Chapter 17
An Education Driven Model for Non-Communicable Diseases Care

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ABSTRACT

Patients with chronic diseases should be made aware of their planned treatments as well as being kept informed of the progress of those treatments. The Chronic Prediction model was designed not only to educate patients and assist them with some chronic non-communicable disease, but to control the risk factors that affect their diseases. The model utilizes Bayesian networks to map three things: to identify the cause and effect relationships among existing risk factors; to provide treatment recommendations about these risk factors and; to aid caregivers in the treatment of the patients.

1. INTRODUCTION

Non-communicable Diseases (NCD) are the greatest contributors in the increasing of diseases incidents in developed countries and it's also increasing rapidly in developing countries. This is mainly due to demographic transitions and changes in the population's lifestyle associated with urbanization (Puoane et al., 2008).

NCDs include heart disease, vascular disease, cancer, chronic respiratory diseases and diabetes. Visual impairment and blindness, hearing impairment and deafness, oral diseases and genetic disorder are other chronic conditions also classified as NCD and compose a substantial portion of the quantity number of diseases (Abegunde & Vita-Finzi, 2005).

In general, deaths from chronic diseases are increasing dramatically between 2005 and 2015, while at the same time the number of deaths from communicable diseases and nutritional deficiencies are falling (Abegunde & Vita-Finzi, 2005).

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Until the end of 2015, there will be 64 million deaths, of these; 41 million deaths are projected to be caused by chronic diseases. Among these diseases, cardiovascular diseases will remain as the leading cause of death, with an estimation of 20 million deaths.

Health systems have historically been organized to quickly and effectively respond to any acute illness or injure that appears. The focus was on the immediate problem, its rapid definition and exclusion of serious alternative diagnoses and the beginning of the professional treatment. The patient's role was typically passive. As a complete clinical course of treatment may extend over days or weeks, there was little urgency to develop any self-management features for either patients or medical staff (Wagner et al., 2001).

Many people with chronic diseases face physical, psychological and social demands in their diseases without having much help or support from doctors. More often, the assistance received cannot provide optimal clinical care or attend to people's needs for the effective management of their diseases. This state of affairs is further aggravated if we also consider that NCD requires continuous and uninterrupted treatment (Wagner et al., 2001; Bodenheimer, Wagner, & Grumbach, 2002). It is important, therefore, that patients with some NCD should have quick and direct access of the current situation of their treatment, regardless of time or location. Moreover, it is important that patients be taught how to make decisions and how to look for alternatives in situations they do not face often.

Therefore, the rise of mobile devices with internet access, such as the smartphones, offers important features and great potential to ease the control and continuous monitoring of patients, mainly because the vast majority of people carry their smartphones everywhere, yet, pervasive internet access enables patients to look up for expert assistance when necessary.

U-Health services can be defined as health services delivered via ubiquitous commonly available technologies, such as RFID, biometric devices, and networks of ubiquitous sensors (Song, Ryu, & Lee, 2011; Yoo et al., 2007). In particular, u-Health can be used to monitor and manage the health of people, including those with some NCDs. Monitoring the health conditions of patients beyond the hospital environment has been of interest to researchers and physicians for many years. Physiological and psychological variables records, obtained online in real conditions, can be especially useful in the management of chronic disorders or health problems, such as for high blood pressure, diabetes, chronic pain or severe obesity (Korhonen, Parkka, & Van Gils, 2003).

The UDuctor model (Vianna, 2013; Vianna & Victoria Barbosa, 2014) was designed at the Mobile and Ubiquitous Computing Lab (MobiLab), belonging to the University Of Vale do Rio dos Sinos (Unisinos), in the state of Rio Grande do Sul, Brasil. It is a model for ubiquitous care which has as its goals the patient education and easing of integration among patients, community resources and health organizations. One thing to be noted is that patients are active participants in the management process of their chronic conditions. For example, diabetic patients can monitor their glucose levels obtained with their regular glucose measurements, store these results in a database and receive feedback. In addition, as a way to add value to the model, applications for mobile devices could use these data together with techniques of artificial intelligence to make predictions about the future status of the patient's health, generate diagnoses and trends based on such stored information, and make recommendations about new and better new possibilities to conduct the treatment.

2. BACKGROUND

2.1 U-Health and Chronic Diseases

Advances in sensor technologies, wireless communication and information technology in gen-