Case Study: Emergency Room (DES)

Patients arrive at the Emergency Room following an unknown probability distribution (stream 1). They will be treated by either of two doctors.

A proportion of the patients are classified as NIA (need immediate attention) and the rest as CW (can wait). NIA patients are given the highest priority, 3, see a doctor as soon as possible for 40 ± 30 minutes (stream 2), then have their priority reduced to 2 and wait until a doctor is free again, when they receive further treatment for 30 ± 20 minutes (stream 3) and are discharged.

CW patients initially receive a priority of 1 and are treated (when their turn comes) for 15 ± 10 minutes (stream 4); their priority is then increased to 2, they wait again until a doctor is free, receive 10 ± 5 minutes (stream 5) of final treatment and are discharged.

An important aspect of this system is that patients who have already seen the doctor once compete with newly arriving patients who need a doctor. As indicated, patients who have already seen the doctor once have a priority level of 2 (either increased from 1 to 2 or decreased from 3 to 2). Thus, there is one shared queue for the first treatment activity and the final treatment activity. In addition, we assume that the doctors are interchangeable. That is, it does not matter which of the two doctors performs the first or final treatment.

Simulate for 20 days of continuous operation, 24 hours per day. Note, the inter-arrival time and type of 100 patients are collected (based on a randomly selected weekday data). The data is attached.

1. Analyze your results and explain your suggestions for reducing the waiting time of the patients.
2. What is the average flow-time for NIA and CW patients before or after applying suggestions. different suggestions.
3. Discuss the utilization of doctors before or after applying suggestions.