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A Fuzzy FMEA Approach to Prioritizing Surgical Cancellation Factors

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Abstract

Background and Objectives: Surgical cancelation is a significant source of time and resource waste, patient safety risk, and stress for patients and their families. In this study, a risk management-based approach is developed to prioritize factors contributing to surgical cancellation.

Methods: Factors leading to surgical cancellation were comprehensively classified based on literature review. A Fuzzy Failure Mode and Effect Analysis were developed for identifying the relative importance of the potential surgical cancellation factors. Validity of the results was examined by obtaining experts' opinions.

Findings: Our analysis identified inadequacy of recovery beds, inadequacy of ICU beds, high-risk surgery, and high blood pressure and diabetes as the most important factors contributing to surgical cancelation.

Conclusions: According to our results, the Fuzzy Failure Mode and Effect Analysis can successfully rank the factors contributing to surgical cancellation. Our results encourage further use of the risk management theory and tools combined with fuzzy set theory to support and facilitate the clinical decision-making process.

Keywords: Risk Management, Failure Modes and Effect Analysis, Surgical Cancellation, Fuzzy Set theory

Background and Objectives

Surgical operation is a key healthcare service, accounting for 40% of hospital expenditures [1-3]. For every surgical operation to be carried out on schedule, various departments and resources must be coordinated and all prerequisites must be met. Lack of the requirements at the time of admission to the operating room, will lead to cancelation of the surgical operation [4]. Surgical cancelation is a significant source of time and resource waste, patient safety risk, and stress in patients and their families [5].

Several studies have been carried out aiming at identifying causes of surgical cancelation [6, 7]; however, there is a lack of a comprehensive classification of cancellation factors in the literature [8]. Previous research have identified factors such as inefficient processes and system failure [9], failure of equipment [10], inefficient teamwork, and inappropriate relationships between the departments and staff involved [11], among the major factors leading to surgical cancelation. On the other hand, efficient addressing of surgical cancelation problem require the identification of virtually all contributing factors and prioritization of them based on their frequency of incidence as well as their degree of contribution to the cancellation of surgery.

Given that numerous inadequacies can lead to the surgical cancelation, efficient meeting of such prerequisites require development of computational tools and expert advising systems facilitating analysis and ranking of the factors involved.

The purpose of this study was to introduce and examine the performance of a risk management approach to prioritizing surgical cancelation factors. Common methods existing for risk assessment are classified to three categories including qualitative, semi-quantitative and quantitative methods [12]. Although qualitative methods have been extensively

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