یازدهمین کنفرانس بین‌المللی
مهندسی صنایع
۱۷ تا ۱۸ دیماه ۱۳۹۳
11th International Industrial Engineering Conference
7-8January 2015

An Integrated Approach for Improvement of Quality Care

A. Azadeh[1], M. Sepahi[1],S.Motevali Haghighi[1 2]

[1] Department of Industrial Engineering, College of Engineering, University of Tehran, Tehran, Iran
[2]Department of Industrial Engineering, Esfarayen University of Technology, Esfarayen, 9661998195, Iran

***Abstract*— In this paper computer simulation and CCR output-oriented Data Envelopment Analysis (DEA) model are used to evaluate the efficiency of various alternatives to improve and optimize the quality care of emergency departments. Moreover, computer simulation is used to generate the related indicators for DEA model. DEA model is then executed with proper inputs and outputs to provide optimization model from a list of potential alternatives. An important and common problem for Emergency Departments (ED) is overcoming. Low staff availability, limited budget, high costs and high patient volume decrease the quality care of medical centers and emergency department. Therefore, emergency departments and medical center must implement highly efficient systems that maximize the utilization of their available resources to minimize the cost and minimize time in system to maximize patient satisfaction.**

Keywords- Computer Simulation; Data Envelopment Analysis; Quality Care; Patient Satisfaction

I. INTRODUCTION

Overcrowding is a common problem of EDs for most than a decade. The causes of overcrowding can be low staff (physicians and nurses) availability, high patient acuity, hospital bed shortage, high ED patient volume, radiology and lab delays, and insufficient ED space [1]. Many researchers claim that computer simulation is a very effective and useful tool to study the complex ED environment [2]. In this paper we use simulation and DEA to address the described emergency department problem. Emergency department's managers must implement the highly efficient systems that maximize the utilization of their available resources to minimize their cost, and minimize time in system to maximize patient satisfaction. We offer the best priority in different section of ED to minimize the patient's average time in system, minimize average queue length and maximize average utilization of resources by applying simulation and DEA. Patients waiting times and scheduling of personnel and staff is most important parameters that influence patient satisfaction with emergency department care. There are limited resources and high demands in this department [3]. So, staff has to work on deferent shifts at day, night and weekends. Hence, among the different staff groups, scheduling the ED is one of the most challenging problems. Simulation is widely used tool to solve this problem [4, 5]. Baesler et al. used simulation's efficient tools for improving performance in certain circumstances of ED, but human aspect is often ignored in the application of modeling and simulation [6]. Generalized linear programming model was presented by Jaumard et al. for nurse scheduling. The objective of their study is to minimize the salary cost and maximize nurse preferences [7]. Tabu search and strategic oscillation method for nurse roster problems was considered by Dowsland ([8].Jinn-Yi Yeh and Wen-Shan Lin used an integrated simulation and a genetic algorithm (GA) to improve the quality of care in the ED by evaluating deferent nursing schedules [2]. Chang-Chun and Sherman studied about nurse scheduling problem; they presented a two-stage mathematical modeling for this problem. They considered hospital management requirement, government regulation and preferences of nurse staff shift. They used genetic algorithm in their model [9]. Fuzzy modeling was used for nurse scheduling problem by Topaloglu and Selim. They considered hospital management and nurses' preferences as objective of problem. In their study fuzzy set theory was applied for nurse scheduling problem in uncertainty environment [10]. Maenhout and Vanhoucke considered hospital's policies and nurses' preferences as objectives of nurse scheduling problem. They applied an exact branch-and-price algorithm for solving this problem [11].

Corresponding Author: Sara Motevali Haghighi, sara.motevali @ut.ac.ir