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A multi-type queuing network analysis method for controlling server number in the outpatient

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High outpatient rates in healthcare in China besides a lack of healthcare resources has resulted in long queues, leading to excessive delays in addressing the patients treatment. Patient influx in outpatient departments cannot be scheduled or controlled significantly because fewer patients choose to make an appointment with doctors in China.

This shortcoming in Chinese outpatient settings is basically "three-long and one-short" queue (long-time queuing for the registration and paying, long-time waiting for doctors' consultation, long-time waiting for the examination and short-time doctors' consultation), observed commonly in big general hospitals.

The queuing theory, based on mathematical models, can successfully address the problems in health care system and assist the hospital management to efficiently cater to outpatients. Most of the literature on the queuing theory research on the outpatient department presents the outpatient system as a single server node and each service node is studied in separation.

Moreover, few queuing network models are used in outpatient research. Previous queuing network models in the outpatient are for limited networks such as a tandem queuing network that makes entry of patients in each service node in the same order, not considering the different type of patients who visit service nodes in different orders. The purpose of

this paper is to establish a multi-type queuing network model. Each type represents a different patient type who visits service nodes in one order. The model contains all the service nodes in the whole outpatient process and then allocates the number of servers in the outpatient resource.

This multi-type queuing network analysis method can assist in the organization of server resources more effectively with limited resources and excessive demand, and can be an important innovation in hospital management.

More information: Zhu Mingzhu et al, A Multi-Type Queuing Network Analysis Method for Controlling Server Number in the Outpatient, *The Open Automation and Control Systems Journal* (2016). DOI: 10.2174/1874444301608010021

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