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Performance Analysis of ambulatory services using discrete-event simulation^{*}

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Abstract

Simulation modeling has become a well-established tool to aid healthcare decision makers in improving hospitals performances, identifying bottlenecks and evaluating alternative system design. In this paper, a discrete-event simulation model is developed to investigate the performance of key services in the trajectories of elective patients who are accepted for ambulatory surgery in a University Hospital in Belgium with varying numbers of necessary resources. The proposed simulation model is tested using data collected over a one-year observation period. In this model, an "As Is" scenario is implemented and two "what-if" scenarios are tested for possible system improvement. Computational results show that the flow of patients is influenced by the availability of resources.

Keywords: Simulation modeling, Patient trajectory, Ambulatory surgery

1 Introduction

In the past few years, performance analysis and customer satisfaction have become more and more important to service firms. Always regarded as a special service organization, healthcare system involves not only numerous human and material resources but also the delivery of equipment and material. In fact, it proves to be a hard problem to improve its performance and provide services to its patients in an efficient and effective manner. In order to achieve high quality services, it is necessary to understand the interrelationship between various services involved in the patient pathway due to the fact that patients are the most important customers to hospitals. Since discrete-event simulation (DES) models are capable of investigating the whole care process, identifying bottlenecks and evaluating system changes, they have become popular tools to aid health-care decision makers in improving the hospital performance[1].

Many successful applications of DES in the health care environment have been reported in the literature. Meier et al. [2] used DES to compare and evaluate eleven scenarios with different numbers of examination rooms and demand shifts of both hospital ambulatory center and independent surgical center. Centeno et al. [3] applied simulation modeling to analyze which factors affect the service time in the operating room and recovery area. Ramis et al. [4] implemented a DES model to evaluate a proposed future center for ambulatory surgery by

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