Information Management in a Health Care System: Knowledge Management Perspective

G. V. R. K. Acharyulu

Abstract—**The medical field in recent years has been facing increasing pressures for lower cost and increased quality of health care. These two pressures are forcing dramatic changes throughout the industry. Managing knowledge in health care enterprises is hence crucial for optimal achievement of lowered cost of services with higher quality. The health care industry is increasingly becoming a knowledge-based community that depends critically on knowledge management (KM) activities to improve the quality of care. Utilizing knowledge management systems to manage medical information and health care knowledge to support the full spectrum of knowledge needs in all the departments of health care organizations cutting across many skilled professionals. Hence, the objective of this paper is to develop a conceptual framework that integrates different processes, KM activities, and enabling information technology (IT) for designing good knowledge management system. The paper also focuses on technology and knowledge management aspects in a tertiary care hospital.**

Index Terms—**Hospital Information Management System, Tacit Knowledge, Information Technology, Health Care**

I. INTRODUCTION

The evolving paradigm shift resulting from IT, social and technological changes has created a need for developing an innovative knowledge-based healthcare system, which can effectively meet global healthcare system demands and also cater to future trends. The Hospital Information Management System (HIMS) is developed in processing and management of hospital information not only inside the boundary, but also beyond the hospital boundary, e.g., telemedicine or e-healthcare. Health care may depend on knowledge management more than any other industry due to the overwhelming concern for patient welfare. Health care knowledge management defined as the "systematic creation, modeling, sharing, operationalization and translation of [health care] knowledge to improve the quality of patient care" [1]. This effort to improve patient care has forced health care organizations to manage a diverse portfolio of information systems, which may have varying levels of interoperability.

The arrival of the information society and the move toward the knowledge-based economy highlighted the importance of tacit knowledge and the need to manage knowledge resources including skills and competencies. Knowledge management as a concept with people taking the centre stage has prompted us to rethink information management and shift focus from trying to develop intelligent systems to that of

developing tools for intelligent people. It is this realization in my opinion that makes knowledge management attractive to many organizations. While the focus in information management is mostly on explicit knowledge, knowledge management brings a new dimension, the need to manage tacit knowledge by focusing on people and enhance their capability by improving communication, information transfer and collaboration.

Knowledge management is concerned with creating, managing and sharing explicit knowledge (e.g., reports, policy statements, procedures, practice guidelines, books, journals articles), as well as tacit knowledge i.e. encouraging employees to share knowledge that they have gained through experience [2].

II. HEALTHCARE KNOWLEDGE MANAGEMENT

The right information to the right people at the right time in the right form to make a difference is still the exception rather than the rule [3]. There are lot of restrictions in place for information and knowledge sharing in the health sector which results in inefficient use of resources, loss of many resources and clinical errors that leads to serious financial and health problems for people and government respectively.
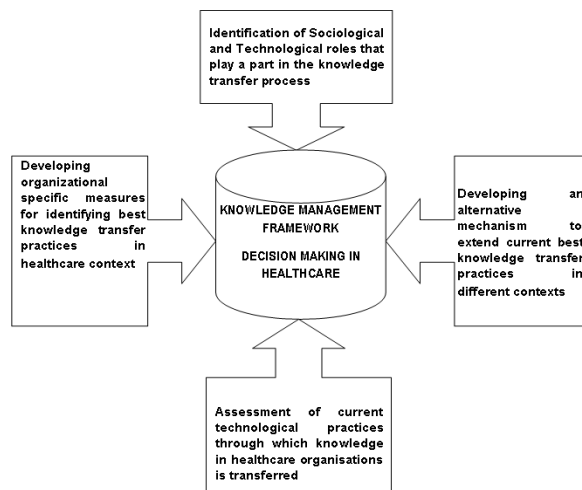

Fig. 1. Knowledge management framework

Health care industry consists of hospitals, clinics, pharmacies and customers that are connected in information and knowledge sharing activities leading up to the improvement of the quality care and best practice. There are four important critical factors of knowledge transfer practices in the Knowledge Management framework as shown in Fig. 1, lead to effective decision making for healthcare organizations.

Knowledge management in health care is "aligning people, processes, data and technologies to optimize information,

collaboration, expertise, and experience in order to drive organizational performance and growth" according to a current knowledge management special interest subgroup of the Healthcare Information & Management Systems Society (HIMSS), a multidisciplinary group of health care IT professionals, clinicians, managers, and consultants grappling with the application of the knowledge management discipline to the health care industry.

Healthcare practitioners and managers increasingly find themselves in clinical situations where they have to think fast and process myriad diagnostic test results, medications and past treatment responses in order to make decisions. Effective problem solving in the clinical environment or classroom simulated lab depends on a healthcare professional's immediate access to fresh information. Knowledge Management (KM) holds the key to effectively manage healthcare environment. KM places value on the tacit knowledge that individuals hold within an institution and often makes use of IT to free up the collective wisdom of individuals within an organization.

Healthcare Knowledge Management: Issues, Advances and Successes will explore the nature of KM within contemporary healthcare institutions and associated organizations. It will provide readers with an understanding of approaches to the critical nature and use of knowledge by investigating healthcare-based KM systems. Different organisations have different meaning and purpose of knowledge management and depend on the type of initiative. Managing knowledge is almost the heart of everything that happens in the health sector today. There is a strong urge and need to have fast access to wide range of sources for accurate information to help deliver the best possible services for users and care givers [2].

Knowledge management is a practice and not just a technology or a set of methodologies. Three main components of knowledge management are people, process and technology. For any health sector to have a good practice in 21st century it should make sure that these three components are in place and functioning properly to achieve the best practice. From the health sector point of view the knowledge management can be thought of ensuring the right information is available to the right people and practiced by the right people at the right time [2]. As health sector is very much interconnected and interrelated so a successful initiative in one department can be easily extended to practice in other departments.

Most health care organisations are poor in knowledge management and information. Although health sector is knowledge and information rich sector but there is not much quality information available to use effectively for the best practice

A. Hospital Information Management System (HIMS)

Hospital management information system plays an important role in Information processing in health care. It is the system used for the benefit of the hospital in which data are coherently stored in a database, from where they are put at the disposal of authorized users at the place and at the time the data are required, in a format adapted to the specific needs of the users. It has many advantages such as faster access, storage and retrieval of data, cost effective, user friendly, more secure and involve less manpower. Hospital

management information system (HMIS) is indispensable for any hospital for strategic planning, programming, budgeting, financial resource allocation, maintaining patients' record, personnel development, distribution and management of equipment.

III. TECHNOLOGY AND KNOWLEDGE MANAGEMENT

Technology and healthcare always have had an uneasy relationship. On one hand, there is the promise of technology and the enhancements it offers healthcare. These include improved medical information access, streamlined reporting, automation, reduced errors and more efficient processes. On the other hand, technology has fallen short of its full potential in healthcare, as too many competing systems make integrated data difficult to obtain. Additionally, the burdens of data entry and analysis burdens overwhelm rather than streamline processes.

Healthcare faces these mistakes if it "applies" technology to organizational Knowledge Management (KM) without first identifying KM goals and understanding how a KM system will be used by administrators, physicians, managers, and staff. Technology facilitates knowledge exchange, but it is not the end-all to managing knowledge effectively. Technology designed to enhance the interaction among a community of similar-minded participants, such as healthcare employees, can greatly enhance the exchange of knowledge. But it is the process and culture of an organization rather than the level of applied technology that make a KM system a wealth or void of retrievable information.

An effective KM system is built on communication and education and thrives in organizations encouraging shared learning both within and outside of the hospital walls. These systems store historical knowledge and knowledge created during exchanges of information among people who are interested in learning. Knowledge management systems designed with goals in mind, versus just acquiring the most advanced technology, is what will support healthcare organizations in streamlining processes, reducing costs and improving care.

A. Knowledge Management in Healthcare

Healthcare industry professionals are realizing that previous efforts, (e.g., searching for the elusive "best practice" and applying it as a commodity), bureaucratic and toothless performance improvement initiatives and poorly thought-out IT implementations, have not led to improved results and reduced costs. As a mindset, KM attaches importance to knowledge and identifies the value of knowledge at different levels. As a framework, KM facilitates knowledge access and transfer, which helps change behaviors and improve decisions.

Knowledge management systems support healthcare workers in using available knowledge to develop organizational learning. This learning assists the employees in critiquing a compilation of practice ideas and successfully designing a customized "best practice" for the organization. A good KM system can help staff create and exploit new knowledge. It is capable of driving decisions, change and improvements to all levels of the organization. And, in this era of escalating costs and declining reimbursements, an

effective KM system is virtually essential to a healthcare organization's process improvement and cost reduction strategies.

Hospitals can be isolated places, which make it tough to gather 'knowledge'. The clinical side has the measurable research and knows the outcomes, but the operational side of the hospital lacks this information. Consider this example. A hospital's operational staff may be well aware of the increased benefit to changing one of its products used for patient care management. Nevertheless, the staff struggles when it comes to demonstrating the cost/benefit to administration and to the physicians. A KM system offers a hospital staff access to strategies and contacts so they can learn how others have successfully carried out similar situations.

An effective KM system would facilitate 'experience sharing' among people struggling with staffing issues. It also archives the solutions brainstormed from the interaction to use as a basis for growing the collective knowledge of the group. This information is then readily accessible the next time a hospital manager (within the hospital or from another facility) faces retention issues. Another method hospitals typically use to gain knowledge is gathering ideas from a multitude of experts, as is done when attending a conference or a convention. Yet, how is that information disseminated throughout the hospital or healthcare organization if only two employees attended the convention? If it is difficult to share and build ideas within one department or even throughout one hospital, how can anyone expect cross-hospital exchanges to prove fruitful? Obviously, it is more difficult to share information when individuals are not physically together and even more complex when the individuals are employees of different healthcare organizations. The benefits of sharing such a huge reservoir of knowledge are colossal. Technology is a must in these cases. While technology enhances sharing and information exchange, even the most technologically advanced KM system will not solve every dilemma. The keys to a successful KM implementation are:

- Identify the knowledge to exchange and distribute
- Determine how knowledge will be managed
- Match technology and resources appropriately to the culture and needs of the organization

B. Importance of Technology in KM

Technology facilitates the process of transmitting and exchanging information. It can be used to manage uncertainty and complexity, where information is more factual and a high degree of interaction is not required. Technology enables individuals to coordinate the logistics of face-to-face meetings. It can also be used to catalogue expertise of organizational members and as a result facilitating access to the right people and enhancing knowledge sharing. Computer-mediated communication such as electronic mail or computer-conferences can help to maintain continuity and connection between conversations, especially for those in different locations [4].

One of the key technologies that are driving knowledge management is collaborative technology. Collaboration tools enable a company's professionals to work together and work virtually regardless of the geographical location. Web technology allows organizations to build web and knowledge portals that can handle substantial amount of information and made it accessible to users anywhere anytime

IV. MANAGING TACIT KNOWLEDGE

Knowledge embodied in books and journals does not necessarily translate into useful and usable knowledge unless it is read, manipulated and communicated from one person to another. In other words, knowledge can only reside in the minds of people and the minute it leaves the human mind, it is information. However, not all types of knowledge can be codified and captured. Knowledge in the form of skills and competencies can only be transferred from one person to another through interaction. Information management on the other hand deals with knowledge that can be captured, processed and managed. The knowledge management activities comprise the construction of information management systems, artificial intelligence, data mining and other enabling technologies. In this case knowledge can be treated as objects that can be identified and handled in an information system. The People track focuses on the management of people [1].

The core knowledge management activities encompass assessing, changing and improving human individual skills and/or behavior. It is a complex set of dynamic skills and know-how that is constantly changing. This simple approach to defining knowledge management, as an IT track and people track does not take into account knowledge embodied in processes and workflows or generated as a result of people interacting with information systems and the environment around them. An expert in one organization might not perform with the same capacity when moved to another organization. Knowledge is not a property of individual but rather held collectively by people working together. 'Know how' is a knowledge created out of practice and collectively shared by workgroup [5].

A. Understanding tacit knowledge

Everyone is more or less agreed that explicit knowledge is information. Tacit knowledge is a type of knowledge that many people believe that can only exist in the human minds. It is a product of people interaction with each other and the people interaction with the environment around them. Polyni referred to tacit knowledge as something that we do unconsciously and most of the time we are not aware of its existence [6]. Knowledge in the form of skills and competencies is normally acquired through training and interaction with the environment. It is not only difficult to articulate, but, it is something that we cannot express and even we do not know [7].

The three different types of knowledge that knowledge management is concerned with are explicit knowledge (information), "Know how" or implicit knowledge (can be captured and codified as information), tacit knowledge (can not be captured and codified as information. For knowledge management to succeed, there is a need to treat knowledge as an activity and not an as an object. The minute an activity is transformed to an object, it should not be called knowledge but rather a piece of information. Therefore, information management systems are good in managing objects and not activities.

V. Healthcare Knowledge Management Gaps

Knowledge in hospitals arises from both internal and external sources. Internal knowledge exists in the form of the patient care data collected and stored, and also from the knowledge, skills, and expertise of the employees (nurses, physicians, managers). External knowledge is the knowledge that hospitals encounter through their association with entities such as regulators and professional conferences. Hospital employees attend conferences and bring in new knowledge to the organization that is sometimes assimilated and combined with the internal knowledge to create new knowledge for a hospital [8].

Knowledge management has become a very critical issue for organizations. In an era where it is easy for competitors to copy processes and policies quickly, organizations are using knowledge to gain competitive advantage. In the future businesses will rely more and more on managing organizational knowledge to create competitive advantage. Future businesses are more likely to perform well when they manage their knowledge well [9].

Health care institutions rely on collecting a large amount of information and also have an influx of knowledge from outside the firm. The high-risk situations involved in hospitals make it necessary to collect and store large volumes of information regarding patient records [10]. What is it that makes the health care environment different from any other organization that collects and stores data about customers and suppliers? The combination of the "consequences of error" (e.g., patient disability or death) and the emphasis in the United States on patient safety and privacy as a critical social issue makes health care institutions highly liable to litigation [11]. Therefore there is an increasing necessity for health care organizations to pay attention to knowledge management issues within the organization.

VI. Conclusion

Knowledge management as a concept is very attractive and for many organizations is trendy and nice to be associated with. For many IT vendors and management consultants, it is a business opportunity that should not be missed. But while there is nothing wrong with making business sense out of knowledge management, there is a need to go beyond the search and replace practice of the word information to the word knowledge. Information management is a subset of knowledge management and technology should be seen as an enabler and part of infrastructure.

For the majority of those interested in knowledge management, the key drivers are organizational efficiency, maximizing organization's potential, competitive advantage, building a learning organisation and managing intellectual capital. However, implementing knowledge management is also not that easy. Organisations wanting to implement knowledge management have to grabble with issues such as strategy, technology, organizational culture, and knowledge organization. But despite all these issues, companies

worldwide in both the private and public sector have shown keen interest in knowledge management, judging from the amount of money expected to be committed for knowledge management in the next few years.

Knowledge management is not a short-term quick fix. It is a long-term, sustainable commitment to changing the culture of health care to become more collaborative, more transparent, and more proactive. Knowledge management, implemented well, will transform the health care delivery system over the next few decades, into a more cost-effective, error-averse, and accountable public resource.

For effective use of knowledge and information in health sector, necessary skills needs to be developed to store, retain and share knowledge. As described earlier people are the most important part in any knowledge management strategy. But for an effective KM strategy, technology and people should be supported by appropriate technology. Knowledge management should be considered a business model to coordinate and collaborate efforts to improve the organisation performance by creating, sharing, retaining and applying the knowledge. It is also believed that organisations productivity can be enhanced by reusing knowledge across the organisation.

References

[1] K.-E. Sveiby, "What is knowledge management?" Brisbane: Sveiby Knowledge Associates, 2001. Available: http://www.sveiby.com.au/knowledgeManagement.html

[2] C. Beverly, "Knowledge management strategy for the adult social care directorate 2007-2010," Cumbria county council. Ver. 1, March 2007.

[3] A. Rector, "From an information poor to an information rich health environment," A research study in health informatics for the UK institute for health informatics, January 2001.

[4] D. Marwick, "Knowledge management technology," *IBM Systems Journal*, vol. 40, no. 4, pp. 814-830, 2001.

[5] J. S. Brown and P. Duguid, "Organizing Knowledge," *California Management Review*. vol. 40, no. 3, pp. 90-111, 1998.

[6] M. Polanyi, *The Tacit Dimension*, New York: Doubleday,1966.

[7] M. Polanyi, *Personal Knowledge: towards a Post-Critical Philosophy*, Chicago: University of Chicago Press, 1958.

[8] S. P. Englebardt and R. Nelson, *Health Care Informatics: an Interdisciplinary Approach*, MosbyPress, 2002.

[9] I. Nonaka, "The knowledge creating company," *Harvard Business Review*, vol. 69, pp. 96-104, 1991.

[10] S.R. Abidi, S. S. R. Abidi, L Butler, and S Hussain, ""Operationalizing prostate cancer clinical pathways: an ontological model to computerize, merge and execute institution-specific clinical pathways," *Knowledge Management for Health Care Procedures* (R. David, Ed.), New York: Springer, pp. 5-6, 2008.

[11] R. Boss, "Knowledge management-enabled health care management systems: capabilities, infrastructure, and decision-support," *Expert Systems with Applications*, vol. 24, no. 1, pp. 59-71, 2002.

G. V. R. K. Acharyulu currently is working as associate professor at the School of Management Studies, University of Hyderabad, India and coordinating MBA (Healthcare & Hospital Management) program. His current research areas include Operations Management, Modeling and Healthcare Management. He has been teaching Hospital Administration, Operations and Supply Chain Management. He has published several research papers in National and International Journals in the area of Operations, Supply Chain and Healthcare. He has also authored books viz., Research Methodology & Statistical Tools, Marketing Research, Supply Chain Management, Strategic Quality Management and Pharmacy Administration.