

**Forecasting Staff in Emergency Departments  
NHS England**

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**September 2016**

**Dissertation submitted in partial fulfilment for the degree of  
Master of Science in Big Data**

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## **Abstract**

It is not an easy task when it comes to management of hospital resources, both facilities and medical personnel. Patients in Accident and Emergency Departments (ED) have high demands when it comes to service—and allocation of staff is no exception. Many studies are made in order to discover the reasons for ED overcrowding, resulting in patients' dissatisfaction in general. A number of publications research on the well-known problem of “beds availability”. They try to make calculation on how to accommodate the patients' volume providing that the number of patients are known, and to improve the ED throughput. Only a few studies are tackling the issue of forecasting the patients' volume in general and the number of medical personnel necessary to meet patients' requirements.

In order to improve hospital ability to capture and accommodate the diverse patient volume, each hospital should be able to plan and allocate its medical staff in timely-efficient and reasonably priced manner. By now, there are a number of systems, including many applications, developed for scheduling patients' appointments-mainly planned GP and specialists' visits. They are meeting the requirements of scheduling patients to the medical staff available at hospitals. When it comes to ED in hospitals, such planning is considered very difficult.

This work has the intention to provide a working tool to for ED in NHS England at present. Based on previously published study by Jones et. Al, 2008 [5] the problem with ED overcrowding is challenged in reverse order, through correct apportionment of medical staff to meet the demands in ED, so that to accommodate the patients attending the ED.

Data set used in this study comprises of numbers of patients arriving in each of the 249 ED departments in England, for 5 years for the period November 2010-June 2015. The patient flow is described in a model of the system, where seasonal autoregressive integrated moving average(SARIMA) is used to forecast daily patients' attendances at each of the ED.

Forecasted daily volumes of patients are coupled with the established statistically significant patients/medical staff ratio to provide means for adequate planning of medical personnel, relevant to the expected number of attendances, utilizing human resources and leading to cost-reduction.