

Definition of Strategies for the Reduction of Operational Inefficiencies in a Stroke Unit

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Abstract

Stroke disease is the second common cause of death in the world and is then of particular concern to policy-makers. Additionally, it is a meaningful problem leaving a high number of people with severe disabilities, placing a heavy burden on society and incurring prolonged length of stay. In this respect, it is necessary to develop analytic models providing information on care system behavior in order to detect potential operational inefficiencies along the stroke patient journey and subsequently design improvement strategies. However, modeling stroke care is highly complex due to the multiple clinical outcomes and different pathways. Therefore, this paper presents an integrated approach between Discrete-event Simulation (DES) and Markov models so that integrated planning of healthcare services relating to stroke care and the evaluation of potential improvement scenarios can be facilitated, made more logically robust and easy to understand. First, a stroke care system from Colombia was characterized by identifying the exogenous and endogenous variables of the process. Afterward, an input analysis was conducted to define the probability distributions of the aforementioned variables. Then, both DES and Markov models were designed and validated to provide deeper analysis of the entire patient journey. Finally, the possible adoption of thrombolytic treatment on patients with stroke disease was assessed based on the proposed approaches within this paper. The results evidenced that the length of stay (LOS) decreased by 12,89% and the mortality ratio was diminished by 21,52%. Evaluation of treatment cost per patient is also carried out.

keywords

Discrete-Event Simulation (DES), Healthcare modelling, Markov model, Stroke