

Modelling a Hospital as a Queueing Network: Analysis for Improving Performance

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Abstract : In this paper, the flow of different classes of patients into a hospital is modelled and analyzed by using the queueing network analyzer (QNA) algorithm and discrete event simulation. Input data for QNA are the rate and variability parameters of the arrival and service times in addition to the number of servers in each facility. Patient flows mostly match real flow for a hospital in Egypt. Based on the analysis of the waiting times, two approaches are suggested for improving performance: Separating patients into service groups, and adopting different service policies for sequencing patients through hospital units. The separation of a specific group of patients, with higher performance target, to be served separately from the rest of patients requiring lower performance target, requires the same capacity while improves performance for the selected group of patients with higher target. Besides, it is shown that adopting the shortest processing time and shortest remaining processing time service policies among other tested policies would results in, respectively, 11.47% and 13.75% reduction in average waiting time relative to first come first served policy.

Keywords : queueing network, discrete-event simulation, health applications, SPT

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