

**CANCELLATION OF ELECTIVE INPATIENT SURGERY
AT KENYATTA NATIONAL HOSPITAL**

DR. OKONU N NANCY

**A DISSERTATION SUBMITTED IN PART
FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF MEDICINE IN
ANAESTHESIA, UNIVERSITY OF NAIROBI**

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DECLARATION

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RESEARCHER:

SIGNATURE

DATE

DR. NANCY N OKONU- H58/70993/09



3/7/2012

MBChB (UON)

POST-GRADUATE STUDENT IN ANAESTHESIA,

UNIVERSITY OF NAIROBI.

This dissertation has been submitted for the degree of Master of Medicine in Anaesthesia with my approval as a university supervisor.

SUPERVISOR:

SIGNATURE

DATE

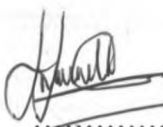
DR. JULIUS MURIITHI

MBChB, M.MED (ANAESTH)

LECTURER IN ANAESTHESIOLOGY,

DEPARTMENT OF SURGERY

UNIVERSITY OF NAIROBI.


JULIUS MURIITHI S.M.
.....

3/7/2012

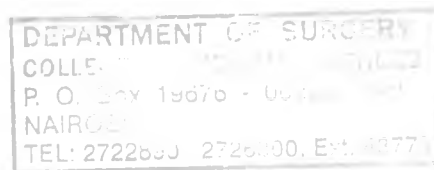


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ACKNOWLEDGEMENTS

I would like to thank my supervisor Dr. Muriithi for his support in writing this dissertation. Thank you for your supervision and guidance.

Special thanks to Dr. Chokwe for giving my study direction and his unrelenting guidance throughout this programme.

I thank Dr. Olang and Dr. Mwiti for their input and positive criticism. I also thank all the lecturers for their support throughout the programme.

I acknowledge the entire theatre staff for their support. Special thanks to all my colleagues.

DEDICATION

I dedicate this dissertation to my dear daughter Neema who was born during this programme for giving me strength to keep going on. To my dear husband Sam for his unrelenting support and understanding throughout this programme. To my dear parents, my dad Nemwel, my late mother Pauline and my stepmother Teresa for raising me to be who I am today and inspiring me to believe in myself. I also dedicate this work to my siblings for loving and believing in me. Special dedication to the KNH patients whose care we always endeavor to improve.

LIST OF ABBREVIATIONS

Clin - Clinical

Cond - Condition

Consul - Consultant

DNA - Did Not Arrive

ED - Emergency Department

ENT - Ear Nose and Throat

Hb - Haemoglobin

HDU - High Dependency Unit

Hosp - Hospital

ICU - Intensive Care Unit

KNH - Kenyatta National Hospital

Med - Medical

NCEPOD- National Confidential Enquiry into Perioperative Deaths

NHS -National Health Service

NPO -Nil Per Oral

Obs/Gyn - Obstetrics and Gynaecology

OR - Operating Room

Pre- Op - Pre-Operative

RF - Ring Fencing

UK -United Kingdom

VHA - Veterans Health Administration

HOSP - Hospital

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ABSTRACT

Background: Cancellation of operations in hospitals is a significant problem with far reaching consequences. It is therefore important to analyze cancellation of surgery in every setting.

Objective: This was a prospective observational study conducted over six weeks from 1st July 2011 to 14th August 2011. The main objective was to determine the incidence, the pattern and the commonest reasons for cancellation of elective inpatient surgery in Kenyatta National Hospital.

Setting and Population: The main study area was at KNH's main theatre and the study population was patients scheduled for elective inpatient surgery at Kenyatta National Hospital.

Methodology: Over a period of six weeks from 11th July to 22nd August 2011 a list of all patients scheduled for elective inpatient surgery was compiled. Each day a form was filled for all operations that were cancelled. A cancellation was defined as any operation that appeared on the definitive theatre list that was subsequently not performed. The reasons for cancellation were documented.

Results: A total of 1,547 patients were booked for surgery during the study period. Out of these, 318 patients were cancelled resulting in a cancellation rate of 20.6%. Cardiothoracic surgery had the highest cancellation rate (38%) followed by neurosurgery (37.8%), orthopaedic surgery (32.6%), general surgery(28%), paediatric surgery(22%), maxillofacial surgery (19.2%), urology (19%), obstetrics and gynaecology (16.9%), ENT (15.4%), ophthalmology (12.9%), private wing (6.4%). Hospital non clinical reasons were the commonest reasons for cancellation (61.7%) followed by hospital clinical reasons (30.1%) and patient reasons (8.2%). The six commonest specific reasons for cancellation were lack of time (43.8%), lack of blood (14.9%), patient illness (8.5%), consultant unavailability (6.7%), patient did not arrive (6.1%) and administrative/logistic errors (4.9%). These six reasons accounted for approximately 84.9% of the cancellations. More than 60% of the cancellations were avoidable.

Conclusion: Cancellation of elective surgery occupies a substantial population (20.6%) of cases in KNH. Majority of these cancellations were due to hospital non clinical reasons with lack of time being the commonest reason. More than 60% of the cancellations were avoidable with better management.

1.0 INTRODUCTION

KNH is the largest National Referral and Teaching Hospital in Kenya. It has a total bed capacity of 1800. It has 50 wards, 22 Out-patient clinics, 24 theatres and an Accident & Emergency Department. About 1,700 major elective operations are currently done at KNH every month. The main study area was the main theatre suite which has twelve theatres. One of the theatres is an emergency theatre and is purely dedicated to emergency operations. The other eleven theatres are elective surgery theatres.

Major operations that are done at KNH include general surgery, orthopaedics surgery, otorhinolaryngology (ENT), obstetrics and gynaecology, maxillofacial surgery, cardiothoracic surgery, plastic surgery, urology and ophthalmic surgery. There are other satellite theatres for emergency and trauma surgery, maternity cases, minor otorhinolaryngology surgery (ENT), plastic surgery as well as minor ambulatory surgery.

The standard hospital practice is that once a surgery is indicated the surgeon schedules the patient for surgery and requests pre-operative tests. Patients are usually admitted a day before surgery. A few patients bypass this system since they are admitted directly to the surgical wards from the surgical clinics and scheduled for surgery or are admitted as emergency cases via the emergency department or from other medical departments. Definitive lists are made a day before surgery and submitted to theatre by 4 pm on the day before surgery.

The patients are then assessed in the wards by anaesthetists once the definitive lists have been submitted to theatre. KNH does not have pre operative anaesthetic clinics. Theatre allocation is by block system, that is, a surgeon or surgical group is given a specific operating theatre on a specific day to perform scheduled cases. This arrangement permits development of specialized operating rooms with complex equipment for complex procedures. There is reduced movement of personnel and equipment hence increased efficiency. The elective theatres are open daily from 8 AM to 5 PM from Monday to Friday. The emergency theatre is open daily for 24 Hours.

Performing a surgical operation is a team effort. The team leader is the surgeon. A decision on whether to cancel a case for whatever reason is made in consultation with the surgeon as much as

the whole team is informed on what is happening. In this study a cancellation was defined as any surgical procedure that appeared on the definitive theatre lists that was eventually not done on the day it was scheduled. This study aimed at determining the commonest causes of cancellation of elective surgery in our setup.

2.0 LITERATURE REVIEW

A new revised National Confidential Enquiry on Perioperative Deaths (NCEPOD) classification divides surgeries into 4 classes:¹⁷

Immediate – Divided into 2 groups: Lifesaving and other such as limb or organ saving surgery. Operation is done within minutes of decision to operate.

Urgent – Interventions for acute onset or clinical deterioration of potentially life threatening conditions, for those conditions that may threaten the survival of a limb or an organ. Operation is done within hours of decision to operate.

Expedited – Patient requiring early treatment where the condition is not an immediate threat to life, limb or organ survival. Normally surgery is done within days of decision to operate.

Elective – Planned or booked in advance of routine admission to hospital.

Performance of an elective surgical operation on schedule requires a complex process of logistics. For every patient that is listed to have a surgical intervention there is a significant amount of organization undertaken in readiness for their procedure to be performed. This include, the patient preparing him/herself for admission, the consultant taking time to review the patient, ward staff preparing the ward for the patient, theatre staff ensuring the correct surgical instruments are available.

Several study reports have shown that cancellations and delays of surgical procedures are quite common occurrences in hospital settings throughout the world. There is intense pressure and need for a better use of health resources worldwide. Hospitals are focusing on being cost effective and encouraging better use of the available resources. This has made it important to study problems such as cancellations of elective surgery as they have a huge impact on the cost

of healthcare. The rate of cancelled procedures is significant in reported studies and has important economic ramifications.^{1,2}

It has been shown that patients suffer economically when their scheduled operations are cancelled. The hospital also suffers an economic loss as the bed occupied by the patient is not available to other patients waiting for admission. Manpower (doctors, nurses, paramedics) also goes waste as the number of hours spent on the patient is lost. Theatre time also gets wasted where another surgery could have been scheduled. There is also increase in pre-operative rework with additional associated expenditure. Cancellations also have an impact on patient waiting lists. Therefore, last minute cancellation of operations is not an efficient use of resources and they result in loss of capacity

Patients are usually very apprehensive when they are informed that they have to undergo a surgical intervention as part of their treatment regime. They make specific plans in advance of their coming into hospital, for example, having to take time off work, organizing care arrangements for elderly relatives, organizing their own aftercare when they are discharged from hospital among others. These arrangements are therefore thrown into disarray when a patient has their operation cancelled at short notice. One study found that some patients expressed extreme negative feelings and some even shed tears while some concealed their sadness from their relatives.⁶²

Cancellation of elective surgery has also been reported to be quite costly.³ Fischer reported that almost 90% of operating room (OR) cancellations are on the day of surgery. These cancellations add an average of 97 minutes to the turnover time.⁴ OR time costs \$8.00/ minute, each of these potentially avoidable patient cancellations costs \$776 in OR time alone.⁵

The cost of healthcare delivery in Kenya is increasing every day. Unfortunately, the financial resources of our patients continue to dwindle due to current economic downturn. It has been said that a physician who refuses to examine the economic consequences of his/her medical practice does not protect the welfare of his/her patient.⁶ Hence there is need for the health care teams to encourage cost-effectiveness in every aspect of patient care. Avoidance of unnecessary cancellation of elective surgery, therefore, should lead to a reduction in the overall cost of treatment.

Incidence of Cancellation of elective surgery

The reported incidence of cancellation in different hospitals varies from 10-40%.^{8,15,18,19,20,21,22} with lower rates reported from highly developed countries and much higher rates from the developing world. The lack of standardized definition and classification probably underlies the relatively wide range of rates of cancellation reported in literature.

This may depend on the type of institution (local hospital versus tertiary referral centre dealing with complex patients), the type of surgery (where patient's co-morbidities may be associated with certain surgery types), the population served (its general level of health or fitness), and the healthcare system (e.g. public versus private, where patients make a more direct investment in their surgery).

Basson *et al* noted before their study that the Veterans Health Administration set 20% as the acceptable upper limit of cancellation.⁵¹ In New South Wales (Australia) the expected rate of cancellations is < 1.5%.⁵⁹ In UK rates of up to 10% seem to prevail.⁶⁰ However well-functioning theatre suites should have cancellation rates of less than 5%.⁶¹

It has been reported in some studies that more than 50% of cancellations could be prevented. One study in Spain showed that 57.1% of cancellations were preventable applying the correct measures.¹⁰ Another study in Australia estimated that 60% of elective procedures that were cancelled on the day of surgery were potentially avoidable.¹⁵

Large differences in rate of cancellation are also seen depending on whether the study is retrospective or prospective. Pollard showed a 6.6% cancellation rate in a retrospective study and a cancellation rate of 13% in a prospective study which was twice that seen in the retrospective study.²⁴ The difference between retrospective and prospective studies can also be quite large. This should be kept in mind while doing similar audits.

Common Reasons for Cancellation Surgery

There are conflicting reports on the commonest reasons for cancellation of elective surgery. However, lack of theatre time, lack of recovery room beds, administrative/logistic issues, absenteeism of patients, patients clinical change and improper patient preparation are the most commonly identified reasons for surgery cancellation.^{23,25,26,27,28,29.}

Cancellation by service also depends on different hospitals. Some specialties of surgery have a higher cancellation rate than others. One study at a Spanish General Hospital found out that the four specialties; general surgery(22.7%), orthopaedics and trauma(18.4%), ophthalmology(15.3%) and otorhinolaryngology) accounted for 75% of the interventions and 71% of the cancellations.²⁶ A trend also seen at King Khalid University Hospital.²⁸

Definitions

Case cancellation is a vague term that includes a lot of different entities. On any given day, Operating Room (OR) cancellations can occur at several time points.⁷

- Before the patient even arrives at the facility (patient/guardian refuses, patient nonappearance).
- When the patient is at the hospital (a full intensive care unit, imaging equipment unavailable, case overruns, no OR staff, or emergency case supersedes the elective schedule).
- When the patient is already in the OR (sudden drug allergy, can't intubate the patient, complication with line placement, or wound infection discovered after patient is in the room).

This categorization broadly caters for the many various operative definitions of theatre cancellation which basically define the non execution of a scheduled surgical procedure as a cancellation.⁸⁻¹⁵ Various combinations of these reasons have been adopted by other working groups showing the importance attached to operation cancellations.

However there is no standard classification system. Unless a predetermined and accepted classification system is used cancellation data obtained from administrative databases may not provide enough meaningful explanation to understand root causes. In this study a cancellation will be defined as any operation that is on the definitive theatre list that is subsequently not done.

The following are examples of classification of reasons for cancellations of elective surgery that have been adopted by various groups.

Table 1: VHA and Seim *et al* classification systems

1)VHA Classification system ⁵⁸	2)Classification by Seim <i>et al</i> ¹⁶
Patient reasons	Patient
Facility reasons	Capacity constraints
Work-up reasons	Work-up reasons
Anaesthesia reasons	Required specialized personnel
Surgeon reasons	

Table 2: The Modernization Agency's Theatre Programme classification.¹¹

Hospital Non-clinical	Hospital clinical	Patient
Ward beds unavailable	Operation not necessary	Patient did not arrive
Consultant unavailable	Pre -op guidance not followed	Operation not required
Emergency and trauma	Patient arrived with illness	Patient unfit for surgery
List overrun / lack of time	Pre-existing medical condition	Appointment Inconvenient
Equipment failure/unavailable		
ICU/HDU beds unavailable		
Administrative error		

Hospital non clinical factors:

Ward beds Unavailable

Several studies have demonstrated that there is no clinical reason for not admitting on the same day as surgery in elective surgery, except in a few cases.³⁴ Traditionally, all surgical patients were hospitalized at least one day prior to surgery for being clerked, investigated and evaluated by the anaesthesiologist.³⁰ At the moment, the preoperative anaesthetic assessment is performed in an outpatient visit and usually when the patient that is admitted to the hospital is waiting for a surgical procedure.

Only a few cases require specific preoperative arrangements for surgery that recommend an admission the day before the intervention. However, there still are admissions the day before in order to avoid cancellations due to the lack of ward beds or to avoid delays in going to the theatre for procedures slated earlier in the day.³⁵

Lack of post operative beds has been cited as a major cause of cancellation of elective surgery in various studies.^{15,29} The way hospital beds are managed affects the way other departments such as operating theatres and emergency department perform since they are dependent on bed availability.³¹ In turn, these other hospital departments have an impact on bed usage.³² Departments that are run inefficiently can lengthen hospital stays and use beds unnecessarily.³³

Consultant Availability

Unavailability of consultants may also lead to cancellations. This involves both surgical and anaesthesia consultants. Surgeons are team leaders in theatre and their role is critical. If a surgeon is not available for whatever reason then surgery may be cancelled. This also applies the anaesthetists. Every major surgery requires anaesthetists to be present to administer anaesthesia as well as monitor patients till surgery is over. Similarly lack of anaesthetists may lead to cancellation of surgery. In one study it was established that a resident doctors' industrial action and unavailability of key members of the surgical team contributed to 4.04% and 1.84% of cancellations respectively.³⁶

Emergencies / trauma

Emergency and trauma may also cause cancellations of elective surgery. Emergency cases are given priority over elective surgery especially in hospitals where there are no designated emergency theatres. In theatres where ring fencing is practiced, the problem is not so rampant. Ring fencing is defined as separating elective from emergency operations in parallel hospital production lines and it has been used to enhance efficiency of operating rooms.³⁷

Lack of theatre time

Theatre room utilization is increasingly important to hospitals in general. Although private sector medicine differs organizationally and financially from the public sector, they both share the challenge of increasing cost and decreasing revenue. Surgical downtime that may result from cancelled operations may lead to theatre room staff working overtime to clear the other cases and this may be costly for theatres. This unproductive unscheduled downtime in the theatre room entails fixed cost which is not offset by net revenues.⁵¹

Lack of theatre time has also been cited as one of the commonest causes of cancellation of surgical procedures.^{23,38,26,37,50} Inefficient utilization of theatre room is mainly caused by late starts, high change-over times and overrunning of cases. Overrunning of cases refers to cases extending beyond the anticipated time they were allocated for surgery. This may be due to unanticipated problems encountered intra-operatively. This may lead to cancellation of other subsequent cases because there isn't sufficient time to complete these cases. However, despite best efforts at standardization, it is simply not possible to predict which patients or staff will arrive late, which patients may have their cases cancelled for medical or other reasons, precisely how long a case will take to perform, or what unexpected problems may delay care or room turnover.⁵¹

It is possible that overbooked theatre lists leading to over-running are managed differently in some hospitals (where staff are employed on contracts of fixed working hours), as compared to institutions where salaries are more directly related to variable hours of work.^{39,40} In the former, there may be no financial incentive for staff to stay late to undertake extra cases (and hence over-

running lists are curtailed by cancellation). In the latter, 'overtime' payments may offer some incentive to prevent cancellation, but the overall costs to the institution may be very high if overbooking is common.²⁶

Equipment failure / unavailable

This is a common problem especially in developing countries where equipment is unavailable or often breakdown due to poor maintenance. This is mainly due to the high cost of maintenance as well as buying new equipment. In one study, unavailability of linen and/or equipment failure resulted in 14% of cancellations.²⁹

Theatre staff unavailable

Theatre staff unavailability may also lead to cancellation of surgery. In some hospitals there is shortage of human resource mainly due to the high cost of paying them. In one study unavailability of nurses accounted for 11% of the cancellations respectively.²⁹ Efforts should be made to prevent cancellation of elective surgery by careful planning, bearing in mind the local constraints in human and material resources. There is no point in preparing an operation list, which the available manpower and logistics cannot accomplish.

ICU / HDU beds unavailable

Some operations need a guarantee of the availability of a bed in ICU/HDU before the operation is done. In many hospitals ICU/HDU beds are very few, in high demand and require disproportionately high resources to establish and maintain. In one study 35% of booked cases were postponed due to lack of ICU beds.⁴⁹

Administrative/Logistic errors

Scheduling of patients is one area of administrative errors that commonly leads to cancellation of elective surgery. A review of operating room cancellations done in various studies revealed that over 40% of their cancellations were as a result of administrative reasons.^{41,42}

Overbooking results from poor scheduling techniques. Surgeons commonly underestimate the time required to perform some operations. This results in lists overrunning and eventually some cases being cancelled. This emphasizes the importance of analyzing theatre efficiency, especially when due to over-booking and theatre over-utilization to prevent cancellation.

Hospital clinical factors:

Operation not necessary

Some surgeries may be cancelled because they are no longer necessary. The surgeon may change the management of a patient at the last minute. In some patients there may be no benefit from surgery. If this is realized late then it may not be possible to fill the blank slot.

Pre-operative guidance not followed

There is currently intense pressure on hospitals to be more efficient. The timing of the preanaesthesia assessment may influence the cancellation rate on the day of surgery. Although early outpatient preoperative evaluation has been advocated, in clinical practice, preoperative evaluation on the day of surgery or the day before surgery is common. Many surgical procedures are delayed or cancelled due to inadequate preoperative assessment and preparation.²⁹

Pollard in 1999 reported that operating room cancellation rate of patients evaluated within 24 hours of surgery is similar to those who are seen 2-30 days before surgery. Both groups had similar rates. However, outpatient clinics may be seen as a convenient time without adversely affecting operating room cancellations.²⁴

Preanaesthesia evaluation

This is the process of clinical assessment that precedes the delivery of anaesthesia care for surgery and nonsurgical procedures. At a minimum, it includes an interview and examination of the patient, a review of previous medical, surgical and anaesthesia problems, a detailed account of current medication use, and provisions for obtaining and reviewing preoperative tests. Preanaesthesia evaluation is the responsibility of the anaesthetist.

The goals are: to reduce the morbidity of surgery, increase the quality but decrease the cost of perioperative care, and return the patient to desirable functioning as quickly as possible. With the current emphasis on cost-effectiveness, reduction in surgical delays and case cancellations are two of the most important goals of the preanaesthesia evaluation process. There is a need to discuss planning and risk of anaesthesia with the patient and surgeon during pre anaesthetic review.

Patient arrived with illness

Acute medical conditions are a common cause of cancellation of surgery. Infections (mainly upper respiratory tract) are responsible for cancellation especially in children presenting for ENT surgery. This is likely inevitable particularly during the cold months.^{10,26}

Pre-existing medical condition

If a patient has a coexisting medical condition which may affect outcome adversely if not under optimum control, there is a strong argument to postpone non urgent surgery until further specialized advice has been sought. Medical causes have been cited to be some of the commonest causes for elective surgery cancellations. Some patients have associated comorbidities. There may be a change in the preexisting medical condition before surgery. The most common conditions that cause cancellation of elective surgery include hypertension and infections.^{26,43,44}

Other medical conditions that may cause cancellation of elective surgery include severe anaemia, acute and chronic renal failure, endocrine conditions like uncontrolled diabetes mellitus, thyrotoxicosis, pheochromocytoma among others.

Although some authors appear to dissent most studies confirm that pre-anaesthetic assessment reduces the cancellation rate.⁴⁵ Rai and Pandit reported halving of the cancellation rate, but theirs was a dedicated short-stay elective surgical unit, with certain constraints on the type of patient admitted.⁸ It has been independently observed that patients with a lower ASA grade suffer less cancellation¹³

Patient Factors:

Patient did not arrive

It is speculated that where care is free at point of care, non-attendance may be higher than where a fee-for-service system prevails. However, there is no data to support this speculation. In some hospitals, the admissions service reminds patients by telephone 10 days before their operation and again 2 days before surgery. The patient is asked to notify the hospital if they cannot attend, but clearly this is not fail-safe. In addition these patients who fail to attend may prevent other deserving patients to be put on a surgical list as the surgical slots are not unlimited and many surgeons do have patients on waiting lists.

A study done in Spain showed that absenteeism of patients accounted for 22.2% of the cancellations. This was related to specific troubles associated with family, workplace or personal change of mind about the decision to be operated on.¹⁰ It is thought that patient cancellations would decrease even more if public oriented campaigns based on the real cost of health delivery systems and on the limits of economic resources were applied in countries where healthcare is free.¹⁰

Financial constraints may also have an effect on patients not showing up for surgery as they 'shop-around' to find a less expensive place.⁴⁶ Inconvenient appointments may also increase the number of patients who don't show up for surgery. It's therefore important to liaise with patients during scheduling to get the most convenient appointment for the patient as well as the hospital. Some patients may also be too sick to come to hospital for surgery whereas others may also change their minds and refuse programming or to consent for surgery.^{10,46}

Pre operative instructions not followed

Non compliance to pre operative instructions has also been identified as a common reason for cancellation of elective surgery. A study done in Pakistan showed that failure to comply to pre operative instructions accounted for 5.4% of the cancellations.⁴⁶ This may be due to failure of

the patient to follow instructions properly or due to the fact that instructions were not issued correctly.

Tackling Cancelled Operations

Cancelled operations are a waste of resources and time. They bring the additional administrative burden of re-scheduling appointments or a blank theatre slot. They are distressing and inconvenient for patients, and when the patients themselves cancel operations, they can also be problematic for the hospital. Identifying the different types of cancellations, understanding the reasons and then tackling them appropriately, improves the throughput of patients.

It has been suggested that with effective management, the only day-of-surgery cancellations should be occasional patients with an acute change of their medical condition. However, managing elective surgery more efficiently requires a well thought out management system with quarantining resources to ensure patient flow.³⁰

Patient care should be hospital driven and patients not admitted unless they are on a clinical pathway. Ryan *et al* suggested protocols which include compulsory pre-admission and pre-anaesthetic assessment, careful construction of lists matching patients to available beds and operating room slots and a guarantee that elective procedures will not be cancelled. Patient flows are predetermined, with a staged recovery process. It is demonstrated that this model does not lead to significant increases in admission rate, nor does it significantly affect community services and is suitable for about 80% of patients requiring elective surgery.⁴⁷ Theatre quality-maintenance systems will therefore need built-in procedures for providing random episodes of independent, in-depth, monitoring.

JUSTIFICATION OF THE STUDY

The purpose of this study was to determine the incidence, causes and pattern of cancellation of elective surgery in Kenyatta National Hospital. Cancellation of elective surgical procedures is a common finding in hospital settings world over and they are not unique to KNH. Many reports have shown the negative impacts of cancellations on loss of operating room time and additional costs for the hospitals besides inconvenience to patients and their families. Cancellations also increase the duration of hospitalization and have an impact on waiting lists.

This study was to show the cancellation rates for elective surgery in KNH. There is no such study done at KNH yet. This study was therefore also to form as baseline study upon which other studies can be done. Sudden cancellation of elective surgery is a measure of quality patient care and quality management system. A significant cancellation rate is therefore a sign of inefficiency on the part of the surgical team.

This study was also to identify the commonest reasons for cancellation of elective surgery in KNH. It will, therefore, assist in making appropriate recommendations on how to address the common causes of cancellations of elective surgery. These pitfalls can then be addressed by the hospital. This may eventually reduce cancellations and enhance operating room efficiency. This may, therefore, minimize wastage of limited resources and manpower.

Enhanced efficiency will ensure that more patients are operated. This will lead to reduced costs of running the hospital by reducing overtime payments, reducing wastage of resources as well as reducing unnecessary bed occupancy. There will also be reduced costs and inconvenience to the patients eventually leading to patient satisfaction.

OBJECTIVE OF THE STUDY

Study Question

What are the commonest reasons for cancellation of elective inpatient surgery at Kenyatta National Hospital?

Broad Objective;

To determine the cancellation rates, the pattern of cancellation and the commonest reasons for cancellation of elective surgery at KNH.

Specific Objectives;

- ❖ To determine the cancellation rates for elective surgery at KNH
- ❖ To determine the pattern of cancellation of elective surgery among surgical specialties at KNH
- ❖ To determine the common reasons for cancellation of elective surgery at KNH

METHODOLOGY

Study Design

This was a prospective observational study that involved completion of a predesigned form accompanied by a cover letter and a consent form.

Study area / Site

KNH is the largest National Referral and Teaching Hospital in Kenya. The main study area was the main theatre suite which has twelve theatres. One of the theatres in the main theatre is an emergency theatre and the other eleven are elective surgery theatres. The emergency theatre was excluded from the study. Data was also collected from the other satellite theatres where elective surgeries are done. That included maternity theatre, burns unit and ENT theatres.

Study Population

Patients scheduled for elective inpatient surgery at KNH.

Sample size

Approximately 13, 000 elective surgery operations are done per year in KNH as per the theatre records for the year 2010. There was no study done at KNH showing the prevalence of cancellation but from literature the prevalence of cancellation of elective surgery averages approximately 25%.

The fisher's formula was used to determine the sample size in this study.⁵⁷

$$n = z^2 pq/d^2$$

Where,

n= minimum sample size (if the target population is more than 10,000)

z= units of standard normal deviation corresponding to 95% confidence interval (usually, 1.96)

p= prevalence of the characteristic being studied

q= prevalence of the population without the characteristic being studied (i.e. 1-p)

d= Error margin (usually 5/100), which is 0.05.

$$n = (1.96)^2 \times 0.25 \times 0.75 / (0.05)$$

$$n = 0.72 / 0.0025$$

$$n = 288$$

To improve the power of the study, 10% was be added to the sample size.

Therefore the desired sample size for this study was 317.

Sampling

Study subjects were recruited by consecutive sampling method.

Inclusion criteria

Patients whose names appeared on the definitive theatre lists for elective surgery whose surgery was cancelled.

Exclusion Criteria

Patients undergoing emergency surgery.

Patients undergoing day case / ambulatory surgery in the minor satellite theatres.

Study method

After approval by the KNH/UON ethics and research committee, a data collection form was given to a research assistant daily. He/she was required to fill the data collection form for every operation that was cancelled. The record included patient's age, gender, date, serial number, diagnosis, theatre, specialty of surgery, type of operation as well as the reason for cancellation.

All forms were collected at the end of each day and checked for completeness. A record of all scheduled operations was obtained from theatre lists from the theatre records office at the end of each day. The data was then coded and analyzed using Statistical Package for Social Sciences (SPSS) version 11.5 and results presented in form of charts, tables, graphs and prose.

CHALLENGES

Difficulty in verification of the reasons given for cancellation of surgery and poor documentation or record keeping of reasons for cancellation of surgery.

BIAS MINIMIZATION

Information bias:

This was minimized by ensuring that the correct reason for cancellation is entered in the data collecting form and this was compared with the data collected by the hospital staff for monthly reports to ensure accuracy. The data collection form was simple and clear and only a few individuals were required to fill it.

Ethical considerations

1. The nature of the study was explained to the participants and informed consent was obtained.
2. The study had no harmful effects on the participants.
3. The study did not have any cost implications on the participants.
4. Utmost confidentiality was maintained.
5. Permission was sought from Kenyatta National Hospital and University of Nairobi Ethics and Research Committee.
6. Study findings will be availed to the Ethics Committee of KNH as well as The University of Nairobi.

RESULTS:

This study was conducted for a period of six weeks from 11th July 2011 to 22nd August 2011. A list of all patients booked for surgery was compiled during the study period. A form was also filled for all patients whose surgery was cancelled. A cancellation was defined as an operation that appeared on the definitive theatre list that was subsequently not performed. A total of 1,547 patients were booked for surgery during the study period. Out of these a total of 318 patients whose surgery was cancelled were enrolled to the study.

The figure below shows the age distribution of the patients whose surgery was cancelled during the study period.

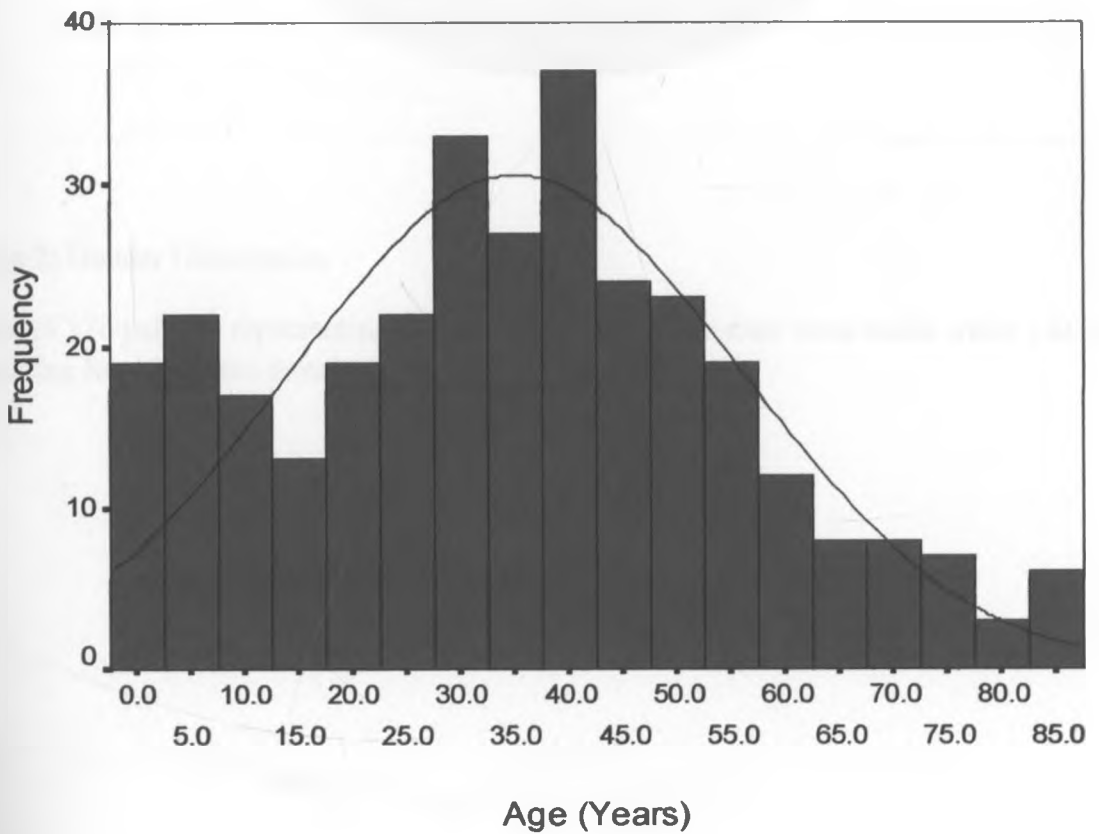


Figure1: Age Distribution in years. The average age of patients whose surgery was cancelled was 35 years with a range of between four months and 85 years.

The following figure shows the gender distribution of the patients whose surgery was cancelled.

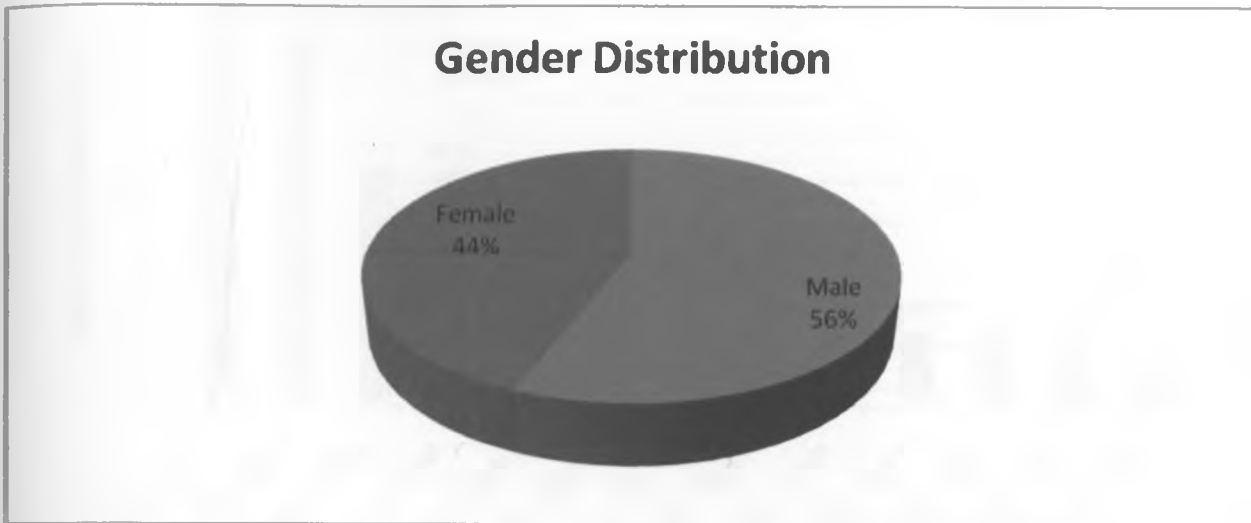


Figure 2: Gender Distribution.

A total of 178 patients representing 56% of the sample population were males while 140 patients accounting for 44% were females.

The figure below shows patients booked for elective inpatient surgery per surgical specialty.

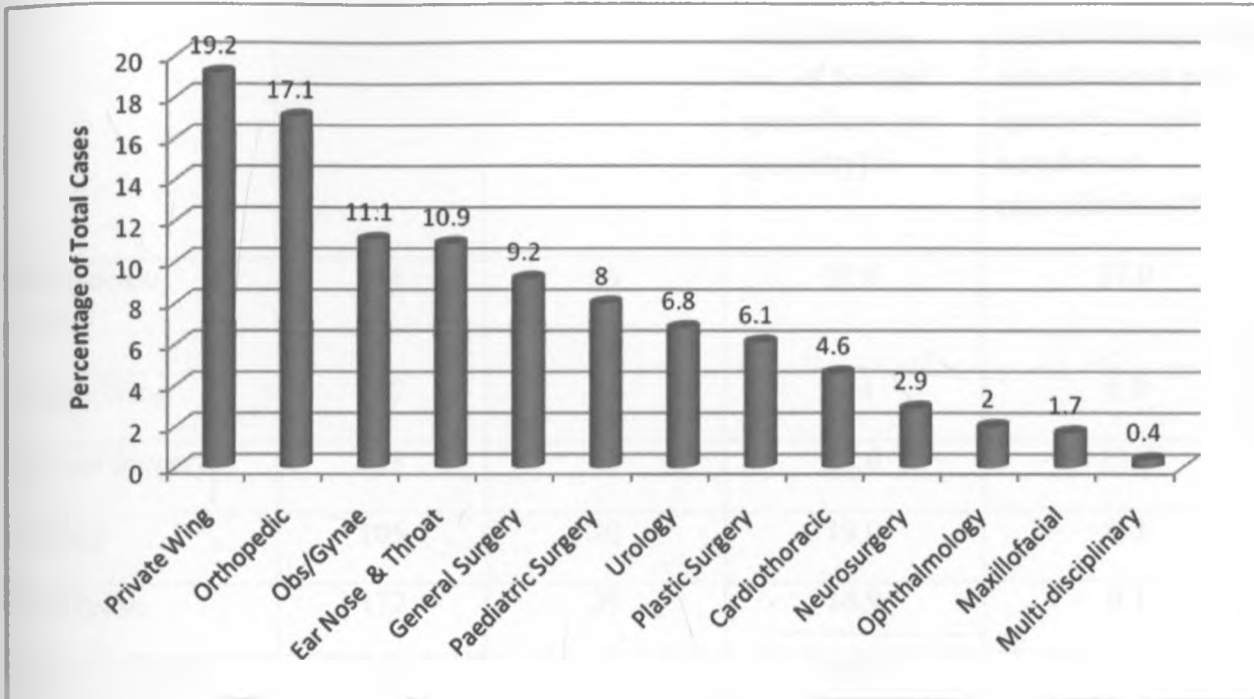


Figure 3: Theatre bookings for elective surgery per surgical specialty.

Orthopaedic surgery (17.1%) had the highest number of patients booked for surgery among the surgical specialties followed by obstetrics and gynaecology (11.1%), ENT (10.9%) and general surgery (9.2%). Private wing (19.2%) had a high number of patients scheduled but these patients were all put together as private patients and not divided into the different surgical specialties. Paediatric surgery (8%) was the fourth in bookings followed by urology (6.8%) and plastic surgery (6.1%). Cardiothoracic surgery booked 4.6% of the patients while neurosurgery and ophthalmology each booked 2.9% and 2% respectively. Maxillofacial surgery and multidisciplinary had the lowest number of patients booked for surgery 1.7% and 0.4% respectively. Multidisciplinary surgery is performed by a team from various surgical disciplines including maxillofacial surgery, plastic surgery, ENT, neurosurgery, vascular surgery among others depending on the pathology.

Table 3: Cancellation rates and contribution to cancellations per surgical specialty.

Surgical Specialty	Booked operations	Cancelled operations	Cancellation rate(no. of cancellations /no. of booked operations per specialty)%	Contribution to total cancellations(no.of cancellations per specialty/ total number of cancellations)%
Orthopaedic surgery	264	86	32.6	27.0
Private Wing	297	19	6.4	6.0
General Surgery	143	40	28.0	12.6
Urology	105	20	19.0	6.3
Obs/Gynae	172	29	16.9	9.1
Ophthalmology	31	4	12.9	1.3
Cardiothoracic	71	27	38.0	8.5
Paediatric surgery	123	27	22.0	8.5
Plastic Surgery	95	18	18.9	5.7
ENT	169	26	15.4	8.2
Neurosurgery	45	17	37.8	5.3
Maxillofacial	26	5	19.2	1.6
Multidisciplinary	6	0	0.0	0.0
Total	1547	318	20.6	100

The table above shows a total of 1,547 patients who were booked for surgery during the study period. Out of these 318 patients were cancelled. The cancellation rate was 20.6%.

The following figure shows the cancellation rate per surgical specialty.

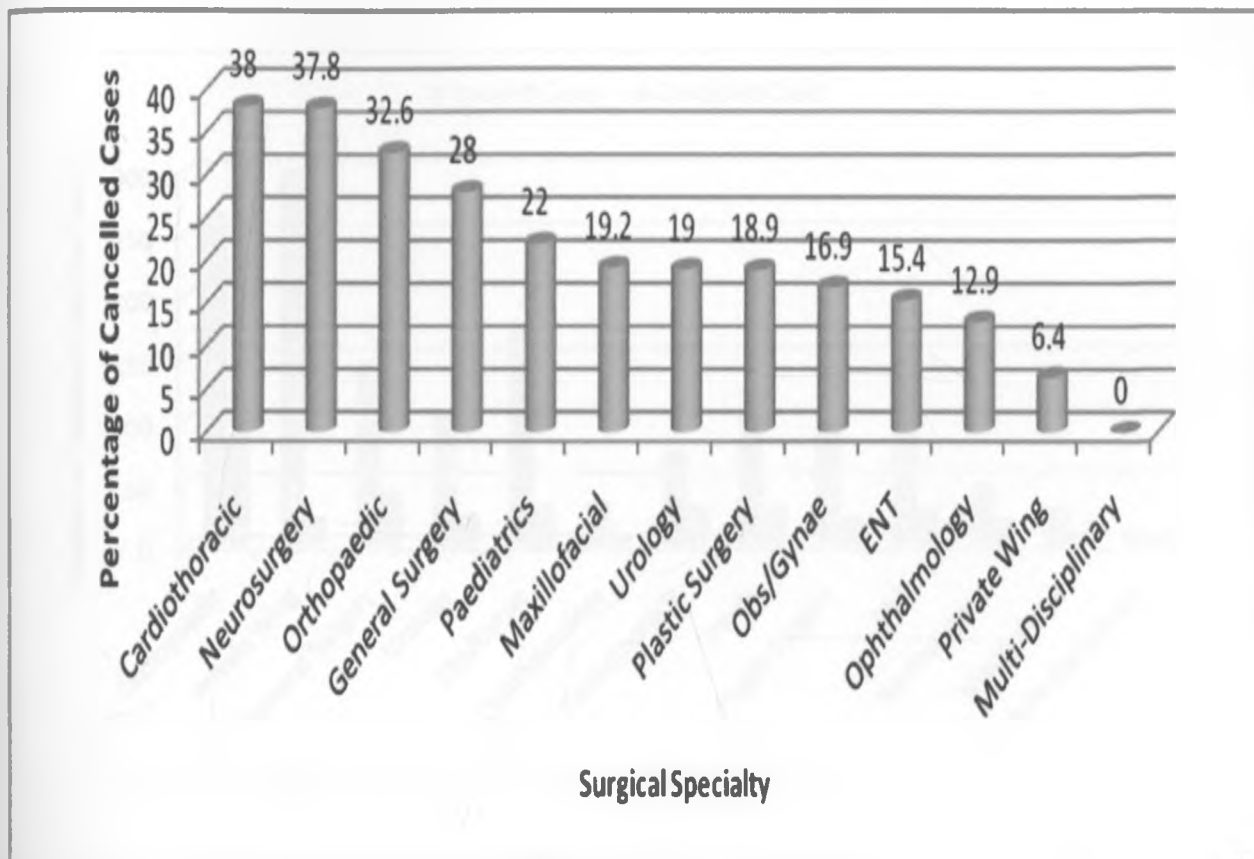


Figure 4: Cancellation rate per surgical specialty.

Cardiothoracic surgery had the highest cancellation rate (38%), 27 out of 71 booked patients were cancelled. Neurosurgery had 45 patients booked out of which 17 were cancelled (37.8%). Orthopaedic surgery had the third highest cancellation rate with 86 patients of the 264 patients booked for surgery cancelled (32.6%). General surgery had a cancellation rate of 28% while paediatric surgery and maxillofacial surgery had a cancellation rate of 22% and 19.2% respectively. Urology had a cancellation rate of 19%, obstetrics and gynaecology (16.9%) while ENT had a 15.4% cancellation rate. Ophthalmology cancelled 12.9% of booked patients while private wing had only a 6.4% cancellation. Multidisciplinary did not have any cancellations though it had only six patients booked.

The following figure shows a comparison between booked and cancelled cases per surgical specialty.

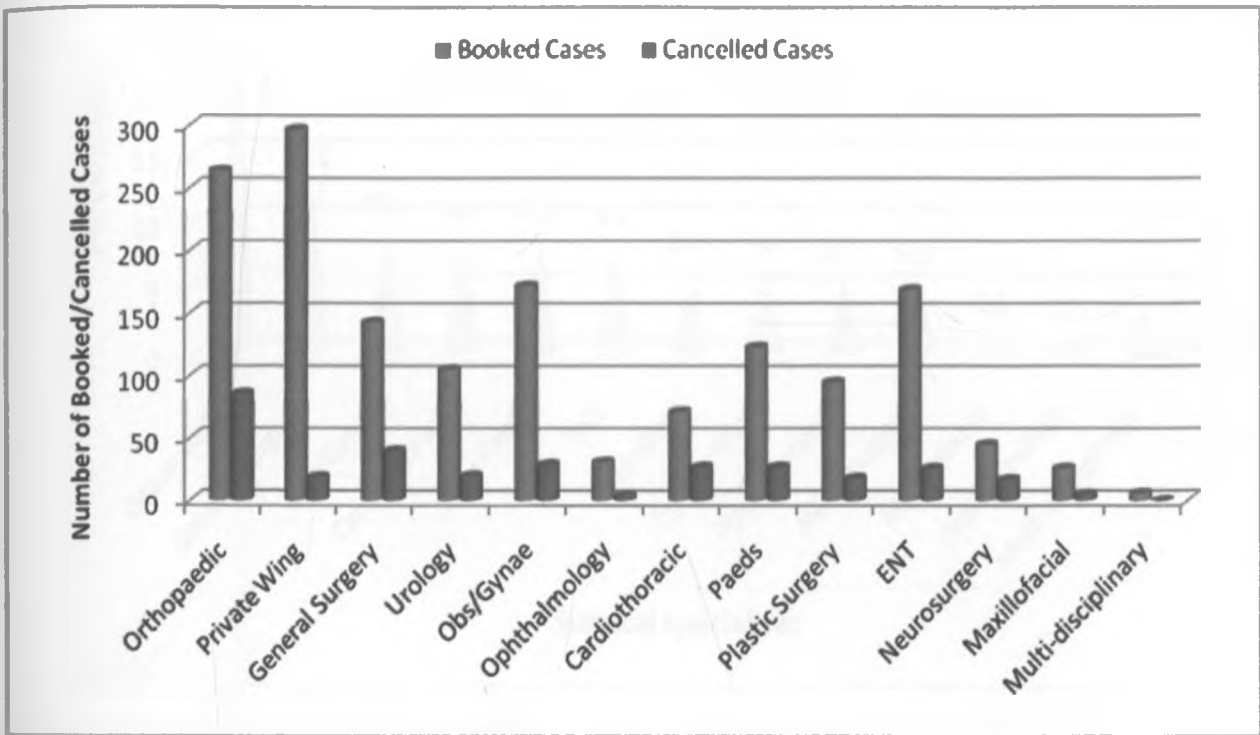


Figure 5: Comparison of booked and cancelled operations per surgical specialty.

Orthopaedic surgery cancelled 86 of the 264 patients booked (32.6%) while private wing cancelled 19 of the 297 patients booked (6.4%). General surgery had 40 of the 143 patients cancelled (28%) while 20 patients were cancelled in urology (19%) and 29 of 172 patients in obstetrics and gynaecology were also cancelled (16.9%). A total of 4 patients of the 31 patients were cancelled in ophthalmology (19.5%) while 27 of the 71 patients booked in cardiothoracic surgery (38%) were also cancelled. In paediatric surgery 27 patients of the 127 patients were cancelled (22%) while 26 of the 169 booked in ENT (15.4%) and 18 of the 95 patients were also cancelled in plastic surgery (18.9%).

The following figure shows the contribution to the total cancellations per surgical specialty.

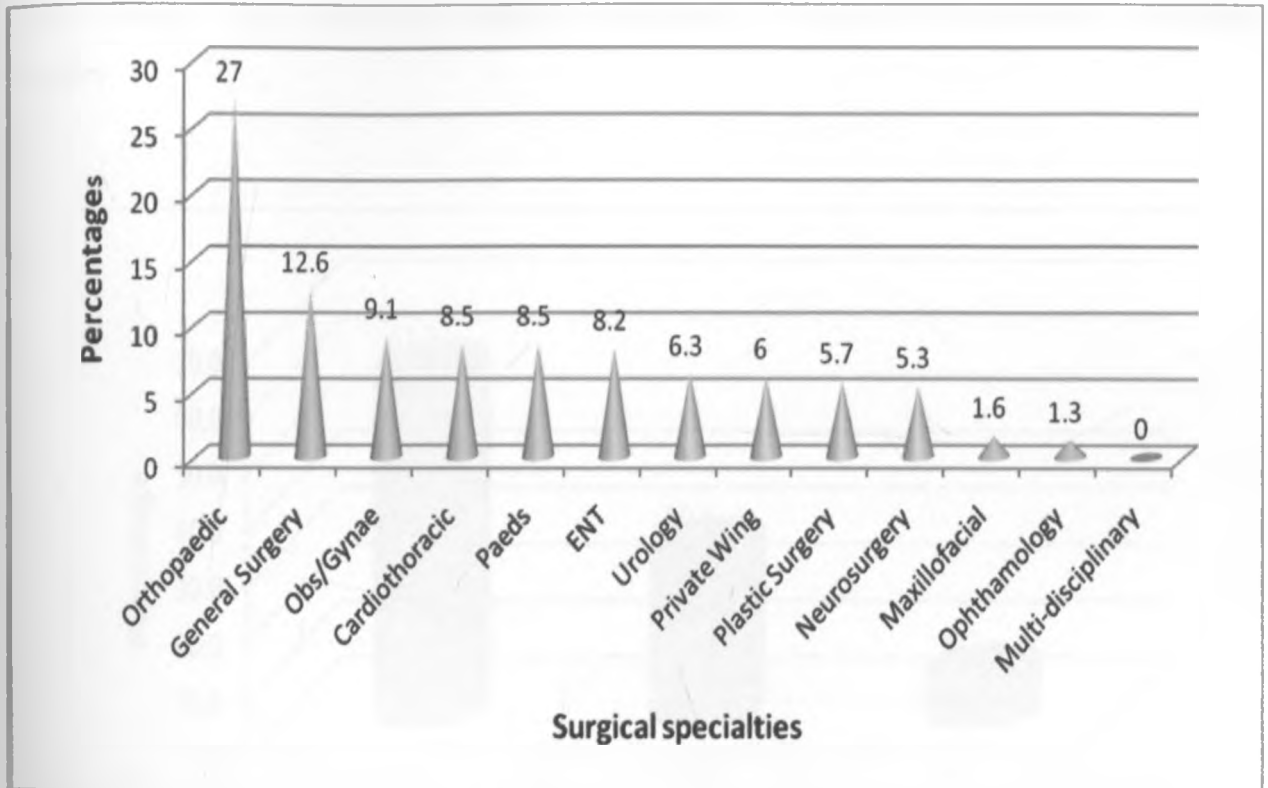


Figure 6: Contribution to total cancellations per surgical specialty.

A total of 86 patients were cancelled in orthopaedic surgery accounting for 27% of all the cancellations followed by General surgery where 40 patients were cancelled accounting for 12.6% of the cancellations. A total of 29 patients were cancelled in obstetrics and gynaecology representing 9.1% while 27 patients were cancelled in cardiothoracic surgery and paediatric surgery accounting 8.5% each. In ENT 26 patients were cancelled while 20 patients were cancelled in urology accounting for 8.2% and 6.3% respectively. Plastic surgery cancelled 18 patients while Neurosurgery cancelled 17 patients representing 5.7% and 5.3% respectively. Private wing only had 19 (6%) patients cancelled despite being the leading in bookings. Maxillofacial and ophthalmology had the lowest number of cancellations with 5 (1.6%) and 4 (1.3%) patients cancelled respectively.

The following figure shows the different categories of reasons for cancellation of elective surgery.

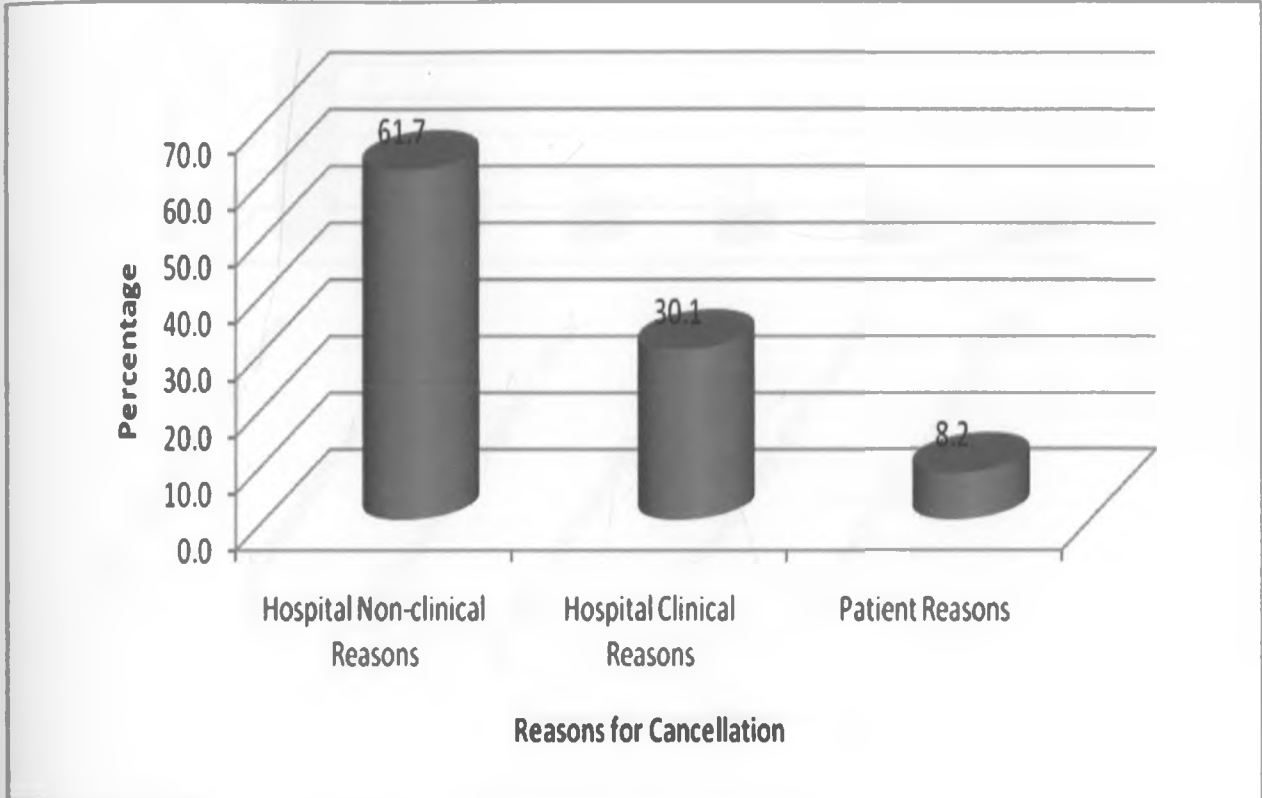


Figure 7: Reasons for cancellation of elective surgery.

A total of 203 (61.7%) patients were cancelled due to hospital non clinical reasons while 99 (30.1%) patients were cancelled due hospital clinical reasons. A further 27 (8.2%) patients were cancelled due to patient reasons.

The following figure shows the hospital non clinical reasons for cancellation of elective surgery.

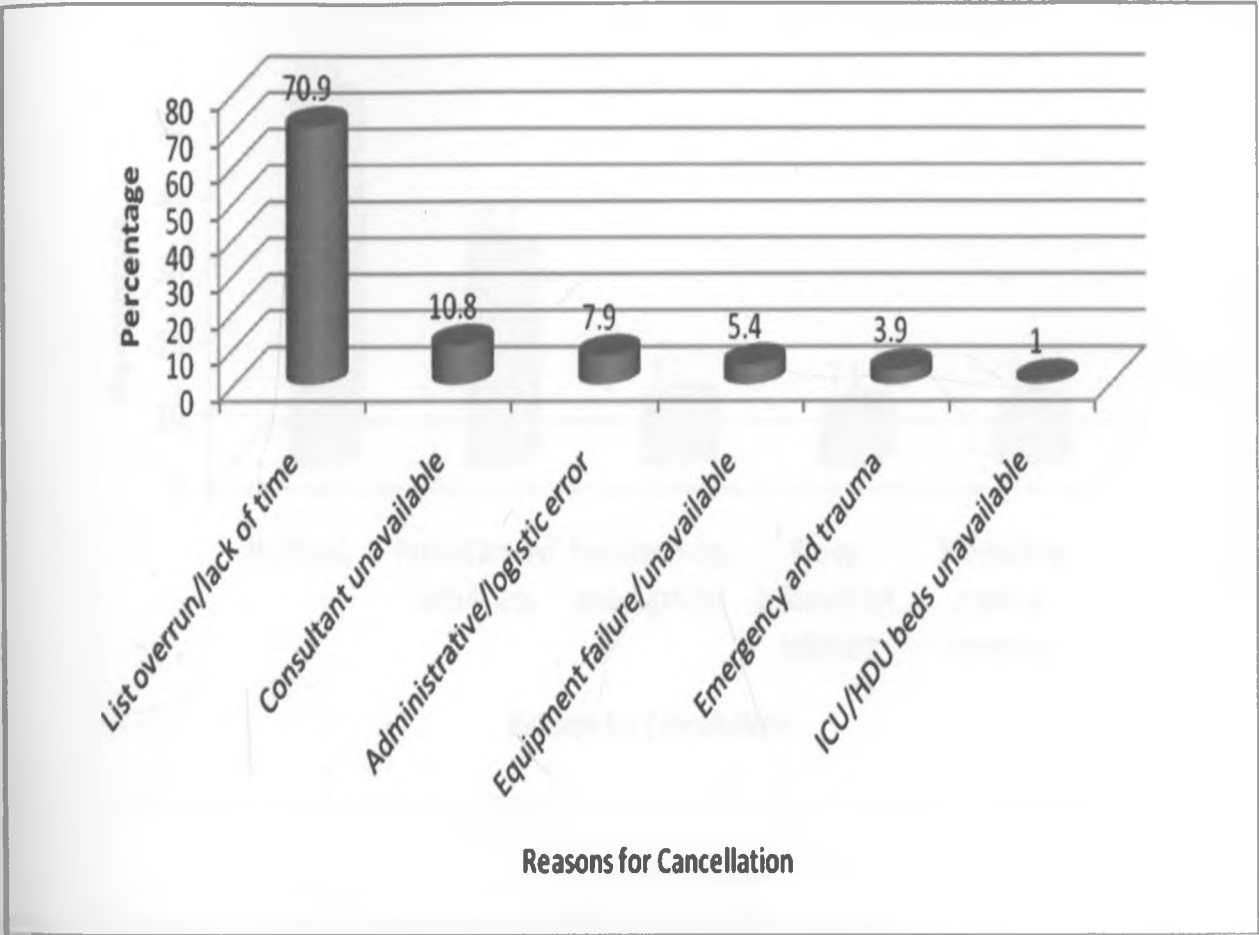


Figure 8: Hospital non clinical reasons for cancellation of elective surgery.

A total of 144 patients were cancelled due to lack of theatre time accounting for 70.9% of hospital non clinical reasons. Other 22 (10.8%) were cancelled due to lack of a consultant whereas a further 16 (7.9%) were cancelled due to administrative/logistic errors. Another 11 (5.4%) were also cancelled due to equipment failure or unavailability. Emergency and trauma caused cancellation of 8 patients while lack of ICU/HDU beds accounted for cancellation of 2 patients accounting for 3.9% and 1% of the hospital non clinical reasons respectively.

The following figure shows the hospital clinical reasons for cancellation of elective surgery.

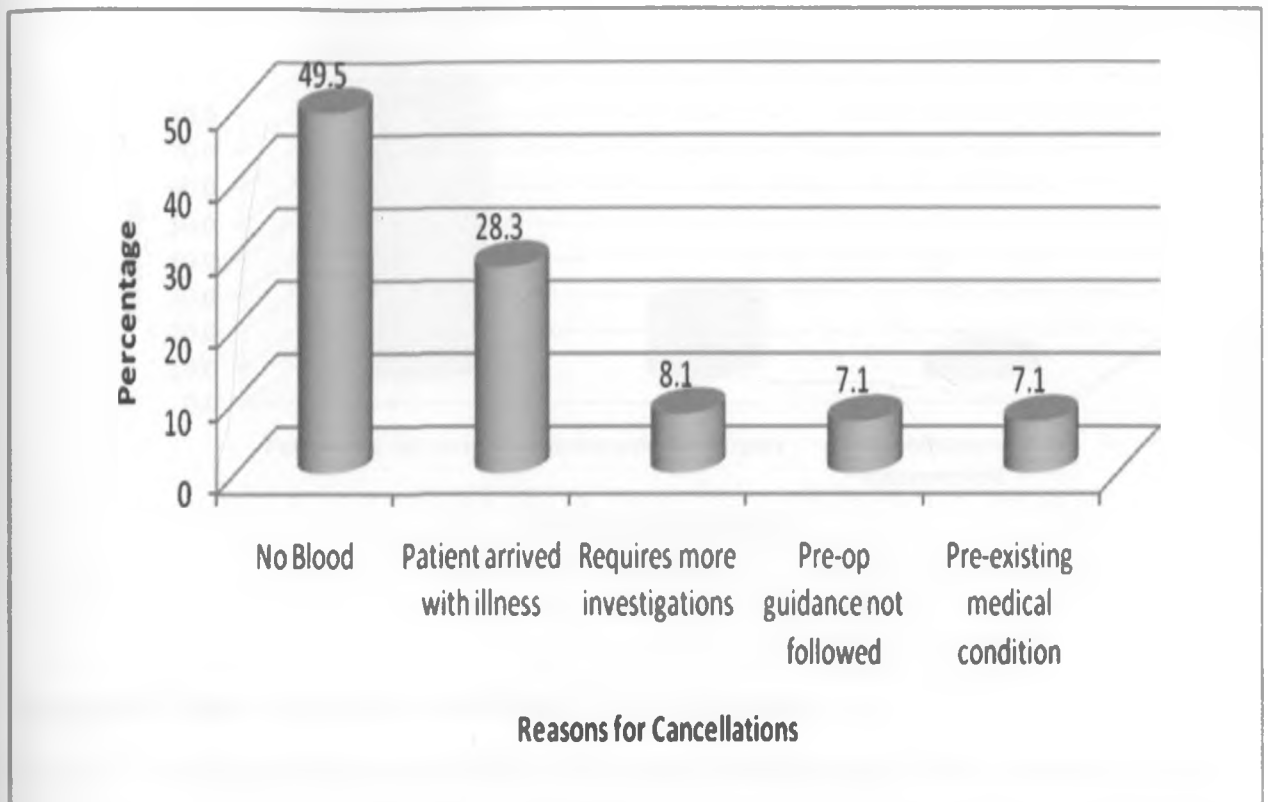


Figure 9: Hospital clinical reasons for cancellation of elective surgery.

A total of 49 patients were cancelled due to lack of blood accounting for 49.5% of the hospital clinical reasons. Other 28 patients were cancelled due various illnesses accounting for 28.3%. Of these patients, 18 had anaemia while the other 10 patients had commonly Upper respiratory tract infections (URTI) and Pneumonia. About 8 patients required further investigations accounting for 8.1% of the cancellations in this category. A further 7 patients had a pre existing medical condition which worsened and another 7 did not follow pre operative instructions accounting for 7.1% of the hospital clinical reasons each. The commonest pre-existing medical condition was uncontrolled hypertension.

The following figure shows the patient reasons for cancellation of elective surgery.

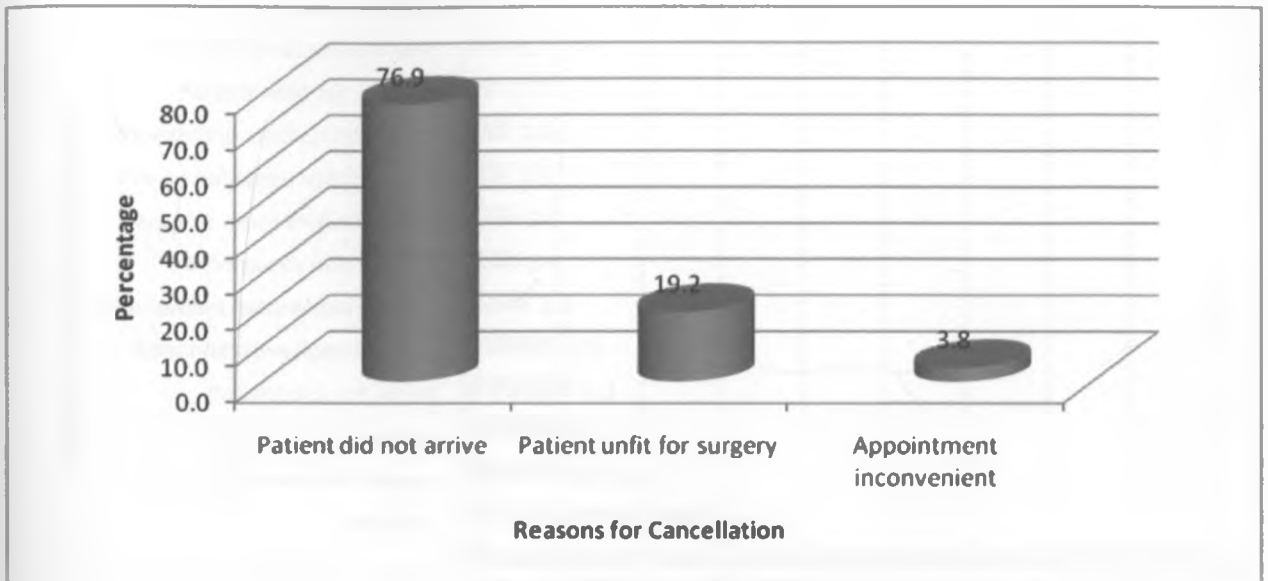


Figure 10: Patient reasons for cancellation of elective surgery.

A total of 20 patients did not arrive for their surgery representing 76.9% of patient reasons. A further 5 patients were unfit for surgery and two had an inconvenient appointment accounting for 19.2% and 3.8% of patient reasons respectively. One of the patients who had an inconvenient appointment was a student who had exams on the same day of surgery and therefore arrived late for surgery which was cancelled.

The following figure shows a comparison of specific reasons for cancellation of elective surgery.

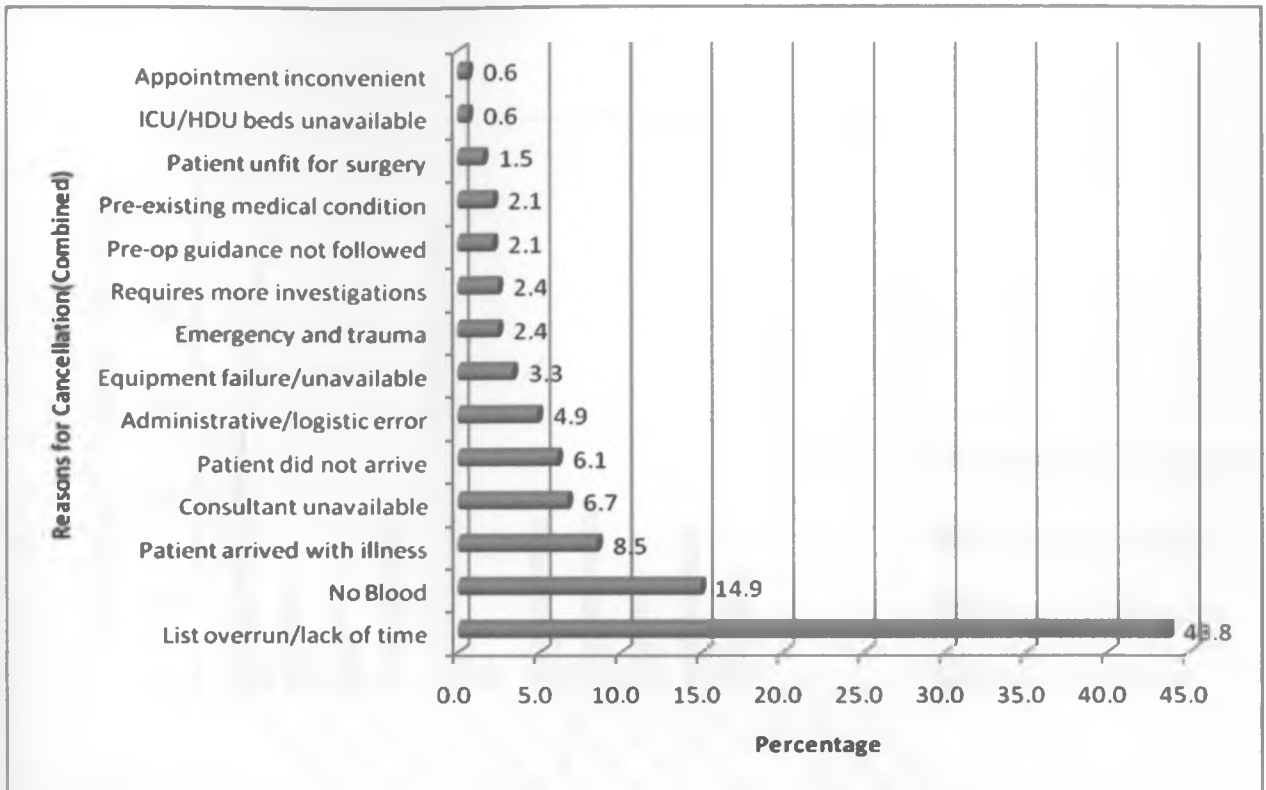


Figure 11: Comparison of specific reasons for cancellation of elective surgery.

A total of 144 patients were cancelled due to lack of time accounting for 43.8% of all cases that were cancelled. Other 49 patients were cancelled due to lack of blood also accounting for 14.9% of all cancelled cases. A total of 28 patients were cancelled due to various illnesses accounting for 8.5% of which 18 had anaemia. 22 patients were cancelled due to a consultant not being available and 20 patients due to failure to arrive for surgery accounting for 6.7% and 6.1% of all patients cancelled. A further 16 patients were cancelled due administrative/logistic errors accounting for 4.9% of the cancellations while 11 patients (3.3%) were also cancelled due to equipment failure or unavailability. A total of 8 patients were cancelled due to emergency and trauma and some other 8 patients required more investigations accounting for 2.4% each. Another 7 patients were cancelled due to worsening of preexisting medical condition and in 7 others pre operative guidance was not followed accounting for 2.1% of the cancellations each. About 5 patients were cancelled for being unfit for surgery (1.5%) while 2 patients were cancelled due to lack of ICU/HDU beds (0.6%) and 2 other patients had an inconvenient appointment (0.6%).

The following figure shows the distribution of the different categories of reasons for cancellation of surgery across the surgical specialties.

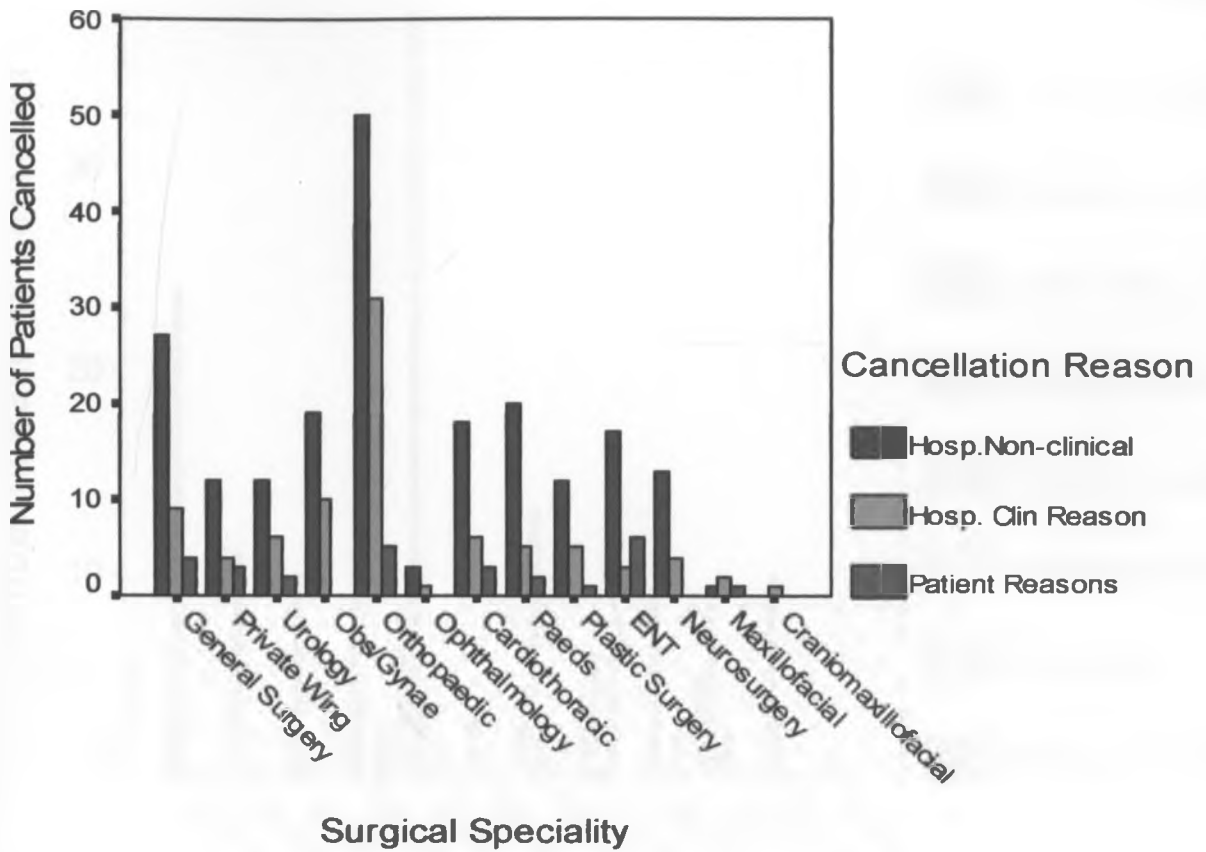


Figure 12: Distribution of the different categories of reasons for cancellation of surgery across the surgical specialties.

The above figure shows the distribution of all categories of reasons for cancellation across all surgical specialties. Hospital non clinical reasons were the commonest across all surgical specialties and the most predominant in orthopaedic surgery followed by general surgery. Hospital clinical reasons were also fairly well distributed across all surgical specialties and so were the patient reasons. In orthopaedics about 50 patients were cancelled due to hospital non clinical reasons, about 30 patients were cancelled due to hospital clinical reasons while six patients were cancelled due to patient reasons. ENT had the highest patient related cancellations in while ophthalmology, obstetrics and gynaecology and neurosurgery did not have any patient related cancellations.

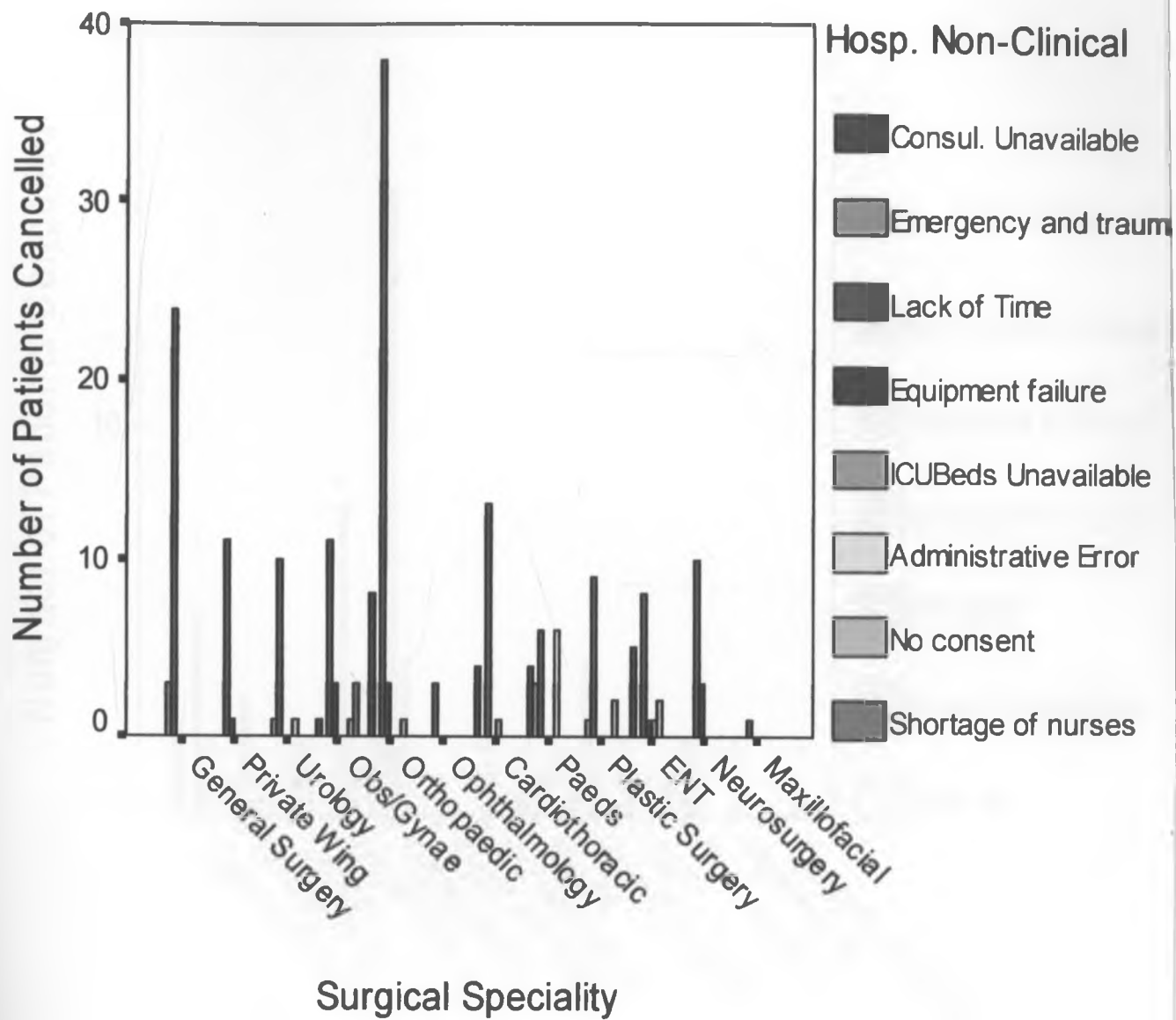


Figure 13: Comparison of hospital non clinical reasons for cancellation of surgery across the surgical specialties.

The above figure shows that lack of theatre time was a constant factor across all surgical disciplines. There was however a bias in orthopaedic surgery where almost half of the cases were cancelled due to lack of time. There was a statistically significant relationship between lack of time and cancellation of elective surgery. ($P < 0.001$)

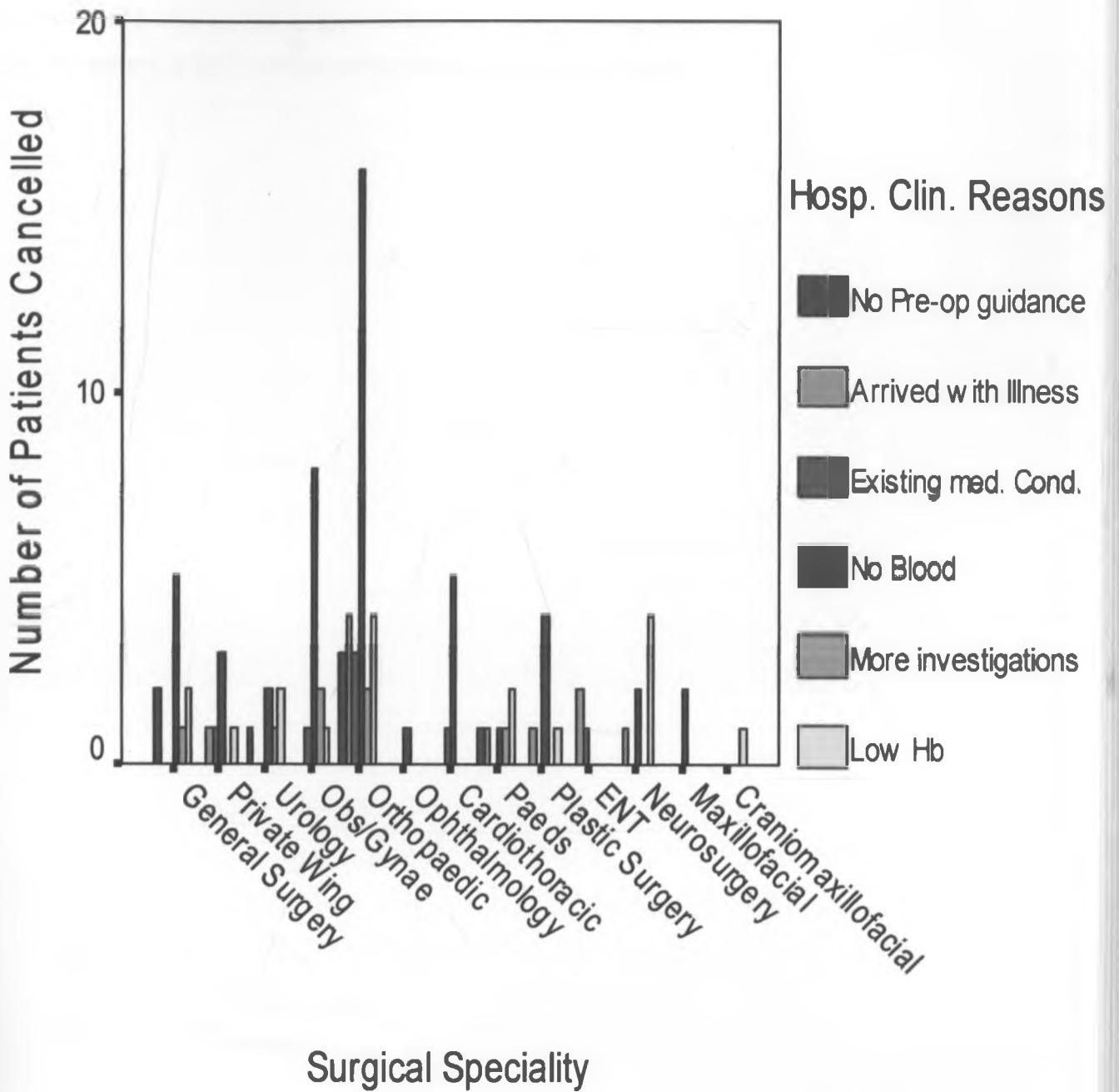


Figure 14: Comparison of hospital clinical reasons for cancellation of surgery across the surgical specialties.

Lack of blood was the commonest reason for cancellation of elective surgery under the hospital clinical reasons across all the surgical disciplines though it was more common in orthopaedic surgery. No patient in ENT was cancelled due to lack of blood though.

DISCUSSION OF RESULTS

Kenyatta National Hospital is the largest teaching and referral Hospital in Kenya. The study was carried out in main theatre, burns unit, ENT clinic and maternity theatres over a period of six weeks from 11th July 2011 to 22nd August 2011. During the study period a total of 1,547 patients were scheduled for surgery. Out of these 318 patients were cancelled (20.6%). The mean age of the patients whose surgery was cancelled was 35 years with a range of 4 months to 85 years. Approximately 56% were male while 44% were female.

The cancellation rate was found to be 20.6% in this study. This is similar to rates found from other studies varying from 10-40%. This has been shown to depend on the type of institution, the type of surgery, the population served and the healthcare system. Our cancellation rate is similar to that from a study in Nigeria and another in Pakistan of 23.15% and 25% respectively.^{36,56}. However another study in New Delhi found a cancellation rate of 30.3% which was much higher than ours⁴⁸

The cancellation rate obtained from our study is evidently much higher than for most studies. Similar studies in West Indies and Sudan found a cancellation rate of 15% and 9.9% respectively both of which are much lower considering that these are developing countries like ours.^{28,55} Similarly other studies in Australia and Spain found cancellation rates of 11.9% and 6.5% respectively.^{15,26}. The reasons for the high cancellation rate obtained from our study are due to multiple factors which will be explored later.

An efficient surgical service should have a low rate of cancellation of operations. If operations are cancelled, the operation theatres are underutilized, efficiency is jeopardized, waiting lists increase and cost rises.⁵⁴ It is also a well known fact that if resources are not properly utilized, the general population suffers especially the lower income groups, who depend more on public or government services for most of their healthcare needs. The cost of a facility and equipment which is underutilized adds to the cost of its services which ultimately passed on to patients. Avoiding cancellations is an essential step to reduce these. The National Audit Office in Britain examined five district health authorities in detail and concluded that operation theatres were being used half their capacity in spite of huge waiting lists.⁵³

Several reports have different cut offs for the acceptable cancellation rates. This again depends on the different types of hospitals. In New South Wales (Australia) the expected rate of cancellations is < 1.5%.⁵⁹ In UK rates of up to 10% seem to prevail.⁶⁰ However, well-functioning theatre suites should have cancellation rates of less than 5%.⁶¹

Orthopaedic surgery had the highest number of patients booked for surgery among the surgical specialties accounting for 17.1% of the total cases booked followed by obstetrics and gynaecology, ENT surgery and general surgery. Private wing patients accounted for the highest number of booked patients (19.2%) but they were not separated into the different surgical specialties.

Cardiothoracic surgery had the highest cancellation rate of 38% followed by neurosurgery and orthopaedic surgery. ENT and ophthalmology had the lowest cancellation rates among surgical specialties while private wing had only a 6.4% cancellation rate. Multidisciplinary did not have any cancellations though it had only six patients booked. The common reasons for cancellation in cardiothoracic surgery were lack of time, lack of blood, consultant unavailability, worsening of preexisting medical condition and lack of ICU beds. However, the issue with lack of ICU beds has been solved with the opening of the ICU in the cardiothoracic ward. This cancellation rate though is much higher than that in literature. Neurosurgery had the second highest cancellation rate with the commonest reasons being lack of time, lack of blood, lack of equipment/failure and patient arrived with illness.

However, orthopaedic surgery accounted for 27% of all the cancellations followed by general surgery and obstetrics and gynaecology. Maxillofacial and ophthalmology had the lowest number of cancellations. Orthopaedic surgery had the highest number of patients booked for surgery and also experienced the highest number of cancellations which is in keeping with the high number of trauma patients seen in our hospital. This is also reflective of the high number of road traffic accidents in our country. Similarly one study in Nigeria found that orthopaedic surgery had the highest cancellation rate of 11.6% though it was second in the number of patients booked for surgery.³⁶

It was also observed that general patients were cancelled more frequently than private patients. Private patients accounted for only 6% of the cancellations though they were the highest in

bookings (19.2%). Similarly, one study in West Indies showed that public patients were cancelled more frequently than private patients and that the incidence of delays and cancellations were higher in public patients (68%) compared to private patients (63%).²⁹ In KNH, private patients are managed purely by consultants while the general patients are managed by junior doctors, residents and consultants. It could not be established from this study why private patients are cancelled less than general patients but it is possible that the consultants have better scheduling techniques bearing in mind how long a procedure takes unlike the junior doctors. They may prepare patients better for surgery and are probably faster in performing surgery thus reducing overrunning of theatre lists. In addition these theatres work for longer hours compared to the general theatres and there is the financial incentive that accompanies private patients.

In one study in Pakistan the influence of the surgeon experience was observed and it was found that inexperienced surgeons added significantly to the operation time.⁵⁶ Consultants were quicker and their presence reduced the likelihood of complications thus reducing operating time. They also observed that if a consultant surgeon and consultant anaesthetist were present in theatre, the list was likely to proceed with fewer delays.⁵⁶

Our study categorized the reasons for cancellation of surgery into three major categories. Classifying reasons for cancellations is useful as it helps identify the weaknesses in the system that might be addressed. Hospital non clinical reasons were the commonest reasons for cancellation of surgery accounting for 61.7% of the cancellations with lack of time being the most rampant reason in this category. Hospital clinical reasons accounted for 30.1% of the cancellations with lack of blood being the commonest reason for cancellation of surgery. Patient reasons accounted for 8.2% of the cancellations with failure to arrive of patients being the commonest reason for cancellation of surgery.

The six commonest specific reasons for cancellation of elective inpatient surgery from all the three broad categories were lack of time (43.8%), lack of blood (14.9%), patient arrived with illness (8.5%), consultant unavailability (6.7%), patient did not arrive (6.1%) and administrative/logistic errors (4.9%). These six reasons accounted for approximately 84.9% of the cancellation while the first two commonest reasons accounted for 58.7% of all the cancellations. These reasons are similar to those found from other studies except for lack of

blood and consultant unavailability. There are conflicting reports on the commonest reasons for cancellation of elective surgery but lack of theatre time, lack of recovery room beds, administrative/logistic issues, absenteeism of patients, patients clinical change and improper patient preparation are the most commonly identified reasons for surgery cancellation.^{23,25,26,27,28,29,}

Lack of theatre time was the commonest reason for cancellation of surgery accounting for 43.8% of the cancellations. Several studies have found lack of theatre time to be one of the commonest reason for cancellation of surgery.^{15,36} One study in New Delhi found that lack of time accounted for 59.7% of the cancellations which was more than that of our study.⁴⁸ One study in Pakistan and another in Portugal also found that lack of time accounted 36% and 32% of the cancellations.^{56,50} In most of the studies in literature however, the rate of cancellation due to lack of time is much lower in comparison to what we found from our study.

KNH is a teaching and the largest National referral hospital in Kenya. Therefore more complex operations are done in KNH in comparison to the rest of the hospitals in the country. In addition teaching sessions are also conducted during elective theatre sessions. This may contribute to lists overrunning but these could not be established from our study. Another study is required to find out why lack of theatre time is the most rampant reason causing cancellations in KNH and also to establish how efficient the theatres are.

However, from literature lack of time has been attributed mainly to late starts, delay in between cases, overrunning of lists and overbooking. These can be reduced by co-operation of all disciplines.⁵² Improvement in late starts can be achieved by co-operation from surgeons, anaesthetists and all theatre staff to arrive on time. However, the time interval between two surgical interventions can be longer when the patient takes a long time to recover from anaesthesia though this is not an everyday occurrence. Overbooking could be reduced by booking cases onto lists using knowledge of surgical procedure duration by using data from theatre logs or from the previously published data.^{5,27}

Overbooked theatre lists leading to over-running are managed differently in some hospitals, where staff are employed on contracts of fixed working hours, as compared to institutions where

salaries are more directly related to variable hours of work.^{39,40} In the former, there may be no financial incentive for staff to stay late to undertake extra cases and hence over-running lists are curtailed by cancellation. In the latter, 'overtime' payments may offer some incentive to prevent cancellation, but the overall costs to the institution may be very high if overbooking is common.²⁶ In a UK audit it was established that in many hospitals theatre lists were consistently overrunning.³⁸ Similarly in KNH, it is not unusual to find theatre lists overrunning well into several hours beyond the usual time but there is no data to support this.

Lack of blood was the second most common reason for cancellation of surgery accounting for 14.9% of the cancellations. Two similar studies in Sudan and West Indies showed that lack of blood accounted for 4.9% and 2.5% of the cancellations respectively which is less than that found from our study.^{55,29} This could be due to the frequent shortages of blood in KNH or due to the blood transfusion practices in KNH. This again is a pointer that KNH may need to review the current blood transfusion practices. One solution could be to put mechanisms in place that ensure blood is available before the definitive theatre lists are made.

Patient arrived with illness was the third commonest reason for cancellation of elective surgery accounting for 8.5% of all the cancellations. The most common illness was anaemia followed by upper respiratory tract infections group scheduled for ENT surgery. Similarly a study in Spain found that 18% of the cancellations were due to URTI mainly in children scheduled for ENT surgery.²⁶

A total of 18 patients were cancelled due to Anaemia (low haemoglobin) accounting for 5.5% of all the cancellations. This reflects the underlying problem of patient preparation. In KNH the protocol is that patients are investigated preoperatively. Unfortunately this is not the case always, as some patients are put on the definitive lists as they wait for their laboratory results with the anticipation that the results will be normal. In the event that the results are abnormal then this may cause cancellations on the day of surgery. This may explain the high number of patients cancelled due to anaemia.

Preoperative preparation of patients is quite important in reducing cancellations. Patients should be reviewed preoperatively by the surgical and anaesthesia teams to ensure only ready patients

are on the definitive lists. The laboratory results should also be availed early so that if a patient is cancelled then there is sufficient time to prepare supplementary lists. Preoperative evaluation is done in the wards as KNH does not have preoperative anaesthetic clinics as in some Hospitals.

There is currently intense pressure on hospitals to be more efficient. The timing of the preanesthesia assessment may influence the cancellation rate on the day of surgery. Although early outpatient preoperative evaluation has been advocated, in clinical practice, preoperative evaluation on the day of surgery or the day before surgery is common. Many surgical procedures are delayed or cancelled due to inadequate preoperative assessment and preparation.²⁹

Pollard in 1999 reported that operating room cancellation rate of patients evaluated within 24 hours of surgery is similar to those who are seen 2-30 days before surgery. Both groups had similar rates. However, outpatient clinics may be seen as a convenient time without adversely affecting operating room cancellations.²⁴

Unavailability of consultants accounted for the fourth commonest reason for cancellation of surgery accounting for 6.7% of all the cancellations. The main reasons given for unavailability of consultants included attending meetings and lectures. Both these are avoidable with good planning and making alternative arrangements in advance.

Failure to arrive of patients commonly known as Did not arrive (DNA) was the fifth most common reason for cancellation accounting for 6.1% of the cancellations. Several studies have found that failure to arrive of patients to be quite a common reason for cancellation of surgery. Two studies done in Spain showed that cancellations due to patient non attendance accounted for 20% and 23% of the cancellations respectively.^{26,25} In the theatre Programme of the NHS Modernization Agency piloted from August 2001 to June 2002, non attendance of patients was the highest reason for patient cancellations in day surgery (23%).¹¹ Another study done in Pakistan also demonstrated that DNAs accounted for 40% of the cancellations.⁴⁶

In all these studies the cancellation rates due to DNA is far much higher in contrast to what we established from our study. This could be due to the theatre booking system in KNH. The definitive theatre lists are made a day before surgery in most surgical departments. Patients are again reviewed at admission with their laboratory investigations. This ensures mostly that only

patients who are present are put on the definitive theatre lists. This explains probably why our cancellation rate due to DNAs is much lower than for most studies. However some surgical departments like ENT have theatre lists prepared much earlier and these experienced much more cancellations due to DNAs.

Other reasons that may have contributed to DNAs include financial constraints. Though from our study, we were not able to establish this. This is because the nature of the study did not explore why patients failed to arrive. One study done in Nigeria found that financial constraints accounted for 20.59% of the cancellations.³⁶ Another study in Pakistan also demonstrated that patient refusal, no-shows and financial constraints were the most common reasons accounting for cancellation of surgery.⁴⁶

It is speculated that where care is free non-attendance may be higher but there is no data to support this. Some hospitals remind patients by telephone 10 days before their operation and again 2 days before surgery. The patient is asked to notify the hospital if they cannot attend, but clearly this is not fail-safe. It is thought that patient cancellations would decrease even more if public oriented campaigns based on the real cost of health delivery systems and on the limits of economic resources were applied in countries where healthcare is free.¹⁰ These patients who fail to attend may prevent other deserving patients to be put on a surgical list. In some western countries patients who fail to attend their appointment are charged a fee. This is again not practical in our setup being a third world country.

Administrative /logistic reasons were the sixth commonest reasons for cancellation of surgery accounting for 4.9% of the cancellations. The most common administrative reasons included no consent, shortage of nurses, scheduled surgical projects, missing files, missing laboratory investigations, missing x-ray films among others. These again can be avoided with better planning.

From our study 61.7% of the cancellations were avoidable. These were mainly cancellations due to hospital non clinical reasons. It has been reported in several studies that more than 50% of cancellations could be prevented.^{10,15,50} Another study in Sudan also found that 86.5% of the cancellations were avoidable. It is possible to reduce cancellations to only those that are unavoidable with the correct measures.

Conclusions:

- The cancellation rate of 20.6% of elective inpatient surgery in Kenyatta National Hospital is quite significant.
- Cardiothoracic surgery had the highest cancellation rate followed by neurosurgery and orthopaedics surgery in Kenyatta National Hospital.
- The most common reasons for cancellation of surgery fall under hospital non clinical reasons. The six commonest specific reasons for cancellation of elective surgery are lack of theatre time, lack of blood, illnesses, consultant unavailability, DNA and administrative/logistic errors. These six reasons accounted for approximately 84.9% of the cancellations.
- More than 60% of the cancellations were avoidable.

Recommendations:

- Focus to be given to the six commonest reasons for cancellation of surgery as they account for approximately 84.9% of the cancellations. Addressing these six common reasons may therefore tremendously reduce the cancellation rate.
- Further studies needed to establish theatre efficiency or inefficiency in KNH in order to make recommendations on better time management since lack of time was the commonest reason for cancellation.
- KNH needs to review the current blood transfusion practices. One practical way could be to have mechanisms in place to ensure blood is available earlier so that when patients are put on the definitive theatre lists their blood is also ready and stored awaiting surgery.
- There should be early and compulsory surgical and anaesthetic review of patients before surgery and protocols for preparation of patients for various operations as well as ensuring strict adherence to these protocols to ensure only ready patients are put on definitive theatre lists.
- KNH to consider putting mechanisms in place to remind patients about their appointments and to encourage attendance.
- Regular audits are highly recommended to regularly assess progress on reduction in cancellations.

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APPENDIX I: COVER LETTER

To participants in data collection;

My name is Dr. Nancy N. Okonu. I'm a Senior House Officer currently undertaking a Masters of Medicine (MMed) degree in anaesthesiology at the University of Nairobi. As part of fulfillment of my MMed programme, I'm conducting a study entitled '**CANCELLATION OF ELECTIVE SURGERY AT KENYATTA NATIONAL HOSPITAL**'.

The purpose of this study is to determine the incidence, causes and pattern of cancellation of elective surgery in Kenyatta National Hospital. It will show the main reasons for cancellation of elective surgery at KNH. It will also assist in making appropriate recommendations on how to reduce these cancellations. This is hoped to enhance efficiency and minimize wastage of limited resources and manpower in the long run.

A form will be availed for any cancellations that occur daily. You will be required to fill out the form and indicate the reason for cancellation of surgery in each case. You are required to fill in the correct reason for cancellation in consultation with the surgeon and the rest of the surgical team. This study will have no harmful effects to the participants or the patients and confidentiality will be maintained. This is a voluntary exercise and you are allowed to withdraw from the study at any time. If you accept to participate in this study please sign the attached consent form.

Thank you for your co-operation.

In case you have any questions concerning this study please contact the following people.

DR NANCY OKONU (Researcher) Tel No - 0720806450

DR MURIITHI (Supervisor) Tel No - 0722850375

APPENDIX II: CONSENT EXPLANATION

To the Patients,

My name is Dr Nancy N Okonu. I'm a Senior House Officer currently undertaking a Masters of Medicine (MMed) degree in anaesthesiology at the University of Nairobi. As part of fulfillment of my MMed programme, I'm conducting a study entitled '**CANCELLATION OF ELECTIVE SURGERY AT KENYATTA NATIONAL HOSPITAL**'.

The purpose of this study is to determine the incidence, causes and pattern of cancellation of elective surgery at Kenyatta National Hospital. It will also assist in making appropriate recommendations on how to reduce these cancellations. This is hoped to enhance efficiency and minimize wastage of limited resources and manpower in the long run.

For me to be able to conduct this study I will need to collect data of all patients who have had their elective surgery procedures cancelled for one reason or another. I therefore need you to fill a consent form attached to this letter if you agree to be included in this study. This study will have no harmful effects to the participants and confidentiality will be maintained. This is a voluntary exercise and you are allowed to withdraw from the study at any time.

Thank you for your co-operation.

In case you have any questions concerning this study please contact the following people.

DR NANCY OKONU (Researcher) Tel No - 0720806450

DR MURIITHI (Supervisor) Tel No - 0722850375

APPENDIX III: UFAFANUZI WA MAKUBALIANO

Jina langu ni daktari Nancy Okonu. Mimi ni mwanafunzi katika kitivo cha matibabu, katika chuo kikuu cha Nairobi. Kabla ya kuhitimu kwa shahada ya masomo yangu, ni lazima nifanye utafiti.

Ninafanya utafiti kuhusu ukosaji kufanyiwa upasuaji wakati ambao mgonjwa ameahidiwa katika hospitali kuu ya Kenyatta. Lengo kuu la utafiti huu ni kujua sababu zinazosababisha wagonjwa kukosa kupasuliwa wakati ambao wameahidiwa. Utafiti huu pia utachangia kutoa mapendekezo juu ya mikakati inayostahili kuwekwa ili kupunguza wagonjwa kukosa upasuaji.

Nitafuata wagonjwa wote watakaokosa kupasuliwa wakati ule walikuwa wameahidiwa kwa sababu yoyote ile. Ningependa wajaze fomu ya idhini ya kushiriki kama watakubali kushiriki kwa huu utafiti. Ningeomba uwe mhusika katika huu utafiti kwa hiari yako mwenyewe bila kulazimishwa. Pia unaweza kutoka wakati wowote unapokuwa na tashwishi. Ujumbe wote utakaopatikana kutoka utafiti huu utatumiwa kuboresha matibabu kwa wagonjwa.

Kwa maswali yoyote, piga simu kwa nambari ifuatayo.

Daktari Nancy Okonu – 0720-806450

APPENDIX IV: CONSENT FORM I

For patients:

I accept to take part in the study entitled “**CANCELLATION OF ELECTIVE INPATIENT SURGERY AT KENYATTA NATIONAL HOSPITAL**”.

I confirm that I have read the consent explanation form that outlines the nature of this study. I have also been explained to about the study by the researcher. I fully understand that this study will have no harmful effects to the participants and that confidentiality will be maintained. I also understand that this is a voluntary exercise and I have a right to withdraw from the study at any time.

I hereby give my informed consent.

Participant’s Signature Date

Researcher’s signature Date.....

APPENDIX V: FOMU YA IDHINI YA KUSHIRIKI

YA WAGONJWA

Ninatoa kibali kuhusishwa kwenye utafiti uitwao **“CANCELLATION OF ELECTIVE INPATIENT SURGERY AT KENYATTA NATIONAL HOSPITAL”**.

Nathibitisha kwamba nimeelewa maelezo yote kutoka kwa daktari Nancy N. Okonu kuhusu utafiti huu. Nimetoa kibali hii cha kushiriki kwa huu utafiti kwa hiari yangu binafsi. Nimeelewa kwamba ninaweza kujiondoa kutoka huu utafiti wakati wowote bila masharti yoyote na kujiondoa kwangu hakutadhuru matibabu yangu kwa njia yoyote. Pia nimeelewa ya kwamba habari yoyote nitakayoitoa itahifadhiwa kwa siri.

Sahihi ya Mhusika..... Tarehe.....

Sahihi ya Mtafiti..... Tarehe.....

APPENDIX VI: CONSENT FORM II

For Participants in data collection.

I accept to take part in the study entitled “**CANCELATION OF ELECTIVE INPATIENT SURGERY AT KENYATTA NATIONAL HOSPITAL**”.

I confirm that I have read the cover letter that outlines the nature of this study. I fully understand that this study will have no harmful effects to the participants and that confidentiality will be maintained. I also understand that this is a voluntary exercise and I have a right to withdraw from the study at any time.

I hereby give my informed consent.

Participant’s Signature Date

Researcher’s Signature Date.....

APPENDIX VII: DATA COLLECTION TOOL – For all patients whose surgery is cancelled.

Date Serial Number.....

Age..... Sex.....

Diagnosis..... Theatre.....

Operation..... Specialty.....

Reasons for cancellation of surgery (Tick where appropriate).

Hospital Non-clinical Reasons	
Ward beds unavailable	
Consultant unavailable	
Emergency and trauma	
List overrun/ Lack of time	
Equipment failure/unavailable	
ICU/HDU beds unavailable	
Administrative / Logistic error (Specify)	
Hospital clinical Reasons	
Operation not necessary	
Pre -op guidance not followed	
Patient arrived with illness	
Pre-existing medical condition	
Patient Reasons	
Patient did not arrive	
Operation not required	
Patient unfit for surgery	
Appointment Inconvenient	
Other Reasons(Specify)	

APPENDIX VIII: BUDGET ESTIMATE

Item	Cost (KShs)
Research assistant	10,000
Biostatistician	15,000
Ethics and Research committee	1,000
Stationery	5,000
Contingencies	5,000
Grand Total	36,000

APPENDIX IX: STUDY PLAN

	Nov 10	Dec 10	Jan 11	Feb 11	Mar 11	Apr 11	May 11	Jun 11	Jul 11
Proposal writing	v	v	v	v					
Ethics committee approval					v	v			
Data collection							v	v	
Data analysis									v
Dissertation Writing									v
Dissertation presentation									v



KENYATTA NATIONAL HOSPITAL
Hospital Rd. along, Ngong Rd.
P.O. Box 20723, Nairobi.
Tel: 726300-9
Fax: 725272
Telegrams: MEDSUP", Nairobi.
Email: KNHplan@Ken.Healthnet.org
8th July 2011

Ref: KNH-ERC/ A/165

Dr. Okonu N. Nancy
Dept. of Surgery/Anaesthesia
School of Medicine
University of Nairobi

Dear Dr. Okonu

Research Proposal: "Cancellation of Elective inpatient surgery at Kenyatta National Hospital"
(P79/03/2011)

This is to inform you that the KNH/UON-Ethics & Research Committee has reviewed and **approved** your above revised research proposal. The approval periods are 8th July 2011 to 7th July 2012.

You will be required to request for a renewal of the approval if you intend to continue with the study beyond the deadline given. Clearance for export of biological specimens must also be obtained from KNH/UON-Ethics & Research Committee for each batch.

On behalf of the Committee, I wish you a fruitful research and look forward to receiving a summary of the research findings upon completion of the study.

This information will form part of the data base that will be consulted in future when processing related research study so as to minimize chances of study duplication.

Yours sincerely

PROF A'N GUANTAI
SECRETARY, KNH/UON-ERC

c.c. The Deputy Director CS, KNH
The Dean, School of Medicine, UON
The Chairman, Dept. of Surgery, UON
The HOD, Records, KNH
Supervisor: Dr. Julius Muriithi, Dept. of Surgery, UON