Chapter 11
Leverage Healthcare Data Assets with Predictive Analytics
The Example of an Australian Private Hospital

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ABSTRACT

Multi-spectral data residing in disparate data bases represents a critical raw asset for today's healthcare organizations (Wickramasinghe & Schaffer, 2010). However, in order to gain maximum value from such data, it is essential to apply prudent technology solutions and tailored analytic techniques. The following chapter proposes how the application of bespoke predictive analytic tools and techniques can be designed and then applied to a hospital data warehouse, called the Hospital Casemix Protocol (HCP) Extended data set, in order to improve decision efficiency in the private healthcare sector in Australia. The main objective of this chapter is to present the developed conceptual model to demonstrate inputs, outputs, components, principles and services of predictive analytics for private hospitals.

INTRODUCTION

According to the Australian Department of Health and Ageing (ADHG 2013), the Hospital Casemix Protocol (HCP) dataset is a valuable source of information for the private health industry. This dataset includes clinical, demographic and financial information for privately insured admitted patient services from 1996/97. The Private Health Insurance Act 2007 (Private Health Insurance Act 2007, 2007) re-

quires HCP data to be submitted for any and all admitted patient episodes where an insurance claim is lodged with an insurer. This requirement is imposed on all declared hospitals public and private. Under this Act both private and public hospitals may be declared. However, public hospitals provide a less complete HCP data set than private hospitals although the long-term aim is for public hospitals to move to full HCP provision.

In 2011, due to the importance of improving information management practices, one of the largest private hospitals in Victoria, Australia, decided to develop a unique project entitled "HCP Extended" to address the following key issues, identified by the hospital as well as by most healthcare sectors:

- Inconsistency of data
- Manual manipulation
- Separate and unlinked data sources
- Results difficult to reproduce
- Unclear source or availability

In this paper, the pseudonym ABC hospital is used to refer to the hospital under study. The objective of the HCP Extended project in the ABC hospital was to develop a single source of truth, supporting high quality and faster analysis of activity, complications and outcomes as well as reporting at hospital, ward, clinical institute, visiting medical officers (VMO) and specialty levels.

To illustrate the benefits of the HCP Extended project for the private healthcare setting in Australia as well as for ABC hospital, exploratory research was conducted to apply intelligent technology solutions and predictive analysis techniques on top of the hospital data warehouse in order to create valuable outcomes faster, in both care processes and decision efficiency. In the past, analytics solutions were frequently limited to structured data, such as the data found in the electronic medical record (EMR) and claims systems. But now, predictive analytics enables us to incorporate unstructured data, such as doctors' dictated notes, discharge orders, radiology reports and more. Although there are several predictive analysis techniques developed for healthcare contexts, the question remains "What are the specific benefits of these solutions in a healthcare environment?"

Therefore, this chapter sets forth the need for predictive analysis tools as applied to the HCP Extended data set in order to address the following primary objectives:

- Predict drug complications, allergies and usage.
- Predict the rate, cause, and preventability of re-admissions.
- Predict key issues that allow negotiation with contractors and payees.

Further, the chapter will answer the key research question:

How can bespoke predictive analytic tools be applied to the HCP Extended dataset to gain maximum benefit and value to improve decision efficiency in private healthcare settings in Australia?

This research is focused on capturing the benefits and current barriers of applying predicative analytics to leverage healthcare data assets in order to improve decision efficiency, in private healthcare settings in Australia. Hence, this chapter presents the first steps in this research initiative, namely, the proffered

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