

Review of Social Networking Applications for Infectious Disease Management Systems in Saudi Arabia: Current Status & Future Prospects

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Abstract—

Internet Technologies are widely used in healthcare services and information management. Various applications have been proved to be highly beneficial in delivering healthcare services, information and disease management. Social Networking is one of the best internet technologies that is being used in various business and management areas, and it has been revolutionary in enhancing the various operations through effective interactions between the various users. This paper focuses on reviewing the social networking, its architecture, and the prospects of using it for Infectious Disease Management (IDM) in Saudi Arabia.

Methods: Review of Various literature sources and Social Networking Applications for Healthcare/IDM Management.

Results: The Study has found that Social Networking can be an effective approach for integrating it with the healthcare/IDM Systems as it would enable effective user interactions, which could enhance behavioral aspects in delivering/receiving healthcare services. However, there has been no study identified that has used social networking for IDM in Saudi Arabia. This paper suggests the wide scope for future research in integrating the social networking concept across various healthcare systems in Saudi Arabia.

Keywords –Web infectious disease management; social networking for healthcare; infectious disease; e-health; Kingdom of Saudi Arabia; Social Networking; Infectious Disease Management; Facebook; Internet.

I. INTRODUCTION

Social networking features are being increasingly adopted across healthcare services in various aspects. It is evident from increasing healthcare applications for various health related services and disease management. About 72% of the people affected with chronic diseases in USA are using such technology for their disease management [1]. Social Networking is also becoming increasingly popular in the Kingdom of Saudi Arabia, with WhatsApp on the top of the list

with 27% penetration rate followed by Facebook (25%), Twitter (20%), and Skype (14%) [2]. This paper reviews the general social networking architecture and some popular social net-working systems used in healthcare management and services, and analyses the prospects of social networking for Infectious Disease Management (IDM) in Saudi Arabia.

II. GENERAL ARCHITECTURE OF SOCIAL NETWORKING

Social networking has been defined in many ways by different authors. A social network is considered to be a common platform, where social relations are built among the people who share common interests.

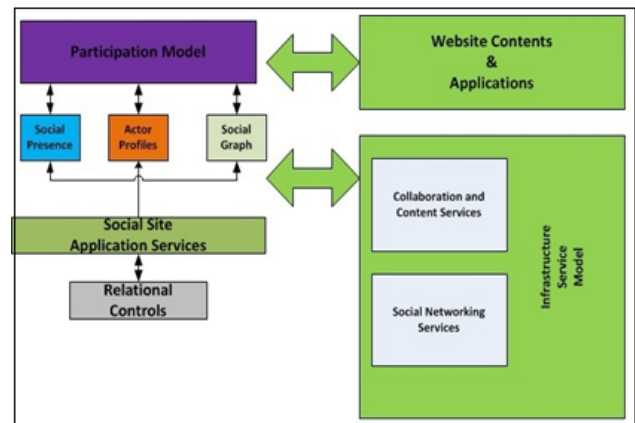


Figure 1. General Social Networking Architecture [4].

In the context of social sciences it can be understood as the social structure consisting of group of actors which might include individuals, groups or organizations with dyadic ties between them [3]. The general social networking architecture is presented in Figure 1. The basic features include the following:

A ‘social networking graph’ is used for representing and implementing the social network [5]. The actor profiles in the social network are termed as ‘user profiles’. A new term ‘social presence’ is coined in the social networking recently which explains the availability or the presence of the actors on the network. Previously the term used to showcase availability, or

being connected, or online. However, these days it is updated, which is notified by the ‘current status’, with a description stating the actor’s activity in real time. The types of relationship among the actors are defined by ‘Relation controls’ [4, 5].

There are different tools such as instant messaging, message board, dash boards which are used as the tools for communicating and interacting among the users, and are referred as ‘User participation tools’.

III. SOCIAL NETWORKING FOR IDM

Social network in healthcare can be classified with respect to the type of users. Figure 2 represents the three types of social networking that can be used in healthcare management.

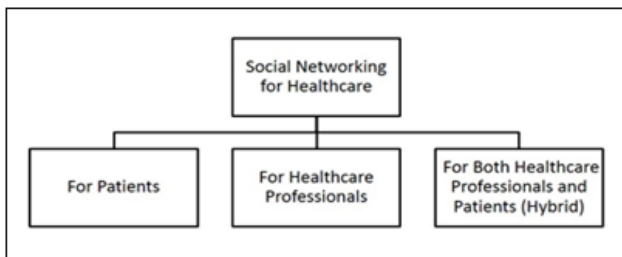


Figure 2. Social Networking Types for Healthcare.

A. Social Networking for Patients

The patients are the key participants in this type of social networking platform. The social graph in this type includes only patients and the relationships between them. Hence only patients can participate in communication and interaction on this platform, with no access to other actors. ‘PatientsLikeMe’ is an example of such social networking platform [6]. This type of social networking benefits the patients as they interact with other patients facing similar conditions and treatments, where they can openly share their feelings and provide support to each other. As it is not always possible for the patients to visit support groups, this type of social platform can be reliable and very useful in having friendly discussion, support and information sharing.

B. Social Networking for Healthcare Professionals

Healthcare professionals are the key participants in this type of social networking platform. The social graph in this type includes only healthcare professionals and the relationships between them. Hence this type of social networking platform is only dedicated to healthcare professionals, where they can share useful information with other participants. Various research updates can be shared among the participants, and can such platforms are very useful for knowledge sharing. Additionally, with no geographical boundaries, the professionals can share information regarding different cases, treatments, methods and practices at various locations [7]. ‘sermo.com’ is an example of such social networking platform.

C. Hybrid Social Networking for both Healthcare Professionals and Patients

Both healthcare professionals and patients are the key participants in this type of social networking platform. The social graph includes both healthcare professionals and the relationships between the patient to patient, healthcare professional to healthcare professional and patient to healthcare professionals and vice versa. This type of social networking effectively supports healthcare management as different information such as follow-up, test results, consultation, feedback, and reviews can be shared among the users. Additionally, it helps in real time information sharing and can be useful for information sharing among the patients who are in remote locations and doesn’t have clinical facilities. ‘Tudiatetes.org’ is an example of this type of social networking platform [8].

D. Social Networking Applications for IDM

Various social networking applications for IDM are reviewed in this section. The applications to be reviewed are categorized in to the following sections.

- Public social networking platform, which can be used by everyone and can also be used by patients with infectious diseases.
- A general social networking platform, which is specifically designed and developed for healthcare services, and can also be used by patients with various infectious diseases.
- A private social networking platform, which is specifically designed and developed for IDM, and can be used by patients with various infectious diseases.

Facebook is reviewed as the public social networking platform. There are various benefits of Facebook, as users can share information through various means. Users can post messages of some important information on their walls which can be viewed by other users. Messaging features can be used for sending personal messages, which can’t be viewed by everyone except the user to which the message is transmitted. Facebook also allows the users to launch applications on its platform, which makes it more functional and can be used for specific streamlined purposes. The security features also provide different settings which users can use in order to maintain their levels of privacy [9]. Additionally, the calendar feature it provides can be very useful for reminders and planning. Facebook can also be integrated with other mobile applications which ensure multiple levels of information access, and helps in interactive information exchange. Specific groups can be created on Facebook, where the users with common interests can participate. Companies or Organizations can also launch their institution specific pages, which can be followed by the people and can have up to date information in different fields [10]. Infectious Disease Society of America, Infectious Disease Institute are few pages which can be found on Facebook.

Twitter is another public social networking platform just like Facebook, but the modes of communication are different from that of Facebook. Twitter allows its users to send short messages, which are usually called as tweets. Tweets can be posted online through web interface or by SMS on mobile, or by using twitter application on mobiles. Most of the conversation on the twitter usually happens within few hours after posting the tweet, which is more like a real time communication for short period [11]. Whereas in Facebook the communication is on-going, and can go on for longer period. To follow some important discussions or a topic, twitter can be used as users can pinpoint their point of interests.

People with different infectious disease can follow disease specific pages or general infectious disease portals to increase their knowledge and awareness on both Facebook and Twitter. For example users can follow @TBAlliance on twitter to increase their knowledge and understanding of Tuberculosis, or can follow @inf disease_news to increase their understanding of infectious diseases and to be up to date with latest information on twitter. Similarly, users can follow different healthcare organizations which are disease specific or healthcare specific and increase their awareness. Additionally they can also participate in conversations by posting messages or tweets, and increase their social presence which could foster their self-management approach.

PatientsLikeMe is the one of the popular social networking application in the field of healthcare which allows users to understand disease symptoms, examine their medical conditions and review their condition [6]. The application supports 16 health related issues and supports patients emotionally by acting as a motivational technique [12]. The application allows users to share their views and experiences and also their recommendations which can be viewed by other users. It also allows the users to view their health related data over a period of time while under treatment or medical drugs graphically which ensures the effective analysis of the patient's improvement or medical condition. The application is integrated with online tracking and clinical trials. The patients who are interested can participate in clinical trials and

provide their health related data and feedbacks along with the response to drugs. This approach ensure in having a large database with different health related information, which can help in research and better understanding of various complications and medical conditions. It also benefits pharmaceutical companies, research laboratories, and educational institutions in inventing better approaches and cures to the various diseases [12, 13, 14].

CureTogether is another social networking application in healthcare which provides the basic services which include information sharing and emotional support [15]. The users of the application can share their information and can track their medical condition while highlighting the main cause which is emotional support [16]. The application allows the users to enter their medical condition which usually includes the information like symptoms, treatment, medication, cure, improvement etc., and can review their progress using rich graphical tools for better analysis. Additionally, the application also allows the users to view their medical details in analytical mode [14].

MedHelp is another popular social networking application in the field of healthcare, which interconnects patients and healthcare professionals, ensuring the delivery of medical advice and support. The patients can communicate with healthcare experts about their condition and receive feedback on the information they have provided. The application allows the users to manage their medical condition more effectively as they can directly discuss with healthcare experts [17, 18].

One of the most popular wireless mobile social networking system in the field of healthcare 'mCare' has many features which would help in better management of healthcare services [5]. There are different features which ensure information readiness, knowledge improvement, and information sharing. The system allows the users to share their questions or doubts and also the answers (if they knew) with their friends and physicians. The users can recommend physicians to their friends. Users can also categories their questions as favorites and can view them any-time, and have the ability to access their Google Health records [5].

TABLE 1. Summary Analyzing of Social Networking Applications for Infectious Disease Management

Social Networking System	Social Networking Graph	User Profiles	User Social Presence	User Participation Tools	User Relation Controls	Infectious Disease Management Tools
Facebook	Many	Many	Current status	Private messaging Instant messaging and other	Friendship	Participation tools are used for managing the patients' medical condition such as patients can update their status using this tool or share information on their wall
PatientsLikeMe	Patients	Patients	Current status	Private messaging Forum Instant messaging	Follow me	Patients can use the application to store the health related data, and can view their historical data using GUI tools.
mCare	Patients & Doctor	Patients & Doctor	Current status	Private messaging Ask Doctor	Friendship	N/A

There are both general and disease specific social networking applications available in the market. These applications offer information to the users in order to increase their knowledge and understanding of a medical condition, and also provide support by advising on precautionary and preventive methods [8, 19]. Patients who use these applications would be effective in managing their medical condition better than those who do not use such applications. These applications also ensure better healthcare services by reducing costs to a great extent. Apart from these applications, other options like individual blogs, diaries, and Wikis are also being used in order to gain information regarding nutrition, diet, medical conditions, symptoms, preventive measures etc.

From the above discussion, it can be concluded that social networking can be used as a tool to improve healthcare services but cannot completely replace physicians or clinicians. They are best used for information sharing, knowledge sharing, receiving feedback and advices. They are most useful for people in remote locations where they do not

have any access to healthcare services, as they can receive advice and treatment over the application. Furthermore, there were no previous studies found which dealt with IDM integrating social networking for Saudi patients. This area largely remained unexplored in Saudi Arabia, where there is an increasing trend in adopting internet and web technologies, with a high risk of infectious diseases. Table 1 compares some of the social networking platforms and their features.

IV. POTENTIAL EFFECTS OF SOCIAL NETWORKING ON IDM

As explained in the previous sections, social networking can be used as a tool in effective management of infectious diseases by using its features like information and knowledge sharing, emotional and motivational support, advice and treatment etc. However, there was no study found which addresses the impact of social networking in specific to IDM. From the literature reviewed, the benefits of social networking in IDM can be summarized in the following points.

Health Behavioral changes among the patients: Social networking can be used as an approach for achieving the behavioral changes in the people by increasing their knowledge and awareness, and preventive and precautionary methods about the various infectious diseases. It can be used as an education tool and also as a platform to exchange ideas and experiences. There are many social networking applications which are being used in this aspect. For example AAFP (American Academy of Family Physicians) has a Facebook page, and provides an open discussion for people with various medical conditions [20]. Accessibility, convenience and 24x7 support offered by the AAFP helps the patients to access information and undergo behavioral change

according to the advice or suggestions made on the social networking platform.

Improved interaction between physicians and patients: The social networking platform allows the patients to interact with physicians in a more effective way, overcoming the drawbacks of traditional clinical visits. It helps in reducing the healthcare costs and also helps the patients remotely access the healthcare services without being required to visit the clinics. **Effective utilization of healthcare resources:** The use of social networking platform ensures the effective utilization of healthcare resources. As most of the diagnosis or advice is being given online; this would reduce clinical visits as patients would require clinical visits only in an emergency. Therefore, the use of healthcare resources can be minimized and streamlined according to the needs, ensuring the cost cuttings.

Effective feedback and communication: As the overall communication is one to one most of the times, the relationship between the patients and physicians would be improved and better analysis of the patients' condition can be achieved which would ensure better feedback. Additionally, the information can be used by the research organizations and medical institutes to understand the medical conditions of the affected people in a more effective way, which would help them in finding better cures [4].

V. CURRENT STATUS & FUTURE PROSPECTS

The information regarding the IDM in Saudi Arabia is very limited and very few studies are found in this aspect related to the region. Therefore there is an immediate need to explore the IDM in Saudi Arabia and also to increase the research studies focusing on the design, development and implementation of web technologies for IDM in the region. The aspect of self-management and the use of social networking tools in IDM in the country also need further research to identify the possibilities of implementation for providing better healthcare. No previous studies were found in the region which dealt with integrating web IDM and social networking interventions. As this technology is new, and not many research studies were found in other regions, there is a need for in depth research in this aspect. Though there are disease specific web applications found, there are no applications found integrating social networking with infectious disease management tailored according to the needs and requirements of the physicians and patients in Saudi Arabia.

An increasing trend of internet and mobile usage is observed in Saudi Arabia especially among the educated and younger population. Taking it as an opportunity and advantage there is a need for formulating innovative and effective healthcare strategies in the country for promoting web technologies especially in managing infectious diseases, which can prove to be beneficial in many circumstances.

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