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Pattern of cancellation of elective cases

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Abstract

Introduction: Elective surgical procedures are cancelled in different parts of the world for various reasons, ranging from patient factor, surgeon factor and also facility related factors. Irrespective of the reason for cancellation, the effect is debilitating on the affected patients with resultant emotional trauma, waste of time, money and resources, and loss of productivity at work. It also causes a longer waiting list thereby putting pressure on surgeons in the outpatient department. There is inadequate use of resources and loss of revenue to the hospital. Eighty percent of the reasons for cancellations have been found to be avoidable while only 20% are unavoidable. The generally accepted cancellation rate is less than 5%, but there have been rates as high as 49% in some places.

This study was designed to determine the rates of, and reasons for, cancellation of elective cases in our centre and to find out the overall pattern and suggest ways to reduce it.

Materials and Methods- This retrospective study was from April 2019 to March 2023. The data of patients whose cases were cancelled in the study period were extracted from the 'Cancelled Cases Register'. The data was filled into questionnaires for each patient. In cases of insufficient information in the register, the electronic medical records of the patients were accessed to confirm the details and fill in the missing details.

The data was analyzed using Statistical Package for the Social Sciences (SPSS) Version 27.

Results: We found that a total of 417 elective cases were cancelled, out of 5,729 scheduled cases, with a female: male ratio of 1.1:1. The cancellation rate was 7.3%. Patient-related factors (72.2%) constituted the main reason for cancellation while Facility -related reasons accounted for 15.6% of the cancelled cases. Surgeon -related factors accounted for 12.2% of cancelled cases. Sixty percent of these reasons were avoidable while 40% were not avoidable. General Surgery (31.6%) had the highest number of cancelled cases while Ophthalmology (1%) had the least. Reason for cancellation (patient-related factors, surgeon-related factor and facility-related factors) was significantly associated with elective procedure cancellation ($p<0.05$). Patient-related factors and Surgeon-related factors are 8 times and 2.42 times respectively more likely to result in cancellation of elective procedures than facility-related factors.

Conclusion: More needs to be done to reduce the rate of cancellation to the barest minimum by addressing the reasons for cancellation. This will reduce patient dissatisfaction, reduce the waiting list and curb wastages in the system.

Keywords: Elective; Cancellation; Avoidable; Non-Avoidable; Reasons; Rate

1. Introduction

Cancellation of surgeries on their scheduled days is a worldwide problem[1] and constitutes a major cause of inefficient theatre use and poor delivery of surgical services. It affects theatre staff, including the surgeons, anesthetists and nurses,

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patients, and their relations, resulting in unnecessary waste of time, emotional trauma[2,3] for the patient, loss of revenue[3,4] for the hospital and inadequate use of scarce resources, and of course, possibility of litigation[5] if such cases are not done within 28 days.

An elective case is cancelled if a case that has been included in the elective list for a particular day is not done. This problem is seen in hospitals around the world and the reasons are multifactorial.

Several authors have shown that the reasons[6] include lack of theatre time, over-scheduling of cases, patient not fit for surgery, refusal of surgery by the patient, inadequate materials and instruments for surgery, lack of or inadequate preoperative investigations. It could also be due to the presence of surgical emergencies[7] competing for theatre space with elective cases.

Patients[8] are affected by cancellations with the attendant disruptions in family life and work, travels, increased expenditure, psychological stress, and increased anxiety. This increases patient dissatisfaction, which negates one of the goals for hospital services. On the part of the doctors, there is anger at their inability to finish their scheduled cases[9] thereby putting more pressure on them at the outpatient clinics. It also negatively affects the training of surgical trainees[10].

Several researchers have divided the reasons for cancellation of cases into avoidable and unavoidable causes and have found that 20% of reasons were unavoidable while 80% were avoidable[10-12].

The generally accepted rate of cancellation is less than 5%[13]. However, national rates have been found to be 1.9-49%[14-15], lower in developed countries than in developing countries.

2. Material and methods

This is a hospital -based retrospective study from April 2019 to March 2023. The list of cancelled elective surgical cases, including the patients' names, card number, age, sex, occupation, diagnosis, the surgical unit involved, procedure booked, date(s) of cancellation, number of times cancelled, and reasons for cancellation in the study period were retrieved from the 'Cancelled Cases Register'. The data was filled into questionnaires for each patient. In cases of insufficient information in the register, the electronic medical records (EMR) of the patients were accessed to confirm the details and fill in the missing details.

The data was analyzed using Statistical Package for the Social Sciences (SPSS) Version 27. Bivariate and multivariate regression analysis were used to test association between the variables and cancellation of elective surgery, binary logistic regression analysis was first conducted to select the variables for consideration in the multivariable analysis.

2.1. Objectives

- To determine the rate of cancellations of elective cases
- To determine the reasons for cancelling elective cases
- To find any correlations between cancellation of surgeries and age, sex, occupation of respondents, procedures and reasons for cancellation.

3. Results

3.1. Participants' Socio-demographic Profiles

The study investigated 417 cancelled elective procedures between April 2019 and March 2023. Out of the 417 cancelled elective cases, 139 (33.3%) were aged 50 years and above, constituting the age group with the highest number of cancelled cases while age group 10-19(9.4%) had the least number of cancelled cases. The mean age of patients was 39.39 years with a standard deviation (SD) of 23.47 years.

There were more female patients 218 (52.3%) than males 199 (47.7%), indicating a female to male ratio of 1.1:1. Furthermore, most of the patients whose procedures were cancelled were students 61 (14.6%). (Table 1)

Table 1 Socio-demographic characteristics of cancelled elective cases.

Variable	Frequency	Percent (%)
Age Group		
<10	59	14.1
10 – 19	39	9.4
20 – 29	40	9.6
30 – 39	72	17.3
40 – 49	68	16.3
>= 50	139	33.3
Gender		
Female	218	52.3
Male	199	47.7
Occupation		
Retiree	45	10.8
Pupil	9	2.2
Student	61	14.6
Neonate	8	1.9
Infant	5	1.2
Toddler	39	9.4
Artisan	24	5.8
Teacher/Lecturer	24	5.8
Civil Servant	33	7.9
Trader	60	14.4
Businessman	6	1.4
Businessman	28	6.7
Housewife	15	3.6
Others	60	14.4

Table 2 Cancelled cases in the study period

Year	Cases Cancelled	Percentage (%)
2019	40	9.6
2020	52	12.5
2021	119	28.5
2022	197	47.2
2023	9	2.2
Total	417	100

Year 2022 had the highest number of cancelled cases (47.2/197).

Table 3 Scheduled and Cancelled Elective cases per year

Year	Scheduled Cases	Cancelled Cases	Rate of Cancellation (%)
2019	1,291	40	3.1
2020	1,125	52	4.6
2021	1,092	119	10.9
2022	1,325	197	14.9
2023	896	9	1.0
Total	5,729	417	7.3

The study reveals that 2020 recorded the highest number of scheduled and cancelled elective cases, on a year-on-year basis. Specifically, 1,325 (23.1%) cases were scheduled and 197 (14.9%) of the cases were cancelled in 2022 due to various reasons. In 2021, the number of cases scheduled was 1,092 (19.1%) with cancellation of 119 (10.9%) cases. The number of cases scheduled in 2019 was 1,291 (22.5%) with 40 (3.1%) of these cases cancelled in the same year. The overall prevalence rate is 7.3%.

Table 4 Cancelled cases by Service Type (Day Case or Admission)

Type of Surgery	Cases Cancelled	Percentage (%)
Day Case	130	31.2
Admission	287	68.8
Total	417	100

Most of the cancelled cases were patients on hospital admission (inpatients). Specifically, 287 (68.8%) were admission cases, while 130 (31.2%) were day cases (outpatients).

Table 5 Cancellation by Department/Unit

Department Involved		Frequency	Percent (%)
	General Surgery	132	31.6
	Neurosurgery	9	2.2
	ENT	6	1.4
	Orthopeadics	37	8.9
	Plastic Surgery	26	6.2
	Ophthalmology	4	1.0
	PSU	55	13.2
	Urology	42	10.1
	Obstetrics & Gynecology	82	19.7
	CTSU	16	3.8
	OMFS	8	1.9
	Total	417	100.0

General Surgery (31.6%) had the most cancelled cases and ophthalmology the least (1%)

Table 6 Diversity of Surgeries Cancelled

Surgery	Cases Cancelled	Percentage (%)
Herniorrhaphy	47	11.3
Herniotomy	17	4.1
Appendectomy	7	1.7
Elective C/S	21	5.0
Thyroidectomy	7	1.7
Myomectomy	18	4.3
Excision & Biopsy	101	24.2
Circumcision	9	2.2
CTTD	5	1.2
Fistulectomy	3	0.7
Urethroplasty	6	1.4
Hydrotubation	3	0.7
Frenotomy	1	0.2
Varicocelectomy	2	0.5
Kasai Procedure	1	0.2
ORIF	13	3.1
Mastectomy	20	4.8
Hermiarthroplasty	6	1.4
TAH	2	0.5
Prostatectomy	4	1.0
Ex. Lap	18	4.3
Hemorrhoidectomy	1	0.2
Debridement	4	1.0
Others	101	24.2
Total	417	100

There was a diverse array of surgeries scheduled and cancelled over the study period. In this investigation, excision & biopsy (n = 101, 24.2%) and others (n = 101, 24.2%) jointly accounted for the highest cancellations. On the other hand, frenotomy (n = 1, 0.2%), Kassai procedure (n = 1, 0.2%), and hemorrhoidectomy (n = 1, 0.2%) were the least cancelled surgical procedures.

Table 7 Reasons for Cancellation

Cause of Cancellation	Cases Cancelled	Percentage (%)
Patient-Related Factors:	301	72.2
No Investigation	26	8.6
Patient Not Fasting	10	3.3
No Show	99	32.9
Refusal of Surgery/Fear/ Anxiety	18	6.0
No Payment	27	9.0

Poor Work-up	5	1.7
Patient not Fit	57	18.9
Suboptimal Results	39	13.0
Medical Conditions (HBP, URTI etc.)	20	6.6
Surgeon-Related Factors:	51	12.2
Procedure Aborted	7	13.7
No Theatre Time	13	25.5
Absent Surgical Staff	2	3,9
Resolved Condition	14	27.5
Change of Diagnosis	9	17.6
Late Start of Surgery	4	7.8
Failed Intubation	2	3.9
Facility-Related Factors:	65	15.6
Theatre/Suite under Repairs	1	1.5
Strike Action	2	3.1
Equipment Malfunctioning/Scarcity	6	9.2
Power Outage	12	18.5
Staff Shortage	4	6.2
No Oxygen	1	1.5
No Scrub Material to use	11	16.9
Unavailable beds space in Ward	1	1.5
Emergency Cases	27	41.5

The most common reason for cancellation of elective surgery was patient-related factors 301 (72.2%). The second most common reason for cancellation of elective surgery was facility-related factor 65 (15.6%).

The most common patient-related causes of elective surgery cancellation were no show 99 (32.9%), patient not fit 57 (18.9%), and suboptimal results 39 (13%).

The prevalent facility-related causes of elective surgery cancellation were emergency cases 27 (41.5%), power outage 12 (18.5%), and no scrub material to use 11 (16.9%).

Table 8 The Reasons for Cancellation Avoidable or Unavoidable?

Category	**Cases Cancelled**	**Percentage (%)**
Avoidable	250	60.0
Unavoidable	167	40.0
Total	417	100.0

The study shows that most of the reasons for elective surgery cancellation (n = 250, 60%) were avoidable, and could have been prevented with necessary interventions. Unavoidable reasons accounted for only 167 (40%) of the aborted cases.

Table 9 Bivariate Logistic Regression Analysis of Factors Associated with Cancellation of Elective Procedure

Variable	Coef (B)	S.E	Crude Odds Ratio	95% C.I. (Upper – Lower)	P-value
Type of Surgery	0.433	0.294	1.54	0.87 – 2.74	0.141
Facility-Related (*Reference category*)			1		< 0.001
Patient-Related	2.109	0.314	8.24	4.45 - 15.25	< 0.001
Surgeon-Related	0.879	0.400	2.41	1.10 - 5.28	0.028
Whether Cancelation was Avoidable	0.650	0.279	1.92	1.11 - 3.31	0.020

To determine the association between the variables and cancellation of elective surgery, binary logistic regression analysis was first conducted to select the variables for consideration in the multivariable analysis.

In the analysis, type of surgery, reason for cancellation, and whether cancellation was avoidable all had their P values less than 0.25 and were, therefore, selected for the multivariable logistic regression. The other predictor variables failed to meet the variable selection criteria and were, therefore, dropped from further analysis. Table 9 summarizes the result of the binary logistic regression analysis (Table only includes the independent variables which show significant effect at $P < 0.25$).

Table 10 Multivariable Logistic Regression Analysis of Variables Associated with Cancellation of Elective Procedures

Variable	Coef (B)	S.E	Adjusted Odds Ratio	95% C.I.(Upper – Lower)	P-value
Reason for Cancellation					
Facility-Related (*Reference category*)			1		< 0.001
Patient-Related	2.098	0.344	8.15	4.16 – 15.99	< 0.001
Surgeon-Related	0.882	0.414	2.42	1.07 – 5.44	0.033

The table only includes the independent variable which shows a significant effect at $P < 0.05$.

Among all the predictor variables selected from the binary regression for the multivariable analysis, the reason for cancellation was the only predictor variable significantly associated with cancelled elective surgery.

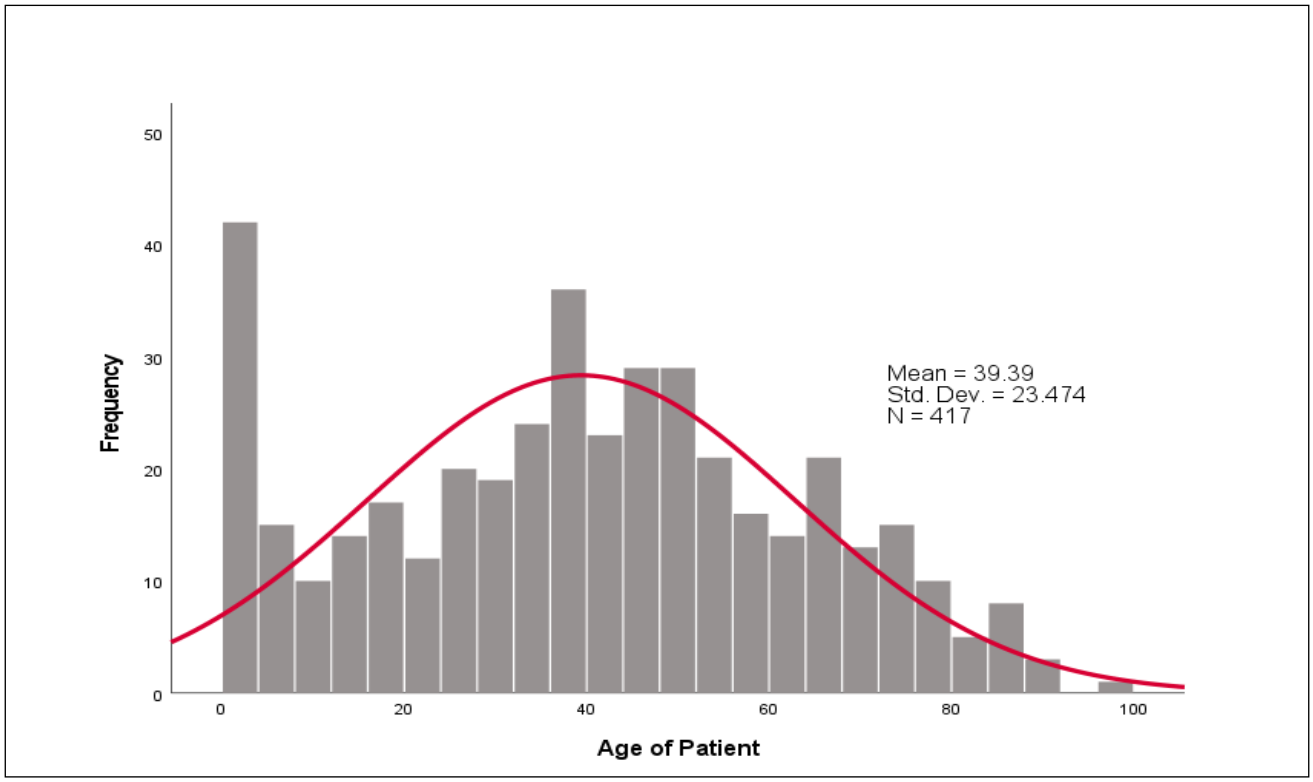

Figure 1 Age distribution of patients

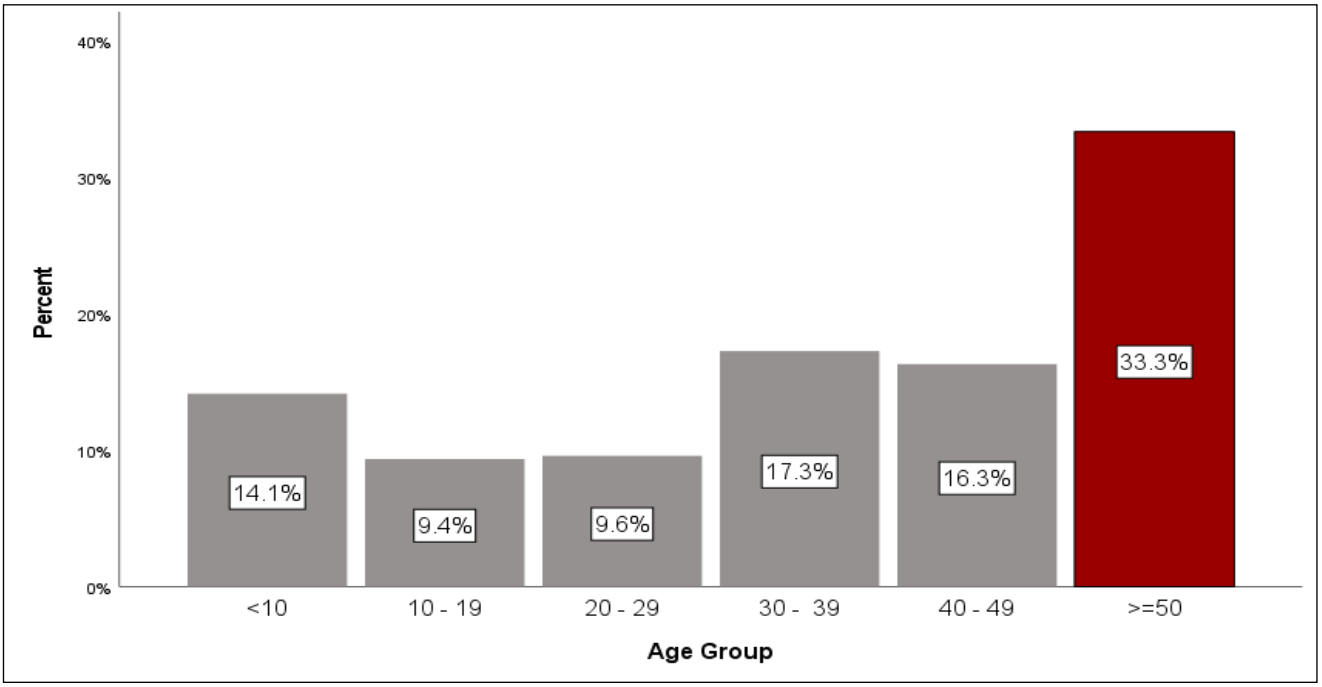

Figure 2 Classification of age group

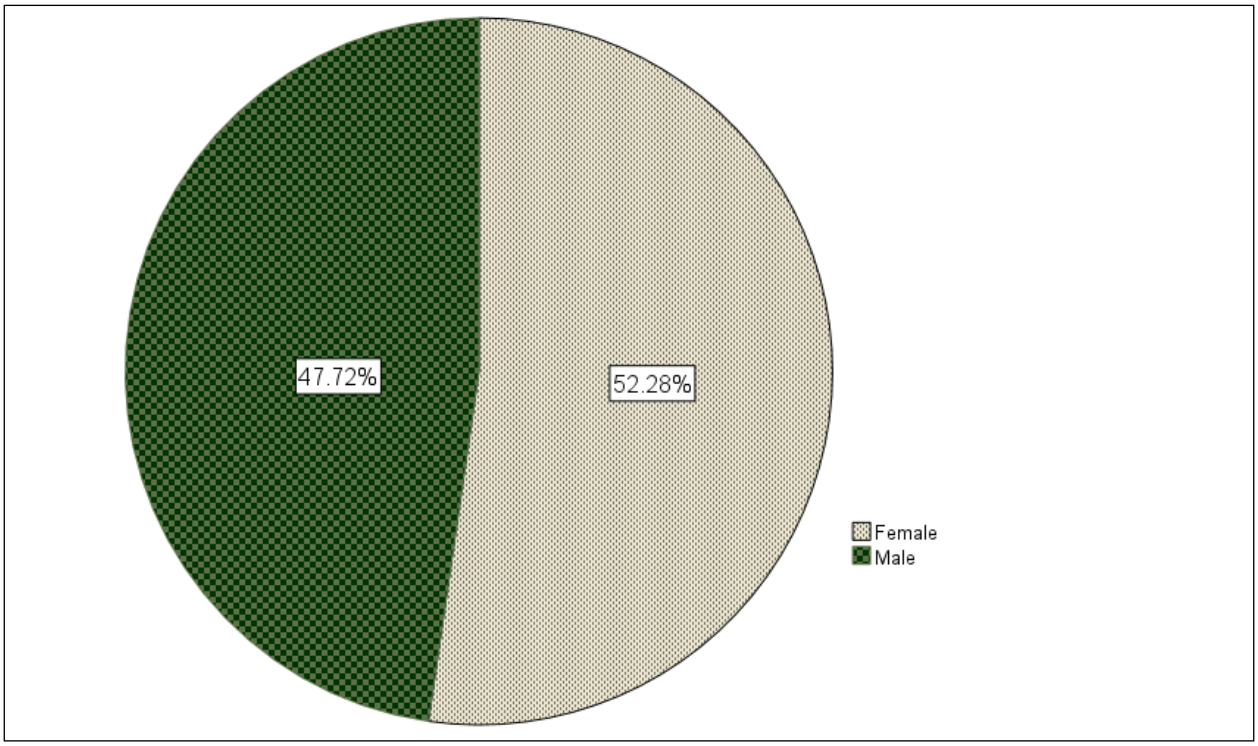

Figure 3 Gender of patients

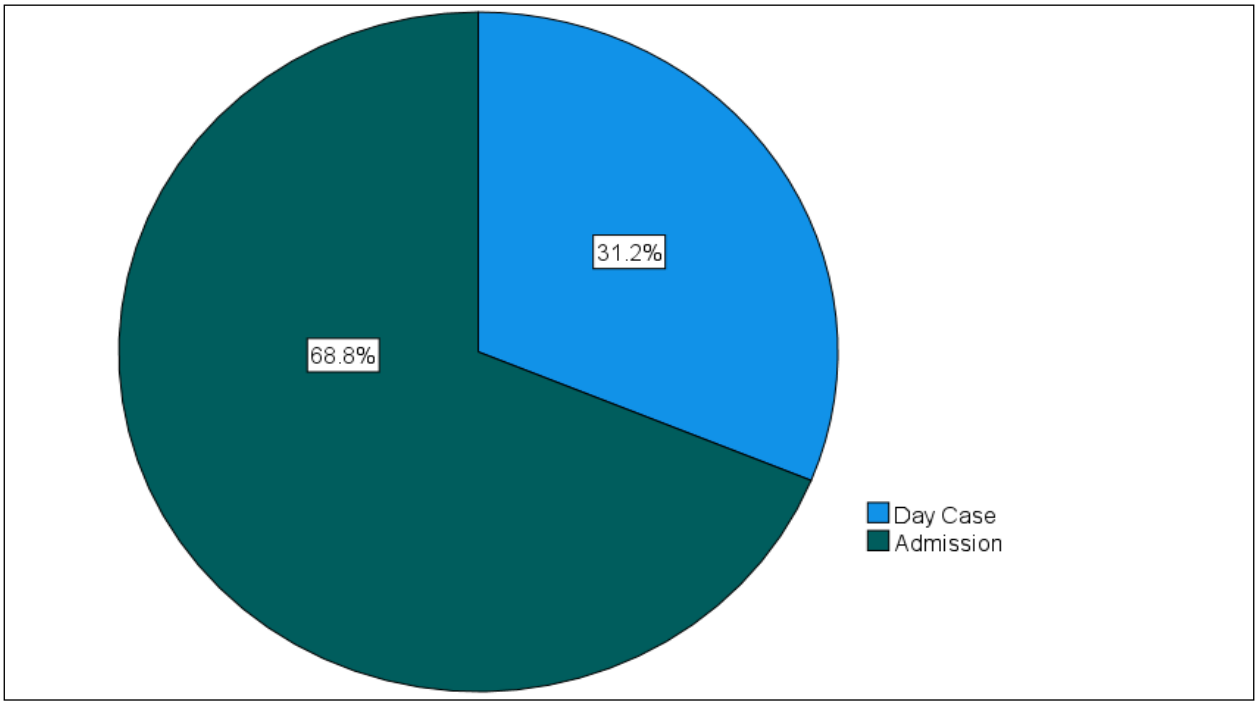

Figure 4 Cancelled cases by Service Type.

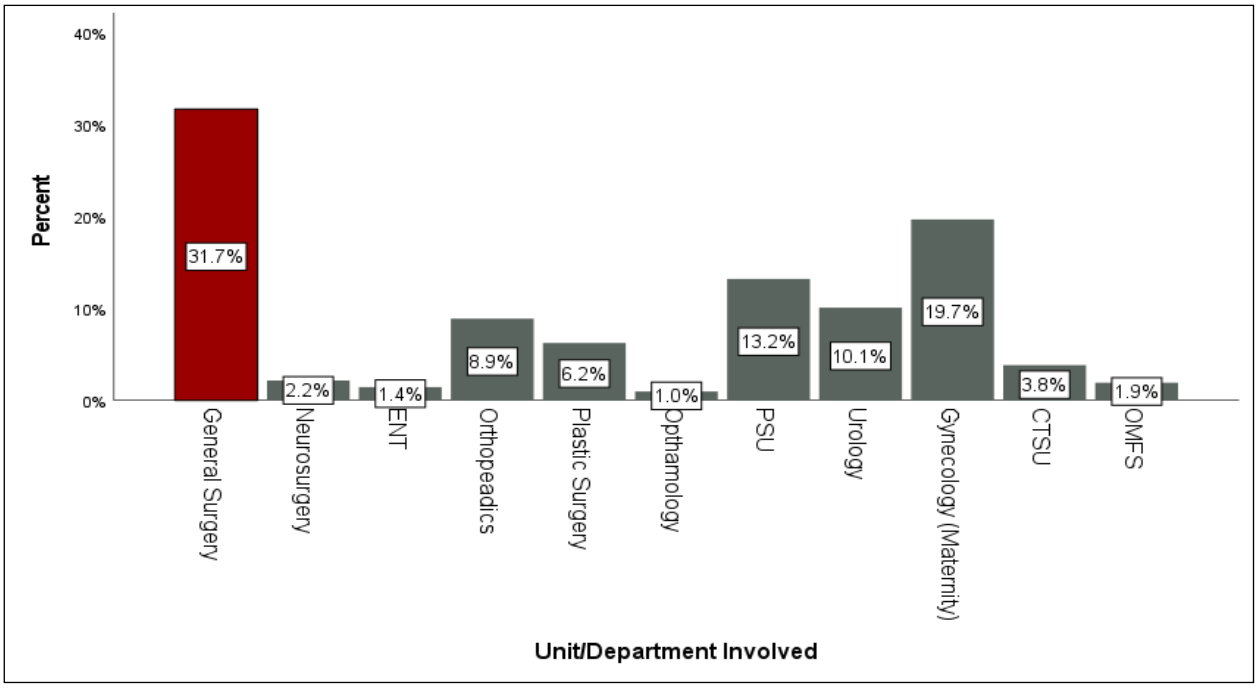

Figure 5 Cancellations per unit/department

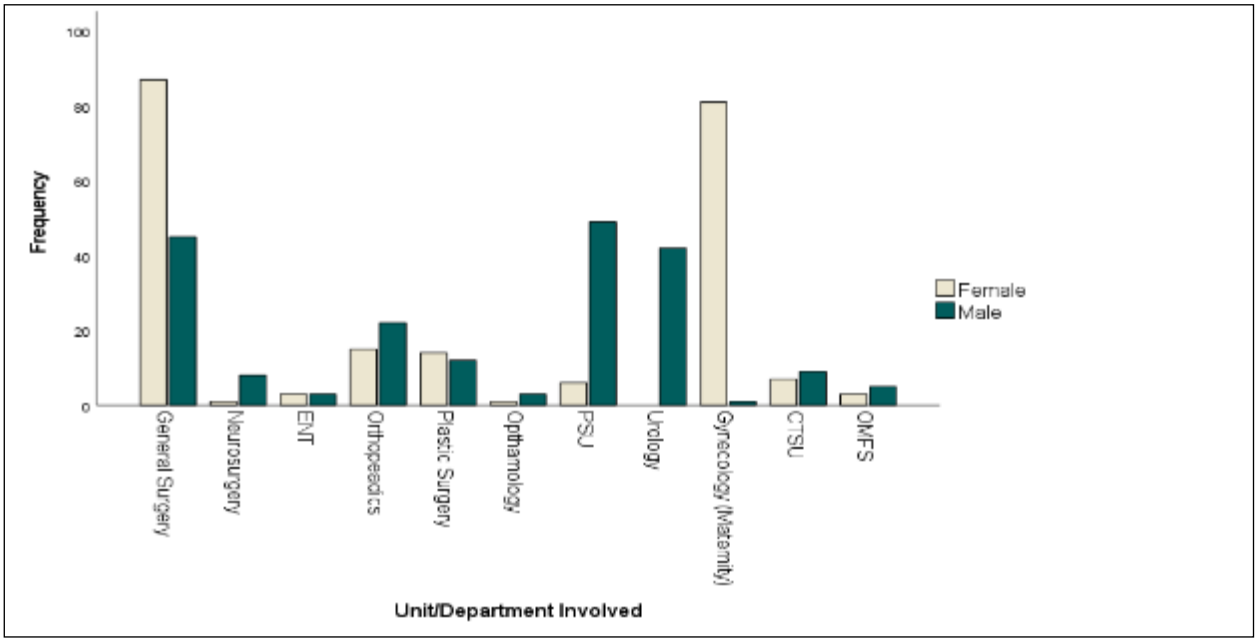

Figure 6 Cancellation per gender per unit

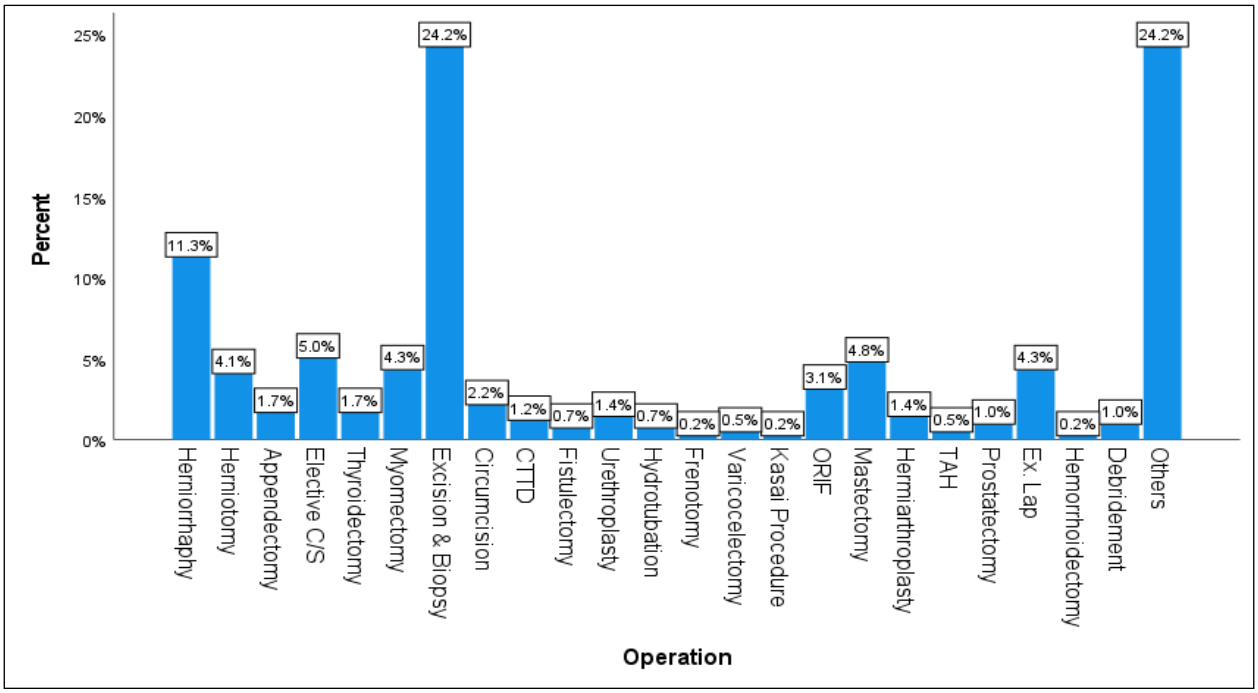

Figure 7 Diversity of cases involved

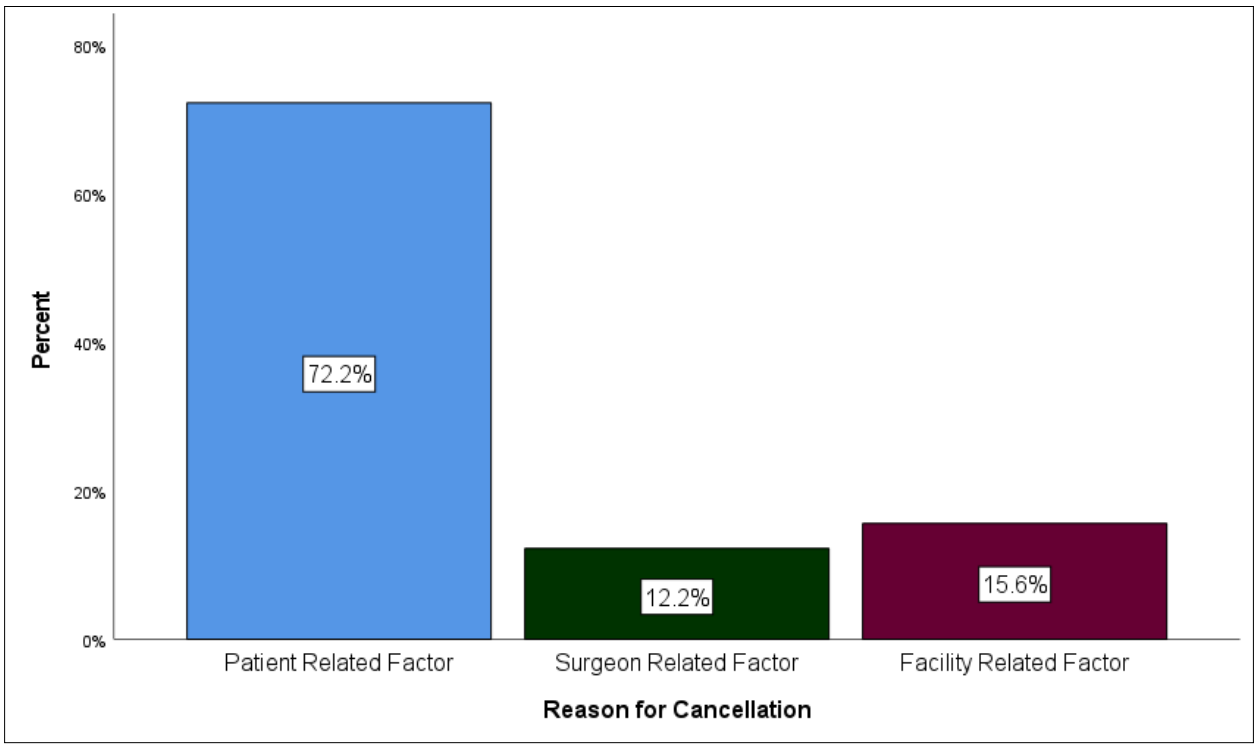

Figure 8 Reasons for Cancellation

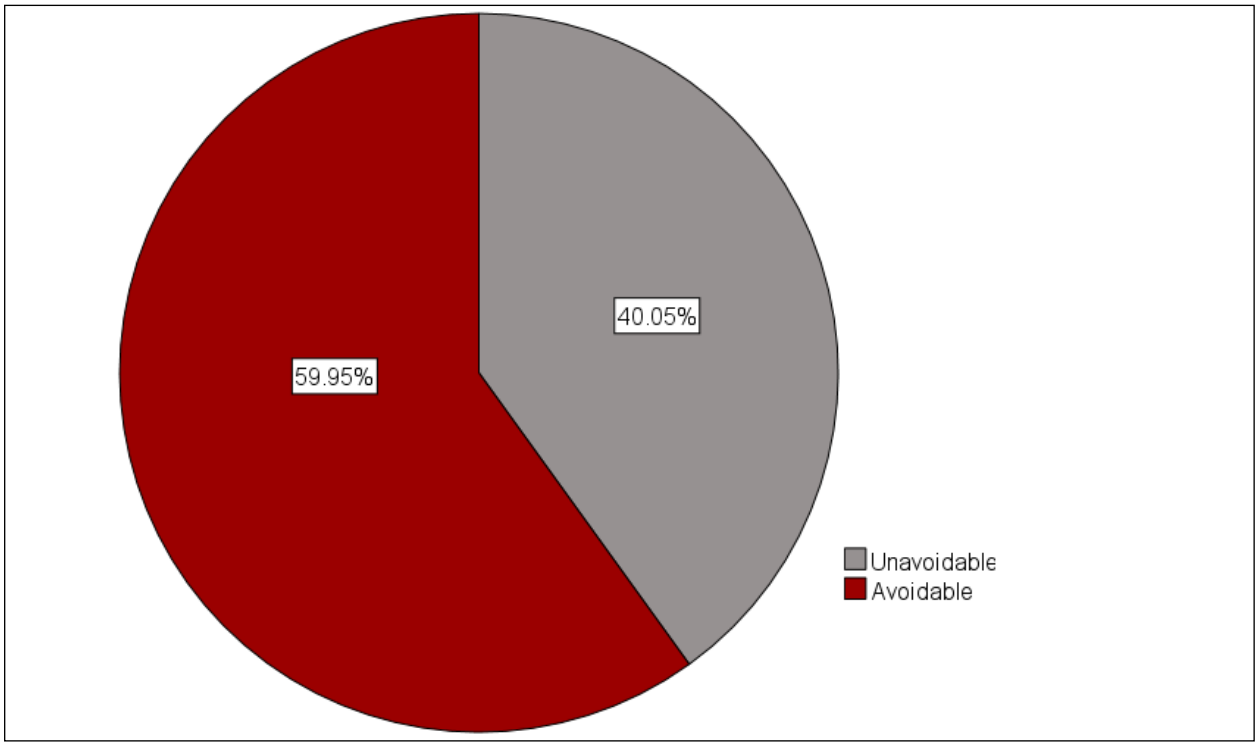

Figure 9 Avoidable or non-avoidable reasons

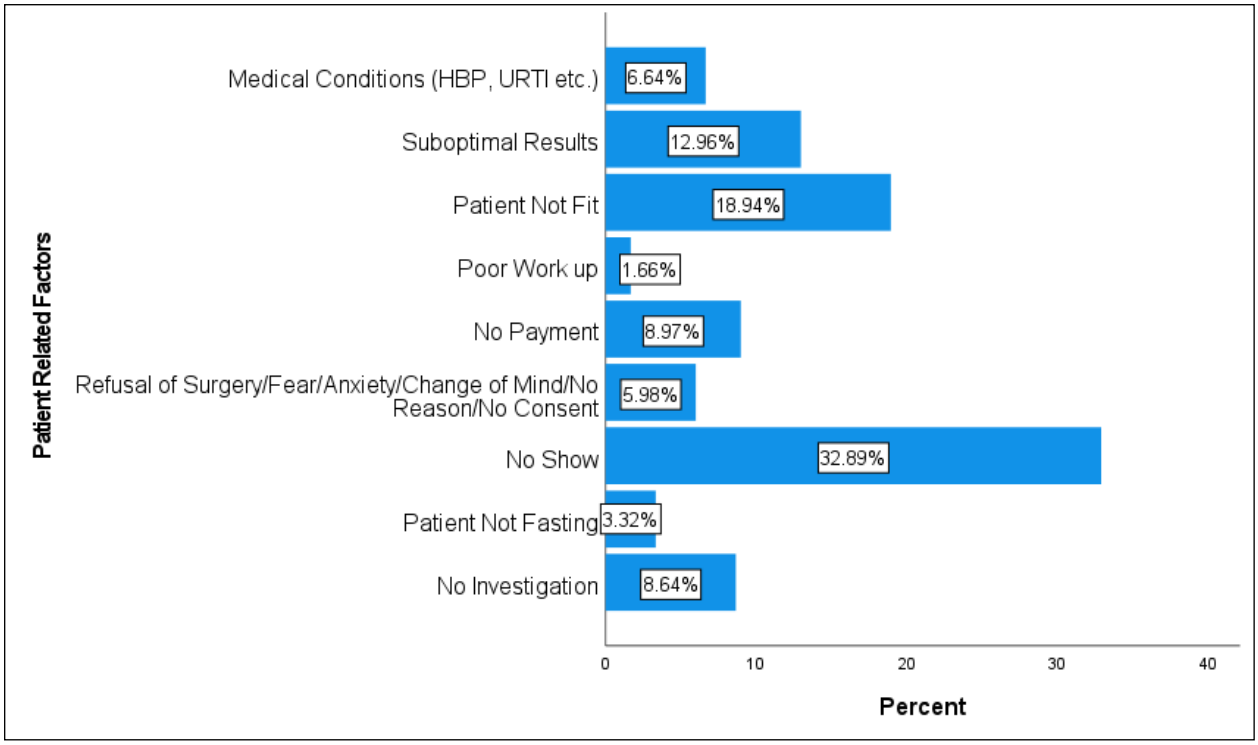

Figure 10 Patient-related factors

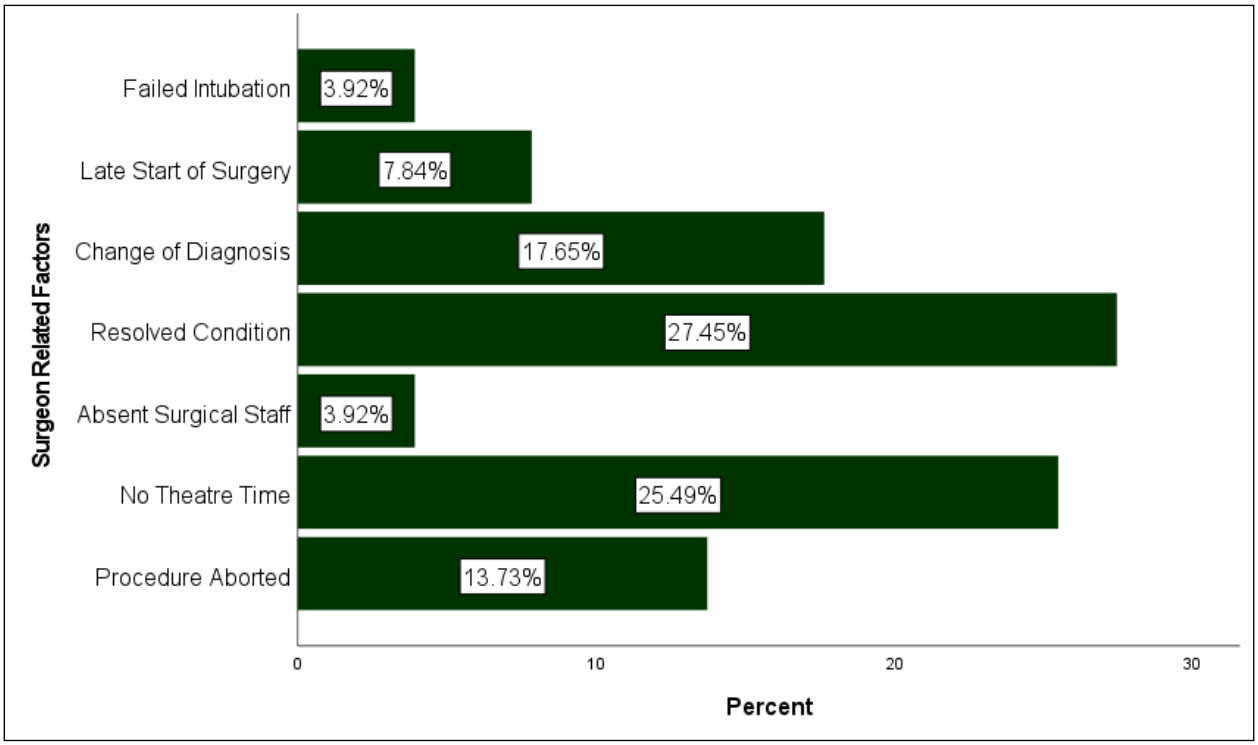

Figure 11 Surgeon-related Factors

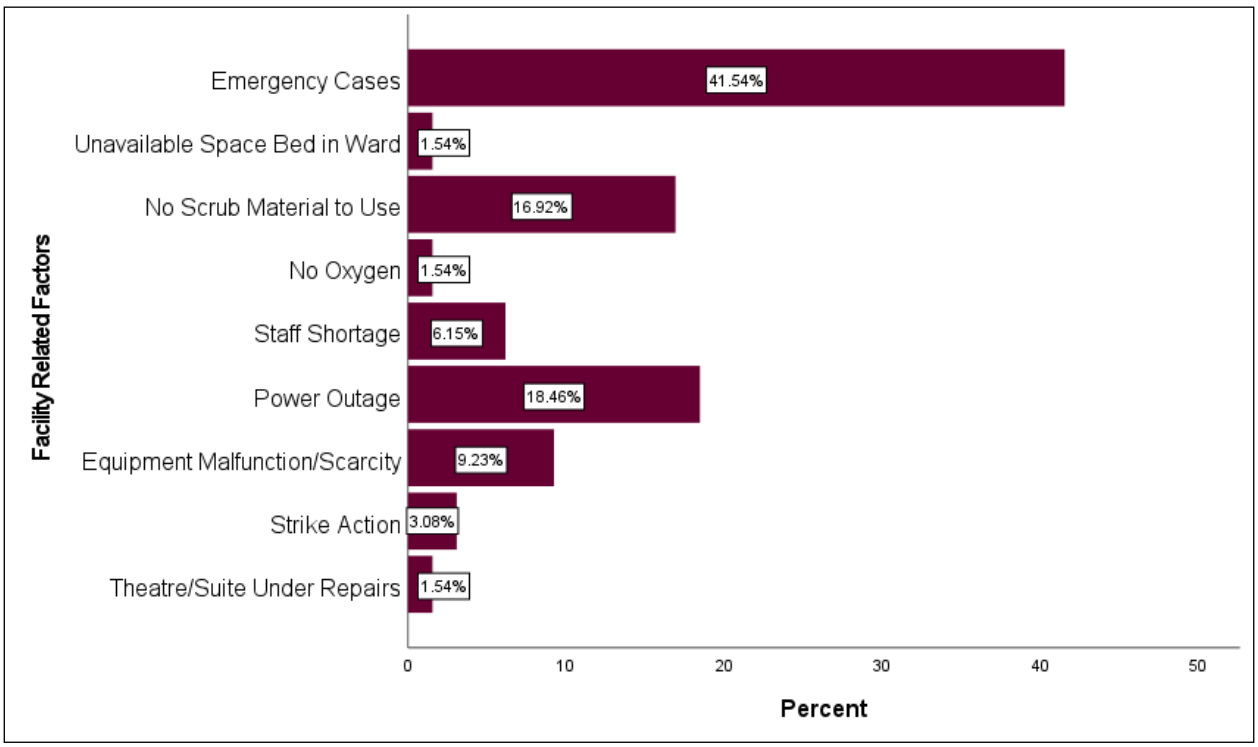

Figure 12 Facility-related factors

4. Discussion

We had a total of 417 cancelled cases comprising 218(52.3%) females and 199(47.7%) males. The female: male ratio is 1.1:1. The highest and lowest incidents were recorded in the 50+ (139/417;33.3%) and 10-19(39/417; 9.4%) age groups respectively. The mean age of patients was 39.39 years with a standard deviation (SD) of 23.47 years. Furthermore, most of the patients whose procedures were cancelled were students 61 (14.6%) as against housewives 87(36.4%) in Burkina Faso[2]. (Table 1). Figure 1-4

Our overall cancellation burden across specialties was 7.3% while year on year cancellation rates were 3.1%, 4.6%,10.9%, 14.9%, 1% for 2019, 2020, 2021, 2022 and 2023 respectively (Table 2). These values are within the acceptable range of 6-39%[16] reported in the literature and are significantly lower than rates of 21.9%, 23.15%, 28.5%, 19.3%, 21.9% reported respectively in Burkina Faso[2], Ilorin[17], Jos[18], and Lagos[19] but compare favourably with 5.4%[1] in the United Kingdom. The low rates for 2019 and 2023 could be ascribed to the fact that the whole year was not involved.

In this study, females were more involved than men. Table 3. This tallies with what was reported by Lankoande *et al*[2] and Adugna *et al*[20] *that* females were more likely than males to have their surgeries cancelled. This may be due to non-appearance occasioned by anxiety and fear in females than males. However, Cho *et al* found that case cancellation was less common in females[21]. Most of the cancelled cases were admission cases (68.8%) as against Day Cases (31.2%). Figure 4. The reason is not clear but could be due to inpatients being more likely to have major surgeries than Day cases, which could be affected negatively by funds, medical co-morbidities and lack of theatre space.

The unit with the most cancelled cases was General Surgery (31.7%) while the least was Ophthalmology (1.0%). Table 5. Figure 5. This is consistent with findings by Lankoande *et al*[2], Kumar *et al*[9] and Garg *et al*[23] who reported General Surgery as the unit with the highest rates with 35.9%, 7.1%, and 30.3% respectively. The cases involved were diverse. Table 6. Figure 6. This is not unexpected since the patient load of General Surgery outnumbers that of other units.

The commonest reason for cancellation of cases was Patient-related, which constitutes 301/417 (72.2%). Table 7. Figure 7. Other factors include Facility-related factors 65/417(15.6%) and Surgeon-Related factors 51/417(12.2%) out of which 60% (250/417) were avoidable while 40% (167/417) were unavoidable. Table 8. Figure 8. While the finding of patient -related factors as the most common reason for cancellation of cases is consistent with what was reported from Jos[18] and Lagos[19], other authors[22] found administrative reasons (83.5%) as the commonest reasons while patient factors accounted for only 7.8%

These patient -related factors include no show constituting 32.9% (99/301), the most common patient-related reason. Other reasons include Patient not fit 18.9% (57/301), suboptimal results 13%, no payment 9%, no investigations 8.6%, and presence of medical conditions 6.6%. Others are Refusal of Surgery 6%, and refusal to fast 3.3%. Figure 10.

'No Show', which means patient did not turn up for surgery, was found to be the most common patient-related reason for cancellations as reported by Kumar *et al*[9], Kolawole *et al*[17] and *Ojo et al*[18] with a rate of 19%, 52.21%, and 45.2% respectively. This contrasts with a study from the UK which found patients not Fit for surgery (33.73%) as the most common patient -related factor ahead of patient not showing up (6.87%)[1]. Patients not showing up for surgery could result from financial constraints, fear of surgery, or wrong advice from friends. When this is not communicated to the operating team, it leads to waste of theatre time and potentially denies others on the waiting list the opportunity to have their surgeries done, with the resultant effect of unnecessarily long waiting lists and prolongation of same. This can be mitigated by ensuring that patients attend pre-surgery assessment clinics to ascertain the readiness of patients for surgery and to clear any doubts.

High rates of suboptimal results could also be addressed during the pre-surgery assessment clinics where only those with normal results are listed for surgery. This presupposes that the patients would have concluded their investigations before the assessment clinics. In Third World countries, the incidence of non-payment for surgeries is ever present because of high poverty level and low coverage of Health Insurance. This also can be reduced or eradicated by ensuring that only those patients who have paid fully for surgery are enlisted. A situation where a patient is listed for surgery in the hope that funds will be made available on admission or on the day of surgery, should not be allowed. Those on Health insurance too should have completed all the formalities before they are included in surgery list. Other patient -related factors like patients not fit for surgery, medical conditions like hypertension and Diabetes Mellitus could also be reduced by ensuring that such conditions are managed by the appropriate specialists in the weeks and months leading to their elective surgeries and by ascertaining that all medical co-morbidities have been effectively managed and patients are stable enough for surgery by using the pre-surgery assessment clinics, or where it's not available due to staff shortages

or space constraints, the last surgical out-patients attendance before surgery should be close as much as possible to the surgery date.

Resolved condition, accounting for 27.45% of surgeon-related factors is the most common. Figure 11. Others include lack of theatre time (25.4%), change of diagnosis (17.65%), aborted procedure (13.73%), late start of elective list (7.84%), absent surgical staff (3.92%), failed intubation (3.92%). Rakesh Garg *et al*[23] found non-availability of theatre time as the most common reason for cancellation. This could be due to a variety of factors, including late commencement of elective list, overbooking of cases by the surgeons, prolonged surgery time probably due to unexpected complications intraoperatively, putting junior surgeons though some procedures and occasionally, having laparoscopic surgeries on the list. These can be reduced by early commencement of elective lists by 8am, necessitating that surgeons, anaesthetists, and other theatre staff should get to the theatre before 8am. Overbooking occurs commonly[24,25] to reduce patients' waiting list. This could result in overshooting the time for elective surgeries. Surgeons should be realistic in the number of cases they book within the time frame for elective surgeries. Scheduling should be based on the expected duration of each case. Having a dedicated minimal access suite and complementary theatre staff to manage it will reduce delays caused by laparoscopic surgeries. Windokun *et al*[26] found Surgeons not showing up (62%) as one of the reasons for cancellation of surgeries. A proper system of audit should be put in place to ensure that this never happens and that starting elective lists late is reduced remarkably.

The booking of emergency cases is the commonest facility -related factor (41.54%). Figure 12. This effectively leads to postponement and cancellation of elective cases, especially in centres where there are no dedicated emergency suites. Wan *et al* found that prioritization of emergencies accounted for 9.6% of cancelled cases[27]. Provision should be made for dedicated emergency suites, to ensure that both emergency and elective cases can proceed simultaneously. Others included power outages (18.46%), lack of materials for surgery (16.92%), equipment malfunction (9.23%), staff shortage (6.15%), Staff Strike (3.08%), lack of oxygen (1.54%), suite undergoing repairs (1.54%). Power outages are common in Third World countries. Efforts should be geared towards installing alternative power supply in critical areas of hospitals as we currently have in this centre. Staff strikes occur commonly in our environment to demand higher wages and better working conditions. We should proactively nip strikes in the bud to ensure uninterrupted service delivery.

Multivariable logistics regression analysis shows that the odds of an elective procedure being canceled were 8 times higher for patient-related factors than for the reference category of facility-related factor (AOR: 8.15; 95% C.I (4.16–15.99); P value <0.001); and the odds of an elective procedure being cancelled were about 2.42 times higher for surgeon-related factors than for the reference category of facility-related factors (AOR: 2.42; 95% C.I. (1.07 – 5.44); P value = 0.033).Table 9.

5. Conclusion

The prevalence of elective procedure cancellation, in this study, was moderate at 7.3% and marginally above the widely recommended rate of less than 5%. The major reason for cancellation was patient-related, and most cancellations (60%) were avoidable. Reason for cancellation (patient-related factors, surgeon-related factor and facility-related factors) was significantly associated with elective procedure cancellation. Patient-related factors and Surgeon-related factors are 8 times and 2.42 times respectively more likely to result in cancellation of elective procedures than facility-related factors.

Cancellation of surgeries should be viewed as an adverse effect, that takes a heavy toll on the finances and is disruptive of the work schedule of the affected patients. It also constitutes a loss of revenue to the hospitals. This should be monitored and critically addressed by the management, to reduce the rate to the barest minimum. Patients should be educated on the effects of self-cancellations (No Show) and the need to communicate to the surgical team so that other patients could be enlisted for elective surgery. Dedicated emergency suites should be provided in addition to elective suites with full complement of theatre staff, so that elective cases do not have to make way for emergencies.

Compliance with ethical standards

Disclosure of conflict of interest

No Conflict of Interest to be disclosed.

Statement of Ethical Approval

Institutional Ethical approval was obtained for the study.

Statement of informed consent

In a retrospective study of this nature, informed consent is not possible.

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