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Abstract: The concept of knowledge management can be defined in a broader sense as the process that includes the creation, sharing, use and management of knowledge within the service/company to improve the practices of using knowledge to achieve the organisational goals. Healthcare organisations must develop knowledge management departments, and consider investing in crucial factors as solutions that allow the improvement of the healthcare systems. The main goal of this research is to evaluate the impact of KMM on the success of healthcare institutions and how the process of KM is implemented. The present study was developed based on answers given by Portuguese healthcare professionals working in mainland Portugal and the Islands. Data were

collected using a questionnaire to hundreds of professionals and statistical analysis was done with SPSS. The main findings show that inefficient communication among everyone, few meetings, technology problems, rare feedback sharing, few service innovations and rare professional training are the main barriers in healthcare service.

Keywords: knowledge; knowledge management; knowledge management maturity models; KMMMs; healthcare.

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1 Introduction

The healthcare systems are facing multiple challenges to deal with the current health needs. Health systems must adapt to these challenges and implement strategies and tactics that ensure coordination between all collaborators to overcome barriers and give a good experience for all patients (Dal Mas et al., 2020; Lopes da Costa et al., forthcoming).

The complexity of multidisciplinary interactions that occur in healthcare organisations needs correct information to minimise errors and ensure future success. So, it is essential that the information and knowledge can be available and shared with teams at the right time to create value and to strengthen the institutions and increase team effectiveness (Ayatollahi and Zeraatkar, 2019). In today's world, knowledge has become a valuable skill and asset for staying strategically competitive (Karamat et al., 2019).

The motivation of this research is to cover the gap of concrete information about how knowledge management (KM) can improve the efficiency of the healthcare services and with it contribute to develop their capabilities and consequently provide a better service to the overall population. KM faces several challenges, once there are different KM models based on different theories and methods, and they vary in focus and scope. This variety is a problem that needs to be overcome. With this research, we intent to provide an evaluation of the impact of KMM on the success of healthcare institutions, to give insights about the balance between technology and people, and to understand if all organisations have a linear and sequential growth or if they skip some stages. The data was collected from Portuguese healthcare professionals working in mainland Portugal and the Islands using a questionnaire. The data collected was analysed in Statistical Package for the Social Science (SPSS), by applying descriptive statistics and correlation analysis.

The structure of this manuscript is divided in six main sections:

- 1 introduction
- 2 literature review
- 3 research methodology
- 4 data analysis
- 5 discussion of results
- 6 conclusions.

The present research was divided into four steps too; the first step is the literature review based on bibliographic research.

2 Literature review

This section provides a thorough analysis of the basic principles discussed in the study's creation and set the stage for it. Firstly, the essential notion of knowledge. The term knowledge is vague, and it has been clarified in its context by various scholars. In any activity that involves human interaction, the process of knowledge conversion is defined as the underlying phenomenon. The principle of information management followed by what comprises a KM structure is then clarified. With a focus on KM processes, each portion of the KM process is then expanded on; methods by which knowledge is created, categorised, and made available in an organisation. We concluded by illustrating the role of KM in the healthcare system and exploring a knowledge management maturity models (KMMMs) as a set of steps of growth and support managers and organisations to evaluate the evolution of KM practices.

2.1 Knowledge definition

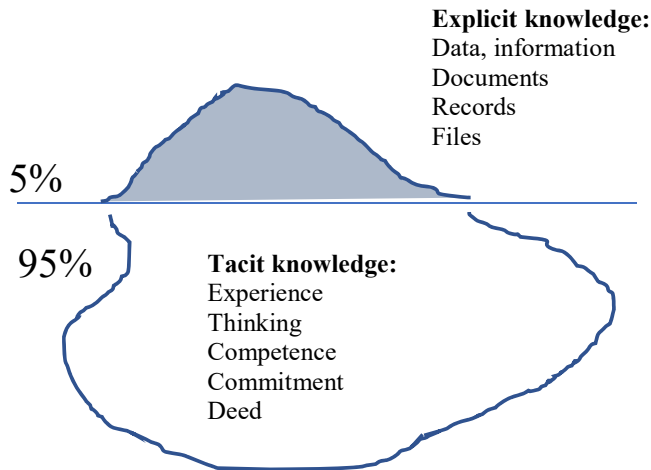
It is crucial to understand what knowledge is to understand the purpose of KM. It has been defined many times in different ways. Knowledge and information are confusing terms, but they have different meanings. According to Davenport and Prusak (2004) and Pereira et al. (2021a), the concepts are related but not synonymous. Information is just a message that is transformed into something that is perceived. To acquire information is needed a receptor and an issuer. On the other hand, knowledge is a mix of experiences, values and information that can be structured, shared, and transformed into new experiences and information.

In the last years, knowledge was typically divided into two types that are tacit and explicit knowledge. Tacit knowledge must be managed differently from explicit knowledge. The tacit is the knowledge that is hard to express and to be acquired, and it is necessary to gain experience. According to Leal et al. (2017), tacit knowledge is individual and could be considered non-visible, hardly ever expressed, communicated, realised, or measured. Explicit knowledge was reported by Zenker (2018) as a resource that is verbalised, codified, systematic and formal. This explicit knowledge can be easily transmitted between people as a result of easy access to it.

This imperative division between these two types of knowledge is shown in Figure 1. The metaphor present in Figure 1 represents the importance not only of the 'visible knowledge' like information or data but also the significant importance (95%) of the 'non-visible knowledge'.

On the other hand, some authors as Sousa et al. (2021) refer that in the individual dimension, the development of knowledge takes place as tacit knowledge. Through social interaction, it becomes explicit knowledge for other individuals, groups and organisations. Many searchers recognise knowledge as a critical economic resource overcoming the traditional assets of capital, labour or land. This viewpoint was recently advanced by Chen and Hung (2010) when he assumed that knowledge is the most important economic resource of future society.

Figure 1 The ‘Iceberg’ metaphor describes the relationship between explicit and tacit knowledge (see online version for colours)



Source: Arshad (2018)

2.2 Knowledge management

KM processes have been defined differently by different authors. According to Probst et al. (2002), KM is divided into the main processes: defining the goals; identifying, acquiring, developing, distributing, using, retaining and assessing the knowledge.

It is defined by Okere (2017) as a process that identifies, capture, codify, store, implement and measure knowledge for an organisation benefit.

KM allows institutions to increase the use of information and develop it to generate a competitive advantage. This competitive advantage results from the focus on the sharing of information, increasing levels of profitability and productivity to create value. Organisations can better control this significant strategic asset by structuring the various stages of the KM process (Pereira et al., forthcoming). However, it is essential to understand that numerous challenges obstruct the transfer of information within companies. These barriers proposed by Szulanski (1996) consist of barriers intrinsic to knowledge, intrinsic to the foundation of knowledge, intrinsic to the receiver of this knowledge and intrinsic to the cultural context. Another typology suggested by Brandt and Hartmann (1999), which has become a classic in the study of management barriers in socio-technical systems, is the division of barriers into three groups, known by the acronym TOP:

- 1 technology-related barriers
- 2 organisation-related barriers
- 3 people-related barriers.

Obstacles to organisational learning must be established, and strategies to address them are suggested (Lotti Oliva, 2014). Despite the different barriers, Yildirmaz et al. (2018) believed that KM has a great potential to acquire a competitive advantage, and it implies a decisive challenge for organisations. Generally, KM can be defined as dynamic, as

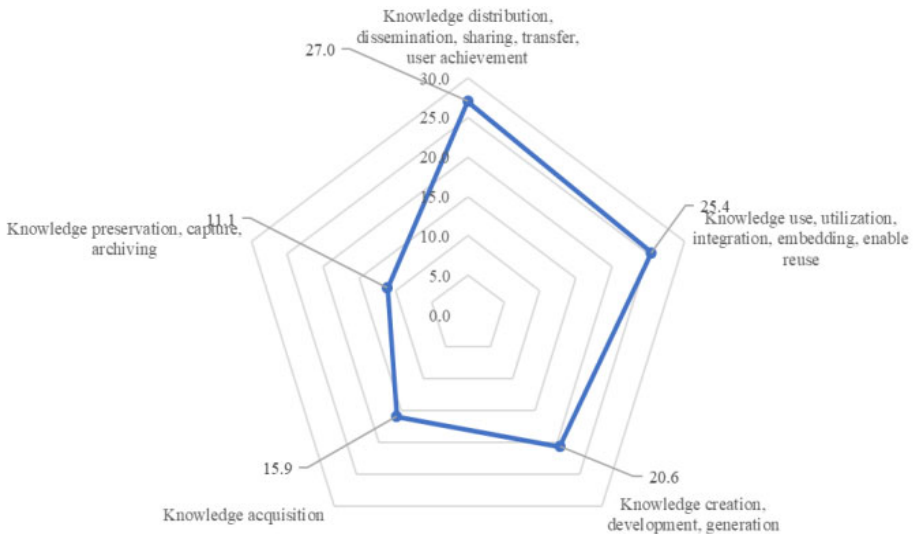
García-Fernández (2015) recorded. This dynamic vision is shared by other authors like Costa and Monteiro (2016). They define it as a result of generation, acquisition, storage and leveraging of knowledge.

Lin et al. (2015) proposes KM orientation as a multi-dimensional construct with organisational memory, knowledge sharing, knowledge absorption and knowledge receptivity. Constantinescu (2009) as Feng et al. (2005) and Shujahat et al. (2017) defined KM as a management function and discipline that evaluate the strategies that ensure the “right flow of knowledge to the right person at the right time and in the right place”.

Recent studies, as Loon (2019) describe it as a set of activities that lead to innovation by the stimulation of an individual’s behaviour. Calvo-Mora et al. (2015) do not differ much from these definitions and mention that the main objective of KM must be to generate value for the agents that intervene in the process. Chang et al. (2012) reinforced the importance of managing the knowledge resources by understanding that organisations could reach a variety of benefits like better corporate efficiency, effectiveness, innovation, and customer service. Following a study by Soto-Acosta et al. (2016) organisations’ survival and success depend on the effort and interactions of employees as they carry the skills and generate knowledge to transform new ideas into innovations (Dias et al., 2022).

The team members should be allowed to speak up, and the knowledge should be documented and made available for the whole organisation to improve the decision-making ability (Pereira et al., 2021b). An environment where people are free to speak without any hierarchy is essential, as Kumta and North (2018) highlight. The knowledge potential is valued through the mass of knowledge, the speed and position and the interaction between them. According to Jang et al. (2014), these processes influence the knowledge creation process.

Figure 2 Distribution of KM processes (see online version for colours)

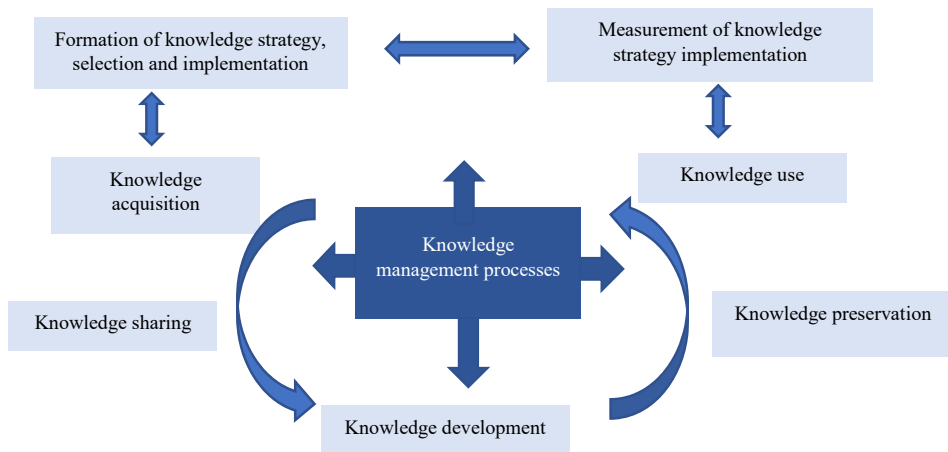


Source: Kianto et al. (2016)

Kianto et al. (2016) analysed the five KM processes. These five are acquisition, sharing, creation, codification and retention. The creation means the ability to create new and valuable ideas and solutions from products and technological processes to management practices (Haq et al., 2021). Codification is the process of transforming the inexpressible knowledge into expressive knowledge to preserve formalised knowledge and to provide the latest registered knowledge to the organisation employees (Figure 2).

According to Kianto et al. (2016), the effectiveness of this process depends not only on the competence and motivation of all employees but also on the information and communication technology infrastructure. It is mentioned that knowledge preservation is the management of human resources to reduce the loss of expertise in the organisation. As shown in the journal article of Raudeliūnienė et al. (2018), the KM process model is completed with an evaluation of the knowledge strategy implementation (Figure 3).

Figure 3 Improved conceptual KM process model (see online version for colours)



Source: Raudeliūnienė et al. (2018)

2.3 KM on healthcare system

Harrington and Burge (2018) mentioned the healthcare system as a complex industry, with specific intervenient as patients, healthcare providers, physicians, payers (insurers) and the pharmacy. The heterogeneity of health professionals makes the system complex. These diverse scientific fields and educational backgrounds became the collaboration between all, a challenging task because they need to collaborate to provide health services. Even in 2005, Ghosh and Scott referred that the interactions between health professionals and patients are the drivers of knowledge creation. Guptill (2005) refer that the importance of KM was early realised in developed countries such as the USA, Canada, the UK and the European Union. These countries are using it in their healthcare. Presently, there are many definitions of KM within healthcare. Weed (1997) and Dal Mas et al. (2020) revealed that KM can be defined as intellectual capital and can be considered an essential intangible asset. This KM can improve profitability, gain new markets, improve new products or services, processes, or make the business grow exponentially.

According to Bahrami et al. (2016) is essentially the evolution of attitude and knowledge sharing skills in the patient care process for any KM program in healthcare. The implementation of KM in healthcare is seen as the way forward to improve the quality of care for patients, which is the goal of healthcare. This is possible by seizing the available opportunities, such as advances in healthcare information and communication technology, clinical decision support systems, electronic health record systems, communities of practice and advanced care planning. Abukhader (2016) reinforce the need for hospitals to share knowledge efficiently. This sharing of knowledge will be an essential step because it will save them time, reduce the costs, improve the cost restoring process, enhance the satisfaction criteria, and improve the health education level.

The healthcare institutions like hospitals need to have a KM system to create an efficient network between all providers. Ali et al. (2017) studied the strong predictors to KM systems success. Knowledge content quality is mentioned by them as a significant factor in healthcare once low-quality knowledge may lead to poor clinical decisions or even endanger lives. Leadership was mentioned by them as the most important organisational factor because it affects the knowledge content quality. Leadership was more important than incentives in healthcare, so the overall findings suggest that it is the key element to promote the success of KM systems in healthcare organisations.

On the other hand, the bureaucratic organisational culture represents a negative and significant relationship with KM (Kumari and Saharan, 2021). Aryankhesal et al. (2020) argued that organisational culture is one of the essential tools for the successful deployment and implementation of KM in organisations.

For healthcare and medical practice, KM has become an effective tool because the human brain's capacity to remember and process a vast amount of information is limited. Over time, much of the information that the healthcare professional holds during his career becomes obsolete, and new strategies for treating patients needs to be taught. The mind does not process a vast volume of information with multiple variables, despite a doctor's experience, to establish proper diagnosis or treatment options based on the characteristics of specific patients. In modern times, doctors need a connection to a medical information archive to keep up-to-date and better apply knowledge to enhance the delivery of healthcare (Weed, 1997; Dal Mas et al., 2020).

The dynamic interaction among clinical practitioners is facilitated by the eHealth technologies, like decision support systems, active directories and portals. Synthesis and dissemination are acts carried out with the aid of technology by people working as teams. In the collaborative model, inter-organisational learning activities are essential components. This model involves events such as weekly conference calls, face-to-face meetings, monthly report exchanges and discussions on Listserv (Nembhard, 2012; Mishra and Upadhyay, 2021).

The feedback encourages all professionals so that more information is learned every time you are more confident of what to do. Nurses need to consult with other professionals to recognise and address patient needs since they are the specialised agencies responsible for a patient's care plan (Ghosh and Scott, 2005). A greater understanding of the respective functions and procedures is a benefit of teamwork and interdisciplinary learning. This interdisciplinary learning provides "synergy that leads to greater potential for innovation and reduces professional jealousies and preciousness."

Two factors are essential for creating and sustaining KM in a healthcare setting: the determination of managers through efficient leadership and the presence of multiple means of knowledge transfer (Karamitri et al., 2015). Knowledge transmission is based

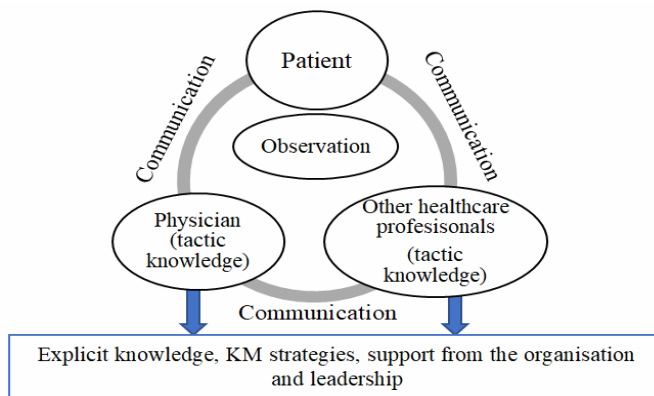
on information technology (IT) assistance (Chang et al., 2012). IT needs to help professional experiences. A great example is the development of a ‘wiki’ or a ‘collaboratively edited web page that allows users to modify or add content’. It could provide a way to share and move information through departments, thereby cutting costs.

Leadership supports the vision of an organisation’s advancement and progress. It can, therefore, help the introduction of KM. The success of information sharing is affected by leadership strategies and attitudes. Leaders at a healthcare unit should cultivate a problem-seeking and problem-solving culture. Leaders encourage staff to embrace KM. Participants proposed in the Sánchez-Polo and Cegarra-Navarro (2008) research that sharing information to enhance patient care could offer tangible rewards. Competition in the healthcare sector may be another motivator.

In healthcare settings, leaders can identify knowledge brokers (barriers). The first step in overcoming KM barriers is to expose them. Time constraints are a significant barrier to implementing KM techniques in the healthcare sector [Dobbins et al., (2004), p.123]. Moreover, sometimes, the quantity and quality of information are often uncertain. Information is often correct or sufficient (De Lusignan et al., 2005), and there is too much detail for others. Other common KM barriers correlate with the flow, such as delays in receiving information and the usefulness of shared information. The knowledge available in terms of technical level, quantity and dependence on written information may be of low relevance (Sylla et al., 2012). It is challenging to build and disseminate information spontaneously in a team, while leaders provide a significant boost with the right encouragement and motivation (Srivastava et al., 2006). Healthcare managers should lead by example and invest in KM instruments and other technologies in ‘early adopters’. KM has six main elements: perceptions of KM, synthesis, dissemination, collaboration, means of knowledge transfer and leadership.

Birkinshaw (2001) defines three components of KM in the public sector: strengthening informal flows between people, developing structures for codifying, and exchanging information within the organisation and expanding into new knowledge from outside-company sources, while Hoegl et al. (2003) define three significant elements of KM: information processing, knowledge building and organisational memory.

Figure 4 KM in healthcare settings (see online version for colours)



Source: Adapted from Karamitri et al. (2015)

Instead of being system-oriented, our point of view is more human-oriented because healthcare settings focus on the networking of individuals from different scientific fields who use different sources of knowledge according to their professional status but should, after all, cooperate effectively. Successful KM leads to better performance in healthcare organisations (Wu and Hu, 2012). Healthcare managers should actively develop a knowledge environment, and leaders should reward individuals who promote knowledge. For this reason, special events will take place annually where the best KM practices will be awarded. Managers can also aim to remove obstacles by promoting user-friendly electronic libraries and information systems. Finally, workers should realise that if they join together and deposit their information into the joint memory account, they benefit from the interest gained (Karamitri et al., 2015).

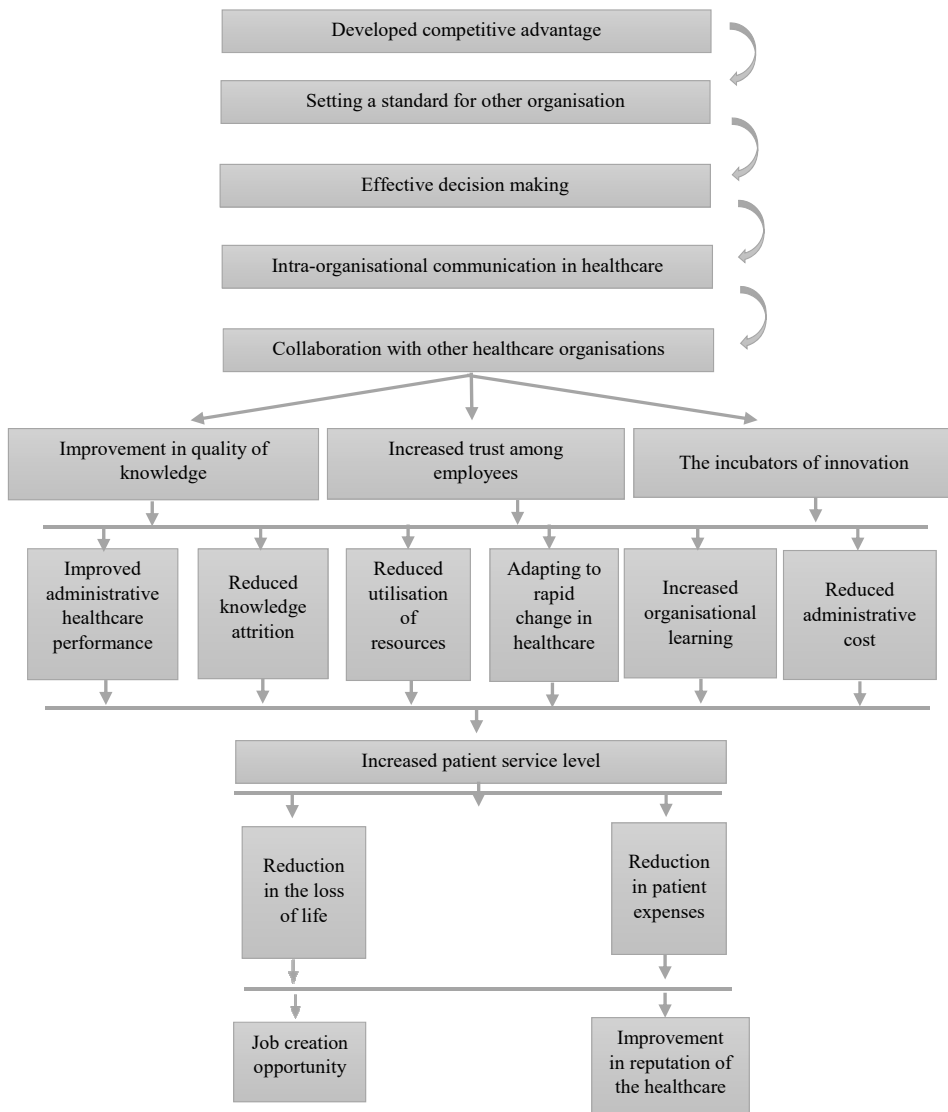
Many earlier studies have established the drivers of KM adoption in various contexts: Table 1 presents the drivers found by a systematic literature review on KM in healthcare.

Table 1 Drivers derived from literature review

<i>Subject</i>	<i>Authors</i>
Developed competitive advantage	Du Plessis (2007), Bontis (1996)
Setting a standard for other organisations	Yu and Gu (2004)
Effective decision-making	Davenport (1998)
Increased patient service level	Davenport (1998), Owusu Darko (2018), Shabbir et al. (2010)
Reduction in the loss of life	Recommended by a group of experts
Improved administrative healthcare performance	Davenport (1998), Owusu Darko (2018)
Intra-organisational communication in healthcare	Du Plessis (2007), Yu and Gu (2004)
Collaboration with other healthcare organisations	Du Plessis (2007)
Improvement in quality of knowledge	Yu and Gu (2004)
Reduced knowledge attrition	Caldwell (2002)
Reduced utilisation of resources	Owusu Darko (2018), Bjørnson and Dingsøyr (2008)
Increased trust among employees	Lee and Kim (2001), Yu and Gu (2004), Owusu Darko (2018)
Job creation opportunity	Davenport (1998), Owusu Darko (2018)
Adapting to rapid change in healthcare globally	Zack (1999)
The incubators of innovation	Du Plessis (2007), Davenport (1998)
Increased organisational learning	Lee and Kim (2001), Yu and Gu (2004), Davenport (1998)
Reduced administrative cost	Davenport (1998), Owusu Darko (2018)
Reduction in patient expenses	Davenport (1998)
Improvement in the reputation of the healthcare	Owusu Darko (2018), Luxford et al. (2011)

Source: Karamat et al. (2019)

Figure 5 Impacts of KM in healthcare institutions



Source: Karamat et al. (2019)

2.4 Knowledge management maturity models

According to some authors, as Jiuling et al. (2012) and Serenko et al. (2015), maturity is a development process of an object, technology or organisation over time. Sajeva and Jucevicius (2010) mentioned maturity in KM as the effectiveness of managing organisations’ knowledge assets. Many authors define KMMM as a set of growth steps and support managers and organisations to evaluate the evolution of KM practices. These models help in decision-making processes, and they have a role as an indicator of

performance improvements (Teah et al., 2006; Lin, 2007, 2011; Gaál et al., 2008; Oliveira et al., 2010; Abu-Naser et al., 2016).

A review of the literature on this topic established a wide variety of models for KM maturity. Usually, 5 out of 8 levels of KM maturity have been described as ‘no KM maturity’ compared to ideal levels where KM appears to be an organisational feature. Conceptually, management maturity models can be divided into several categories. This is done based on the capability maturity model (CMM). Most maturity models have borrowed their initial structure from CMM. A CMM is structured at five levels with functions to prioritise the increase in the maturity of a software operation, according to Karamitri et al. (2015).

Lee and Kim (2001) and Kruger and Johnson (2010) referred that KMMM are influenced by two different approaches: this CMM or organisational life cycle (OLC). These two approaches differ in terms of the process. The first one focused on the maturity process of products as software because it usually arises from a technical approach. On the other hand, the second approach is based on the maturity process of organisations, and it is more managerial perspective focused (Klimko, 2001; Gaál et al., 2008). According to Lee and Kim (2001) and Kruger and Snyman (2005), the CMM model features various cons to be applied. The CMM approach looks to an organisation as an information processing machine and does not focus on specificities related to people knowledge and learning; consequently, it expends too much time on solving technology problems and devalues the importance of organisational culture, a key factor do KM. Akhavan and Jafari (2006) also agree that CMM-based KMMM represents a limited vision by treating the organisation as a product. They believe that the challenge of managing organisational knowledge is related to the interrelation of content, context, and people and not so much with technology.

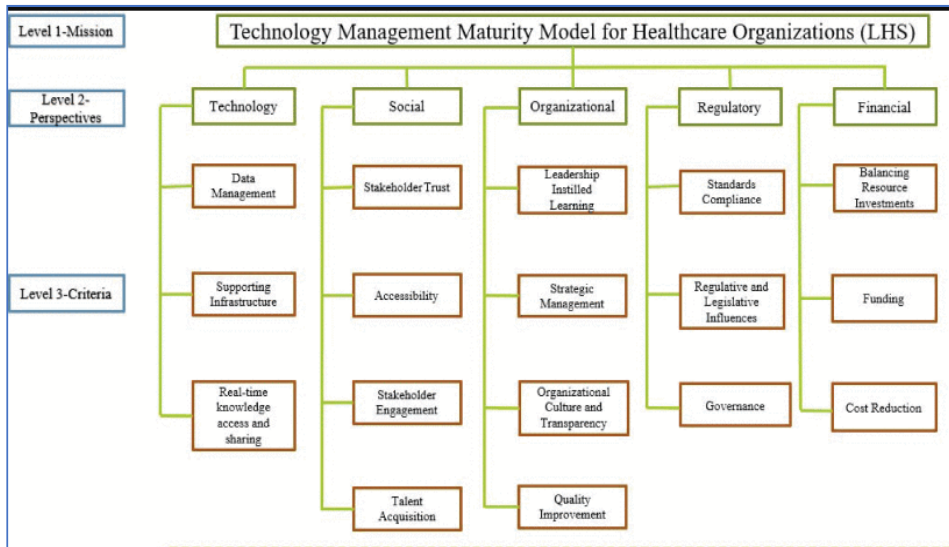
Ruggles (1998) and De Long and Fahey (2000) referred in their studies that only 20% of KM was supported by technology, and the other 80% was supported by people and culture. Despite all these theories, Lee and Kim (2001) believed that models influenced by the OLC model have a linear, sequential and invariant development character. In the end, they were criticised for equating organisations to social organisms.

A variety of existing models make the comparison, evolution and application very difficult. Teah et al. (2006), Pee and Kankanhalli (2009) and Lin (2011) proposed integrating existing KMMM in order to identify key elements to KM development. Maturity models are tools for promoting the management of organisations. Such models have been used for various aims and purposes. In various areas, such as healthcare, maturity models are helpful (Shaygan and Daim, 2019). There are different perspectives and sub-criteria that affect the maturity models in healthcare. To priorities, these different factors are used in the hierarchical decision model (HDM). This model was initially proposed by Cleland and Kocaoglu (1981). It is structured by formulating consensus among participants who are primarily experts in specific areas related to decisions. HDM has represented by five levels the mission, objective, goal, strategy and action (MOGSA) (Daim, 2015).

Since 2007, healthcare has been associated with the term learning health systems (LHS), which was first coined by the National Academies of Medicine. The LHS is a way of thinking that became a part of the employees’ and stakeholders’ culture through exemplary leadership as a part of a socio-technical infrastructure (Friedman et al., 2017). Although this way of thinking, in healthcare, there is a lack of models to quantify the

different aspects of the organisation’s movement towards becoming a learning system and help decision-makers prioritise and allocate strategies and resources.

Figure 6 The HDM model for technology management maturity model for healthcare organisations for the case of LHS (see online version for colours)



2.5 Critical analysis

The complex and multidisciplinary design of healthcare creates significant challenges in terms of operation and people management, and ITs and systems. The principle of KM is not well known in the healthcare literature. Theoretical considerations are based on so many articles.

There are effective examples of KM practices in healthcare organisations that include critical care pathways, care coordination, and evidence-based decision-making. However, there are barriers to solve, such as the need for consumer engagement, technology investment, and KM-friendly organisational systems and cultures. These results have led many to conclude that there is a potential to apply KM principles to build a strategic, constructive, and knowledge-intensive healthcare delivery system. Companies are gradually incorporating KM into their usual business operation. An actual change in mindset is a transition from the initial, strongly IT-centred KM approach to a state where human factors are higher on the stakeholder’s agenda than ever before. In addition, the increasing digitalisation of healthcare systems includes well-defined guidelines and progress reports to rationalise and manage the transformation process effectively. There are few models of healthcare that can measure the various dimensions of an organisation’s transformation to being a learning system and support decision-makers in their positions of prioritisation and resource distribution.

Table 2 Studies on KM

<i>Authors</i>	<i>Subject</i>	<i>Year</i>
Lee and Kim	'A stage model of organisational knowledge management: a latent content analysis'	2001
Ghosh and Scott	'Comparing knowledge management in health-care and technical support organizations', <i>IEEE Transactions on Information Technology in Biomedicine</i>	2005
Akhavan and Jafari	'Critical issues for knowledge management implementation at a national level'	2006
Lin	'A stage model of knowledge management: an empirical investigation of process and effectiveness'	2007
Kruger and Johnson	'Principles in knowledge management maturity: a South African perspective'	2010
Lin	'Antecedents of the stage-based knowledge management evolution'	2011
Xiao et al.	'Study on maturity level transition mechanism of knowledge management'	2012
Karamitri et al.	'Knowledge management practices in healthcare settings: a systematic review', <i>The International Journal of Health Planning and Management</i>	2015
Serenko et al.	'An application of the knowledge management maturity model: the case of credit unions', <i>Knowledge Management Research and Practice</i>	2015
Soto-Acosta et al.	'Social web knowledge sharing and innovation performance in knowledge-intensive manufacturing SMEs'	2016
Kianto et al.	'The impact of knowledge management on job satisfaction', <i>Journal of Knowledge Management</i>	2016
Bahrami et al.	'The mediating role of organizational learning in the relationship of organizational intelligence and organizational agility'	2016
Abukhader	'Exploring knowledge management implementation in large-sized service organisations – Saudi Arabia as a case', <i>Knowledge Management Research & Practice</i>	2016
Ali et al.	'Knowledge management systems success in healthcare: leadership matters', <i>International Journal of Medical Informatics</i>	2017
Raudeliūnienė et al., Dias et al. (2021)	'Knowledge management process model', <i>Entrepreneurship and Sustainability Issues</i>	2018
Shaygan and Daim	'Technology management maturity assessment model: an exploratory multi-criteria approach for healthcare organizations'	2019
Karamat et al.	'Promoting healthcare sustainability in developing countries: analysis of knowledge management drivers in public and private hospitals of Pakistan'	2019
Aryankhesal et al.	'Staff perspectives on the relationship between knowledge management and social capital with organisational health in selected educational hospitals in Tehran'	2020

Source: Authors

A practical model for measuring maturity is believed to enable managers to recognise their organisation's level and grow to higher levels that lead to the institution's best KM. One of the organisations' most valuable resources is information. This essential asset is handled accurately and productively, enabling the company to optimise its efforts to accomplish its strategic goals. As a result, recognising the barriers to improved KM helps the company formulate plans to resolve them. While understanding the obstacles to KM is essential for managers, knowing the best practices associated with KM is also important.

The idea of KM in healthcare organisations enables consistency with corporate policy, innovation-focused philosophy, level of expertise, clarity in information description and updated resources. With this in mind, the analysis of the influence of personal and experience characteristics of healthcare professionals and managers on KM acceptance of healthcare services is essential as a first step and a contribution to healthcare KM literature and the assessment of the impact of information management maturity models on the performance of healthcare institutions. The variations between KMMM and the gaps between them will be explored in this report and whether all companies have a predictable and sequential development path or whether any can miss some steps. Then, there is the observation of barriers to healthcare collaboration and the possible role of KM in eliminating such obstacles.

3 Research methodology

The tool that drives any study toward information acquisition and results is methodology. Issues from the literature are transformed into research questions that are linked to specific research objectives to guide this study to its last conclusions and results. Table 3 provides a quick summary of the research instruments and goals.

The present study was developed based on answers given by Portuguese healthcare professionals working in mainland Portugal and the Islands. Data were collected using a questionnaire. The main objective of this study was to identify the perception of healthcare professionals about the level of KM in Portuguese healthcare units.

All healthcare professionals who have been working in healthcare for at least one year were included in the study. All others were excluded.

Data collection was conducted from July to September 2021 through questionnaires and then analysed. Individuals were informed about the aim and purpose of the study and the guarantee of confidentiality of answers.

Statistical analysis involved descriptive statistical measures (absolute and relative frequencies, means and standard deviations) and inferential statistics. The level of significance to reject the null hypothesis was set at $(\alpha) \leq .05$. Spearman's correlation coefficient, Cronbach's alpha internal consistency coefficient, Mann-Whitney test and Kruskal-Wallis test were used.

Statistical analysis was performed with SPSS version 27 for Windows.

Table 3 Relationship between literature review, research objectives and research questions

<i>Research objective</i>		<i>Research question</i>		<i>Literature review</i>
RO1	To evaluate the impact of KMM on the success of healthcare institutions	Q1	What is the knowledge management maturity level of an organisation? (Through the different factors)	Kianto et al. (2016), Serenko et al. (2015), Nembhard (2012), Karamat et al. (2019)
		Q2	Do knowledge management maturity impact the perception of the organisation's success and efficiency by healthcare professionals?	
		Q3	Are the KMMM related to better professionals' experience and satisfaction?	
RO2	To perceive the balance between technology and people	Q4	What is the right balance between solving technology-related problems and organisational culture?	Aryankhesal et al. (2020)
RO3	To perceive if all organisations have a linear and sequential growth or skip some stages	Q5	Do all organisations reach the topmost KMM level, or sometimes it is more advantageous to reach an intermediate level?	Escrivão and Silva (2019)

Source: Authors

Table 4 Sample, health professionals (N = 118)

Years of professional experience	1–5/6–10/11–15/> 15
The profession in the healthcare unit	Doctor, nurse, researcher, superior diagnostic and therapeutic technician
Gender	Female/male
Region of Portugal	North, Central, South, Islands
Healthcare unit	Private/public
Size of healthcare unit	Health centre/clinic/hospital/other

4 Data analysis

4.1 Characterisation of the sample

The data refer to a total of 118 respondents. The majority were female (80.5%), with more than 15 years of professional experience (63.6%) and with the professional category of superior diagnostic and therapeutic technician (92.4%). Almost half of the sample worked in the central part of the country (47.5%), and 84% mainly worked in public health units. A percentage of 76.3% worked in hospitals.

Table 5 Socio-demographic characterisation (N = 118)

	<i>N</i>	%
Gender		
Female	95	80.5
Male	23	19.5
Years of professional experience		
1–5 years	18	15.3
6–10	6	5.1
11–15	19	16.1
> 15 years	75	63.6
The profession in the healthcare unit		
Nurse	1	.8
Researcher	1	.8
Doctor	7	5.9
Superior diagnostic and therapeutic technician	109	92.4
Region of Portugal		
Central	56	47.5
Islands	7	5.9
North	31	26.3
South	24	20.3
Healthcare unit		
Private	19	16.1
Public	99	83.9
Size of healthcare unit		
Health centre	9	7.6
Clinic	11	9.3
Hospital	90	76.3
Outro	8	6.7

Source: Authors

4.2 Results

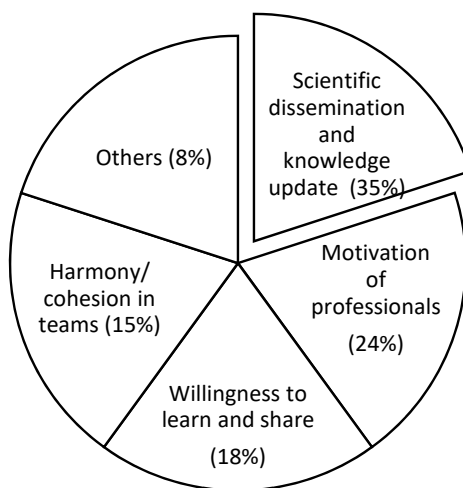
When asked if, in the service where they work, it is common to have meetings, discussions to share new knowledge and/or new ideas for improving the service or system, more than half of the sample (56.7%) indicated that this happens very rarely or rarely.

The professionals were asked to write the main reasons they thought were essential for knowledge sharing to exist. In Figure 7 are the main reasons.

Table 6 Frequency of meetings and discussions

	<i>N</i>	%
Very rarely	43	36.4
Rarely	24	20.3
Sometimes	22	18.6
Often	20	16.9
Very often	9	7.6
Total	118	100.0

Source: Authors

Figure 7 Main reasons for knowledge sharing

Source: Authors

In a high percentage of workplaces, there were not any user-friendly electronic libraries (76.3%).

Table 7 Electronic library

	<i>N</i>	%
No	90	76.3
Yes	28	23.7
Total	118	100.0

Source: Authors

In the workplaces where it exists, 31% affirm that they consult it sometimes, and 27.6% consult it rarely.

A percentage of 66.1% claim to receive very rarely or rarely feedback about their work performance.

Table 8 Frequency of library consultation

	<i>N</i>	%
Very rarely	4	13.8
Rarely	8	27.6
Sometimes	9	31.0
Often	6	20.7
Very often	2	6.9
Total	29	100.0

Source: Authors

Table 9 Feedback on work performance

	<i>N</i>	%
I receive very rarely	43	36.4
I receive rarely	35	29.7
I Receive sometimes	25	21.2
I receive very often	14	11.9
I receive very frequently	1	.8
Total	118	100.0

Source: Authors

The percentage of respondents who indicated that the institution where they work frequently invests in innovation (technological-e-portals, services-patient offer and administrative) is 23.7%, and 5.9% rate the institution as focused on this culture of constant updating and innovation.

Table 10 Innovation culture in the institution

	<i>N</i>	%
Bets on innovations sporadically	24	20.3
Bets on innovations with some rarity	27	22.9
Bets on innovation sometimes	32	27.1
Bets on innovation frequently	28	23.7
Focused on this culture of constant updating and innovation	7	5.9
Total	118	100.0

Source: Authors

The main barriers to knowledge sharing (often and always) identified by respondents were ‘lack of incentive’ (52.5%) and ‘lack of culture for sharing’ (50%). The internal consistency of the questions related to barriers to knowledge sharing is .875 (good).

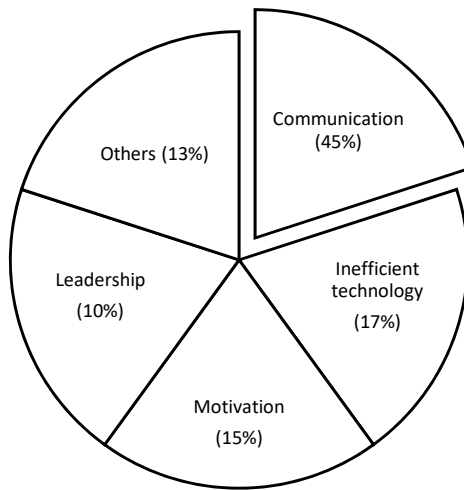
The healthcare professionals were asked to refer to other barriers that they considered important, as seen in Figure 8.

Table 11 Barriers to knowledge sharing

	1	2	3	4	5
Hierarchical divisions	6.8%	16.1%	38.1%	28.8%	10.2%
Large diversity of professional groups	11.0%	27.1%	39.0%	17.8%	5.1%
Difficult to share with excessive work hours	7.6%	14.4%	28.8%	30.5%	18.6%
There is a lack of interest in sharing	5.1%	18.6%	29.7%	36.4%	10.2%
Communication among everyone is inefficient	6.8%	16.1%	34.7%	27.1%	15.3%
There is a lack of culture for sharing	6.8%	19.5%	23.7%	31.4%	18.6%
There is a lack of incentive	4.2%	10.2%	33.1%	28.8%	23.7%

Source: Authors

Figure 8 Main barriers to knowledge sharing by the professionals



Source: Authors

Regarding IT, the professionals mentioned which are the main problems they face in the institutions, 29.7% reported that there is no success due to technical problems, 28.8% reported lack of time to learn, 23.7% reported lack of training and that the daily use was not integrated into the normal work practice, 20.3% reported lack of identification of the adequate IT tool, 14.4% reported that the system is very complicated and that there is lack of user understanding due to poor communication. Only 5.9% report that they have no difficulty in using IT.

Table 12 Departments responsible for KM practices

	N	%
It does not exist	30	25.4
Do not know if it exists	44	37.3
Yes, it exists	44	37.3
Total	118	100.0

Source: Authors

Departments/areas in the healthcare unit responsible for KM practices exist in about 37% of the cases.

Only 29.6% of the healthcare professionals refer that their workplace offers training frequently or very frequently.

Table 13 Employee training

	<i>N</i>	%
Very rarely	31	26.3
Rarely	29	24.6
Sometimes	23	19.5
Often	24	20.3
Very often	11	9.3
Total	118	100.0

Source: Authors

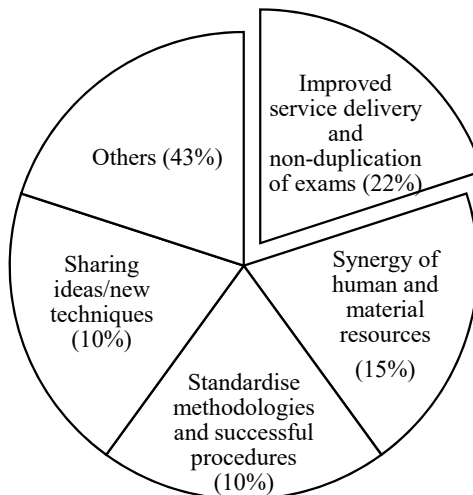
A little more than half of the respondents (54.2%) indicated some type of collaboration between theirs and other health units.

Table 14 Collaboration with other health units

	<i>N</i>	%
No	24	20.3
Do not know	30	25.4
Yes	64	54.2
Total	118	100.0

Source: Authors

Figure 9 Advantages of collaboration with other health units



Source: Authors

The healthcare professionals were then asked about the importance of such collaboration. (Do you consider it advantageous to have this collaboration? Why?) All respondents said yes and justified it. The main reasons are represented in Figure 9.

Most respondents (56.8%) indicated that the healthcare units do not have policies or programs to improve employee retention.

Table 15 Worker retention policies or programs

	<i>N</i>	%
No	67	56.8
Do not know	45	38.1
Yes	6	5.1
Total	118	100.0

Source: Authors

The professionals who answered yes (6), then explained what the programs were. The retention programs were childcare allowance, scientific training, allows evolution and adequacy of remuneration with experience, bonuses according to the evaluations and years of work in organisation and financial incentives.

More than a third of the respondents (34.8%) indicated that they propose new ideas and suggestions for service improvement often or very often.

Table 16 Frequency of proposals of new ideas and suggestions

	<i>N</i>	%
Very rarely	15	12.7
Rarely	10	8.5
Sometimes	52	44.1
Often	27	22.9
Very often	14	11.9
Total	118	100.0

Source: Authors

A high percentage of the professionals said that they had already given suggestions for improving the subsequently applied service.

Table 17 Suggestions for improving the service that was applied

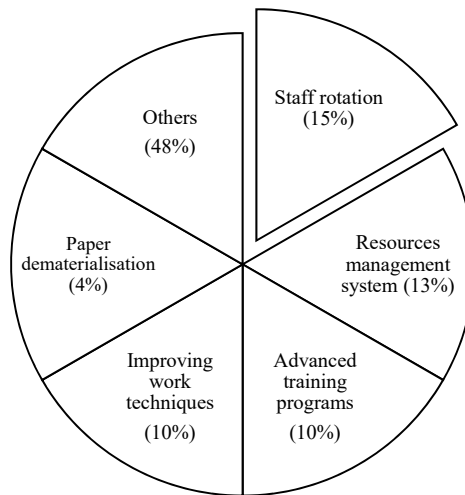
	<i>N</i>	%
No	51	43.2
Yes	67	56.8
Total	118	100.0

Source: Authors

Sixty-seven professionals who said yes described what suggestions they made, and these are summarised in Figure 10.

A percentage of 34.9% consider their healthcare unit an efficient or very efficient unit, and 24.6% consider them not at all efficient or not very efficient.

Figure 10 Suggestions for improving the service



Source: Authors

Table 18 Perception of the organisation’s efficiency

	N	%
Not efficient at all	14	11.9
Not very efficient	15	12.7
Reasonable	49	41.5
Efficient	36	30.5
Very efficient	4	3.4
Total	118	100.0

Source: Authors

The respondents answered what makes the health unit efficient or, on the other hand, what they thought needed to be improved, as represented in Figure 11.

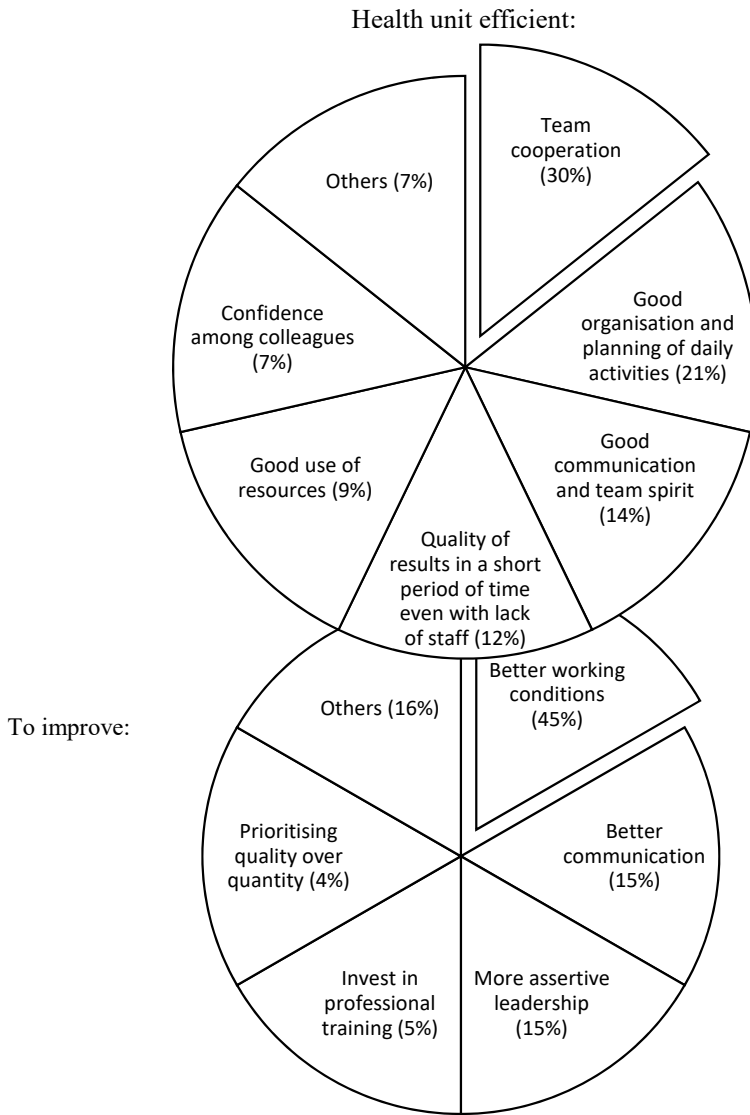
The degree of job satisfaction is 40.6%, while job dissatisfaction covers 29.6% of respondents.

Table 19 Job satisfaction level

	N	%
Not at all satisfied	9	7.6
Not very satisfied	26	22.0
Indifferent	35	29.7
Satisfied	43	36.4
Very satisfied	5	4.2
Total	118	100.0

Source: Authors

Figure 11 Factors of efficiency of the healthcare units and factors that need improvement



Source: Authors

When the respondents were asked to rank the factors in order of importance, they consider determinants for their job satisfaction; the three factors that come in the first place are trust with co-workers, Cooperation among different teams, and service organisation, while the three factors considered to be less important were decision-making power, training offered, and an adequate number of professionals at work.

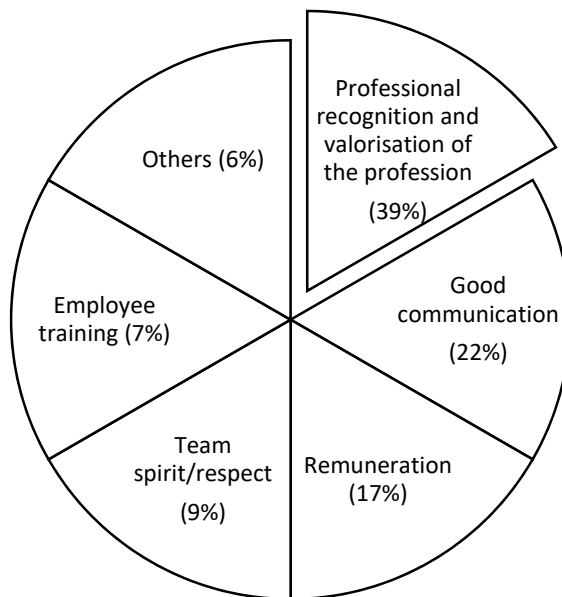
Respondents mentioned other essential factors for their job satisfaction that are described in Figure 12.

Table 20 Determinant factors for job satisfaction

	<i>Mean</i>
Trust with co-workers	3.09
Cooperation between different teams	3.78
Ease of knowledge sharing	4.82
Organisation of the service	4.37
Adequate number of professionals in the service	5.67
Training offered	7.09
Performance appraisals	5.30
Decision-making power	7.25

Source: Authors

Figure 12 Important factors for job satisfaction



Source: Authors

4.3 Correlations

4.3.1 The correlation between perceived barriers to knowledge sharing and job satisfaction

The correlation coefficients between perceived barriers to knowledge sharing and job satisfaction are statistically significant and negative. As the coefficients are negative, the higher the perceived barriers to knowledge sharing, the lower the job satisfaction.

Table 21 Correlation between barriers and job satisfaction

	<i>Satisfaction</i>
Hierarchical divisions	-.292***
Large diversity of professional groups	-.100
Difficult to share with excessive work hours	-.192*
There is a lack of interest in sharing	-.323***
Communication among everyone is inefficient	-.301***
There is a lack of culture for sharing	-.332***
There is a lack of incentive	-.378***

Note: * $p \leq .05$, ** $p \leq .01$ and *** $p \leq .001$.

Source: Authors

4.3.2 The correlation between perceived barriers to knowledge sharing and the level of efficiency

The correlation coefficients between perceived barriers to knowledge sharing and the organisation's efficiency level rating are almost all statistically significant and negative. As the coefficients are negative, the higher the perceived barriers to knowledge sharing, the lower the organisation's efficiency level rating.

Table 22 Correlation between barriers and efficiency level

	<i>Efficiency level</i>
Hierarchical divisions	-.310***
Large diversity of professional groups	.038
Difficult to share with excessive work hours	-.037
There is a lack of interest in sharing	-.257**
Communication among everyone is inefficient	-.235*
There is a lack of culture for sharing	-.376***
There is a lack of incentive	-.263**

Note: * $p \leq .05$, ** $p \leq .01$ and *** $p \leq .001$.

Source: Authors

4.3.3 Meeting's frequency and job satisfaction

The correlation coefficient between the frequency of meetings, discussions to share new knowledge and/or new ideas for improving the service or system, and job satisfaction is statistically significant and positive. As the coefficient is positive, the higher the frequency of holding these meetings, the higher is job satisfaction.

Table 23 Correlation between meeting's frequency and job satisfaction

	<i>Satisfaction</i>
Meeting's frequency	.321***

Note: * $p \leq .05$, ** $p \leq .01$ and *** $p \leq .001$.

Source: Authors

4.3.4 Barriers to knowledge sharing and type of unit

When we compared the degree of agreement with the statements related to barriers to knowledge sharing and the type of healthcare unit where respondents work, we found the following significant differences:

Table 24 Correlation between barriers to knowledge sharing and type of unit

	<i>Private</i>		<i>Public</i>		<i>Sig.</i>
	<i>M</i>	<i>DP</i>	<i>M</i>	<i>DP</i>	
Hierarchical divisions	3.16	1.12	3.20	1.04	.933
Large diversity of professional groups	2.37	.83	2.87	1.05	.035*
Difficult to share with excessive work hours	3.74	1.10	3.31	1.17	.136
There is a lack of interest in sharing	3.05	1.18	3.32	1.02	.330
Communication among everyone is inefficient	3.00	1.37	3.33	1.06	.430
There is a lack of culture for sharing	2.84	1.46	3.45	1.11	.077
There is a lack of incentive	3.11	1.15	3.67	1.06	.053

Note: * $p \leq .05$, ** $p \leq .01$ and *** $p \leq .001$.

Source: Authors

Large diversity of professional groups as a barrier, $MU = 665.500$, $p = .035$, agreement with this statement is significantly higher in public institutions (2.87 vs. 2.37).

4.3.5 Barriers to knowledge sharing and years of experience

When we compared the degree of agreement with the statements related to barriers to knowledge sharing and the length of professional experience, we found the following significant differences in Table 25.

Table 25 Correlation between barriers vs. years of experience

	<i>Up to 10</i>		<i>11–15</i>		<i>> 15 years</i>		<i>Sig.</i>
	<i>M</i>	<i>DP</i>	<i>M</i>	<i>DP</i>	<i>M</i>	<i>DP</i>	
Hierarchical divisions	2.92	1.06	3.21	1.18	3.28	1.01	.361
Large diversity of professional groups	2.50	.83	3.00	.82	2.83	1.12	.248
Difficult to share with excessive work hours	3.71	.95	3.00	1.37	3.37	1.16	.173
There is a lack of interest in sharing	3.08	1.14	3.11	1.05	3.39	1.01	.317
Communication among everyone is inefficient	3.04	1.20	3.11	1.33	3.40	1.03	.433
There is a lack of culture for sharing	2.71	1.23	3.26	1.33	3.59	1.07	.008**
There is a lack of incentive	3.08	1.10	3.84	1.01	3.67	1.07	.036*

Note: * $p \leq .05$, ** $p \leq .01$ and *** $p \leq .001$.

Source: Authors

There is a lack of culture for such sharing, χ^2 KW (2) = 9.568, $p = .008$. Agreement with this statement is significantly higher in the subjects with more than 15 years of professional experience than those with less than ten years (3.59 vs. 2.71).

There is a lack of incentive, χ^2 KW (2) = 6.631, $p = .036$; agreement with this statement is significantly higher in the subjects with more than ten years of professional experience when compared to those with less than ten years (3.08 vs. 3.84 and 3.67).

4.3.6 Job satisfaction and type of unit

Job satisfaction is higher in private healthcare facilities, although the difference is not statistically significant (3.16 vs. 3.06), $MU = 921.500$, $p = .884$.

Table 26 Correlation between job satisfaction and type of unit

	<i>Private</i>		<i>Public</i>		<i>Sig.</i>
	<i>M</i>	<i>DP</i>	<i>M</i>	<i>DP</i>	
Job satisfaction	3.16	1.01	3.06	1.03	.884

Note: * $p \leq .05$, ** $p \leq .01$ and *** $p \leq .001$.

Source: Authors

5 Discussion of the results

In the present section, the results obtained through the data collection will be compared with the literature review. The aim is to understand if these results answer the research questions of the current investigation.

Q1 What is the KM maturity level of an organisation?

The level of KM maturity of an organisation will always depend on how many factors are fulfilled according to its mission and objectives. In healthcare, there is a lack of models to quantify the different aspects and factors of KM present in the organisation.

The identification of key elements for the development of KM becomes crucial. The most important factors for implementing KM in healthcare, according to Karamat et al. (2019), are factors that promote competitive advantage, setting a standard for some organisations, effective decision-making, intra-organisational communication, and collaboration with other healthcare organisations. A little more than half of the respondents (54.2%) indicated some type of collaboration between theirs and other health units. The healthcare professionals were then asked about the importance of such collaboration. All respondents answered yes, and gave the different reasons: improved service delivery and non-duplication of exams (22%), synergy of human and material resources (15%), standardise methodologies and successful procedures (10%), sharing ideas/new techniques (10%) and others (43%).

Q2 Do KM maturity impact the perception of the organisation's success and efficiency by healthcare professionals?

Q3 Are the KMMM related to better professionals' experience and satisfaction?

The presence of KM processes in the workplace is related to high job satisfaction, according to Kianto et al. (2016), and job satisfaction is related to the perception of

success by healthcare professionals. According to with results, a percentage of 34.9% consider their healthcare unit an efficient or very efficient unit, and 24.6% consider them not at all efficient or not very efficient. The respondents answered that what makes the health unit efficient or, on the other hand, what they thought needed to be improved.

The degree of job satisfaction is 40.6%, while job dissatisfaction covers 29.6% of respondents. When the respondents were asked to rank in order of importance the factors they consider determinant for their job satisfaction, the three factors that come in the first place are trust with co-workers, Cooperation among different teams and service organisation. The correlation coefficients between perceived barriers to knowledge sharing and job satisfaction are statistically significant and negative. As the coefficients are negative, the higher the perceived barriers to knowledge sharing, the lower the job satisfaction. Moreover, the correlation coefficients between perceived barriers to knowledge sharing and the organisation's efficiency level rating are almost all statistically significant and negative. As the coefficients are negative, the higher the perceived barriers to knowledge sharing, the lower the organisation's efficiency level rating.

From the different factors analysed, we perceive that almost all these factors are described as little present in the workplace, which thus also leads to lower job satisfaction and to the fact that low percentages of professionals consider the workplace to be efficient or very efficient.

The feedback encourages all professionals so that more information is learned every time you are more confident of what to do (Ghosh and Scott, 2005), However, with this research, it was found that a percentage of 66.1% claim to receive very rarely or rarely feedback about their work performance. Leadership supports the vision of an organisation's development and progress. It can, therefore, help the introduction of KM. The success of information sharing is affected by leadership strategies and attitudes. Leaders at a healthcare unit should cultivate a problem-seeking and problem-solving culture (Sánchez-Polo and Cegarra-Navarro, 2008).

Q4 What is the right balance between solving technology-related problems and organisational culture?

The dynamic interaction among clinical practitioners is facilitated by the eHealth technologies, like decision support systems, active directories and portals. Synthesis and dissemination are acts carried out with the aid of technology by people working as teams (Nembhard, 2012). However, what has verified is that there are 29.7% of professionals reported that there is no success due to technical problems, 28.8% reported lack of time to learn, 23.7% reported lack of training and that the daily use was not integrated into the normal work practice, 20.3% reported lack of identification of the adequate IT tool, 14.4% reported that the system is very complicated and that there is lack of user understanding due to poor communication. Only 5.9% report that they have no difficulty in using IT. In a high percentage of workplaces, there were not any user-friendly electronic libraries (76.3%).

In the collaborative model, inter-organisational learning activities are essential components. This model involves weekly conference calls, face-to-face meetings, monthly report exchanges and discussions on Listserv (Nembhard, 2012). Healthcare managers should lead by example and invest in KM instruments and other technologies in 'early adopters'. The results obtained in the questionnaires have demonstrated that it is not common to have meetings/ discussions with the objective of sharing new knowledge

and/or new ideas for improving the service or system, more than half of the sample (56.7%) indicated that this happens very rarely or rarely, the correlation coefficient between the frequency of meetings, discussions to share new knowledge and/or new ideas for improving the service or system, and job satisfaction is statistically significant and positive. When we compared the degree of agreement with the statements related to barriers to knowledge sharing and the type of healthcare unit where respondents work, we found that the large diversity of professional groups as a barrier is significantly higher in public institutions.

Furthermore, job satisfaction is higher in private healthcare facilities, although the difference is not statistically significant. The healthcare professionals were asked to refer to barriers to knowledge sharing that they considered important. They referred the communication (45%), inefficient technology (17%), motivation (15%), leadership (10%) and others (13%).

According to Kumta and North (2018), an environment where people are free to speak without any hierarchy is essential as a highlight. Aryankhesal et al. (2020) argued that organisational culture is one of the most important tools for successfully deploying and implementing KM in organisations. In this research, the agreement with 'there is lack of culture for such sharing' is significantly higher in the subjects with more than 15 years of professional experience when compared to those with less than ten years and the agreement with 'there is lack of incentive' is significantly higher in the subjects with more than ten years of professional experience when compared to those with less than ten years. Departments/areas in the healthcare unit responsible for KM practices exist in about 37% of the cases.

The last question:

Q5 Do all organisations reach the topmost KMM level, or sometimes it is more advantageous to reach an intermediate level?

Sometimes it can be more advantageous to reach an intermediate level; if we think of a standard model for all healthcare units, it is noticeable that the level of investment, both at the technological level and the level of information sharing strategies, will have to be different, considering, for example, the size of the institution, large or small organisations. The organisational model is different, the investments will be different too, but organisations must know the importance of KM implementation to improve healthcare services.

6 Conclusions

The primary purpose of this study was to evaluate the impact of KMM on the success of healthcare institutions and perceive if KMM is related to the organisation's success, efficiency and job satisfaction.

With the present research, it was possible to prove that there are indeed positive relationships in the implementation of KM models with the implementation of critical success factors of KM. It is possible to improve healthcare services concerning job satisfaction and the efficiency of the organisation.

The critical factors can be divided into five categories: organisational infrastructure, technology, culture, human resources management, and the healthcare unit responsible for KM practices.

The first one can include the type of structure, team format and the processes of communication. The second: technology can include databases, electronic documents on the electronic library, programs and software's platforms. The culture includes the collaboration between services and other healthcare units, learning activities, like employee training, weekly conference calls, face-to-face meetings for healthcare professionals learning. The human resources management can include rewards, retention programs, and opportunities for healthcare professionals to participate and propose new ideas and innovations. The last category is the healthcare unit responsible for KM practices, the responsibility for the leadership.

As so, the main objective of the present study was achieved. In today's world, knowledge has become a valuable skill and KM has a great potential to acquire a competitive advantage, and it implies a decisive challenge for organisations. To conclude, KMMMs on organisational strategy allow for better development of an organisation over time. Finally, it is hoped that this research can motivate further studies in this field, which is likely to become increasingly important, particularly at the organisational level.

Even if the results are promising and applicable, we recognise some limitations, like the size of the sample being gathered only in Portugal what can limit its generalisation to other geographies. With this in mind, we recommend in future research to apply the same model to different geographies and different healthcare systems. Also, with a bigger sample it would be interesting to explore differences between medical specialities or professional categories.

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Annex

Authors	Subject	Year	Summary
Lee et al.	'A stage model of organisational knowledge management: a latent content analysis'	2001	This research introduced a stage model of organisational knowledge management and used secondary data analysis to validate it. For verification. Creation of a series of checklists for management objectives, managerial behaviour, and characteristics of management artefacts in each stage to ensure continuity in evaluation. Each stage of knowledge management has its own set of management goals and management actions. By confirming the four distinct stages of knowledge management implementation, this study contributes to knowledge management research.
Ghosh and Scott	'Comparing knowledge management in health-care and technical support organizations', <i>IEEE Transactions on Information Technology in Biomedicine</i>	2005	Systems that reduce a clinical worker's personalisation practices are unlikely to be effective. Systems can be changed to collect more personalisation data, provide real-time contact between professionals, and facilitate information creation initiatives. This study has shed light on the various methods and applications for knowledge management in professional support and healthcare. While some methods, procedures, and lessons learned from using KM in professional services can be extended to healthcare, they must be changed to suit the very different approaches.
Akhavan and Jafari	'Critical issues for knowledge management implementation at a national level'	2006	According to the findings, strategic planning, public perception, and information and communication technologies are some of the 'key drivers' of success that are linked to knowledge management implementation.
Lin	'A stage model of knowledge management: an empirical investigation of process and effectiveness'	2007	According to the empirical evidence from this research, different stages of KM evolution can be differentiated across dimensions of the KM process, KM effectiveness, and socio-technical support. The results fill a gap in the literature caused by the lack of implementation of a stage model of knowledge management that can be used to determine a company's current state of knowledge management practice.
Kruger and Johnson	'Principles in knowledge management maturity: a South African perspective'	2010	Organisations recognise that it is critical to set the stage for KM, but knowledge is often viewed as a strategic corporate resource. Although most companies, regardless of their competitive strategy, follow a codified or technology-based strategy, most organisations pursue a hybrid KM environment that includes technology and people. The inability of organisations to step beyond technologically assisted KM initiatives may explain why so many KM initiatives fail miserably.
Lin	'Antecedents of the stage-based knowledge management evolution'	2011	The evolution of knowledge management becomes a significant guarantor of long-term competitive advantage. This study creates a research model to investigate the influence of three key contextual variables, namely, human, organisational, and information technology, on the evolution of knowledge management across three stages (KM initiation, KM implementation, KM institutionalisation).

Annex (continued)

<i>Authors</i>	<i>Subject</i>	<i>Year</i>	<i>Summary</i>
Xiao et al.	'Study on maturity level transition mechanism of knowledge management'	2012	Maturity levels and key process areas are the important parts of KMMM; group implementation of key process areas is the basis of maturity level transitions. The four main process areas are based on the analysis of KMMMs: people, process, technology and culture. It is essential to identify parameters that would effectively promote the transition of maturity levels from multiple perspectives for the wide range of knowledge management.
Karamitri et al.	'Knowledge management practices in healthcare settings: a systematic review', <i>The International Journal of Health Planning and Management</i>	2015	Healthcare leaders should deliberately foster a knowledge ecosystem, and those who encourage knowledge, such as knowledge brokers, should be rewarded. For this purpose, special activities may be held annually to recognise and reward the best KM practices. As a result, administrators should promote user-friendly electronic libraries and information systems to remove obstacles.
Serenko et al.	'An application of the knowledge management maturity model: the case of credit unions', <i>Knowledge Management Research and Practice</i>	2015	It is important to establish a formal KM strategy, generate a link between an overall organisational vision and KM direction, introduce a dedicated KM budget, and assign a person responsible for KM and KM promotion mechanisms should be established, developing quantitative measures to assess the progress and impact of KM.
Soto-Acosta et al.	'Social web knowledge sharing and innovation performance in knowledge-intensive manufacturing SMEs'	2016	Knowledge is a critical component in adding and creating value. Knowledge sharing has been considered essential to achieve the desired outcomes of KM practices. Organisations' survival and success depend on the effort and interactions of employees as they carry the skills and generate knowledge to transform new ideas into innovations. The importance of social web knowledge sharing, which IS incorporation combined with commitment-based HR activities, creates a context that promotes social web knowledge sharing, which contributes to new knowledge and innovation.
Kianto et al.	'The impact of knowledge management on job satisfaction', <i>Journal of Knowledge Management</i>	2016	The presence of knowledge management processes in the workplace is related to high job satisfaction. KM is an important driver of value creation, organisational competitiveness and success.
Bahrami et al.	'The mediating role of organizational learning in the relationship of organizational intelligence and organizational agility'	2016	The improvement of organisational learning abilities can affect an organisation's agility which is crucial for its survival. The implementation of KM in healthcare is seen as the way forward to improve the quality of care for patients, which is the goal of healthcare.
Abukhader	'Exploring knowledge management implementation in large-sized service organisations – Saudi Arabia as a case', <i>Knowledge Management Research & Practice</i>	2016	The most commonly utilised tools of KM in large-sized organisations, as per the responses, include groupware, electronic bulletin boards, document management systems, shared databases, training sessions and expert systems. Leadership, strategy formulation, and KM processes/methodology are the top CSFs for large-sized service enterprises implementing KM.

Annex (continued)

Authors	Subject	Year	Summary
Ali et al.	'Knowledge management systems success in healthcare: leadership matters', <i>International Journal of Medical Informatics</i>	2017	The success of knowledge management systems was found to be strongly correlated with the quality of knowledge content. In healthcare, information quality is critical because poor knowledge can lead to poor clinical decisions and even put lives at risk. Overall, the results indicate that leadership is an essential factor in ensuring the effectiveness of knowledge management programs in healthcare organisations.
Raudeliūnienė et al., Dias et al. (2021)	'Knowledge management process model', <i>Entrepreneurship and Sustainability Issues</i>	2018	Knowledge potential management is an effective tool for improving the efficiency of organisations. Effective organisation knowledge potential management impacts the entire knowledge creation value chain by setting the stage for identifying evolving customer needs and purposefully developing the organisation's knowledge potential to meet such needs to generate reciprocal value. It is challenging to quantify knowledge management processes, necessitating the creation of a structured knowledge management model.
Shaygan and Daim	'Technology management maturity assessment model: an exploratory multi-criteria approach for healthcare organizations'	2019	This study proposes a technology management maturity model evaluation tool to improve knowledge of how healthcare organisations measure the application and acceptance of being a learning health system. This study will try to achieve its aim by finding vulnerable points within the organisation, and this assessment model will aid health agencies in classifying and organising their goals. This maturity model will help health organisations make better decisions and be seen as the first step toward better patient satisfaction, quality care, and cost of care outcomes.
Karamat et al.	'Promoting healthcare sustainability in developing countries: analysis of knowledge management drivers in public and private hospitals of Pakistan'	2019	In the healthcare sector, there are several KM drivers. Healthcare institutions need to understand when and how to use them. The most important drivers for KM implementation in healthcare, according to the findings, are gaining a competitive edge (driver 1), setting a standard for other organisations (driver 2), effective decision making (driver 3), intra-organisational communication (driver 7) and collaboration with other healthcare organisations (driver 8).
Aryankhesal et al.	'Staff perspectives on the relationship between knowledge management and social capital in organisational health in selected educational hospitals in Tehran'	2020	All components of knowledge management and social capital have a positive and significant relationship with organisational health dimensions. Knowledge management training should be included in hospital manager training, especially for educational hospitals, and the effect of this training should be evaluated on an annual basis. It is also recommended that hospital administrators and authorities, especially hospitals, make better use of current, competent, and experienced staff to boost their morale, dignity, and competence by engaging with academics.