Chapter 7
Improving Pharmaceutical Care through the Use of Intelligent Pharmacoinformatics

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ABSTRACT

The expansion of drug-related problems urged healthcare organizations to adopt Pharmacoinformatics to signal, analyze and report Adverse Drug Reactions (ADRs). Data for this study have been compiled from local and international sources such as WHO. The study resulted into the development of an intelligent multi-agent decision support system including a process model, a multi-agent architecture and an integrated data processing model with clear description of agent functionalities. The model reflects three main modules: a data capture and update module, diagnosis module and a pharmaceutical care and drug monitoring module. The study also reflected on the practical and managerial environment of the model and the basic considerations to be taken into account. The study also provided some important recommendations.

INTRODUCTION

The use of information systems for the improvement of healthcare is gaining paramount importance. They increase information accessibility to healthcare providers (Makus, 2001) and increased convenience for patients (Fitzgerald, Piris & Serrano, 2008; Glaser & Foley, 2008). Their deployment by pharmaceutical care assists in the assessment and management of therapeutic outcomes in patients as well as in detecting, signaling, evaluating, and solving potential and actual drug-related problems (including adverse drug events or drug interactions). Within the context of a wider hospital management system, the use of information systems to assist in pharmacy-related decision making is known as "pharmacoinformatics". In addition to databases, such systems make use of different technological settings (including informatics, the internet, and interactive technologies) to assist in improving pharmaceutical care, patient safety and enhancing hospital management processes. They aim at improving the capacity of clinical practitioners

to efficiently acquire and develop new treatment strategies. The use of such systems by practitioners tends to focus on three main areas: facilitating information exchange, detecting and managing adverse drug events and enabling the supply chain management process.

However, despite the potential outstanding benefits to be gained by hospitals as a result of the deployment of powerful pharmacoinformatics applications, the realization of such applications is still limited. Currently, pharmacoinformatics applications are used as sub-modules of the corporate information system. Their roles tend to be limited to stock control, monitoring drug availability and issuance at outpatient and ward pharmacies. Even for stock control, there seems to be no emphasis on the use of electronic ordering and procurement processes for which no standard operating procedures exist. The analysis of drug therapies and management of prescription inconsistencies are not supported by the current pharmacoinformatics applications in use. Moreover, there is a considerable lack of emphasis on developing and deploying information systems for signaling and detecting adverse drug events manifested in patients and recorded by healthcare professional. While the role of Pharmacovigilance centers in analyzing and managing adverse drug reactions is fundamental, there is a considerable lack in using information systems to establish relationships between such centers and hospitals through which adverse events can be reported and tracked. As a result, hospitals tend to miss the technical support provided by national Pharmacovigilance centers.

Therefore, the aim of this project is to develop a reference multi-agent pharmacoinformatics model to assist in detecting adverse drug events and drug interactions, as well as improving hospital management. The model will be based on the use of multi-agent technologies which has proven to be suitable for tackling large, real-world problems (Gasmelseid, 2006).

1. PROJECT'S OBJECTIVES

This project highlights the different Pharmacoinformatics channels that have been used (by both healthcare professionals and patients) in hospital management and the provision of pharmaceutical care which involves identifying, solving, and preventing potential or actual drug-related problems (DRPs) with regards to a patient's drug therapy.

Despite the fact that there are a number of different approaches to the development of Pharmacoinformatics applications used for decision support, there is a general agreement that decision support systems are developed most successfully by an interactive, prototyping approach. The suitability of this approach for this project stems from the fact that complete information requirements of stakeholders are difficult to identify in advance and may change significantly over time. To achieve the aims of this project emphasis will be made on:

1. The articulation of the issues which can potentially affect hospital management processes and the quality of pharmaceutical care in public hospitals in pursuit of providing insights into how Pharmacoinformatics can potentially affect the future of healthcare.
2. The development of a process mode (including all decision models and processing functions relevant to the organization as a base for the transformation of data into information) and
3. The development of a data processing model (establishing relationships between the system's structure and dynamics.

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