Healthcare Analytical System to Predict Necessary Resources in Case of Crises

TREO Talk Paper

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Abstract

In general, there are two kinds of modeling methods to study the behavior of a real-world system, physical or logical. Examples of such systems are hospitals, airports, traffic networks, banks, and manufacturing facilities. Researchers use simulation modeling in situations where experiments are not possible because either the process does not exist nor is cost-effective (i.e., it is too expensive) to perform in a real-world setting (Pérez et al. 2017). While in some cases, traditional mathematical methods such as queuing theory, differential equations, and linear programming have been and can be used, introducing real-world complexity and randomness encountered in healthcare with such methods are inadequate, these methods cannot represent the system by just deriving an analytical model (Pérez et al. 2017). These cases, such as the case with Zika and the healthcare model called for simulation modeling as it is the only method that can handle the complexity found in any real-world setting.

Based on the information given about a clinic located in Midwest region of USA, simulated models were generated to estimate the average amount of time that a patient (child or adult) spends waiting to see a nurse and/or physician with & without increasing the number of physicians. In this particular situation, the hospital will use a healthcare analytical system titled SAS Simulation Studio (Figure 1) to predict the necessary resources to govern the emergency situation. By utilizing historical data, such as the average amount of time that a patient spends waiting to see a nurse and/or physician, a discrete-event simulation of resource scheduling was applied to estimate the number of additional medical doctors need to be hired.

This talk will cover a solution to a case where the Zika Virus hits the town in which this urgent care clinic is located. Based on a historical data given about this clinic the analytical system will be used to answer What if type questions. Finally, the generated simulated models to estimate the average amount of time that a patient (child or adult) spends waiting to see a nurse and/or physician will be discussed. Furthermore, a study of the value of multiple replications for discrete-event simulation models will be defined along with factors that enable greater control of multiple design points with this simulated experiment.

References