Chapter 3

Modeling Simulation-Based Agents for Reducing Operative Deferral in Oncology in a Virtual Scenario using Ergonomics

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ABSTRACT

For public hospitals, the patients are generally placed on a waiting list prior to having their surgery; it means that they have an elective surgery. The elective surgery is what can safely be delayed for more than 24 hours, but this usually is moved when some external factors are present, one of these is attributable to medical skills. For this reason, it is necessary to analyze the behavior of the last one to determine its relationship with the elective surgery performance and how it increases the surgical deferral. For purposes of the desired analysis, it is necessary to use one of the analysis complex system techniques, in this case the modeling and simulation agent-based.
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INTRODUCTION

Elective surgery is one of the leading healthcare public hospitals that provide efficiency and quality of scheduled service directly influences the increase of the surgical deferral. “Surgical interventions produce at least 7 million disabling complications and one million deaths a year worldwide. Half of these complications could have been avoided if applied systematically and efficiently the basic standards of care in rich and poor countries” (Berrueta, Malagón, Alvarado, Fernández, & Sosa, 2008). One of the reasons attributable to the surgical deferral is the lack of personnel (Berrueta et al., 2008) and in this context is necessary to identify the influence of each surgeon in performing elective surgeries and the effect it has on the surgical deferral. Therefore, a previous analysis of medical competence is a complex system, i.e., the behavior of a social system or society of agents (Medina Ramírez, 2013). Simulation software environment that allows the same model of the skills and attitudes of surgeons and the result of integrating a simulated surgery department then seeks to develop a simulation model agent-based (Gilbert, 2004; Izquierdo, Galán, Santos, & Del Olmo, 2008).

General Objective

Determine the effect of heterogeneity in the surgeon skills that influence in surgical deferral by applying the technique of analyzing complex systems such as agent-based modeling.

Specific Objectives

- Characterize the surgeon skills in a surgical procedure.
- Build a conceptual model of the current allocation system using agent-based modeling.
- Develop a mathematical model that represents the relationship between the performance of elective surgical and medical skills in a surgical procedure.

BACKGROUND

Nowadays exist a quantitative assessment of the efficiency of the operating room, by identifying variables proposed by the working group such as start time of surgery (Secretaría de Salud Pública (SEP, 2002). Campaña Nacional por la Calidad. Lineamientos Operativos del Sistema de Monitoreo para la Gestión de la Calidad, 2002), the percentage of cancellations, time changes and long delays. Only collection and analysis of data are collected (Bejarano, 2011). Another research is what assesses the work performance of doctors in Cuba in which uses empirical methods such as questionnaires, interviews, and surveys applied to teachers and students. In each case, the universe and the corresponding sample, as well as the considerations for choosing a strategy to establish a specific assessment model, was established. (Salas Perea, 2010). Finally, it was found a research that presents a classification of competencies profile surgeon in Mexico, by the critical incident technique 998 positive and negative incidents, information was grouped by similarities for identifying functions and activities were collected (Abreu et al., 2008).

At the present time the surgical deferral, i.e., elective surgery is again scheduled, is considered a critical impact on hospitals, whether public or private, generating major problems initially presenting...