OVERVIEW OF KNOWLEDGE MANAGEMENT APPLICATIONS IN HEALTH CARE DELIVERY OF DEVELOPING COUNTRIES

O.A. Bolarinwa
Department of Epidemiology
and Community Health
University of Ilorin
NIGERIA.
drdeji@yahoo.com

A.G. Salaudeen
Department of Epidemiology
and Community Health
University of Ilorin,
NIGERIA.
adekunlesalaudeen@yahoo.com

T.M. Akande
Department of Epidemiology
and Community Health
University of Ilorin,
NIGERIA.
akandetm@yahoo.com

ABSTRACT

Knowledge Management (KM) is defined by World Health Organization (WHO) as "a set of principles, tools and practices that enable people to create knowledge, and to share, translate and apply what they know to create value and improve effectiveness". This study critically reviewed KM applications in health sector with special attention to developing countries. It also appraised the prospect of its usage in the health sector. While KM applications are extensively been employed in business and other sector, its use in health sector has been limited. Its application in health sector of developing countries has also being very low and there was no literature sited on its use in developing countries.

Keywords: Knowledge, Management, developing country, Health care

INTRODUCTION

Knowledge Management (KM) refers to all management activities necessary for effective creation, capturing, sharing, and managing knowledge. Knowledge management have always been a central question in human societies. In the ancient Greece, scientific discussions often lead to philosophical debates, especially on the concept of knowledge (Abidi, 2001). Knowledge Management (KM) became a discipline during the 80's, and the growing role of information technologies enabled the development of efficient KM tools using databases and collaborative software

The current concept of Knowledge Management (KM) however emerged in the early 1990s within various fields like business administration, public policy, information systems management, library and information sciences (Abidi, 2001). KM is viewed as a way of providing the right information, to the right person, at the right time, with the potential of attaining greater competitive advantage. As an interdisciplinary concept, KM regroups concepts from Information Technology Management, Philosophy, Cognitive Sciences, and Organization Studies.

In the health care sector, KM is being developed mainly in the domain of electronic health record management and health organization management; in this context, previous researches in the business domain have been adapted and applied to the Healthcare Knowledge Management. But Health care KM raises different challenges and issues due to the own nature (Abidi, 2001). For WHO, the main purpose of knowledge management is to bridge the knowledge gaps between and within countries. Knowledge management concerns itself with developing systems and processes that leverage information and knowledge in order to promote originality, creativity, intelligence and learning. The discipline of knowledge management has three major components (WHO) (Wigg, 1993):

- People: who create, share, and use knowledge, and who collectively comprise the organizational culture that nurtures and stimulates knowledge sharing;

- Processes: the methods to acquire, create, organize, share and transfer knowledge;

- Technology: the mechanisms that store and provide access to data, information, and knowledge created by people in various locations.

It is a various set of professional practices which improves the capabilities of the organization's human resources and enhances their ability to share what they know. In essence, knowledge management not

only involves the production of information but also the capture of data at the source, the transmission and analysis of this data as well as the communication of information based on or derived from the data to those who can act on it (Davenport & Prusak, 1998). A knowledge-based view of the firm identifies knowledge as the organizational asset that enables sustainable competitive advantage especially in hyper competitive environments (Zack, 1999) or in environments experiencing radical discontinuous change (Malhotra, 2000). This is attributed to the fact that barriers exist regarding the transfer and replication of knowledge thus, making knowledge and knowledge management of strategic significance. A variety of terms such as the Post-Industrial Era (Huber, 1990), the Information Age (Shapiro, & Verian, 1999), the Third Wave (Hope, & Hope, 1997) or the Knowledge Society are being used to describe this epoch. However, from the mid 90s, there has been tremendous investment in knowledge management and knowledge management systems (KMS). (Wichramasinghe, 2000)

Differentiating Data, Information and Knowledge in Health

KM distinguishes among **data**, **information**, and **knowledge**, although all three are essential to the success of health care organizations. Data are the raw facts that form the basis for what we know (Gill, 2000) (NHS, 2003) . for example, Maternal Mortality Rate (MMR) in Nigeria is a data. People transform data into information by adding order, context, and purpose. Thus the MMR data become usage rates that reveal differences by region and women's social status as well as trends over time. For instance, the evidence that Female education has a direct negative influence on maternal and child survival in Nigeria and that Maternal Mortality rate is higher in women in low socioeconomic group and in Northern part of Nigeria has transform Data on MMR in Nigeria to an Information. One can however, transforms information into knowledge by adding meaning: they make connections and comparisons, explore causes and consequences, and determine what action should be taken (Gill, 2000) (NHS, 2003). For example, decision-makers could employ information on maternal mortality to design a strategy to reduce the high maternal mortality in the country. In this instance there would be creation of documents on MMR in Nigeria, with the determinants and vulnerability, the strategies available for the reduction of MMR and policy and resources that can be mobilized for the reduction of MMR. This documents can be stored, shared and transferred from one user to another thereby making this a knowledge platform on MMR in Nigeria.

In practice, many people use the terms knowledge and information interchangeably. Though there is a thin demarcation between the two. However, knowledge could be seen as what is written down in handbooks, training manuals, policies, protocols, databases, project reports, and other documents. This is described as **explicit knowledge**. Explicit knowledge is what can be captured in words and numbers, whether written or spoken (Cummings, 2003). This makes it relatively easy to catalog, copy, and share with others (APQC, 2000 & 2003). Explicit knowledge, however, constitutes just a small fraction of our total knowledge (Polanyi 1996). Most knowledge resides in people's heads in the form of practical know-how, rules-of-thumb, and intuition based on personal experience. This kind of **tacit knowledge** is less structured and can be hard to articulate, but it is essential to making judgments and taking action (Haytmanek *et al.,* 2003).

Tacit knowledge explains why a veteran family planning provider who has counseled thousands of clients performs better than does a novice following a written protocol. Still, experienced workers may not be conscious of their tacit knowledge or able to express it in a way that can be written down. While tacit knowledge is often the product of experience, it can be learned from others (Polanyi, 1996). People at the same level or with the same background can easily transfer tacit knowledge to one another, often through stories or demonstration. Experienced workers can transfer tacit knowledge to novices through direct contact and dialogue, for example, by coaching or mentoring (Haytmanek 2003; Smith 2001) and novices can learn by observing. This is a form of knowledge that is embedded in the traditional African and Asian knowledge transfer about culture, trade, norms and herbal medical practices. So in essence, Tacit dimension of knowledge is an individual's mental maps, intuition, beliefs, judgment, and viewpoints (cognitive elements) & know-how, skills and personal experience (technical elements). Explicit knowledge is formal, systematic knowledge that can be codified, written down, and passed on to others in documents. Other notable dimensions of KM in health care are;

- Clinical experiences (both recorded and observed) and lessons learnt.

- Collaborative problem-solving discussions between practitioners.

- Operational policies eliciting clinical protocols and care pathways.

- Educational resources in terms of medical education content for practitioners and health education content for patients.

- Support (symbolic) rules obtained from domain experts and/or decision models induced from data, and stored in knowledge-bases.

- Social knowledge in terms of a community of practice (CoP) and their communication patterns, interests and expertise of individual community members.

- Data-induced observations derived from clinical observations, diagnostic tests and therapeutic treatments recorded in medical records.

In Information Communication Technology (ICT), 'information' is central - originating from data and moving towards knowledge. Although 'data' provides no judgment or interpretation, it is essential raw material for the creation of information (Davenport & Prusak, 1998) which is important for effective data management in any electronic development (e-development) initiatives particularly in the health sector (Kuhn, 2004). Knowledge management (KM) utilizes how these data can be transformed into another resource (Alavi & Leidner, 2001). Thus, knowledge constructs a shared understanding of how information can be applied to solving problems and getting things done by utilizing intuition, judgment, and wisdom.

The implications for this knowledge management approach in ICT applications are important (Hansen *et al.,* 1999). It was argued that explicit knowledge is a people-to-documents approach, so developing an electronic document system that codifies, stores, disseminates, and allows reuse of knowledge as opposed to person-to-person approach under tacit knowledge. These issues are crucial in knowledge-sharing. ICTs, for example, such as videoconferencing or the telephone, are proved effective at enabling people to transfer tacit knowledge. The impacts of the role of ICTs in this data-information-knowledge continuum are of great value in development informatics since ICT embodies the 'message' (information), the 'cement' (communication) and the 'vehicle' (technology). (Castells, 1989; Hedlund, 1994).

Overview of Importance of Knowledge Management Applications in Health Sector

Many organizations fail to effectively manage and use the most important competitive edge they possess - their knowledge and "intellectual capital (Jay, 1997; PMNCH, 2008). Though the use of KM evolved from business cycle its use has been extended to other fields of developments. Its use in Economics (Myburgh, 2003) of information and how to measure the end use of KM itself has helped to assess the challenges faced because of the intangible nature of knowledge. Engineering and technology sector (Winberg *et al.,* 2008) has also been able to tap from the principles of KM to preserve and transfer best technological practices. Higher education sector (Lazanas, 2006) has used the KM strategy to preserve and transfer expertise and competence skills that are importance in academics. Recently in Agriculture and Health sector, traditional knowledge transfer on medicine and food obtained from plant garden (Zobolo & Mkabela, 2006) was studied and shown that if properly utilized, it could be used to improve on yields and produce. It has also been used to study the Indigenous knowledge of people (IK) to determine how their practices towards certain health issues are formed and how this could be use to improve on the health of the community (Zobolo & Mkabela, 2006) and to share best practices methods and interventions among professional and communities (Olatokun & Ayanbode, 2008).

Healthcare is experiencing an exponential growth in the scientific understanding of diseases, treatments and care pathways. As a consequence, healthcare knowledge is in flux. New healthcare knowledge is being generated at a rapid pace and its utilization can profoundly impact patient care and health outcomes. But, this growth of knowledge is not congruent with the ability to effectively disseminate, translate and apply current healthcare knowledge in clinical practice (Lazanas, 2006).

The state-of-affairs is that the large volume of healthcare knowledge, dispersed across different mediums, is making it extremely difficult for healthcare professionals to be aware of and to apply relevant knowledge to make the 'best' patient care decisions. Patient care decisions should be based on best available knowledge applied in line with point-of-care patient data and compliance with the patient's therapeutic preferences. Recent research has shown that the inability of physicians to access and apply current and relevant knowledge healthcare leads to the delivery of suboptimal care to patients (McGlynn *et al.,* 2003).

Study estimated that around 98,000 patients die each year as a consequence of preventable errors (Kohn *et al.,* (eds.) 1999) Likewise, a study of two UK hospitals found that 11% of admitted patients experienced adverse events of which 48% of these events were most likely preventable if the right knowledge was applied (Vincent *et al.,* 2001). The inference drawn from the above studies is that the under-utilization of healthcare knowledge contributes to incorrect clinical decisions, medical errors, sub-optimal utilization of resources and high healthcare delivery costs. Healthcare knowledge is central to clinical decision. Throughout the diagnostic therapeutic cycle, Knowledge is applied to arrive at correct diagnostic decisions and to derive the most effective therapeutic regimes. Clinical decisions are made in a cyclic manner, whereby in each cycle the healthcare professional applies knowledge to validate prior hypothesis and satisfy a few more constraints to get closer to the final decision. In this cyclic decision-making process, healthcare knowledge is dynamically contextualized to interpret the patient's evolving health status and to derive treatment interventions that will work for a specific patient in a specific healthcare setting. Therefore, the key to successful clinical decision-making is the timely availability of correct and relevant knowledge with respect to the clinical context.

Healthcare knowledge is transformative in nature. It is global health contention that the apt and timely utilization of healthcare knowledge can transform healthcare practices to achieve high levels of patient safety, care quality, team-care, patient centeredness, and cost-effectiveness. More so, it is of strategic value to address the issues contributing to the under-utilization of knowledge through concerted, systematic and pragmatic mechanisms to 'manage' available healthcare knowledge. Healthcare knowledge management, both as an emerging research theme and a pragmatic practice, aims to manage healthcare knowledge to address the knowledge gaps inherent within a healthcare system (Bali, 2006).

The advent of Health Information Technology, e-medicine, Tele-medicine, Community of Practice (CoP), mobile clinics and global medical tourism have all buttress the need to improve the usage and practice of KM in the health sector. Interestingly, this has created a paradigm shift, largely driven by the unique demands of different healthcare stakeholders, where each stakeholder manifests a specific knowledge need, usage pattern and expected outcome. For instance, the demand from healthcare professionals is not just for mechanisms to easily access knowledge, rather they are demanding the seamless incorporation of current knowledge in clinical workflows to support decision-making (Montani & Bellazzi, 2002). Likewise, patients seek personalized care maps and care-related education to help them understand and cope with their care trajectory. In this paradigm, healthcare knowledge is not just a resource; rather it is a 'service'. Studies have revealed that main advantages of KM in Health care system are; medical error reduction, improvement of cooperation and innovation, improvement of quality of care, health cost reduction, improvement of health knowledge organization and health organizational learning while main challenges are dearth of KM expertise in health system, low awareness and lack of integration with other IT based media (Montani & Bellazzi, 2002).

Health Care Knowledge Management in Developing Countries

Although there is little applications of KM in health sector of developing countries according to available literature. A broader view of aspects of KM life cycle in health sector of developing countries revealed an abysmal performance. An interesting and common finding is that the management of information mostly through Health care information systems (e.g. automation of patient records) in developing countries is quite dismal for several reasons including; data complexity (Atkinson *et al.,* 2001), static nature of database (Lorenzi & Riley, 2003), lack of supports and motivation from participants (Madon *et al.,* 2007), and lack of technical staff or 'people-ware' (Ball *et*

al., (eds) 2004). These portend bad outcome for health sector development in these regions since they are likely to be left behind in the global shift towards Health knowledge management.

Three types of gaps has been shown to exist in Health Care Information Systems (HCIS) domain (an important prerequisites to KM) (Heeks & Duncombe, 1999). These are: (a) mismatch between design rationality and behavioural realities; (b) situational incompatibility, e.g. private sector application copied for public sector; and (c) contextual inconsistency, e.g. application in one country but developed in a different country. Though it was further argued that these initiatives are at least the building blocks of computer-based information systems by replacing a manual record-keeping system. Most of these Health Information studies emphasized on health policy-making (Report of a WHO expert committee 1994; Chanda & Shaw, 2010) e.g. planning, resource allocation, implementation & monitoring of patient health status without looking at other clinical and preventive aspect of Health knowledge management.

Despite this low level of conscious efforts by developing countries to effectively manage their health knowledge. One can still say every health care organization in developing counties unconsciously manage knowledge. For example, when it trains providers, analyzes data from a management information system, or publishes a report. By applying the right knowledge management (KM) tools, however, Health managers can systematically increase (Powell, 2003), efficiency, effectiveness, creativity and empowerment. If well harnessed all these unconscious efforts would contribute to better organizational performance and, ultimately, better health outcomes in developing countries.

Prospects of Knowledge Management Applications in Developing Countries

With appropriate technology and system, KM use in health sector of developing countries can really improve health care performance. For instance the head of health facilities could arrange to pool and share resources with other organizations that provide similar health services. In-service training by a supervisor or content expert also could ensure that providers are updated routinely. With a stronger and more current knowledge base, providers could then offer clients better care which ultimately might increase health service utilization. In another scenario Health project teams could meet periodically, throughout the development and implementation process, to review progress and generate lessons learned. Their reports could be made easily accessible to others, either in print or online. For instance a case study conducted to assess the perceived benefits of the KM among the system user in a Taiwanese medical center KM system implementation in a hospital setting, revealed that there was an overall positive attitude and benefit perceived by KMS users in the hospital. In this same study In Chang *et al.,* online), several major challenges affecting the implementation of a KMS system were identified including "perceived usefulness", "perceived ease of use", "incentives for KMS users", "concerns of data security and confidentiality" and "organizational support".

Recent Knowledge Management Applications in Reducing Maternal and Child Health

The Partnership for Maternal, Newborn and Child Health (PMNCH) was launched in September 2005 as a merger of pre- existing partnerships, it is focusing on continuum care of MNCH and the main aim is to accelerate the achievements of MDGs 4 and 5. It has 6 constituency groups; Developing country governments, Donors (bilateral and foundations), UN agencies (WHO, UNICEF, UNFPA, World Bank), Health care professional associations, Academic / training / research institutions and Non Governmental Organizations (PMNCH, 2008). The strategic framework of PMNCH sets out six main inter-linked areas of work: knowledge management, developing consensus on core packages of MNC interventions, essential MNCH commodities, Strengthening human resources for MNCH planning and policies, advocacy and tracking progress and commitment of MNCH.

The first of these, knowledge management, established a comprehensive knowledge management system which supports the creation, capture, storage and dissemination of information on MNCH, in order to provide readily-available robust knowledge summaries in a variety of formats, and to identify and flag critical knowledge gaps. The knowledge management system will include a web-based managed portal. For the IMNCH interventions to be generally acceptable there would be need to inform and educate the masses on the need to change their behaviours and practices and this could only be possible if the Communities' general knowledge acquisition, storage, sharing and transfer are

identified. There would be the need to map these knowledge resources, identify and institute effective ways to utilize this for the purpose of managing the knowledge resources for Maternal, Newborn and Child Health interventions in the Country.

CONCLUSION

Since Knowledge Management (KM) became a discipline during the 80's, Its usage in other professional fields has been tremendous. Its use has also been extensively recognized as a strategy that can be used to improve service provision in the health sector. While this is been improved upon world over, the progress of KM usage in health care sector of developing country has been abysmal. There is however, perceived prospect in the KM applications in the health sector of developing countries if conscious efforts are made to apply it.

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