

Cancellation of elective surgical operations in a teaching hospital at Khartoum Bahri, Sudan

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Abstract

Introduction: Cancellation of elective surgical operations is common, and most of these cancellations are due to preventable causes. Cancellation of operations increases cost and decreases efficiency. It wastes time and resources and causes emotional distress to the patients and their families. **Aims and Objectives:** The aims of this study were to investigate and analyze the reasons of cancellation of surgical operations, establish its extent, and suggest solutions. A prospective observational, hospital-based study conducted at Khartoum Bahri Teaching Hospital during a period of 1 year. **Methodology:** The study subjects included all patients, of all ages, both genders, scheduled for surgery from all surgical subspecialties except emergency, trauma operations, ophthalmology, obstetrics/gynecology, and cardiothoracic operations. **Results:** A total of 3990 patients were scheduled for surgery during 48 weeks. A total of 3185 operations were performed (79.8%), and 805 (20.2%) operations were canceled or postponed on the day of operation. The overall patients' related causes of cancellations accounted for more than 2/3 (68.28%). The major reason of cancellation of elective surgical operations (35.5%) was patients not attending to the surgery. Chronic medical diseases accounted for 21.97%. Lack of time was the reason of cancellation in 9.93%. Cancellation causes related to administration were 9.4%. **Conclusion:** Clinics for preoperative evaluation, timely communication, and prompt reminding of patients are effective measures for reducing the cancellation rate. Late cancellations of elective surgery will always be present due to intercurrent diseases, work commitment, and social obligations of the health care providers and patients

Key words: Cancellation, elective surgery, reasons, Sudan, teaching hospital

INTRODUCTION

Every hospital's administration seeks to attain excellence in operating theater's efficiency, but this would be difficult with a high cancellation rate of elective surgical operations. The operating theater is the hospital's largest cost center and the largest source of income. It is recommended to recognize the efficiency of the operating theater and to reduce the high cost and increase the source of revenue.^[1]

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In the developing countries, cancellation of elective surgical operations is common and most of these cancellations are due to preventable causes. Cancellation of elective operations is known to increase cost, decrease efficiency, and waste time and resources; it may also cause significant emotional distress and trauma to the patient and his family, in addition to the financial increased burden and social disturbances.^[2,3] The financial burden is increased by repetition of preoperative investigations and preparations. The social burden is caused by the good number of the patient's family members and friends who accompany the patient to support him during and after operation. In Sudan as in many developing

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countries where the families are extended, members of the family feel obliged to come to visit and support their patient during surgery. This requires leave from work and financial cost. The suffering of patients who had cancelled operations might be increased and the chances of achieving optimum results might be reduced. Cancellation may prolong the postoperative rehabilitation period, and it may also lead to loss of trust and confidence in the hospital and surgeon and contribute to the feeling of insecurity and uncertainty and hence increasing the fear of the patient.^[4-6] The most damaging impact of cancellation of surgery is when cancellation occurs after patient's preparation (i.e., on the day of surgery in the operating room [OR]).^[7]

Cancellation rates vary widely between different types and capacities of hospitals and depend on the surgical subspecialty, individual surgeons, how data were collected, and how cancellation was defined.^[5] The rate of cancellation will be high when nonattendance of patients and/or the administrations' related causes are included. Data whether collected prospectively or retrospectively may also affect the cancellation's rates.^[5,8] The magnitude of the problem of the cancellations of the surgical operations varies significantly from 1% to up to 25% for outpatients and 66% for inpatients. This variation of the rates of cancellations of elective surgical operations also depends on the availability of staff and patients' medical conditions.^[9] Different studies reported different incidences, reasons, and causes of cancellations of elective surgical operations.^[1-17]

To reduce the rates of canceled surgical operations and improve the operating theater efficiency, the reasons and causes of cancellation should be recognized, analyzed, and taken appropriate measures that would help reducing the magnitude of the problem. Late cancellations or postponements of elective surgery will always be present due to intercurrent diseases, work commitment, and social obligations of the health care providers and patients.

Khartoum Bahri Teaching Hospital (KBTH) is a Tertiary Care Governmental Teaching Hospital, where medical students from different medical colleges are trained as well as surgical trainees (residents) and nurses. Its bed capacity is 500 beds for inpatients of different medical subspecialties. There is a separate Accident and Emergency department (A/E) that deals with emergencies of all medical subspecialties, except those of the obstetrics and gynecology, which has a separate A/E department. The capacity of A/E department of KBTH is 100 beds with a separate operation theater that deals with emergencies and trauma. The main surgical theater of KBTH deals with elective general surgery (GS), orthopedics, neurosurgery (NS), urology, plastic surgery (PLS), pediatric surgery (PES), and ear, nose, and throat (ENT) surgery. Each subspecialty has a number of allocated ORs according

to the number of the available surgeons. The obstetrics and gynecology, ophthalmology, cardiothoracic and transplant surgery each has its separate operation theaters in separate locations. The main operation theater of KBTH operates 5 days/week, Sunday–Thursday, from 8 am to 4 pm.

The aims of the present study were to investigate and analyze the reasons and causes of cancellation of the elective surgical operations, establish its extent, and suggest measures to be adopted to reduce rates and improve operating theater efficiency, in our teaching hospital at Khartoum Bahri, Sudan.

METHODOLOGY

This is a prospective observational, hospital-based study conducted in one teaching hospital at KBTH between March 1, 2013, and February 28, 2014 (48 weeks). KBTH is a tertiary care governmental hospital, with a bed capacity of 500 beds, for inpatients of different medical subspecialties. There are five ORs (i.e. 25 OR/week) allocated as 8 ORs for GS/week, 5 for orthopedics, 3 for urology, 4 for ENT, 2 for each of plastic and PES, and 1 for NS.

The study subjects included all patients, of all ages, both genders, who were scheduled for elective surgical operations at KBTH, from all surgical subspecialties except emergency operations, ophthalmology, obstetrics and gynecology, and cardiothoracic operations. A canceled operation was defined as a scheduled elective surgical operation which was not performed on the day of the surgery, for any reason, after being listed on the list of operations submitted on the previous day.

Patients are usually scheduled for elective surgical operations in the referral clinic by the surgeon after confirming the diagnosis and the indication for surgery. Each patient is given a card including his/her diagnosis, type of operation, and date of operation. The patients are usually informed about their scheduled date, and they can select the convenient date for their operations, if possible. The booked patients are requested to come a week before the scheduled date for preoperative investigations and preparation of blood. They are usually admitted to the surgical wards the day before surgery. The operating list is agreed upon and approved by the surgeon and send to the theater complex before 2 pm the day before the scheduled list.

Data were collected in specially designed two datasheets. The first sheet for daily registration and collection of the number of the patients on the submitted lists of operations for each subspecialty, number of performed operations, and number of canceled operations at the end of working day. The second data collection sheet included the demographic data of the canceled patients the subspecialty, cause of cancellation, and

who canceled the operation. The data were collected daily on the sheets and checked weekly at the end of each week by one of the investigators. The sheets were then collected and kept for analysis at the end of the duration of the study. The possible causes and reasons of cancellations were listed in the data collection sheet after literature review and extensive discussion among the investigators. In the presence of an odd cause, the collector will write it on the data collection sheet.

The present study was approved by the research committee of AAU. Ethical approval to conduct the study was obtained from KBTH research committee.

Data analysis was performed using SPSS version 21 as software (IBM Corporation, New York USA).

RESULTS

The total number of the patients scheduled for surgery

during the study period, of 48 weeks (240 days), was 3990 patients. Out of the total scheduled operations, 3185 operations were performed (79.8%) and 805 (20.2%) operations were canceled or postponed on the day of operation for different reasons and causes. Table 1 shows the numbers and percentages of the performed and canceled operation during the study period. The highest number of canceled operations was in the GS (242) followed by PLS (200) and orthopaedic surgery (OS) (144) whereas the lowest number of the canceled operations was NS^[1] followed by PES (46) and ENT surgery (65) [Table 1]. The highest percentage of cancellation related to the scheduled operations was in the NS 27.5% followed by PLS and OS (27.4%, 24%). Regarding the highest rate of performed operation, PES comes first followed by ENT and GS. The group with other causes included rare reasons of cancellation that include theater not informed, water cut off, no gowns and/or towels, no oxygen, surgery performed as emergency, thyrotoxic patients, no anesthesia

Table 1: The number and percentage of the performed and canceled operations (Khartoum Bahri Teaching Hospital) 2013-2014

Surgical subspecialty	Scheduled operations, (n)	Performed operations, n (%)	Canceled operations		
			n (%)	Percentage of total scheduled	Percentage of total canceled
General surgery	1229	987 (80.3)	242 (19.7)	6.1	30.1
Plastic surgery	730	530 (72.6)	200 (27.4)	5.01	24.8
Orthopedic surgery	607	463 (76.0)	144 (24)	3.61	17.87
Pediatric surgery	558	511 (91.6)	46 (8.4)	1.2	5.71
Urological surgery	480	383 (79.8)	97 (20.2)	2.4	12
Ear, nose, and throat	346	281 (81.2)	65 (18.8)	1.62	8.1
Neurosurgery	40	29 (72.5)	11 (27.5)	0.3	1.36
Total	3990	3183 (79.8)	805 (20.2)	20.2	100

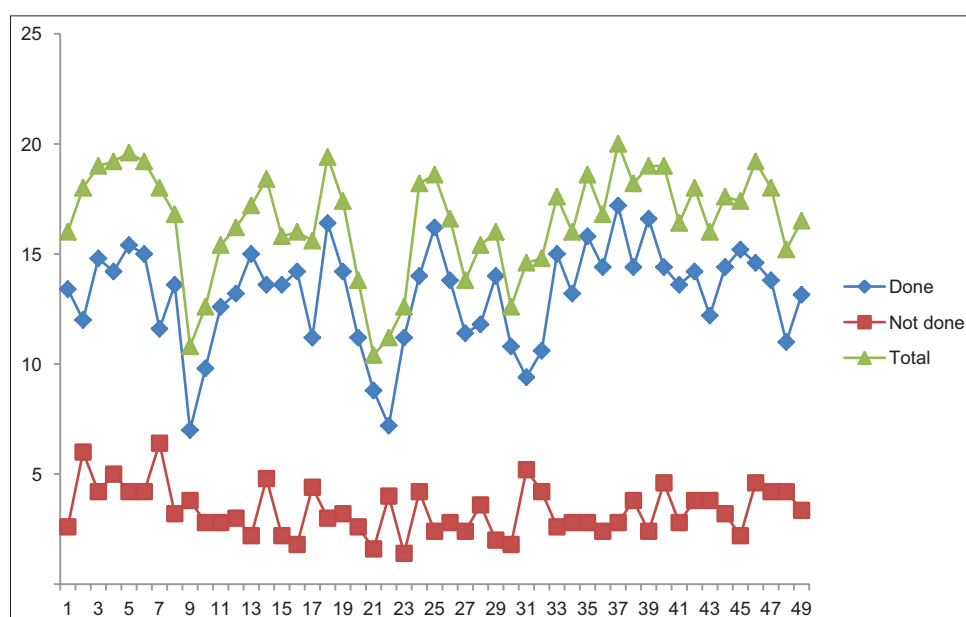


Figure 1: Distribution of the scheduled, performed, and canceled operations throughout the study period (in weeks)

Table 2: Who is behind the cancellation of elective surgical operations

Decision maker/reasons	n (%)
Anesthetist	268 (33.3)
Surgeon	168 (20.8)
Patients' reasons	320 (39.8)
Administration's reasons	49 (6.1)
Total	805 (100)

Table 3: The causes/reasons of elective surgical operations' cancellations (Khartoum Bahri Teaching Hospital; 2013)

Causes/reasons	n (%)
Patient not coming to surgery	286 (35.52)
Uncontrolled hypertension	70 (8.69)
Lack of time	70 (8.69)
Chest infection	57 (7.08)
Electrocardiogram changes	34 (4.22)
Blood not prepared	23 (3.1)
Low hemoglobin	30 (3.72)
Specific investigation not done	30 (3.72)
Abnormal investigation results	22 (2.73)
Electrical cut off	20 (2.48)
Patient not paid fees	19 (2.36)
Devices not prepared	12 (1.49)
Poorly controlled diabetes mellitus	14 (1.74)
No instruments/equipment	10 (1.24)
No sterilization	10 (1.24)
Condition improved, no need for surgery	10 (1.24)
No postoperative beds	9 (1.1)
Surgeon called for meeting or emergency	9 (1.1)
Patient not fasting	10 (1.24)
Patient refused operation	10 (1.24)
Acute attack of asthma	6 (0.74)
Starting list late	10 (1.24)
Others	34 (4.22)
Total	805 (100)

Table 4: The reasons behind lack of time as a cause of cancellation of the elective surgical operations at Khartoum Bahri Teaching Hospital

Reasons	n (%)
Overbooked lists	11 (13.75)
Overrun operations	11 (13.75)
Surgeon came late	8 (10)
Prolonged difficult intubation	7 (8.75)
Starting list late	10 (12.5)
Long turnover time	13 (16.25)
Overbooked list + overrun operations	20 (25)
Total	80 (100)

technician, patient had menstrual cycle, patient developed jaundice, and consent not signed. Figure 1 illustrates the scheduled, performed, and canceled elective operations throughout the study period.

There was always theater personnel who make the decision, alone or after consultation with others, of cancellation and put the evidence and justification for it. Table 2 shows the different personnel who make the cancellations decision and the other causes which led to cancellation of elective surgical operations.

The most common reason of cancellation was related to patients, followed by anesthetists' and surgeons' decisions, whereas the least number of elective surgical operations' cancellation was related to administration causes [Table 2].

Nonattendance of patients to surgery was the most common cause of cancellation of the elective surgical operations in KBTH [Table 3]. The overall patients' related causes of cancellation (i.e. not attending for surgery, comorbidities, abnormal results of investigations or tests, financial reasons, refusing surgery, and patients not fasting) represented more than 2/3 (68.28%) of the reasons of cancellations of the elective surgical operations. Lack of time was the reason of cancellation in 9.93%. Table 4 illustrates the reasons behind the lack of time as a cause of cancellation of elective surgical operations. Cancellation causes related to administration were 9.4%. The administration's related causes include electrical and water cut off, sterilization, nonavailability of equipment/instruments, gown/towel, oxygen, and blood bags.

DISCUSSION

The relative high rate of cancellation in our study can be explained by the fact that our study investigated all reasons of cancellations of elective surgical operations including patients' nonattendance to surgery, medical reasons, and administrative reasons. This wide approach of investigating the cancellation rate is commonly associated with high rate of cancellation.^[2,5,8,12,18] Different rates of cancellations were reported depending on the approach to defining cancellation of elective operation (10–24%).^[12] Our data collection method, being prospective, on specially designed data collection sheets which were recorded daily and checked weekly, minimizes the underreporting of cancellations. One more fact to be considered in our study is that this hospital is a teaching hospital, where undergraduate medical, nursing, and anesthesia students and surgical trainees (residents) are trained. This factor effects of cancellations compared to a nonteaching hospital.^[19]

Different rates of cancellation were reported in the literature, with wide variations depending on the study design, type of hospital and its level and capacity, how cancellation is defined, type of patients (inpatient or

outpatient) and on the medical subspecialty. A range of 10–40% was reported as an overall rate of cancellation of elective surgical operations.^[5,6,11-18]

Patients not attending to their scheduled surgery was the major reason of cancellation of elective surgical operations at KBTH (35.5%). Patients not coming to surgery as a cause of cancellation of elective surgical operations was reported by many studies in different rates. Here are some international statistics (23% from Jordan, 1.8% from South Africa, 25% from Tanzania, 16.89 from Qatar, 20%, 33% 14.6%).^[3,4,16,18,20-22] Why patients do not show to surgery? Social obligations and events (death or wedding of a family member) are one of the common reasons that prevent Sudanese patients from attending to their planned surgery. Work commitment, financial reasons, and another family member acute illness are other causes of the nonattendance of patients to surgery. Nonattendance to scheduled surgical operations could also be related to the health care system, and whether the care is free of charge or not because the rate could be higher if the care is free.^[15] Nonattendance for surgery is common cause of cancellation that can be minimized by good scheduling, which involves the patients in selecting the date of their surgery and by timely communications and prompt reminding of patients.^[16,18,20,21,23]

The second most common cause of cancellation of elective surgery was chronic diseases which contributed to 21.97% of all cancelled operations. These chronic diseases included uncontrolled hypertension, poorly controlled diabetes mellitus, anemia, respiratory tract infections, and acute exacerbation of bronchial asthma. Patients with chronic diseases are at high risk when subjected to the surgical trauma and the hazards of the general anesthesia. Those patients require appropriate preoperative control and correction of their chronic conditions to prevent peri- and post-operative complications. Uncontrolled hypertension contributed to 8.69% of all cancellations. High blood pressure (BP) is one of the most common medical causes for cancellation of elective surgical operations.^[12,24] There is no universally accepted guideline for the BP that can lead to cancellation of elective operation under general anesthesia. A history of hypertension is associated with increased risk of perioperative cardiovascular death in noncardiac surgery; however, what level of BP can increase this risk is not well established.^[24] Cancellation of elective surgical operations, on the day of intended surgery, because of high BP represents a real problem to the surgical team. There is the possible and real risk of the general anesthesia and surgical trauma; on the other hand, there is the inconvenience and distress caused to the patient by cancellation of the surgery on the day of surgery. The cancellation also contributes in the waste of the theater

resources. Proper preoperative workout and control of the chronic medical conditions, within a multidisciplinary teamwork, minimizes the effect of this factor on the rate of cancellation. Acute exacerbations of medical conditions (7.82%) are unavoidable causes of cancellation because respiratory tract infections and asthma are major risk factors for peri- and post-operative complications that threaten the life of the patients. Preoperative clinics are effective in reducing the number of patients who do not come to their scheduled surgery; it also reduce the rate of cancellation caused by medical conditions.^[9]

Lack of time accounted for 9.93% of all cancelled operations. Shortage of operating time could be related to starting lists late, overbooked lists, overrun operations, slow turnover of cases, unanticipated surgical or anesthetic problems, operation performed or finalized by junior staff, prolonged time of intubation and extubation, deficient transportation mechanisms, shortage of helpers which leads to slow cleaning, shortage of proper instruments, suture material, and staff.^[25] Compared to other rates in literature, our rate of cancellation of elective surgery due to lack of time is acceptable. Farrukh *et al.* reported a rate of 35.75%,^[25] González-Arévalo *et al.* reported a rate of 23%,^[15] Kumar and Gandhi reported that 31% of operation lists in the USA were overbooked.^[13] In an Indian study, out of the 30.3% overall cancellation rate, 59.7% were due to lack of time.^[23] Overrunning of operations accounted for 5% of cancellation of the elective surgical operations in the United Kingdom.^[26] Overbooking of operation lists is commonly adopted to reduce pressure for shortening the waiting list, or it is related to the surgeon's avoidance of any perception of not working hard or show that the surgical team is working hard, so members can be appraised by the hospital administration.^[26,27] Underbooked lists or sometimes cancelled lists may be intentionally due to planned absence for meeting or scheduled examinations. Implementation of a multidisciplinary preoperative preparation system may help to decrease the rate of cancellation of elective operations. However, there is no a perfect system; hence, some cancellations are inevitable, but there is no consensus on the acceptable rate of cancellations of elective surgical operations.^[15] The efficiency of the operating theater can be raised by prompt starting time, appropriate booked lists, efficient turnover and finishing time, better-organized transfer personnel service, greater and timed availability of the anesthesia, and surgery teams and interdisciplinary collaboration.^[6]

The administration's related causes of cancellation represent a major reason of cancellation of elective surgical operations in many studies. These causes included lack of theater space and facilities, unavailability of beds, shortage of anesthesia staff and surgeons, and administrative and

Table 5: Who was responsible for cancellation of elective surgical operations

Authors/country	Anesthetist (%)	Surgeon (%)	Patient (%)	Administration (%)
Sultan <i>et al.</i> ^[29] /Kingdom Saudi Arabia	0.11	34	32	34
Ezike <i>et al.</i> ^[16] /Nigeria	-	35.8	35.6	17.5
Zafar <i>et al.</i> ^[11] /Pakistan	43	39	31.6	18
Sahraoui and Elarref ^[22] /Qatar	16.89	18.01	16.89	24.7
Isamat <i>et al.</i> /Sudan	33.35	20.8	39.8	6.1

logistics reasons. Rates as high as 82% were reported from Tanzania, 34% from Saudi Arabia, 30.4% from Jordan, 25% from Spain, 35.8% from Nigeria, 18.1% from Australia, 12.8% from Qatar, and 24.7% from a previous study from Sudan.^[2,7,12,15-17,22,27-29] In our study, the administration's related reasons of cancellation accounted for 9.4%.

Anesthesiologists were involved in taking the decision of cancellation in 33.3% of patients, whereas surgeons were responsible in the decision of cancellation in 20.8%. These findings if compared to other studies, we find that the difference was most likely due to the differences in designs of the studies, surgical subspecialties, and type of hospitals. Table 5 shows some of data of cancellations related to different studies.

The introduction of preoperative preparation clinic reduces cancellation on the day of surgery.^[30] The holistic approach of the patients during the preoperative care visits proved to reduce the cancellations related to medical condition and nonattendance of patients.^[30,31] Many of the reasons of cancellations of the elective surgical operations were preventable.^[6,7,9] In our study, 70.25% of the reasons of cancellation were avoidable by better administrative and surgical planning and better communications with patients and families.

A separate operation theater for trauma and emergencies is recommended as a solution for reducing the rate of cancellation of elective operations that could be cancelled for emergency priorities.^[32,33]

In spite of all the efforts of reducing the cancellation of elective surgical operations, there remain a proportion of cancelled elective operations. There is no consensus on the acceptable rate of cancellation. Actually, this acceptable rate of cancellation of elective surgery is related to multiple factors which are very difficult to be eliminated totally.

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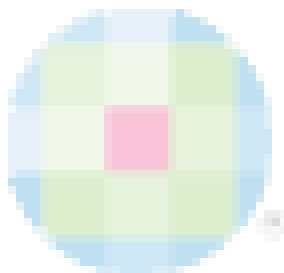
Conflicts of interest

There are no conflicts of interest.

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