Statistical Modeling of Affluence to the Emergency Service of HESE

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The demand for emergency services in hospitals is a global problem affecting health professionals and users. This overcrowding is associated with several factors, including reduced access to other medical emergency or primary care services, and has led to delays in the care of urgent patients. Hospital do Espírito Santo de Évora, EPE (HESE) is the largest and main hospital unit in Alentejo, the one that offers greater differentiation and, in addition to receiving patients from Central Alentejo, treats more and more patients from Alto Alentejo, Baixo Alentejo and Alentejo Litoral. In this work, based on generalized linear models and control charts, we analyze the inflow of users to the emergency service, seeking to provide support for decision making by the service management team.

Public hospitals are an essential part of the National Health Service (NHS), and one of the main and most complex areas is its Emergency Department (ER). The medical care provided by this service is focused on urgent situations. However, there has been an increase in emergency department visits for episodes classified as less or non-urgent, according to data from the Reassessment Committee of the National Emergency/Urgent Care Network in 2010. The influx of non-urgent patients to the ER may lead to overcrowding of a hospital's emergency department, leading to excessive waiting times, deterioration of the clinical response and patient dissatisfaction. This international problematic of the ER has received special attention from the political authorities and the press [2] and is referred to as a worldwide problem [1], [3] and [4]. Characterizing a frequent user of the Emergency Department of Espírito Santo Hospital in order to understand the factors that lead him to an excessive demand for this type of services, can be very useful to decision makers. Based on statistical quality control, we will monitor the inflow to the ER according to the Manchester Protocol, allowing us to identify some factors that influence the inflow by color and to estimate the process ability to meet the specifications according to that Protocol.

The data we will analyze correspond to 148120 emergency episodes in 2018 and 2109. The average age of the user per episode is about 42 years with a standard deviation of 29 years. Just over half of the episodes resulted from women going to the ER (53%). The season of the year with the highest affluence was autumn in the months of October and December. Yellow episodes were about 40% in the two years of collection, constituting the highest occurrence, followed by Orange with 26% and Green with 24%. The affluence in the ER was also analyzed considering the days in relation to a holiday, i.e., holiday's eve, day before a holiday, day after a holiday, where 37% were registered in the days after a holiday. In relation to the daily affluence, as can be seen in Figure 1, it increases from 6 am on, with the highest peak occurring between 9 am and 11 am, and another peak being registered at 3 pm. Monday is the day of the week with the highest affluence.
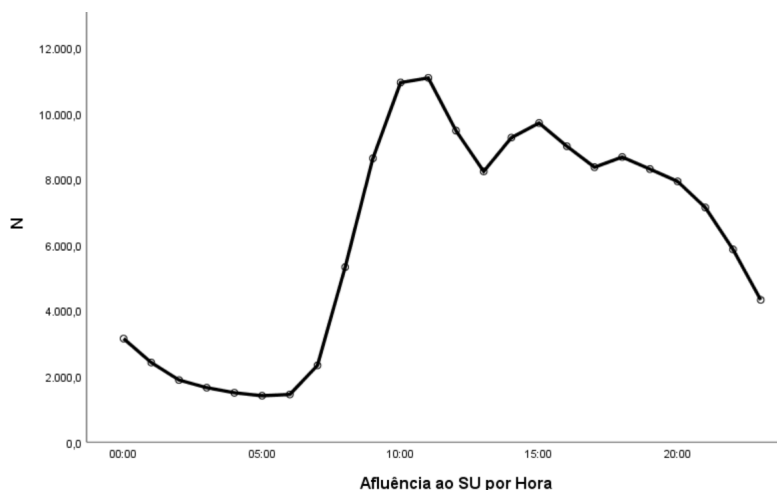

Figure 1: Turnout in the ER by hour.

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