

# Chapter 69

## Sleep Disorder Diagnosis: An Analytical Approach

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### ABSTRACT

*Sleep disorders are a significant and growing problem, both for the economy of the nation and for the physical and psychological well-being of individual sufferers. Physicians are under pressure to find ways of dealing with the backlog of patients. The purpose of this chapter is to investigate the operational, administrative, and medical environment within which sleep physicians diagnose patients with sleep disorders and develop an online support system that would efficiently gather patient history data and improve the effectiveness of patient-physician consultations, the diagnoses, and patients' self-management of any subsequent treatment plans. Investigations confirm that the physicians spend a large portion of the available consultation time on routine questions. In the new system, the patient information is captured by the patient completing an online questionnaire. Due to the reduction in time given for data collection, the physician can spend time with the patients discussing patient-specific symptoms and life-styles.*

### INTRODUCTION

Sleep disorders are a significant and growing problem, both for the economy of the nation and for the physical and psychological well-being of individual sufferers. Physicians, who deal with sleep disorders, and their administrative support staff and facilities, are under constant pressure to find more efficient ways of dealing with the back-

log of patients, many of whom face significant wait times before being able to attend a consultation.

The main symptom of a sleep disorder is excessive daytime sleepiness there are a number of lifestyle consequences associated with this. Deloitte Access Economics (2011) state that 8.9% of the Australian population are affected. The direct and indirect costs of sleep disorders to the Australian society in 2010 was 36.4 billion dollars

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(Deloitte Access Economics 2011). The indirect costs include co-morbidities<sup>1</sup> such as hypertension, lost production, transport and workplace accidents and social costs, such as learning difficulties. Physically, sleep deprivation may be associated with an increased risk of myocardial infarction (heart attack), type two diabetes, depressed immune response (Akerstedt & Nilsson 2003) and may present as depression. However treatment for sleep disorders reduces the direct and indirect costs restoring productivity and well-being to the individual and any organisation they are involved with. Sleep disorders are a chronic condition, so that for most conditions a treatment plan must be enduring requiring a considerable on-going commitment from the sufferer and partnership with their physician.

The estimate of 8.9% of the Australian population who have a sleep disorder is in all probability an underestimate with sleep disorders underdiagnosed in Australia (Deloitte Access Economics 2011), other countries report similar statistics (Young, Peppard & Gottlieb 2002) with the people who are referred for treatment being strongly symptomatic (Kramer et al. 1999). This means that there remains a sector of the population who are yet to seek treatment demonstrated by the direct costs of sleep disorders comprising only two per cent of the total cost. Sleep disorders commonly affect people around middle-age so as the population ages there are an increased number of people with sleep disorders with risk factors in adults being obesity, alcohol, smoking, nasal congestion and menopause (Young et al. 2002). The wait times for a consultation in a publically funded facility may be significant (Flemons et al. 2004). The wait times demonstrate a gap between demand for sleep disorder assistance and the ability of the most health services to provide for the current level of people referred to sleep clinics. Australia in common with other developed countries is also facing an aging population in which sleep disorders will become more prevalent (Alzougool, Chang & Gray 2008).

## INCREASING DEMAND FOR SERVICES

This increasing service demand and a shortage of sleep disorder specialists (Australian Medical Workforce Advisory Committee 2000; Patlak 2005) have driven the sleep community interest in changing the traditional model of care for sleep disorders to one that leverages information systems to provide efficiencies and timely communication flows (Colten & Alterogt 2006). Abidi (2001) refers to the strategic use of knowledge derived from healthcare data as being “... *pertinent towards the improvement of the operational efficiency of the said healthcare enterprise*” (Abidi 2001, p. 6) while Hirakis & Karakounos (2006) and Haux (2010) state that knowledge management in healthcare allows the development of best practice models, making guidelines explicit and encourages innovation through development of the resultant knowledge base.

The term health informatics was developed by the International Medical Informatics Association (IMIA). They defined the term as “a combination of computer science, information science and health science designed to assist in the management and processing of data, information and knowledge to support healthcare and healthcare delivery (Conrick 2006, p. 4). Health informatics now forms part of the infrastructure for the delivery of healthcare with one of the major fields of research being decision support (Haux 2010). Health informatics allows the timely retrieval and filtering of patient and disorder information so that care givers have appropriate information in a quickly assimilated format within their work flow. Health informatics is the overarching domain within which this project lies as this project aims to use information systems to assist in providing knowledge to support both the patient and physician in the diagnosis of sleep disorders.

One important avenue to leverage the capabilities of this project and its collection of sleep disorder data is that of business analytics. Chen,

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