



ORIGINAL ARTICLE

Study of the Extent and Causes of Surgical Cancellations at the Largest Educational Medical Center in the Southeast of Iran

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ABSTRACT

Background: Last-minute cancellations of surgical procedures not only disrupt operating room schedules but also cause anxiety for patients and their families, in addition to wasting hospital resources. This study aims to analyze the frequency and causes of surgical cancellations at Shahid Sadoughi Hospital in Yazd city.

Methods: This is a descriptive and applied study. To obtain the results, we compiled a report on the number of surgeries performed and those canceled during the specified time period. Data were collected using a researcher-designed form and the hospital Health Information System (HIS) software, followed by data analysis using SPSS₂₁ with descriptive statistics such as frequencies and percentages.

Results: At Shahid Sadoughi Hospital, from March 2020 to March 2022, a total of 35,396 surgical procedures were scheduled across various specialties, including obstetrics and gynecology, orthopedics, ophthalmology, otolaryngology, general surgery, vascular surgery, neonatology, thoracic surgery, urology, and neurosurgery. Out of this number, 35,152 surgeries were performed, while 244 were canceled (0.68%). The analysis indicated that the highest rate of cancellations occurred in general surgery, with 61 surgeries canceled (25%), whereas the lowest cancellation rates were observed in neurosurgery and urology (0%).

Conclusion: Given the higher rates of cancellations in certain specialties and during specific months of the year, investigating the effective factors and necessary planning in this regard is crucial.

Keywords: Surgery, Operating Room, Hospital. Surgery Cancellation

Introduction

The increasing costs of healthcare services have turned hospitals into one of the most significant and simultaneously costly organizations, absorbing a substantial portion of the community health resources. It is reported that 42% of the government current expenditures in the healthcare sector is allocated to hospitals (1). The operating room, a vital department of any hospital, consumes about 40% of total expenses and requires a significant allocation of human and

financial resources (1, 2). Among various causes of inefficiency and resource waste that generate stress and dissatisfaction for patients and their companions, surgical cancellations are critical (3). A surgical cancellation refers to the postponement of a scheduled surgery that is intended for a patient, surgeon, and operating room, resulting in rescheduling for another time. The rate of canceled surgeries is one of the parameters used to assess the quality of care

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provided to patients and the management system (4).

Surgical cancellations can lead to numerous problems, such as disruption of the operating room schedule, wasted time for surgeons and anesthesiologists, confusion, idleness, and fatigue among operating room staff, anxiety for patients and their companions, increased length of hospital stay, occupation of hospital beds, higher costs, and an elevated risk of hospital-acquired infections. An extended hospital stay can impose significant financial burdens on the healthcare system while delaying other patients waiting for surgery (5). Research indicates that the rate of surgical cancellations varies among healthcare facilities worldwide, ranging from 41% to 91% abroad and from 3% to 59% domestically (2). The study estimated that during the first wave of the pandemic, about 28 million elective surgeries were postponed or canceled worldwide (6). Another study in a teaching hospital in Ethiopia (2023) found a cancellation rate of 22.3%, primarily due to a lack of operating room time and equipment shortages (7). Sanji et al. (8) demonstrated in their study that 8% of surgeries are typically canceled within the first 24 hours prior to the operation. One of the consequences of surgical cancellations is depression. Studies have shown that 45% of parents and 16% of children experience this issue following a canceled procedure, while 3.3% of those parents have also reported feelings of anger (5).

In teaching hospitals, the presence of surgical assistants can lengthen the surgical process, and delays in the arrival of faculty surgeons to the operating room can also extend the duration of surgeries, contributing to surgical cancellations (9). Poor preoperative patient preparation, clinical issues, team delays, changes in patient treatment plans, hospital admission problems, time limitations, and prioritization of emergency surgeries, as well as patient dissatisfaction with consultations, are among the factors leading to surgical cancellations (10, 3). Some hospitals have established preoperative clinics to improve

coordination with patients and ensure adequate preoperative care, aiming to reduce patient stress and lower costs; however, surgical cancellations continue to occur (10). A study conducted by Zare et al. in educational hospitals in Yazd revealed that approximately 12.5% of canceled surgeries were due to the surgeon's absence (11).

Understanding the causes and contributing factors behind surgical cancellations can assist stakeholders in designing and implementing intervention programs to prevent cancellations, thereby optimizing the use of hospital resources. This approach not only emphasizes the importance of hospital resources but also respects patient rights (9). Surgical cancellations have numerous repercussions that affect educational groups in hospitals, staff, patients, and their companions, necessitating hospital managers to pay attention to the lost resources anticipated for each surgery (12). The rate of elective surgery cancellations on the day of surgery serves as a good indicator for evaluating operating room efficiency. Although there is disagreement over acceptable cancellation rates, a generally accepted threshold recommends keeping cancellation rates below 5% in well-managed operating rooms (13). Elective surgery cancellations on the day of surgery can lead to increased financial burdens and resource waste for healthcare facilities (14).

Surgical cancellations can have irreparable consequences, imposing extra costs on the healthcare system, while simultaneously occupying hospital beds and causing mental and emotional distress for patients. Therefore, in the present study, the researchers aimed to identify the frequency and causes of surgical cancellations, categorized by specialty type, during different months of March 2020 to March 2022 at Shahid Sadoughi Hospital in Yazd city.

Materials and Methods

This study was an applied research categorized as descriptive and cross-sectional. The population under investigation encompassed all patients who had their surgical procedures scheduled at Shahid

Sadoughi Hospital from March 2020 to March 2022, but whose surgeries were canceled for any reason. It should be noted that a census sampling method was employed for this study. This hospital is a 300-bed specialized and super-specialized medical center and one of the key facilities for providing healthcare services to patients in Yazd province and surrounding cities.

For data collection, a researcher-designed information gathering form was utilized. The instrument consisted of months of the year, number of surgical procedures, number of cancellations by type of surgery, and reasons for cancellation of each surgery.

A list of all surgical procedures performed, categorized by specialty and month, was extracted from hospital Health Information System (HIS). Subsequently, the number of canceled surgeries and the reasons for each cancellation were identified through a review of the surgical logbook in the operating room. After identifying canceled surgeries, reasons for each cancellation were determined by examining operating room records, categorized according to the responsible group: surgeon, patient, hospital, and other factors.

Upon completing the aforementioned form, the percentages and frequencies of canceled surgeries were calculated, and reasons for cancellations were classified accordingly. The collected data were entered into SPSS₂₁, and descriptive statistics such as percentages, and frequencies were employed for analysis.

Results

Out of a total of 35,396 planned surgical procedures, 35,135 surgeries were performed as scheduled, and 244 cases were canceled, resulting in a cancellation rate of 0.68%.

In Table 1, the frequency and percentage of canceled surgeries relative to the total surgeries performed by specialty are displayed. The highest number of canceled surgeries pertained to general surgery (1.3%), while the lowest was related to thoracic surgery (0.39%).

In Table 2, reasons for cancellation of surgeries are presented by specialty.

Based on Table 2, reasons related to the surgeon, with 53 cases, represented the highest number of cancellations. Regarding the explanations of various reasons for cancellations, the following points can be mentioned:

Among the most important reasons related to the surgeon are cancellations made at the surgeon's discretion, the absence of the surgeon, and the diagnosis of no need for surgery. Reasons related to anesthesia include anesthesia team's refusal to precede, decisions made by anesthesia team, and unacceptability of anesthetic responsibility due to high risks. Factors related to the operating room and hospital include the unavailability of surgical instruments, overcrowding in the operating room, unavailability of the room, insufficient staffing, lack of available ICU beds, and time constraints. Patient-related reasons include patient dissatisfaction, lack of cooperation, restlessness, and unpreparedness before surgery (e.g., not fasting). Patient clinical issues involve cancellations for individuals with underlying conditions such as hypertension, diabetes, or infectious diseases like fever and cold. Factors related to para clinical services and consultations include unavailability of test results, lack of an ECG, lack of an MRI, and absence of consultations.

Finally, in Table 3, the frequency and percentage of canceled surgeries based on demographic factors are displayed.

Table 1. Frequency of surgeries performed and canceled by specialty

Specialty	Total Surgeries Performed	Canceled Surgeries	Cancellation Rate
Obstetrics and Gynecology	7572	33	0.43
Orthopedics	4322	43	0.99
Ophthalmology	9565	31	0.32
Ear, Nose, and Throat	5215	38	0.72
General Surgery	4686	61	1.3
Vascular Surgery	1245	17	1.3
Neonatology	1270	16	1.2
Thoracic Surgery	1260	5	0.39

Table 2. Frequency and percentage of reasons for canceled surgeries by specialty

Specialty	Surgeon-Related Causes	Anesthesia-Related Causes	Operating Room and Hospital-Related Causes	Patient-Related Causes	Patient Clinical Issues	Paraclinical Services and Consultation	Canceled Reason Not Specified	Other
Obstetrics and Gynecology	3(9.09)	1(3.03)	2(6.06)	6(18.18)	10(30.3)	7(21.21)	1(3.03)	3(9.09)
Orthopedics	12(27.9)	4(9.3)	13(30.23)	5(11.62)	4(9.3)	2(4.65)	1(2.32)	2(4.65)
Ophthalmology	10(32.25)	2(6.45)	1(3.22)	3(9.67)	9(29.03)	4(12.9)	2(6.45)	0
Ear, Nose, and Throat	7(18.42)	1(2.63)	5(13.15)	8(21.05)	4(10.52)	9(23.68)	3(7.89)	1(2.63)
General Surgery	12(19.67)	2(3.27)	10(16.39)	7(11.47)	10(16.39)	13(21.31)	4(6.55)	3(4.91)
Vascular Surgery	2(11.76)	0	1(5.88)	2(11.76)	3(17.64)	0	9(52.94)	0
Neonatology	5(31.25)	1(6.25)	0	2(12.5)	5(31.25)	2(12.5)	0	1(6.25)
Thoracic Surgery	2(40)	0	0	0	1(20)	0	1(20)	1(20)

Table 3. Frequency and percentage of canceled surgeries based on demographic factors

Variable	Frequency	Percentage of Frequency	
Type of insurance	Social Security	89	36.5
	Government Employees	13	5.3
	Universal Health Coverage	20	8.2
	Rural	62	25.4
	Private and Other	60	24.6
Sex	Female	127	52
	Male	117	48
Age	0-10 years	20	8.2
	11-20 years	21	8.6
	21-30 years	24	9.8
	31-40 years	30	12.3
	41-50 years	31	12.7
	51-60 years	44	18
	61-70 years	45	18.4
	71-80 years	19	7.8
	81-90 years	7	2.9
91-100 years	3	1.3	

According to Table 3, the highest frequency of canceled surgeries was associated with the age group of 61-70 years (18.4%), female patients (52%), and individuals covered by social security insurance (36.5%).

Discussion

At Shahid Sadoughi Hospital in Yazd, 14,222 out of 14,296 planned surgeries were performed between March 2020 and March 2021, resulting in 74 cancellations (0.51%). In the following year (2022), 20,930 out of 21,100 planned surgeries were completed, with 170 cancellations (0.80%). Over the two-year period, a total of 35,396 surgeries were scheduled across various specialties, including obstetrics and gynecology, orthopedics, ophthalmology, ENT, general surgery, vascular surgery, neonatology, thoracic surgery, urology, and neurosurgery. Of these, 35,135 surgeries were performed, and 244 were canceled.

A similar study by Jafari et al. at Shahid Beheshti Hospital in Taft (2019–2020) reported a 0.9% cancellation rate over two years, with rates of 0.98% in 2019 and 0.79% in 2020 (15).

The current study found that general surgery had the highest cancellation rate (1.3%), while thoracic surgery had the lowest (0.39%). This aligns with Jafari et al.'s findings, which also identified general surgery as the specialty with the highest number of cancellations (15). In contrast, Zarei et al. reported the highest cancellation rate in neurosurgery (43.3%) (11).

Regarding reasons for cancellations, the highest frequency of surgeon-related cancellations occurred in orthopedics and general surgery. While Zarei et al. attributed surgeon-related cancellations primarily to the surgeon's absence (11), the present study found that the most common reason was the surgeon's discretion. For anesthesia-related cancellations, orthopedics had the highest frequency. Kiasari et al. reported that 56.6% of patients were evaluated by anesthesiologists preoperatively, with 10.3% of these cases canceled. In contrast, 11.4% of the 34.4% of patients not evaluated by anesthesiologists were

canceled, highlighting the importance of preoperative anesthesia assessments in reducing cancellations (12).

Operating room and hospital-related cancellations were mostly in orthopedics. Gholami et al. identified operating room issues as the primary reason for cancellations in 52% of cases, with insufficient operating room capacity accounting for 49.5% of cancellations over a one-month period (4). For patient-related cancellations, otolaryngology had the highest frequency. Ebrahimpour et al. noted that patient non-attendance was the second most common reason for cancellations, with dissatisfaction and failure to fast being the fifth and sixth most common reasons, respectively (16). Zarei et al. found that patient-related issues accounted for 0.16% of cancellations, with non-attendance or leaving the hospital being the most frequent subgroup (11).

Cancellations due to clinical problems were most common in obstetrics and gynecology and general surgery. Mohammad et al. reported that clinical issues were responsible for 64% of cancellations, emphasizing the importance of preoperative patient evaluation to address this problem (3). Similarly, Mir Mohammadi et al. identified the patient's clinical condition as the primary reason for cancellations, which also resulted in prolonged hospital stays and increased costs (8).

For paraclinical service-related cancellations, general surgery had the highest frequency. Ramazankhani et al. identified lack of paraclinical test results and patient consultations as the third most common reason for cancellations (10). In contrast, Jafari et al. found that clinical unpreparedness of patients was the leading cause of cancellations (0.38%) (15). These differences may be attributed to variations in hospital size and specialty distribution, as Jafari et al.'s study was conducted in a smaller hospital in a smaller city.

International studies also indicate similar rates of surgery cancellations. For example, a study conducted in Norwegian hospitals revealed that

12.5% of surgeries are canceled for various reasons, with the most common causes being organizational issues (37%), patient-related factors (32%), and clinical concerns (21%) (17). Another study in the UK found that 14.4% of surgeries are canceled, with the most frequent reasons being patient unpreparedness (32%) and hospital resource-related issues (28%) (18). These findings align with the results of the present study, which indicate that patients' clinical problems and organizational issues are among the primary reasons for surgery cancellations. Furthermore, a study in the United States demonstrated that improving pre-operative processes, including comprehensive patient assessments and more precise planning, can reduce surgery cancellation rates by up to 50% (19). This highlights the importance of pre-operative evaluations and coordination among different hospital departments in minimizing surgery cancellations.

This study provides detailed statistics on surgery cancellations over two years at Shahid Sadoughi Hospital, including the total number of surgeries scheduled, performed, and canceled. This level of detail enhances the credibility and reliability of the findings and breaks down cancellation rates by medical specialty (e.g., general surgery, thoracic surgery, orthopedics), providing valuable insights into specialties that are most affected and its reason (strengths). However, the study also has some limitations. The study focuses on a single hospital, which may limit the generalizability of the findings to other hospitals or regions with different healthcare systems, resources, or patient demographics and the study relies on hospital records, which may not always accurately capture the reasons for cancellations. For instance, surgeon-related cancellations might be underreported due to professional or administrative biases. The study heavily relies on secondary data (e.g., hospital records and comparisons with other studies) without primary data collection, such as interviews or surveys with patients, surgeons, or hospital staff. This limits the depth of understanding underlying issues.

Conclusion

Although postponing surgeries may seem simple at first glance, a deeper look reveals that this issue leads to inefficient use and waste of hospital resources on one hand, and creates anxiety for patients and their companions on the other hand. Hospitals allocate significant resources to manage the operating room to ensure that surgical procedures are performed in a timely manner; therefore, one of the important causes of inefficiency and lack of productivity in hospitals is the cancellation of surgeries. While surgical cancellations are sometimes unavoidable, in many cases, they can be prevented through following suggestions:

- ✓ Regularly collect and analyze data on surgery cancellations to identify patterns, root causes, and areas for improvement.
- ✓ Establish a mandatory preoperative evaluation process for all patients, including medical history reviews, laboratory tests, and anesthesia consultations.
- ✓ Develop a patient education program to inform patients about preoperative requirements (e.g., fasting, medication adjustments) and the importance of adhering to scheduled surgeries.
- ✓ Use advanced scheduling software to allocate operating room time more efficiently, considering factors like surgery duration, surgeon availability, and resource allocation.
- ✓ Implement policies to minimize surgeon-related cancellations, such as requiring surgeons to confirm their availability well in advance and providing backup surgeons for emergencies.

Ethical Considerations

In this study, ethical considerations were upheld, including confidentiality of all patients' personal information and maintaining integrity and honesty throughout all stages of the work. This article is also the result of an approved project by Shahid Sadoughi University of Medical Sciences, with ethics code IR.SSU.SPH.REC.1041.184.

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Author's Contribution

Study concept and design: H.J, MK.R, F.Kh . Data collection: F.Kh, SZ.H Statistical analysis and interpretation of data: H.J, F.Kh . Drafting the manuscript: H.J. All the authors read and approved the final version.

Conflict of Interests

The authors declare that there is no conflict of interest.

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