Knowledge Management in Health Information Environments

Abstract

Objective: To identify current and potential knowledge management technology trends and issues for health information.

Methodology: Knowledge management concepts from business environments were applied to health information environments, to study knowledge management techniques of healthcare and health information professionals. Medical literature involving knowledge management was also consulted.

Results: Four key methods of knowledge transfer were identified. Examples from the healthcare industry were found for each of these knowledge transfer methods.

Conclusions: Healthcare professionals in different disciplines exhibit unique methods of knowledge management. Access and ease of use determined initial and continued usage of artificial knowledge management tools and technologies. Some aspects of knowledge management now rely on technology for preservation and inheritance purposes.
Introduction

When knowledge is managed as a resource, the desired outcome usually involves protecting, promoting and continued creation of situational intellectual capital. Whether in a corporate, academic or healthcare environment or organization, employees are often the major determining factor of the organization’s success. Just as profit is a strong motivator for sound decision making in a business, matters of life and death greatly influence information and knowledge management in a healthcare setting.

Methods, support and technologies for patient care are becoming more and more sophisticated, in the interest of providing best healthcare practices or services. Experience gained by healthcare practitioners is the greatest contributor to a health knowledge base. Present-day healthcare requires more than just good technique, however. New and emerging trends, technologies and research findings must be acknowledged in any sound clinical practice, from surgery to filling a prescription to discharging an inpatient. Each of these situations requires a judgment call to be made, where a health professional relies on inherent and available knowledge to make an appropriate care decision.

Clinical settings are not overflowing with resources; in terms of priorities, patient care might come before, or at the expense of conducting clinical research. It is sometimes left up to someone else – an information specialist – to monitor trends in clinical practice, research and delivery, to retrieve and subsequently disseminate this information to front-line healthcare workers. In recognizing information needs of healthcare practitioners, information specialists influence the structure of organizational knowledge bases.

Background for Knowledge Management

Knowledge as an asset in an organization is a relatively new concept, with most literature on this topic having been produced in only the last ten years or so. In 2002, Ponzi and Koenig (1) discussed whether knowledge management was merely another management fad. According to their conclusions, knowledge management appeared to have survived the initial curiosity stage and has more or less become integrated into accepted management practices. Earlier in 1999, Hermans (2) likened knowledge management to the conversion of intangible company assets into tangible assets, such as converting or capturing employee social networks and personal communications in online discussion forums.
In order to apply knowledge management processes to any working environment, the theory behind knowledge management must be defined. In order for knowledge to be managed, it must first be created and recognized. Based on previous work by Nokana and Takeuchi (3) and Davenport and Prusak (4), Marwick (5) in 2001 defined two specific knowledge domains – tacit and explicit – for knowledge representation. Tacit knowledge is that which resides in the mind, comprised of feelings, sensations, experiences and ideas that cannot be easily captured or represented out of context. Explicit knowledge is more structured, and easier to state, translate and communicate between people. Explicit knowledge is more like simple information stored in a container; anyone can open the container and make sense of the contents.

Marwick, followed by Abdullah, Kimble, Benest and Paige (6) explored four distinct knowledge transformation processes involving tacit and/or explicit knowledge. Carvalho and Ferreira (7) built upon this research and identified some technologies that successful knowledge management processes could not function without. They believed that technology was necessary in collecting, storing and sharing information and knowledge. At the time, ten electronic software-specific trends for knowledge management were identified: intranet-based systems; electronic document management systems; groupware; workflows; artificial intelligence-based systems; business intelligence; knowledge map systems; innovation support tools, and knowledge portals. Several of these listed technological trends have become commonplace in knowledge management. It is evident that most knowledge management technology focuses on capturing or manipulating explicit knowledge in order to form tacit knowledge, or to speed up the knowledge transfer process.

Knowledge Management in Healthcare Environments

The four knowledge transfer processes (5, 6) – tacit to tacit; tacit to explicit; explicit to tacit; and explicit to explicit – will be used as major categories for sorting current technological and ideological trends in knowledge management in health information environments. Knowledge management trends vary from profession to profession, and from setting to setting, as shown in the following examples. In some cases, knowledge management is self-directed, in that health professionals are able to access the information or technology themselves without the guidance of a professional health information specialist.
Tacit to tacit (socialization). Personal knowledge is shared between people, especially those in a common culture or work environment through face-to-face conversation. Team meetings discussing work experiences are probably the most effective example of tacit knowledge sharing. Socialization has been described as the most difficult knowledge transfer process to capture, as a great deal of the knowledge shared is strictly contextual or situational. Often one health professional asks another for advice on a particular situation, and no further thought is given to preserving the moment of knowledge transfer.

Tacit to explicit (externalization). This communication pathway is similar to socialization, above, except some tacit knowledge is transformed into an explicit form, such as a written answer sheet or a spoken story.

One of the best examples available for capturing of health-related tacit knowledge is the web link to the mydoctor.ca website (8) from the Canadian Medical Association (CMA) main website. While many physicians recognize the role the Web plays in providing consumer and professional health information, it is a valid assumption that many of these same physicians do not necessarily have a proficiency in web information authoring or website development. Members of the CMA are given the opportunity to personalize a provided template to best represent their own professional practice, research, or specialty. The mydoctor.ca website takes away the fears of using information technology, in providing a hosted, maintained website that simply requires input of personal, tacit knowledge. A limited amount of peer learning is also available, as ‘best site winners’ are posted as examples for budding web physicians to emulate.

Explicit to tacit (internalization). Internalization involves creating personal knowledge, through listening to, reading, or viewing explicit knowledge. Existing tacit knowledge, such as a handbook, is read and evaluated, and new knowledge is created based on that interaction.

Of the four knowledge management processes employed in healthcare provision, internalization likely has the greatest growth potential available. At the same time, the success rate of current and future explicit-to-tacit knowledge processes may be very low. Honeybourne, Sutton and Ward (9) recently studied the impact of personal digital assistants
(PDAs) on delivering healthcare information. Clinicians were given PDAs to carry around and access while performing regular job tasks, and were not limited as to what resources could be stored on the devices. Some example information sources included drug dosages, summaries, management algorithms, and clinical ‘bottom-line’ resources. It was believed that the combination of technology and information access would ease the information transfer from the clinician – a doctor, resident, nurse, consultant, and even a health sciences librarian – to the final information recipient. In forcing participants to use technology that was proven to be useful, most participants did find the PDA to actually be helpful in passing on information to the end user.

The PDA study was not that simple, however. The researchers found that the PDA usage during consultations was only considered if the ease of use of the PDA was simple. Clinicians simply did not have the time to learn, figure out, or update the actual software and resources. Other confounding factors to usage included the lack of desktop or laptop computers to synchronize the handheld devices with, and the lack of training to effectively perform the synchronization. This is what separates knowledge from information; if a clinician knows they can walk into the adjacent room to obtain an answer, a correct one, from a colleague in an efficient manner, they will do so rather than attempt to extract similar information from an impersonal, objective technological device in determining practices to follow.

This example reinforces the need for information specialists to be familiar with all information and knowledge management technologies used in their own work settings. If the storage device is not acting as a useful information tool, it might actually be acting as a barrier to communication or information sharing. If the healthcare librarian is able to equip the clinician with useful information resources, this transaction is just as valuable as a tacit knowledge conversation.

Explicit to explicit (combination). Accessing an electronic document through an online database is an example of explicit knowledge sharing. Reading a clinical care pamphlet and passing it on to a patient might also be considered explicit-to-explicit knowledge management.

Email discussion lists are becoming commonplace for question and answer in the health information professions. The Medical Library Association provides several different
general and specific lists that professionals may subscribe to. Current topics of discussion include expert searching and health information literacy. These topic lists (10) are also used for promoting continuing education opportunities for MLA members and other health professionals.

Other common methods of information and opinion sharing may be of some benefit in a health information environment. Web logs (blogs), podcasts (audio broadcasts), video conferencing and other technology-dependent communications will only be useful in a delayed-time environment, where information is not immediately needed. Archiving of such interactions is similar to taking minutes at a staff meeting, where these meeting minutes are referenced later, to expand a clinician’s own knowledge base. The success of this system is that the time is available to comprehend the information presented, and appropriate decisions can be made to accept, or ignore what is available.

In any knowledge management system, there is a knowledge or information expert providing a service for another user. Manipulating a system to provide information in an understandable manner allows for information to be turned into knowledge. Abdullah et al. (6) described a typical knowledge management schematic, involving a knowledge base, context, and an inference or knowledge extraction mechanism. The knowledge base indirectly connects the expert and the information seeker or user. It is the combination of speed of retrieval of information, and high-quality information that will determine the worth of any knowledge management system.

Conclusion

Patient care is affected by information or knowledge availability. Issues of proper procedure and desired outcome play a major role in determining a course of action in healthcare provision. Combining technological advances with knowledge management processes could result in positive outcomes in health information environments. Outcomes such as more effective patient treatment, or quicker access to health information and knowledge resources may act as the difference between life and death in a clinical setting.
References
General Search Strategy Employed


- Scopus database (Science/Technology, Medicine) was used; all(“knowledge management”) and all(“health”) search string used. 1400+ results, but simple browsing of article titles and journal names provided a simple and effective method for article evaluation. In some cases, promising articles in Scopus were viewed by complete record, and the ‘cited by’ in Scopus function helped to establish relevance relationships between articles. Attempting to find similar articles by search string parameters was not as successful.

- CINAHL/OVID database (Allied Health, etc.) was used first; searched for knowledge/td, ut. Other search strings/subject headings used: health knowledge/ut, research/ut, exp knowledge management/; exp professional knowledge/ or student knowledge/ or nursing knowledge/ or knowledge/.

- CINAHL Plus/EBSCO database was also used. Most searching centered around knowledge management, which was ‘using and adding value to an organization’s information and intellectual assets’. This was not to be confused with information management, which was explicitly defined for use in the ‘acquisition and organization of information’. The visual search function in this database was also helpful in determining scope or influence of specific articles. In browsing the database based on one search term, many other relevant search terms were also brought up, but neatly compartmentalized according to subtopic heading. Each ‘pod’ or ‘circle’ of information could be viewed separately for scope, while still maintaining the relationship with the other circles.

- PubMed search for “health knowledge”, “health knowledge trends”.

- Ovid MEDLINE search. Exp knowledge/; trend$.mp.; 1 and 2; knowledge/; information management/td; 5 and 2. In this case, some relevant articles appeared under information management that actually represented knowledge management.

- Web search using Google search engine. Keyword “health knowledge management” searched in both Google and Google Scholar. Potentially relevant concepts found included leveraging data; core knowledge management competencies and skills; governance; Dublin core metadata initiative; folksonomies and taxonomies.
• Web search using Google for “medical association”, “medical library association”, “health information association” to obtain links to MLA, CHLA, Canadian Medical Association, and so forth. Each of these sites provided some links to health professional or practitioner tools or resources that were evaluated according to this paper’s guidelines.