

An analytical model based on simulation aiming to improve patient flow in a hospital surgical suite

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Abstract

Surgical suites allocate a large amount of expenses to hospitals; on the other hand, they constitute a huge part of hospital revenues. Patient flow optimization in a surgical suite by omitting or reducing bottlenecks which cause loss of time is one of the key solutions in minimizing the patients' length of stay¹ (LOS) in the system, lowering the expenses, increasing efficiency, and also enhancing patients' satisfaction. In this paper, an analytical model based on simulation aiming at patient flow optimization in the surgical suite has been proposed. To achieve such a goal, first, modeling of patients' workflow was created by using discrete-event simulation. Afterward, improvement scenarios were applied in the simulated model of surgical suites. Among defined scenarios, the combination scenario consisting of the omission of the waiting time between the patients' entrance to the surgical suite and beginning of the admission procedure, being on time for the first operation, and adding a resource to the resources of the transportation and recovery room, was chosen as the best scenario. The results of the simulation indicate that performing this scenario can decrease patients' LOS in such a system to 22.15%.

Keywords: Simulation, discrete-event modeling, patient flow, hospital, surgical suite

1-Introduction

At present, optimizing health care centers encounter problems more than any other time (VanBerkel and Blake, 2007). All human beings have been part of this system from birth to death, and healthcare is considered as one of the influential factors affecting the economic growth rate of countries (Najmuddin et al., 2010). The systems in the healthcare area have many complexities at all levels (Hamrock et al., 2013). A complex system is a set of factors with indefinite relationships which its functionality is not generally predictable (Santibanez et al., 2009).

Hospitals are considered one of the most important sections of healthcare area, and they allocate more than 36% of the state expenses to themselves (Pham and Klinkert, 2008). Likewise, the surgical suite as the most important hospital department comprised of operating and recovery rooms, owns 40% share of total hospital expenses (Ozcan et al., 2017). Also, around 60 to 70 percent of the hospital admission is for surgeries (Hans and Nieberg, 2007). On the other hand, surgical suites are closely related to other hospital departments and improving their efficiency will have a significant effect on increasing the total efficiency of the hospitals (Ozcan et al., 2017). Thus, the importance of surgical suites and also the necessity of regarding patients as the center of attention in healthcare centers have made optimization of patient flow in the surgical suite a necessary work to do (Ozcan et

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