

SIMULATION STUDY OF THE OPTIMAL APPOINTMENT NUMBER FOR OUTPATIENT CLINICS

Zhu, Z. C.; Heng, B. H. & Teow, K. L.

Department of Health Services & Outcomes Research, National Healthcare Group, Singapore
6 Commonwealth Lane, Level 04-01, GMTI Building, Singapore 149547

E-Mail: zhecheng_zhu@nhg.com.sg

Abstract

This paper analyzes the appointment scheduling systems in specialist outpatient clinics (SOC) to determine the optimal number of appointments to be planned in one session under different performance indicators and consult room configurations. A discrete event simulation model is constructed to model the workflow of a SOC considering three consult room configurations. Ground data are collected to generate model parameters including consult time, no-show rate and lateness rate. An appointment rule based on Bailey's rule is proposed to generate appointments with various numbers of planned appointments in one session. Simulation results are measured by performance indicators including patient queue, patient waiting time, doctor utilization and doctor overtime. Simulation results show that the optimal number of planned appointments varies according to different operational requirements and consult room configurations. Study in this paper provides a guideline to choose the optimal number of planned appointments according to specific requirements.

(Received in December 2008, accepted in May 2009. This paper was with the authors 2 months for 2 revisions.)

Key Words: Appointment Scheduling, Discrete Event Simulation, Outpatient Clinics

1. INTRODUCTION

An outpatient clinic is a private or public healthcare facility which is devoted to diagnoses and treatments of outpatients [1]. There are many types of outpatient clinics and functions of clinics vary from country to country [2]. For example, a general outpatient clinic provides general treatments for patients of all kinds of diseases. A specialist clinic offers sophisticated diagnoses and treatments for a specific disease. In Singapore, there are mainly three types of outpatient clinics: general practitioner (GP), polyclinic and specialist outpatient clinics (SOC). GP is a private medical practitioner who provides consultation and medicine in the neighbourhood. Polyclinic is a government clinic covering a wide range of treatments for subsidized patients. SOC is clinics associated with hospitals and medical centres. Each SOC is specialized on one type of diseases, e.g., orthopedic clinic, ear, nose and throat clinic, eye clinic.

Among the three types of outpatient clinics, GP and polyclinic mainly accept walk-in patients and SOC mainly accepts patients with appointments. Patients are referred to SOC by GP or polyclinics. Schedulers in SOC make an appointment for each referred patient by picking up a free slot of a specific specialist through the appointment management system. The number of available slots is determined by multiple factors, e.g., doctor workload, target revenue. Compared to walk-in based clinic, SOC has several advantages [3], e.g., patients are able to see their preferred doctors and continue to see the same doctor for their follow-up visits; waiting time of patients with appointments is usually less than those walk-in patients.

An SOC itself is a complex system which contains complex workflow and various uncertainties. Many constraints should be considered during the appointment scheduling phase. On the system side, many doctors work in an SOC simultaneously. Hence the

5. ACKNOWLEDGEMENTS

The authors wish to sincerely thank staffs in the Singapore public hospital for providing source data used in this study and professional opinions.

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