Chapter 4
A Clinical Recommendation System to Maternity Care

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ABSTRACT

Nowadays in healthcare, the Clinical Decision Support Systems are used in order to help health professionals to take an evidence-based decision. An example is the Clinical Recommendation Systems. In this sense, a pre-triage system was developed and implemented in Centro Hospitalar do Porto in order to group the patients on two levels (urgent or outpatient). However, although this system is calibrated and specific to the urgency of obstetrics and gynaecology, it does not meet all clinical requirements by the general department of the Portuguese HealthCare (Direção Geral de Saúde). The main requirement is the need of having priority triage system characterized by five levels. Thus some studies have been conducted with the aim of presenting a methodology able to evolve the pre-triage system on a Clinical Recommendation System with five levels. After some tests (using data mining and simulation techniques), it has been validated the possibility of transformation the pre-triage system in a Clinical Recommendation System in the obstetric context. At the end the main indicators achieved with this system are presented in the Business Intelligence Platform already deployed. This paper presents an overview of the Clinical Recommendation System for obstetric triage, the model developed and the main results achieved.

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INTRODUCTION

Currently, in health institutions, there is an increasing amount of information. The need of making decisions the most correct as possible, emerges the Decision Support Systems (DSS) as a way of supporting the decisions of healthcare professionals based on evidences. In this context are inserted the Clinical Recommendation Systems, whose objective is the use of various computational techniques to achieve a particular purpose (Mackway-Jones K., 1997) (Filipe Portela César Quintas, José Machado, José Neves, & Santos, 2013) and recommending a clinical action.

Furthermore, the triage systems used in hospital emergency units may be considered a Clinical Recommendation System. In the case of *Centro Hospitalar do Porto (CHP)*, the triage system aims to select the type of patients in terms of clinical urgency, prioritizing the treatment response speed, the type of assistance and response resources to the level of urgency. So patients with a higher level of urgency and with increased risk of worsening of the disease, are attended as soon as possible. The most commonly used triage systems are those with five levels of severity, such as the Emergency Severity Index (ESI), the Manchester Triage System (MTS) and the Canadian Triage Acuity Scale (CTAS). The main limitation of this type of scales is the lack of flexibility, since usually they are used only in general emergency units and they are not specific for other units (Murray, Bullard, & Grafstein, 2004) (Portela et al., 2013). Due to this lack of flexibility for specific specialties, particularly for the obstetrics specialty, a pre-triage system was developed in 2010 in order to categorize the patients on two levels: Urgent (URG) and Consultation (ARGO) (Portela et al., 2013). It should be mentioned that this system only performs a routing triage. This system can forward the patient to the urgency (URG) - if the clinical features justify it, or for consultation - in the less urgent cases.

On the other hand, it is currently recommended by the general department of the Portuguese HealthCare (*Direção Geral de Saúde (DGS)*), more specifically by the *Comissão Nacional da Saúde Materna, da Criança e do Adolescente (CNSMCA)*, the use of the priority triage system with five priority levels in the obstetric emergency units (Infantil, 2013).

Having in consideration these two factors a set of studies was developed (Pereira, Brandão, Salazar, et al., 2014) (Abelha, Pereira, Brandão, Portela, Santos, & Machado, 2014) involving Data Mining and Simulation techniques in order to evaluate if it would be possible transforming the existing pre-triage system in a Clinical Recommendation Triage System for Obstetric (CRTSO). The Business Intelligence Platform (Brandão et al., 2014; Pereira et al., 2014) will contains several indicators about triage process (% usage room, type of patient, waiting time (expected, real, average, by level, among others). Additionally the own CRTSO also can be considered a Business Intelligence system due the way of how it was developed and