The effectiveness of Knowledge Management in the Map of Medicine compared with Nonaka's Knowledge Spiral

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Abstract

Recently, the business world has reaped the benefits of an effective Knowledge Management (KM) set up. It has helped propel them into an age of information and this has quickly transformed itself into commercial assets. The importance of integrating this attitude, from the aspect of the medical world, can potentially be central to effective patient care and staff management. Through the use of KM schemes there can be an acceleration of productivity due to the competent way knowledge is created, critiqued and disseminated amongst employees.

The medical profession deals with an ever-growing amount of information from a number of publishers, articles, journals and regulatory bodies. This can be overbearing for a healthcare practitioner particularly with respect to the intimate nature of medicine. Nevertheless, using KM models and theories these issues can be dealt with more efficiently by creating a regulated flow of knowledge that maximises its, access, accuracy and the standard of care delivered by the NHS and is personnel.

The Map of Medicine is thought to be a useful support system for doctors in a clinical environment in a field they are least confident in. at the heart of its concept it relevantly sifts through the databases of information and presents it in a way that is user-friendly and up-to-date with modern findings.

Introduction

Knowledge management (KM) has flaunted its benefits to a growing business world for a number of years. Its importance and utility have emerged from being a somewhat conceptual idea to being integrated into some of the largest companies in the world. This is partially due to the ever-growing development of computer and information technologies [1] and “formation” of new knowledge into a database of vast unspecified information. Businesses saw knowledge as tangible assets of an organisation that required delicate management and dissemination.

Defining Knowledge Management:

In order to define knowledge management we must clarify the steps necessary to create “knowledge”. The “data hierarchy model” [2] indicates the evolution of data (consisting of just facts) to wisdom (the ultimate level of understanding) [3].

The hierarchy model is defined into the following:

Data - Data is a set of discrete, objective facts about events [4]. By itself it holds little “meaning” and is significant only when placed into context against other data; information. It is truth and a baseline from which information is derived.

Information – This is data that has a reason and makes a difference [4]. It compares data and reveals relationships.

Knowledge - Knowledge is the perception of the agreement or disagreement of two ideas [5]. It is information that makes a difference to something or someone.

Wisdom – Epitome of understanding through the emergence of patterns and meta-patterns of information [6]. It contains an element of personal insight, experience and knowledge almost combining tacit and explicit knowledge.

Other concepts:

Different types of knowledge exist. Tacit and explicit knowledge have been defined as knowledge that resides in people (experience, intuition, insight) and knowledge that can be recorded, shared and stored on a database (reports, instructions, procedures), respectively.

Furthermore, the evolution of KM has produced 3 perspectives of KM relevant to this report [7]:

Techno-centric – Focus on technological development to aid the sharing of knowledge.

Organisational – focus on organisational development to accommodate knowledge facilitation.

Ecological – focus on the interaction between people and environment it occurs in to enable knowledge sharing.

In an educational organisation such as the National
Healthcare, these 3 areas must work together to create an atmosphere whereby vital knowledge can flow freely between the many levels of healthcare professionals.

Knowledge management is best defined by Ron Young, CEO/CKO Knowledge Associates International as, “the discipline of enabling individuals, teams and entire organisations to collectively and systematically create, share and apply knowledge, to better achieve their objectives” [8].

Knowledge in Healthcare

Knowledge management systems. It is one of the largest aspects of modern economics and, by nature, deals with a vast amount of information on a daily basis [9]. Failure in regards to information flow chains and organisation of information can be vital in the overall success of medicine. For instance, the 10,000 diseases, 3,000 medications, 1,100 laboratory tests, 300 radiology procedures and 400,000 newly published medical articles [10] that plague the mind of a modern healthcare stakeholder can be overwhelming. Even general practice organisations have been overburdened with almost 22kg worth of guidelines [11]. However, with effective knowledge management of information of this quantity healthcare can work towards efficiency, productivity and overall improvement in patient care. This is essential in the ever-indebted NHS and its dedication to continuously improve clinical knowledge and patient satisfaction [12].

Moreover, “learning” is seen as a characteristic of an adaptive organisation that can acquire, transfer and implement changes based on new relevant knowledge [13]. The nature of medicine and the NHS relies on this concept to advance its overall professional knowledge of the medical world in order to advance the level of satisfactory and standardized patient care.

Learning that is applicable to the development of further knowledge to a healthcare professional may be considered as cyclical [14]. It relies on a continuous flow of knowledge and intermittent evaluation to maximise the learning potential of a healthcare individual. Nevertheless, this cycle only works if every aspect is managed effectively by the individual party and the organisation as whole.

Examples of KM within medicine include PubMed, Medline and hospital libraries. These allow quick access to medical articles [15, 16]. Quality management of the published studies are undertaken by the Primary Care Data Quality Program [16]. Even so, databases such as these are notorious for producing unspecified and unnecessary results even with the use of a filter. Additionally, the spectrum of different languages incorporated into the database makes its utility limited [15].

Nonakas Knowledge Spiral

Healthcare has become in need of intricate knowledge management systems. It is one of the largest aspects of modern economics and, by nature, deals with a vast amount of information on a daily basis [9]. Failure in regards to information flow chains and organisation of information can be vital in the overall success of medicine. For instance, the 10,000 diseases, 3,000 medications, 1,100 laboratory tests, 300 radiology procedures and 400,000 newly published medical articles [10] that plague the mind of a modern healthcare stakeholder can be overwhelming. Even general practice organisations have been overburdened with almost 22kg worth of guidelines [11]. However, with effective knowledge management of information of this quantity healthcare can work towards efficiency, productivity and overall improvement in patient care. This is essential in the ever-indebted NHS and its dedication to continuously improve clinical knowledge and patient satisfaction [12].

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Socialisation (tacit to tacit) – Requires person-to-person interaction and experience; leads to an acquired skill or mental model.

Externalisation (tacit to explicit) – Involves an individual articulating their tacit knowledge to others or translating another’s tacit knowledge into readily usable explicit knowledge.

Combination (explicit to explicit) – Involves dissemination of explicit knowledge, commonly through technology (e-mails, databases, intranets etc.) and linking the new explicit knowledge with what is already known. Groups across an organisation have access to this knowledge and can consolidate it.

Internalisation (explicit to tacit) – Involves the individual absorbing explicit knowledge and converting it into their own tacit knowledge through experience and practice.

Map of Medicine

The Map of Medicine (MoM) is an interactive flow chart that is based around the patient. It was designed to help improve clinical standards whilst reducing costs, reducing unnecessary referrals and maintaining up to date clinical guidelines [19]. MoM was drafted from over 200 guideline producers using over 7000 journals that are reviewed and critically appraised by experienced clinicians [19]. It constantly searches through 3000 journal articles and monitors 150 publishers [19]. Moreover, it is updated quarterly and in September 2011 included Quality Standards Information from the National Institute for Health and Clinical Excellence [19].

This is all intended to reflect real-life patient scenarios to enhance clinical practice and patient care and satisfaction. The MoM can be employed as a diagnostic tool and a guide for available services. Its concise pathway model operates via presenting symptoms or (suspected) diagnosis and following the model using some level of medical knowledge. For this reason however, a disclaimer advises against its use as a substitution for a healthcare professional as it is unsuitable for lay use. In addition to this, it can be used to help create new care maps that are specific to a patient’s or healthcare professional’s requirements.

In the filter engine used by the MoM [19]; the upper row is dedicated to searching through specific areas of medicine and the lower row searches through clinical presentation. If we select an area, for instance surgery; appendicitis; suspected; we get onto viewing the map. Designers have introduced a useful key to distinguish primary and secondary care levels and, in this way, help clarify the need for referral. Continuing down the Map we enter into management and then post-operative management. Finally, by selecting the last step a small box appears that has specific management procedures that a healthcare practitioner can use with discretion. Each node can be selected and an information box will appear with relevant prompts ensuring the user is justified in proceeding to the next stage.

Map of medicine versus Nonakas Knowledge Spiral

In order to evaluate the effectiveness of The Map of Medicine’s ability to manage knowledge, this section will compare the characteristics of the MoM against those of the Knowledge Spiral. Specifically, focussing on the four transitions of knowledge and whether the MoM represents this theoretically, practically, directly or indirectly.

The MoM itself directly lacks the dialogue that helps maintain tacit knowledge at the socialisation stage. It is also limited in the type of knowledge it manages. Although it externalises and distributes explicit knowledge effectively, it has a limited input of tacit knowledge. For an organisation as large as the NHS, this knowledge type is a rich and valuable source that requires accessing. It is scarcely used when compared to its potential within KM.

Nevertheless, the map can be used to as a tool to teach through similar methods of socialisation. It can be individualised into personalised patient care maps or remain generic as it is. This could then be used to help educate students about patient treatment procedures/history taking of an individual special case or just within a specific area of medicine. This would expand or reinforce knowledge expressed by the Map and, additionally, include any input the healthcare professional makes to the adapted patient-specific care maps.

On the other hand, it is important to note that there is a standardised level of care within the NHS. When utilising the MoM solely on its explicit knowledge, it can control the level of patient care being distributed; maintaining the acceptable standard of care. Hence, the addition of a clinician’s own tacit knowledge could disrupt this system. Without regulation the knowledge passed on here is not controlled or equally disseminated in the same way as an unedited care map. Still, this new tacit knowledge could be vital information that could potentially save a patient’s life. Despite this, it would make difficult work for any
regulatory body within the NHS to maintain a certain level of care. Thus, a limitation of MoM is that, in order to comply by NHS standards, the type of knowledge it distributes must be evidence-based explicit knowledge whereby a standard of care can be derived from.

Similarly, the MoM is hindered at the externalisation phase of tacit knowledge into explicit knowledge. Again, this is partially due to the principle of standardized care. However, a way of expressing tacit knowledge could be through the creation of individual care maps as well. Yet, the Map’s first stage of knowledge management is based entirely on externally evaluated trials, articles and journals. Its demanding methodology is a considerably positive facet from which the map stems from. In my opinion, changing this in order to facilitate the transition of tacit to explicit knowledge would be more adverse to the map than beneficial.

The Map’s ability in the combination phase is its strongest feature. It makes a huge amount of feasible knowledge available through its resource search and organises relevantly on the interactive map. This is shown by distinguishing the search engine via “presenting symptoms” or a general area of medicine. The MoM’s accessibility is enriched by a user-friendly interface and the clarity of its instructions is clear to follow or be prompted by.

Its speed of disseminating explicit knowledge from the raw materials of trials and journals is admirable; the European Science Foundation evaluates that it can take almost 10 years for good research to turn into implemented changes [20]. The rigorous methodology the MoM is put through accelerates this and, in a field where knowledge is central to saving a patient’s life, this is vital. For instance, simple procedural information or adverse drug effect information can help eradicate a large number of preventable patient deaths [21].

The transition of converting explicit knowledge into tacit knowledge is something that is not specified in the MoM. This is implied by the nature of teaching within the NHS as a “learn by doing” model – similar to internalisation of the Knowledge Spiral. This theory has become perfunctory clinical practice in order for the healthcare professional to maintain an ever-growing knowledge base. The Map can be used to deduce one’s learning outcomes. It is used by the majority of clinicians in areas they are least confident in. Procedural reminders, such as those shown in figure 6, are clearly presented, unequivocal and simple to learn. This encourages reinforcement of techniques previously mastered and the learning of newly developed skills and methods.

Next steps

The MoM is a stepping stone into the right direction of knowledge management. Tom Sensky mentions the importance of decision-making algorithms being incorporated into medicine [22]. He describes it accounting for key individual variables that are inputted by the clinician. These can be used to calculate a risk assessment of disease or treatment options, cost effectiveness of treatment options or running of key clinics and personalising treatment for individual patients, for example. Perhaps the MoM is a stage towards this eventuality whereby a system is created that is accurate, personalised and useful in the clinical field. Ideally, this device would incorporate explicit and tacit knowledge effectively by having an area for clinician’s input. This may seem unfeasible given the size of the NHS, however, the gradual shift into digital databases and healthcare management may make this easier. Individual clinicians can have their insight and experience scrutinised in a similar way to the articles, journals and publishers are in the making of the MoM.

Then, we can use tools of KM analysis to evaluate the overall efficiency of each developed model (including the MoM). This could be in the form of “Information Management Auditing” mentioned by Liebowitz [23] or “tests of Organisations KM” by Webb [24]. Whatever the results of these comparisons produce, it will help further develop our understanding of healthcare knowledge management and, inevitably, benefit healthcare professionals and their patients.

The reduction of unnecessary referrals is definitively a positive outcome from using the MoM. It visibly separates the role of primary and secondary care so that there is no margin for error within the system. The healthcare professionals involved with the referral would then be open to the benefits and drawbacks of the referral system; getting the best possible care for the patient and administration of appropriate patient notes, respectively. Alternatively, the MoM could be adapted to include, in personalised care maps, the electronic patient records and possibly separate nodes – or stages between nodes – with other relevant information. In this way, the Map manages the next step for the patient but also upholds the duties of the referring healthcare professional. By incorporating this into the structure of the Map, each variable is accounted for in the referral stage. It can be further amended and improved to include shorter pathways
for specialist conditions/treatments that, practically, cannot conform to the normal pathways.

Conclusion

The MoM is a useful tool to a clinician. Reviews praise its ability to lower costs, unnecessary referrals and patient waiting times [25]. It is a useful instrument in terms of filtering through the vast pools of medical knowledge and transforming it into a tangible source. Many healthcare practitioners will welcome such a system rather than having to unrealistically rummage through 4500 journals in 30 languages equating to almost 12million articles since 1966 to the present [21]. The author Daniel R. Masys agrees that, “against the background of an explosively growing body of knowledge, [clinicians] relying upon their memory and personal experience, will be inadequate in effective twenty-first-century health care delivery” [21].

The MoM employs a techno-centric and organizational perspective which can be used with an ecological aspect in order to teach. The Map does rely on technology and as it advances, perhaps can be the basis of the next stage of development. This would not necessarily require further organizational development to facilitate an interactive map. Furthermore, developing the ecological aspect could enhance the distribution of useful and different knowledge. This aspect would most likely be effective for tacit knowledge dissemination, yet, the downsfalls of which have been previously discussed.

The Evidence-Based Medicine (explicit knowledge) has its own short-comings. Engel states that we should recognise the limitations of Evidence-Based Medicine because patients cannot be solely managed through biomedical models [26]. Therefore, because the MoM is based on EBM, it carries a degree of innate inaccuracy in terms of satisfactory patient care. Nevertheless, by only using explicit knowledge that is proven, the NHS maintains its level of “standardized care”; essential in maintenance of a satisfactory level of care and legal protection of the organisation.

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