Analysis of Patients Tweet Data for Understanding Impacts of Different Empowerment Patterns on Breast Cancer Patients

Web 2.0 refers to a second generation of Internet-based services—such as social networking sites, wikis, communication tools—that emphasize online collaboration and sharing among users [1]. As the term Web 2.0 distinguishes activities from traditional static and passive web pages from a paradigm of dynamic and interactive knowledge creation on the Internet, similarly Health 2.0 terms refers its usage in health care domain [2]. Health 2.0 defines the combination of health information with patient experience through the use of Information and Communication Technologies (ICT), enabling the patients to become an active and responsible partner in his/her own health and care pathway [3].

This new emerging type of patient called as 'empowered patient', indicating that information has impact on individual behaviour and creates a sense of control over ones well-being and health. Empowerment is viewed as a process of activating patients, who as a result of rejecting the passivity of sick role behavior and assuming responsibility for their care [4]. Internet as a source of information and social network empowers patients, changes patient-physician relations, their health related choices and decisions, and patterns of accessing health services [5, 6,7].

In literature there are many studies that address patients' information needs involving treatment decisions [8]. Patients request information to know whether they had a disease or not, the information on the illness, and their progress in treatment [9]. However the knowledge that many patients are reluctant to make treatment decisions is rarely addressed [10].

As empowerment is focused on how to help patients to become more knowledgeable and take control on their bodies, disease and treatment, there are many debate on the outcomes of it. Some authors argue that empowerment and control are not the same things. It is stated that empowerment assumption ignores some underlying factors of the decision-making capacity, which are linked to important dimensions of the patients' illness experience, such as their need for security, self-determination, and a continuous sense of self. Moreover in some cases, empowerment may be an indicator that the patient is avoiding awareness of the impact of illness on his/her life [4]. Even though empowered patient' can be perceived as desirable, enabling the democratisation of healthcare, it can also be constraining. Patient might experience a tension between self-reliance and compliance [11]. From the point of provider side such patients have been met with scepticism and some anxiety by health professionals, who fear more, rather than less [12].

While debates on positive and negative impacts of patient empowerment are going on, Internet and social networks continue to have strong impulse patient empowerment. In near future Web 2.0 technologies will lead to more radical reforms on patients' role in health care and the way that medicine is practiced. Therefore it is important to understand impacts of patient empowerment on real world. Obviously there are many ways or patterns that empowered patients obtain and use information. Those patterns might vary by type of sources; such as illness stories, health care providers sites, support groups, charities, survival sites, so on. Or by reliability of the exposed information ranges from official web sites of health care providers to commercial products. Or by how patient reacts to information; are they passive receivers or active responders. Another important aspect can be considered as disease type. Each disease type has different psychosocial impact on patients. Empowerment pattern of common cold would be significantly different from the empowerment pattern of cancer.

Data science and analysis of big data provides us valuable tools to analyse patients experience related with different empowerment patterns. In this research we aim to conduct a sentiment analysis on tweeter data to understand effects of different information sources on breast cancer patients.

Cancer domain has its own distinct features. For centuries a large number of deaths have been associated with cancer. When patients encounter the fact that they have cancer, beside the physical existence of disease, patients have to deal with psychological factors such as fear, stress and anxiety. There are several coping mechanisms for patients to deal with cancer, such as avoidance, distancing, focus on positive, so on. These coping mechanisms either negatively or positively, have a psychosocial impact of prognosis of disease, as well as influencing decision making process of patient and personal control level.

Our assumption is patient expresses different coping mechanism when they are sending tweets and emotional mode of patients can be identified by applying sentiment analysis on them. In our research, we aim to investigate whether different patterns of patient empowerment leads to different emotional modes; and if yes identify what type of information or interaction patterns are related to the different emotional states reflecting coping mechanisms.

We believe that analysis of big data can lead us to discover many hidden emotional status and empowerment mechanism patterns. Results would be beneficial for both health care providers dealing with cancer patients through many means, as well as researcher and health policy planners for designing and encouraging more beneficial patterns of empowerment tools.

In our methodology we will query tweeter data for selected keywords for breast cancer. Query results (hashtags) could be analysed according to a set of criteria including number of followers, or re-tweets. Top 50 hashtags with selected. They would be classified according to a set of criteria including their type, information content reliability, so on. Each class would be representing different pattern of patient empowerment mean. Later followers of each class will be identified and their tweets will be analysed to discover sentiments. Finally, it would be tested if there is a meaningful difference between the expressions of different type of sentiments among classes.

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