Chapter 5.7
An Investigation into the Use of Pervasive Wireless Technologies to Support Diabetes Self-Care

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ABSTRACT

Diabetes is one of the leading chronic diseases affecting Australians and its prevalence continues to rise. The goal of this study is to investigate the application of a pervasive technology solution developed by INET in the form of a wireless enabled mobile phone to facilitate superior diabetes self-care.

INTRODUCTION

Diabetes is a chronic disease that occurs when there is too much glucose in the blood because the body is not producing insulin or not using it properly. The total number of diabetes patients worldwide is estimated to rise to 366 million in 2030 from 171 million in 2000 (Wild et al., 2004). With increasingly growing prevalence which includes an estimated 275 Australians developing diabetes daily (Diabetes Australia, 2008), Australia is expected to be a significant contributor to this projected trend.

An estimated 700,000 Australians representing approximately 3.6% of the population were diagnosed with diabetes in 2004-05 and between 1989-90 and 2004-05 the proportion of people diagnosed with this disease more than doubled from 1.3% to 3.3%. Additionally, between 2000-01 and 2004-05, diabetes hospitalisation rates increased by 35% from 1,932 to 2,608 hospitalisations per 100,000 people (AIHW, 2008). Recent statistics also show that for every person diagnosed with diabetes, it is estimated that there is another who has yet to be diagnosed which doubles the

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number of diabetes sufferers (DiabetesAustralia, 2008). Diabetes is, thus, one of the fastest growing chronic diseases in Australia (AIHW, 2008; Chittleborough et al., 2007).

Diabetes can have a major impact on the quality of life of its patients and its long-term effects can evolve into serious complications. For instance, people with diabetes are at greater risk of developing cardiovascular, eye or kidney diseases, lower limb amputation and even reduced life expectancy than people without diabetes (AIHW, 2008; Rasmussen, Wellard, & Nankervis, 2001; Tong & Stevenson, 2007). These complications can lead to death, and currently, diabetes ranks as the sixth leading cause of death in Australia (DiabetesAustralia, 2008)

Evidence also shows that diabetes and its complications incur significant costs for the health system in Australia including costs incurred by carers, government, and the entire health system (DiabCostAustralia, 2002). For instance, in 2004-05 direct healthcare expenditure on diabetes was A$907 million which constituted approximately 2% of the allocatable recurrent health expenditure in that year (AIHW, 2008). Further costs include societal costs that represent productivity losses for both patients and their carers (DiabCostAustralia, 2002). Diabetes can, therefore, have considerable social, human, and economic impacts and tackling these requires solutions that substantially enhance the existing fragmented and uncoordinated capacity for effective prevention, early detection and management (VictorianGovernment, 2007). Hence, a treatment imperative is to provide patients with appropriate levels of monitoring to ensure containment of the disease and prevention of further complications. Given the exponential growth predicted for patients suffering from this disease coupled with the geographic spread across Australia (AIHW, 2008), a pervasive technology solution would offer the necessary monitoring that is both cost effective, convenient to both patients and clinicians and least disruptive to patient life style.

Recognizing the need to have a solution that can enable the ubiquitous monitoring of diabetes patients while also continuously educating them, the goal of this chapter is to investigate the application of a pervasive technology solution developed by INET International in the form of a wireless enabled mobile phone to facilitate superior diabetes self-care in the Australian setting. The realization of this goal can contribute by establishing a benchmark for theoretical and empirical testing. To achieve this goal, first, we provide a general background on the Australian health scene and critically review existing research. An elaboration of the proposed pervasive mobile technology solution and of the anticipated barriers and facilitators the Australian setting is then provided. Future trends are subsequently discussed before the chapter is concluded.

BACKGROUND

Current Australian Health Scene

Both healthcare professionals and people with diabetes require quality information if disease conditions are to be effectively managed, detected early and/or prevented. Recent research shows that there are several deficiencies and gaps in the information provided by the existing system for monitoring diabetes in Australia (Dixon & Webbie, 2006). First, data collected in hospitals are episode-based rather than patient-based which makes it difficult to determine statistics concerning individual admissions, re-admissions, and treatment patterns. Second, there is lack of data on incidence and prevalence by diabetes type that can help reliably assess the magnitude of the problem. Also, diabetes trend information across the population is sparse. Third, the accuracy of recording data in administrative data sets, such as hospital morbidity, mortality and general practice data is uncertain. Fourth, clinical management information is derived from uncoordinated and