

Optimization of Surgical Scheduling: Predicting Surgery Time Duration using Machine Learning

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Introduction: The operating room (OR) is a highly specialized hospital department that requires a large amount of resources which has a high impact on hospital funding (1). The OR is an essential area for the hospital operation and its management must guarantee the best efficiency and the highest quality of patient care. Despite some initiatives already implemented to meet the demand for surgical treatment, as described in the European Commission's 2021 report (2), waiting times for surgery in Portugal have increased in the last decade. Surgical scheduling is fundamental in the OR management (3). One of the challenges related to surgical scheduling is the prediction of surgery duration, which is essential for the allocating OR occupancy times. Currently, this prediction is essentially based on the surgeon's experience in a particular surgical procedure and may not take other variables into account (1).

Objectives: The aim of this study is to predict more accurately the duration of the surgeries in the specialties of General Surgery, Orthopedics and Urology by developing a model based in machine learning techniques with data from clinical records of surgical cases.

Methods: The sample of this study includes data from surgical cases performed in a hospital center. The following cases were excluded: Surgeries with patients under the age of 18; without a defined preoperative diagnosis; unspecified surgical specialties; no record of the start and/or end time of surgery and surgeries that took place on an outpatient basis. Multiple Linear Regression (MLR) and Random Forest (RF) techniques were applied to develop the model.

Conclusions: Accuracy in predicting the duration of surgeries can optimize the OR occupancy and at the same time decrease the waiting time experienced by the patients.

Keywords: Operating Room efficiency; Operating Room scheduling; Surgery scheduling; Machine Learning.

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