Previous research has found that certain operations management techniques used within both the service and manufacturing industries may help increase efficiency. As demand for healthcare increases, key stakeholders are continually working to optimize hospital workflows, designs, and therapeutic delivery. From the perspective of operations management, an emergency department (ED) is a system that consists of different facilities related to each other, and the proper placement of these facilities should contribute to overall operational efficiency. “Process mining” is a method for extracting information concerning activities and their causal relationships using data logged within an information system. Process mining may help designers better understand and improve ED functions.

This study used data from a large (approx. 80,000 visits per year) Korean hospital spanning a period of 61 days. In order to optimize the assignment of clinical units to available spaces within the hospital, research was conducted aimed at minimizing patient movements. The researchers used a goal programming (GP) approach, which enabled the consideration of several factors simultaneously.

The optimal ED layout identified through the equation used by the researchers reduced the travel distances of both critical and noncritical patients by 53.5% and 43.9% respectively. It was found that the ED’s present layout (at the time of study) was already optimal in terms of design preferences for overall space utilization. A third layout that combined maximized design preferences for space and minimized patient movement resulted in a decrease of critical and non-patient travel by 36% and 28% respectively. The authors conclude that optimizing layouts in order to...
achieve one goal affects all other potential goals, while a GP approach can factor in multiple conflicting objectives at once for a more balanced form of optimization.

Limitations

The authors note that their proposed method is not intended nor suited to completely automating the healthcare design process. Many unpredictable factors that occur in real-time hospital operation could not be accounted for in the operations management models used in this study. This study was also conducted within one location across a relatively short period of time.