A Review On Implementing Knowledge Management In Healthcare

Suzan Katamoura[1], Mehmet Sabih Aksoy[2]

[1]Statistics and Analysis Officer, Studies and Research Sector, King Abdullah City for Atomic and Renewable Energy, Riyadh 11451, Saudi Arabia; s.katamoura@energy.gov.sa
PHD Student atKing Saudi University
[2]Professor, Department of Information Systems, College of Computer and Information Sciences King Saudi University, Riyadh 11451, Saudi Arabia; msaksoy@ksu.edu.sa

ABSTRACT:Healthcare is a dynamic profession that is continuously changing and evolving. Doctors are always in circumstances where they have to think, analyze and process a wide range of medical conditions, laboratory and radiology results, medications, treatment history, and similar patients' cases to make decisions. Therefore, healthcare is a knowledge-driven field. Thus, implementing healthcare knowledge management systems will support streamlining information to achieve the most efficient patient care. In addition, a proper knowledge management system will assist stakeholders in policy development and decision making by maintaining the information flow between the stakeholders and staff, which will result in higher productivity. This paper offers an overview of knowledge management implementations in healthcare organizations, including the types of healthcare knowledge, the importance of knowledge management for healthcare, and the advantages and disadvantages of implementing these systems. The work also introduces several relevant concepts related to this field, such as big data and expert systems.

Keywords: Knowledge Management, Healthcare,Big Data, Expert Systems

Introduction

In this evolving world where technologies are continuously changing, discoveries are happening, and data is accumulating, healthcare practitioners face a significant challenge since the field depends on knowledge and expertise that are critical and difficult to transfer to others. Here, knowledge management systems play an essential role in articulating, organizing, mapping, storing, and making good use of knowledge. However, implementing knowledge management in healthcare is not an easy task. Instead, it is a challenging process due to many factors. In the following sections, there will be an introduction to knowledge management and its importance in healthcare. Next, the authors will state the source of healthcare's big data and the data applications. Then, they will present the types of healthcare knowledge. After that, the authors will indicate knowledge management framework components and illustrate the success factors of knowledge management implementation in healthcare along with the implementation methodology. In addition, the paper will discuss the evaluation of knowledge management implementation and contribution to healthcare and explain the concept of medical expert systems. Finally, the work will list the advantages and challenges of implementing knowledge management in healthcare.

Knowledge Management

Knowledge management (KM) has various definitions in the literature that are very close in meaning. However, one commonly used definition of knowledge management is "the process of creating, sharing, using and managing the knowledge and information of an organization" [1]. Therefore, it is a multidisciplinary approach to achieving organizational objectives by making the best use of knowledge by directing efforts toward strategic goals such as improved performance, competitive advantage, innovation, sharing lessons learned, integration, and continuous improvement. Hence, it can result in remarkable benefits for the business and individuals.

Knowledge Management in Healthcare

Applying knowledge management in the healthcare field is the formal process of gathering, analyzing, and sharing information and insight based on health data that has been collected in various ways for various purposes [2]. The need for such systems in this profession arises from the fact that in this practice, situations always require fast thinking and processing of a specific collection of diagnostic test results, medications, past treatment responses, and similar patient cases to make optimal decisions that affect lives. Previously, this information and knowledge about healing practices used to be stored in experts' minds where they could share it on formal and informal occasions like individuals, groups, or communities. Nowadays, knowledge management considers being the gate to proper patient care in complicated situations, especially in an increasingly complex environment. Additionally, healthcare organizations need to effectively manage internal and externally generated knowledge to deliver high-quality healthcare outcomes, achieve operational excellence and faster innovation, and therefore gain a competitive advantage.

Power of Sharing

Consider the volume of knowledge and expertise required to treat each patient's case, including diverse information like determinants of health, measures of health, health status, and care delivery documentation. Moreover, to care for patients effectively, healthcare providers and staff must be able to share clinical knowledge and knowledge around organizational processes and procedures and current drug and treatment information [3]. Furthermore, that information can change by the day as the medical field constantly evolves with new research being released, new treatments being discovered and technologies being developed and improved. For example, today, gallbladder removal is performed through a laparoscopy procedure that allows a surgeon to access the inside of the abdomen with three small incisions in the skin. In contrast to the situation 30 years ago, doctors performed gallbladder removal through a large incision, which resulted in a longer healing time and more possible side effects.

Big Data in Healthcare

The health care field generated about 153 Exabytes of data in 2013, approximately equivalent to 2.6 trillion music albums. However, that number increased dramatically in 2020 by more than 11,000% to 2,314 Exabytes, equivalent to more than two trillion laptops worth of data. Also, there is an estimated growth in data generated in healthcare by 48% annually.

The sources of this massive volume of data, as illustrated in Figure 1 below, are patient information, population studies including diet and genetics, research evidence, clinical results, and medical effectiveness and errors reports.

Figure 1: Types of data in healthcare

In addition, other clinical data is captured by computerized physician order entry (CPOE), and clinical decision support systems incorporate medical doctors' written notes and prescriptions, medical imaging and reports, laboratory results, insurance, and other administrative data [4].

Application of Data in Healthcare
There are numerous applications for such big data that maximize the benefit of the data and allow it to achieve objectives. Figure 2 presents a set of these applications, and the following lines will describe it briefly.

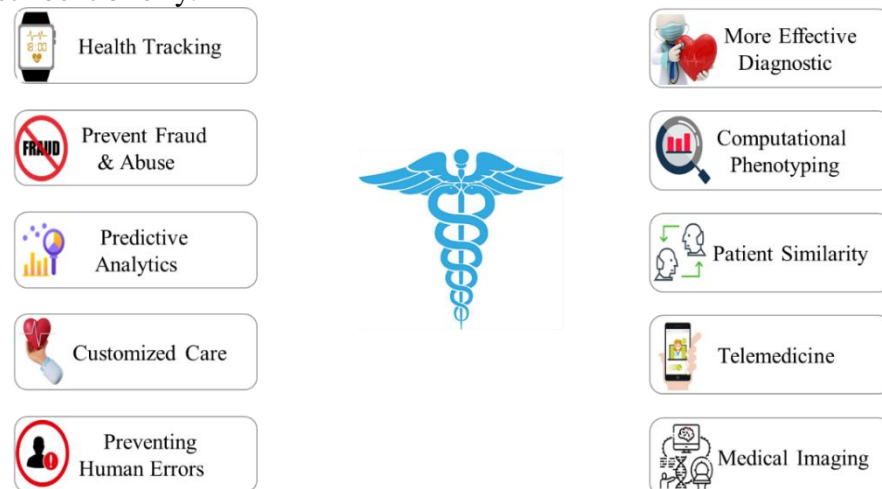Figure 2: Applications of data in healthcare

Health Tracking: Using wearables and different software applications on smartphones that allow people to track their heart rate, blood pressure, weight, activity levels, stress levels, and even sleeping behaviors; some examples include: FitBit, PIP, MyFitnessPal, etc.). Medtronic recently partnered with IBM to crowdsource medical data from apps and other devices.

Prevent Fraud & Abuse: companies that provide medical insurance have suffered significantly due to abused services by the insured persons or the healthcare providers and fraud incidents where insured members let others use their insurance or make fake claims. With knowledge management systems in place, all these incidents are considerably reduced.

Predictive Analytics: is an advancing method of improving patient outcomes. It alerts medical practitioners and care providers of the probability of events and outcomes ahead of time, helping them to prevent health issues that might occur.

Customized Care: the ability to provide non-medical companion/homemaker services to seniors, those recovering from surgery, new and expectant mothers, and others to remain in the comforts of their own homes, including 24-hour live-in care or hourly care.

Preventing Human Errors: errors in the medical field can be fatal. These errors could be as simple as prescribing penicillin for an allergic patient. However, such incidents are reduced a lot due to the proper use of knowledge management systems that keep all the data in one place and highlight any critical items to be considered.

More Effective Diagnostic: with all the data available to the doctor in the system, not only about the patient and the medical history but all available references, the diagnostic will be more effective and lead to better care.

Computational Phenotyping: is transforming the noisy, massive Electronic Health Record (EHR) data into meaningful medical concepts and using it to predict the risk of disease for an individual or the response to drug therapy.

Patient Similarity: is identifying similar cases and studying them to find out treatment plans based on these similarities.

Telemedicine: has recently become a top-rated application due to Covid-19. It is consultations run over phones to provide healthcare services remotely.

Medical Imaging: Medical images are rich information resources. It includes a broad spectrum of different image acquisition methodologies for various purposes. They can vary from two, three, to four-dimensional images [5], [19].

Importance of knowledge management in healthcare

1. Building learning organizations by developing learning routines. Organizational research has highlighted three main factors that are critical for organizational learning and adaptability:
   - a supportive learning environment, strengthen learning processes and practices, and leadership behavior that provides reinforcement,
   - Allows continuously assess our successes and our failures as we strive to improve continuously, and
   - Creates a culture that learns from experience based on a data-driven performance and outcomes assessment. Also, learning from experience builds knowledge that can then be used to improve, care and streamline operations over time.
2. Stimulating cultural change and innovation by actively managing knowledge and encouraging the free flow of ideas and innovative culture. However, a creative culture begins with accepting that the world is changing and being open to doing things differently.
3. Improving the quality of care by reducing the waste of information, reducing inefficiencies, and assisting in real-time resource utilization productivity analysis [6], [7].

Types of Healthcare Knowledge

There are three types of healthcare knowledge: provider, patient, and organizational knowledge.

Provider Knowledge:

This knowledge is related to practices; thus, it is also known as practitioner knowledge. Medical professionals possess knowledge (explicit and implicit). Also, they must know standard medical information that is easily comprehended from reference materials like textbooks (e.g., human anatomy). Additionally, with years of medical practice and experience with numerous patients, doctors develop an internal knowledge base of symptoms and facts about patients and medical conditions that address needs for preventative maintenance and illnesses.

Patient Knowledge:

The other side of the medical spectrum consists of tacit knowledge in patients. This type of information is considered health status as patients own complex expertise in current and past medical conditions that practitioners may not know about. However, such knowledge is vital for practitioners, especially regarding the diagnoses and prescription treatments for illnesses.

Organizational Knowledge:

Healthcare entities consist of other knowledge-based resources available for patients and doctors. This domain of knowledge comprises a variety of knowledge from medical diagnostic systems, text-based materials, and other medical professionals with medical specialties. Moreover, this domain could contain medical land treatment process knowledge recommended by an institution or medical society (e.g., American Medical Association) [7].

KM Framework Components

The knowledge management framework is designed to help map, create, distribute, scale, and optimize a company's knowledge and knowledge resources. The framework supports everything, including the information found in an employee handbook, user manuals of different software programs, responses to customers' frequently asked questions, and market research necessary for stakeholders' decision-making. The Knowledge Management framework consists of five core components: hardware, software, data, procedures, and people [8].

Implementing Knowledge Management

Factors affecting the implementation of KM:

*   **Corporate Politics:** adopt trust-based, promote a culture of knowledge sharing/absorption toward enhanced innovation, improved performance & sustainable competitive advantage.
*   **Technology:** enhance how to configure and use tools and automation to enable Knowledge Management.
*   **Leadership:** increase the ability of individuals within the organization to influence others.
*   **Organizational Processes:** include best practices and governance for efficient and accurate knowledge identification, management, and dissemination.
*   **Organizational Culture:** establish and cultivate a knowledge-sharing/driven culture for long-term success.
*   **Strategy:** clear goals and objectives of a shared vision, develop a KM strategy aligned with business strategy & precise tasks and objectives. [9], [10].

Success Factors of KM Implementation:

Implementing a knowledge management system (KMS) becomes a key challenge for organizations. Therefore, a study was conducted to determine the relationship between employee training, leadership, performance management, and information system infrastructure with knowledge management implementation. The authors collected information through a questionnaire distributed among 31 respondents. They concluded that firms have to recognize significant sources to obtain the competitive advantage of knowledge management. According to the study, information system infrastructure, employee training, leadership, and performance management, show a significant relationship with knowledge management implementation [11].

Steps of KM Implementation in Healthcare

A successful knowledge management system increases staff productivity, product and service quality, and deliverable consistency by capitalizing on intellectual and knowledge-based assets. However, implementation is a challenge. The following steps are recommended by [12].

1. Establish appropriate program objectives: identify and document the business problems that need resolution and the business drivers to rationalize the implementation. Then, set goals to address the business problems. The short-term objectives will validate that the program is on the right path. On the other hand, the long-term objectives will help create and communicate the big picture.

2. Prepare for change, and create a team of contributors, editors and managers to build the knowledge base: since culture is an essential factor in knowledge management implementation, employees should be encouraged to rethink how they share the knowledge. One common motivation for increasing knowledge sharing is that companies reward individual performance toward this goal.

3. Define a high-level process as a foundation. Then, use contextual help to explain complicated healthcare concepts and jargon: A primary step for effective knowledge management implementation is to develop a high-level process that progressively develops and improves detailed procedures. This step should fully engage the related users and contributors of knowledge. The fully developed process should be finalized and approved before implementation.

4. Determine and prioritize technology needs: It is vital to assess the technology to enhance and automate knowledge management-related activities. Then, determine and prioritize the suitable technology based on program objectives and the process criteria. The available knowledge management solutions are enormous and diverse; they require adequate information such as providers, cost and benefit of each type, and solutions' suitability.

5. Assess the organization's current state of knowledge management: The assessment should cover the core knowledge management components. It should offer an overview of the current state, the gaps between the present and desired states, and the recommendations for bridging the gaps.

6. Build knowledge management implementation roadmap: presented as related projects, where each addresses specific gaps identified by the assessment. The roadmap can range from months to years with well-defined milestones and dependencies. A good roadmap yields quick wins early in the project life, reinforcing support for subsequent steps. Yet, it is necessary to continue reviewing and evolving the roadmap based on the changing conditions and additional business insight obtained via the lessons learned.

7. Implementation KM and creating a robust security system: Implement the program and enhance the organization's overall efficiency. The progress should be gradual and celebrate each incremental, making sure to realize the short-term wins. Since the value and benefits of the developing program are recognized, the resistance to continue investing in knowledge management should be marginal.

8. Audit content and measure and improve knowledge management program for performance improvement: there should be a method to assess the efficiency and compare it with anticipated results. Thus, establish a baseline measurement to capture the organization's performance before and after the implementation. Then, compare both results to detect the performance improvement. Also, improve the overall efficacy of the knowledge management program by elevating compliance, performance, quality, and value gaps.

9. Allow translation of knowledge base into multiple languages: to achieve further needs such as different users' linguistic skills or ubiquitous level, the translation to various languages must be considered.

10. Make the knowledge base highly searchable: to serve a wide range of users' requests, the knowledge management content must be searchable and easy to find. Therefore, establishing tool support for search and other functions is valuable.

A case study can further demonstrate the implementation process of knowledge management at Skaraborg Hospital, a group of hospitals in the southwest of Sweden. The approach helps plan for common challenges, minimize the risks, and maximize the rewards [13]

Methodology for The Implementation of KM

Implementation refers to the step-by-step building process, while methodology is the design process. Unfortunately, serious difficulties arise when planning to implement knowledge management in an organization. One important reason behind this situation is the lack of suitable methodology to guide the development and implementation of a Knowledge Management System. This computer system allows the processes of creating, collecting, organizing, accessing, and using knowledge to be automated as far as possible. A proposed methodology for directing the process of developing and implementing a knowledge management system in any institution is organized in phases and defines the required activities, selected techniques and supporting tools for use, and the expected results for each phase [14].

The methodology is divided into five phases:

1. Analysis and Identification of the Target Knowledge: Identify the existing knowledge. Analyze it to decide the suitable activity to carry on.

2. Extraction of the Target Knowledge: Extract, collect, and codify information so that it can be stored and distributed using a computer system. Identify the suitable mechanism to obtain knowledge.

3. Classification and Representation: Categorize knowledge and represent it in such a way as to provide an organization's knowledge map; a visual aid that shows where knowledge can be found within a group or organization and how to determine the most expertise or risks.

4. Processing and Storage: Generate an executable model for the knowledge management system that runs on a specific technological platform. This model is produced as the result of processing the knowledge map on a particular computer platform to allow the enterprise to obtain and utilize the knowledge wherever/whenever it is requested. The

final result will be a knowledge portal that shows the knowledge map of the organization and offers different tools to locate and access it.

5. Utilization and Continuous Improvement: Involves making a knowledge portal available to the organization and providing mechanisms needed to use the developed KMS efficiently. This involves performing different tasks related to training, evaluation, continuous improvement, and maintenance.

Evaluation of Implementing KM in Healthcare

Previous work was conducted on evaluation knowledge management implementation in healthcare organizations. The study shows three main important factors that affect the implementation success; fidelity, feasibility, and acceptability of tools [15]. The factors and their impact on the implementation are summarized in Table 1 below.

Factor	Impact
Fidelity	The role of a facilitator during the implementation was essential and valued by study participants.
Feasibility	Implement knowledge management tools to share both explicit and implicit knowledge.
Acceptability of Tools	Enabling organizational environments was essential for implementation.

Table 1: Important Factors for Implementation KM and Their Impact

Contribution of KM to Healthcare

Among the important contributions of knowledge management in the healthcare field include:

Connected Home Health:

Knowledge management utilizes sensors to take vital-sign data such as blood pressure, weight, glucose level, and temperature, then transmits this data wirelessly to the medical staff for analysis.

Enterprise Health Analytics for Healthcare Providers:

Knowledge management aggregates and analyzes information from clinical and business application systems and data collected from sensors, patient monitoring systems, medical instruments, and handheld devices. It helps healthcare staff answer questions about the organization's performance, clinical results, and patient satisfaction.

Health Information Exchange:

Knowledge management gathers, classifies, and aggregates patient information from various sources. Also, it enables documents and images sharing among healthcare enterprises, regardless of source, location, or format, supporting improved patient care. Additionally, knowledge management serves as a data repository and searchable registry of clinical documents. Moreover, it records audit events generated by all exchange interactions and establishes a standards-based, data-sharing methodology essential to creating and adopting Electronic Health Records.

Asset Management:

Examples including, manage calibration of instruments, tools and special equipment, support for electronic signatures, records and audits, and support for asset-related corrective and preventive action (CAPA) such as Real-Time Location Systems (RTLS) tags and IBM® WebSphere® Process Server [1], [16].

Medical Expert Systems

It is also called diagnostic expert-based systems. It is computer systems that imitate the diagnostic decision-making ability of human experts. Examples are Mycin for infectious diseases and Internist-1 for general internal medicine.

There are three main components of an expert system, as can be illustrated in Figure 3:

1. A knowledge base (KB) encapsulates the evidence-based medical knowledge organized by experts in the field.
2. A rule-based inference engine developed by the programmer. It operates on the knowledge base to generate a differential diagnosis.
3. The interfaces to knowledge acquisition and user interaction.

Diagnostic knowledge bases generally consist of diseases, findings (i.e., symptoms, signs, history, or lab results), and their relationships. In many cases, they explicitly lay out the relationships between a set of findings and the things that cause them (diseases). For example, a knowledge base might include influenza and show its relationships with fever, coughing, and congestion [16].
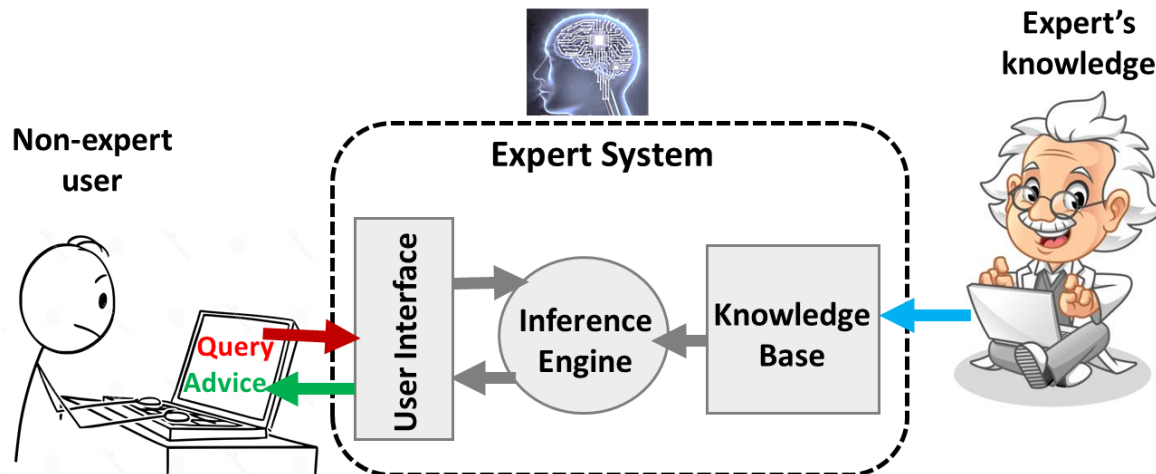
Figure 3: The main components of the Expert System

Also, machine-learning algorithms can be programmed to look at data and outcomes of past patients, which then offers insight into treatment approaches that will work optimally for the current patients.

Advantages of KM in Health Care

Benefits of Knowledge Management in Healthcare

1. Medical Error Reduction

The patient is the core of healthcare activities. Therefore, any medical error could damage the patient's health or death. Some medical errors and drug issues can cause injuries or fatalities. Consequently, the use of knowledge management systems supports decision-making for practitioners and assists in medical error reduction. Also, constant monitoring of medical conditions can provide alerts to take preventive action.

2. Cooperation and Innovation

In a complex field such as healthcare, cooperation between the different healthcare providers is crucial to deliver quality care. Studies proved that lack of cooperation in healthcare is a leading cause of many medical mistakes, hence the need for a coordinated inter-professional care

strategy. Therefore, the health care actors can achieve cooperative diagnosis by implementing knowledge management systems. Besides, cooperation is a chance for innovation; researchers recognized this and created knowledge transfer networks.

3. Quality of Care

Enhancing the quality of care is a primary objective in all health research; therefore, finding, sharing, cooperating, and developing clinicians' knowledge is necessary to discover and improve knowledge and the quality of care. Thus, the adoption of knowledge management techniques can enhance the quality of care. Besides, adopting knowledge management techniques in daily practice can improve work efficiency.

4. Administrative Cost Reduction

We can increase the cost-effective use of health resources by sharing information among a coalition of providers, payers, employers, and other stakeholders. In addition, knowledge management-based decision-making helps in effectively reducing medical errors and costs.

5. Knowledge Organization and Organizational Learning.

Knowledge is a vital part of healthcare organizations' daily activities. It encourages a continuous learning environment in the healthcare organization. In addition, it involves many activities like financial management, human resources management, organizational dynamics and governance, strategic planning, information management, risk management, and quality management. Knowledge management aims to transform healthcare institutions into learning organizations that generate new knowledge, create knowledge systems, and base organizational actions on knowledge. Furthermore, in multicultural, multilingual, or multinational collaborative healthcare teams, KM can play a role in terminology translation to overcome barriers of language and culture in the learning organization [7].

The Challenges of KM in Healthcare

Implementing a knowledge management program is not easy, even with good planning and the desire to overcome obstacles. The following listssome common challenges to prepare for:

The basic challenge is the awareness of the importance and the potential of knowledge management in healthcare. Once knowledge management is recognized as an organizational and practical asset, a knowledge management strategy is needed. Next, change management should establish a knowledge management adoption culture in the workplace and find KM champions among practitioners to facilitate the adoption. Also, any KM initiatives should consider both people and technologies. A powerful KM tool will thrive when concerned individuals are committed to using it. In addition, for the employees to stay highly motivated to adopt KM, the tools supporting KM should be highly usable and provide relevant features.

Establishing trust in knowledge management systems and providing adequate confidentiality and security measures are of particular concern in healthcare. Besides, the well-known time pressure in the health sector, due to a shortage in healthcare staff, is forming a barrier to the implementation of KM in healthcare. For instance, IT and KM tools will face resistance unless adequate usability consideration and innovative interfaces are developed for the systems. Similarly, the lack of integration between the different IT-based systems (telemedicine, electronic health record, decision support systems, etc.) will be challenging.

The complex relationship between healthcare and technology. The Healthcare system consists of diverse components and functions and the dynamic complexity among them. Thus, it is challenging to direct recommendations to healthcare as a total system. For example, the inability to recognize or articulate medical practitioners' knowledge; turning tacit knowledge

into explicit knowledge as well as the loosely defined areas of expertise. Also, geographical distance and language barriers in an international healthcare environment. Additionally, the limitations of information and communication technologies, constantly changing business, internal conflicts (e.g., professional territoriality), and cultural barriers (e.g., "this is how we've always done it" mentality) all form serious obstacles. Furthermore, some challenges related to involved people include the lack of incentives or performance management goals and poor training or mentoring programs. Finally, the information distributed among all stakeholders raises concerns; separation of aspects of healthcare and knowledge distribution. [18].

Conclusion:

The Healthcare field is considered to be a knowledge-driven industry. Implementing a knowledge management system in healthcare can create an efficient stream of information between all stakeholders and staff, ultimately leading to increased work quality and productivity. Adopting an appropriate healthcare knowledge management solution is crucial to enhance patient care quality and continuity. Knowledge management in healthcare is emerging, and the healthcare sector's challenges can be addressed by adopting clear strategies for knowledge management programs. The state of knowledge management in the healthcare field can be improved as the implementation of KM systems will allow healthcare partners, including practitioners, administrators, etc., to conduct evidence-based practice and collaborate, relying on the best knowledge available. Evidence-based medicines will help increase the global quality of patient care and the efficiency of knowledge management in healthcare. However, this challenge opens the way to more innovations in both knowledge management and the healthcare field.

New technologies are emerging, which will push the boundaries of using healthcare analytics. Therefore, using artificial intelligence, machine learning, and natural language processing, forming the actual future of healthcare by wielding these technologies for more significant impact. Big Data and advanced analytics support promoting how providers leverage technology to make informed clinical decisions and luxury healthcare. For instance, the chance of survival for open-heart surgery increases with the proper knowledge and procedures. However, many healthcare facilities did not fully utilize all the benefits of knowledge management systems. Knowledge management in healthcare has astonishing benefits that could make a difference in people's lives. The coming era embraces significant improvements in doctor care based on medical knowledge management. Also, each component in the knowledge management system will undergo technological advancements to ensure the most efficient information is available.

References:

[1] Afrah Almansoori, Mohammed AlShamsi, Said A. Salloum, Khaled Shaalan, (2021) chapter: Critical Review of Knowledge Management in Healthcare, Recent Advances in Intelligent Systems and Smart Applications Book.

[2] Rajeev K. Bali, Ashish Dwivedi, (2010) Healthcare Knowledge Management: Issues, Advances and Successes. Springer Science & Business Media.

[3] Video: Knowledge Management: Strengthening Health Services, Saving Lives: A K4Health Animation, (2010) https://www.youtube.com/watch?v=8vSJyDl874U

[4] Big Data Can Revolutionize Health Care, (2022), https://www.micron.com/insight/big-data-can-revolutionize-health-

care#:~:text=According%20to%20the%20International%20Data,more%20than%20an%2011%2C000%25%20spike.

[5] How Big Data is transforming healthcare industry?[with Case Study], (2022), https://techvidvan.com/tutorials/big-data-healthcare

[6] Linda Bird, Sam Heard, Jim Warren, (2003) Knowledge Management in Healthcare, Journal of Research and Practice in Information Technology, Vol. 35, No. 2·

[7] Christo El Morr, Julien Subercaze, (2010) Chapter 23: Knowledge Management in Healthcare.

[8] Gregersen, E, (2022), 5 Components of Information Systems. Encyclopedia Britannica, https://www.britannica.com/list/5-components-of-information-systems

[9] Karel Fukaa, Elina Syrjänenb, Dr Rudolf Hankac, (2000), Knowledge Management in Healthcare, Proceedings of IRIS 23. Laboratorium for Interaction Technology,

[10] Asmahan M. Altaher, (2010) Knowledge Management Process Implementation 2011, International Journal of Digital Society (IJDS), Volume 1, Issue 4

[11] Abdul Samad, (2014) Critical Success Factors of Knowledge Management Systems Implementation, KASBIT Business Journal (KBJ) Vol. 7, No.2, 64-78.

[12] Brayn Wills, (2022) Knowledge Management in Healthcare: A Prerequisite for Flawless Health Services, URL: https://www.proprofskb.com/blog/knowledge-management-in-healthcare/

[13] Anne Persson, Sweden Janis Stirna, Sweden Lena Aggestam, (2008), How to disseminate Professional Knowledge in Healthcare: the case of skaraborg Hospital, Journal of Cases on Information Technology, 10(3), 41-64.

[14] Ricardo Chalmetaa, Reyes Grangela, (2008) Methodology for The Implementation of Knowledge Management Systems, Journal of the American Society for Information Science and Technology·

[15] Anita Kothari, Nina Hovanec, Shannon L. Sibbald, Lorie Donelle, and Patricia Tucker, (2015) Process evaluation of implementing knowledge management tools in public health, Knowledge Management Research & Practice 1–11, Operational Research Society Ltd.

[16] Sánchez-Polo, Maria Teresa, Cegarra-Navarro, Juan G, (2008) Implementing Knowledge Management Practices in Hospital-in-the-Home Units, Journal of Nursing Care Quality.

[17] Anitha Kannan, 2019, The science of assisting medical diagnosis: From Expert systems to Machine-learned models, Curai Health Tech. https://medium.com/curai-tech/the-science-of-assisting-medical-diagnosis-from-expert-systems-to-machine-learned-models-cc2ef0b03098#:~:text=Medical%20Expert%20Systems,DXplain%20for%20general%20internal%20medicine.

[18] Bowden, Dawn E., Smits, Stanley J., Andrews, Matthew A., (2020) The Challenge of Knowledge Management in Healthcare, 13th Annual Conference of the EuroMed Academy of Business.