Original Research Article

Knowledge Management and Knowledge Reuse Models to Support Healthcare Practitioners

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ABSTRACT

Backgrounds: Health care management has been becoming an important aspect in the growing technological and competitive age. These areas seem to be rapid growing business as well as highlight society's related challenges due to large population and limited resources particularly for the country like India. Off-course there are devastating confrontations including need of a single model, financial implications, variation in management and cultural barrier across India.

Objective: Our main subject of study is "What kind of model on knowledge Management (and knowledge refinement) can be employed which not only supports the creation, use and sharing of knowledge in healthcare industry (particularly in Asthma) while it also facilitates reuse of knowledge and hence saves efforts and time as well as enhances quality of knowledge?"

Materials and Method: Present work illustrates some obstructions and suggests a knowledge management skeleton to conquer these obstructions by combining improvement with the help of knowledge management (and reuse) as well as knowledge unearthing models and methods.

Results: Present work argues about incorporating the models and systems in managing knowledge management practices in healthcare which can construct healthcare delivery more useful and professional, and thereby explore the full latent characteristics of healthcare industry and hence the knowledge assets. Our projected skeleton may be useful for the domain of Asthma.

Conclusions: Present knowledge management and knowledge reuse skeleton may be helpful in supporting the technologically oriented fast healthcare job workers and advance their rational assets to offer smart health care related management solutions in the country.

Keywords: Healthcare Industry, Reuse of Knowledge, Knowledge Management, Nonaka Models, Asthma, Three dimensional Harsh model.

INTRODUCTION

Healthcare workers can be regarded as stylish knowledge workers. [1] Similar to knowledge workers in a lot of regions, physicians use and interpret this asset of knowledge by their own way of particular kind of knowledge. Since healthcare-workers hold specific ability and preparation for which noteworthy resources have already been available for their learning. Such workers have the ability to formulate their own choices that have immediate as well as outlying significances. [1]

Healthcare workers suffer the problems like need of knowledge and lack of admiration of the functions of other health experts, hierarchical managerial and learning constitution that dishearten inter-specialized teamwork, need of suitable method for timely swap of information, need of structure for trouble finding and

decree, unwillingness to recognize proposal from squad members in lieu of other professions; and lack of trust in the collaborative process. [2] Therefore, the present investigators would like to make efforts to investigate the resolution in the light of knowledge administration instruments to decide these disputes of healthcare employees.

During the previous few years, the Indian government has been trying to give priority to health services in rural areas. Several novel proposals have been materialized concentrating on many features of healthcare, such as patients' electronic files, statistical scrutinizing of infectious diseases, connecting some hospital systems using internet and monitoring etc. [3] However, the discharging such services suffer various hurdles due to one or more reasons. Off-course these initiatives have been impaired by many problems as mentioned below:

a. Lack of proper Information Technology tools related to information systems
b. Lack of computer technology and their experts
c. Lack of interest of health care professionals especially for the rural area.
d. Human obstacle which may include need of trust by medical staff towards computer oriented medical resolutions
e. Financial obstacles
f. Maintenance and or recovery problems.

MATERIALS AND METHODS
Knowledge and Knowledge Management

Today, hospitals and clinics have been providing care to patients directly or indirectly by online or manual knowledge management or knowledge reuse systems. Through such systems, it is easy to share and manage knowledge not only for the care of the patients while to keep the record of the systems which can be further improved as time goes-on which can result in high quality and useful healthcare system. Healthcare system created in this way can capture, represent and disseminate more and more knowledge with time and can help in adopting new strategies and practices. So out of available practices, best practices can be adopted. [4]

Application of selected practices can make organization to compete and keep quality of products and services. Knowledge Management is a useful mechanism to capture the intellectual capital of organizations, and healthcare establishments, in particular, so that they can deliver the best quality of care. E-learning environment can assist healthcare experts to handle the partitioned and dispersed character of medical knowledge. However, there are few challenges like excess information and the lack of awareness of local condition in making clinical conclusions. [5] Nurses and other medical staff can also learn social impacts of such systems and accordingly can assist in providing the relevant training material.

No doubt Knowledge management can make available an active procedure of confining, storing, sharing and generating explicit and tacit both kinds of knowledge. [6] Explicit knowledge is transmissible in organized words while tacit knowledge is acquired during practice and cannot be expressed. [7] According to Nonaka and Takeuchi [7] knowledge transforms from explicit to tacit and vice versa in two dimensional learning settings that happens during four procedures, called as SECI, in the shape of a spiral. SECI consist four forms alteration practices: Socialization, Internalization, Externalization, and Combination (as shown in Figures 1, 2& 3).

Socialization

Socialization enables the conversion of tacit knowledge via interaction among individuals and can be achieved through shared experiences. Socialization which is the procedure of communication among persons and provides the tacit knowledge sharing happens more broadly and it can be observed more mutually since in any business, staff not only distributes their knowledge, psychological models, attitude and perception while they also distribute

their reuse practices. Thus one can grant that such knowledge (residing peoples' brains like tacit knowledge) going to the society will get enhanced because of application of reusability. Socialization indicates the relocation of tacit to tacit knowledge.

Externalization

Externalization enables tacit knowledge to be converted to explicit knowledge. Externalization is the sequence of capturing information of knowledge which signifies that the conversion of tacit into the explicit knowledge. Examples are: writing the text, sketching a figure etc. Such processes will be accelerated as the time enhances due to contribution of reusable knowledge. Such procedure represents that efficiently more knowledge will be accessible to business as contrast to two dimensional model of Nonaka and Takeuchi Model. [4,7] Thus people will have more confidence in the accessible knowledge since there is a repetition of knowledge.

Combination

Combination is the process of 'systematizing concepts into a knowledge system, [7] for example, people create different sources of explicit knowledge through meetings, conversations and exchange of documents. [8,9] Use of reusability of knowledge will generate additional combination of qualitative knowledge. Through such knowledge the workers in the institute sense more connected with knowledge in fewer time. Under such procedure the role of together novel and existing explicit knowledge becomes critical as well as significant. There will be extra rate of increase of knowledge. Thus there is a conversion of explicit knowledge into the more (useful) explicit knowledge. Such kind of knowledge added is qualitative.

Internalization

Internalization enables converting explicit knowledge to tacit knowledge Internalization is the method of realizing the information, placing it into with one's own existing customized knowledge (Nonaka and Takeuchi Model. [4,7] Such knowledge

may be represented in the three dimensions (Figures 2 & 3). These processes obviously reveal that the knowledge conversion (from explicit to tacit and vice versa) enhances with the increase of reuse. Thus we will be capable to place extra knowledge into our accessible internal knowledge.

Nonaka inferred that knowledge is generating endlessly by rearranging the available knowledge during the synergy of above four methods. Though, some serious points have been raised regarding Nonaka's principles; therefore, additional models have been created which is either the extension or refinement of Nonaka model including the idea of cognitive knowledge and emotional knowledge and reuse of knowledge. [10,11] It should be noted that proposed knowledge flows model which confines the enterprise knowledge dynamics by adding two additional dimensions to Nonaka's model such as life cycle and flow time model represent knowledge more comprehensibly. Harsh [11,18-20] suggested a third dimension in which is responsible for knowledge reusability and also includes the role of technology and human interaction during the administration of data, information and knowledge.

Knowledge management and knowledge reuse not only allows a methodical technique while it serves greatly to improve the quality of useful knowledge and also makes sure that public health doctors have right to apply and reapply such knowledge to the most belatedly investigation for general public especially in e-health environment. They can apply these techniques collectively to not only at regional level while to also for global programs. Such kind of system is a valuable tool for creating, sharing and recognizing useful knowledge which can be again and over again used (means reused) by each time rectifying its drawbacks if there is any. Public health organizations that assume knowledge management (KM) strategies and practices can help in advancement of programs of health employees and can fulfill the objective of (progressing health

results) communities. By applying KM, public health agendas such as:

- Create sense of knowledge and its strategies
- Helps in understanding the capturing knowledge by technology
- Promote teamwork and culture
- Improve health education and its programs
- Advance curriculums, observations, and investigation
- Create and inform policy and promotion

Knowledge Reuse

All KM programs can be supported by reuse by three useful and unavoidable components; they are people, processes, and technology. People who use the methodology in creating, accumulating, and splitting or sharing the knowledge can also reuse the same methodology again and again. Similarly, same processes can be further used for capturing, curetting, and sharing the knowledge. Such processes should be cuddled and incorporated into an institute's every day job in order to create a successful planning. It should be noted that technology helps in expediting knowledge storage, recovery, and swap.

Reuse of knowledge with time in succession helps in finding mistakes and hence useful in enhancing the quality. Thus time is a factor which allows understanding relevancy of reused knowledge while technology is a tool to reuse accurately in contemporary environment. Repetition of processes can further help in rectifying mistakes in procedure and useful in enhancing quality.

Application of reuse with time continuously enhances the quality as well reliability of our system in contemporary environment. Thus system will be cheaper and has great use for low- and middle-income people. All the reusable data, information and knowledge can further facilitate the health system across the laboratories which ultimately improve the uniformity as well as competence of public health plans.

DISCUSSION
Relevance of Knowledge Management in Health Care Sectors

No doubt that to care large number of people across India it needs huge knowledge system moreover system in such environment needs the professionals who are aware about intensive knowledge practices. In growing technological environment there are large numbers of clinical factors which are to be decided and diagnosed at high pace. Decision making under such environment sometimes becomes tedious.

Solution of crisis faced by health care professional is the function of available knowledge at that point of time. It would not be possible immediately to confer with a library for particular information thus health professional has to be trained efficiently to administer knowledge while making judgment. Not only above factors only while healthiness of people is predisposed by communal as well as its financial conditions and the health care services they receive.

Health care professionals should have both theoretical background with practical training and should be allowed to learn crucial skills. They should access suitable knowledge at appropriate time. Appropriate knowledge may direct towards novelty that can create efficiency of organization.

Health Knowledge Management Framework

We can realize that in spite of successful application of knowledge management in the healthcare areas, still there are number of obstacles due to several reasons for example, need of efficient members, cultural issues and deprived infrastructure etc. [12,13]

According to Finn and Warring, [14] 'architectural knowledge' is basic for competent group applications to make sure that the release of secure and efficient help to patients. Sometimes, cultural barrier also present hindrance in the process of knowledge management. In addition to

these there are some other factors like lack of adoptability of system by the doctors because of confidentiality of knowledge and findings. [15] Another type of problems is related with reuse of knowledge. How can a practitioner make sure that a particular kind of knowledge is being used successfully and repeatedly by large number of health practitioners?

What is a time gap by virtue of that a particular medicine is being updated or elevated by a company? How long a particular type of treatment in the industry is being successful or unsuccessful? Is reuse of medicine help in the improvement of quality of medicine? Is reusability helps to some practitioners to understand its feasibility or viability?

Guven-Uslu [16] mentioned that divergence between clinician and managers is the great obstacle because managers would always like to minimize cost while clinician efforts are to give best treatment to patients. The question is that how can we tackle these issues by a joint or unique methodology? Therefore, in the present work an effort is being made to present a systematic approach in terms of knowledge management and knowledge reuse model to deal with all the above barriers by a single approach. Present idea is motivated by the SECI model of Nonaka [7] and revised SECI model by Harsh [11,17-20] by incorporating the idea of third dimension of reuse and their applications.

Present structure basically is being proposed to deal with some of the obstructions mentioned earlier out of four viewpoints, which in the present work we replace by industry, people, economy and tools (Fig.1). Knowledge management and reuse can be incorporated into knowledge discovery or detection which can help in recognizing, extracting and arranging both types of knowledge such as tacit and explicit knowledge. It can also help in providing an opportunity for producing and dividing reliably novel knowledge by connecting tacit and explicit knowledge to a precise medical sphere. Adoption of reuse of tacit and explicit knowledge further presents an extended opportunity to create a qualitative as well as refined knowledge as the time enhances for a given system. Independent treatment of knowledge reusability presents another dimension [11,18-20] (See Fig. 2) where repetition of application of knowledge creates set of behavior which can be further incorporated into the future strategies. Present work is centered on a precise medical sphere e.g. Asthma. To deal this problem, as mentioned earlier, we here apply the Nonaka [4,7,17,21] and Harsh [11,18-20,22] models (Figures 1, 2 & 3) of knowledge management and knowledge reuse.
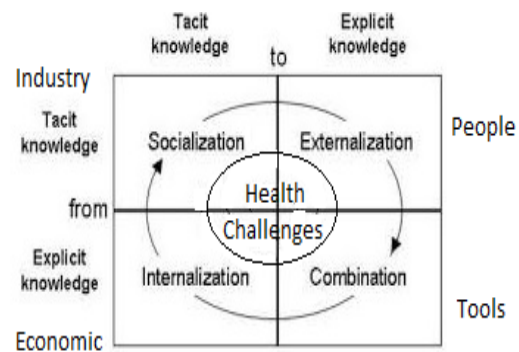

Figure 1: Constituents of Knowledge Management of Health

(Based on Almuayqi et al work [28])

Present section explains the four constituents of our framework (as mentioned in Fig. 1). The Industry constituent is centered on executive concerns and intends at extracting and running the obstacles connected with the breakdown of accepting health information services and medical protection system (see Figures 1 and 2). This can be achieved from a decision support system or data mining. Refer to Fig. 3, it is the individual person who is responsible to handle such industrial component and are called socialization. Second factor is the human barrier which is responsible for people's hindrance in using the tools or technology by the healthcare employees. Therefore, the identification of best practices is required which correspond to externalization. Here a group of people surrounded by individuals handle such a

situation (Figures 1, 2 & 3). Sometimes there are unenthusiastic faiths of such employees to adopt the growing technological tools. For this we need clinical procedures and clinical guiding principle to handle the technology. This desires the group of people within an organization and hence this belongs to combination process. Finally, the economic constituent tries to extract the limitations and policies connected with the execution, preservation and scrutinizing of healthcare information services as a part of internal process which represent internalization. This is associated with individual, group as well as organization that can use groupware, intranet or extranet (Figures 1, 2 & 3). This interpretation is in accordance with the Fig

3 which accounts for individual, group as well as the organization at the different stages.
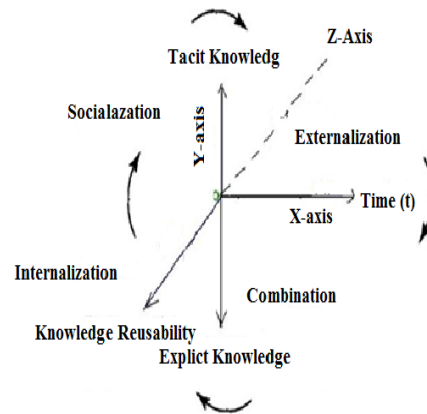

Figure 2: Extended Nonaka and Takeuchi [7] model: Taken from reference [11]
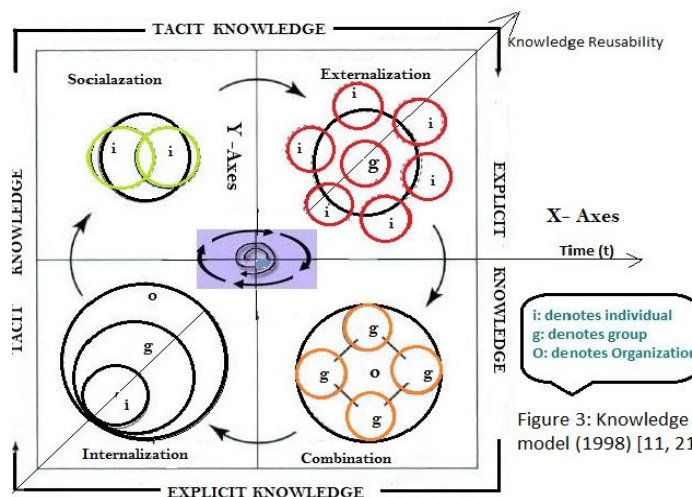

Figure 3: Knowledge Reusability with Nonaka/Konno model (1998) [11, 21].

The Indian health data produced during the above four mechanisms (Fig. 1) may be examined by applying machine learning methods to provoke best practices and approaches. Likewise, patients' data may be extracted to excerpt valuable leanings and relations to expand the healthcare facilities. Thus the assimilated information from these four constituents may be then characterized into a knowledge administration arrangement, which can deliver appropriate awareness to healthcare specialists who may be looking for sharing finest practices, approaches, procedures and policies. In this way patients can be provided precise and extra healthcare facilities.

Solutions in Terms of Knowledge Management

Knowledge management and knowledge reuse utensils facilitate organizations undertake most of the dilemmas connected to knowledge management and knowledge reuse efficiently at cheap expenses with optimum knowledge. Also, these utensils not only assist to control the cooperative knowledge and understanding of an organization to speed up modernization and sharpen viable benefit while also boost the confidence of practitioner also.

Financial advancement in the contemporary era needs improved application of information and knowledge.

It needs releasing the knowledge resources of a society as the controller of financial growth. It also needs releasing the concealed knowledge about a society which is also related with the route of financial expansion. KM tools can widen the information gap and provide the simultaneous information about the developments across the globe.

The features such as dissemination of knowledge, numerous knowledge related set-ups, formation of prospect for managerial education, better partnership, assembly and through use of knowledge, distribution of knowledge, and expansion of a tactical expertise are responsible for socio-economic arrangement of trade and skills. Thus a health-concerned practitioner can deal with a different environment where the knowledge assets allow him or her to resolve the problem in a comprehensive manner.

Domain of Applications

Asthma is one of the most widespread persistent diseases of early days, touching an expected 7 million kids (9.4%) in the United States and 3% in India. Asthma care is multifaceted and active needing sequential and synchronized attention. The purpose of the Asthma care during the present investigation is to assist care providers offer support-based and principle-amenable assistance to patients with systematic awareness of knowledge and its applications in this area.

Providing knowledge based care for patients with asthma is to engage in determining the patient's current asthma control stage, which can be multifaceted and is supported on recent symptoms in the patient's current precedent medical history. Integration of knowledge management along with decision support tool into the electronic health documentation can answer extra (standardized) and dependable care for the outpatient handling of this illness. This will help in the improvement in the quality of Asthma knowledge and hence declining crisis visits for such patients.

Electronic health record

Electronic health documentation consists of plans, patient calls information, and about past. Electronic health documentation comprises of past record data about the patient's medical history, calls to the healthcare organization, and laboratory results. In contrast to paper-centered histories, electronic health documentation is useful to deal real-time clinical verdict condition to support workers in deciding care decisions. Clinical decision support systems (CDS) can deliver warnings about medicine, standard-based care endorsements, and other prompts especially under the above mentioned models where knowledge and knowledge reuse tools can facilitate further for knowledge based investigations. Such CDS schemes are planned to benefit or assist the electronic health record in an intensive knowledge environment as an instrument to recover care instead of just a data source for curative information. Asthma care under such prevailing environment will be easier as well as logical and will assist to care providers in manifolds where organized responsiveness of knowledge and its applications in this area is considered necessary.

Decision Support

Above mentioned clinical decision support systems can deliver symptoms-oriented and argument based attention for clinicians using intensive knowledge based electronic health record. Clinical decision support systems can develop clinician performance. [23,24] Though, effective incorporation of clinical decision support systems into the clinical information stream is versatile and needs numerous issues to be considered, comprising local employer participation as well assisting with the present recording scheme. [25]

Asthma oriented advice decision support systems may be employed during the critical care [26,27] It should be noted that the clinical decision support systems can offer great precision in managerial carefulness. [26]

Quality of Care

Knowledge Management (KM) ideology is imperative in considering the consequence of excellence or quality and its connecting subject. It is anticipated that organizations have to generate their wisdom approach by applying the current tools to accumulate and use the knowledge for the right disease at right time. Significant query is that how this knowledge can influence in making note-worthy knowledge atmosphere to utilize best services at an appropriate time?

It is well established fact that quality is the ultimate subject for each organization which admits to capture, share and deliver best out of available knowledge. Knowledge is always concerned with its quality when it is distributed from health care practitioners to patients.

Quality of knowledge is the important requirement for the health care practitioners where knowledge workers not only gain the constructive yield while they can reuse it for one or more reasons for their prospective venture. However, quality of knowledge and its reuse engage a lot extra, even further than the natural knowledge and technologies.

We in the present work present the idea of knowledge reusability in the Nonaka model (Figures 2 & 3) and adopting the approach of Harsh [18-20] which delivers not only the quality of data, information and knowledge while also helps us in the refinement of data, information and knowledge due to the concept of reusability.

RESULTS

Application of knowledge management and knowledge reuse not only create a single platform for knowledge workers while it would also help in the improvement of the quality of health care due to repetitive reuse and refinement of data, information and knowledge.

Our suggestion is that knowledge and its reuse models can be employed to improve not only the quality of healthcare knowledge in a clinical environment by adopting the usual knowledge practices as discussed above B while these models can also allow an organization with a technique to resolve the association-ship among cause and concerns by applying the techniques of best practices.

CONCLUSION

Knowledge management and knowledge reuse are growing areas of modern research. Though, the analysis of the available research has revealed that there is a lack of management and reuse of knowledge in health care industry in India. Particularly critical issues have not been dealt appropriately in the health care sectors to address the application of knowledge. The objective of our investigation is to advance the appropriate knowledge of healthcare services and offer a discussion for healthcare experts to convey the finest healthcare to respective patients particularly in the area of Asthma.

Reuse of knowledge tools not only promotes the local market while it creates awareness about the insurgency of knowledge among the general public as the time changes. Such assets can be captured, shared and reused as per the needs of the industry and the local environment. In this way there is a revolution in the knowledge in the health-care industry.

Conflict of Interests: The present researchers announce that they have no conflict of concerns.

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