

# Contributing Factors of Elective Surgical Case Cancellation: A Cross- Sectional Descriptive Study at a Tertiary care hospital

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## ABSTRACT

**Introduction:** Elective surgical case cancellation refers to a scheduled surgical procedure that is not performed on a given day. Cancellation of elective surgeries is recognized as a major cause of emotional trauma to patients as well as their families. It has been a long-standing problem for healthcare organizations across the world.

**Methods:** This was a cross-sectional descriptive study conducted from September 01 to November 30, 2021 for a period of three months in a 750-bedded tertiary care hospital, Shree Birendra Hospital (SBH), Kathmandu, Nepal. A cancelled procedure was defined as a patient's name appearing on the list for surgical operations but the operation not being performed on the scheduled date. Patients scheduled for surgical procedures were included into this study by the principal investigator and research assistants on the day prior to their operation.

**Results:** Of total 600 patients scheduled for elective procedures over a period of three months, the prevalence of cancellation of elective surgical procedures was found to be 15.33% (n=92). Of the examined surgical specialties, the cancellation prevalence was highest in gastrointestinal and hepato-pancreatico-biliary (GI & HPB) at 37 (40.2%) closely followed by urosurgery at 31 (33.6%), general surgery 17 (18.47%), paediatric surgery five (5.4%) and burn and plastic surgery two (2.1%) having the least cancellation rate at two (2.1%) which was statistically significant (P value < 0.05).

**Conclusions:** Inadequate preoperative preparation, prioritized emergency cases and equipment shortages are the common causes of elective surgical cancellations.

**Key Words:** Cancellation, Elective, Surgery.

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## INTRODUCTION

Operating Rooms (OR) generate the highest costs in the hospital, while also being the largest source of revenue.<sup>1,2</sup> Case cancellation however is one of the leading cause of decrease in the efficiency of OR.<sup>3,4</sup> Case cancellation reduces utilization of OR time, affects surgeon's productivity and staff morale, causes anxiety and emotional distress in patients, and results in extra costs for patients, physicians and hospitals.<sup>5</sup> Elective surgical case cancellation refers to a scheduled surgical procedure that is not performed on a given day. It has been a long-standing problem for healthcare organizations across the world.<sup>6-8</sup> Many patients do not undergo elective surgery as per schedule. Most hospitals invest resources to support operating suites. However, there is a concern of unanticipated cancellation of scheduled surgery.<sup>9</sup>

In developing countries, cancellation of elective surgical operation is a common phenomenon.<sup>10</sup> There are many reasons for cancellation of elective surgical cases but they might differ from hospital to hospital. Unexpected cancellation of planned surgery can be divided into avoidable and unavoidable cancellations.<sup>11</sup> Scheduling errors, equipment shortages and inadequate preoperative evaluation are avoidable cancellations. Unavoidable cancellations are emergency encounters and unexpected changes in the patient's medical status. Different literatures have suggested that, by improving the planning most cancellations are avoidable. It has also suggested that patients themselves should receive notification early about their operation day and a reminder for their appointment.<sup>12</sup> Involving patients in such ways may increase their satisfaction with treatment decisions during initial consultations, which is a strong predictor of attendance for surgery.<sup>13</sup>

Although this is a very relevant subject in the field of surgery, there is lack of research in this field from our siasaaaaade of the world. This study aims to identify the contributing factors for elective surgical case cancellation in a tertiary care hospital.

## METHODS

This study was conducted at Shree Birendra Hospital (SBH), a tertiary care teaching hospital affiliated with Nepalese Army Institute of Health Sciences (NAIHS) with a capacity of 750 beds in Chhauni, Kathmandu, Nepal. This was a cross-sectional observational study conducted from September 01 to November 30, 2021

for a period of three months. In this study, all the cases were cancelled elective inpatient surgery from five specialties – General surgery, Gastrointestinal (GI) and Hepato-pancreatico-biliary (HPB) Surgery, Burn and Plastic surgery, Urosurgical and Paediatric surgery. At SBH, surgical elective cases are performed in four different operating theatres, all of which were functional during the entire study period. Prior to ward admission, all patients who are posted for elective surgeries in these specialties attend a surgical outpatient clinic, where they are registered and undergo Pre-anesthetic Check-up (PAC). Date for surgery is given only when patient has been regarded fit for surgery after PAC check-up. Elective surgeries begin at 9:00 AM and are required to be finished by 4:00 PM. Data were collected on demographic characteristics, diagnosis, surgical specialties, planned procedures, assigned theatre, cancellation and reasons for cancellation. In terms of reasons for cancellation, surgical team members were able to select multiple reasons from a list provided to them as per the validated standard performa, and they were also invited to add reasons that were not on the list. A cancelled procedure was defined as a patient's name appearing on the list for surgical operations but the operation not being performed on the scheduled date. Patients scheduled for surgical procedures were recruited into this study by the principal investigator and research assistants on the day prior to their operation. Patients with multiple cancellations and those denying consent were excluded from the study. Data from the completed questionnaires were entered in excel sheet. After editing, the data were exported to SPSS 20.0 for analysis. Categorical variables were summarized using percentages, proportions, means, medians and standard deviations. The overall prevalence of cancellation was calculated by dividing the total number of cancellations by the total number of operations scheduled. A binary logistic regression model was used to identify factors that were statistically associated with the cancellation of elective procedures. Odds ratios (ORs) and 95% confidence intervals (CIs) of cancellation were estimated for the different specialties. The level of significance was set at  $P < 0.05$ . This study was conducted after an approval from institutional Review Board (IRB) of NAIHS Ref no. 245 / Reg. no.453. Patients and / or their next of kin provided consent for participation in this study. For minors, consent was obtained from the parents of the children.

**Table 1.** Demographic profile and surgical specialty of scheduled elective surgical cases

S.No	Variables	Frequency (N)	Percentage (%)
1.	Age in years		
	1 - 14	88	14.6
	15 - 30	169	28.1
	31 - 45	245	40.83
	46 - 60	56	9.3
	> 60	42	7.0
2.	Sex		
	Male	411	68.5
	Female	189	31.5
3.	Surgical specialty		
	•GI and HPB surgery	212	35.3
	•Urosurgery	174	29.0
	•General	97	16.16
	•Paediatric	88	14.3
	•Burn and Plastic Surgery	29	4.8
	Total no. of scheduled cases	600	100

\*GI and HPB – Gastrointestinal and hepato- pancreatico-biliary

## RESULTS

The baseline characteristics of 600 patients scheduled for elective procedures over a period of three months are provided in Table 1. The most frequent surgeries performed among surgical specialty was represented by GI and HPB surgery 212 (35.3%) followed by urosurgery, general, pediatric and plastic surgeries. Among all the patients who were included in the study, male to female ratio was 2.1:1. Among these patients, 88 (14.6 %) children aged 0 – 14 years, 169 (28.1%) were aged 15 – 30 years, 245 (40.83%) adults aged 31 – 45 years, and 56 (9.3%) adults aged between 46 - 60 years and 42 (7.0 %) were  $\geq$  60 years.

Many reasons were reported to be contributing to the cancellation of elective surgical procedures. These reasons were broadly categorized into three broad parameters - Health professional - related reasons, patient - related reasons and facility - related reasons as shown in Table 2. Among these variables, patient - related factors accounted for two - thirds 54 (59%) followed by facility related 29 (31.5%) and health care professional

reasons nine (9.5%) respectively for cancellations at Shree Birendra Hospital.

The prevalence of cancellation of elective surgical procedures was 15.33 % (n = 92) Table 2. Among the demographic profile of cancelled cases, majority of cases belonged to age group more than 60 years i.e. 32 (34.7%) followed by 46 - 60 years i.e. 29 (31.5%). Of the examined surgical specialties, the cancellation prevalence was highest in GI and HPB at 37 (40.2%), closely followed by urosurgery at 31 (33.6%), general surgery at 17 (18.47%), paediatric surgery at five (5.4%) and burn and plastic surgery having the least cancellation rate at two (2.1%) as shown in Table 3. These variables were selected for consideration in the multivariate analysis which showed that surgical specialty was significantly ( $P < 0.05$ ) associated with the cancellation of elective surgical procedures. It showed that GI and urosurgery have significantly high cancellation rate as compared to general, paediatric and burn and plastic surgery (Table 3).

## DISCUSSION

Elective surgery cancellation is considered a fundamental problem in healthcare services. It causes considerable disruption of patient flow, further erodes the often stretched operating capacity which consequently reduces both hospital performance and patient satisfaction.<sup>8</sup> There is no consensus on the maximum acceptable case cancellation rate for efficient operating theatres.<sup>9</sup> Our study showed the prevalence of elective surgical cancellation to be 15.33% which was much less compared to the results of Ebirim et al.'s finding of a cancellation rate of 28% in Nigeria.<sup>14</sup> However, few other studies have shown higher cancellation rates of elective surgeries ranging from 20 - 40 %.<sup>15,16</sup> Cancellation of scheduled surgery is a global problem with a worldwide incidence ranging from one to over 23%. Our findings differ from previously published studies. Kaddoum et al in their study showed that 55% of surgeries resulted in cancellation due to workup-related, 7% due to patient-related, 22% due to admission - related and 12% due to surgeon / facility related issues.<sup>15</sup>

The demographic profile of elective surgical cancelled cases in our study showed that majority of cases belonged to age group above 60 years 32 (34.7%) followed by 46 - 60 years 29 (31.5%) and was statistically significant with a P value of 0.013. This study shows that multiple comorbidities were among

**Table 2.** The reasons for cancellation among patients posted for elective surgical cases

S No	Variables	Frequency	Overall Percentage
1.	Health professional-related reasons Surgeon with required expertise not available Surgeon changed patient's diagnosis Changed patient's management plan	- 01 08	9.5%
2.	Patient-related reasons Patient did not follow preoperative instructions Patient declined to undergo the procedure Patient had abnormal preoperative tests Patient found to have undiagnosed heart disease Patient refused for surgery prior to OT	12 01 32 06 03	59%
3.	Facility-related reasons Emergency case prioritized Sterile instruments or consumables not available Power outage before the procedure Oxygen not available in the theatre Required equipment broken or unavailable Insufficient time in the theatre to complete the procedure by the required time (4:00 PM) Impromptu theatre fumigation Shortage of blood No intensive care unit beds available	10 - - - 02 10 - 04 03	31.5%
	Total cancelled cases	92	100 %

**Table 3.** Analysis of factors associated with cancellation of elective procedures

S No	Variables	Cancellation of surgery		Total	P value
		Yes	No		
1.	Patient age (Years)				0.013
	•1 - 14	5 (5.4%)	83 (16.3%)	88	
	•15 - 30	09 (9.7%)	160 (31.4%)	169	
	•31 - 45	17 (18.4%)	228 (44.8%)	245	
	•46 - 60	29 (31.5%)	27 (5.3%)	56	
	•> 60	32 (34.7%)	10 (1.9%)	42	
2	Surgical specialty				0.027
	•GI and HPB Surgery	37 (40.2%)	175 (34.44%)	212	
	•Urology	31 (33.6%)	143 (28.14%)	174	
	•General Surgery	17 (18.47%)	80 (15.8%)	97	
	•Paediatric	05 (5.4%)	83 (16.33%)	88	
	•Burn and Plastic Surgery	02 (2.1%)	27 (5.3%)	29	

the reasons for cancellation of elective surgeries among elderly population. Similar results were shown in few other studies which showed that comorbidities such as cardiovascular and chest related were important factors that avoids posting of patient for an elective surgery.<sup>10-14</sup> Of the examined surgical specialties, the cancellation prevalence was highest in GI and HPB at 40.2% (n = 37), closely followed by urosurgery at 31 (33.6%), general surgery at 17 (18.47%), paediatric surgery at five (5.4%) and burn and plastic surgery at two (2.1%). Further analysis in the study showed that more than 60% of cases in GI and HPB were malignant cases who underwent major operative procedures. The preoperative preparation of these patients was one of the common causes behind the cancellation of elective cases. In other departments such as urosurgery, general surgery, pediatric and burn and plastic surgery, most of the cases were below 40 years and were associated with benign disorders resulting in decrease amount of cancellation of electively posted cases.

We investigated all possible factors associated with the cancellation of elective surgical operations, ranging from patient - related factors such as abnormal preoperative tests to facility - related factors such as insufficient time in the operating theatre to complete the procedure on the scheduled day. Among the reasons that were broadly categorized for the cancellation of operative procedures, patient- related factor accounted for two-thirds 54 (59%) followed by facility related 29 (31.5%) and health care professional reasons nine (9.5%) respectively for cancellations at SBH. Few other studies have highlighted similar factors as the cause behind cancellation of surgical procedures in hospitals.<sup>16</sup> In a study conducted by Ogwal A et al, patient related factors were the most common reason behind cancellation of elective cases.<sup>17</sup> This study thus highlights on the importance of preoperative preparation of patient before surgical procedures so as to minimize the cancellation of the surgical procedures. This study also showed that incomplete preoperative preparation among patients with comorbidities such as hypertensive crisis was the single most common reason for the cancellation of a scheduled surgery (80.7%). Hypertension is a prevalent disease affecting up to 30% of patients scheduled for non-cardiac surgery. A history of poorly controlled hypertension is associated with an increase in the risk of perioperative

mortality in non-cardiac surgeries, perioperative complications such as cerebral stroke, myocardial ischemia and acute heart failure.<sup>14-16</sup> It has also been shown that about 25% of the patients undergoing non-cardiac surgery and 80% undergoing cardiac surgery have perioperative hypertension and the history of hypertension can increase the perioperative cardiovascular complications by 35%.<sup>17-19</sup> Other causes regarding cancellation of surgical procedures such as facility related and health care professional reasons accounted for one third of cancellation of surgeries in our study.

In this study, the prevalence of elective surgical case cancellation was minimal as compared to few other international studies. The most common causes for elective surgical case cancellation were patient related factors followed by facility related and healthcare related factors. The causes for the cancellations are potentially preventable. Thus, efforts should be made to prevent unnecessary cancellations through careful planning. Quality improvement strategies are necessary for administrative as well as surgical and anesthetic specialties during preoperative preparation of patients who are more susceptible to procedure cancellations.

## CONCLUSIONS

Abnormal preoperative investigations among elderly patients with multiple comorbidities followed by prioritization of emergency operative cases and equipment shortages were the major causes for cancellation of scheduled surgeries. Most of the cancellations were considered to be potentially avoidable if improvement in preoperative assessment and facility related factors were taken into serious consideration so as to reduce scheduled case cancellation rate and improve quality care of the patients admitted for surgery.

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