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Exploring the rate and reasons for same-day cancellation of cardiac surgery after implementing joint commission international standards: a retrospective cross-sectional study

Mohammed A. Alanazi^{1*} and Sherran Milton²

Abstract

Background Same-day cancellation of cardiac surgery significantly impacts operating room management efficiency, which can be mitigated by taking preventive measures. This study aimed to explore the same-day cancellation rate of elective adult cardiac surgery, as well as the reasons for those cancellations. A retrospective cross-sectional study reviewed the records of 581 scheduled elective adult cardiac surgical cases at a single cardiac center from June 2017 to May 2018. The same-day cancellation reasons were grouped into four broad categories: nonclinical cancellations, clinical cancellations, patient-related cancellations, and 'other reason' cancellations. A case was considered canceled when it was not performed on the same day as the planned surgery.

Results A total of 581 elective adult cardiac surgeries were scheduled during the study period, and 56 (9.63%) of these were canceled. The highest cancellation rate was due to nonclinical cancellations, with 39% of scheduled cases, followed by clinical cancellations, with a 34% cancellation rate. Patient-related cancellations accounted for 23% of cancellations, while the lowest rate was due to 'other reasons,' which accounted for 4% of total cancellations. The most common reason for nonclinical cancellations was the inclusion of emergency cases ($n = 8$; 14%). The most common reason for clinical cancellations was changes in the patient's medical condition ($n = 8$, 14%). The common reason for patient-related cancellations was the refusal of surgery ($n = 9$; 16%). The lowest rate was for menstruating female patients ($n = 2$; 4%).

Conclusions The same-day cancellation rate was 9.36%, and most of the cancellation reasons could be mitigated by implementing preventive strategies to improve the efficiency of the operating room. Preoperative preparation clinics and paying particular attention to female patients scheduled for surgery might reduce the rate of elective cardiac surgery cancellation.

Keywords Cardiac surgery, Operating room, Surgery cancellation, Elective surgery, Same-day cancellation

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Background

Last-minute delay or cancellation of elective surgical procedures represents a serious health issue. In cardiac surgery, postponing or canceling surgical treatment could expose patients to several risks, including myocardial infarction, increased risk of infection, and complications

resulting from prolonged hospital stay [1]. Same-day cancellation (SDC) is a cancellation of elective cases that appeared in the final operative list and were not carried out as planned on that day [2]. In addition to health-related issues resulting from cancellation, canceling elective surgery could have economic, social, and psychological impacts, as many patients have a long waiting list for their surgeries [3–5]. Beyond the impact on patients, delaying surgeries could affect the patients' families [6].

The rates and causes of elective surgery cancellation widely vary in the literature among different countries and institutions [7, 8]. The surgical cancellation rate indicates effective operating room utilization; a rate less than 5% is the standard [9]. The elective surgery cancellation rate varies between 0.84% and 16% in developed countries [10, 11] and 9% and 48% in developing countries [3, 12].

The National Health Service (NHS) established three main categories for cancellation reasons: nonclinical cancellations, clinical cancellations, and patient-related cancellations. In the literature, nonclinical reasons are the most common and range from 25 to 73% [13, 14]. Avoiding elective surgery cancellation is considered an area of improvement since 65 to 80% of elective surgery cancellations could be avoided with properly applied standards [6]. There is a need to thoroughly evaluate the rate and reasons for canceling elective cardiac surgeries in developing countries to establish strategies and new policies to tackle the cancellation problem. Therefore, this study investigated the rate and reasons for same-day cancellation in elective cardiac surgeries in a single-tertiary referral center, which might help to improve efficiency, clinical practice, and patient care.

Methods

Study design

A quantitative, retrospective, cross-sectional descriptive approach was chosen to achieve the current study's objectives.

Population

The study included electively scheduled adult cardiac procedures (ages from 18 to 80 years) between June 1st, 2017, and May 31st, 2018. This time period was chosen because it is after implementing Joint Commission International (JCI) accreditation and before the era of the COVID-19 pandemic, which had its own cancellation rate and reasons that do not currently apply. Patients were scheduled for elective surgery using cardiopulmonary bypass between 7 am and 4 pm and were shown on

the theatre board but were not performed according to the schedule. Patients with emergency surgery, night or weekend surgeries, and missing data were excluded from the analysis. Additionally, we excluded minor cases performed without cardiopulmonary bypass, such as wound debridement.

Settings

The study was based on the Department of Cardiac Surgery at a tertiary cardiac referral center, currently considered one of the largest national cardiac centers for referral and education, with a capacity of 174 beds. The study's location was the main operating suite, which included five cardiac operating rooms.

Data collection

Data were retrospectively collected from electronic and paper medical records. Cancellation reasons were grouped into nonclinical reasons (unavailable intensive care unit beds, unavailable surgeons, introducing emergency operations, and unavailability of blood), clinical reasons (change in patient's medical condition, having an infection or need for further investigations), and patient-related reasons (patient's refusal or unfit for surgery). We added another category (other reasons) to provide space to discover more unusual cancellation reasons that could be specific to the country and organization (female with the menstrual cycle). Furthermore, data related to patient age, sex, date, and time of surgery were collected. According to the hospital protocol, the operating room clerk must inform the charge nurse about the cancellation, and the nurse must confirm with the doctor who reported the cancellation. After that, the nurse documented the information related to the cancellation reasons.

Ethical considerations

Approval from the hospital Research Ethics Committee was obtained from conducting the study (Reference number: R18003), and patient consent was not needed. Data were collected anonymously.

Data analysis

Descriptive statistics were used to show the trends and models that were raised from the data and could be used to interpret the results in a simplified manner. Microsoft Excel spreadsheets were used to organize the collected data regularly and apply some basic data analysis tasks. Microsoft Excel was also used to present the results in charts, tables, graphs, and texts. The data are presented as numbers and percentages.

Results

Cancellation rate

A total of 581 adult elective cardiac surgical procedures with cardiopulmonary bypass were scheduled during the study period. A total of 56 (9.64%) procedures had same-day cancellations.

Cancellation reasons

The most common cancellation category was nonclinical cancellations ($n = 22$, 39%), followed by clinical cancellations ($n = 19$, 34%), patient-related cancellations ($n = 13$, 23%), and other reasons ($n = 2$, 4%) (Fig. 1).

Nonclinical cancellations

Five nonclinical SDC reasons were recognized, including ($n = 8$, 14%) because of the inclusion of emergency surgery, ($n = 6$, 11%) because of the unavailability of blood, ($n = 3$, 5%) because no beds were available, and ($n = 3$, 5%) due to a lack of theatre time. The lowest cancellation rate was due to the surgeon's unavailability, representing 3.57% ($n = 2$) (Table 1).

Clinical cancellation

There were three causes for clinical cancellations: an infection, a sudden change in the patient's medical status, and the need for further patient investigations. A sudden change in the patient's medical condition represented the most common reason ($n = 8$, 14%), followed by infection ($n = 7$, 13%) of the total SDC, while the lowest clinical cancellation rate was due to patients needing further investigations ($n = 4$, 7%) (Table 1).

■ Nonclinical cancellations ■ Clinical cancellations
 ■ Patient-related cancellation ■ Other reasons

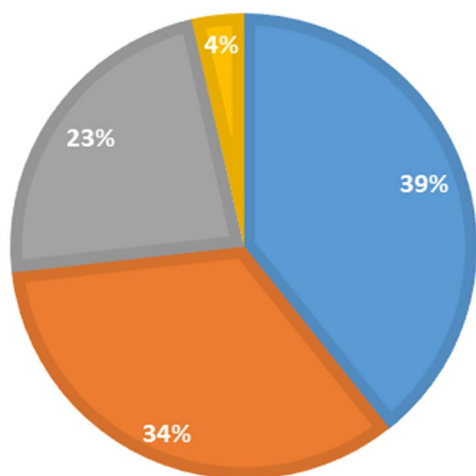


Fig. 1 The different categories of same-day cancellation reasons and their rates

Table 1 Reasons and rates for cardiac surgery cancellations

	<i>n</i> (%)
Nonclinical reasons (total)	22 (39.3%)
Unavailability of intensive care unit beds	3 (5.36%)
Theatre time overrun	3 (5.36%)
Surgeon unavailability	2 (3.57%)
Emergency case inclusion	8 (14.29%)
Blood not available	6 (10.71%)
Clinical reasons (total)	19 (33.93%)
Infection	7 (12.5%)
Change in patient's medical condition	8 (14.29%)
Further investigations required	4 (7.14%)
Patient-related reasons (total)	13 (23.21%)
Patient refused surgery	9 (16.07%)
The patient was not fit for surgery	4 (7.14%)
Other reasons (total)	2 (3.57%)
A female patient was menstruating	2 (3.57%)

Patient-related and other cancellations

Patient-related cancellations included all same-day cancellations of operations due to the patient refusing surgery and not being fit for surgery. Of these, 16.07% ($n = 9$) were patients who refused surgery, and 7.14% ($n = 4$) were declared unfit for surgery. Other reasons included female patients presenting for surgery while they were menstruating ($n = 2$, 4%) (Table 1).

Age

Same-day cancellation was 16% in adults aged 18–39 years old, whereas 34% were adult patients aged between 40 and 60. Patients aged 61–80 had the highest surgical cancellation rate, accounting for 50% of the total same-day cancellations (Fig. 2).

Gender

Female cases had a high same-day cancellation rate, accounting for 57% ($n = 32$) of the total, while male cases accounted for 43% ($n = 24$) (Fig. 3).

Discussion

This retrospective study aimed to explore the cancellation rate of elective cardiac procedures and their causes. The study reported that 56 patients (9.64%) had same-day cancellations. High rates of same-day cancellation for elective procedures are barriers to achieving institutional efficiency [15] and affect the operating room's quality [16]. It is difficult to set a standard rate for cancellation because it depends on the type of surgery and hospital location. González-Arévalo et al. reported a cancellation rate of less than 1.5% in New South Wales, Australia

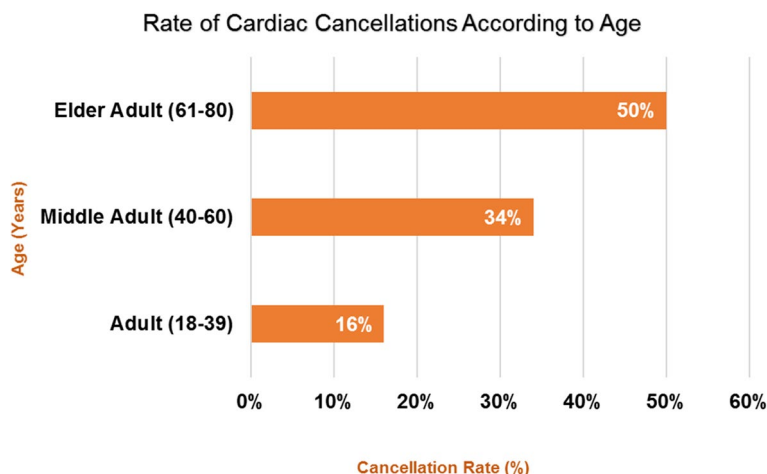


Fig. 2 Rate of cardiac cancellations according to age

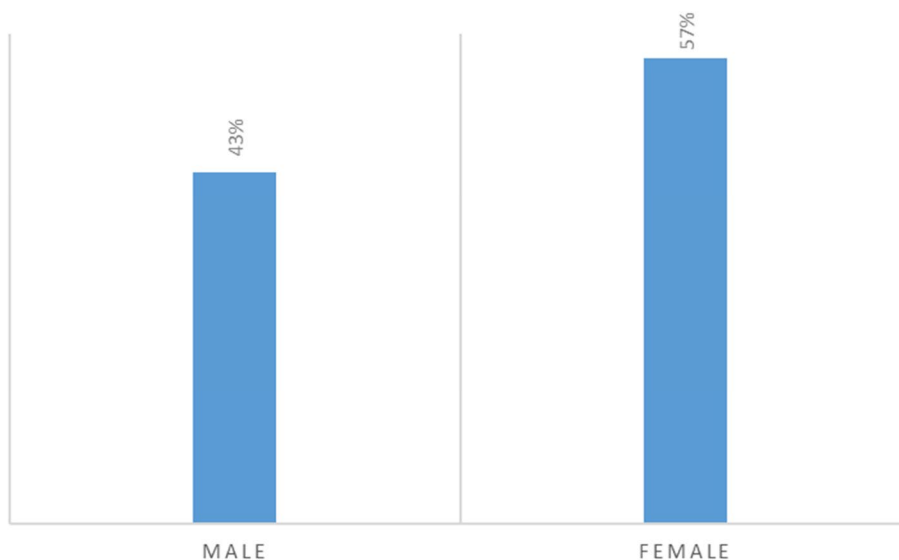


Fig. 3 Same-day cancellation rate in male and female patients

[16]. Olson and Dhakal set a 5% cancellation rate to be an accepted rate for optimal operating room utilization [11]. Furthermore, cancellation rates could differ between developed and developing countries. Reasons for cancellation in developing countries could be attributed to unavailable beds or resources, ineffective communication or poor clinical policy, and lack of patient education [17]. Desta et al. reported a rate of 31.6% (146 cases), and the study was conducted in a developing country [18]. The study highlighted suboptimal administrative processes and a lack of guideline adherence. On the other hand, studies performed in developed countries reported a lower cancellation rate, and Yu et al. reported a 6% cancellation rate [19]. Adherence to the preoperative

assessment guidelines could be the reason for this low cancellation rate.

Classifying the cancellation rate is useful to spot the defects in the system [17]. The main reasons for cancellation were nonclinical, clinical, patient-related, and other reasons. The study reported the highest rate to be nonclinical, 39% (22 patients) of the total number of canceled cardiac cases. Wong et al. [14] and Chiu et al. [20] reported that the most common cause of cancellation was nonclinical. The implicated reasons for nonclinical cancellation were poor communication and coordination [21]. The study identified five main nonclinical reasons related to cardiac surgery cancellations that emerged from the data: “unavailability of intensive

care unit beds,” “lack of operating room time,” “surgeon unavailable,” “inclusion of emergency procedures,” and cancellation due to “unavailability of blood.”

Cancellation because of the unavailability of intensive care unit beds was reported in 3 (5.36%) patients, which is lower than that reported in the literature. Hospitals with higher bed capacity have a lower cancellation rate. Dimitriadis et al. [22] reported a cancellation rate of 21.79% ($n = 219$) due to a lack of beds. McKendrick et al. [23] reported a cancellation rate because the shortage of beds increased during infectious outbreaks. Cancellation because of lack of operating room time was 5.36%. This could arise due to ineffective coordination or the surgeons underestimating the surgery time [20]. Abeeleh et al. [12] reported that inexperienced surgeons markedly increase the operating room utilization time. This issue can be partially resolved by avoiding overbooking the operating room [22]. Cancellation due to surgeon unavailability accounted for 3.57% ($n = 2$). JCI policy requires that surgeons be available in the operating room before patient arrival, which contributes to lowering the cancellation rate due to surgeons’ unavailability. Cancellation because of emergency cases accounted for 14.29% ($n = 8$). This issue can be resolved by avoiding overbooking and keeping the on-call surgeon available only for emergencies [16]. The cancellation rate due to the unavailability of blood was 10.71% ($n = 6$), presenting the second most common cause of cancellation. Elrahman et al. [24] reported that 9.3% ($n = 288$) of their total same-day cancellation rate was due to the unavailability of blood. Increasing the awareness of blood donation and requesting donations from patients’ relatives could alleviate this issue.

The second most common reason for canceling a cardiac case in this research was due to “clinical cancellations,” comprising 34% (19 cases), and 12.5% of them (7 cases) were due to infection. Patients scheduled for surgery are prone to infection, especially urinary and respiratory infections [12]. Proper identification of infection preoperatively facilitates surgical rescheduling, and the anesthesia clinic plays a role in tackling this. Additionally, patient education should ensure that patients or their families are aware of reporting any change in patient condition before surgery. Surgical cancellations due to a sudden worsening in a patient’s medical condition accounted for 14.29% ($n = 8$). This reason indicates inappropriate preoperative evaluation. Cancellation because of requiring additional investigations accounted for 7.14% ($n = 4$). According to the NICE (2016) recommendations, healthcare providers should ensure that the necessary investigations are performed, the results are available, and the necessary actions are taken before surgery [25].

The third most common reason for canceling a cardiac case in this research was “patient-related cancellations,” comprising 23% (13 cases), and 9 cases (16.07%) were because of patient refusal. This could arise from patients’ anxiety and fear and lack of proper preoperative education. Involving the patients in their care could solve this issue, and healthcare professionals should ensure that patients make their own decisions [26]. Other reasons for cancellation were menstruating females ($n = 2$). During menstruation, females have functional weakness in their coagulation system, which could aggravate bleeding during cardiac surgery [27]. Some surgeons believe that surgery should not be performed on a menstruating female as they are under hormonal stress, which could lead to bleeding [28]. This issue can be overcome by appropriate surgical planning strategies for females undergoing elective surgery.

Study limitations

The retrospective study relied on the cancellation causes reported by the clerks, which could be nonstandardized. The study is a single-center experience, and the generalizability to other centers should be considered cautiously. The study is also limited by a small sample size; a larger sample could identify other cancellation causes.

Conclusions

The same-day cancellation rate was 9.36%, and most of the cancellation reasons could be mitigated by implementing preventive strategies to improve the efficiency of the operating room. Preoperative preparation clinics and paying particular attention to female patients scheduled for surgery might reduce the rate of elective cardiac surgery cancellation.

Acknowledgements

Not applicable

Authors’ contributions

MA: data collection, analysis, interpretation, drafting. SM: supervision, design, interpretation, reviewing. All authors read and approved the final version of the manuscript.

Funding

No funding was received for this project. This research did not receive any grants from funding agencies in the public, commercial, or non-profit sectors.

Availability of data and materials

the authors declare that the data supporting the findings of this study are available upon reasonable request to the corresponding author.

Declarations

Ethics approval and consent to participate

IRB approval number: R18003. Prince Sultan Cardiac Center- Riyadh- Saudi Arabia-2018. Consent to participate was waived by the Ethical Committee.

Consent for publication

Not applicable

Competing interests

The authors declare that they have no competing interests.

Received: 21 November 2023 Accepted: 2 December 2023

Published online: 09 December 2023

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