Chapter 7

Developing a Personalised Diabetic Platform Using a Design Science Research Methodology

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ABSTRACT

Type II diabetes is a rapidly growing non-communicable chronic disease that is causing significant concern to healthcare systems around the world. As there is no foreseeable cure, the most effective solution is to focus on strategies to control blood glucose levels by regular monitoring of diet, exercise, and when necessary, medication management. In today's environment, to do so effectively necessitates the need for a personalised self-management technology solution which can help patients take control of their diabetes. This chapter presents initial data from a research in progress study focused on designing a personalised diabetic application. The authors proffer a design science research methodology (DSRM)

approach to design, develop, and ultimately, evaluate a patient-centric diabetes platform. This application is not only a smart patient empowering solution which serves to guide patients and assist their care team with regard to diet, exercise, medication and their respective impacts on blood sugar levels but is also designed to be culturally sensitive.

INTRODUCTION

Diabetes Mellitus (aka Diabetes), a prominent chronic disease, affects individuals of all genders and ages across the globe (International Diabetes Federation, 2019). About 425 Million people were directly affected by both Type I and II diabetes in 2017 (International Diabetes Federation, 2019). This has rapidly grown to 463 Million in 2019 as reported by IDF Diabetes (International Diabetes Federation, 2019). The number is expected to grow further, to at least 578 Million individuals by 2030 (International Diabetes Federation, 2019) given the continuing increase of Type II diabetes in most countries due to a combination of issues including drastic change of lifestyle, diet and lack of regular exercise (Kharroubi & Darwish, 2015). Currently in Australia, over 1.3 million individuals have type 2 diabetes and this figure continues to grow exponentially (Shaw & Tanamas, 2012). If this growth continues, up to 3 million Australians over the age of 25 will have diabetes by the year 2025 (Shaw & Tanamas, 2012).

The most common complications of diabetes include damage to: (i) the large blood vessels leading to heart attack, stroke or circulation problems in the lower limbs; (ii) the small blood vessels causing problems in the eyes, kidneys, feet and nerves and (iii) issues with the skin, teeth and gums (National Diabetes services scheme, Diabetes-related complications June 2016); thus making it an unpleasant chronic condition that requires further invasive, ongoing and expensive healthcare attention if left unchecked.

As there is no effective cure for diabetes at this time, typical patient care focusses on maintaining appropriate blood glucose levels by focusing on appropriate diet, exercise and when necessary medication management (Khan et al., 2019). Critical to this approach is to empower patients with diabetes to actively engage in self-management regimens (Wickramasinghe et al., 2019). In this way, it is possible to avoid the nasty complications that can develop with uncontrolled diabetes and, in some cases, type II diabetes can be permanently reversed (Khan et al., 2019). Self-management generally involves daily monitoring of blood glucose levels and blood pressure and keeping these within the target ranges; eating a healthy diet focusing on foods with a low glycaemic index (GI); engaging in regular exercise, at least 30 minutes on most days; reducing weight if it is above the recommended range and quitting smoking (National Diabetes services scheme, Diabetes-related complications June 2016). Based on research conducted by inet International Inc., it was demonstrated that the majority of people with diabetes find self-management regimens difficult to follow on an on-going basis (Wickramasinghe et al., 2019).

Not only are the consequences of poor self-management potentially devastating for an individual with diabetes but also the pressures on the healthcare system with the alarming rising figures of individuals with diabetes is unsustainable (Shaw & Tanamas, 2012). For example, in Australia, 40% ($55 billion) of healthcare costs are for chronic conditions while $2 billion of that is paid by private health insurers. Moreover, hospitals see more patients for preventable operations and these individuals have higher risks

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