowledge dynamics in an outpatient's clinic of an Australian public hospital. From these early observations, it is proposed to examine a tentative conceptual model that examines and attempts to explain knowledge dynamics in this community of practice. Such a model could guide future discussion and research on the topic for the purpose of stimulating researcher's interest in building more generalizable theory regarding knowledge dynamics in communities of practice.

The methodology involved a case study approach. This research was considered to provide a fine-grained approach recommended for improved understanding of nuances, detail, and the forces underlying the phenomena under observation (Harrigan, 1983). Focus on detail was an important attribute of this study notwithstanding possible shortcomings in not being able to externalize the research findings. Yin (2004) has responded to the issue of externalization by pointing out that case studies, like experiments, are generalizable to theoretical propositions and not to populations or universes. Hence, this project can be classified as exploratory and was intended to uncover issues of knowledge creation and transaction which impact on the delivery of health services in a public hospital, providing insights to the implications for knowledge management in this environment.

Direct observation is one of six data collection techniques recommended for case study research (Yin, 2004). The data for this case study was collected as part of a video ethnography project exploring clinician identity in multidisciplinary health care teams. A researcher spent 10 months observing and videoing a variety of interactions between team members, including a number of

focused observations of the corridor space in the clinic. The excerpts presented are transcripts taken from video footage of two particular clinic sessions (Iedema, Long, Forsyth, & Lee, 2006). All names used are pseudonyms.

The Research Site

The research clinic used as the research site for this article can be classified as a community of practice within the hospital's organizational setting. A community of practice has been defined as (Wenger, McDermott, & Snyder, 2002); "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis." In terms of organizational knowledge management, communities of practice play an important role as they provide a forum to enable knowledge creation through externalization of tacit knowledge, facilitate the sharing of knowledge and increase knowledge flow, enhance the creativity and integration of collective knowledge (Wenger & Snyder, 2000; Kodama, 2009). Corridors have been seen to be as back stages or liminal spaces "in between" key front-stage organizational locations and are less inscribed with conduct regulations and institutional prerequisites that the spaces corridors connect. Front stages in the hospital context are offices, meetings rooms, entrances, operating theatres, etc. (see Goffman, 1963). Communities of practice have been described as key sources and users of organizational knowledge (Perrott, 2007).

From these prior studies and observations, it is useful to present the various community of practice concepts diagrammatically as shown in Figure 1.

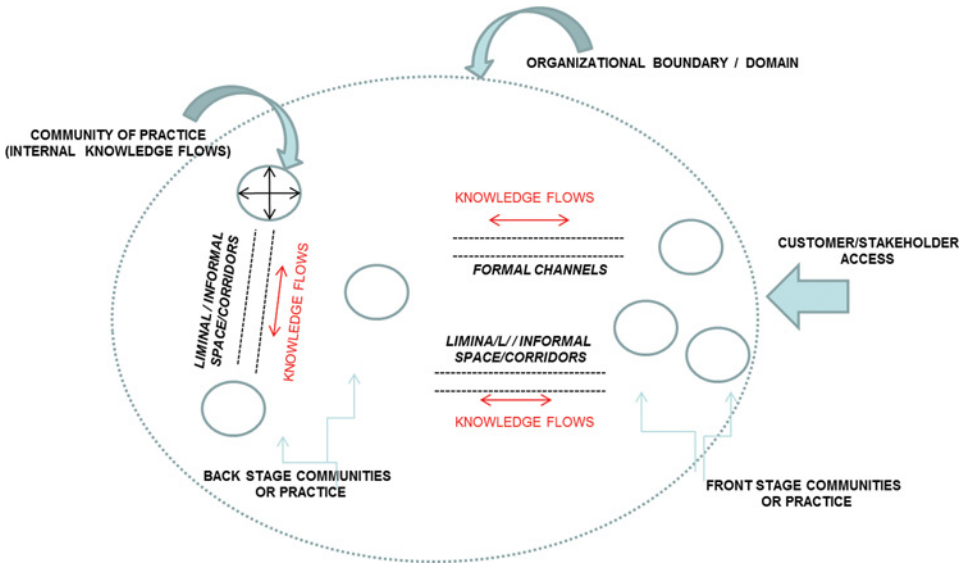

FIGURE 1 Organizational knowledge flows. (color figure available online)

Within an organization's boundaries, various communities of practice carry out their allocated functions. Front stage communities are those that first interface with the external environment and key stakeholders such as the consumer/customer. Back stage communities carry out the internal and less visible functions of the organization. Knowledge is created and exchanged both within and between communities of practice through both formal channel links and the informal or liminal spaces that link them.

Organizational context is seen to be critical to effective knowledge management. The ideal structure to facilitate knowledge flow has been described as "N form" rather than the traditional "M form." M form is a hierarchical structure where communication is primarily vertical with top management as the critical layer and the competitive scope is based on economies of scale and diversification. By contrast, the N form communication is lateral where middle management is the critical layer and competitive scope focuses on economies of depth (Hedlund, 1994, p. 83).

The outpatient's clinic involved in this study provides care for people with spinal cord injury who have developed pressure ulcers. It is an innovative clinic, in that it brings together a team of multidisciplinary clinicians in one clinic session. Where previously patients would have had to make separate appointments to see a number of clinicians: the specialist spinal doctor, occupational therapist (OT), physiotherapist and, if their wound required surgery, a plastic surgeon, and in some cases also an orthopedic surgeon. At this clinic they had access to everyone at the same time. This has a number of advantages for both clinicians and patients. Although the sessions are long, they are more convenient for the patients than multiple hospital visits, especially given the transport complications associated with having a spinal cord injury. For clinicians, it gave them the opportunity to discuss their treatment needs with each other, allowing much more achievable management plans to be instigated.

The clinic also included a social worker, dietitian and peer support worker, all of whom contributed to quality of patient care and effectiveness of care management plans. Members of the clinical team gather for monthly team and case management meetings and for teleconferences to rural clinicians as required. Most of the team members of this clinic also work together in other capacities within the spinal unit: servicing inpatient clients, and in other outpatient clinics. Also present during the clinic are at least one, but often two, nurses who are based in outpatients and assist the multidisciplinary team with patient organization, follow-up appointment scheduling, specialist appointment booking, test ordering, and wound dressing. There are other outpatients clinics running simultaneously, and other outpatient nurses come through the corridor to get equipment, or help out if this clinic is busy and theirs is slow.

The multidisciplinary approach to pressure ulcers has produced dramatic clinical outcomes. For patients with wounds requiring surgery, the

average time spent in hospital was reduced from 264 to 54 days. The cost benefits to the hospital system are significant. In this hospital, the cost of treating a pressure ulcer surgically for someone who has not come for pre-operative consultation in the clinic averages $198,000 per patient. The average cost for patients who have come through the clinic is less than a quarter of that, $42,000.

The doctor and nurse have their offices in the same place, in the offices of the unit specialty. Allied health team members have offices based in their professional units (i.e., dietitian in the dietetics department, physiotherapist in the physiotherapy department, etc.). There are two implications that follow from this: structurally the only times all team members are together are during the fortnightly clinics and the monthly team meetings, and spatially some people have more access to others in the daily course of their work. For example, the physiotherapy and occupational therapy departments are next to each other, as are the social work and dietetics departments. Both are on different floors to the unit offices, where the staff specialist and support nursing staff have their offices.

The staff specialist who established the team consciously aimed at a "flat," nonhierarchical management structure, and values informal and non-formal as well as formal communication. All team members described the clinic as "chaotic," however they were convinced of the value of communicative flexibility this offered. Many of the care management decisions were made in non-formal communications in the corridor of the outpatient's clinic. The corridor provides flexible communicative space in which complex, multifactorial, heterogeneous interactions can take place (Iedema, Long, Carroll, Stenglin, & Braithwaite, 2005).

Figure 2 shows the layout of the clinic space. Conversations most frequently take place in the corridor space between the procedures room and the office, however they also take place in the corridor outside consulting Rooms A and B, or around the desk at the end of the corridor (see Figure 2).

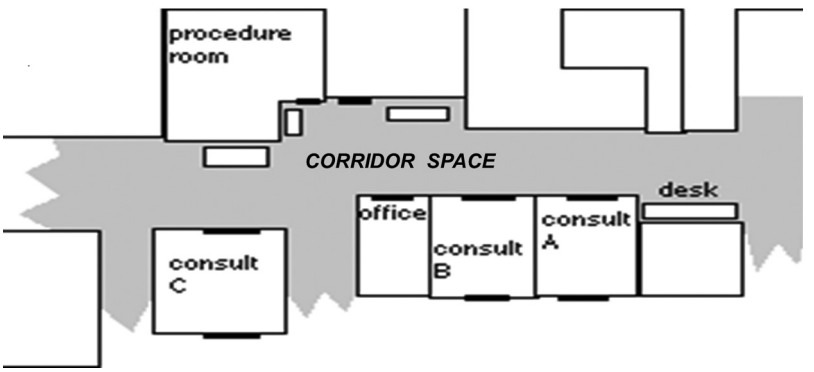

FIGURE 2 Plan of the clinic's corridor space.

Corridor Communications

Discussions in the corridor included the expected exchanges of clinical knowledge, as well as giving and receiving of instructions. In this clinic, corridor conversations also covered a wide variety of other topics, such as time management and work flow planning; discussions on equipment costs and purchasing (for both patients and the clinic); incidental, filler and social communications; knowledge, skill exchange and reflection on practice; and conflict resolution.

In hospital based health care in industrialized communities, clinical knowledge is inextricably intertwined with technology. Treatment and management plans inevitably involve technology. By way of example, in the following excerpt, the OT tells the social worker about a discussion she had with a patient regarding a particular wheelchair that the doctor has recommended.

> OT: And then he said he understood why [doctor] wanted him to buy it … it means that you can get out of bed, and you can change the angle of how you sit and you can just be a little bit more interactive.

Technology discussions in this corridor included clinical applications of technology, such as types of pressure relieving mattresses and cushions that might be suitable for particular patients needs. They also included high-tech diagnostics, such as heat mapping photography equipment to track wound healing; evidence based practice, such as latest recommendations on types of bandaging for particular types of wounds; infrastructure discussions about having tracks installed into particular treatment rooms to allow hoists to be used (to lift patients) and very pragmatic exchanges of skills, such as how to insert text boxes into word processing documents, or tips on navigating the newly introduced telephone note dictation service.

Technology may either facilitate or hinder communication. For example, IT may facilitate or hinder communication in a hospital that is strongly technology driven. As one example, computerized notes are replacing and/or accompanying hand written medical records; clinicians communicate via e-mail and mobile phone; x-ray and pathology test results are increasingly accessed via computer rather than by paper record. Technology also requires communication: clinicians keep each other informed of new developments, they exchange information on usage and practice, as well as on workarounds (ways of "fooling" the system), and they reflect on effectiveness or otherwise of technological solutions (see Ratcheva, 2008). Corridors facilitate conversations about all of these aspects of hospital work; a dynamic and interactive opportunity for informal and spontaneous communication and knowledge exchange with other members of this community of practice.

Knowledge Transfer

Corridor communications allow clinicians to pass on knowledge that they see as relevant to patient care but may not want to document. Information about a patient's emotional state, family situation, or substance abuse are examples of this.

The following interchange occurs in the area outside procedures room (refer to Figure 2), between the OT, the nurse, and the doctor. They begin discussing the patient who is located in the room behind them, offer and accept infection control advice, move on to discuss a patient who has been admitted on the ward as an inpatient, engage in knowledge exchange regarding input from a surgeon, make a joint management plan regarding the patient, discuss how best to negotiate what they require with ward staff, and discuss the appropriateness of the patient's involvement in feeding back management plan decisions to night shift staff on the ward. The conversation involves a significant amount of body language, as well as verbal interchange, with clinicians using their hands and bodies both for illustration and emphasis.

Excerpt 14 is inserted next in order to provide a general example of the type and nature of conversation that takes place in this community of practice. This example may provide the reader with an idea of the context in which knowledge is exchanged in the luminal space of this community (DR = specialist medical practitioner; CNC = clinical nurse):

DR: [He has to not] sit up so much. He's sitting up for 6 to 8 hours.
OT: How is the pressure area?
DR: It's a Grade 1 area [*indicating size with fingers—not large*], but he's got no fat over his IT [*ischial tuberosity*] area, so he's going to have to be another couple of weeks off it, just to finish it off.
OT: But he hasn't [*tying apron around front*] …
CNC: [*Reaching hand in OT's direction*] Don't tie it around the front.
DR: Yeah [*Reaching hand out, smiling*] I can't do the back tie.
OT: [*Ties apron around the back*] He hasn't agreed to … um … any equipment or anything. He's not on a mattress, or anything [*looking at CNC*]. He's just on his own bed.
DR: I'm not sure what's happening.
CNC: I can't remember.
OT: He's got a seating appointment this afternoon as well.
DR: Collette [*relieving OT*] said that she talked to [community organization] about his equipment, who said …
OT: I need to catch up on what's happened, then.
DR: I guess the thing is he's sitting up for 6 to 8 hours anyway, and that area's not going to heal unless he gets off it.
OT: OK. That's fine. I can talk to him about that. Can I pick your brain about Patient C as well? He's getting red areas on his shins, and … [*end of quote*].

Knowledge Dimensions

The literature draws a distinction between tacit and explicit knowledge. Tacit knowledge is that held in the minds of individuals while explicit knowledge is that externalized and shared with others. It has been suggested that there are four modes of interaction between these two forms of knowledge (Polanyi, 1967):

Mode A: From tacit knowledge to tacit knowledge: The process of socialisation through shared experience and interaction.
Mode B: From explicit knowledge to explicit knowledge: The process of combination through reconfiguring existing knowledge such as sorting, adding, recategorizing, and reconceptualizing explicit knowledge can lead to new knowledge.
Mode C: From tacit knowledge to explicit knowledge: Process of externalization using metaphors and figurative language.
Mode D: From explicit knowledge to tacit knowledge: The process of internalization through the learning process.

The knowledge management process is necessarily loose and collaborative because the human qualities of knowledge such as experience, intuition and beliefs are not only the most valuable, but also the most difficult to manage and maximize (Davenport & Prusak, 1998). Hence, the knowledge management process integrates theories from at least four distinct fields; theories about organizational culture, organizational structures, organizational behavior and knowledge based systems leading to theories about knowledge support infrastructures (Baskerville & Dulipovici, 2006).

Other researchers emphasizes the importance of context in the knowledge conversion process (Ancori, Bureth, & Cohendet, 2000) suggesting that knowledge should be seen as a cultural process situated in and inextricably linked to the material and social circumstances in which it is produced and consumed (Hassard & Keleman, 2002). A balanced environment of power, control and trust is seen as an essential condition for a successful knowledge oriented culture. Allee (2003) suggested that if people do not trust each other, they do not exchange knowledge and ideas. Here, trust helps build and sustain valuable networks and rewarding relationships while a lack of trust erodes knowledge leadership, creation and transfer (Janowicz-Panjaitan & Noorderhaven, 2009).

In terms of the Polanyi's (1967) four modes of interaction, the following examples demonstrate the occasions and types of knowledge flow that occur in this clinic's health community of practice.

Mode A: From tacit knowledge to tacit knowledge. Here, a member of the community is willing to share their tacit knowledge with another individual member of the community—this is Polanyi's process of socialization. This knowledge may relate to an individual's professional knowledge or knowledge

acquired from practical clinical experience. The following example of knowledge exchange from this research is between the doctor (DR) and OT:

DR: He's still on ionotropes and still in intensive care, but the only thing I could think of is it might be worth swinging by there and just checking what mattress he's on.
OT: In intensive care?
DR: Yeah [*and makes the comment about how important it is to provide good pressure relief in intensive care to avoid pressure sores*].
OT: I heard he was coming back up to the ward today?
DR: No way.
OT: That's not true?
DR: [*Doctor shakes his head and comments that the patient can't come back to ward while still needing ionotropes*]
OT: What's ionotropes?
DR: It's something to keep your heart going.
OT: OK, so we need to swap the mattress again.

Mode B: From explicit knowledge to explicit knowledge. This is the process where explicit domain knowledge, known and shared by this community of practice is openly exchanged. This can lead to a joint application of the knowledge, and possibly new knowledge gained from this new application. An example of knowledge exchange from this research is between DR, OT, and clinical nurse (CNC):

OT: I mean they were talking about putting foam underneath his shins, and everything … and that really defeats the whole purpose of the Cairwave mattress [*type of mattress*].
CNC: The mattress, yes.
OT: And I mean do you even want to try … because the Cairwave is a really hard mattress. I was just wondering if you wanted to put him down onto a Trinova [*another type of mattress*], if he's turning that often. Could we first of all try turning him less, do four and one, or three and one rather than two and two. Is that what he's doing at the moment?
DR: Two and two is what he's doing at the moment. Do you want to move to three and one?
OT: Could we try that and see what happens?
CNC: I like that idea.

Mode C: From tacit knowledge to explicit knowledge. This is the process of externalization where an individual's tacit technical or clinical knowledge is externalized to the community of practice and made available for application by that community of practice. This adds to the accumulated knowledge of that community of practice. An example of knowledge exchange from this research is between DR, OT, and CNC:

DR: I'm not sure what's happening.
CNC: I can't remember.
OT: He's got a seating appointment this afternoon as well.
DR: Collette said that she talked to the community organization about this equipment, who said …
OT: I need to catch up on what's happened then.
DR: I guess the thing is he's sitting up for 6 to 8 hours anyway, and that area's not going to heal unless he gets off it.
OT: OK, that's fine. I can talk to him about that. Can I pick your brain about Patient C as well? He's getting red areas on his hands and shins, and …

Mode D: From explicit knowledge to tacit knowledge. This is the process of internalization whereby openly available (explicit) community of practice knowledge is absorbed into an individual's knowledge bank. This process individualizes openly available explicit knowledge and creates a new dimension in the form of tacit knowledge. This is the process of knowledge adoption and adaption. An individual's experience and culture creates an individualized version of the original explicit knowledge. An example of knowledge exchange from this research is between DR, OT, and CNC:

OT: I've asked the registrar to do a vitamin D on Patient F—he hasn't been out in the sun for 5 or 6 years!
DR: By the way, Patient E got sick again on the weekend.
PS: Oh no!
DR: [*He explains that Patient E is back in intensive care and describes the tests that he has ordered.*]
OT: Great.
DR: He's still on ionotropes and still in intensive care, but the only other thing I could think of is, it might be worth swinging by there and just checking what mattress he's on.

Of the four modes of knowledge exchange observed to take place in this community of practice, Mode C (tacit to explicit) stands out as a key finding. Here, the release of each individual's tacit knowledge is forthcoming and free flowing given the established culture of trust in this clinic in the sharing of individual knowledge in the luminal space of the corridor where the exchange of much of the community's collective knowledge takes place. In this environment there is less presence of the controls and exposure to the formal organization's rules and regulations.

These four modes of knowledge transfer are shown diagrammatically in Figure 3.

This clinic's corridor is less inscribed with the usual conduct regulations and institutional prerequisites than the spaces that the corridors connect (see Goffman, 1963). Front stages in the hospital context are offices, meetings rooms, entrances, operating theatres, etc. Hence, a positive and sharing culture should positively impact on that community of practice' effectiveness,

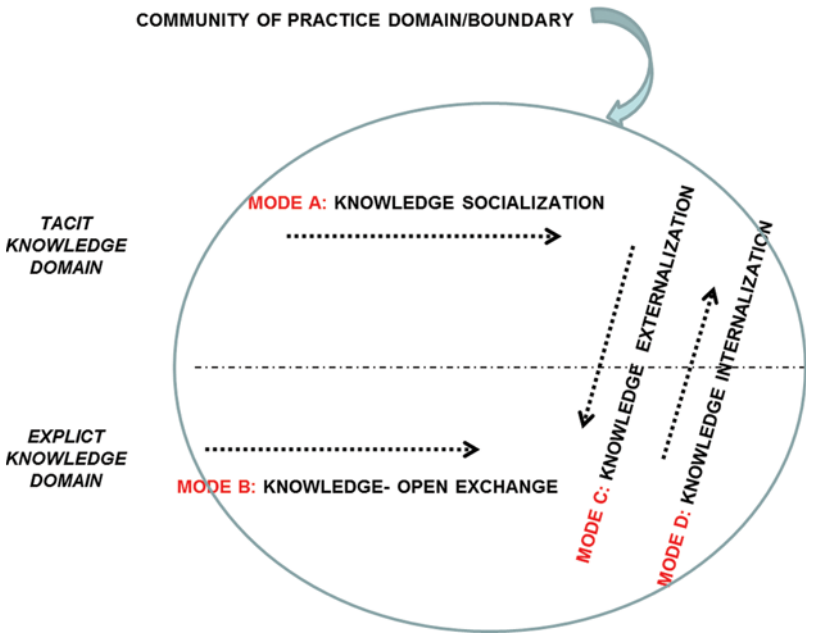

FIGURE 3 Modes of knowledge transfer in communities of practice. (color figure available online)

productivity in its operation, achievement of objectives and the creation of new knowledge that could solve the issues that confront this particular community. Without the sharing and positive culture, individuals could be more inclined to withhold their own knowledge, thus depriving the community of practice (and the wider organization) future knowledge building and creation opportunities. This observation also has implications for wider hospital knowledge management. When tacit individual knowledge is willing to be shared (made explicit), it is then available for application in the wider organization on an ongoing basis.

Discussion

From this case study there have been a number of interesting observations regarding knowledge dynamics in this particular community of practice. The clinical team being multi disciplinary and multi functional implies a wide variation in the type and range of tacit knowledge held by individuals.

This clinic community of practice demonstrates the development of a unique culture that enables the effective exchange of knowledge in ongoing communications that take place in the neutral territory of the hospital corridor. This process is loose and collaborative and not formally directed or orchestrated (see Davenport & Prusak, 1998). The corridor provides the context seen as being essential to the knowledge conversion and exchange processes (Ancori et al., 2000). Hence the corridor culture has evolved to

encourage the free flow and exchange of both tacit and explicit knowledge related to the diagnosis and treatment of the clinic's patients outside the formal hospital reporting and communication process.

The corridor has become a liminal space where this community of practice come together to discuss and resolve patient issues. Such non-official space can become a site of intense productivity (Iedema et al., 2005):

> The corridor is a space whose perceived liminality becomes a crucial resource: this is a unique site where final decisions can be held in abeyance and where uncertainties and provisional decisions can co-exist: a space where the fixities of hierarchy and specialization can be attenuated in not suspended: and a space where people can agree to work around rules and regulations: in short, a space where tasks and positioning become sufficiently provisional, flexible and negotiable to enable clinicians to weave complexity of emerging facets of clinical practice into a workable and productive unfolding.

This is in line with the observations of researchers Hassard and Keleman (2002), suggesting that knowledge should be seen as a cultural process situated in and inextricably linked to the material and social circumstances in which it is produced and consumed. The informality of location has allowed knowledge transfer to occur in this liminal space. Here the open flow of relatively sensitive knowledge may have been inhibited in a more formal workplace environment.

Implications for Knowledge Management

It has been observed that there is an increasing trend to attempt to acquire and share expert knowledge held by health care workers with a view to providing improved decision support and medical education systems across whole organizations (Abidi, Cheah, & Curran, 2005; Waring & Currie, 2009; Oborn & Dawson, 2010). Health care has had the luxury of learning from the experience of other industries as managers move to improve clinical and operational performance in today's hospitals (Perrott, 2011).

This case study suggests that communities of practice can play a key role in facilitating the flow of knowledge within organizations. Implications for practicing health care managers are summarized as follows:

- Managers need to develop an in-depth understanding of the type and nature of existing knowledge banks and flows in key communities of practice. This would be an important contribution towards gaining a better understanding of the strategic potential for a firm's knowledge portfolio (see Birchall, Tovstiga, & Watson, 1999).
- An evolving plan setting out knowledge objectives and key strategies should be prepared on how to improve the stock and flow of certain

types of knowledge both within and between communities of practice (Quintas, Lefrere, & Jones, 1997)
- Consider how the benefits of informal or luminal spaces can play a key role in achieving knowledge flow objectives. Use these spaces to create more effective N form organizational context and dynamics and hence improve the flow and application of critical knowledge across the organization (Leonard & Sensiper, 1998)
- Develop an understanding of how emerging technologies impact on how knowledge is created, stored and disseminated through both formal and informal channels (see Ratcheva, 2008). Ensure that technology capabilities are considered in establishing organizational knowledge management objectives and strategies.

Future researchers may study knowledge exchange dynamics in other health care locations with a view to building on this exploratory work and contributing to the long path of generalising relevant early findings.

A better understanding of the circumstances of communications and knowledge dynamics in communities of practice will be critical to the effective management in health care organizations of the future (Perrott, 2007). Another author has prepared number of components to help guide future knowledge management planning and practice in health care operating environments (Guptill, 2005):

Communities of practice

Knowledge management is more than a centralized repository of data, documents and other information. It also encompasses the social context of others' experiences in the process. Here the goal of knowledge management is to codify and understand how the dynamics of the particular community operate in the context of the wider organization.

Environment

Operating environment is all important in facilitating the flow of knowledge. Hence creating a conducive atmosphere to knowledge exchange is fundamental to effective knowledge management. In planning knowledge management strategies and processes, the importance of informal exchange locations and occasions need to be included as critical knowledge transfer is likely to occur in such places.

Teams

The health care workplace often consists of multidisciplinary teams working closely together. This may present challenges to knowledge transfer processes because of differences in grounding, education, training, experience and sometimes values. Hence, knowledge management needs to take a holistic view of how members of a team relate, communicate and interact.

Content management

Here a repository is developed to facilitate knowledge exchange with careful planning as to the types of content to be published, access guidelines, update processes, and publishing practices. This phase also includes a communications plan for marketing the knowledge base throughout the organization.

Knowledge and capability transfer

In addition to information and knowledge transfer, there should be change in behavior leading to innovation, operational process improvement and enhanced patient care. This component is concerned with strategies to ensure the spread of new and best practices between units and across hospitals.

Performance results tracking

To ensure that knowledge activities lead to improved organizational performance, rigorous monitoring needs to be incorporated into the tracking of results. Three types of measures are seen to be appropriate:

- Outcome measures that reflect attainment in clinical, financial and operational targets;
- process measures that track activity that is expected to yield results; and
- satisfaction measures that track improvements in staff/consumer/physician satisfaction with the care process.

Technology and support infrastructure

This research has shown that technology has both a positive and negative impact on the flow of knowledge in a health care environment. With technology playing an increasing role in all sections of health care, careful planning is required to consider each adoption phase and the impact it will have on knowledge transmission and management. Managers need to minimize any potential negative effects that may come with the introduction of new technology modules.

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