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Research Model to Identify the Characteristics of an Effective Medicine 2.0 Application

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ABSTRACT

This research in progress paper proposes a research model to identify the characteristics of effective Medicine 2.0 applications. The research will be carried out in two phases. First, the research will focus on investigating the empirical effect of using Med 2.0 Applications on Patient Outcomes. Second, those patients whose outcomes improved will be surveyed to determine what characteristics of the Med 2.0 Application they found useful. This phase will concentrate on examining the effect of Med 2.0 principles on the intention to use a Med 2.0 application. Underlying theoretical explanation of these results may be found in the Technology Acceptance Model and/or IS Success Model. For a research model we propose, if a Med 2.0 application improves patient outcomes the improvement is "caused" or at least explained by the Med 2.0 application mediated by Med 2.0 Principles used in the Med 2.0 application and further moderated by the Patient Demographic.

Keywords

Med 2.0 Principles, Med 2.0 Applications, Effective Med 2.0 Applications,

INTRODUCTION

Social Media Use and Healthcare

The use of Social Media has expanded from casual social groupings with familial or similar interests into the more carefully monitored and cautiously navigated healthcare arena. In fact, the advancement of Web 2.0 into healthcare is becoming so prevalent that the term Medicine 2.0 has been coined.

A report by The California Healthcare Foundation identifies the Web 2.0 movement as "user generated content, with social media technologies providing the platform for users to share health information and get support" Woodside (2012). And further, "social media includes electronic tools that improve communication, collaboration, content generation, and knowledge sharing" Woodside (2012). Medicine 2.0 adds two more principles- apomediation and openness.

Social Media tools in healthcare are valuable only if users actually use them. The literature reports that patients are using Social Media for healthcare support and that positive patient outcomes may occur when Social Media applications are used by stakeholders, etc.

Research by Gay and Peter (2011) uncovered changing attitudes by users in the United States regarding healthcare. Data from a telephone survey involving over 3000 adults found that "… *as mobile access spreads, more people have the ability – and increasingly, the habit – of tracking their workout routines, posting reviews of their medical treatments, and raising awareness about certain health conditions. There are pockets of highly-engaged patients and caregivers who are taking an active role in tracking and sharing what they have learned."*

However, even before the advent of electronic Social Media, research has shown, "The positive relationship between strong and supportive social relationships and health outcomes— and conversely, the negative relationship of isolation and limited social networks with health …" Heidelberger, C., El-Gayar, O. and Sarnikar, S. (2011). It seems reasonable that healthy outcomes would continue when the support is augmented by the use of Social Media or through Medicine 2.0.

And, even though Medicine 2.0 may not be the primary source of medical information, it may provide another avenue for information and affect eventual outcomes. "Research has found social networks have a significant effect on health decision making" Heidelberger, C., El-Gayar, O. and Sarnikar, S. (2011).

The California Healthcare Foundation reports "The support of an extended social network beyond family and friends to include neighbors, community member, healthcare providers, organizations, employers, and policy makers helps encourage behavior change" (Woodside 2012).

With the powerful tool of Social Media available, Woodside (2012) notes that "Social media in healthcare can lead to improved health outcomes, reduce costs, and improve productivity and employee health".

However, it is unclear from the literature the specific principles at work that make Medicine 2.0 efficacious for the improvement of patient outcomes. This paper seeks to develop a model to be used to determine the aspects of Medicine 2.0 that affect patient outcomes favorably.

The remainder of this paper presents the concepts of Social Media, Web 2.0, and Medicine 2.0. These concepts are then used to develop a research model intended to be used to investigate the effect of Social Media applications on patient outcomes and also explain those results.

SOCIAL MEDIA, WEB 2.0 TECHNOLOGY, AND MEDICINE 2.0 APPLICATIONS

Social Media

Social media may be defined as online applications used to share opinions, experiences, perceptions, information, etc. using various forms of media. For example, photos, video, music as well as text. A key concept in social media is: the consumers of the content are also producers of the content. And as such these users will provide feedback that will affect the intention to use and the effectiveness of a particular social media application.

Social media applications are designed and implemented using the principles of Web 2.0 technology. The next section provides a concise overview of Web 2.0 technology,

Web 2.0 Technology

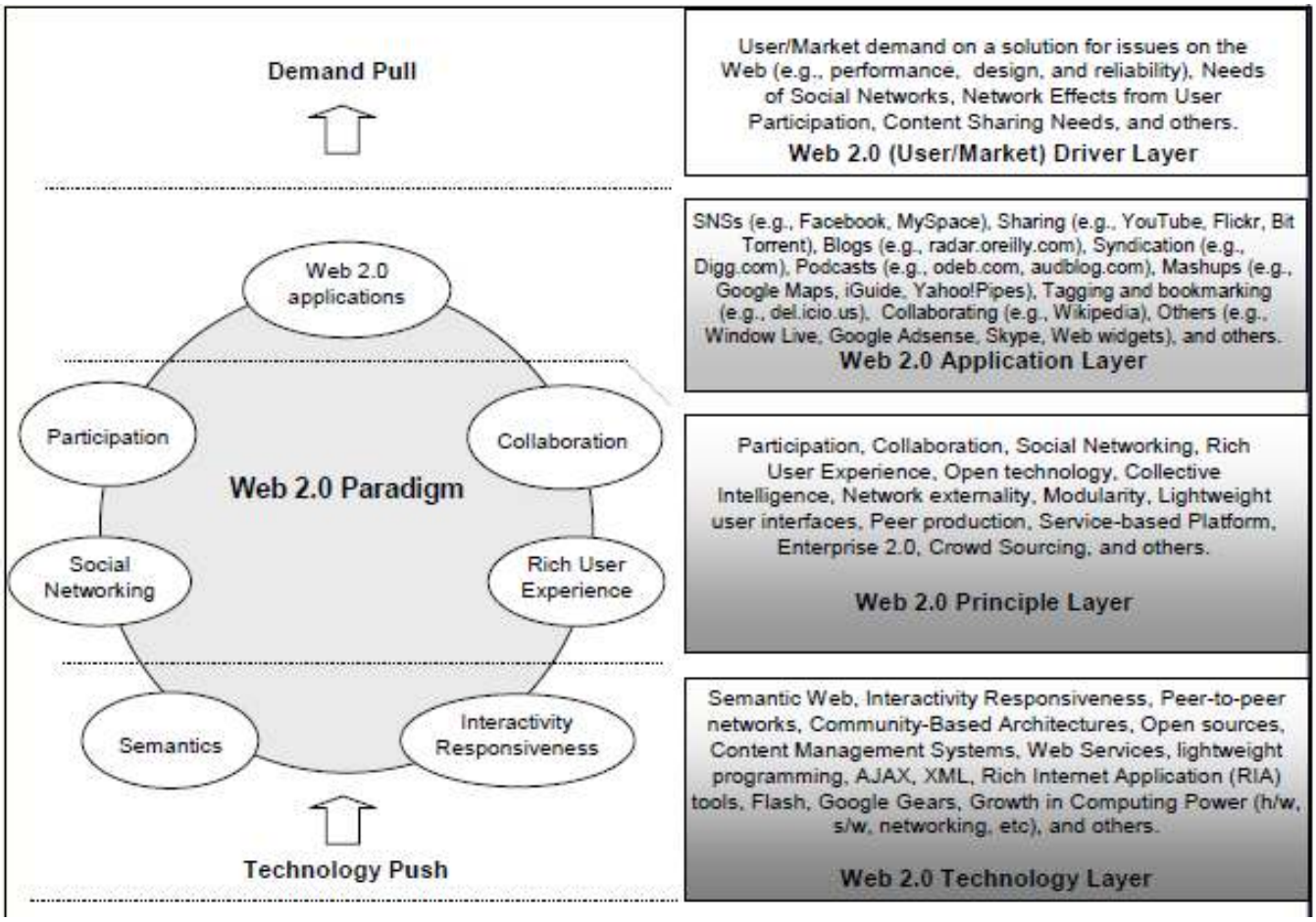

Figure 1 Web 2.0 Paradigm

A layered framework of the Web 2.0 paradigm is presented in Figure 1 above. This diagram is from Kim, D., Hall, S., Yue, K. and Gates, T. (2009) and presents one of the best high level view of the concept of Web 2.0. The four layers presented can be used to understand the use of Web 2.0 in the development and use of healthcare social media applications. In particular types of applications (e.g. SNSs, Blogs, et. al) from the Web 2.0 Application Layer are used to provide not only healthcare information may provide patient support. However the concepts of the Web 2.0 Principle Layer are used to design and implement the components of the Web 2.0 Application Layer we propose the components of the Web 2.0 Principle Layer may be used to explain an effective Medicine 2.0 application.

Medicine 2.0

Medicine 2.0 applications are defined as:

> *"Medicine 2.0 applications, services, and tools are defined as Web-based services for health care consumers, caregivers, patients, health professionals, and biomedical researchers, that use Web 2.0 technologies and/or semantic web and virtual reality approaches to enable and facilitate specifically 1) social networking, 2) participation, 3) apomediation, 4) openness, and 5) collaboration, within and between these user groups."* Eysenbach (2008)

Four of the five characteristics - social networking, participation, collaboration, and openness are similar to those in the Web 2.0 Principles Layer. The remaining one - "apomediation" is a term used to characterize another way for users to identify trustworthy and creditable medical information and providers of medical information. Apomediaction is in contrast to "intermediation" where there is an intermediary (e.g. physician) between the user (the patient) and medical information, and "disintermediation" where the user (the patient) is on his own to find relevant medical information.

In an application that employs apomediation there will be resources (people, software tools, etc) available to the user which will guide the user to the trustworthy and creditable medical information or providers of medical information they are seeking. This is similar to the listserv concept in Web 1.0 but unlike the Listserv the elements of the list will be available via Web 2.0 techniques (e.g. GUI, Crowdsourcing, Twitter Feeds, RSS, et. al.). Apomediation has the effect of opening access to bono fide medical information without the overhead of a healthcare moderator.

Next is an overview of a model that identifies the characteristics of an effective Med 2.0 application followed by a detailed description of the model and an example of how the model may be employed.

RESEARCH MODEL TO IDENTIFY CHARATERISITICS EFFECTIVE MED 2.0 APPLICATIONS

Patient Outcomes
Treatment Decision
Physician Decision
Healthcare Maintenance
Physician Dialogue
Pain Management
Diet and Exercise Management
Stress Management
Information Result
Symptom Reduction
No Readmission

Table 1

Med 2.0 Application Types
Blog
Microblog
Social Networking Site
Virtual World
Audio/Video
RSS
Portal
Wiki

Table 2

Med 2.0 Application Principles
Social Networking
Participation
Collaboration
Openness
Apomediation

Table 3

Patient Demographics
Age
Gender
Education
Computer Literacy

Table 4

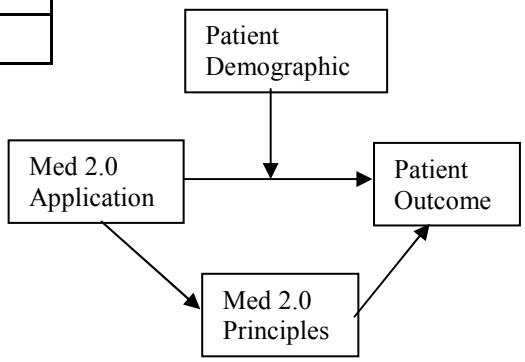

Figure 2 – Med 2.0 Research Model

Explanation of Model

The model is intended to be used in two steps.

The first step is a *medical condition – treatment - outcome* process where a particular medical condition is identified, a Med 2.0 application treatment is applied, and effectiveness of the "treatment" is determined by the patient outcome. The research will focus on investigating the empirical effect of using Med 2.0 Applications on Patient Outcomes.

The second step is, if the "treatment" results in improved patient outcomes then those patients who were successfully "treated" can be surveyed as to what characteristics of the Med 2.0 application they found useful or important. This research will concentrate on examining the effect of Med 2.0 principles on the intention to use a Med 2.0 application. Underlying theoretical explanation of results may be found in the Technology Acceptance Model and/or IS Success Model

Tables1, 2, 3, and 4 above contain values that can be used to instantiate a specific instance of the general model that can be used to determine the characteristics of a particular type of Med 2.0 application used to "treat" a particular medical condition.

Currently we propose, if a Med 2.0 an application improves patient outcomes the improvement is "caused" or at least explained by the Med 2.0 application mediated by Med 2.0 Principles of the Med 2.0 application and moderated by the Patient Demographic.

An Example of Use of the Research Model

Let us suppose a particular medical condition, say Cystic Fibrous (CF).

For those that may not know CF is an inherited chronic disease that affects the lungs and digestive system. A defective gene and its protein product cause the body to produce unusually thick, sticky mucus that clogs the lungs leading to life-threatening lung infections and obstructs the pancreas stopping natural enzymes from helping the body break down and absorb food. Of the 30,000 people, 55% of whom are under the age of 18, in the United States with this condition, most will experience symptoms of persistent coughing, at times with phlegm, frequent lung infections, wheezing or shortness of breath, poor growth/weight gain in spite of a good appetite, very salty-tasting skin and frequent greasy, bulky stools or difficulty in bowel movements. Health is maintained with daily treatment and regular clinic visits. During clinic visits, a patient's lung function is evaluated with a Pulmonary Function Test (PFT.)

Now let us suppose a Med 2.0 application has been designed to "treat" patients with this medical condition. Perhaps it is a virtual world application where participation in the virtual world educates the patient with this condition why the patient should perform a particular therapy. The choice of a virtual world application may be good choice given the age distribution of the patients with CF. The patient outcome in this situation would be a reduction of symptoms as measured by the patient's increased PFT values.

To carry out the experiment a group of patients with CF would be randomly partitioned into two groups: treated – those participating in the virtual world app and non-treated – those patients not participating in the virtual world app. After a period of time the average PFT values of each group would be compared.

If the treated group showed improvement in their PFT values then they would be questioned as to which of the five characteristics of Med 2.0 apps they found to be most influential in their intension to use the virtual world application.

CONCLUSION

This is a first draft of the model and as such it may be incomplete. For example, the list of Med 2.0 principles may need to be extended to include the principle of "push vs. pull" information. In addition it may need to be 'tightened up" in some areas. Nonetheless it is an attempt to understand how effective Med 2.0 applications may be designed and implemented.

If Med 2.0 applications become a component of a medical protocol for the treatment of a particular medical condition it important to use the best Med 2.0 application for that condition. An understanding of the "anatomy and physiology" of Med 2.0 applications will help to select the best Med 2.0appliction for the "treatment" of a particular medical condition.

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