Improving Preventive Healthcare based on a User-centric Behavior[1]

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Recently, telemedicine has been helped by advances in mobile communication and the adoption of tablets and smartphones. For example, it's now easier to reach older patients whose medical access is often hampered by physical constraints. For example, mobile communications and portable devices permit monitoring of vital signs, no matter the patient's location. The Continua Health Alliance[2] and the Personal Connected Health Alliance[3] are examples of standards that made less painful the implementation of commercial services in this area.

It is now a reality that devices like electrocardiograms, blood pressure meters, oximeters, thermometers, scales, glucometers, pedometers and spirometers are connected wirelessly to a tablet or smartphone that transmits, point-to-point, information over a cellular network or the Internet to a healthcare center in the scope of, for example, a tele-homecare service. Currently, cloud services are starting to be used in the medical field for remote monitoring, so that it can act as hub to heterogeneous data generated by a patient – a user-centric approach. Homecare data and in-hospital data could be combined towards a more precise and personalized health prevention program.

Using cloud computing, medical professionals can access several medical centers if needed via Web services and RESTful APIs. They analyze the vital signs of their patients (e.g. using Java applets or HTML5), perform a diagnosis, send alerts to the mobile application, cross this data with previous in-hospital exams, and even contact patients via teleconference — all of that using a Web browser at the medical center, which provides on-demand access to the main application in the cloud (e.g. based on the Java EE computing platform).

The shared technology and infrastructure allows for lower costs. The goal is not to replace medical consultation, but rather complement and expand the service and combine homecare data with hospital examinations, offering guidance and monitoring from a distance. Besides, other very important information needs to be converged in this healthcare user-centric model: wellness and behavior data over time.

Nowadays, it is common to use "apps" and gadgets, i.e., wearables for wellness that are simpler to produce data and do not need to follow restricted healthcare regulations. Activity monitors, like Jawbone[4] or Shine[5], or simpler apps that calculates burned calories based on jogging or cycling can produce informative data that when combined with homecare signs and hospital examinations can produce rich information towards

[1] Position Paper

[2] http://www.continuaalliance.org/

[3] http://www.pchalliance.org/

[4] https://jawbone.com/

[5] http://www.misfitwearables.com/

prevention. However, the wellness field lacks of data standardization and our point of view is that the combination of such data generated by heterogeneous sources – some more informal and some more complex – can reflect patients behavior.

One of the important goals is to encourage prevention and health promotion through the user/patient's interaction with advanced technological tools. In line with the concept of social networks, patients could also interact with other people with similar medical situations in a social web-based environment, encouraging information exchange, and commitment to self-care. They should be encouraged to take an active role in their healthcare and systems like IBM Watson[6] could help the medical staff to track not only vital signs and complex examinations, but also combine with patient's behavior based on wellness data.

There are also financial benefits to this model. Use of technologies that improve the quality of preventive health and reduce medical costs has become a necessity since the costs of secondary and tertiary care are very high and constantly growing. For example, due to these benefits, the global telemedicine market has increased from about $8.2 billion in 2009 to a projected mark of $23 billion by 2015, according to consulting firm BCC Research.

Of course, there remain data interoperability and security and privacy issues. Health information must be protected to prohibit unauthorized access to patient records, as well as to guarantee data integrity and make sure that transmitted data are not maliciously modified. Finally, combining these data to data generated by smart homes regarding living behavior (e.g. sleep conditions) could lead to a more complex, but personalized and preventive medicine towards health prevention.

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[6] http://www-03.ibm.com/innovation/ca/en/watson/watson_in_healthcare.shtml