



International Journal of Medical Anesthesiology

E-ISSN: 2664-3774
P-ISSN: 2664-3766
www.anesthesiologypaper.com
IJMA 2021; 4(1): 06-10
Received: 25-10-2020
Accepted: 05-12-2020

Dr. Shivakumar G
Professor and Head,
Anaesthesiology Mandya
Institute of Medical Sciences
Mandya, Karnataka, India

Dr. Lokesh VC
Assistant Professor,
Anaesthesiology Mandya
Institute of Medical Sciences
Mandya, Karnataka, India

Corresponding Author:
Dr. Lokesh VC
Assistant Professor,
Anaesthesiology Mandya
Institute of Medical Sciences
Mandya, Karnataka, India

Reasons and appropriate measures to circumvent cancellation of elective surgical cases: A clinical audit of a government teaching hospital

Dr. Shivakumar G and Dr. Lokesh VC

DOI: <https://doi.org/10.33545/26643766.2021.v4.i1a.187>

Abstract

Background: Cancellation of elective surgical cases is a major unresolved problem for health care organizations worldwide and also a parameter for assessing the quality of both the patient care and management system. In the present study, we retrospectively investigated the cancellation rates and reasons for the same in a government teaching hospital and suggested measures to circumvent such cancellations.

Materials & Methods: Medical records of 1207 patients, whose elective surgical procedures were cancelled on the day of surgery between June 2015 and May 2017, from all surgical specialties of the hospital, were retrospectively audited. The reasons for cancellation were noted.

Results: Of the 7316 cases scheduled for elective surgeries between June 2015 and May 2017; 1207 (16.49%) cases were cancelled on the day of surgery. The highest number of cancellations occurred in the specialty of orthopaedics (6.84%) followed by general surgery (5.41%). Both otorhinolaryngology (2.06%) and gynaecology (2.07%) exhibited similar cancellation rates whereas facio-maxillary surgery exhibited the lowest cancellation rate (0.09%). The main reason for cancellation was the unfit condition of patients for surgeries because of medical reasons [599 (49.6%)], followed by Inadequate operation theatre time [274(22.7%)], equipment failure [207(17.2%)] and patients not turning up for procedures [127(10.5%)].

Conclusion: Cancellation rates and reasons for cancellation vary across institutions. Regular prospective or retrospective clinical audits improve quality of health services, whereas control charts help in enhancing the overall picture and monitoring the reasons for cancellation. Most of the cancellations are avoidable.

Keywords: Elective surgery, cancellations, control chart

Introduction

Operation theatres require a considerable amount of human resources in both the teaching institutes and corporate setups and represent a crucial part of hospitals. They contribute to majority of the hospital income in corporate setups, whereas they provide a bulk of surgical cases in government hospitals. The Inefficient use of operation theatres mainly due to reasons such as surgical procedure cancellation on the day of surgery increases the financial and patient burden^[1]. Elective cases cancelled on the day of surgery leads to inefficient use of operation theatre time and wastage of resources^[1, 2]. Cancellation rates and reasons for cancellations vary across institutions. The most common factors that cause cancellation on the day surgery are the lack of operation theatre time, patient not turning up for the surgery, and patient not being medically optimized. According to several studies the cancellation rates range from 1.96% to 40%^[3, 4, 5]. Surgery cancellations have been extensively studied using a wide range of statistical methods^[6]. A relatively recent statistical method, namely statistical process control (SPC), for assessing variations in the medical field provides in-depth understanding of surgery cancellations. The SPC (Statistical Process Control) chart facilitates the assessment of cancellation rates variation and subsequently the tracking of improvement following application of any intervention. Thus, the present retrospective study attempted to analyze the rate and causes of cancellation of elective procedures in a government teaching hospital and suggests measures for the optimal utilization of operation theatre time.

Materials and Methods

About the hospital

Our hospital is a 450 bedded multidisciplinary government teaching hospital (Mandya Institute of Medical Sciences, Mandya) serving patients across four districts. Operation theatre was renovated in May 2015 and which includes eight operating tables covering orthopedics, general surgery, gynaecology and otorhinolaryngology. On an average 2500 cases are being operated every year.

The present retrospective clinical audit was conducted at in Aug 2017. The number of scheduled and cancelled surgeries was obtained from the operation theatre registries. Operation theatre registers are maintained by entering the details of scheduled cases, elective surgeries performed, and cases that are cancelled from the scheduled list. The operation theatre list provides details of the patient, diagnosis, and the intended procedure. We defined cancelled cases as the booked case (already documented on the operation theatre list), that were cancelled on the day of surgery. Additional data on the reasons for cancellation documented in a separate register for each specialty were noted. Since operation theatre was renovated and started functioning from May 2015, data from June 2015 to May 2017 were retrieved and analyzed. Monthly and yearly scheduled and cancelled cases were also reviewed. Emergency surgical cases and cases scheduled under local anaesthesia were excluded from the analysis. Additionally, patient case files were reviewed when necessary to clarify the exact reason for the cancellation.

The reasons for cancellation were classified into the following four groups:

1. Patient related factors: patient not turning up for surgery, or refusal to sign consent form
2. Preoperative preparation causes: requirement for further optimization, requirement for further investigation, and abnormal test results.
3. Hospital management related factors: lack of operation theatre time, unavailability of equipment or implants.
4. Socioeconomic factors: High socioeconomic group patients denying surgery at our hospital and getting it performed elsewhere.

Because the present study was retrospective and no intervention was applied, we constructed basic control chart using Microsoft Excel 2007 (MS Office 2007, Microsoft, USA). This simple chart is a dynamic line graph that represents the data over time. Time is represented on the horizontal (X) axis and the cancellation rate is plotted on the vertical (Y) axis. A centerline represents the average rate of cancellation. Control charts display lines for an upper control limit (UCL) and a lower control limit (LCL), which are calculated from the intrinsic variation (standard deviation) of the data. Variations on graphs reflect common variations or may indicate significant special cause variation, which can be on the favorable direction (low cancellation rate) or

on the unfavorable direction (high cancellation rate) depending on the intervention.

Results

A total 7316 elective procedures were scheduled for 24 months from June 2015 to May 2017. The total number of surgical procedures performed was 6109 in eight operation rooms. Of these 1207 cases were cancelled, displaying a cancellation rate of 16.49%. The cancellation rate was reported to be the highest in April 2016 (21.64%) and the lowest in May 2017 (11.32%).

Orthopaedics had the highest number of scheduled cases [3381 (46.2%)], followed by general surgery [2240 (30.6%)], otorhinolaryngology [878 (12%)] and gynaecology [807 (11%)] cases and dental had the least number of patients scheduled for operation [35 (0.4%)] (Table 1). Out of the cancelled procedures, the highest number of cancellations were in orthopaedics [501(6.84%)], followed by general surgery [396(5.41%)]. Both gynaecology [152(2.07%)] and otorhinolaryngology [151(2.06%)] exhibited almost similar cancellation rates, where as dental surgery exhibited the least cancellation rate [7 (0.09%)]

The highest cancellation rate was observed in dental surgery (20%). Followed by gynaecology (18.6%), general surgery (17.6%) and Otorhinolaryngology (17.2%), and orthopaedics exhibited the lowest cancellation rate (15%).

The rate of cancellation was higher in the first 15 months, after which it gradually declined (Fig 1). The UCL was 24.36%, the LCL did not cross 9.12% and the average cancellation rate was 16.74%. The Cancellation rate after the 16th month displayed a downward trend, with five consecutive points below the average line and subsequent points recording the lowest cancellation rates.

We studied 1207 cancellations over a period of 2 years (June 2015 to May 2017) to define various reasons and specialties of cancelled surgeries (Table 3). The prime reason for cancellation was inability to obtain patient fitness for surgery due to medical reasons [599(49.62%)], followed by inadequate Operation theatre time [274(22.7%)] and equipment failure [207(17.2%)]. Patient related factors were the major cause of cancellation [726 (60.2%)]. The number of patients not presenting for the surgery was less among the poor socioeconomic group [13(9%)] as compared with the high socioeconomic group [114(91%)].

Numerous reasons for cancellation due to medical reasons are enumerated in Table 4. Major reasons were uncontrolled hypertension [259(43.2%)] and uncontrolled blood sugar level [154 (25.7%)] followed by the < 10gm% hemoglobin level [115 (19.2%)], abnormal biochemical parameters [47(8%)] and abnormal 2D Echo findings [14(2.3%)]. Pareto chart was used to interpret reasons for cancellation and accredit the lack of operation theatre time and patient requiring optimization for more than 60% of surgery cancellations [Fig 2].

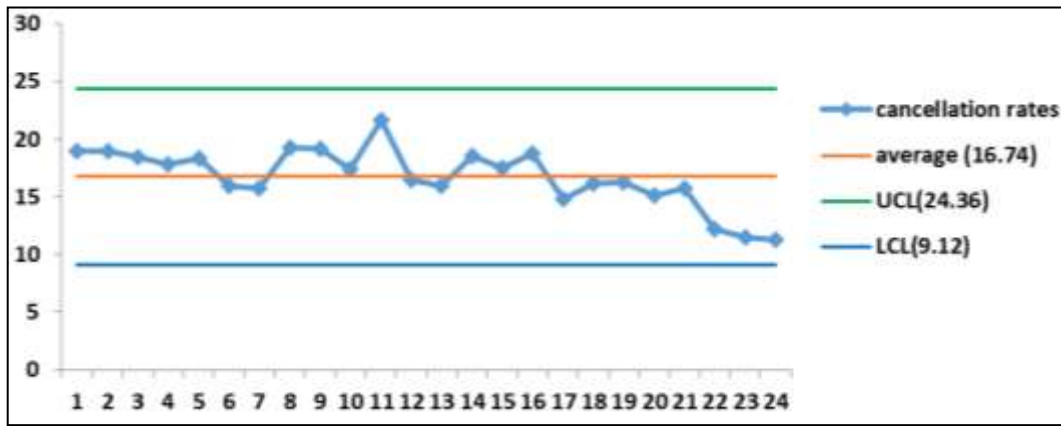


Fig 1: Control chart showing cancellation rate with monthly variation

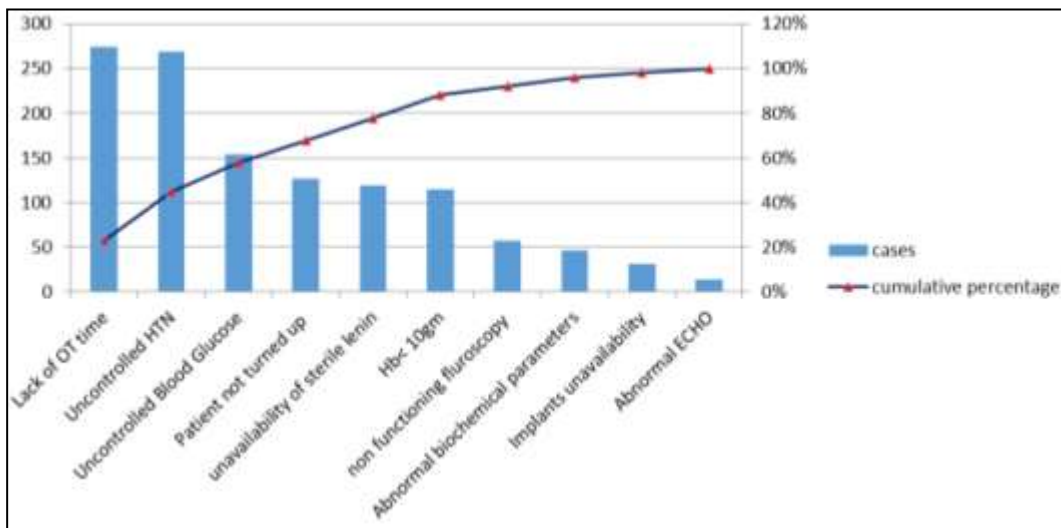


Fig 2: Pareto chart for causes of cancellations from JUNE 2015 to MAY 2017

Table 1: Specialty wise distribution of cases (scheduled and cancelled)

Specialty	Scheduled cases (%)	Cancelled cases (%)
Surgery	2240 (30.6)	396 (5.41)
Orthopedics	3356 (46.2)	501 (6.84)
Gynecology	807 (11.03)	152 (2.07)
Otorhinolaryngology	878 (12)	151 (2.06)
Dental	35 (0.4)	7 (0.09)
Total	7316 (100)	1207 (16.49)

Table 2: Cases cancelled as a percentage of cases

Specialty	Scheduled cases	Cancelled cases	Percentages of cancelled cases (%)
Dental	35	7	20
Gynaecology	817	152	18.6
Surgery	2240	396	17.6
Otorhinolaryngology	878	151	17.2
Orthopaedics	3381	508	15.0

Table 3: Reasons for cancellation of surgery

Reasons for cancellations	Number of cancelled cases (%)
Patients unfit for surgery due to medical reasons	599 (49.62)
Inadequate OT time	274 (22.70)
Equipment failure	207 (17.15)
Patient not turned up for surgery	127 (10.52)

Table 4: Causes for cancellation of surgery due to medical reasons

Patients unfit due to medical reasons	Number of cancelled cases (%)
Uncontrolled Hypertension	259 (43.23)
Uncontrolled Blood Glucose	154 (25.7)
Hemoglobin <9gm%	115 (19.19)
Abnormal Biochemical parameters	47 (7.8)
Abnormal Echocardiography findings	14 (2.3)

Discussion

A Low surgery cancellation rate is the hallmark of efficient surgical services, particularly in government hospitals. Underutilization of resources negatively influences the patients belonging to low socioeconomic group who depend on public services for most of their health care needs [7]. In the present study, more than 60% of cancellations were observed on the day of surgery. Fischer *et al.* also reported that almost 90% of cancellations were on the day of surgery [8]. Cancellations on the day of the intended surgery have psychological, social and financial implications [9]. Our retrospective audit demonstrated that most of the cancellations are potentially avoidable.

The average rate of surgery cancellation in the present study was 16.5%, which is similar to that reported in a study by Kumar *et al.* (17.6%), and the most common reason for cancellation reported in the study was the lack of availability of theatre time [10]. This rate is comparable with other institutes, which have reported cancellation rates

ranging between 10 and 20% [11, 12]. Nevertheless, this rate is considerably higher than that recorded by other studies (2-8%) thus leaving significant room for improvement [13, 14, 15].

The present study suggests that the unfit condition of patients for surgical procedures due to medical reasons is the most common reason for cancellations. Cancellations caused by medical problems are especially upsetting for both patients and members of the medical staff. Thus, these cancellations may be more memorable than other cancellations [8]. Inadequate preoperative medical optimization was another vital reason for case cancellation in our study. The major reasons for this finding were uncontrolled hypertension and diabetes. In our hospital, all the patients are evaluated a day before surgery by an anesthesiologist after receiving the operation theatre list and patients who require preoperative medical optimization are referred to a physician. However most of the time surgeons schedule the surgery of their patients immediately after physician's reference without optimizing the patient. Studies have reported that preoperative anesthesia assessment in preanesthesia clinics significantly reduces operative room delays and cancellations. A Study by Hussain *et al.* observed that 8% case cancellation on the day of surgery is related to anaesthesia [17].

The second most common reason for cancellation was the lack of operation theatre time. A lot of time is wasted due to late starts, time between cases, preparation and cleaning theatres, which delay the shifting of patients to operation theatres. Similar results were found in a study by Garg *et al.*, where 60% cases were cancelled due to the lack of operation theatre time [18]. A lengthy operation theatre list prepared by overenthusiastic junior surgeons who underestimate the duration of the procedure is also a reason for cancellation on day of surgery. Generally, surgeons add more patients to the Operation theatre list to avoid unexpected last minute cancellations. Unforeseen anaesthetic and surgical complications may also delay the planned list. Less experienced surgeons and trainees often require more than the expected time. Additionally, unavailability of sterilized materials and equipments in time also results in last minute cancellations.

Nearly 10% of the patients did not show up for the surgery, which may be due to doubts and fear regarding surgery. Possible explanations can be poor communication, social and personality issues, attitudes and improvement in the socioeconomic condition of the patient or change of mind. A majority of patients who did not show up for surgery in our study belonged to the high socioeconomic group (>90%). Because the low socioeconomic group mainly depend on government hospitals for their health care needs, the number of patients who did not turn up for surgery in this group was low. A similar study by Paschoal *et al.* reported that more than 50% of cancelled cases are due to absenteeism of the patient [19].

In a recent study by Fayed A *et al.* concluded that the use of advanced control charts generated using the SPSS can evaluate cancellation rates following an intervention [20]. They studied and compared the cancellation rates before and after the launch of new operation theatres, and observed a significant reduction in cancellation rates. However, the main reason for cancellation [27%] in their study was patient not turning up for the surgery. Sincere efforts are required to improve patient communication and facilitate their compliance with the scheduled procedures.

In the present study, the control chart allowed us to define some uncontrolled time points in the earlier months with unusual variation in cancellation rates. Afterwards, it exhibited a steady decline in the cancellation rates with consecutive time points. This decline in the cancellation rate could be because of improved surgical skills by the junior surgeons over the time. Additionally, effective communication and cooperation between the multidisciplinary team may have led to early starts, thus avoiding time delay between cases. Moreover, additional operation tables were utilised to manage the lengthy operation list.

The cancellation rate differs across various surgical specialties. In the present study, orthopedics and general surgery both had the highest cancellation rates. This finding is in accordance with other studies [20, 21].

Measures to circumvent day of surgery cancellations

A. Patient not fit for surgery due to medical reasons

The establishment of a preanaesthesia evaluation clinic is the commonest approach. Patients with complex medical diseases may be evaluated a few weeks prior to surgery early because much time is required to optimize them. However, early assessment (30 days before the operation) of patients was not associated with the number of cancellations compared with the assessment 24h before the operation [21]. In case of too early preassessment (before operation) of patients, the health status of patients can change in the time period until operation, whereas in case of too late preassessment, the availability of time for any implemented interventions to optimize the patient preoperatively is limited. Thus, a balance must be maintained. A team approach with better communication between the fellow surgeons and physicians regarding treatment strategies is required. Moreover, a complete workup and follow up of patients with complex medical disease are required.

C. Lack of Operation theatre time

A shortage of theatre time can be caused due to various reasons, such as over-ambitious theatre lists due to the underestimation of theatre time by surgeons or inappropriate management of the waiting list. Although unpredictable events during an operation can sometimes lead to list overruns, over-ambitious surgeons who consistently overrun can be easily identified by monitoring and auditing theatre time utilization.

Another reason might be the inefficiency of the theatre multi-disciplinary team, a factor that can lead to late starts and long waiting times between cases, usually due to delayed transportation, theatre cleaning, or prolong preparations for the next case. Time delay could also due to prolonged induction time or performing regional blocks. These problems can be reduced by communication and cooperation between the various surgical disciplines. Starting the cases early, blocks performed in the preoperative room in between the cases, providing additional operating tables and restricting the number of cases posted per day, may optimize the operating theatre time. The requirement of the instruments, drugs, and other equipment necessary for scheduled surgical list should be discussed by surgeons, staff nurses, and anesthesiologists a day prior to planned operation theatre list. These measures can improve the efficiency of the multi-disciplinary team operations. Theatre utilization, list overruns and

cancellations should be regularly audited to identify and address the reasons for inefficient theatre management.

C. Patients not turning up for the surgery

Patients not turning up for the operation is common reason for cancellation on the day of surgery and the problem is difficult to manage. Possible explanations for this phenomenon can be poor communication, social and personality issues, patient attitudes and improvement in the socioeconomic condition of the patient, or change of mind.

One possible solution to this problem is to communicate with patients a day before operation and confirm their willingness to undergo surgery. Although cancellation on a day before the operation can cause significant inconvenience to the surgical service provider, some arrangements, such as scheduling other patients to the operation list to cover the vacancy, can still be made to minimize the wastage of resources.

Study Limitations

This study has certain limitations. The retrospective nature of the investigation introduced multiple confounding factors. Additionally, it mainly focused on reasons for cancellation on the day of surgery in a government teaching hospital; hence the results and suggestions cannot be generalised and applicable in institutions with different operational policies. Mostly, the recommendations are based on successful implementation of different measures in literature. Although most of these recommendations have already been shown to be effective in specific circumstances, further studies should assess the implementation rate of these measures in institutions with different characteristics.

Conclusion

Reasons for surgery cancellations are specific for every institute. Even a low cancellation rate necessitates further investigations and improvement in the quality of care. The cancellation rate in the present study leaves significant room for improvement with appropriate interventions to circumvent cancellations on the day of surgery. Future prospective studies should be conducted to validate categorization and define cancellation causes in more depth.

References

- Morrissey S, Alun-Jones T, Leighton S. Why are operations cancelled? *BMJ* 1989;299:778.
- Dudley H. Empty theatres. *BMJ*. 1988;297:1490.
- Jim'enez A, Artigas C, Elia M, Casamayor C, Gracia J, Mart'inez M, *et al*. Cancellations in ambulatory day surgery: An observational study. *Ambul Surg* 2006;12:119-23.
- Chalya PL, Gilyoma JM, Mabula JB, Simbila S, Ngayomela IH, Chandika AB, *et al*. Incidence, causes and pattern of cancellation of elective surgical operations in a university teaching hospital in the Lake Zone, Tanzania. *Afr Health Sci* 2011;11:438-43.
- Laisi J, Tohmo H, Keränen U. Surgery cancelation on the day of surgery in same-day admission in a Finnish hospital. *Scand J Surg* 2013;102:204-8.
- Dexter F, Marcon E, Epstein RH, Ledolter J. Validation of statistical methods to compare cancellation rates on the day of surgery. *Anesth Analg* 2005;101:465-73.
- Zafar A, Mufti TS, Griffin S, Ahmed S, Ansari JS. Cancelled elective general surgical operation in Ayub teaching Hospital. *J Ayub Med Coll Abbottabad* 2007;19:64-6.
- Fischer SP. Development and effectiveness of an anesthesia preoperative evaluation clinic in a teaching hospital. *Anesthesiology* 1996;85:196-206.
- Nasr A, Reichardt K, Fitzgerald K, *et al*. Impact of emergency admissions on elective surgical workload. *Ir J Med Sci* 2004;173(3):133e5.
- Kumar R, Gandhi R. Reasons for cancellation of operation on the day of intended surgery in a multidisciplinary 500 bedded hospital. *J Anaesthesiol Clin Pharmacol* 2012;28(1):66-69.
- Lacqua MJ, Evans JT. Cancelled elective surgery: An evaluation. *Am Surg* 1994;60:809-11.
- Jonnalagadda R, Walrond ER, Hariharan S, Walrond M, Prasad C. Evaluation of the reasons for cancellations and delays of surgical procedures in a developing country. *Int J Clin Pract* 2005;59:716-20.
- Haana V, Sethuraman K, Stephens L, Rosen H, Meara JG. Case cancellations on the day of surgery: An investigation in an Australian paediatric hospital. *ANZ J Surg* 2009;79:636-40.
- Bathla S, Mohta A, Gupta A, Kamal G. Cancellation of elective cases in pediatric surgery: An audit. *J Indian Assoc Pediatr Surg* 2010;15:90-2.
- González-Arévalo A, Gómez-Arnau JJ, delaCruz FJ, Marzal JM, Ramírez S, Corral EM, *et al*. Causes for cancellation of elective surgical procedures in a Spanish general hospital. *Anesthesia* 2009;64:487-93.
- Dimitriadis PA, Iyer S, Evgeniou E. The challenge of cancellations on the day of surgery. *Int J Surg* 2013;11:1126-30.
- Hussain AM, Khan FA. Anaesthetic reasons for cancellation of elective surgical inpatients on the day of surgery in a teaching hospital. *J Pak Med Assoc* 2005;55:374-8.
- Garg R, Bhalotra AR, Bhadoria P, Gupta N, Anand R. Reasons for Cancellation of Cases on the Day of Surgery—A Prospective Study. *Indian J Anaesth* 2009;53:35-9.
- Paschoal ML, Gatto MA. Rate of surgery cancellation at a university hospital and reasons for patients' absence from the planned surgery. *Revista Latino Americana Enfermagem* 2006;14:48-53.
- Fayed A, Elkouny A, Zoughaibi N, Wahabi H. Elective surgery cancellation on day of surgery: An endless dilemma. *Saudi J Anaesth* 2016;10(1):68-73.
- Griffin X, Griffin D, Berry A, Hunter D. Cancellation of elective surgery any improvement after ten years? *Ann R Coll Surg Engl* 2006;88(1):28e30.