

Chapter 15

Knowledge Acquisition Process for Intelligent Decision Support in Critical Health Care

Filipe Portela

University of Minho, Portugal

Alexandra Cabral

SPMS, Portugal

António Abelha

University of Minho, Portugal

Maria Salazar

Centro Hospitalar do Porto – HSA, Portugal

César Quintas

Centro Hospitalar do Porto – HSA, Portugal

José Machado

University of Minho, Portugal

José Neves

University of Minho, Portugal

Manuel Filipe Santos

University of Minho, Portugal

ABSTRACT

An efficient triage system is a good way to avoid some future problems and benefit the patient. However, a limitation still exists. The triage system is general and not specific to each case. Manchester Triage System is a reliable known system and is focused in the emergency department of a hospital. When applied to specific patients' conditions (such as pregnancy), it has several limitations. To overcome those limitations, an alternative triage system, integrated into an intelligent decision support system, was developed. The system classifies patients according to the severity of their clinical condition, establishing clinical priorities and not diagnosis. According to the urgency of attendance or problem type, it suggests one of three possible categories of the triage. This chapter presents the overall knowledge acquisition cycle associated with the workflow of patient arrival and the inherent decision making process. Results show that this new approach enhances the efficiency and the safety through the appropriate use of resources and by assisting the right patient in the right place, reducing the waiting triage time and the number in general urgency.

INTRODUCTION

Usually, when a patient arrives to medical emergencies is submitted to a triage process to determine the priority of treatments based on the severity of their clinical condition. The waiting time depends on the patient condition and if arrives by ambulance or not. Apart from this, it is a quick process that normally takes between 2 and 5 minutes.

In the hospital environment various types of triage systems are used. The most commonly used are those with five levels of severity, such as the Emergency Severity Index (ESI) (Tanabe, Gimbel, Yarnold, & Adams, 2004), the Manchester Triage System (MTS) (Mackway-Jones, Marsden, & Windle, 1997), and the Canadian Triage and Acuity Scale (CTAS) (Beveridge, Ducharme, Janes, Beaulieu, & Walter, 1999). The main limitation with this type of scales is the lack of flexibility; normally they are only used in general emergency units.

Addressing to a specific type of emergency, in this case women who seek Gynecological and/or Obstetrics (GO) emergency care, was detected that the system they are using in the Hospital is not the most correct. They were assisted in the general Emergency Department (ED) of Hospital Geral de Santo António (HGSA) using the MTS, which hasn't been effective for GO due to the generality of the questions used for the triage.

In 2010, this type of care was transferred to Maternidade Júlio Dinis (MJD). MJD is a maternity hospital that provides care for women during pregnancy, childbirth and for newborn infants. Due to the failures detected in the triage system used, a new system was developed. However, the need for a triage system in MJD still exists because of the misclassification of non-urgent patients, when patient's severity is not identified at the triage stage, or if there is no accordance on what problems are non-urgent (Bianco, Pileggi, & Angelillo, 2003; Hayden, Jouriles, & Rosen, 2010; Rassins, Nasie, Bechor, Weiss, & Silner, 2006; Wuerz, Fernandes, & Alarcon, 1998).

Nowadays, in the ED of MJD, women who seek for GO emergency care (pregnant, non-pregnant, parous or primiparous) pass through a triage system that was specially developed for GO. However, some limitations remain due to:

- Limitations associated to the process of validating triage scales, because, even in developed countries, there are problems in conceptualizing validation methods (Twomey, Wallis, & Myers, 2007);
- The maternal different symptoms that is possible to have and the difficult to represent them. These symptoms normally require a continuous and special evaluation. It should also be stressed that the limited budgets for health care make crucial to prioritize patients' needs and assist them with the most appropriate resources;
- Having a single triage system can be not enough because sometimes the symptoms show a specific problem and, in other moment, a totally different disease. Joining that, having much information is difficult to disseminate this in the right time.

In order to support the decision-making process for a better healthcare in MJD distinguishing urgent and non-urgent patients an Intelligent Decision Support System (IDSS) was designed. The objective is, through the use of the knowledge discovery and data/text mining techniques predict the level of urgency and help to choose the better decision for each situation.

This IDSS will use the different data available, collected through the triage questionnaires, to help the emergency staff choosing the best decision to the women, in the moment they need the information.

To this approach the knowledge was obtained directly from the doctors' empirical and scientific experience to make the first version of decision models. Due to the particular gynaecological and/or obstetrics requests, other characteristics had

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