

Evaluation of the Influential Factors in Cancelling Surgical Operations and Developing Management Strategies to Reduce these Factors in Shahid Kamyab Hospital of Mashhad, Iran during 2012-2013

Amir Ashkan Nasiripour¹ (PhD); Mojtaba Hosseini² (PhD); Ali Reza Rezazadeh³ (MSc); Mohammad Ali Azizi^{4*} (PhD Candidate)

¹ Faculty of Management and Economic, Islamic Azad University Science and Research Branch, Tehran, Iran.

² Faculty of Management and Social Sciences, Islamic Azad University North Tehran Branch, Tehran, Iran.

³ School of Paramedical Sciences, Mashhad University of Medical Sciences, Mashhad, Iran.

⁴ Shahid Kamyab Hospital, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran.

ARTICLE INFO	ABSTRACT
<p>Article type: Original Article</p> <hr/> <p>Article history: Received: 07-July-2015 Accepted: 27-Dec-2016</p> <hr/> <p>Keywords: Hospital Surgery cancellation Surgical operation</p>	<p>Introduction: One of the main determinants of hospital costs is the efficiency of operating rooms, and substantial resources are allocated to the management and timely performance of surgical operations. Cancelling surgical operations is one of the main causes of healthcare inefficiency and resources waste. The present study aimed to evaluate the rate and influential factors in cancelling surgical operations in Shahid Kamyab Hospital of Mashhad, Iran.</p> <p>Materials and Methods: In this retrospective cross-sectional study, data were collected from the hospital information system of Shahid Kamyab Hospital and classified into five surgical services, including orthopedics, neurosurgery, general surgery, facial surgeries, and ear, nose, and throat (ENT) surgery. Causes of cancelling surgical operations were divided into six categories, including patient-related problems, surgeon-related problems, paraclinical test results, operating rooms problems, anesthesia, and hospital-related issues.</p> <p>Results: Among 13,674 preplanned surgical operations, 8% were orthopedic surgical operations, 4.2% were ENT operations, 3.5% were facial surgeries, and 1.1% were neurosurgeries. The most frequent causes of surgery cancellation were due to clinical problems (2.21%), refusal of the patient to pay the costs (19.1%), and surgeon-related problems (11.4%), while paraclinical test results accounted for the lowest frequency in this regard (1.1%).</p> <p>Conclusion: According to the results, most of the causes of surgery cancellation were patient-related. Therefore, it is suggested that patient evaluation be performed by surgeons and anesthesiologists prior to the surgical operation in order to prevent clinical problems during the surgery, offer insurance strategies, and solve the problems relating to the healthcare costs for the less privileged patients, especially those requiring surgery after accidents.</p>

► **Please cite this paper as:**

Nasiripour AA, Hosseini M, Rezazadeh AR, Azizi MA. Evaluation of the Influential Factors in Cancelling Surgical Operations and Developing Management Strategies to Reduce these Factors in Shahid Kamyab Hospital of Mashhad, Iran during 2012-2013. *Patient Saf Qual Improv.* 2017; 5(2):542- 547.

Introduction

Due to increasing healthcare costs, hospitals have become one of the most important costly organizations, as a major part of the hygiene and healthcare resources of the society is upon hospitals. Approximately 50% of the government's current costs is allocated to the hygiene and healthcare sectors (1).

To perform timely surgical operations, hospitals employ numerous resources for operating room

management and recruiting surgeons and operating room staff (2). One of the main determinants of hospital costs is the efficiency of the operating rooms. Financial capacity of hospitals could grow through increasing the quality of operating rooms (3). However, the last-minute cancellation of surgical operations is considered to be one of the most significant causes of inefficiency and waste of hospital resources (4, 5). Other

disadvantages of cancelling a surgical operation include wasting the costs of preparing the personnel and operating room on the scheduled day; therefore, the principals and educational and training groups of hospitals must take these matters into consideration (6, 7).

Causes of surgery cancellation are complex because they depend on the problems of patients and organizational and clinical staff (8, 9). According to the literature, cancellation of a surgery occurs for various reasons, the most important of which are the poor preparation of the patient before surgery, clinical problems of the patient, delayed attendance of the surgical team, sudden changes in the treatment plan, problems associated with patient admission, time limits, and prioritization of emergency surgeries (10).

Rate of cancelled operations varies in different healthcare centers. In particular care centers in Canada, Australia, Britain, and Pakistan, the rate has been reported to be 10%, 11.9%, 14%, and 25%, respectively (11-13). To avoid stress in the patient and decrease the associated costs, some hospitals have established preoperative clinics so as to prepare the patient for preoperational procedures; however, cancellation remains a significant issue in the surgery departments of numerous hospitals (14).

Previous studies in this regard suggest that it is possible to reduce the rate of surgery cancellation to half through amending performance in operating rooms, improving planning, coordinating, and quick clinical assessment of the patient before surgery (2, 12, 15). Furthermore, some software programs have been designed to monitor and report the cancelled operations based on the recorded data by the operating room staff. Although these programs are helpful in the monitoring of daily operations, they fail to provide the required information for applying the necessary policies to minimize surgery cancellation (2).

Given the importance of operating rooms in hospitals and the financial burden of cancelled surgeries, the present study aimed to evaluate the influential factors in the cancellation of surgeries in Shahid Kamyab Hospital of Mashhad, Iran. In the final section of this paper, specific strategies have been proposed based on the professional attitude and experiences of experts for the reduction of surgical operation cancellation in this hospital.

Materials and Methods

This retrospective cross-sectional study was conducted in Shahid Kamyab Hospital of Mashhad, Iran in 2013. Shahid Kamyab Hospital is a teaching hospital affiliated to Mashhad University of Medical Sciences and is a specialized care center for accident and trauma equipped with 320 beds. In all the operating rooms of the hospital, five surgical services are carried out. All the preplanned operational procedures (optional and non-optional) and personal information of the patients are recorded daily by the operating room

staff in the hospital information system (HIS) and Microsoft Office Excel, including the first name, family name, age, file number, name of the ward, date of admission, date of operation, type of fracture, type of surgical operation, name of the surgeon and surgeon's assistant, name of the anesthesiologist, type of anesthesia, shift attendant, start and end time of the surgery, and length of the operation. Moreover, in most cases, the cancelled surgery is recorded in the Excel software. In the current study, the data were pertinent to all the surgeries (optional and non-optional) date in the period of March 20 (2012)-March 11 (2014), which were collected during three months through coordination with principal and trauma research center of the hospital.

Sample size was determined using the census method, and all types of surgical operations were taken into account. By studying the related articles and sources, the main causes of cancelling surgical operations were classified into six sub-categories, as follows:

1. *Surgeon-related causes*: non-attendance of the surgeon and lack of time due to previous surgeries;
2. *Patient-related causes*: lack of consent from the patient or patient companions for the surgery, refusal of the patient to pay the costs, lack of the requirements provided by the patient, clinical problems of the patient, changes in the treatment plan (e.g., no need for surgery due to the decision of the surgeon, need for further consideration, transfer to another surgical service sector), poor preparation of the patient before surgery (e.g., non-fasting patients), absence of the patient, leaving the hospital, and non-urgent condition of the patient;
3. *Paraclinical test results*: lack of radiography or CT-scan;
4. *Causes relating to the operating room*: dysfunction in the equipment of the operating room or inadequate operating rooms;
5. *Causes relating to anesthesia*;
6. *Hospital-related causes*: lack of coordination between the hospital wards.

Data analysis was performed in SPSS version 20 using the statistical indices of mean and standard deviation, frequency, and statistical tests.

Results

In total, there were 7,250 preplanned surgeries in 2011 and 6,424 surgeries in 2012 in the selected hospital, 1,321 of which (18.2%) were cancelled in 2012, and 1,149 cases (17.8%) were cancelled in 2013.

According to the information in Table 1, orthopedic surgeries (n=7,280) had the highest frequency, followed by facial surgeries (n=1,264). Meanwhile, orthopedic surgeries (81.7%) and neurosurgeries (1.1%) had the highest and lowest rate of cancellation, respectively. In between these operations were general (8.2%), ENT (4.2%), and facial surgeries (3.5%). In addition, the lowest rate of cancellation was reported in paraclinical

surgeries (n=21; 1.10%). The most common causes of cancelling the surgical operations were found to be surgeon-related problems (n=217; 11.40%).

Table 2: Frequency and percentage of cancelling surgeries in 2012 and 2013 in Mashhad Shahid Kamyab hospital.

Table1: Percentage of Preplanned and Cancelled Surgical Operations in Shahid Kamyab Hospital of Mashhad, Iran (2012-2013)

Surgical Services	Frequency of Surgery	Total Percentage of Surgical Operations	Total Percentage of Cancelled Surgical Operations
Orthopedic Surgery Services	7,280	54.5	81.7
General Surgery Services	1,898	14.2	8.2
Neurosurgery Services	1,816	13.6	1.1
ENT Surgery Services	1,117	8.2	4.2
Oral and Maxillofacial Surgery Services	1,264	9.6	3.5

Table2: Frequency and Percentage of Surgery Cancellations during 2012-2013 in Shahid Kamyab Hospital of Mashhad, Iran

Cancellation Causes	Frequency	Percentage
Surgeon-Related Problems	217	11.40
Patient-Related Problems	1423	74.90
Paraclinical Tests	21	1.10
Operating Room	56	2.90
Anesthesia	120	6.30
Hospital	62	3.30

Discussion

In the present study, 18% of the scheduled surgical operations were cancelled during 2012-2013.

According to the findings, a significant number of the preplanned surgeries were cancelled in the studied hospital. In a teaching hospital in Tehran (Iran), 18% of the scheduled surgical operations were cancelled within a nine-month period (16).

In this regard, the study by Norouzinia in Urmia (Iran) reported a cancellation rate of 18.6% in the surgical operations, which is consistent with the current research (17).

On the other hand, the results of a study in a non-teaching hospital in Kermanshah (Iran) indicated the cancellation rate of surgical operations to be 1.3% within a six-month period (18). In a hospital in Hong Kong (China), this rate was reported to be 7.8% (19),

while in a study conducted in a hospital in Sari (Iran), 10.9% of all the elective surgeries were cancelled (20).

In a study conducted by Lopez in New Zealand, 14.2% of the surgeries were cancelled (21). Moreover, in the research by Scheffield in Australia, the cancellation rate was reported to be 11.9%. In an investigation in the United States, Ju reported the rate of surgical operation cancellation to be 6.6% (22). The aforementioned findings are in congruence with the results of the present study.

In the Prince Sultan Cardiac Center in Saudi Arabia, 23.27% of all the preplanned surgical operations were cancelled (23). Furthermore, a similar study conducted in Spain estimated this rate at 23% (24). According to the results obtained by Rakesh in India, rate of surgical operation cancellation was 30.3% (25), which is inconsistent with the results of the present study.

Evidently, comparison of the aforementioned studies suggests that Shahid Kamyab Hospital is in a more favorable condition in terms of the cancellation rate of surgical operations. Differences in the reported rates could be due to the fact that the mentioned hospitals are non-teaching care centers with various specialty statuses. Shahid Kamyab Hospital is a specialized center for accidents and trauma, and patients with accident injuries are considered to be in emergency conditions; therefore, some operations might be cancelled due to the priority of emergency surgeries (7).

Providing the required equipment and mandatory pre-pay for surgical operations was observed to be a cause of cancellation in Shahid Kamyab Hospital compared to the other hospitals in Mashhad city.

Clinical conditions of the patients injured by accidents is another cause of cancelling surgeries since performing operations in these cases might not be possible in the due time.

According to the results of the present study, approximately four-fifth (81.7%) of the cancelled operations is reported in orthopedic surgical services, and one-fifth is reported in the other surgical services (general, ENT, and facial surgeries, and neurosurgeries). Furthermore, our findings demonstrated that orthopedic operations and surgeries on fractured limbs were among the most frequently cancelled surgical operations. Depending on the type of orthopedic surgeries, the results obtained in local studies have indicated the rate of cancellation to be 1.08-18.7%. On the other hand, foreign studies have shown this rate to be 8-26.6%.

In a study by Mohammadi conducted in Kermanshah (Iran), the most frequently cancelled operations were general surgeries (2.31%) and orthopedic surgical services (1.08%), respectively, while the least frequently cancelled operation was reported in ophthalmological services (0.54%) (18). In another research carried out in educational teaching hospital in Tehran (Iran), the most frequently cancelled operations were vascular surgeries (32.1%), orthopedic surgeries

(18.7%), general surgeries (15.5%), and ENT surgeries (13.7%), respectively. In a hospital in Hong Kong, general surgical services were reported to be the most frequently cancelled operations (20%), whereas orthopedic surgical services (8%) and cardiac surgeries (6%) had the lowest cancellation rate, which is inconsistent with the results of the present study (19).

In a research performed in a hospital in Spain, the most frequently cancelled operations were reported to be orthopedic services (26.6%), general surgeries (22.1%), and gynecologic surgeries (17.8%), which is not consistent with the current study. According to our findings, rate of cancelled ENT and general surgeries was significantly lower compared to the other cancelled operations in Shahid Kamyab Hospital. Compared to the previous studies, Shahid Kamyab Hospital was observed to have a more favorable condition in this regard. Considering that orthopedic surgeries constitute more than half of the preplanned operations in Shahid Kamyab Hospital, cancelled operations are justifiable.

Moreover, since this hospital is a specialized center for accidents and trauma, the rate of cancelled orthopedic surgeries, which are mainly in the cases of hips, legs, and arm fractures, is comparatively higher. It seems that the difference in the proportion of cancelled operations in various surgeries is due to the general or non-teaching structure of the hospital.

In general, the major causes of cancelling surgical operations are patient-related problems (3/4 of the cases), surgeon-related problems, and anesthesia, respectively. Similarly, our findings indicated that patient-related problems were the most significant causes of cancelling surgeries in Shahid Kamyab Hospital. Meanwhile, surgeon-related factors are also effective in this regard. In particular, the main causes of surgery cancellation in the current research were determined to be the clinical problems of the patients (21.2%), refusal of the patients to pay the costs (19.1%), changes in the treatment plan (6.03%), and non-consensus of the patients or their companions (4.9%).

According to the results of the present study, the main surgeon-related problem was the lack of time for surgical operation (7.1%). In some studies, it has been shown that 30-45% of the cancelled operations are due to time limits (10), which is not in line with the results of the current research (6.4%). With respect to the cancelling of surgical operations due to the lack of time, findings of the current study are in congruence with the results obtained by Lopez, Chie, and Mohammadi, while inconsistent with the findings of Sultan, Rakesh, Scheffield, and Ramezankhani (2, 16, 23, 25).

In a study conducted in a hospital in Saudi Arabia, the most important causes of cancelling surgical operations were reported to be surgeon-related problems (34%), management-related problems (34%), and patient-related problems (32%) (23). In another research carried out in a hospital in India, 59.7% of the

surgeries were cancelled due to the inadequate time in the operating room, absence of the patient on the scheduled day (16.2%), and medical-related problems (10.8%) (25). In an investigation performed in a hospital in New Zealand, the most significant causes of cancelling surgical operations were determined to be the factors relating to surgical equipment and facilities (38.9%), factors relating to the surgery ward (36.7%), patient-related factors (19.9%), and surgeon-related problems (5%) (21). In another study conducted in a hospital in Australia, the main causes of cancelling surgeries were the lack of time (18.7%), insufficient beds in the intensive care unit (ICU) (8.1%), and lack of patient consent for the operation (17.5%) (2).

Meanwhile, the results obtained in a hospital in Ireland indicated that 92% of the causes of cancellation were associated with the admission of emergency patients and inadequate time for elective surgeries (26).

Since Shahid Kamyab Hospital is educational teaching and emergency center, one of the major causes of cancelling surgeries was patient-related problems, which may occur due to not providing the required equipment by the patient because of the high price, especially in the case of elective surgeries (non-emergency), as well as in orthopedic surgeries, which mainly require expensive devices (e.g., screw and plate). Another reason discovered in the patient records was the delayed delivery of the necessary equipment by the medical equipment suppliers or providing the wrong equipment; in other words, although the patient has paid for the required equipment, the company in charge has not delivered the equipment on time or has provided the wrong device.

Some of the clinical problems of patients for cancelling surgeries in the present study included the lack of confirmation by the internal physician or cardiologist, changes in the treatment plan, decision of the physician indicating no need for surgical operation, patient's need for further consideration, and transfer of the patient to another ward.

Conclusion

According to the results, Shahid Kamyab Hospital of Mashhad has a favorable condition in terms of the logical reasons for the cancellation of surgical operations. This is owed to the fact that a small proportion of the cancellations are due to the lack of time to perform surgeries. Several causes of cancelling surgical operations could be eliminated or minimized by improving the related processes. To this end, the following measures could be taken:

1. Initial visit of the patient by faculty surgeons rather than medical students;
2. Checking all the equipment needed for the surgical operation;
3. Preparing the patient and performing all the required tests for the surgery;
4. Designing a checklist in in-patient wards for surgical operations;

5. Calculating the average time needed for an operation using statistical methods.

Shahid Kamyab Hospital is the main hub of trauma and accidents in Khorasan Province in the east and northeast of Iran, which admits a large number of emergency patients. Non-emergency operations are cancelled due to two main causes: (1) disproportionate number of the operating rooms to the number of the admitted patients; (2) prioritizing emergency patients to the other patients. Cancelling of surgeries is inevitable in many cases, and the rate is likely to be higher in the patients admitted in the ICU. Some contributing factors in this regard include the poor clinical condition of the patient and the absence of the anesthesiologist or neurologist. To reach the optimal point, all hospital wards should be coordinated with the operating room as ICU head nurses help arrange the operating room programs. In addition, a committee consisting of the directors of ICU operating rooms, medical records, ICU resident anesthesiologist, experts, and managing director agents could contribute to solving the problems in this regard. Some of the suggested strategies to reduce the rate of cancelled surgeries are as follows:

1- The main cause of cancelling an operation is the clinical problems of the patients. Therefore, it is recommended that hospitals take the necessary measures to eliminate these problems. One strategy is to examine the condition of the patient before the assessment by the anesthesiologist and consider the test results. Afterwards, the patient could be registered on the list of operations, so that possible problems could

be prevented before and during the surgical operation. To do so:

- a. Patients should be visited, and a treatment plan should be developed.
- b. Patients with clinical problems should not be on the list of surgical operations.
- c. Only patients with a high possibility of undergoing surgery must be registered on the list of operations.

2- Another influential factor in the cancelling of surgical operations is the refusal of the patients to pay the costs. This problem has also been reported in elective surgery patients and could be solved through insurance strategies and allocating the necessary budget to the hospitals, especially in the case of orthopedic surgeries, which are highly costly, and substantial healthcare costs are imposed on the patient as well. Fortunately, the mentioned problem has been eliminated by the health system development plan, which has been recently implemented in Iran (since 2014). According to the development plan, patients with accident injuries who are in a critical, emergency condition must receive treatment free of charge.

3- Designing an encouragement process chart motivates the healthcare personnel and physicians, thereby increasing the quality and quantity of surgical operations.

Acknowledgement

Hereby, we extend our gratitude to Shahid Kamyab Hospital of Mashhad, Iran and the Orthopedic Research Center for assisting us in this research project.

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