

Application of Queuing Models to Reduce the Waiting Time: Case Study Based on Dental Clinic of Colombo South Teaching Hospital

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One of the major essentials in improving efficiency in the provision of health care services is patient flow. The growing population and health-need due to adverse environmental conditions have led to escalating waiting times and crowding in government hospitals. Queuing theory has effectively been applied to various fields including health care. According to the previous literature, the application of queuing theory enhanced the efficiency of the waiting time of both dentists and patients. As a developing country, Sri Lankan government hospitals also face the challenge of queuing problems. The problem of this study is identifying an appropriate queuing model to enhance the efficiency of waiting time in the Dental clinic in Colombo South Teaching Hospital (CSTH). This study has used the secondary data obtained through the annual bulletin of Colombo South Teaching Hospital Statistic unit, Hospital data Queries and also primary data were obtained by the direct observations and structured questionnaire within January 2019. In the analysis purpose, this study mainly used queuing approach with M/M/1, M/M/S, M/M/S/N systems and the service disciplines like first come first out, priority and shortest job first. Under these queuing models, study has calculated the various parameters to measure the queue performance in a dental clinic in the CSTH. In this case study use M/M/4 queue model to characterize the patient flow in the Dental clinic of CSTH and M/M/S/N system characterized at the light surgery section of the dental. Under these queuing models, this study has measured various parameters such as Utilization factor, Average queue length, Average number of system, Average waiting time in the queue, Average waiting time in the system, Idle time of the servers and Probability of exactly n customers in the system, etc. The Multiple Single-Server queuing model is employed at the dental clinic. This implies that patients on arrival to the clinic join a queue to see any out of about 3 to 5 doctors who are consulting at the same time. All dentists have a single line of patients waiting to be attended to and the patients are directed to the queues by the nurses and record staff of the clinic. The patients are directed to queues in the order they arrived. This study has considered that the number of dentists is less than with the number of beds. Practice shows that the majority of the cases the dentists can deal with more than 1 patient in 25 minutes. Some of the suggestions from patients included more dentists be employed to reduce waiting time on the queue, doctors need to come on time to avoid stagnation of patients at the clinic, first-come-first-serve discipline should be observed on the queue to ensure fair play, and records staff should not take bribe from patients for the purpose of jumping the queue. Queues should arrange on the aspect of service provided by each dentist.

Keywords: Dental Clinic, Efficiency, Patient flow, Queuing models, Waiting time

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