

Exact and Approximate Results for the Kit Management Problem

by Refik Güllü

Consider a company supplying hospitals with medical equipment to be used in orthopedic surgeries. Surgeons performing such operations often demand a set of items (for example, implants), rather than a specific item due to uncertainties in the surgery. The set of medical items (a kit) is needed to be delivered before the operation, and a missing item in a kit is not acceptable. Therefore, demand occurrences are not for individual items, but for kits. Also, there may be types of items that occur in different kits, and therefore the inventories are kept for the items instead of kits. In this talk, we present the kit planning problem motivated by the health care application mentioned above. We assume that the kit demands occur according to a Poisson process and whenever a kit demand occurs, only one item from the kit is used and the rest is returned. The item that will be used from the kit is not known in advance and the whole kit has to stay at the demand site for the whole duration. The used item is replenished through a stochastic supply system, with possible capacity limitation. Our aim is to present exact expressions for the kit availability probability (the service rate of the supplier company), and we provide approximate procedures for cost-based performance measures.