

## Magnitude and Factors Associated with Elective Surgery Cancellation

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### Abstract

**Background:** Elective surgical case cancellation refers to scheduled patients not operated on the scheduled date. The reason for cancellations on mostly related to patients, organizational issues, and clinical staff. Hence, the objective of this study was to assess the magnitude of surgery cancellation and associated factors in Yekatit 12 Hospital Medical College.

**Methods:** A prospective cross-sectional study was conducted at Yekatit 12 Hospital Medical College. All patients scheduled for surgery in the major Operating room (OR) from June 01/2022 to September 30/2022G.C were included in the study and data were collected from the patient registry for cancelation and recovery registry logbook using data extraction checklist and entered into EpiData and then exported to SPSS version 25 for data analysis.

**Results:** In this study, about 692 patients were scheduled for elective surgeries and the surgery of 42 (6.1%), (95% CI: 4.4, 8.1%) patients were canceled. The most common reason identified for cancellation -facility-related (40%), patient-related (16.7%), staff-related (11.9%), emergency (11.9%), acute medical illness (7.1%), lack of investigation (7.1%), and emergency (4.8%). General surgery (20%) and orthopedic surgery (6%) were the most common cases of canceled surgeries.

**Conclusion:** The magnitude of elective surgery cancelation in this study was 6.1% and it was relatively lower than most other studies. Causes for cancellation are preventable and feedback of appropriate data to surgeons and other healthcare workers involved in the care has been shown to be an important component of strategies to reduce cancellation.

**Keywords:** Cancellation; elective surgery; Yekatit 12 hospital medical college; Ethiopia

### Acronyms and Abbreviations

CC: case cancellation.

CR: cancelation rate.

DM: diabetes mellitus.

ECG: Electrocardiogram.

ESC: Elective surgery cancelation.

ICU: intensive care unit.

LFT: Liver function test.

OR: Operation Room.

PFT: Pulmonary function test.

PRE-OP: pre-operative.

RFT: Renal function test.

URTI: Upper Respiratory Tract Infection.

Y12HMC: Yekatit 12 Hospital Medical Collage.

### Introduction

The operation theatre is the hospital's largest cost center and the largest source of income so every health facility administrative body usually seeks to attain excellence in operating theater's efficiency, unfortunately for most facilities, this would be difficult with a high cancellation rate of elective operation. It is recommended to recognize the efficiency of the operating theatre to reduce the high cost and increase the source of revenue which enables the facility to strengthen capacity building [1-3].

Elective surgery cancellation is one of the health care quality problems in numerous hospitals in the world especially in developing countries where scheduled patients for surgery are not operated on the scheduled date which harms patients and wastes resources leading to increased healthcare costs where most cancellations are due to preventable causes. It usually decreases patient satisfaction which is one objective of any healthcare system and reports showed the cancellation rate ranges from 1% to 23% [4-10].

There are many avoidable and non-avoidable reasons for the cancellation of elective surgeries which are complex and related to patients, facility/organization issues and clinical staff. Of the avoidable cancellation scheduling errors, equipment shortage and inadequate preoperative evaluation, and from unavoidable cancellations emergency cases superseding the elective schedule, unexpected changes in the patient's medical status, or patient nonappearance and the most frequently mentioned reason is lack of OR time [7, 8, 10, 11].

Preparation and planning for elective surgery cases necessarily involved a multi-disciplinary approach involving the surgical team, operation theater staff and hospital administration to decrease cancellation and increase operation theatre efficiency. Preparation and planning include a functional operating theatre booking system, patients presenting themselves for on-time admission, patient optimization before scheduling, availability of operation theatre equipment, ward personnel preparing for patients' admission and planning for post-operative care should be all settled [12-15].

Most hospitals in developed countries invest considerable resources in maintaining operation suites and having surgeons and theatre staff available on an agreed schedule, but in developing countries where resources are scarce cancellation from preventable reasons is paramount which ultimately increases cost, decreases efficiency, duplicates workload and wastes of operating room time [16-18].

The purpose of this study was to assess the magnitude and reasons for elective case cancellation as well as the surgical specialties most affected at Y12HMC. It is relevant because research and reviews are inadequate so identification of reasons for elective surgical case cancellation enables the health facilities to make appropriate strategies and make better use of its operation theatre facilities.

### Methods

#### *Study areas and period*

The study was conducted at Yekatit 12 Hospital Medical College, Addis Ababa Ethiopia. It is one of the oldest government institutions currently running undergraduate and postgraduate programs along with clinical services. The study was conducted from 01 July 2022 to 30 September 2022 G.C.

### *Study design and aim*

A hospital-based prospective cross-sectional study was conducted to determine the magnitude and reasons for surgical case cancellation.

### *Study participants and sampling procedure*

All patients admitted to the hospital for elective surgical procedures from 01 July to 30 September 2022 were the source population. All patients scheduled for different elective surgical procedures during the study period were included in the study but Patients who were listed for elective surgery but done before the day of scheduled as an emergency, Minor ambulatory surgery outside major OR theater.

### *Variables and measurements*

Surgical case cancellation was the dependent variable of the study and independent variables were; age, sex, departments of patient admission, patient-related (medical, refusal, absent); management-related factors(equipment, electric power shortage, lift problems); shortage of time(prolonged case, over-scheduling); staff related factors(surgeon, anesthetist, nurse); incomplete investigation, cancellation of surgical procedure is defined as a planned operation that is not performed on the day of the schedule.

### *Data collection technique and quality control*

The data were collected from daily schedule lists for elective surgery with a structured questionnaire which was developed by reviewing patients' charts and related literature. The questionnaire had basic patient information and presumed reasons for cancellation. Causes for the cancellation were identified by interviewing operation theatre staff (nurse, surgeon. or anesthetists) and ward medical staff on the day of surgery and immediately recorded in the predesigned questionnaire by the data collector. Data collection was conducted by trained three junior surgical resident physicians supervised by the first author and data completeness was checked on a daily basis.

### *Data processing and analysis*

Data was entered and analyzed using SPSS version 25 software was used to enter and analyze data. Descriptive statistics such as frequency, percentage, mean, standard deviation (SD), or median were used for most of the variables and results were presented using tables, graphs and narrative descriptions.

## **Result**

### *Socio-demographic characteristics*

During the study period, a total of 692 patients were scheduled for elective surgeries. The mean and median age of participants was 25.69± 19.79 (SD) years and 24 years respectively of which 417 (60.3%) were male with male to female ratio of 1.5:1. About 261 (37.8%) of patients scheduled for elective surgeries were younger than 15 years.

General surgeries accounted for one-third of all elective scheduled procedures (202, 29.3%), followed by ENT surgeries (185, 26.8%) and Pediatric Surgeries (122, 17.7%). (Table-1)

### *Magnitude of cancellations*

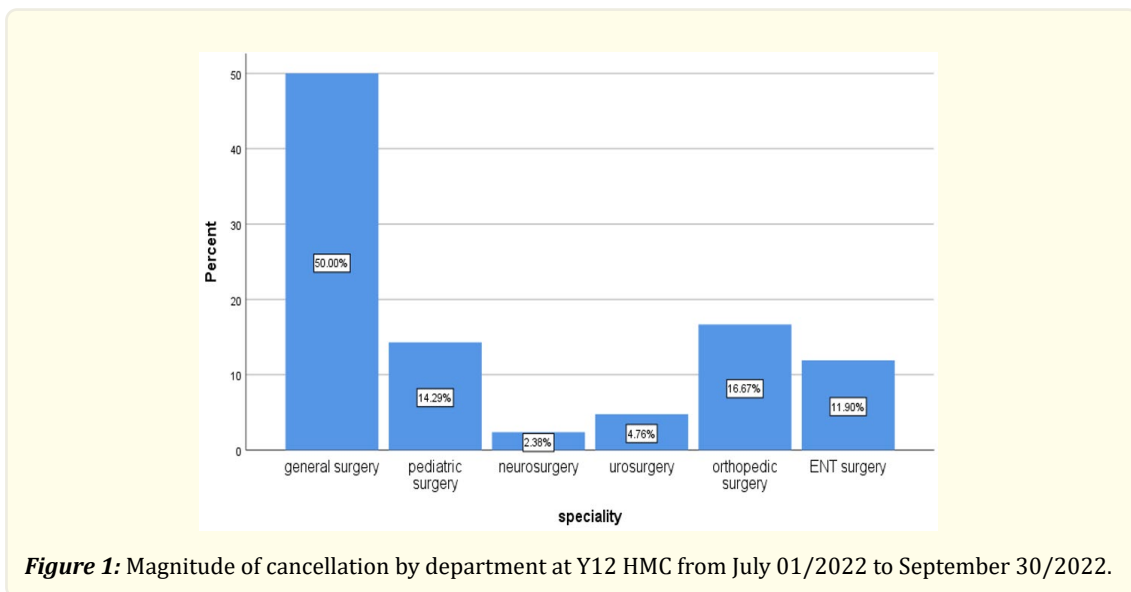
About 42 of 692,6.1% (95% CI: 4.4,8.1%) of the scheduled patients were canceled from the scheduled patients. From the total of canceled patients in the study the highest number of cases were general surgery 20 (50%), followed by Orthopedic surgery and Pediatric surgery 15%, ENT surgeries 12.5%, Urology (5%) and Neurosurgery 2.5% (Figure 1). The age 30 and 45 were highest cancellation age group is 30-45 with 17 (47%) cancellations and the list age group of between 45-60 years. (Table-2)

| <i>Variables</i>      | <i>Frequency</i> | <i>Percent</i> |
|-----------------------|------------------|----------------|
| Age                   |                  |                |
| <15                   | 261              | 37.7           |
| 15-30                 | 156              | 22.5           |
| 30-45                 | 145              | 21             |
| 45-60                 | 93               | 13.4           |
| >60                   | 37               | 5.3            |
| Sex                   |                  |                |
| Male                  | 417              | 60.3           |
| Female                | 275              | 39.7           |
| Department            |                  |                |
| General surgery       | 202              | 29.3           |
| Pediatric surgery     | 122              | 17.7           |
| Neurosurgery          | 32               | 4.6            |
| Urosurgery            | 34               | 4.9            |
| Orthopedic surgery    | 95               | 13.7           |
| ENT                   | 185              | 26.8           |
| Maxillofacial surgery | 22               | 3.2            |

**Table 1:** Shows summary of sociodemographic characteristics (n = 692) at Yekati 12 Hospital Medical College, Addis Ababa, Ethiopia, from July 01/2022 to September 30/ 2022 G.C.

| <i>Is there cancellation</i> | <i>Patient age interval</i> |              |              |              |               | <i>Total</i> |
|------------------------------|-----------------------------|--------------|--------------|--------------|---------------|--------------|
|                              | <i>&lt;15</i>               | <i>15-30</i> | <i>30-45</i> | <i>45-60</i> | <i>&gt;60</i> |              |
| yes                          | 9                           | 8            | 17           | 3            | 5             | 42           |
| No                           | 250                         | 148          | 128          | 91           | 33            | 650          |
| Total                        | 259                         | 154          | 145          | 93           | 37            | 692          |

**Table 2:** Shows cancellation rate by age interval at Y12 HMC from July 01/2022 to September 30/2022 G.C.



**Figure 1:** Magnitude of cancellation by department at Y12 HMC from July 01/2022 to September 30/2022.

**Reasons for cancellations**

Out of all canceled cases (n=42), the most frequent reason for the cancellation was facility-related (40%) and facility-related reasons malfunction of the lift and operation theatre sewerage system were the most mentioned facility-related reasons for cancellation. Patient-related (16.7%) factors were the second cause of cancellation and the most common patient factors were patient refusal (9.5%) and absence from OR (7.1%). The other causes of cancellation were staff-related (11.9%), and emergency (11.9%). Acute medical illness (7.1%), lack of investigation (7.1%), and shortage of time (4.8 %). (Table 3)

| <b>Variables</b>              |                                | <b>Frequency</b> | <b>Percent</b> |
|-------------------------------|--------------------------------|------------------|----------------|
| Patient related               | Patient refusal                | 4                | 9.5            |
|                               | Absent from OR                 | 3                | 7.1            |
|                               | Total                          | 7                | 16.7           |
| Acute medical illness         | Acute febrile illness          | 3                | 7.1            |
| Lack of investigation         | Organ function tests           | 1                | 2.4            |
|                               | Imaging and others             | 2                | 4.8            |
|                               |                                | 3                | 7.1            |
| Management /facility/ related | Shortage of OR materials       | 2                | 5              |
|                               | Lack of blood prepared         | 3                | 2.5            |
|                               | Lack of sterial OR materials   | 2                | 4.8            |
|                               | Malfunction of lift and toilet | 10               | 24             |
|                               | Total                          | 17               | 40             |
| Staff related                 | Surgeon                        | 2                | 4.8            |
|                               | Others                         | 3                | 7.1            |
|                               | Total                          | 5                | 11.9           |
| Shortage of Time              | Previous case prolongation     | 2                | 4.8            |
| Unexpected emergency          | Failed intubation              | 1                | 2.4            |
|                               | HTN                            | 4                | 9.5            |
|                               | Total                          | 5                | 11.9           |

**Table 3:** Shows reason for cancellation of scheduled patients (n = 42) at Yekatit 12 Hospital Medical College, Addis Ababa, Ethiopia, July 01/2022 G.C to September 30/2022 G.C.

**Discussion**

Cancellation is one of the main problems of hospital operation theatre inefficiency and it also costs patients for prolonged inpatient admission and painful stay for a prolonged time. The number of cancelations and reason for cancelation depends on the hospital, surgical specialty, and the health system. The accepted rate for cancellation of elective surgical procedures is still controversial at less than 5% but widely reported incidences showed variation from 10-40 % [10, 19, 20].

Cancellation of elective surgery causes significant emotional disturbance and trauma to the patients and their families in addition to the financial and social disturbance faced. The financial burden is usually from the repetition of investigation and expense for preparation as the social burden is usually caused by patients’ family members and friends accompanying the patients to support them during hospital stay which requires leave from work and financial cost. Patients who have cancelled operations usually achieve reduced optimal results and also prolong the postoperative rehabilitation period as well as This may result loss of trust and confidence in the hospital and surgeon which contributes to the feeling of insecurity and uncertainty of the patients. The most damaging impact of cancelation of surgery for the patients is usually when cancellation occurs on the day of surgery in the operation theatre room [21-25].

In this study the cancellation rate was 6.1 % of enrolled patients which is low as compared to developing countries and significantly low as compared to TikurAnbesa Specialized Hospital (33.9%), Wolaita Sodo University Hospital (25.6), Jimma university (23%), India (9.5%) [11], El Obeid Hospital, Western Sudan (9.9%), Khartoum Bahri, Sudan (20.2%), Asela teaching Hospital (32.2%), Gonder University Hospital, Ethiopia (15.2), Debretabor Hospital (32.1%), Nigeria (9.1%), and in the accepted rate of cancellation for developing countries and still consistent to some studies like Boston (5%) and Middle east (3.8%) [4, 10, 15, 25-33]. The reason for low cancellations compared to other studies can be explained due to the institution attention to health care quality, and in fact the institution currently the only health care quality training centre opening healthcare quality department in the country which may also contributed for the low cancellation rate.

A wide range of cancellation rates from 1% to 40% was reported in the literature depending on the study design, types of hospitals and their level and capacity, how cancellation is defined, types of patients and the medical specialties. Our data collection was prospective one on specially designed data collection sheets which were recorded daily and checked weekly by the principal investigator, which minimized the underscoring of cancellation [2, 4, 5, 11, 13, 22, 34-39].

This study found that the cancellation rate of total scheduled operations in males and females were 4.8 % and 7.4 % but out of canceled cases proportion of males to females was about 1:1 and this finding was parallel to the study done in Asella Teaching Hospital and WoliataSodo Hospital [26, 30].

In this study out of all departments general surgery had the highest rate of cancellation 19 (50%) and these findings consistent with Asela Teaching Hospital, a rural private tertiary hospital in Western Uganda, Nigeria, Tanzania and Woliata Sodo Hospital, North-east India [2, 26, 30, 32, 40, 41] but in some studies like TikurAnbesa Specialized Hospital, Hawasa Comprehensive Hospital, and Tertiary Hospital in Uganda Orthopedic surgery cancellation has the highest rate of cancellation [15, 42, 43]. This could be due high burden of patients under general surgery departments which may result in inadequate investigation, lack of ICU beds and operation theatre equipment.

This study found that the most common reason for the cancellation was facility/ administrative related which was 40% and it parallel with studies in Tertiary Hospital in Uganda, and Tanzania, Systematic review in Ethiopia, Urban Indian Hospitals [28, 42, 44, 45], but in other studies like the Middle East, rural private tertiary hospitals in Western Uganda, Tikur Anbesa Hospital and Nigeria Teaching Hospital patient-related reasons were the most frequently mentioned reason for cancellation [15, 32, 33, 40]. These causes included lack of theatre space and facilities, unavailability of OT equipment, shortage of logistics Shortage of OR materials, lack of blood prepared and hospital sewerage systems.

Patient-related (16.7%) factors were the second cause of cancellation and due to patient refusal and absence from operation theatre also reported by different studies like 23% from Jordan, 1.8% from South Africa, 25% from Tanzania, 16.9% from Qatar [2, 35, 46, 47], and from our study, the reason for absenteeism was not identified but said to be the financial reason and social commitment of either the patients themselves or family members (attendants). The other cause of patient-related factors is patient refusal which usually happens when patients have a lack of adequate awareness about the planned surgery and fear of surgery on the date of surgery so with high-level discussion about the disease and planned surgery including the possible complication patient refusal could be solved.

In our study clinical staff-related cancellation accounted for 11.9% of all canceled operations, and compared to other studies like Hawassa Specialized Hospital, Jimma University Hospital Hong Kong, Spain and India [27, 36, 43, 48-50], the cancellation due to clinical staff is acceptable in our study. The commonest reason from clinical staff is surgeon-related factors. This might be due to the unavailability of a surgeon and the scheduling of emergency surgery at the same time resulting in the postponement of the elective surgeries from the scheduled days of surgery.

In our study, lack of time accounted for 4.8% of all canceled operations due to prolonged time of previous surgeries. Shortage of operation time could be related to starting overbooked schedule lists, slow turnover of cases, unanticipated surgical or anesthetic

problems, operation performed by junior staff, prolonged time of intubation and extubation, deficient transportation mechanisms, shortage of proper instruments, suture materials and staff [51]. Compared to other studies (35.5%), Spanish General Hospital (23%) and Tikur Anbesa Hospital (42.4%), the cancellation due to lack of time is acceptable in our study [11, 15, 51]. Implementation of multidisciplinary pre-operative preparation may help to decrease the rate of cancellation although there is no perfect system to implement all possibilities due to some inevitable reasons. The efficiency of operation theatre can be raised by initiating early starting time, appropriate booked lists, efficient turnover and finishing time, better-organized transfer personnel service (porter), timely availability and collaborative surgical team staff.

## **Conclusion and recommendation**

Cancellation of elective surgical procedures on the scheduled day of surgery was low during the study period comparable to other studies. The most mentioned reasons for cancellation were known facility-related, staff-related and patient-related reasons. Despite the low rate of cancellation for the study, most of the reasons for cancellation were avoidable and interrelated. It is advisable before patients are admitted and scheduled for surgery, they should be given clear and honest information about the procedure and outcome of the surgery and there should be collaboration and communication among healthcare providers and facility managers.

## **Ethical approval and patient consent**

Ethical clearance was obtained from the postgraduate department of Yanet College (Reference number: YEC/073/22) and taken to Y12HMC and got permission from the Medical service vice provost office and OR directorate. The information gained from the patient registry logbooks was kept confidential by using codes for each card throughout the study. The procedures followed were by the ethical standards of the Helsinki Declaration.

## **Informed Consent**

We obtained documented and witnessed informed verbal consent for publication from the administration bodies otherwise informed consent from the subjects was not required.

## **Availability of data and materials**

All data and materials are available to the corresponding author.

## **Competing interest**

No conflict of interest.

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