E-Healthcare Knowledge Creation Platform Using Action Research

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Abstract. There has been a long discussion on knowledge creation in the health care environment. Recently, the action research approach is attracting considerable attention. Action research supports a learning process where collaboratively the healthcare stakeholders are cooperating to produce knowledge that will influence their practice. Usually physicians are involved in case study research where information is produced but it is not used to offer insights back to the community. In this paper we propose a healthcare learning platform (HLP) that enables members of the health multidisciplinary communities to collaborate, share up-to-date information and harvest useful evidence. In this e-health platform knowledge is created based on patient feedback, the dynamic creation of communities that involve the participation of several stakeholders and the creation of an action learning environment where problem identification, investigation and planning, action and reflection is a cycle that enables knowledge and experience to contribute to healthcare knowledge creation.

Keywords: E-health · Knowledge creation · Action research

1 Introduction

E-health systems have been evolving the last years towards the direction of generating increased knowledge, value and innovation [3]. Tacit knowledge that resides on the peoples' mind and innovation that can be derived by human interactions are new aspects that need to be considered when we evaluate healthcare systems. Healthcare professionals are exploring new ways if interactions and knowledge sharing and in that process they have incorporated social media in their practice. In [2] the authors show that the benefits of staying connected with colleagues, sharing knowledge and benchmarking have contributed towards the use of social media. On the other hand, time, trust and information anarchy when using social media create reservation. In a similar study [5] a strong network with several related participants, with trust and shared language can be a motivating factor for participating in knowledge creation and knowledge sharing activities. Hence there is a need for an e-health platform that will cater to an adequate set of professionals creating dense network, that will use a variety tools of digital communications tools, that will foster a cross-disciplinary approach and will do in a structured and trusted environment.

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On the other hand, in the discussion of knowledge creation, the action research approach is attracting considerable attention. Action research supports a learning process where collaboratively the stakeholders are cooperating to produce knowledge that will influence their practice. Action research is cyclic process where the participants are sharing information, planning and design action in order to address a problem, then they reflect and they re-execute the cycle [10]. Although usually physicians are involved in case study research where information is produced, it is not used to offer insights back to the community.

In this work we propose an innovative platform in the context of e-health that will enable the sharing of information and contribute towards knowledge creation. Our proposal is motivated by the recent observation in the bibliography that sharing best practices, mistakes and feedback exchanges, contributes to better and innovative health care services.

2 Related Work

In recent research on healthcare systems, the need for the development of user-centered systems which span across different domains of health and incorporate ethical and social care aspects has been identified [1]. The need of digital collaborative environments has been identified in the literature, where the authors in [4] present a survey of knowledge exchange portals and conclude that they are beneficial because they provide a one-stop point for information sharing while identifying the need to further examine their contribution to evidence-informed decision making. Out platform is making a next step and provides a digital place where not only content is retrieved but people are communicating, different levels and type of data are provided and this is done across disciplines in a dynamic environment.

An interesting approach on patient value co-creation is presented in [6] where the authors identify its need and importance and examine the factors that motivate the patients to active participation. In the same context in a previous work [7] the authors identify as cooperation, co-learning, connecting with family, friends, doctors and other health professionals, co-production and positive thinking as activities that can contribute to measure for patient value co-creation. Our approach considers all these aspects and provides a digital environment that supports and strengths all the above activities.

Although several digital solutions have been proposed in the literature for healthcare collaboration most of them caster only to a subset of collaboration. For example, in [7] the authors propose a platform for safe and easy communication between patients and healthcare providers. In [8], the authors propose a cloud based solution for sharing of clinical images between clinicians and researchers. While the authors in [9] identify the problem of poor collaboration of clinicians and statisticians and provide a platform to enhance this collaboration.

From the above discussion it is evident that there is lack of a platform that will be able to be dynamically create and provide a forum consisting form a diverse set of healthcare stakeholders, enabling knowledge exchange and creation. This gap is addressed by our research and by our proposed platform.

3 The Healthcare Learning Platform (HLP)

In this paper we propose the Healthcare Learning Platform (HLP), as a new and innovative approach towards knowledge creation. HLP platform creates a collaborative environment where users can exchange information and create knowledge. The platform supports the action research knowledge creation cycle with a variety of tools. The main parts of the platform are the stakeholder involvement, the community action research module and the stakeholder profiling. Figure 1 presents the HLP system architecture.



Fig. 1. HLP system architecture

3.1 Stakeholder Involvement

Stakeholders like patient will participate in the platform contributing with their lived experiences being able to convey the experience through a diverse set of tools and formats i.e. uploading images, videos, chatting in forums etc. Our learning platform values the idea that patient experience and feedback is central to the healthcare learning process and should be recorded and taken into consideration. Such participation challenges the traditional way of knowledge creation where a set of experts choose the information based on which knowledge is created. It suggests an expectation of a partnership with the patients and other stakeholders where through a collaborative relationship she/he can contribute to learning.

This module will enable the upload of learning material and information, in various formats and from various tools and it will provide a set of tools that the stakeholders can use for uploading the data, for labeling thus adding semantics information to the data module. Stakeholders can communicate and interact in this process as well, outside and within the communities.

HLP adopts a critical reflective approach that enables dialogue to happen. It incorporates evidence based practice but at the same time it considers the knowledge contributed by the patients and other relevant stakeholders. These lived experiences are creating multiple stories and present multiple possibilities. In this way, physicians can critically reflect on their own practices and result in the transformation of their practical knowledge.

3.2 Stakeholder Profiling

Each user/stakeholder will participate in the platform with a profile. The profile will register a physician with relevant information. The profile of a user will constitute with information provided by the user himself and statistics that are derived based on the user behavior within the platform.

The information derived by user participation will be extracted by the evidence of user behavior within the platform. This information shall consist of metrics like the number of communities that the user participated, the number of posts he contributed to the communities, the number of cases he shared, the number of times the patients commended on the user (positively/neutral/negative), the number of times the fellow doctors commented on the cases/data the user uploaded to the platform and the nature of comments (positive/neutral/negative). The stakeholder profiling will have a part that will be public so that other members can view information about the user and a private one. It will be mainly used by the community creation submodule of the Community requirements to users' profiles. As a result, HLP will support a dynamic community creation and deletion environment that will be able to address the changing needs and unexpected requests for knowledge creation.

3.3 Community Action Research Module

HLP is supporting community based action research for healthcare. Communities are statically and dynamically created within the platform based on their common interest on a problem. The purpose of each community is to contribute to extending and augmenting the understanding of the problem and its surrounding environment and thus resolve the problem while creating new knowledge.

The main principle of community creation is to support a multidisciplinary group where several stakeholders will participate. Possible participants could be physicians of different level of expertise, physicians from different disciplines, researchers, clinical staff, patients etc. Several search tools and guidelines will be offered for the static and dynamic creation of the communities.

HLP will support the basic action research routine: look, think and act by providing a road map where participatory action research can take place. In the look phase information will be gathered from different resources. This information will be structured and the participants will contribute to define and describe the problem. In the second phase the exploration and analyze process will occur. Physicians will comment on the information, analyze it, interpret and explain it (how and why things are as they are and try to theorize). In the last stage action will occur. A report will be build that will describe plans for future action. This process will be re-cycled as the same or similar problems will re-occur and the communities will discuss them. In each cycle the report from previous cycles and previous communities will be considered as part of the collected information and will be evaluated and added to the cycle. The community will reflect on the previous results, and decide upon modification on their actions.

This knowledge creation is a collective process where the links and the relationships within the community are empowered. Since these steps cannot occur in a strict sequential manner, HLP for each community will provide tools (i.e. libraries for information uploading, sorting and collection, tags to characterize a contribution to the community as look, think or act, grouping of the posts based on the tags etc.) so that each community member will be able to express his/her opinion but at the same time the platform will contribute to maintain an action research approach towards producing a result.

HLP provides the platform for the interested parties to make meaning of their experiences as a result of their own experience and their relationships to others in the context of their environment. It enables the implementation of participatory action research approach enhanced with the use of communication technologies thus improving the engagement and community interactions compared to traditional approaches. For example, physicians can create online journals where they can record their experience on a subject and reflect on the changes as influenced by other physicians, their data, the patients' info and the clinical and other relevant participants.

In this process the participants will have the chance to reflect on the situation and they can address misconceptions, misinterpretations, share a broader set of information and be involved in a constructive analysis. This sharing of a diverse knowledge, cases, opinions and expertise by physicians and patients will improve the community life by improving healthcare practice. The idea behind the HLP platform is not only to produce knowledge that will potentially be published in journals or magazines or that will provide a set of

best practices. It goes beyond these objectives and aims to make a difference and improve the everyday life of the participants. Hence physicians that participate in HLP platform should improve their everyday practice and their reputation, patients should have a better treatment, academics should be able to produce quality research etc.

4 Conclusions and Future Work

In this paper we presented a system architecture for an innovative system for e-healthcare knowledge creation. Our proposed solutions take into consideration that there is a need for a multidisciplinary involvement and interaction when creating knowledge in the healthcare field. Moreover, it addressed the problem that knowledge creation can be better served not by specific platforms that enable communication among specific stakeholders but by a generic platform that will allow the dynamic creation and termination of communities based on the information needs and the stakeholders' skills, treating each problem separately. As a future work, we intent to implement a pilot project and run a pilot study.

References

- May, C.R.: Making sense of technology adoption in healthcare: meso-level considerations. BMC Med. 13, 921 (2015)
- Panahi, S., Watson, J., Partridge, H.: Social media and physicians: exploring the benefits and challenges. Health J. 22(2), 99–112 (2016)
- Miller, L.M.: E-health: knowledge generation, value intangibles, and intellectual capital. Int. J. Healthc. Manag. 8(2), 100–111 (2015)
- Quinn, E., Huckel-Schneider, C., Campbell, D., Seale, H., Milat, A.: How can knowledge exchange portals assist in knowledge management for evidence-informed decision making in public health? BMC Public Health 12(14), 443 (2014)
- Zhao, J., Sejin, H., Wi, R.: The influence of social capital on knowledge creation in online health communities. Inf. Technol. Manag. 17(4), 311–321 (2016)
- Zhao, J., Wang, T., Fanm, X.: Patient value co-creation in online health communities: Social identity effects on customer knowledge contributions and membership continuance intentions in online health communities. J. Serv. Manag. 26(1), 72–96 (2015)
- Font, J., Magdalena, D., Soldevila, M., Pascual, J.: Canal Paciente. Platform for collaboration and communication between patients and healthcare providers. Int. J. Integr. Care (IJIC) 16(6), 1–2 (2016)
- Doel, T., Shakir, D., Pratt, R., Aertsen, M., Moggridge, J., Bellon, E., David, A., et al.: Giftcloud: a data sharing and collaboration platform for medical imaging research. Comput. Methods Programs Biomed. 139, 181–190 (2017)
- Raptis, D., Mettler, T., Tzanas, K., Graf, R.: A novel open-source web-based platform promoting collaboration of healthcare professionals and biostatisticians: A design science approach. Inf. Health Soci. Care 37(1), 22–36 (2012)
- Sankara, S., Dick, B., Passfield, R. (eds.): Effective Change Management Through Action Research and Action Learning: Concepts, Perspectives, Processes and Applications, pp. 1– 20. Southern Cross University Press, Lismore, Australia (2001)