Evaluating and investigating knowledge management practices and ICT in health care: an emerging economies perspective

Introduction

The Covid-19 pandemic hit the world with almost zero notice and spread so fast that even the most advanced economies are still struggling to deal with it. The pandemic upended all parts of society (Zhang and Varma, 2020), but especially hit the health care sector the hardest, as governments and health-care professionals did not know enough about it to protect the populace (Pereira et al., 2021). Indeed, as Tovstiga and Tovstiga (2020) noted “the coronavirus COVID-19 pandemic has produced a perfect knowledge storm [...] The pandemic has painfully exposed how ‘we do not know what we do not know’.”

What this pandemic has made clear is that knowledge management (KM) has a critical role to play in the management of health-care (Pereira et al., 2020). Indeed, several aspects of KM have allowed governments around the world to respond in a number of ways, such as sharing knowledge among scientists across the world to help develop diagnostic kits and then vaccines. Next, sharing data and knowledge about the effectiveness of preventive and curative measures has enabled the establishment of prevention and treatment protocols. Finally, monitoring and sharing information about the spread of cases allowed governments to make informed decisions that often involved trade-offs between economy and health such as lockdowns. The knowledge needs sharing among not only states and the medical fraternity across the world but also with the citizens to encourage preventive behaviors to control the disease. In this connection, the effective design and implementation of information communication technology (ICT) tools and interventions has shown to enhance KM practices, which, in turn, strengthened the response to the pandemic. The pandemic response highlights the fact that KM has significant implications for multiple and diverse stakeholders involved in health-care, ranging from health-care providers, service seekers, hospitals and hospital systems, as well as governments (Nicolini et al., 2008). Indeed, effectively managing the sharing and transfer of knowledge through ICT, which requires effective KM mechanisms, is pivotal to exploit the full potential of ICT for KM in health-care (Abidi, 2001).

It is critical that we understand how KM works in the health-care domain and further explore how ICT can serve as the vehicle through which governments and health-care professionals can draw maximum benefits of KM. In the health-care domain, the application of KM implies a purposive outflow and inflow of knowledge to enhance patient care and benefit the overall effectiveness and efficiency of the health care system (Sheffield, 2008; Patnaik et al., 2020). In the recent past, the focus on patient empowerment (Anderson and Funnell, 2010); provision of patient centered care (Van Beveren, 2003); evidence-based medicine (Gabbay and le May, 2004); quality of health-care (Khatri et al., 2017) and efficiency of health care...
ICT-based KM can potentially overcome several challenges in health-care through the following ways:

- By addressing, the issues related to information overload by providing focused access to relevant knowledge at the required time and place and in an appropriate form such as clinical settings or community health.
- By enhancing implementation of standardized and evidence-based provision of advise and treatment so as to increase efficiency and reduce clinical errors.
- By supporting the development of health-care providers at multiple levels through collaboration and affecting diffusion of knowledge (Bose, 2003; Wills et al., 2010).

Information communication technology and knowledge management

Stankosky and Baldanza (2000) developed a KM conceptual framework that has considered four important and equally important pillars, i.e. leadership, organization, technology and learning, thus highlighting the importance of ICT in KM. ICT facilitates KM at multiple levels. These levels are identified as knowledge creation, knowledge retrieval, knowledge sharing (KS) and knowledge application, all of which are important for enhancing health-care delivery in emerging economies (EEs) (Wills et al., 2010). The ICT can enable various processes involved in KM including knowledge capture, sharing, distribution and personalizing (Mohamed et al., 2006). While these aspects are evident for explicit knowledge, the rationale of ICT for managing tacit knowledge also exists. Transmitting of tacit knowledge happens when unconscious tacit knowledge comes into the realm of consciousness when the knowledge holder becomes aware of the tacit knowledge- the tacit meta-knowledge point (Hannabuss, 2000). Scholars (McDermott, 1999) have described the role of ICT in bringing the unconscious tacit knowledge to the conscious fore, thus initiating the process of sharing.

Technological advancements have enhanced the potential for KM tremendously, especially for the resource constraint contexts such as EEs. For example, the streaming technology that has addressed the complexity of imaging and audiovisual content delivery pushing and compressing content to the “edge” of the internet resulting in reducing bandwidth requirements and loads, as well as in enhancing the user experience (Claxton, 2001). The technology not only enables efficient use of network resources but also enables overcoming an important barrier to KM in the EEs – language. Indeed, audiovisual content in the local language has been the most important facilitator of the distribution of knowledge to the periphery – the frontline health-care workers who directly interact with communities.

However, scholars have cautioned that excessive or sometimes even exclusive, focus on technology without incorporating the important human behavior and contextual aspects can result in not using the full potential of ICT in KM.

Information communication technology and knowledge management in health-care in the emerging economies context

Several nuances of health-care in the EEs make it a unique and distinct challenge for ICT and KM.

EEs characterize poor infrastructure, especially with respect to electricity, digital infrastructures and limited institutional support for the ICT ecosystem (Luo and Bu, 2016). Whilst the context of EEs, regarded traditionally as technologically challenging, newer technology developments have attempted to overcome the same and have been quite successful in doing so. Recently, the penetration of ICT in EEs have burgeoned, resulting in the increasing incorporation of ICT in health-care.
EEs, also characterized by a poor health-care infrastructure and shortage of skilled work force reflecting in lower doctor population ratios and health-care worker per population ratios. In such circumstances, most of the health-care workers face an overload of work. To overcome the shortage at the rural and peripheral levels, many EEs have a significant cadre of frontline health workers who act as a bridge between the formal systems and communities. These community health workers (CHWs) being embedded in the community, may have just some basic education rather than a detailed formal training in care and support. In other words, their education levels might be limited but they play a crucial role in delivering health-care to communities. Another limitation is the dominance of English language in health-care conversations. In the context of EEs, local indigenous languages play a key role, especially at the frontline and community levels as the ICT and KM design and intervention that target such frontline workers need to be cognizant of this limited infrastructure, their education status and language preferences.

To summarize, there is significant complexity of the knowledge flow among the stakeholders in health-care delivery from governments and executives in the center to the doctors, nurses and health-care managers in the hospitals to the frontline workers facing the communities. This is especially relevant in the context of the EEs. EEs portray unique characteristics such as increasing digital penetration and access. This has resulted in several ICT-based projects/programs on health-care such as virtual consultation via telemedicine, use of m-Health for enhancing the work of frontline health-care workers (Chib, 2010) and use of mobile for enhancing compliance to protocols of treatment (Free et al., 2013) – to name a few.

The above aspects necessitate an in-depth inquiry into the application of KM practices and strategies for enhancing health-care delivery in the EEs using ICT (Dwivedi et al., 2008). Various studies have highlighted the use of web and mobile technologies by both health-care providers (Singh et al., 2018) and health-care seekers (Stellefson et al., 2013) to enhance their knowledge. However, the research conducting in depth inquiry into the role of ICT in enhancing health-care from a KM perspective, particularly, those research resulting in advancing the theoretical concepts in this domain is limited (Paul, 2006; Sims, 2018).

The present issue

This issue contributes to the literature on KM in health-care focusing on the ICT-based practices and strategies in EEs context, a context where research still needs catching up (Pereira et al., 2019). The papers included in this issue theoretically advance the conceptualization of the role of ICT and KM in health, by studying various dimensions of the phenomenon of ICT and KM in health-care in terms of the diverse actors involved – physicians, frontline health workers, organizations; diverse contexts- India, Bangladesh, Lebanon; and diverse methodologies applied- qualitative, quantitative, mixed and literature review.

The papers included in this issue have focused on different dimensions of ICT and KM in health-care in the EEs context. The included papers focus on diverse levels in their respective analysis. Out of the six empirical papers, four papers focus on the issues related to KM at an individual level, one at the organizational level and one at the intersection of organization and community. Among those at an individual level, the Fletcher-Brown et al. (2021) paper focuses on the frontline health workers in an Indian context. The Turulja et al. (2021) paper focuses on health-care providers at the primary health care centers in Bosnia and Herzegovina. The Maheshwari et al. (2021) paper conduct their analysis with physicians in India. Finally, the Epaminonda et al. (2021) paper attempts to understand the issues at an employee (health-care) level, in a Lebanese context. The seventh paper by Cheerkoot-Jalim and Khedo (2021) is a review paper on the topic of biomedical text mining. Figure 1 below, captures the comprehensive coverage of diverse levels and contexts included in the current issue.
Further, the studies in this special issue present diverse aspects of KM in the health-care domain from knowledge creation to KS to understanding the outcomes of implementation of KM systems (Figure 2).

Additionally, as ICT is an umbrella term for different types of technologies with each one having distinctive features and affordances, the issue includes papers that discuss different
types of technologies – m-Health, Web 2.0, messaging and text mining. The papers also include a range of different methodologies applied, from qualitative (Fletcher-Brown et al., 2021; Tripathi et al., 2021; Turulja et al., 2021) to quantitative (Maheshwari et al., 2021; Arefin et al., 2021) to mixed methods (Epaminonda et al., 2021). The issue also includes a review paper on biomedical text mining (Cheerkoot-Jalim and Khedo, 2021).

EEs often suffer from what has been termed as “double burden” – diseases that affect third world countries such as diarrhea and malnutrition, as well as the diseases of the affluent countries such as cancer and obesity. While the traditional focus of the health care system has been toward the former- largely to control infectious diseases and malnutrition, the increasing prevalence of diseases such as cancer and diabetes poses new challenges as these diseases are linked to lifestyle, which is embedded in and affected by the socio-cultural milieu.

The paper by Fletcher-Brown et al. (2021) explores the effectiveness of m-Health as a KM tool in the context of breast cancer awareness in India. The study is focused on the frontline CHWs in rural India – Accredited Social Health Activist (ASHA). Through a qualitative study, the authors establish that the use of ICT by ASHA workers sent a signal of quality breast-cancer awareness and knowledge to all stakeholders, especially in resource constrained settings such as EEs. The auditory and visual aspects of ICT can enable knowledge capture and dissemination across several geographical boundaries. The study furthers that ICT enabled the CHWs to normalize the discourse on breast cancer in the Indian society where the socio-cultural norms limit the openness to discuss such sensitive issues. However, the ASHA workers used their cultural embeddedness for knowledge codification rather than knowledge transfer. The paper highlights how the ASHAs made use of technology to adapt to the cultural nuances, thus emphasizing that designing and implementing of KM takes into consideration the prevalent socio-cultural norms.

The study by Maheshwari et al. (2021) examines the context of KS among physicians using Web 2.0. As an interactive technology, Web 2.0 offers a significant way in which physicians treating the patients can communicate with each other (Singh et al., 2018). Increasing specialization of medical sciences entails that communication among specialists can enhance the quality of decisions, and hence, the health-care delivery. However, the effectiveness of the technology for KM depends upon the KS attitude, intention and behavior. The authors conduct a quantitative study, investigating factors that affect KS in physicians working across tertiary care hospitals in India. While the authors confirm the link between attitude toward KS and intention to share knowledge, they further analyze the antecedents and moderating factors that influence the relationship. The authors posit that self-efficacy and reciprocity positively affect attitude toward KS using Web 2.0. Further, the study suggests that face and reputation moderate the relationship between attitude and intention to share knowledge. The moderation effect of rewards was not significant. Both face and reputation refer to extrinsic motivators that enhance self-image, as well as create trust between doctors and patients. In Asian cultures such as India, where the doctor-patient relationship is of paramount importance, building a positive reputation can be a strong motivation for KS as found in the study. The lack of significance of financial rewards as a moderating factor also corresponds to the Indian cultural norm where health-care professionals are supposed to focus on the patients and rise above the financial motivation. KS, therefore, is important for improving their services to the patients, to develop as a professional and help colleagues and to contribute to the body of knowledge. KS has been one of the most important hurdles that need overcoming, to make optimal use of KM systems. Previous researchers have highlighted aspects of enhancing through designing appropriate pay-offs and by accentuating employees’ perception of group identity and individual responsibility (Cabrera and Cabrera, 2002). This study incorporates the importance of cultural nuances in determining KM.
The Turulja et al. (2021) paper is similar to the above study, as it focuses on the KS, regarded as the key pillar of KM (Shujahat et al., 2019). The authors examine the sharing of knowledge among employees of a primary health-care facility in Bosnia and Herzegovina. The qualitative study reiterates that KS incorporates a mix of both traditional face-to-face and ICT-based tools. The study establishes the importance of health-care professionals learning from each other’s experiences and that such tacit and experiential learning is significantly important in medical practice. The authors also highlight the need to regard communication among informal networks and within communities of practice, as very crucial for practice in resource-limited contexts. Owing to poor technological infrastructure such as poor internet connectivity, email facility and integrated hospital information systems, the health-care providers relied on basic technologies such as messaging (Viber) for communicating among the informal channels, as well as with the colleagues. The authors find that health-care professionals prefer using formal channels for sharing explicit knowledge and informal channels for tacit knowledge. They also posit the coexistence of traditional and ICT-based KS. The study, thus, illuminates the nuanced use of technology in a resource-constrained environment.

While the Maheshwari et al. (2021) paper focuses on individual factors that affect KS, the Arefin et al. (2021) paper examines organizational level factors that affect tendency of KS. This study focuses on the organizational level importance of business intelligence systems (BIS) that process information for making strategic decisions in the organizations. The authors undertake a quantitative analysis among managers from various hospitals across Bangladesh, belonging to different departments such as human resources (HR), Information Technology (IT) and administrators. The study establishes the mediating role of BIS in the relationship between organizational learning culture and organizational performance. A strong learning culture in an organization creates an environment that encourages the employees to create and share knowledge, which, in turn, helps managers to make better strategic decisions. A well-designed BIS indeed facilitates the employees to express their KS behavior. The paper highlights yet another nuance about the importance of organizational culture that can facilitate the use of KM systems such as BIS.

The study by Tripathi et al. (2021) however, focuses on another aspect of KM, knowledge creation. Knowledge creation refers to the development of new tacit or explicit knowledge from data and information or from the synthesis of prior knowledge (Becerra-Fernandez et al., 2004). There is a consensus that enhancing of knowledge creation is possible by systems and technologies such as neural networks, data mining and Bayesian methods (Wills et al., 2010). These technologies enable deriving insights from disparate and diverse data sources. Further, ICT that enables collaboration across people, especially from diverse contexts, can also result in the cross-pollination of ideas that can develop shoots of new knowledge generated. Knowledge creation process entails the requirement of multiple interactions and collaboration among actors across boundaries (Nuruzzaman et al., 2019). The authors conduct an ethnographic study of sickle cell practices in a not-for-profit organization in India. Adopting a knowledge-in-practice approach, the authors analyze ICT-mediated interactions among various levels in the organization and at the boundaries between organization and community – including physicians, front-line counselors, tribal patients and their families. The authors find that the technology-based interactions mediate the knowledge creation process at the boundaries of organizational technology. The paper highlights how the interactions bridge the socio-linguistic and interpretive barriers between actors and helps in generating knowledge about the community and insights about the socio-cultural and clinical dimensions of sickle cell disorder. The study signifies the design and implementation of ICT for generating knowledge in resource constrained environments such as EEs. The ICT-based interactions with the communities was crucial for empathetic access to health-care, especially in developing a nuanced understanding of orphan diseases such as sickle cell disorders. Further, the integration of ICT and human infrastructures (Chandwani and Kumar, 2018) by employing local human resources as front-line counselors and nurses...
enabled incorporating socio-cultural knowledge in clinical considerations. The authors also
demonstrate how ICT can enable knowledge generation at a local level and which can inform
policy formulation and implementation.

The Epaminonda et al. (2021) paper studies the outcomes of ICT and KM at the employee
level and at the patient level. The authors conduct a mixed-method study among hospitals in
Lebanon to explore whether ICT and KM implementation affects employees’ job satisfaction
(JS) and customer satisfaction (CSAT) in the hospitals. The authors found no relationship
between ICT and KM on one hand, CSAT and JS on the other hand. The qualitative study
revealed the issues that could result in such findings. The authors posit that though ICT may
improve work processes, and hence, JS, limited resources, system failures and gap between
expectation and delivery can negatively affect the relationship between ICT and JS. Similarly,
ICT could lead to higher CSAT but this was dependent upon system reliability and stability.
Technical problems could negatively affect the relationship between ICT and CSAT.
Technological stability, reliability and system robustness, which are significant issues in the
EEs, could jeopardize the optimal benefits accruing from ICT and KM initiatives in health care
organizations. The study, thus, shifts the focus from socio-cultural nuances, both at the
societal and at the organizational levels, to technological infrastructure, which is a grave area
of concern in the EEs.

Finally, last, but not the least, the Cheerkoot-Jalim and Khedo (2021) paper conducts a
detailed and systematic review of literature on biomedical text mining to describe the areas of
biomedical domain explored by the scholars and practitioners. The authors found that most
scholars mined the data from diverse sources including electronic health records, social
media and health-related forums, as well as biomedical literature. The commonly used
techniques included natural language processing, named entity recognition, entity and
relationship extraction. Such techniques have been extremely useful in bringing in diverse
perspectives from various sources together, and hence, enabling the generation of new
knowledge for clinicians, pharmaceuticals, health-care administrators and policymakers. For
example, helping in identifying and reporting adverse events due to drugs (Rebholz-
Schuhmann et al., 2012). Increasing digitalization of health records along with increasing
penetration of internet connectivity would generate humongous amounts of data in the EEs.
Availability of text mining techniques, especially as open source, would be of great help in
generating local knowledge about diseases, socio-cultural aspects of illnesses, control costs
by designing effective interventions and all of these can be crucial for improving overall
health-care delivery in EEs.

Directions for future research

In this special issue, we included manuscripts that cover several aspects of the use of IT in
KM, in the context of health-care in EEs. The varied and in-depth analyzes presented in these
papers offer fruitful directions for future research.

The papers in this issue relate to the phenomenon of KM with respect to individuals involved
in health-care delivery – mainly frontline workers and physicians, as well as at the
organizational level. That is, the analysis needs conducting at an individual level or at an
organizational level. The papers further explore how the application of KM at a broader
collective level, for example, in health care systems level. The focus of KM in the current
pandemic, for example, was at multiple levels cutting across the boundaries. Literature
suggests that as one moves from an individual to the collective level, several other factors
that were not relevant for individual-level analysis become relevant, for example, social
dynamics between individuals, the intersection between communities, interfaces between
formal and informal systems, etc., (Hitt et al., 2007; Chandwani and Kumar, 2018). Carrying
out research across multiple levels can highlight how the factors at different levels interact
with each other, and thus, can present greater robust insights about KM. At the organizational
level, specific support mechanisms made available by the organization such as the
organizational culture, leadership support and supportive HR practices play an important role in determining the implementation dynamics and user adoption of KM systems (Martín-de Castro et al., 2011). In one of the papers included in the issue, the authors highlight the importance of BIS in mediating the relationship between organizational learning and organizational performance. Future researchers can look at conducting multilevel studies to understand how these organizational level factors interact with the largest individual level factors explained in the current issue. Further, the development of technology and the generation of new knowledge at a broader level can also affect knowledge management systems (KMS) and other systems at the organizational level. For example, Barley (1990) has suggested introduction of technology influences the knowledge-based competency maps in organizations and that, in turn, influences the emerging roles and social structures in the organization. Future research can incorporate some of such higher-level constructs to study how IT and KM manifests at a systems level.

Future researchers should also look at the social dynamics at the community level, especially in the rural areas of EEs where frontline workers who are crucial for the delivery of health-care to the masses, as they are embedded in the community itself (Mane Abhay and Khandekar Sanjay, 2014). Though several researchers have studied the role of m-Health interventions on KM among CHW, only a few have outlined the social and psychological aspects of m-Health interventions on the frontline health workers (Scott et al., 2019). While some studies have found that ICT empowers these workers (Marinova et al., 2017), others have highlighted the negative effects and dis-empowerment (Mushtaq and Hall, 2009). As evident, understanding these aspects of ICT and KM in the rural areas of EEs is critical for not only deriving optimal benefits from such a program but also for identifying and addressing some unintended, social or psychological level consequences arising from such interventions.

IT can potentially enhance capabilities related to both exploitation and exploration (Soto-Acosta et al., 2018). In ideal circumstances, the ICT design and implementation should focus on balancing both the explorative and exploitative aspects of KM. In one of the papers included in this issue, the authors provide empirical evidence of exploration-new knowledge creation at the interface between health care organizations and the community and another paper highlights the role of biomedical text mining as a tool to generate new knowledge. There can be several factors affecting the use of KMS, for exploration or exploitation. For example, as culture (Durcikova et al., 2011) found that climate for autonomy increased exploration while the climate for innovation increased exploitation, thus highlighting the importance of managerial and organizational influence on the use of KMS. Future researchers can build on the findings and examine, which aspects of organizational culture and organizational climate affect the use of KMS for exploration or exploitation. In addition, what are the individual level factors that affect the two dimensions? Arguably, broader cultural factors highlighted by Hofstede (2011) such as uncertainty avoidance, individualism versus collectivism and others can also influence the use of KMS for exploitation or exploration. Future researchers can undertake studies that investigate such effects.

According to Foucault (1980, p. 52) “the exercise of power perpetually creates knowledge and, conversely, knowledge constantly induces effect of power [. . .]. It is not possible for knowledge not to engender power.” Thus, there is an argument that due to the entwining between knowledge and power, the viewing of KMS from a power dynamics perspective, is a possibility (Kakabadse et al., 2003). The papers included in this issue, for example, point toward empowerment of the frontline health workers and physicians. However, the papers have not dwelled into the concept of power dynamics in detail. The context of health-care itself implicates complex power relationships between patients, physicians, hospital managers and government (Formosa, 2015). These accentuated aspects characterize EEs context. Future researchers could explore how ICT and KMS influence the power dynamics within health-care settings at multiple levels – individual, organizational and societal or systems level. For example, does the use of ICT by frontline health workers alter their power relationships with the actors in the formal health care system or with the community, and if so
how? Similarly, at the organizational level, does the implementation of ICT and KMS in the hospitals alter the power relationships between managers and physicians and between different physicians?

EEs as context also provide fertile areas to explore other aspects of KM. Most of the EEs have had flourishing indigenous systems of medicines consisting of local natural remedies such as herbs. Such indigenous medical knowledge is widely accepted and prevalent at the community level. While ICT and KM highlight the conversation in the modern biomedical science realm, the community level discourse is highly influenced by indigenous systems. Future researchers can investigate how the ICT and KM in the two systems interface with each other. They can further address questions such as “are some ICT tools more appropriate for one system over another?” If so, how and why?

Finally, one of the most important stakeholders in ICT and KM in health-care in EEs are the communities. One paper included in the study explains the creation of new knowledge at the interface of organizations and communities. Further studies need to explore how the ICT and KM affect behaviors at community levels, for example, health-seeking behaviors, lifestyle modifications for chronic diseases, adherence to drugs, etc. As the health care systems move toward evidence-based medicine, it is extremely critical to examine the factors affecting ICT and KM in health-care.

References


Further reading


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