

# Knowledge management in health care: an integrative and result-driven clinical staff management model

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## Abstract

**Purpose** – This paper aims to propose an integrative and result-driven health-care knowledge management (HKM) model and discuss the findings of a research that examines how the KM initiatives of a major private Brazilian hospital system are linked to its health-care performance outcomes.

**Design/methodology/approach** – Data were collected from a top-level Brazilian private hospital system (Mater Dei Healthcare System – MDHS), which is composed of three large hospitals internationally accredited by ISO 9001/2000, NIAHO and JCI. Multiple qualitative approaches were used to collect data such as 16 in-depth interviews with health professionals and managers, document analysis, participatory observation and benchmarking interviews with two reference hospital networks in Brazil.

**Findings** – The proposed health-oriented KM model is an expansion of the organizational knowing cycle model (Choo, 1996), adding absorptive capacity (ACAP) as a new construct. The paper discusses how ACAP integrates with sense-making, knowledge creation and decision-making processes within the health-care context. Information technology and clinical governance were identified as support factors to the HKM processes.

**Practical implications** – The paper presents a pragmatic and result-driven knowledge management (KM) model using health-care-welfare key performance indicators, as well as the emergence of KM as an integrative and strategic approach to hospital management.

**Originality/value** – The present study presents a knowledge-based perspective to clinical staff management, demonstrating the tangible results of KM initiatives that contribute to health and management performance outcomes.

**Keywords** Health-care knowledge management (HKM), Hospital administration, Clinical governance, Absorptive capacity, Quadruple aim

**Paper type** Research paper

## Introduction

Health-care organizations are driven by the trade-off between welfare quality, welfare cost control and the improvement of population's health conditions in an expression called as triple aim (Berwick *et al.*, 2008). Such expression recently evolved to quadruple aim because of the inclusion of the improvement of the health-care workforce experience (Bodenheimer and Sinsky, 2014). Patient-based care, integration, clinical outcomes, information technology (IT), people development, training and education are some of the future challenges for the health-care industry (Pihlainen *et al.*, 2019). Although such aims are explicit, reality presents increasing costs and unsatisfactory quality, despite the hard work of well-qualified health professionals (Porter and Lee, 2013). Christensen *et al.* (2009) stated that "hospitals are among the most intractable institutions that comprise the historical records of capitalism."

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Hospitals may be considered knowledge-intensive organizations (Wu and Hu, 2012; Millar-Schijf *et al.*, 2016) with particularities in relation to other industries. The welfare-health-care staff is composed of professionals with different technical skills, abilities, values and bonds with the health institutions (Bordoloi and Islam, 2012). Physicians, nurses, psychologists, physiotherapists, occupational therapists, nutritionists, pharmacists, administrative staff as well as patients and family members are collaboratively integrated into formal and informal process networks, fostering knowledge creation and interactions in decision-making scenarios (Rangachari, 2009). Additionally, the health-care informational environment is intrinsically multidisciplinary, complex and subject to information overload as a result of the fast pace of medical knowledge advances in drug research and changing health protocols. For instance, PubMed, which is a medical research database provided by the United States National Library of Medicine, already featured more than 43,000 papers with the terms Covid-19 by August, 2020. Furthermore, changes in the demographic profile of an aging population impose new challenges to the health-care industry (Costa Neto *et al.*, 2016).

Low application of relevant knowledge to patients and knowing-doing gaps have produced suboptimal care (Cochrane *et al.*, 2007). Furthermore, contextual factors may generate different patterns of knowledge-sharing restrictions among life science professionals (Gerbin and Drnovsek, 2020). Although improvements in patient experience have been achieved more recently, deficits in care continue to create serious hazards to public health (Levine *et al.*, 2016). Nonetheless, the current dynamics of health-care organizations do not allow them to simply adopt static management models or structures roughly adapted from the industrial sector, without taking into account the peculiarities of health care (Ali *et al.*, 2014). As a result of the many managerial challenges facing health-care organizations, there is a perception of the importance of using knowledge management (KM) systems in health care (Ramos *et al.*, 2020), although cultural differences between physicians may alter such perceptions (Lin, 2014).

Health-care knowledge management (HKM) can be defined as the systematic creation, modeling, sharing, operationalization and translation of health-care knowledge to improve the quality of patient care (Abidi, 2007). Numerous barriers to HKM may be outlined such as the ambiguous nature of knowledge, knowledge transfer issues, low absorptive capacity and the difficulty in measuring outcomes (Lin *et al.*, 2008). Tremendous obstacles exist to realize the HKM portfolio, especially the development of knowledge-centric services that seamlessly integrate within the clinical workflow (Abidi, 2007).

Many integrative models in KM in specific contexts have been published (Abidi, 2001; Makoul and Clayman, 2006; Currie, 2012; Hsiao and Chen, 2015; Hillen *et al.*, 2017), but uncertainty about HKM results predominates (Assem and Pabbi, 2016; Hillen *et al.*, 2017). In a quantitative study with ten public and private Portuguese hospitals, Cruz and Ferreira (2016) concluded that the existing KM practices in hospitals are mostly informal and lacking consistency and alignment with the organizational strategy because hospital top management does not understand clearly the KM concept and its potential. Slightly better results were found in private hospitals, but the authors called for new studies in the field. A recent and systematic literature review about the role of intellectual capital in the health-care sector (Paoloni *et al.*, 2020) concluded that the structural capital (focus on explicit knowledge) is widely discussed, whereas the relational capital (focus on external knowledge connections with universities, suppliers and health networks) has remained in the shadow, and human capital (focus on tacit knowledge) is the less studied component.

The objective of this paper is to propose an integrative and result-driven HKM model and also to discuss the findings of a research that examines how the KM initiatives of a major private Brazilian hospital system are linked to its health-care performance outcomes. The paper is structured as follows: the next section comprises literature review with a health-care-based perspective of the knowing cycle model adding absorptive capacity as a new construct; the third section describes the qualitative approach of the research which

included interviews, document analysis, benchmarks and participant observation; the last section discusses the theoretical implications of the study and the contributions for KM practitioners and health professionals.

## Literature review

It is relevant to revisit the seminal organizational knowledge cycle model (Choo, 1996; Choo, 2006) because it constitutes the major theoretical background for the health-based KM model proposed in this study. The knowledge cycle model was chosen because of its particular fit to the health-care context. Differently from the majority of KM models in the literature that typically end with the knowledge transfer activity, the knowledge cycle model's holistic perspective also encompasses the decision-making process, which is critical to patient care. Furthermore, this model has been used in many KM studies on medical contexts (MacIntosh-Murray and Choo, 2005; Meenakshi, 2016; Jamil *et al.*, 2019). The model comprises three interacting areas of information strategic usage: sense-making, knowledge creation and decision-making. These constructs are initially explained in a generic perspective and later contextualized into the health-care domain.

The purpose of *sense-making* is the creation of common meanings and purposes, giving rise to understandable environments and meaningful interpretations, which provide the contexts and guidelines for organizational action (Choo, 1996). It is fostered by signals from the external environment and represents a "station along the path" for the pursuit of consensus and coordinated action within the system. Through processes guided by beliefs and actions, the target is the construction of shared meanings which represent a link between sense-making and organizational action (Choo, 1996).

Several studies have shown the importance of sense-making for hospital management with impacts on the health-care-welfare results, showing evidence of protocol reviews and better shared understanding about hazards and patient safety risks (Leykum *et al.*, 2014; Hultin and Mähring, 2017). Paoloni *et al.* (2020) emphasized the role of external knowledge from health networks and suppliers as part of the relational capital of health-care organizations. Penney *et al.* (2018) described that a major problem in a US Veterans hospital was the high percentage of early readmissions. The study unveils a clinical staff sense-making approach to this issue based upon the construction of common purposes.

The *knowledge creation* process comprises a dynamic interaction between tacit and explicit knowledge within an organization, mediated by the social processes that support the creation and sharing of new knowledge (Nonaka and Takeuchi, 1995). Schubert (2011) described the danger of tacit knowledge to health organizations, where the improper reliance on tacit knowledge can lead to omission, obscurity and simplification of the procedures. Indeed, when there are no formal KM procedures available, health-care professionals rely on informal conversations and seminars to share knowledge (Assem and Pabbi, 2016).

Within health organizations, explicit knowledge may be associated with the paradigm of evidence-based medicine (EBM), which aims at applying better current evidence from the medical literature for decision-making regarding an individual patient. Such paradigm is considered concurrently with the patient's needs and wishes, and with the practitioner's experience (Evidence Based Medicine Working Group, 1992). Other sources of explicit knowledge include clinical guidelines and protocols that are intended to guide decision-making, but they usually are not enforced (Grol, 2001).

Concerning the tacit dimension of knowledge creation, Communities of Practice (CoPs) are informal groups of people who share their passion and expertise about something they do through regular social interaction (Wenger and Snyder, 2000). In Brazil, a consistent example of CoPs is the Israelite Albert Einstein Hospital, which was a benchmark for this research (Klajner *et al.*, 2015).

The third area of the knowledge cycle model (Choo, 1996) is *decision-making*, which is influenced by the principle of bounded rationality (Simon, 1997). Decision-making is guided by organizational rules and routines that produce rational choices that are good enough and acceptable, but not necessarily the best possible alternatives.

In health care, decision-making constitutes a critical point of knowledge application. Hospitals are seldom structured in terms of KM, but decision-making occurs all the time and sometimes under pressure in the operating rooms and intensive care units. The difficulties originate from the complexity of the knowledge involved, as well as from psychological, affective, cognitive and heuristic factors of patient care services (Croskerry and Nimmo, 2011). The use of standards, routines, protocols and checklists are meant to institutionalize “correct” interpretations of problem situations to reduce uncertainty and ensure consistency. Indeed, health-care efficiency and effectiveness require knowledge processes that support decision-making and interaction between different stakeholders within a health-care network (Stefanelli, 2004).

Furthermore, hospitals are promoting the adoption of shared decision-making, involving clinical staff, patients and even their families to integrate their needs and preferences (Elf *et al.*, 2015). According to Roshanghalb *et al.* (2018), EBM may be understood as a process that connects sources of evidence, types of analysis, kinds of decisions and groups of decision-makers. In a study conducted by Guo *et al.* (2017) among 154 US health-care leaders, 90% of the participants self-reported having used an EBM approach for decision-making, and professional experiences was the top evidence consulted daily.

The link between knowledge creation and decision-making is based on new knowledge and capabilities being developed and absorbed by the organization that makes possible new courses of action for decision-making (Choo, 1996). A fundamental aspect of the knowledge creation is the organizational ability to absorb external knowledge called absorptive capacity, which has emerged as a concept that connects across the literature on dynamic capabilities and organizational learning (Ferreira *et al.*, 2018). Thus, *absorptive capacity* (ACAP) may be included as a fundamental dimension of the KM cycle.

ACAP was originally defined as the ability to identify, absorb and explore the external environment knowledge, thus fostering innovation, flexibility and competitive advantage for the organization (Cohen and Levinthal, 1990). In a survey with Australian care organizations, Preece (2015) found that absorptive capacity explained 56% of the total variability for effective KM. The research of Wu and Hu (2012), with a sample of 144 Asian hospitals accredited by the Joint Commission of Taiwan, also provides support to the inclusion of absorptive capacity as a dimension of the knowledge cycle (Choo, 1996) because it indicated that higher absorptive capacity produced a relevant impact on hospital process capabilities and financial and patient performance.

Absorptive capacity is considered a dynamic capacity (Teece *et al.*, 1997) that allows the change and reconfiguration of the existing organizational capacities and can be developed to increase, acquire and create new organizational knowledge (Volberda *et al.*, 2010). Zahra and George (2002) divided the construct into potential and realized absorptive capacity (PACAP and RACAP, respectively): the former relates to knowledge acquisition and absorption, whereas the latter deals with knowledge transformation and exploitation. The efficiency of absorptive capacity may be estimated as the ratio between the realized absorptive capacities to the potential capabilities. Minbaeva *et al.* (2003) analyzed the interaction between absorptive capacity and knowledge transfer processes. The authors demonstrated that human resource practices, such as training and performance review, enhance PACAP. On the other hand, the human resource practices related to promotions based on merit, remuneration based on performance and internal communication are related to the motivation of the employees and associated with the RACAP.

Zahra and George (2002) also proposed four dimensions for absorptive capacity: acquisition, assimilation, transformation and exploitation. According to Wang and Byrd (2017), within the context of health-care organizations, acquisition is the “identification of valuable clinical knowledge from internal resources, such as diagnostic or monitoring instrument data and patient behavioral data, and also from external resources, such as insurance claims, pharmacy and lab data.” Furthermore, assimilation is achieved through the sense-making process of the clinical knowledge, whereas transformation is the integration of new knowledge with existing knowledge, and, finally, exploitation is the application of the integrated knowledge to improve the health-care performance.

Previously, the three original areas of the knowledge cycle model (Choo, 1996) were discussed and the introduction of ACAP as the fourth dimension was justified. Further, in this paper, these constructs are represented as four sails of a windmill that is used as a metaphor for the HKM model. Besides absorptive capacity, HKM literature gives support to the inclusion of two more constructs, which are not part of the extended knowing cycle, but are intrinsic to the health-care management context. These constructs are health-care-welfare outcomes and IT and they will have a supporting function in the windmill model structure.

Absorptive capacity reflects health-care organizations' ability to highlight and apply new clinical knowledge, which is critical to clinical performance (Wang and Byrd, 2017). Within the health-care context, to sustain long-term KM practices, both intangible and tangible results should be pursued, keeping the focus on the patient and the excellence in health-care-welfare. KM-enabled performance should be rooted in the identification of knowledge resources, including knowledge assets and capabilities (Wu and Hu, 2012). The desired *health-care-welfare outcomes* may be articulated using key performance indicators (KPIs), such as in a Balanced Score Card (BSC) (Kaplan and Norton, 1996). The health-care-welfare KPI is an approach to analyze the dimensions of quality of assistance, the patients' health conditions, in addition to organizational processes and care. Porter *et al.* (2016) emphasized the need to standardize the indicators used in health metrics. Lin (2015) described the use of the BSC methodology to verify the outcomes linked to KM.

The applicability of IT to health is evolving significantly, generating outcomes that may affect the attendance quality and patient safety (Ash *et al.*, 2004). Previous studies on health information management faced the challenge of integrating health information systems in health-care work (Berg, 2003). Electronic medical records, mobile-health, Internet of Things (IoT), applications of artificial intelligence (AI) in medicine, genetic engineering, nanotechnology and other digital breakthroughs push a new agenda for medicine and bioinformatics. In fact, the adoption of digital technologies can improve the performance of main health-care business processes and increase efficiency by allowing the delivery of better quality and reduced response times (Laurenza *et al.*, 2018). A recent study with frontline community health workers in India (Fletcher-Brown *et al.*, 2020) found that KM plays a facilitating role in mobile-health in an emerging economies context. KM is also found to have a decisive role in IoT-driven mobile-health, helping health organizations to identify business requirements and address privacy and security issues (Lokshina and Lanting, 2019). Information systems usage may prevent drug administration mistakes and the occurrence of adverse events, facilitate communication and improve the responsiveness of professionals and health-care teams, make knowledge accessible in a timely and appropriate manner and generate feedback about events (Mamlin and Tierney, 2016). IT may also mediate knowledge creation practices, helping to produce EBM (Tripathi *et al.*, 2020).

The research model developed in this paper presents an integrated view of the processes and capabilities related to KM in the context of hospital management. The model examines the relationships between sense-making, knowledge creation and decision-making that were previously proposed in the knowledge cycle model (Choo, 1996) and incorporates the

concepts of absorptive capacity, IT and health-care-welfare outcomes as specific constructs for the health-care domain. The theoretical categories and subcategories are described in [Table 1](#).

## Research method

This section explains the research strategy, describes the empirical unit of analysis (Mater Dei Healthcare System – MDHS), reports the data collection steps and details the data analysis procedures.

### Research strategy and framework initial validation

The present study adopted a qualitative strategy ([Burrell and Morgan, 2017](#)) using a case study method ([Dubois and Gibbert, 2010](#)) within a private hospital health system in a holistic and exploratory manner, comprehensively investigating the KM phenomenon immersed in its social system ([Yin, 2017](#)). The qualitative approach was chosen because of the underlying complexity of the HKM phenomenon characterized by a wide-ranging set of interconnected variables ([Eisenhardt, and Graebner, 2007](#)). Besides its appropriateness to in-depth studies of complex phenomena ([Eisenhardt and Graebner, 2007](#)), a distinctive feature of the qualitative method in comparison to other approaches is the opportunity to build a strong relationship between the researchers and the participants, developing close and empathic relationships with these actors to unveil their professional contexts and research field events ([Yilmaz, 2013](#)).

An initial framework was designed based on the KM literature review with a sharper focus in the health-care domain, using not only Information Science and Management databases for search, but also PubMed. Subsequently, a KM research group composed of four PhD

**Table 1** Research model constructs and its subcategories

Construct	Subcategory	Major supporting references in chronological order
Sense-making	Belief-oriented processes	<a href="#">Choo (1996)</a> ; <a href="#">Leykum et al. (2014)</a> ; <a href="#">Hultin and Mähring (2017)</a> ; <a href="#">Penney et al. (2018)</a>
	Action-oriented processes	
	Development of shared meanings	
Knowledge creation	Medical literature	<a href="#">Evidence Based Medicine Working Group (1992)</a> ; <a href="#">Choo (1996)</a> ; <a href="#">Wenger and Snyder (2000)</a> ; <a href="#">Grol (2001)</a> ; <a href="#">Schubert (2011)</a>
	Evidence-based medicine (EBM)	
	Communities of Practice (CoP)	
	Development of protocols, routines and guidelines	
Decision-making	Shared experience	<a href="#">Choo (1996)</a> ; <a href="#">Stefanelli (2004)</a> ; <a href="#">Croskerry and Nimmo (2011)</a> ; <a href="#">Wang and Byrd (2017)</a>
	Adoption of protocols, routines and guidelines	
	Goals	
	Notification of adverse events and noncompliance reports	
Absorptive capacity	Professional self-sufficiency	<a href="#">Cohen and Levinthal (1990)</a> ; <a href="#">Zahra and George (2002)</a> ; <a href="#">Minbaeva et al. (2003)</a> ;
	Recruitment and screening	
	Performance review and competence and training	
	Compensation for performance and meritocracy	
Healthcare-welfare outcomes	Internal communications	<a href="#">Kaplan and Norton (1996)</a> ; <a href="#">Lin (2015)</a> ; <a href="#">Porter et al. (2016)</a>
	Balanced Score Card mindset	
	Consolidated and specific indicators	
Information technology	Result-driven culture	<a href="#">Berg (2003)</a> ; <a href="#">Mamlin and Tierney (2016)</a> ; <a href="#">Laurenza et al. (2018)</a>
	Health information systems	
	Electronic medical records	
	Information-based decision-making	

Source: Developed by authors.



professors and eight researchers reviewed the framework, providing an initial construct validation.

Regarding the development of the framework from a practitioners' point of view, semi-structured interviews were conducted in the Lebanese Syrian Hospital and in the Israeli Albert Einstein Hospital, in 2018. Both hospital networks have their headquarters in São Paulo and are considered benchmarks because of their high number of international accreditations and research agreements with North American and European hospitals. Altogether, six in-depth interviews (average time of 53min) about KM practices were conducted in both hospitals with the following respondents: one chief medical relations officer, one chief innovation and KM officer, and a group of four physicians directly involved in clinical management. At the end of the interviews, the framework was presented to the respondents, providing significant insights for the framework maturation. Later, the core categories and subcategories for field research were defined.

### *Unit of analysis*

The MDHS was selected for this study because the hospital system has many structured KM initiatives linked to clinical results and because one of the researchers is a physician who has worked in the hospital system since 1999, allowing the application of participant observation. The choice of this case meets the prerequisites of observing a critical phenomenon that is useful for testing theory (Yin, 2017) because of the following reasons:

- MDHS was one of the pioneers among Brazilian health organizations to systematize policies and practices for clinical staff management.
- MDHS is recognized as a standard of clinical and management benchmarking for Latin America health-care organizations.
- MDHS has an open clinical staff policy, adopting a more flexible labor relationship with no employment binds.
- MDHS develops numerous simultaneous projects associated with knowledge creation and organization.

Founded in 1980, MDHS is located in Belo Horizonte, Minas Gerais, Brazil, and comprises three large hospitals, holders of level III certifications from the Brazilian Accreditation Organization, the National Integrated Accreditation for Healthcare Organizations (NIAHO) from the USA, ISO 9001:2008 and the maximum level of excellence from the Joint Commission International (JCI). The hospital system infrastructure offers 1,100 medical beds (including 238 beds of intensive care), 51 surgery rooms (some of them with robotics surgery support), capacity to attend 3,000 patients per day, human reproduction center, transplant unit, oncological center with 64 chemotherapy rooms, a research center with partnerships with international universities, 3 hospital units all with heliports and the fourth hospital is currently under construction in the city of Salvador, Bahia for 2022 (Rede Mater Dei, 2017). One particularity of the system is that it comprises an open group of 4,000 registered physicians with no formal employment relationship, but with long-term contract relationships that require periodic renovation according to performance parameters.

### *Data collection procedures*

The data collection phase was preceded by two meetings with the senior managers of the MDHS to authorize the field research. One of the axioms of the case study method is the usage of several sources of evidence for triangulation purposes (Yin, 2017). Accordingly, data collection used multiple sources of evidence: files and documents; managerial reports; health information systems; minutes of meetings; training events; selection and recruitment database; in-depth interviews; and participant observation.

After document investigation, the next step was primary data collection. The interview script was structured based on the six constructs and their subcategories that were derived from the literature review (Table 1). After the pretests, the semi-structured in-depth interviews were carried out at different hierarchical levels, leading to different insights (Meyer, 2001). The respondents were selected according to their critical role in medical and managerial decision-making. Interviewees include senior members of the management teams such as the vice-president of assistance, the clinical and technical executive officers, medical coordinators from specialized clinics, nurse coordinators of sectors such as the Intensive Care Center and administrative and welfare managers involved in the medical team quality management processes. All the interviews were conducted in closed environments and were recorded and transcribed later with the consent of the interviewees.

Field data from participant observation from one of the researchers was also obtained, bringing insights about the protocols' execution and decision-making routines. Participant observation was possible because this researcher has worked for MDHS since 1999 and he has been the head of the anesthesiology department for more than 10 years, managing a group of approximately 40 physicians. Furthermore, anesthesiology is a transversal discipline, allowing interactions with many other clinical departments across the hospital system and a comprehensive perspective for observation. The data obtained from the multiple sources were submitted to content analysis supported by NVivo, version 11.

### *Data analysis procedures*

Data analysis was based on content analysis techniques (Bardin, 2011). The first step was data aggregation on a single research database for triangulation and information convergence. The research database was populated with documents, transcribed interviews and reports from field observations. The next step comprised data codification (Bardin, 2011) and classification on the six categories of the research model (Table 1), resulting in a corpus of analysis which was used for data treatment. The qualitative data analysis software enabled the generation of various schemes for data interpretation, including cluster analysis, coding matrix graphs and the most frequent word map. The main guideline was to identify significant findings related to the phenomenon (Yin, 2017), keeping the options open for the emergence of new categories (Eisenhardt *et al.*, 2016) such as the support factors IT and clinical governance that were identified during data analysis.

### *Data analysis and findings*

During the period from January to September 2019, 16 semi-structured interviews (Table 2) were carried out, totaling 12.75 h of recordings with authorization from interviewees. The interview transcriptions resulted in 116 pages. The average duration of the interviews was 47.81 min, and 14 interviewees were physicians and nurses. The average age of the interviewees was 46.06 years and the average working time in MDHS was 15.31 years, representing a good level of experience and familiarity with the organizational values, systems and protocols. Curiously, despite the predominance of health professionals within the respondents, 56% of the interviewees have primary or complementary education in the administration area, either with bachelor's or master's in business administration (MBA) degrees.

For a better presentation of the findings, the following subsections are divided according to the research model constructs (Table 1), starting with the health-care-welfare outcomes, followed by the three original dimensions of the organizational knowledge cycle model (Choo, 1996) and finishing with the concept of absorptive capacity. Later, the major HKM practices identified in the study are grouped by these same constructs (Table 3). This section also includes the discussion of IT and clinical governance that emerged as supporting factors during the data analysis. Such constructs and factors were used to design the integrative HKM model to be presented in the last section.



**Table 2** Interviewees' profile

<i>Interviewee</i>	<i>Position at MDHS</i>	<i>Age</i>	<i>Gender</i>	<i>Length of the interview (min)</i>	<i>Experience at Management MDHS (years)</i>	<i>background</i>
A	Assistance Vice-President (VP)	54	Female	55	36	✓
B	Technical Director	51	Female	44	6	✓
C	Gynecology and Obstetrics Coordinator	45	Female	40	21	
D	Intensive Care Center Team Coordinator	44	Male	41	16	✓
E	Orthopedics and Traumatology Clinical Coordinator	38	Male	36	19	
F	Cardiology Coordinator	48	Male	55	6	✓
G	Consultant for JCI accreditation and for the "More Health" project	50	Male	54	17	
H	Orthopedics and Traumatology Team Coordinator	45	Male	54	17	
I	General Surgery Coordinator	60	Male	48	32	
J	Neurology Coordinator	37	Male	51	3	✓
K	Intensive Care Center Clinical Coordinator	54	Female	48	22	
L	Oncology Coordinator	49	Male	45	7	
M	Standardization and Quality Assurance Service Manager	49	Female	73	10	✓
N	Customer Service Manager	36	Female	41	14	✓
O	"More Health" Project Manager	34	Female	39	5	✓
P	Intensive Care Unit Nursing Coordinator	43	Female	41	15	✓

Source: Developed by authors

### *Health-care-welfare outcomes (key performance indicators)*

There was broad consensus among the interviewees regarding the importance of defining the health-care-welfare outcomes in MDHS in the form of KPIs that comprise multiple dimensions, as recommended by Donabedian (2005). The 1,631 KPIs linked to the clinical team are distributed across 38 specialized clinical practices and are classified by the MDHS into the eight following categories: external customer satisfaction; clinical excellence; professional development; buy-in to internal processes; prevention of welfare risks; prevention of ethical-legal risks; event control; and sustainability. Some of the categories and indicators are common to all clinical practices, whereas others are customized according to specific demands.

The KPI data analysis process is called critical analysis and comprises the systematic practice of knowledge sharing and decision-making regarding the KPI. Indeed, the critical analyses are formal and structured meetings that occur systematically at three levels. At the first level, managers review the data and the KPIs within the hospital system, and the quality group audits the analyses in the sequence. At the second level, all managers submit their assessment data to their supervisors and superintendents. Finally, at the third level, middle management prepares an executive presentation to the board of directors, highlighting the data related to more comprehensive KPIs, action plans to improve the indicators and organizational strategic projects. The coordinators of the different specialized clinics also present the quarterly results of their team to the MDHS board, generating action plans for the following quarter. The outcomes are also presented to medical teams.

According to the interviewees' perceptions, the main advantages of the KPI-driven approach are the following: definition of a reality-based purpose; visibility and facilitation of communication oriented toward organizationally relevant themes; better project follow-up and deployment over time; and disclosure of improvement points with impact on the results. On the other hand, the main negative feedback reported particularly by the physicians on

**Table 3** Compilation of KM practices in health care

<i>Category</i>	<i>Subcategory</i>	<i>Major health-care KM practices</i>
Sense-making	Belief-oriented processes	Results-driven mindset Pursuit of excellence KPI Professional growth and development stories
	Action-oriented processes	Hospital accreditation processes Periodical re-certifications Critical assessment of results
	Development of shared meanings	Engagement of physicians in managerial processes Personal and professional development Pursuit of result improvement Mutual agreement to define protocols
Knowledge creation	Medical literature, Evidence-based medicine (EBM)	Research in medical periodicals' databases Participation in congresses, symposiums and scientific events Sponsoring of scientific events Sharing of medical papers through instant messaging Discussion of medical literature in clinical meetings
	Communities of Practice (CoPs)	Integration of protocols Cross-functional teams Systemic KPI monitoring Virtual groups to discuss clinical cases
	Development of protocols, routines and guidelines	Development of protocols for the most prevailing pathologies Periodical protocol updates Standardization of conduct and routines Development of integrated protocols
	Shared experience	Continuous professional update Individual and team outcomes follow-up Professional expertise Development of residents
Decision-making	Adoption of protocols, routines and guidelines	Tracking protocol adherence rates Individual and team outcomes presentation Critical assessment of outcomes: monthly or quarterly Permanent clinical audits
	Goals	Definition of goals Outcomes monitoring Periodical reviews and updates of the goals
	Notification of adverse events and noncompliance reports	Motivation and facilitation of notifications Assessment of mistakes and near-misses Root-cause analysis System analysis records
	Professional self-sufficiency	Approach to complaints through the Customer Service Center Justifications for protocol bypass Justification log in the system Shared decision-making in virtual groups
Absorptive capacity	Recruitment and screening	Assessment of qualification and professional expertise Assessment of technical and behavioral skills Performance review of resident physicians
	Performance review and competence and training	Stewart's Radar Individual and team feedback Performance KPIs Critical assessment of KPIs
	Compensation for performance	Profit-sharing Public acknowledgment

Source: Research data

the use of KPI are the following: unreliability of the data; lack of connection between KPI and the medical reality; overly objective approach of numerical data, absence of an analytical and holistic vision of the KPI; and a comfort zone of the professionals regarding any improvement of an indicator.

## Sense-making

The subcategories related to sense-making are belief-oriented processes, action-oriented processes and creation of shared meanings (Choo, 1996). Processes guided by personal beliefs were seldom mentioned by the interviewees in the present study. Instead, interviewees reported a broad perception of action-driven sense-making processes, which is consistent with senior managers' choice to orient the organization toward a "more pragmatic" direction (Interviewee A). The respondents' testimonies emphasized interpretations based on a result-based mindset and the frequent use of KPI. Such a mindset also favors the retention of talents among the health professionals, who identify themselves with a professional practice in the pursuit of excellence. These action-driven processes enhance the strategic options of the MDHS, aligning expectations of the clinical team with the target indicators proposed by top management. Furthermore, these processes influence the level of commitment of the professionals, helping to attract practitioners, as reported by one of the interviewees:

At MDHS, I'm part of an organized team that holds weekly clinical meetings; I share my doubts and I learn [...] While I could make more money in another organization, I currently have a level of commitment with the team I didn't have before (Interviewee J).

The action-driven processes generate networks of meaning around the developed actions. Examples of action-driven processes may be found in the certifications and re-certifications of clinical accreditation. Clear evidence of such behavior is the "More Health" project, which aims to bring the best attention to the monitored patients so that they are clinically stable through guaranteed and coordinated continuity of care. It was necessary to "improve the clinical outcomes of patients, as well as highlight the cost-effectiveness of coordinated care, showing this effectiveness to our stakeholders" (Interviewee O). Lines of care focused on diabetes, heart failure and endometriosis were structured, comprising 27 specialties. The involvement of professionals from many disciplines in CoPs also built shared meaning through action-oriented projects. Such internal and external knowledge combination resulted in the review of many protocols and goals of clinical conduct.

Experiences such as the "More Health" project keep the processes going over time, fostering their continuous improvement of processes and the pursuit of welfare excellence. However, the action-driven processes must require realistic data to improve professional outcomes. Otherwise, there could be overall resistance on behalf of the medical practitioners because they are usually skeptical about calls to change their behaviors. The collective discussion of goals and KPIs within teams was seen as essential to collective sense-making because the improvements of some KPIs require the involvement of several practitioners.

The pursuit of shared sense-making is evident and even more critical in a hospital network where the physicians are not employees. The labor relationship is structured in the form of an open clinical team with medical coordinators, demanding extra efforts to reach strategic alignment and build commitment. From the physicians' perspective, this situation is a win-win relationship because shared sense-making promotes professional development as a result of the learning of new protocols, medicaments and technologies to reach better health-care-welfare results. Nevertheless, shared sense-making is far from being a trivial process as stated by several respondents, who reported difficulties and resistance to changes in the doctor-patient relationship and conflicts arising from different technical experiences:

Perhaps one of the core difficulties is the physician. When a technical difference exists, a conflict arises. The trend is that the lower level physicians believe that higher level physicians are determining conduct according to the literature, neglecting their opinion. [...], but it generates a lot of conflicts when we have weaker teams [...] (Interviewee K).

## *Knowledge creation*

The interviewees emphasized the importance of using EBM for professional renewal and the difficulty of selecting knowledge because the interdisciplinary approach of EBM sometimes clashes with overlapping knowledge of several specialties. The clinical team demonstrated comprehensive access to explicit knowledge sources with several databases being used to update specific topics. Participation in scientific events, such as congresses and symposiums, is supported and measured by individual and team KPIs.

Concurrently, scientific events held by the teams of specialized clinics within the MDHS are a systematic practice for knowledge creation and transfer. The MDHS has a goal to hold a yearly symposium for each specialized clinic and the theme of such an event is collectively defined by the team itself, empowering the CoPs. Approximately, 30 internal specialized events are held each year.

Frequent advances reported in the recommended medical literature can require changes in many of the ongoing routines and practices. The interviewees highlighted the transition of a tacit medicine based only on the experience of the health professionals toward a more scientific medicine with stricter criteria based on research evidence:

Looking into the future, the association of evidence-based medicine with medicine based on experience will be a key factor to practice the so-called competency-based medicine. If you can aggregate the managerial models to this combination, I have no doubt that you will have a service with higher quality in both the scientific and human aspects (Interviewee H).

All protocols were exhaustively built in conjunction with the different specialized clinics. Doctors are part of the construction process. This participation is essential for improving results over time. The protocols are updated periodically (Interviewee A).

The development and updating of protocols, guidelines and routines are daily practices at the MDHS and have been enhanced by the accreditation processes, since 2000. The protocols must be customized to the reality of the health-care institution, demanding biannual updates by the clinical team as part of the constant maintenance of the accreditation processes. Respondents identified a clear association between the protocols and the improvements in the health-care-welfare outcomes.

The health-care-welfare protocols are reviewed monthly, along with their KPIs, in a critical third-level analysis. They are considered strategic assets for the organization and “are built in accordance with the hospital network’s epidemiology” (Interviewee G).

Critical analysis of the indicators was mentioned as a way to foster the development and upgrading of the protocols. Hence, a checking mechanism for knowledge internalization is also required. After the protocol preparation, the extent that health professionals adhere to the agreed practices should be examined by collecting reliable data, internal audits and identification of patterns related to decision-making (Crebbin *et al.*, 2013), thus illustrating a relevant connection between explicit knowledge creation and decision-making, as described in the knowing cycle (Choo, 1996).

According to Lugtenberg *et al.* (2009), health professionals fail to buy-in to the applicability of the protocols because of the following reasons: lack of applicability or evidence of the protocol’s importance; environmental factors, such as lack of communication within the organization; lack of knowledge about the guideline; and ambiguous recommendations of the guidelines. There was no evidence of any of these four factors among the data collected in the MDHS; therefore, the studied case diverged from literature in this particular feature.

The experience and expertise of health professionals are the main examples of tacit knowledge in a health-care institution. Tacit knowledge plays a pivotal role in patient care, particularly in critical situations that require fast and effective decision-making. Tacit

knowledge is also important for the pursuit, choice and retention of knowledge based on the medical literature, as well as for the preparation of guidelines, protocols and routines, reinforcing the connections between knowledge creation and absorptive capacity. Furthermore, tacit knowledge is also relevant for socialization among professionals still in training, such as younger physicians in medical residency. The following testimonies provide us more evidence of knowledge creation:

We have a very experienced clinical staff that attends practically all specialties related to cancer patients. Formerly, the performance of the professionals was done individually with little interaction. More recently, we created the Integrated Cancer Hospital with the involvement of all these professionals with a common objective: to speed up the service and improve the results (Interviewee A).

Our technical knowledge has grown a lot with the integration between professionals with the Integrated Cancer Hospital. Our results in terms of survival have greatly improved (Interviewee L).

Physical and virtual CoPs are widely used in the MDHS in the pursuit of better results. Although the nomenclature adopted in the practice is slightly different, most of the projects involve cross-functional teams having expertise in several areas, often complementary to each other, including physicians, nurses, managers and staff. Several projects were developed with CoPs such as the Healthcare-Welfare Improvement Committee (meetings every two weeks), medical bed sprints at the intensive care unit (twice day meetings) and the Heart Team (weekly open meetings). Other projects carried out and managed by CoPs in MDHS are associated with the integration of protocols that necessarily require cross-functional teams to be prepared, implemented, managed and monitored.

Some examples of integrating protocol CoPs are sepsis, pneumonia, congestive heart failure, prevention of venous thromboembolism, door-to-balloon time and door-to-needle time. Each existing protocol relies on a CoP to be implemented and managed and some of the professionals may have roles in more than one community. CoPs were mentioned as rapid response teams, multidisciplinary teams and committees to address specific topics by all 16 interviewees.

The spaces for knowledge creation may be physical or virtual. The physical spaces tend to be standardized by the MDHS, providing a minimum standard layout consisting of meeting rooms, auditoriums and study centers for several specialized clinics. On the other hand, the virtual spaces tend to be used by health professionals to share knowledge and to assist in decision-making. WhatsApp groups are currently the main virtual spaces for knowledge sharing, and a major concern regarding these groups is the confidentiality of patient information.

### *Decision-making*

Health decision-making in a large hospital system is a critical and complex process because of the large number of professionals who are engaged in providing patient care and also to the idiosyncrasy, preferences, diversity of educational backgrounds and cognitive styles of the professionals. Moreover, the need for autonomy by physicians in terms of decision-making makes this process even more complex.

The self-sufficiency feature emerged as a result of the content analysis of the interviews. Professional self-sufficiency is considered a choice of the practitioner to be able to breach protocols, bypassing routines and guidelines. These breaches should not be understood as noncompliance or arrogance, but as a result of a decision-making process that considered the particulars of the clinical case and the patient's anamnesis. Nonetheless, protocol bypassing is tracked and monitored by the MDHS and the involved professionals must justify it.

Protocols reduce the variability of the medical practices, reducing ambiguity in decision-making (Costa Uchôa and Camargo, 2010). With MDHS, there is a clear set of specific KPIs that measure the adoption level of each protocol among health professionals. The model adopted by the MDHS may be classified as a rational decision-making model (Choo, 2006) because it is guided by objectives, rules, routines and performance programs:

In the critical assessments, we show the data, with the names per team, and compare the professionals' performance: why do certain physicians follow the guidelines correctly, while others never do? They know they are being monitored since then and, in three months, we will meet again to evaluate the performance of that specific physician (Interviewee A).

Indeed, there is usually a tension between autonomy and adherence to protocols and standards. A substantial connection between sense-making and decision-making processes (Choo, 1996) was perceived because the close alignment of beliefs and the construction of shared meanings favored a more rational and less risky decision-making culture. This decision-making culture recognizes the need to attend to case particularities, but also the need to ensure consistency, assuring that different physicians would make similar decisions in similar situations.

Some of the protocols and KPIs already include well-proven performance goals which are used as benchmarks among hospitals, such as door-to-balloon, door-to-needle and door-to-antibiotic times in cases of acute myocardial infarction, cerebrovascular accident and sepsis, respectively. Bibliographic references become essential for the validation of the proposed goals.

Posting adverse event notices and non-conformity reports is being fostered within the MDHS, and a large increase in the number of notices has been found, disseminating a safety culture. Another point of concern for improving decision-making refers to complaints within the Customer Service Center, as well as to evaluations received by the sector from critics, mentioning the welfare-health-care staff.

### *Absorptive capacity*

MDHS has more than 4,000 registered and active physicians. While "approximately 20% of the physicians are in charge of approximately 80% of the hospital's productivity" (Interviewee A), a significant number of professionals regularly provide services at the institution. Hence, the absorptive capacity becomes strategic for the organization and deeply associated with skill development, as described by Interviewee A: "We will not be able to find in the labor market the physician who is ready to perform, with all these management concepts aligned with our philosophy [...] we must develop these professionals."

The essential element for absorptive capacity development is the individual's prior knowledge. Within this context, strict selection and recruitment criteria plus the organizational staff development acquire, over time, an unparalleled relevance to potential absorptive capacity:

All the professionals who are part of our team were trained in reference services with great theoretical education. This high-quality education facilitates a lot the discussions (Interviewee I).

The start of robotic surgery at Mater Dei also required the development of qualified labor. We selected professionals with great surgical expertise and who would like to dedicate time in their training to the improvement of this technique. All were trained and certified internationally for these surgeries (Interviewee A).

The medical residency works as a laboratory for the selection and recruitment of professionals to be part of the organization's clinical staff. However, endogeneity is avoided and the recruitment is not limited by the residency program. To avoid such a possibility,



the MDHS also hires professionals who have recommendations from fellows with reputations and credibility outside the organization, perceiving an opportunity to capture external knowledge (exploration).

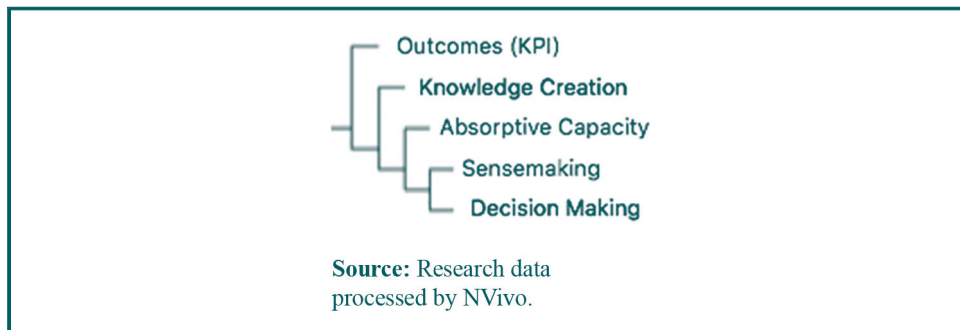
Performance review practices are commonly used in MDHS as reported by the interviewees. Individual feedback consists of the consolidation of individual performance data and the preparation and delivery of a document to the coordinators of specialized teams. This document allows the professionals the opportunity to compare their performance with a defined indicator, with the goal of their clinic and also with the best individual performance.

The individual feedback document is a requirement of the accreditation organizations, such as NIAHO and JCI, and should be carried out with the clinical team every year. The individual feedback may also convey other messages to the clinical team, such as the “pursuit of improvement of results, the effort and commitment of the organization with the healthcare-welfare outcomes and with professional development, strengthening the organization’s mindset,” as reported by Interviewee G. All KPIs related to the clinic are submitted, discussed and reviewed by the professionals, highlighting the use of Stewart’s Radar to integrate the data (Stewart, 1998).

On the other hand, data related to organizational performance and some protocols impact the activity of various sectors and specialized clinics of the organization. Such protocols are called systemic protocols. They are consolidated monthly and the analysis of root causes, using the Ishikawa Fishbone Diagram which is a traditional quality management tool, and the feedback of relevant cases are provided in real-time to the professionals involved in the cases.

Another feature associated with absorptive capacity refers to training, which is also fostered concerning the KPIs of professional development. Some clinical teams have goals for publication in conferences and academic journals. Regarding compensation for performance, it is necessary to remember that the physicians of the MDHS do not hold any formal employment relationship with the organization. Indicators, such as the door-to-balloon time for the treatment of patients with acute myocardial infarction, accrue a profit-sharing distribution among the employees (nurses and staff) involved, which is bound to the achieved goals as proposed by each indicator. Sometimes, however, the professionals do not wish to adapt themselves to the requirements and demands of the MDHS, then it is necessary to dismiss them from the clinical team. The low turnover indicator reinforces the intention of long-term relationships based on trust. Although meritocracy and internal communication were subcategories of the research model, they were not emphasized by the interviewees.

**Figure 1** Cluster analysis



The synthesis of the major categories, subcategories and the main practices of HKM based on data analysis are presented in [Table 3](#).

The relationships among the research model categories were better understood through a cluster analysis supported by NVivo ([Figure 1](#)). The materials collected were classified accordingly to the categories of analysis: health-care-welfare outcomes (KPI); knowledge creation; sense-making; decision-making; absorptive capacity; and IT. It should be emphasized that IT was initially included as a category for assessment. However, it was removed after the data analysis to be discussed as a supporting factor in the present study.

Cluster analysis demonstrated the dynamic and two-way relationship between sense-making and decision-making, indicating that the creation of shared meanings influences decision-making as stated by [Choo \(1996\)](#). The cluster analysis concurrently demonstrated the role of absorptive capacity, emphasizing its relationship with the set formed by the decision-making and sense-making dimensions, as well as the relationship between the knowledge creation and all other mentioned dimensions. [Choo \(1996\)](#) described how knowledge creation results in new capabilities that influence decision-making and this study shows that absorptive capacity may reinforce this link.

The health-care-welfare results (KPI) are not related to any specific category, but to the set of all other categories. The interpretation of the cluster analysis is that the purpose and contextualization of the KPI outcomes may lead to any of the four dimensions evaluated in the present study.

By tabulating the data, using the software NVivo, the two following support factors were identified:

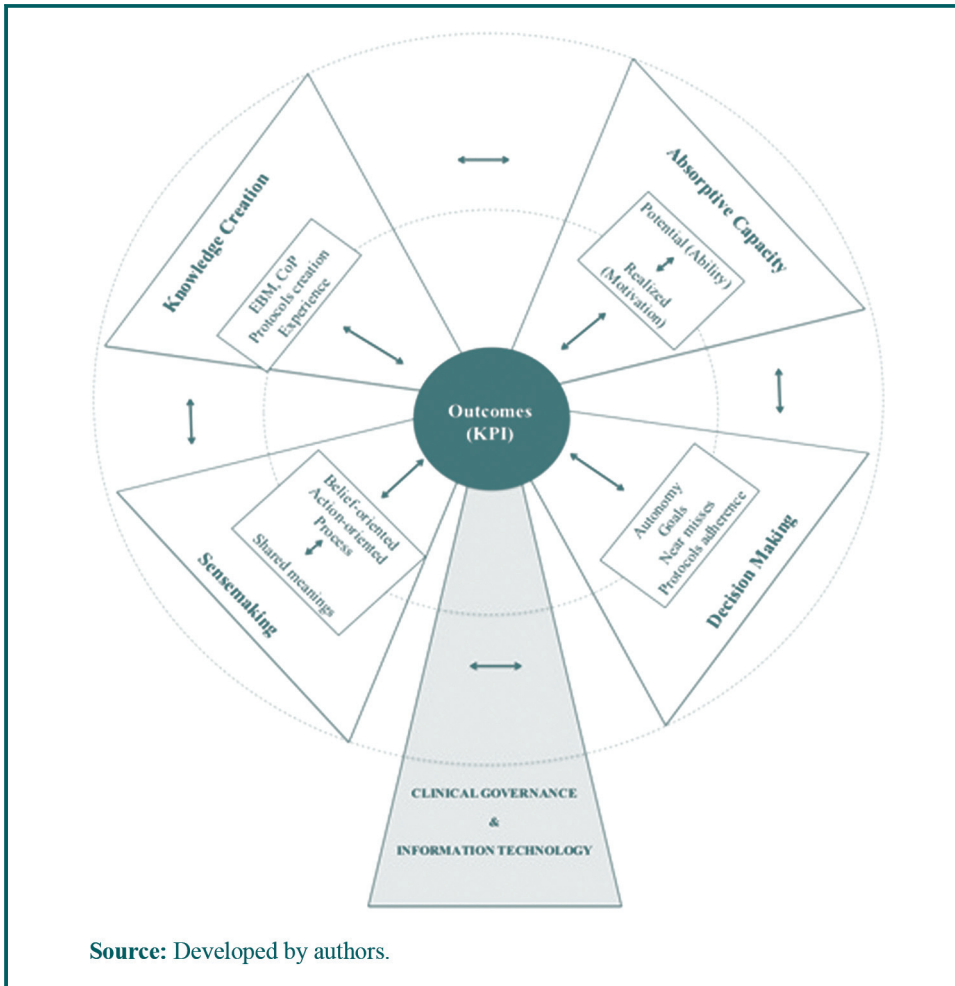
1. IT: the results placed IT in a supporting role for the KM practices of the MDHS, reinforcing the findings of [Laurenza et al. \(2018\)](#). IT factor was mentioned by all interviewees, except for Interviewees M and N. Without IT support, the data collection and analysis related to the KPIs, protocols, feedback, critical assessment and integration would not be possible.
2. Clinical governance: this function not only provides data and KPI to all the MDHS staff, but also monitor the indicators by developing internal audits and result validation and tracking, as recommended in the work of [Scally and Donaldson \(1998\)](#) in the National Health System of England. The interviewees emphasized the supporting role of clinical governance in the assessment processes, action plans and joint approach of KPI with the clinical and technical executive officers of the organization, reinforcing the study of [Tuan \(2013\)](#) that emphasized the connections between clinical governance and knowledge processes. Consequently, clinical governance and IT constitute the foundation pillars of the windmill that is a representation of the HKM. IT provides the infrastructure for the data repositories and clinical databases, whereas clinical governance works tirelessly to assure information reliability and continuous monitoring.

## Discussion and implications

The evidence contained in the present study may be summarized and graphically represented in a form of a windmill ([Figure 2](#)). This framework is intended to be a pragmatic and integrative model of HKM. The sails of the windmill are the three original areas of the knowing cycle ([Choo, 1996](#)), including absorptive capacity as a new dimension. The inclusion of this new construct was based upon health-care literature and evidence from this empirical research, but further studies should be cautious in extrapolating the inclusion of absorptive capacity in other domains because of the limitations of the present study.

The axial center of the windmill is associated with the health-care-welfare outcomes which connect the four shovels in a result-driven approach of the knowledge-based processes. This perception emerged from the cluster analysis of the interviews and it is consistent with

**Figure 2** Integrative model for health-care knowledge management



the quadruple aim (Bodenheimer and Sinsky, 2014), which is the prevailing destination of not only KM initiatives, but of the majority of health-care management efforts. The windmill structure emphasizes that the knowledge processes cannot be sustained in the long term without a tangible connection with the health-care-welfare outcomes; otherwise, the shovel will run out of its axis. IT and clinical governance are the foundations of the HKM framework because without their support, it would be inconceivable to monitor systematically the spectrum of indicators required by accreditation authorities. In the studied case, the MDHS database controls 1,631 KPIs from 38 specialized clinical practices.

Absorptive capacity plays a vital role in the acquisition and assimilation of new knowledge and skills, being closely associated with knowledge creation (Minbaeva *et al.*, 2003). Skill development and knowledge exploitation also influence physicians' decision-making because they deal with the tension between professional autonomy and protocol adherence. Hospitals need to combine clinical knowledge, experiential knowledge and external knowledge through "managerial models" (Interviewee H) or KM practices.

Sense-making is anchored in and framed by the KPIs or the defined performance outcomes of the organization. The belief-driven processes tend to be more intangible and associated with the team alignment with the hospital values, mission and vision. On the other hand, the

action-driven processes have a more pragmatic approach because they are linked to projects inspired by epidemiology needs or KPI assessment. According to the interviewees, the proposed model provides an integrative approach to HKM processes with a result-driven perspective.

As discussed in the Introduction section, other integrative health models were already published in the literature. The present study aligns with the findings of [Barbosa et al. \(2009\)](#), whereby practices related to KM are related to the improvement of health-care-welfare results. Ultimately, the present study corroborates the conclusions of [Sibbald et al. \(2016\)](#) in qualitative research with ten Canadian health organizations, which highlighted the importance of the external and internal contexts of the organization, as well as the processes of decision-making and knowledge seeking and sharing.

On the other hand, the findings of this study differ significantly from the results achieved by [Cruz and Ferreira \(2016\)](#) in Portuguese hospitals, because in the MDHS case, there are structured KM practices with a straightforward connection with health-care-welfare results because of the top management support for knowledge-based activities. The research evidence contradicts at some level with the seminal studies made by [Abidi \(2001\)](#), because the language used in the MDHS is in line with the daily life of the practitioners, as active agents, to define the operating KPIs, protocols and processes, showing that the MDHS has overcome some barriers pointed in previous studies.

One limitation of this study is the interviewees' profile which intentionally comprised physicians and top- and middle-level management involved in decision-making. It is important to highlight the large number of professionals that are part of the clinical teams and the assistance areas of a hospital. The insights from other professionals could have brought additional perspectives. The present study evaluated a private hospital health system, and this study does not allow assertions and generalizations encompassing the Brazilian health industry, because the reality of public hospitals is very different, despite the impressive quality improvements of the Brazilian free, comprehensive and public health system in the past decades. Although IT is a supporting factor in the proposed HKM integrative model, another limitation is that the paper does not focus on the discussion concerning the potential for AI in health care which has strong implications for diagnosis and treatment recommendations, patient engagement, job automation and adherence, and administrative activities as well ([Davenport and Kalakota, 2019](#)). Indeed, AI breakthroughs constitute a new frontier for health-care KM studies.

Some of the contributions of the present study demonstrate the bonds between KM and bottom-line results, which is not the mainstream of KM literature, where more indirect and intangible results prevail, which is expected because of the intrinsic nature of knowledge. Indeed, information and knowledge architecture provides a relevant perspective to investigate health-care services business models ([Jamil, 2020](#)). For future research, a qualitative study of the windmill framework in other health-care institutions, which may be public, charitable or private, is recommended. Furthermore, the categories and subcategories of the proposed framework may serve as inspiration for quantitative studies with validation purposes of the relations of the knowing cycle ([Choo, 1996](#)) with the inclusion of the absorptive capacity. The association between investments in KM and results obtained by these practices represent an explicit line of research, opening a valuable perspective in health management studies. A recent quantitative study ([Popa and Stefan, 2020](#)) has found that KM processes significantly influence economic and social outcomes of Romanian health organizations.

Ultimately, KM can play a strategic role in health-care institutions. Its dimensions are broad, allowing a vision that dialectically integrates theory and pragmatism; reflection and action; self-sufficiency and control; and skill and motivation. Differently from industrial society management models, KM seems to be a promising management paradigm for health-care

organizations, because it is human-centered and designed to deal with the many informational issues of the daily activities of physicians, who need to make sense of changing clinical situations, absorb new knowledge to stand up to new diseases, create new knowledge in the form of protocols and drugs and also make critical decisions on the bedside. The strategic application of KM in health care can lead to quality improvements in the care given to patients; the enhancement of health services; the development and the performance of health professionals; and the overall excellence of health organizations in the pursuit of humanized treatments. The summation of all these challenges provides a vital research agenda for HKM.

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