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# Assessing the Extent and Causes of Cancellation of Surgeries: An Important Issue in Improving the Efficiency of the Hospital

**Hasan Jafari[1], Parvin Jafari[2], Mohammad Kazem Rahimi[1*], Roohollah Arab Saniabadi[3], Farzaneh Zare Banadkooki[2]**

[1]Health Policy and Management Research Center, Department of Health Care Management, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[2]Quality Improvement Office, Taft Shahid Beheshti Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
[3]Management Office, Taft Shahid Beheshti Hospital, Shahid Sadoughi University of Medical Sciences, Yazd, Iran

***Corresponding Author:** Mohammad Kazem Rahimi, Ph.D., Assistant Professor, Health Policy and Management Research Center, Department of Health Care Management, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran. Tel: +98-035-31492288, Email: m.k.rahimi.65@gmail.com

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**Abstract**

**Background:** Canceling surgery imposes the high cost of the healthcare provider system and wasted many energy and time from the patient and the care team.

**Objectives:** This study examined the extent and reasons of canceling of surgeries in one of the hospitals affiliated to Shahid Sadoughi University of Medical Sciences, Yazd, Iran.

**Methods:** This was a descriptive-applied study. In order to get the number of operations from April 2018 to March 2020, the hospital used HIS software and then extracted the reasons from the operating room office and the quality improvement office in the hospital. Data were analyzed by SPSS version 21 software.

**Results:** Among 8654 planned surgeries, 0.9% were cancelled. The highest frequency of surgical cancellation is associated with general surgery, and the highest rate of surgical cancellation is associated with the ENT specialty. The highest cancellation rate was 1.82% in August 2018 and 2.87% in February 2019. The lack of preparation of patients and patients did not require surgery was the main and worst reason for discontinuing surgery, respectively.

**Conclusion:** The lack of clinical preparation of the patient was the main reason for the cancellation. Therefore, pre-surgery patient evaluation can help solve this problem, make the operating room more effective, and increase patient satisfaction.

**Keywords:** Surgery, Operating Room, Hospital, Cancellation of Surgery

## 1. Background

Today, rising costs of medical services have made hospitals one of the most important and at the same time very expensive organizations. This is because most of the resources of the public health sector and 24% of the current government spending in the health sector are allocated to hospitals.[1] On the other hand, running an operating room in a hospital is the most expensive and at the same time the largest source of income. Therefore, operating rooms and surgical departments generally have special sensitivities within the hospital and are considered the most important departments in the hospital, providing significant resources for maintaining these rooms and planning the availability of surgeons and managers. They have important incentives to achieve their efficiency.[2]

After coordinating specialized departments, doctors and operating rooms to organize the work scheduled at the medical center, a list and schedule of work is currently being created. Therefore, the surgery list in the operating room is decided in advance, and the necessary equipment is prepared on the surgery day.[3] But again, one of the problems with hospitals is that surgery is stopped, especially at the last moment. Surgery is usually painful for patients and their families. Especially, if the patient is a child or if surgery falls into the high-risk surgery category.[4]

Surgery discontinuation stresses the patient and his companions, causes the patient to lose working days, and is associated with a significant waste of patient time (surgery cancelation). It also eliminates the financial burden and unnecessary repetition of preoperative preparatory activities.[5]

Cancellation of surgical procedures will have numerous reasons: such as the reasons of the surgeon, anesthesiologist, running room, patient, his clinical troubles and the health facility. The Results of the Hashemi Dehghi et al. in 2019 confirmed that non-referral of patient, fever and cold and different elements have the most percent of cancellation of surgical procedures,

respectively, and in line with the ranking, the solutions of "patient education" and "planning for supplies", "personnel training", "improvement of preoperative session process" and "inter-departmental coordination" had been decided on to lessen the cancellation of surgical procedures.[1] In developing countries with restrained assets, cancellation of surgical procedures is a usual phenomenon. For example, the cancellation price of surgical procedures in Canada is 11%, the UK 12%, Australia 9% and Pakistan 45%.[3]

Research via way of means of Appavu et al shows that 12% of consuls had been tested for loss of beds with inside the health facility recuperation room. Also, the duration of the affected person's live with inside the extensive care unit and the supply and unpreparedness of this unit have an effect on the surgical time table and in the end the cancellation of surgical procedures, therefore, right control in hospitals to nicely use assets and offer services. Optimizing sufferers and growing profits and growing pleasant could be very important.[6]

## 2. Objectives

There is a need for thorough studies in this field in Iran due to the aforementioned occurrences, as well as the decrease of power of operating room personnel, waste of surgeon time, underused facilities provided for the patient, and a greater incidence of cancellation of chosen procedures than the norm. As a result, given the necessity of determining the variables that influence the causes of surgery cancellations, as well as the evidence that resources are squandered on the one hand and the harmful emotional and physical impacts on patients and their families on the other, this research was undertaken. The rate and causes of surgery cancellations were studied in one of the hospitals affiliated to Shahid Sadoughi University of Medical Sciences, Yazd, Iran in order to identify the causes and factors affecting surgery cancellations, as well as to assist managers in designing and implementing intervention programs to prevent surgery cancellations and to aid in the most efficient use of hospital resources.

## 3. Methods

This was a descriptive, cross-sectional and applied study. All patients who had an operating room file for them at the hospitals from the beginning of April 2018 to the end of March 2020 but whose surgery was canceled for any reason were included in the research population. It should be mentioned that it was census sampling.

A researcher-made data collection form with three tables was utilized to gather the data. The first table had the months of the year in its columns and the number of surgeries in its rows; the second table had the months of the year in its columns and the consular number in each type of operation in its rows; and the third table had the operations in its columns and the consular number in each type of operation in its rows. Each patient's procedure was canceled individually, and the reasons for each of these surgeries were listed in the rows.

The approach was as follows: At first, a list of all elective and emergency operations for which the operating room file was created was pulled from the HIS system by specialty and on a monthly basis, including those that were canceled or conducted. By reviewing the operation registry in the operating room and the quality improvement office, the number of canceled procedures and the cause for each of these surgeries were extracted individually for each month and for each specialty.

After identifying the canceled procedures, the reason for each surgery was identified independently for each person using patient records and operating room registries, and these reasons were then categorized into related categories of patient, hospital, doctor, and so on. The obtained data were input individually into SPSS version 21 software after completing the data collection form, and the required tables were constructed using descriptive statistics of percentage and frequency dispersion indices.

## 4. Results

Fifty procedures were canceled out of 5105 scheduled surgeries in 2018, while 28 surgeries were canceled out of 3549 planned surgeries in 2019. General and orthopedic surgeries had the largest proportion of cancellation surgeries compared to the total number of surgeries conducted in 2018 and 2019, respectively, whereas eye and ENT surgeries had the highest percentage of cancellation surgeries compared to each other in 2018 and 2019 (Table 1).

In 2018, the greatest proportion of surgery cancellations was associated with ENT surgery (25%) and then eye surgery (6.38%). In September 2019, the highest percentage of surgery cancellations was associated with ENT surgery (14.29%) and then eye surgery (6.38%). In 2018, the most canceled surgery was in August, with 1.82 percent of cancellations, while in 2019, the most canceled procedure was in February, with 2.87 percent of cancellations. In addition, the majority of the canceled surgeries in both years are ENT-related (Table 2).

The largest and lowest reasons of surgery cancellation in 2018 and 2019, respectively, are a lack of clinical preparation and a lack of necessity for operation, with 30 and 3 frequencies, respectively (Table 3).

## 5. Discussion

8654 operations were scheduled in general surgery, ophthalmology, orthopedics, neurology, urology, obstetrics, ENT, and detoxification throughout the study period, with 8576 procedures completed. Fifty procedures were canceled out of 5105 scheduled surgeries in 2018, while 28 surgeries were canceled out of 3549 planned surgeries in 2019. In the last two years, 0.9% of all scheduled activities have been canceled, compared to 0.98% in 2018 and 0.79% in 2019. The statistics also revealed that the months of May, February, August, and September had the greatest frequency of surgical cancellations in these two years, with 11, 9, 9, 11 cancellations, respectively.

**Table 1.** Frequency and Percentage of Canceled Operating Room Operations by Each Specialty in 2018 and 2019

| Description | 2018 | | | | 2019 | | | |
|---|---|---|---|---|---|---|---|---|
| | Total | Cancelled | Percentage of Each Specialty Per Year | Percentage of Total | Total | Cancelled | Percentage of Each Specialty Per Year | Percentage of Total |
| General surgery | 1746 | 15 | 0.01 | 0.003 | 967 | 12 | 0.012 | 0.003 |
| Eye | 592 | 10 | 0.02 | 0.002 | 874 | 8 | 0.009 | 0.002 |
| Orthopedist | 1205 | 13 | 0.01 | 0.003 | 1066 | 5 | 0.005 | 0.001 |
| Neurology | 1 | 0 | 0 | 0 | 2 | 0 | 0 | 0 |
| urology | 2 | 0 | 0 | 0 | 7 | 0 | 0 | 0 |
| Obstetrics and Gynecology | 1151 | 8 | 0.01 | 0.002 | 398 | 0 | 0 | 0 |
| ENT | 198 | 4 | 0.02 | 0.001 | 69 | 2 | 0.029 | 0.001 |
| Detoxification | 160 | 0 | 0 | 0 | 138 | 1 | 0.007 | 0 |
| Total | 5055 | 50 | 0.01 | 0.01 | 3521 | 28 | 0.008 | 0.008 |
| Total sum canceled and not | 5105 | | | | 3549 | | | |

**Table 2.** Cancellation Percentage of Surgeries by Each Specialty and Each Month in 2018 and 2019

| Description | April (%) | May (%) | June (%) | July (%) | August (%) | September (%)) | October (%) | November (%) | December (%) | January (%) | February (%) | March (%) | Total Percentage Per Year |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **2018** | | | | | | | | | | | | | |
| General surgery | 0.00% | 0.00% | 0.00% | 1.05% | 1.61% | 1.44% | 0.69% | 1.28% | 0.00% | 0.69% | 0.76% | 2.68% | 0.86% |
| Eye | 7.69% | 2.86% | 0.00% | 1.72% | 3.33% | 3.23% | 1.27% | 0.00% | 2.04% | 0.00% | 0.00% | 1.64% | 1.69% |
| Orthopedist | 1.19% | 0.93% | 0.00% | 0.00% | 2.84% | 1.72% | 3.90% | 0.00% | 0.00% | 1.59% | 0.00% | 0.93% | 1.08% |
| Neurology | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0 |
| urology | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0 |
| Obstetrics and Gynecology | 0.00% | 0.00% | 0.00% | 1.52% | 0.90% | 0.00% | 2.63% | 0.00% | 0.00% | 1.28% | 1.12% | 1.15% | 0.70% |
| ENT | 0.00% | 14.29% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 7.14% | 0.00% | 25% | 9.09% | 2.02% |
| Detoxification | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0 |
| **Total 2018** | 0.66% | 0.88% | 0.00% | 0.93% | 1.82% | 1.16% | 1.66% | 0.54% | 0.54% | 0.82% | 0.74% | 1.77% | 0.99% |
| **2019** | | | | | | | | | | | | | |
| General surgery | 1.43% | 1.64% | 0.91% | 3.75% | 0.00% | 1.30% | 0.00% | 0.00% | 0.00% | 0.00% | 4.08% | 0.00% | 1.24% |
| Eye | 0.00% | 0.00% | 0.27% | 0.00% | 3.33% | 6.38% | 0.00% | 0.00% | 2.04% | 1.79% | 3.03% | 0.00% | 0.92% |
| Orthopedist | 0.68% | 1.37% | 0.65% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 2.33% | 0.00% | 0.47% |
| Neurology | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| urology | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| Obstetrics and Gynecology | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% |
| ENT | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 14.29% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 2.90% |
| Detoxification | 0.00% | 8.33% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.72% |
| **Total 2019** | 0.67% | 1.28% | 0.44% | 0.66% | 0.50% | 2.65% | 0.00% | 0.00% | 0.43% | 0.53% | 2.87% | 0.00% | 0.80% |

**Table 3.** Reasons for Cancellation of Surgeries in 2018 and 2019

| Description | Lack of Clinical Preparation | Dissatisfaction of the Patient and Her Companion | Physician-Related Causes | Lack of Preoperative Counseling | No Need for Surgery | Lack of Equipment | Total |
|---|---|---|---|---|---|---|---|
| General surgery | 11 | 1 | 11 | 2 | 2 | 0 | 27 |
| Eye | 7 | 1 | 7 | 2 | | 1 | 18 |
| Orthopedist | 6 | 3 | 1 | 3 | 1 | 4 | 18 |
| Obstetrics and Gynecology | 3 | 1 | 4 | 0 | | 0 | 8 |
| ENT | 3 | | 3 | | | | 6 |
| Detoxification | | 1 | 0 | | | | 1 |
| Total | 30 | 7 | 26 | 7 | 3 | 5 | 78 |

The greatest frequency of surgical cancellations across specialties was 27 in general surgery, with the largest number of cancellations occurring in February 2019 with 4 cancellations. It is worth noting that the urology and neurology specialties have never canceled surgery. Across contrast to the findings of this research, Leslie et al reported that 1544 out of 19 141 elective surgery cases (8.07%) in three surgical specialties (general surgery, obstetrics, and urology) were canceled, with urology having the highest cancellation rate (9.53%).[7] The results of a research done in India by Farooq and Mir revealed that it was roughly 20% of the consular rate, with the greatest rate being associated to the orthopedic department, which did not agree the findings of the current study.[8]

According to the findings of this study, the highest proportion of surgery cancellations occurred in the ENT specialty in February 2018 (25%) and September 2019 (14%) respectively. Cancels are more common in general surgery, but the ratio of them to the number of procedures scheduled is greater in the ENT specialty. Boudreau et al found that ENT surgery had the largest number of cancellations, with the inefficiency of the patient's clinical examination the day before surgery being the major cause for cancellation.[9] Appavu et al also found that throughout the research period, a total of 4814 elective procedures were scheduled, with 1235 (26%) of them being canceled. General surgery had the largest proportion of overall cancellations (65%) while ear, nose, and throat surgery had the highest rate of elective surgical cancellations (42%) according to specialty. In his research, one of the most prevalent causes for surgery cancellation was a lack of assessment of the patient's clinical state (63%). Only 2% of cancellations were due to the provision of physical space and operation room facilities.[6]

In general, the most common cause for surgery cancellation was the patient's lack of clinical preparation (30 cases), followed by the absence of necessity for operation (3 cases). As a result, patient assessment before to surgery may assist in resolving this issue and improving operating room administration. In a research conducted in Senegal by Sabounji et al, the cancellation rate was about 29.4%, and the most common cause for cancellation was linked to patient preparedness, which was similar with the findings of the current study.[10] In their research, Mohammadi et al. found that the most frequent reason of cancellation was the patient's clinical difficulties, and that the most canceled procedures in his study were connected to general surgery service with 2.31% and the least related to eye service with 0.55%. In the Mohammadi et al study, preoperative hypertension was the most prevalent cause for cancellation, followed by cardiac arrhythmias, poor preoperative evaluation, myocardial ischemia, and pneumonia, according to the study. With good treatment of preoperative examinations and the patient's cardiovascular status these causes may be rectified and avoided,[4] although Emanuel and Macpherseon showed that the most common reason for cancellation was non-compliance with pre-surgery medication instructions and preoperative clinical deterioration of the patient.[12] Momen et al demonstrated that surgery cancellation is a significant and difficult issue for hospitals and patients, citing important factors such as ICU bed unavailability, hypertension, diabetes, high-risk surgery, nurse unavailability, and lack of receiving medication prior to surgery as reasons for surgery cancellation in their study.[13] Ghanaie et al concluded unsuitable patient preparation was the most prevalent cause for surgery cancellation, accounting for 39% of renal and urinary tract procedures and 26% of gynecological surgeries, according to the study.[5] Meanwhile, Bastani et al found that the most frequent cause for canceling operations before to the Health Transformation Plan was surgeon considerations, while the most common reason for canceling surgeries following the Health Transformation Plan was organizational and management reasons. There wasn't enough time in the surgery room. As a result, it seems that the transformation strategy has been able to significantly minimize surgery cancellations.[3]

Hashemi-Dehaghi et al discovered that underlying disorders, non-referral, fever, and cold account for the greatest percentages of surgery cancellations. Patient education is ranked first through sixth in terms of reducing surgery cancellations.[1] Mosadeghrad and Khalaj came to the conclusion that the surgeon, anesthetic visit, failure to complete a prior operation on time, and a shortage of beds in the critical care unit were all key causes for the surgery being canceled.[2] The lack of recovery beds, the inadequacy of ICU beds, high-risk surgery, high blood pressure, and diabetes, according to Khasha et al, were the most critical causes in surgery cancellation.[13]

## 6. Conclusion

The cancellation of a surgery puts a large cost on the provider system since health care institutions invest a lot of resources to maintain the operating room ready, the availability of surgeons and skilled operating room personnel according to the schedule. It protects the patient's health and consumes a lot of energy and time from the care team, yet procedures are nevertheless canceled in many instances on the planned day, and in some cases even in the last minutes before the surgery.

Because operating rooms are one of the most important centers for patient admission in the hospital, and because cancellation of surgeries can reduce patient satisfaction while increasing quality and revenue, complete and accurate preparation of operating rooms before surgery, as well as taking measures to prevent surgery cancellation, is essential. Identifying the patient's underlying issues and conducting the right admission procedure may be useful in decreasing surgery cancellations and maximizing operating room capacity in order to start operations on time. It is recommended that a full report be created and documented after each operation cancellation to explain the causes and assist management and stakeholders in making positive changes to decrease system inefficiencies. Also, documents

## Research Highlights

### What Is Already Known?

Most of the resources of the health department are used in hospitals. One of the departments that has the highest cost as well as the highest income of the hospital is the operating room. The canceling of operation room in addition to causing stress for the patient and his companions, it caused wasted of financial resources and increases hospital costs.

### What Does This Study Add?

Recognition the causes of operating room cancellation can help managers to avoid wasting limited resources. In this study, it was found that one of the most important factors in operating room canceling is the patient's clinical unpreparedness. Therefore, to prevent this type of cancellation and use the maximum efficiency of the operating room, it is recommended that the patient be evaluated before surgery

for pre-surgery preparations should be prepared and provided to the patient before to hospitalization (in the clinic, office, etc.) for them to review and complete, and training sessions on cancellation reasons and how to avoid them should be established for the personnel involved.

### Authors' Contributions

HJ, PJ, and MKR designed this study, developed the study methods, collected and analyzed the study data, and wrote the first draft of the manuscript. RAS and FZB also collected the data. All authors read and approved the final version of the manuscript.

### Conflict of Interest Disclosures

In this research, the authors had no conflict of interest.

### Ethical Approval

Ethical factors such as maintaining the confidentiality of all patients, observing loyalty and honesty at all levels of work were observed in this research. Additionally, this paper is the outcome of a plan authorized by Shahid Sadoughi University of Medical Sciences, Yazd, Iran in accordance with the code of ethics, IR.SSU.SPH.REC.1399.229.

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