# Chapter 97
# Healthcare Knowledge Management: Integrating Knowledge with Evidence-based Practice

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**Abstract** Healthcare is experiencing a significant growth in the scientific understanding and practical approach of diseases, care pathways, treatments and clinical decisions. However, the literature reveals that this exponential growth of knowledge is not consistent with the users' ability to effectively disseminate, transfer and apply healthcare knowledge in clinical practice. Healthcare is intensive in knowledge and its efficient use can profoundly impact the quality of patient care decisions and health outcomes. Over the past decade Knowledge Management (KM), as a concept and a set of practices, has penetrated increasingly into the fabric of managerial processes in organizations all over the world. KM refers to strategies and processes for identifying, capturing, structuring, sharing, storing and applying an organization's knowledge to extract sustainable competitive advantages. KM in healthcare may be seen as a set of methodologies and techniques to facilitate the creation, acquisition, development, dissemination and utilization of healthcare knowledge assets. The goal of Healthcare Knowledge Management (HKM) is to structure, provide and promote timely and effectively healthcare knowledge to healthcare professionals, patients, individuals and policy makers when and where they need it in order to help them to take high quality, and cost-effective care decisions. The Evidence-Based Practice (EBP) approach focuses on the need for clinicians to keep up to date and improve not only their own skills in seeking the evidence, but also to build on their own knowledge base of what effective practice is. KM can only improve healthcare when knowledge has been successfully integrated with EBP. KM in the context of evidence-based

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healthcare creates a learning environment and ensures that best practice is captured and disseminated. This work aims to explore how KM practices can leverage different types of healthcare knowledge in the context of EBP. This research is theoretical in nature and seeks to contribute to understand the numerous challenges that exist to fully realize the HKM portfolio, namely knowledge processes that can improve the quality of patient care.

**Keywords** Clinical decisions · Evidence-based practice · Healthcare knowledge · Healthcare knowledge management · Practical approach of diseases

## 97.1 Introduction

Healthcare organizations are source of knowledge creation; yet, much of healthcare knowledge is under-utilized at the point-of-care and point-of-need. In such organizations, clinical staff is one of the key sources of knowledge creation however the inability of physicians to access and apply current and relevant knowledge leads, sometimes, to the delivery of suboptimal care to patients. Studies in the field [15, 17, 24] reveal that the large amount of healthcare knowledge is dispersed across different tools which makes difficult for healthcare professionals to apply timely the relevant knowledge to make the best patient care decisions. In 1999, the Institute of Medicine published the "To Err Is Human" report, which estimating that up to 98,000 patients a year die as a consequence of preventable errors [14]. More recently, a study reports that the number must be much higher–between 210,000 and 440,000 patients each year who go to the hospital for care suffer some type of preventable harm that contributes to their death [13]. The literature provides evidence that the under-utilization of healthcare knowledge contributes to medical errors, incorrect clinical decisions, high healthcare delivery costs and sub-optimal utilization of resources. Healthcare knowledge is central to clinical decision making processand then it is critical for organizations to make the most of their internal knowledge in order to offer the best possible health care. While there is no theory associated with the Evidence-Based Practice (EBP) [22], it is described as clinical practice consistent with the current best evidence. Studies in the field suggest that it is possible to conceptualize EBP as an evolving heuristic structure that helps improve patient outcomes, accounting for concepts such as knowledge acquisition, knowledge development and knowledge use. These concepts are part of the Knowledge Management (KM) cycle offering a structured process for the generation, development, sharing, distribution and utilization of knowledge, in order to generate value from it. This includes both tacit knowledge (personal experience) and explicit knowledge (evidence). In this sense, KM can provide an effective and efficient way of organizing what is known, reinforcing the EBP of healthcare professionals. In addition, clinical practitioners need to acquire proficiency in understanding and interpreting clinical information so as to attain knowledge and wisdom when dealing with large amounts of clinical data. Integrating KM paradigm with the healthcare system, in a manner where technol-

ogy, people and processes are in harmony, can provide a holistic picture of HKM. We believe that a critical understanding of the concept of KM can provide an important perspective into how EBP can be more effectively implemented within a healthcare organization. On the basis of the KM and healthcare literature, this paper aims to develop a framework that integrates KM practices with EBP to provide an explanation of the application and impact of KM practices in healthcare delivery.

## 97.2 Theoretical Development

In a technically and intellectually based economy the rules of economics have been transforming the way we live and the way we work. The knowledge economy is seen as an external KM promoter, which influences every organization within this economy. Knowledge is described as a "capacity to act" [23] which suggests that the link between knowledge and outputs/outcomes in organizations becomes a critical issue to be addressed in the business and societal fields. In the healthcare field, knowledge is defined as "capacity to act competently" [25] signaling the importance to managing healthcare knowledge through systematic mechanisms. The literature highlights the potential of the concept "KM" to the healthcare domain. It is recognized that sound research requires a conceptual framework of the empirical reality being analyzed. Therefore, a key theme in which progress must be made is associated with the modeling of the processes of healthcare knowledge creation and diffusion.

An overview of the health and business/management literature on KM in healthcare will be undertaken. Theoretical assumptions for this work start by characterizing healthcare knowledge. Having gained an understanding of healthcare knowledge, we follow by discussing some KM and EBP concepts and processes and their application in HKM.

1. Healthcare Knowledge

Healthcare is knowledge rich, being generated at rapid pace. The information explosion in healthcare in the last decades has adversely affected the ability of healthcare professionals, particularly physicians, in providing accurate and timely medical decisions. Healthcare industry is in a state of flux, likely to be further accentuated by advances in biomedical knowledge and genetic engineering. The large volume of healthcare knowledge is often dispersed across different mediums which make it extremely difficult for healthcare professionals to be aware of the relevant knowledge to make the best patient care decisions [2]. One of the most recurring approaches of the literature on KM in the healthcare is the discussion around the distinctive nature of knowing in healthcare. The first issue is the highly fragmented and distributed nature of healthcare knowledge [10]. The healthcare practice is knowledge intensive and the large amount of knowledge is still tacit. Additional difficulties arising from the distributed nature of knowing in the healthcare sector have been discussed in the literature [7, 11], such as: (1) the presence of strong professional boundaries which retard the spread of innovations and makes knowledge sharing very difficult to happen in practice, and; (2) the presence of different groups with specific rules,

job representations, behaviors, and values, which makes it difficult to see the whole knowledge process because of the distinctly different way their organizations and their work practices are structured. The second consideration is the reference to the proliferation of knowledge within the sector. It is observed that the digital era is revolutionizing the healthcare industry, providing an over abundance of complex medical knowledge launching medicine at a crisis point. Some authors [12, 19] claim that doctors can no longer memorize or effectively apply the vast amounts of scientific knowledge that are relevant to their clinical practice. A third theme relates to the importance of local knowledge in the medical decisions processes. As healthcare decisions come from various different sources and types of knowledge it is common a preference for local knowledge and tacit knowledge [6]. At this respect, the literature on evidence-based medicine [9] emphasizes that the integration of individual clinical expertise with the best available external clinical evidence (based on all valid and relevant information) that comes from a systematic research, moves medical practices toward evidence faster, more consistently, and more efficiently than evidence-based individual decision making alone.

Additionally, some works observed that health literacy skills are increasingly important for both health and healthcare. Patients with inadequate health literacy who have chronic diseases, e.g. diabetes, hypertension or asthma have less understanding of their disease than patients with adequate literacy. Healthcare knowledge concerns are at both the point-of-care and the point-of-need. Studies on social marketing for healthcare purposes have proven that centric-customer programs are well succeeded to promote healthy behaviors, preventing diseases, with impact on many aspects of a person's welfare, housing services, unemployment and lifestyle [4].

The literature identifies an assortment of knowledge types that contribute to clinical decision-making and care planning. Abidi has defined eight different types of knowledge within healthcare, as described in Table 97.1.

2. Knowledge Management

Within the context of the new world order, the challenges of prosperity and sustainability are essentially determined by our ability to wisely use knowledge, a global resource that is the embodiment of human intellectual capital and technology. The literature discusses several approaches for integrating KM with business processes and strategies in organizations. From the healthcare management perspective, the focus of research has been to examine different healthcare management concepts such as evidence-based medicine (EBM) and KM, both of which could potentially alleviate the problem of health-care information overload.

Knowledge is managed, structured and categorized information accessible by the right people at the right time [3]. Knowledge combines data and information, in addition to past experiences of experts' knowledge to support decision-making. Being described as the capacity to act, it is suggested that organizational knowledge is uniquely linked to action. Knowledge in organizations exists in multiple experiences and perspectives, being classified as: (1) tacit knowledge, and; (2) explicit knowledge. Explicit knowledge can be embodied in a code or language and as a consequence it can be verbalized and communicated, processed, transmitted and stored relatively easily. It is public and can be shared in the form of data, scientific formula, man-

**Table 97.1** Types of healthcare knowledge

| Type of knowledge | Description |
|---|---|
| Medical knowledge | It is knowledge domain that describes the theories abouthealth and healthcare, healthcare delivery models and processes |
| Patient knowledge | Refers to a clear description of the health status of the patient. It comprises medical observations of the patient and the inferences drawn by physicians, which are coded in the medical record, to provide a complete picture of the patient |
| Practitioner knowledge | Entails practice-related tacit knowledge that is exercised by the practitioner whilst discharging patient care. Practitioner knowledge is acquired through active learning, internship, observations and experiences |
| Organizational knowledge | This domain comprises knowledge flows within the organization such as a variety of knowledge from medical diagnostic systems, text-based materials, and other medical professionals with medical specialties |
| Process knowledge | Concerns institution-specific care pathways (or work flows) that determine the stipulated discourse of care for specific medical conditions within a healthcare setting |
| Resource knowledge | Refers to care delivery resources and infrastructure available within a healthcare setting, such as medical diagnostic devices and tools, drugs, support staff, nurses, hospital beds or surgical facilities |
| Relationship knowledge | Reflects the social capital withheld within an organization. It entails the communication mechanisms and contacts between multiple departments and institutions for the purposes of patient information sharing |
| Measurement knowledge | Describes the metrics, criterion and standards to measure success of a healthcare delivery process/system and the associated health outcomes |

*Source* Adapted from Abidi [2]

uals, books, journals, and mass media such as newspapers, television, internet, etc. In a business context, patents may be considered an ideal example of explicit knowledge. In the healthcare domain, an example of explicit knowledge is the EBM literature, reviews, case studies, clinical practice guidelines, and so on. In contrast, tacit knowledge is embedded within an individual's experiences, beliefs, perspectives, values and instincts and is mostly inexpressible. Because it is rooted in action, commitment, values and emotions, it is hard to formalize. Tacit knowledge is well communicated by face-to-face encounters and it is acquired by sharing experiences, by observation and imitation. In healthcare, tacit knowledge of practitioners is manifested in terms of their problem-solving skills, judgment and intuition. Tacit and explicit knowledge are complementary, which means both types of knowledge are essential to knowledge creation. Explicit knowledge without tacit insight quickly loses its meaning. Knowledge is created through interactions between tacit and explicit knowledge and not from either tacit or explicit knowledge alone [18].

There are a number of management studies that stress the influence of KM in business performance [5], innovation [8] and sustainability [16]. Everybody discusses KM, but how can it be used and how can we successfully apply it? This question has its root in a practical problem experienced by many organizations (pri-

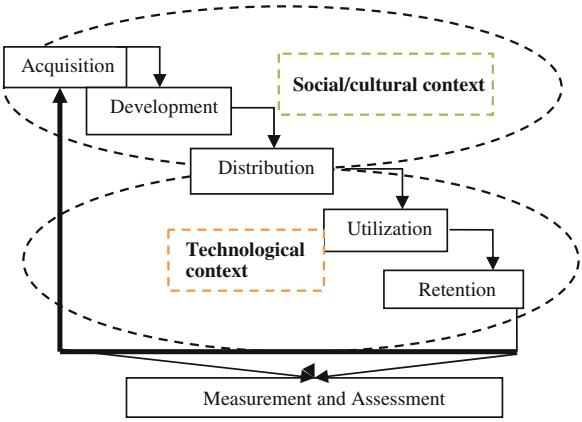


**Fig. 97.1** Knowledge management key activities

vate or public, profit or non-profit) that are seeking to understand and deploy KM for their business. Several definitions of KM exist in the literature. KM is a complex and multidisciplinary concept that encompasses everything an organization does to make knowledge available to the business, such as embedding key information in systems, processes and products, applying incentives to motivate employees, interpreting and absorbing customer's wishes and forging alliances to combine the business with new knowledge. The objective of an organization applying KM is simply to make the right knowledge available at the right time at the right place. Therefore, KM relates to the processes and practices through which organizations create knowledge-based value.

Fundamental Approaches to Knowledge Management

The literatures stresses two fundamental approaches to KM: the process approach and the practice approach. The process approach attempts to codify organizational knowledge through formalized controls, processes, and technologies. In contrast, the practice approach to KM assumes that a great deal of organizational knowledge is tacit in nature, and that formal controls, processes, and technologies are not suitable for transmitting this type of understanding. The flow of knowledge depends on people and the social environment they operate in Fig. 97.1 illustrates this conceptual linkage between socio-cultural context (practical approach) and technological context (process approach).

Key KM activities are: knowledge acquisition (from customer, supplier, competitor and partner relations), knowledge development (directed toward creation of new skills and products, better ideas and improved processes), knowledge distribution (exchange and dissemination of knowledge from an individual to a group or the organization), knowledge utilization (productive use for the benefit of the organization), knowledge retention (selection, storage and updating of information, documents and experience) and measurement and assessment of knowledge. Therefore, KM represents a systematic approach towards searching and using the knowledge


**Fig. 97.2** Basic steps in evidence-based practice

on behalf of creating value. The goal of KM initiative in a healthcare setting is to provide the professional healthcare with appropriate tools, technologies, strategies and processes in order to make healthcare delivery more effective and efficient, and thereby maximize the full potential of all healthcare knowledge assets.

3. Evidence-Based Practice

Evidence-based practice (EBP) is the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual clients [21]. Evidence-based practice is meant to integrate individual clinical expertise and the best external evidence found in research. Hence, medical knowledge should be made available to practitioners. While evidence based medicine is a key aspect of today's medical practice, the abundance of information can keep a health professional from finding the right information. The need is to deliver the right information, at the right time, to the right person, and in the right format. Failing to do so is an impediment to the implementation of evidence based medicine. In this context, KM can play an important role by organizing knowledge and making it accessible.

The evidence-based method aims to turn clinical problems into questions and then systematically locate up-to-date research findings to produce qualitative appraisals or quantitative summary statistics as the basis for recommendations for clinical practice [20].

Implementation of EBP mainly involves four sequential steps, as depicted in Fig. 97.2: first, framing a clear question based on a clinical problem; second, searching for relevant evidence in the literature; third, critically evaluating the validity of contemporary research, and; fourth, applying the findings to clinical decisionmaking.

Despite the huge amount of information held in the healthcare knowledge database, it is unable to successfully apply the information across the entire spectrum of health-care delivery. Information provided in order to support evidence-based decision making in healthcare is a complex and non-structured component of KM. Using the best available evidence means identifying and integrating the most current research and practice results for effective care in order to support clinical decision making of the healthcare practitioners. EBP approach aims to understand how health resources can be used most effectively to improve health outcomes and the quality of patient care.

4. Healthcare Knowledge Management

There is much debate in healthcare over the use of the term "knowledge management" (KM), particularly when applied to healthcare operations. The reason behind this is that KM is a topic associated to business and industry, may be unfamiliar to

many healthcare workers, but largely used by non-healthcare industries to achieve improved performance both for the individual and the organization. In addition, it is argued that previous healthcare management paradigms were unable to offer solutions to the information management crisis in healthcare. The information explosion in the last decade has adversely affected the ability of healthcare professionals, particularly physicians, in providing accurate and timely medical diagnosis and treatment.

Knowledge management research in healthcare over the years has focused on three topics: (1) the nature of knowledge in healthcare sector; (2) the type of KM tools and initiatives that are suitable for the healthcare domain, and; (3) the barriers and enablers to adoption of KM practices. More recently, researchers have begun to examine the theories and practices of KM applied to healthcare. Healthcare is a knowledge intensive business and KM initiatives hold the promise of improved efficiency in this sector. Given the universal pressures on healthcare resources worldwide, there is a clear need to examine whether an approach to KM could bring benefits to health services. However, we need an approach that recognizes the whole picture and embraces holism, rather than reductionism, in order to understand the complexity of human cognition; in other words a systems understanding of Healthcare Knowledge Management (HKM).

At present, KM in health care has largely concentrated on the generation of evidence from research (explicit knowledge) and the provision of evidence at the point of clinical decision making. According to Abidi [1] HKM can be defined as the systematic creation, modeling, sharing, operationalisation and translation of healthcare knowledge to improve the quality of patient care. This definition excludes a number of processes which may support and facilitate the knowledge flow. Knowledge flows comprise the set of processes, events and activities through which data, information, knowledge and meta-knowledge are transformed from one state to another (tacit to explicit; explicit to tacit). The literature describes various KM processes, varying according to the organization's context. To simplify the analysis of knowledge flows, the framework described in this paper is based primarily on a general knowledge model. The model organizes knowledge flows into four primary activity areas: knowledge acquisition, retention, distribution and utilization (Fig. 97.3).

Knowledge acquisition: This comprises activities associated with the entry of new knowledge into the system, and includes knowledge development, discovery and capture.

Knowledge retention: This includes all activities that preserve knowledge and allow it to remain in the system once introduced. It also includes those activities that maintain the viability of knowledge within the system.

Knowledge distribution: This refers to activities associated with the flow of knowledge on sharing acquired knowledge. This includes communication, translation, conversion, filtering and rendering.

Knowledge utilization: This includes the activities and events connected with the application of knowledge to business processes. Utilization is regarded as the capacity of the organization in applying knowledge generated in new situations. Within each activity phase exists other, smaller knowledge flows and cycles. These layers span a wide range of macro and micro behaviors, ranging from broad organizational

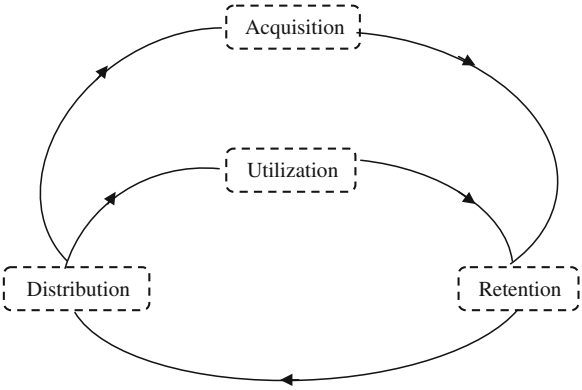


**Fig. 97.3** The general knowledge model

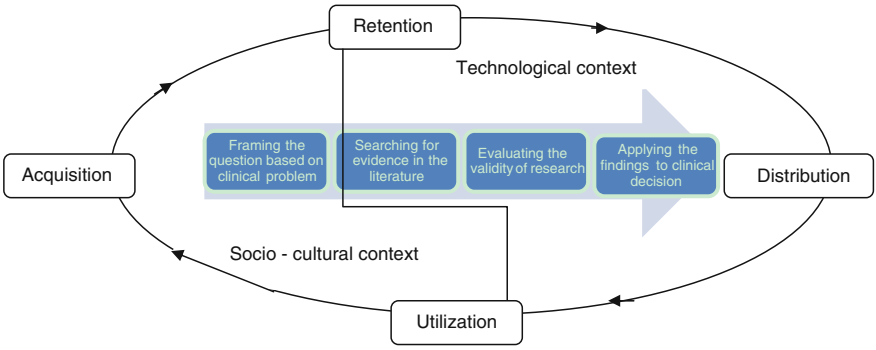


**Fig. 97.4** Integrating knowledge and evidence-based practice

processes to discrete actions and decisions, and include all the various intervening layers: activities, tasks, work flows, systems, interfaces and transformations.

The purpose of the HKM is to promote and provide optimum health knowledge, timely, effective and pragmatic for health professionals (and even to patients and individuals) where and when they need to help them create high quality, well-informed patient care decisions and cost savings.

On the basis of the literature review, we suggest the framework depicted in Fig. 97.4, which combines the primary phases of general knowledge model with the EBP sequential phases.

One of the main features of EBP is the reliance on the partnership among hard scientific evidence, clinical expertise and individual patient needs and choices. As a process, EBP is about finding, appraising, retrieving, and applying scientific evidence to the treatment and management of healthcare. Ultimately EBP is the formalization of the care process that the best clinicians have practiced for generations. Its aim is to support practitioners in their decision making to eliminate/mitigate the use of ineffective, inappropriate, too expensive and potentially dangerous practices.

Theoretically, evidence-based medical practice is premised upon both explicit and tacit knowledge use. Steps of promoting adoption of EBP can be aligned with KM practices. Knowledge acquisition can conduct the research and then retaining and packaging relevant research findings into products that can be put into action—such as specific recommendations—thereby increasing the likelihood that research evidence will find its way into practice. Librarians play an important role in the spread of EBP because of the importance of identifying and retrieving appropriate literature from various sources for use in making health care decisions.

The findings from this study have implications for the provision of an evidence based practice as part of systematic KM as a way of improving decision making. We argue that KM in the context of evidence-based healthcare creates a learning environment and ensures that "best practice" is captured and disseminated.

## 97.3 Conclusions

There is an increasing consensus that healthcare decisions should be based on the best possible evidence, ensuring that healthcare is both effective and efficient. The literature reports the production and dissemination of evidence-based guidelines as a frequently used approach. At the same time, an increasing interest has been emerging in KM as an approach to increase the effectiveness of organizations. Experience of KM initiatives in non-health care organizations can offer useful insights and strategies to implement evidence-based practice in healthcare. KM can play a vital role in organizing, structuring and supporting evidence-based health decision making. KM is able to assist in medical errors reduction, and consequently their cost, by providing a decision support for practitioners.

There are many reasons for adopting the knowledge management practices in EBP, like patient safety, supporting care and reducing treatment cost are the factors for knowledge management adoption.

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