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Assessment of forecasting models for patients arrival at Emergency Department

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Abstract

The unpredictability of arrivals to the Emergency Department (ED) of a hospital is a great concern of the management. The existence of more complex pathologies and the increase in life expectancy originate a higher rate of hospitalization. The hospitalization of patients via ED upsets previously programmed services and some cancelations may occur. The Hospital's ability to predict turnout variations in the arrivals to the ED is fundamental to the management of the human resources and the required number of beds.

Braga Hospital, in Portugal, is the subject of this work. Data for ED arrivals in 2 years (2012-2013), the test period, was studied and forecasting models based on time series were built. The models were then tested against the real data from the evaluation period (2014). These models are of ARIMA (AutoRegressive-Integrated- Moving Average) type, used software was the Forecast Pro.

Keywords: Forecasting models; Emergency Department; Optimization; Health costs.

2010 Mathematics Subject Classification: 62M10; 62M20; 62P25.

1 Introduction

In all societies, health resources are evaluated according to the populations' perceived added value of the services they provide [2]. One of the main features of the National Health System is the Hospital, which is a complex system of services divided in medical specialties relying on proficient practitioners and advanced technological equipment. The Emergency Department (ED) of public hospitals are an essential part of the Health System. Its primary objective is to provide immediate and accurate health care. Situations involving long-term care are forwarded for hospitalization or for follow-up in outpatient regimen. The growing demand for urgent consultations spring from the gradual ageing of the population and the lack of accessibility to primary health care, within the framework of the National Health Service. Overcrowding of emergency services is an international phenomenon that, if not correctly solved, impacts negatively on the quality of care provided, on clinical outcomes and on users' satisfaction [4, 13]. Several researchers have

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