

Scheduling Patients' Appointments: Allocation of Healthcare Service Using Simulation Optimization

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Abstract: In the service industry, scheduling medical procedures causes difficulties with both patients (waiting times) and management (decision-making). Factors such as fluctuations in customer demand and service time have affected the performance of appointment scheduling systems. This research develops four appointment scheduling policies (Constant Arrival, Mixed Patient Arrival, Dome Pattern Arrival, and Irregular Arrival) to apply in an ultrasound department of a hospital in Taiwan. Based on the combined mathematical programming and simulation optimization procedures, the results of the proposed policies are presented and compared. Furthermore, this research performs sensitivity analysis for key performance indicators (KPIs), such as the average total idle time, average patient waiting time, and average overtime of each ultrasound room. The findings show that in terms of the results of the KPIs and the practicality of implementation, the Mixed Patient Arrival Policy is recommended. Therefore, the outcomes will be useful for hospital managers in allocating their healthcare service capacities.

Keywords: *Appointment Scheduling; Healthcare Services; Scheduling Policy; Simulation Optimization*