LENGTH OF STAY AND DIRECT COST OF CARE AMONG SURGICAL INPATIENTS AT UNIVERSITY COLLEGE HOSPITAL, IBADAN

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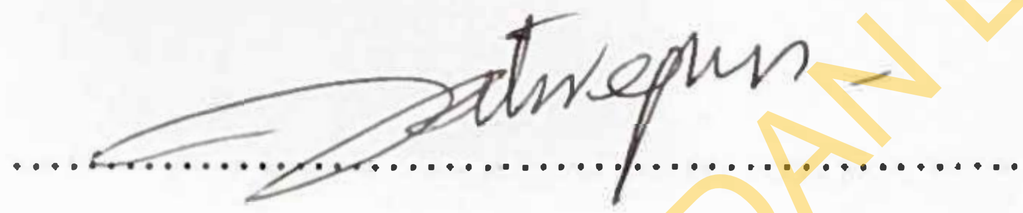
CERTIFICATION

I certify that this research was carried out by Dr, Olayinka Stephen ILESANMI, in the Department of Epidemiology and Medical Statistics, Faculty of Public Health, University of Ibadan.



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DEDICATION

To the Father, Son and the Holy Ghost

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I give thanks to the Lord for the gift of life that He has showered on me and for the grace to complete this work. I also appreciate my supervisor Dr A. A. Fatiregun for his commitment, encouragement and thoroughness.

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Mine for ever, thanks for your ability to cope with a busy husband. Tolu and Ayanfe, thank you for your understanding, I will have more time for your home work hence forth.

ABSTRACT

Minimising hospital length of stay (LOS) has been shown to be of importance to eliminate ~~unnecessary~~ resource use without sacrificing, patient care and safety. Yet few studies exist in published literatures that document the LOS of surgical inpatients in Nigeria. This study was conducted to assess the LOS among surgical inpatients, identify factors associated with prolonged hospital stay among them and estimate the direct cost of hospital stay.

A retrospective review of records inpatients that had surgery from January to December, 2010 was conducted. Data was collected with the aid of a semi-structured pro-forma. Information was collected on socio-demographic variables, LOS, investigations, drugs and other variables on procedure performed and cost of care. Prolonged LOS was defined as >7 days. Cost was estimated using hospital billing documents used at the period studied. Chi square test and Pearson correlation coefficient were used to test association of potential factors which are likely to be associated with LOS. Logistic regression was used to identify the determinants of prolonged LOS using odds ratio at 95% Confidence Interval. Mean cost of care were compared using t-test and Analysis of variance (ANOVA). Linear regression analysis was used to determine the predictors of increasing cost of care. Level of significance of 5% was used.

The median age of patients was 30 years with inter-quartile range of 13-42 years. Males were 257(63.6%) and Christians were 143 (35.4%). Median LOS was 11 days with an inter-quartile range of 5-20 days. In all, 254(63%) had prolonged stay. The mean overall cost of care was ₦66,983 ± ₦31,985. Cost of surgery is about 50% of total cost of care. LOS had positive and significant correlation with only duration of surgery r = 0.25. The determinants of prolonged LOS were Islamic religion [OR: 1.7 (1.04- 2.92)] versus Christianity, plastic surgery [OR: 4.5(1.3- 15.3)], emergency surgery [OR: 2.1(1.2- 3.8)] versus elective surgery, ASA grade II [OR: 2.2(1.2- 4.2)], presence of blood transfusion [OR: 2.1(1.01- 4.53)] versus no blood transfusion. Patient first seen at the Accident and Emergency had a significantly higher mean cost of care of β = ₦11,986 compared to others that were first seen at Children Outpatient Clinic, Gynaecology Clinic and Eye Clinic. (95% CI: ₦297 to ₦23,674). Other determinants of increase cost were ASA II, (β=₦12,382), ASA III(β=16,117), ASA IV (β=16,489) versus ASA I. Neuro Surgery (β=₦29,755) versus General Surgery, General Anaesthesia (β=₦14,513) versus Local Anaesthesia, Blood loss above

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1000mls (β=₦15,922) versus Blood loss of less than 500 mls, Blood transfusion (β=₦14,437) versus no transfusion all contributed to cost of care significantly.

Prolonged LOS was experienced by a high proportion of surgical inpatient at University College Hospital, Ibadan. Most of the factors associated are non modifiable. There is therefore an urgent need for a prospective research to follow up patients from admission to discharge to identify hospital related factors responsible for prolonged LOS and make recommendations.

Key words: Cost, Surgery, Anaesthesia, blood transfusion, resource, inpatients

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LIST OF ABBREVIATIONS

ASA: American Society of Anaesthesiologist

DAMA: Discharge Against Medical Advice

GOPD: General Out Patient Department

LGA: Local Government Authority

LOS: Length of Stay

MOP: Medical out Patient

OTCHEW: Otunba Tunwase Children Emergency Ward

PHC: Primary Health care

SOP: Surgical Out Patient

UCH: University College Hospital

CHAPTER ONE
INTRODUCTION

1.1 Background

Variations in hospital length of stay (LOS) have assumed greater importance as the search for solutions to rising health care costs has intensified over the past few years (Emi and Kiyohide, 2009; Fontaine et al. 2011; Gilliard et al. 2006; Lena et al. 2010; Tara et al. 2011). There are particular concerns about the expanding cost of care in many developing countries (Dienye et al. 2011). LOS has been designated as a universal metric for gauging the cost of care as prolonged hospitalization tends to increase aggregated health-care expenditures including the opportunity cost of hospital stay (Emi and Kiyohide, 2009; Gilliard et al. 2006). The trend in most developed countries has therefore been to promote shortened hospital stay where possible (Hari, 2010).

Hospital LOS has been used as one of the indicators for assessing how good an hospital is performing (Kulinskaya et al. 2005). Hospital performance assessment has been found to impact positively on service delivery (Rapoport et al. 2003). LOS is also very important for hospital planning since it is a direct determinant of the number of beds to be provided. Hospital with lesser stay will yield high bed turnover rate. Bed turnover rate is the ratio of the number of discharges (including deaths) in a given time period to the number of beds in the hospital during that time period (Rapoport et al. 2003).

Hospital stay is necessary to ensure optimal management of most surgical patients since compliance with therapeutic regimens can be assured to a great degree in hospital in-patients. It also allows the patients to recover from the effect of the surgical procedure. Hospital stay may also be beneficial by protecting patients from the adverse health effect of factors present in their home environments during the vulnerable periods of their convalescence (Mark, 1983). However hospital stay also has associated risks. Other than increased health care expenditure there is an increased risk of nosocomial infections, (Rubin, 2006) adverse drug reactions particularly with intravenous drug use and complications related to other invasive procedures. Coincident remote site infections, colonization (in particular, nares colonization with *S. aureus*), diabetes, cigarette smoking, use of systemic steroids, obesity (body mass

index ≥ 30 kg/m2), extremes of age, poor nutritional status, perioperative blood transfusion and prolonged preoperative stay have all been shown to increase the risk of surgical site infection. These risks have been shown to increase with increasing duration of hospital stay (Empey, 2010; Harrison and Escobar, 2010).

The hospital LOS is determined mainly by the surgeons' clinical judgment and by health care system factors. Surgeons now commonly encourage their patients to get out of bed and walk within the first day or two following many different surgical procedures (Ramesh and Galland, 1993). Patients and their family members are also encouraged to participate actively in decision-making about discharge dates in many countries. It is yet to be determined if these practices have been instituted in Nigeria.

1.2 Problem statement

The average length of stay per capita showed Japan with 36.3 days, the United States with 6.5 days, Germany with 10.4 days, France with 13.4 days, and the UK with 7.2 days (OECD, 2006). The average LOS decreased by two days from 9.3 to 7.3 from 2003 to 2007 in Georgia (World Health Organisation, 2009). In Saudi Arabia, the mean length of stay in open appendectomy was 3.02 days (Yagnik et al. 2010). In Nigeria 3-5 days after operation is the average stay for patients undergoing open appendectomy (Oludiran and Ohanaka, 2002). LOS for common operations in various countries tends to decrease. However, it is still high in Nigeria. The mean duration of hospital stay was 13.11 days among patients with post traumatic bowel injury in Ibadan, Nigeria (Dongo et al. 2011). Increase in length of hospitalization tends to increase aggregated health-care expenditures (Daly et al. 2003; Emi and Kiyohide, 2009). A quarter of the respondents studied in a Nigerian population experienced financial hardship in settling their medical bills, invaluable assets of the respondents such as farm lands were sold in the quest of seeking health care (Sambo et al. 2010). Prolong LOS in hospital has been seen as an embarrassment to family members (Dienye et al. 2011). Some surgical patients could not come for follow up due to financial constraint as a result of long hospitalization. Some patients were also detained in the hospital due to inability to pay their bills (Wiesmann and Jütting, 2000). Difficulty has also been seen in carrying out post operative investigations, purchase of post operative drugs and payment of hospital bill after a long stay in the hospital (Dienye et al.2011).

1.3 Justification

In the United States, The Centres for Medicare and Medicaid established industry standards for LOS for a patient based upon the diagnosis related group and clinical indicators they fall under (Kudyba and Gregorio, 2010). In Nigeria guideline does not exist for ~~determining~~ hospital LOS. There is information on the length of stay of surgical patients with abdominal trauma in Ibadan. However, the length of stay of other surgical patients has not been documented. This analysis of LOS identified the associated factors with prolonged hospital stay and direct cost of care which were not discussed in the previous study. There are little published literature on length of hospital stay in Nigeria, this study should stand in this knowledge gap and serve as basis for further research work. LOS summarizes the pooled effects of a vast collection of patient characteristics and exposures, including diverse processes of care (Schulman, 2006). This study on hospital LOS is needed to know the areas where hospital performance must be reorganized and restructured to meet future demands as Schulz et al. pointed out (Schulz et al. 2004).

1.4 Objectives

1.4.1 General objective

To determine the hospital length of stay, direct cost of care and associated factors among surgical patients at the University College Hospital Ibadan

1.4.2 Specific objectives

1. To determine the median length of hospital stay and magnitude of prolong stay among surgical inpatients.
2. To identify factors associated with prolong hospital stay among surgical patients.
3. To estimate the direct cost of hospital stay to surgical inpatients
4. To assess determinants of cost of care among surgical inpatients

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

Length of Stay (LOS) referred to the total days of hospitalization per patient from admission to discharge (Petsunee et al. 2007). Various measures of hospital LOS have been used including number of calendar days, days at midnight census, total hours, or the relative LOS (expressed as ratios of actual and expected LOS) (Amaravadi et al. 2000; Cho et al. 2003). The number of calendar days (LOS calendar) was most frequently used to determine length of stay. Length of stay proves to be a critical metric for healthcare organizations and the complexity of fully identifying all factors that may impact this variable remains (Kudyba and Gregorio, 2010). Length of stay is, however, probably a surrogate for severity of illness and co-morbid conditions requiring inpatient work-up or therapy before or after the operation (W H O, 2009).

2.2 LOS among surgical inpatients

Hospital stay is necessary to ensure optimal management of most surgical patients. Length of stay for common operations in various countries tends to decrease; patients undergoing open appendectomy often remain in hospital for 3-5 days after operation (Oludiran and Ohanaka, 2002). In Saudi Arabia, the mean length of stay in open appendectomy was 3.02 days (Yagnik et al. 2010). In Tanzania, the overall ICU length of stay (LOS) for all trauma patients ranged from 1 to 59 days (median = 8 days) (Chalya et al. 2011).The mean duration of hospital stay was 13.11 days among patients with abdominal trauma and requiring surgical intervention seen in the University College Hospital Ibadan, Nigeria between September 1st 1999 and August 31st 2005 (Dongo et al. 2011).

2.3 Factors associated with prolonged LOS among surgical inpatients

Various reasons have been given in many studies associated with length of stay. LOS was greater among males, those aged ≥60, those with neoplasm, those who lost weight during their stay, and those who were classified as malnourished (Vânia Aparecida et al. 2011). Other identified reasons can be associated with various organizational levels of the health system: waiting for the results of an examination, delays for appointments, waiting for diagnostic procedures or treatment, gaps in the continuity

from hospital care to home care. Next to healthcare organizational issues, some reasons for unjustified hospital day are related to the willingness of the family to accept the patient to return home or not being ready yet for his return (Fontaine et al. 2011). The availability of registered nurses and their professional nursing skills may also influence patient length of stay and hospital costs (Petsunee et al. 2007). Increasing the number of registered nurses and providing more registered nurses hours per patient day has been showed to decrease patient LOS significantly (Needleman et al.2002). Other factors identified in the literatures as the causes of variation in LOS include diagnosis (Kjekshus, 2005), hospital related factors such as, number of ward rounds done during admission, cancellation of surgery/procedure, complication/hospital based infection, number of days of availability of drugs during admission, Patient related factors such as insurance status of patients (NHIS/fee for service) (Younis, 2004), the type of wards patient was admitted (e. g side wards/ general wards)(Zhu et al. 2009) and malnutrition (Brantervik et al. 2005). Delay to surgery contributes to increasing length of stay also (Siegmeth et al. 2005). The nature (type) of surgery, whether it is elective or emergency could affect LOS of patients. Elective surgical patients had shorter hospital stay, while discharges of high-risk emergency patients are postponed (Schwierz et al. 2011). Prolonged preoperative stay, coincident remote site infections, colonization (in particular, nares colonization with *S. aureus*), diabetes, cigarette smoking, use of systemic steroids, obesity (body mass index $\geq$ 30 kg/m^2), extremes of age, poor nutritional status, and perioperative blood transfusion have all been shown to increase the risk of surgical site infection (Dindo et al. 2003; Lindhout et al. 2004; Weber, 1995).

One of the potential drivers of the costs of care may be the quality of care coordination and the overall efficiency of the hospital environment (Tara et al. 2011). To date there is increasing pressure on surgeons to minimize the time that the patients stay in hospital (Hari, 2010). Surgical site infections lead to an average increase in the length of hospital stay of 4–7 days (W H O, 2009).

Increase in co-morbidities in ASA groups three and four has been reported compared with groups one and two (Siegmeth et al. 2005). Malnutrition must be diagnosed early on, as it is an independent risk factor for morbidity and mortality, and prolongs the length of hospital stay (Goiburu et al. 2006).

Patients hospitalized with a primary diagnosis of cancer have a higher severity of illness, longer LOS, greater hospital costs, and poorer outcomes than those of non-

oncology controls. Utilizing cost-effective therapy, decreasing length of stay, and decreasing morbidity and mortality could have a significant impact on hospital resources spent on patients with cancer.

2.4 Direct cost of hospital stay to surgical inpatients

In developed countries impact of health care financing is reduced because various health insurance schemes are available which tends to off-set a greater part of the hospital bills. Health care financing has been a problem in Sub – Saharan Africa in the last two or three decade because of the continuous increase in price of goods and services, shrinking budgetary resources, increase demand for health services and rising health care cost (Anyaehie and Nwobodo, 2004). In Nigeria, National Health Insurance Scheme was established in 1999 by the Federal Government of Nigeria to improve health care security system that guarantees the provision of needed health services to persons on the payment of contributions at regular intervals (Onwujekwe et al. 2009). However, only few can benefit from the scheme till date. Therefore, it is important to determine the pattern of hospital bills and common causes of unnecessary increase of the bill among surgical patients, in order to determine ways to reduce this financial burden.

Health care expenditures often place a significant burden on the financial sustainability of households (Leive and Xu, 2008). This is especially so in resource-poor settings where effective coverage of health insurance schemes are lacking and out-of pocket expenditure is the common form of health care financing (Leive and Xu, 2008; Onwujekwe et al. 2009). Out-of pocket health expenses are common in sub Saharan Africa and other developing countries and it has been heavily criticized due to its negative impact on health equity and access, healthcare uptake or utilization, and the cost-effectiveness of the healthcare system (Leive and Xu, 2008; Wiesmann and Jütting, 2000). Many factors have been postulated to affect the financial sustainability of households. For example, preventive services like immunization and outpatient care may have limited effect on health care expenditure while hospital stay and curative services like surgical intervention may be more burdensome on the finances of the recipient and the entire household (Mondal et al. 2010). In addition the reason for seeking health care and where health care was received in the rural or urban areas have implications for health care expenditures (Ezeoke et al. 2012).

The premise has been that by discharging patients more quickly, hospitals reduce overall health care costs, even if patients continue to receive care on an outpatient basis, because such care is assumed to be less expensive (Schwartz and Mendelson, 1991). The bulk of health care expenses take the form of overhead, or they are incurred early in patients' hospital stays. This comes as no surprise to practicing physicians who recognize that the early phase of care involves expensive diagnosis and intervention, while the final days are essentially recuperative (Taheri et al. 2000).

Reducing the length of stay releases capacity in the system but requires proactive planning of the whole process of care, as well as active discharge planning. This can be achieved by having a clear pathway of care or flow model through the system for particular conditions. These pathways of care should also include an estimated date of discharge, which the patient must be aware of (Stewart, 2003). Delay in surgery because of staffing problems or lack of operating time affects all aspects of hospital management and patient care (Siegmeth et al. 2005).

Hospital stay can drain the patients financially (Stewart, 2003). Other than increased health care expenditure there is an increased risk of nosocomial infections (Rubin, 2006), adverse drug reactions can occur particularly with intravenous drug use and complications related to other invasive procedures. These risks have been shown to increase with increasing duration of hospital stay (Empey, 2010; Harrison and Escobar, 2010). This will further increase health care expenditure. Higher ASA has been found to be associated with high cost of care (Daabiss, 2011). Variables that describe patient treatment activities, administrative processes, testing procedures and general operational attributes involving various departments of a healthcare organization can provide decision makers with vital information regarding resource effectiveness in patient care (Kudyba and Gregorio, 2010).

2.5 The American Society of Anaesthesiologists (ASA) physical status classification of preoperative patients

In 1941, a committee of three physicians: Meyer Saklad, Emery Rovenstine and Ivan Taylor were asked to study, examine, experiment and devise a system for the collection and tabulation of statistical data in anaesthesia to allow anaesthesiologists to record the overall health status of a patient prior to surgery and, thereby, allow patients outcome to be stratified by a general assessment of illness severity (Saklad, 1941). While their mission was to determine predictors for operative risk, they quickly

dismissed this task as being impossible to devise. ASA proposed the physical status classification of preoperative patients for anaesthetic risk assessment in 1963 (Dripps, 1963).

The ASA score is a subjective assessment of a patient's overall health that is based on five classes (I to V).

I. Patient is a completely healthy fit patient.
II. Patient has mild systemic disease.
III. Patient has severe systemic disease that is not incapacitating.
IV. Patient has incapacitating disease that is a constant threat to life.
V. A moribund patient who is not expected to live 24 hour with or without surgery.

E. Emergency surgery, E is placed after the Roman numeral.

Since inception it has been revised on several occasions and an 'E' suffix was included denoting an emergency case. Being simple and widely understood, ASA score also has been used in policy making, performance evaluation as an easy tool for audit, resource allocation, reimbursement of anaesthesia services and frequently is cited in clinical research as well (Daabiss, 2011).

The ASA classification is an assessment of the patient's preoperative physical status. On its own, the ASA classification of physical status is not a predictor of operative risk. Operative risk is a combination of: the physical status of the patient; the physiological derangement that the procedure will cause; the skill and experience of the operator; the skill and experience of the anaesthetist (including the choice of anaesthetic); and the physiological support service in the peri-operative period (including pre-operative optimisation and critical care) (Fitz-Henry, 2011).

In addition, the ASA score had been found in some studies to be a strong predictor of postoperative resource utilization and mortality in numerous surgical fields. It was significantly related to the incidence of postoperative death in a group of 3,438 elective total hip and Total Knee Arthroplasty (TKA) patients with class III patients were more likely to encounter postoperative death as compared to patients with lower ASA scores (Rauh and Krackow, 2004).

2.6 Wound healing and surgical procedures

Wound healing is a highly regulated and complex process, consisting of four stages (haemostasis, inflammation, proliferation and remodelling using the terminology of and requiring the coordination of the activities of many chemical and cellular species. Haemostasis typically lasts for a few hours and involves the control of blood loss in the damaged region. The inflammation stage lasts several days and coincides with inflammatory cell migration into the wound space and the release of chemical factors such as vascular endothelial growth factor (VEGF). These chemicals provide the stimulus that ultimately leads to the formation of new blood vessels (angiogenesis), an important step in the proliferative stage of healing. During this healing phase, there is a surge in the proliferation rate of fibroblasts, endothelial and epithelial cells and the rate at which collagen is deposited by fibroblasts (Jeffcoate et al. 2004). The final stage of healing sees the wound increase in tensile strength via remodelling of the extracellular matrix. The healing process is tightly regulated by many factors including oxygen supply and new capillary development (Grey and Harding, 2006). Honey dressings make wounds sterile in less time, enhance healing, and have a better outcome in terms of hypertropic scars and post-burn contractures (Singh et al. 2011). A chronic wound is one which either fails to proceed through an orderly and timely process to produce anatomic and functional integrity, or proceeds through the repair process without establishing a sustained anatomic and functional result (Lazarus et al.1994). A recent estimate suggests that the US health care system spends in excess of US$25 billion annually treating patients with non-healing wounds (Sen et al. 2009). Chronic non healing wound can lead to further increase in the cost of care of surgical inpatients (Sen et al. 2009).

2.7 Uses of investigations in Surgery

Traditionally, routine investigations prior to surgery are considered an important element of pre-anaesthetic evaluation to determine the fitness for anaesthesia and surgery. During past few decades this practice has been a subject of close scrutiny due to low yield and high aggregate cost (Kumar and Srivastava, 2011). The results suggest that unnecessary laboratory testing during preoperative preparation of patients is still common. A substantial excess cost is incurred due to this. There is ample opportunity to rationalize testing practice and decrease testing related

costs without altering outcome (Ranasinghe et al. 2010) Unnecessary over investigation may have adverse effect on patients care (Klein and Arrowsmith, 2010). Laboratory and radiological investigations are also done post surgery to monitor patients.

2.8 Hospital bed occupancy

Beds are one of the most useful resources in hospitals. Availability of beds may largely affect the access to healthcare facility and patient safety. For instance, patients from ambulance could be delayed in the waiting area of the emergency department for a long period due to lack of beds. Patients with scheduled surgeries may have to cancel their appointments for the similar reason. All the above situations have negative impacts on the service level and patient safety. Hospital-wide speaking, shortage of beds not only causes crisis inside the inpatient department, it also significantly impacts the functionality of other departments, for example, overcrowded emergency department due to long awaited admissions, waste of operating theatre slots due to surgery cancellation. On the other hand, more than enough beds cause a waste of hospital resource and pose additional financial burden upon the hospital. Therefore, how to manage the beds in a hospital to keep a balance between service level and cost efficiency is an important task to many healthcare service providers.

Bed management is a challenging task in many aspects. The needs for beds are highly fluctuating. The admission rate varies by hour of the day, day of the week. A sudden surge of admission may lead to a temporary shortage of beds. Another source of variation is the length of stay. The distribution of the length of stay is highly skewed by long stay patients. This also affects the availability of beds negatively. In addition to the variations existing in the practice of bed management, some policies may affect the availability of beds as well. For instance, it is a common practice to separate the beds into different classes in purpose of service differentiation. Such a policy could cause the imbalance of resource utilization among different classes. Some classes are out of beds while some classes have surplus empty beds. Besides all the challenges mentioned above, healthcare service providers are also burdened with the pressure of the increasing demand of beds due to population growth and aging society.

Good bed management will help to solve the overcrowding in emergency department. The admission and discharge activities throughout a day were studied. Mismatch between the two activities was observed, the cyclical fluctuation of

admission/discharge among different weekdays was also observed. (Proudlove et al. 2003) How to manage the elective and emergency demand to smooth the fluctuation of demand in beds has also been studied (Scott, 2010). Strategies to reduce the demand of beds including reforming patient flow, reducing readmission rates, and early patient discharge and good bed management process have been documented (Jennifer et al. 2000). Healthcare system engineering methods was used to identify the root causes of delay in patient discharge. Design and management of patient discharge process to accelerate the whole process has been studied. In the study of the relationship between delayed discharge and the cost of bed occupancy it was found that it was cost effective to discharge earlier (Barton et al. 2010).

CHAPTER THREE
MATERIALS AND METHOD

3.1 Study area

The study was carried out at the University College Hospital (UCH), Ibadan. UCH is a tertiary health institution with eight hundred and fifty beds which serves as referral centre for other hospital within and outside Oyo state. The hospital has 60 service and clinical Departments and runs 131 consultative out-patient clinics a week in 50 specialty and sub-specialty disciplines.

There are four major surgical wards in the hospital each accommodating minimum of 30 patients. There are seven operating theatres in the Main Theatre suites, two in the Gynaecology suites and one in Accident and Emergency. An average of 300 surgeries monthly out of which about 120 are electives under general anaesthesia are performed in these operating theatres. There are over 165 Hospital consultants and in-patient admissions exceed 10,000 while out-patient clinic attendances approximates to over 170,000 a year (Adekunle et al. 2010). It is thus an ideal tertiary institution for training in all specialities.

The Health Records Department of the University College Hospital, Ibadan is made up of a central record and about 14 units. The central record serves administrative purpose. It is also the usual place where new case notes are retrieved and reference numbers are assigned. Case notes of patients who have not visited the hospital for about ten years are also kept in the central records. Recently retrieved case notes from the wards are also received there before sending them to the assigned units. The other units of the department serve designated clinics. The other places where health records are located include Surgery clinic, Opthalmology clinic, Children outpatient clinic, Medical outpatient clinic, Gynaecology clinic General outpatient clinic, Psychiatry clinic, Radiotherapy department, palliative care centre, staff clinic, Metabolic research ward, Accident and emergency, Otunba Tunwase Children Emergency Ward.

The pattern of flow of case notes of surgical inpatients is usually from the theatre to the wards and from the wards after discharging the patients to the central records where they are sent to the surgery records.

3.2 Study design

A retrospective review of records of inpatients that had surgery from January to December, 2010 in the University College Hospital, Ibadan was conducted.

3.3 Inclusion criteria

From available records a total of 3,312 patients had surgery in the main theatre of University College Hospital, Ibadan from January to December 2010. In all, 1,571 patients were in the inclusion criteria out of which only 420 case notes were available at the surgical outpatient unit of the Health Records Department. Patients in the inclusion criteria were patients that had General Surgery, Paediatric Surgery, Plastic Surgery, Urology, Orthopaedics and Neurosurgery. These groups of patients are primarily categorised into Surgery Department.

3.4 Exclusion criteria

Patients that were excluded include surgical patients who had day cases and those whose case notes are not usually kept at the surgical outpatient unit of the Health Records Department. The patients were admitted in other department entirely. They were as listed below with their respective number.

1. Ear Nose and Throat (ENT) patients (211).
2. Ophthalmology patients (332).
3. Obstetrics and Gynaecology patient (398).
4. Patients that were from the private suit of the hospital (24).
5. Patient that had day case surgery (776).

3.5 Data collection

A semi-structured pro-forma was used to extract variables needed from the case notes (See Appendix) The hospital numbers of surgical patients seen from January to December, 2010 were obtained from the main operating theatre's surgery register. The register contained the hospital number, name, age, sex, operation done and surgeon, anaesthetist and type of anaesthesia. The hospital number collected was used to locate patient's case notes from the record unit of the Surgery outpatient clinic.

The pro-forma obtained information on socio-demographic variables, admission and surgical processes, peri-operative and post-operative conditions and duration of hospital stay. LOS was determined from the day of admission to the moment of discharge or Discharge Against Medical Advice (DAMA).

The cost of patient case notes, consultations, surgery, anaesthesia, investigations and other related bills were extracted from the hospital`s price list. Costs of laboratory investigations were estimated by collating all the available investigation result seen in the case note and the price were checked from the hospital`s price list. Cost of drugs were based on the hospital cost of each drugs prescribed before and after surgery. This was done by contacting the hospital pharmacy. Cost of consumables like syringes and needle were imputed from the number of times intravenous drugs were used. Costs of intravenous cannulars were based on the approximate number of times it was changed during admission. All the costs were calculated by using the hospital billing documents at the period studied. Daily charges of bed fee and feeding fee were calculated and multiplied by the total number of days spent on admission. The case notes were scrutinized for every duplicate copy of receipt or bank teller seen and any record of payment. Summation of all the cost was done to estimate the direct cost of patient care. Each pro forma took an average of thirty minutes to be completed. Two male research assistants with Ordinary National Diploma (OND) in Health Information Management were trained for two days to assist with data collection. The research assistants were supervised daily. Data was collected from January to March, 2012.

3.6 Data management

Data was entered, cleaned and analysed with SPSS version 15 to generate frequencies, proportions, associations between variables of interest, Median discharge time and Predictors of prolonged hospital stay.

The dependent variables were:

1. The median length of hospital stay.
2. LOS categorized into normal or prolong.
3. The direct cost of hospital stay.
4. Reason for patient exit from the hospital e.g stable and discharged and Discharge Against Medical Advice, death.

The independent variables included:

1. Socio-demographic variables including age, sex, marital status, religion, level of education, occupation.
2. Case specific variables e.g diagnosis type of surgery done, co morbidities, anaesthesiologists grading i.e. American Society of Anaesthesiologists (ASA) grading of patients physical status pre operative.

Socio-demographic variables e.g sex, marital status, religion and occupation were presented as proportions. Continuous socio-demographic variable e.g age was categorised and presented as proportion. Cost of care was summarised as means with standard deviation. Skewed continuous variable like age and LOS was summarised using median and inter quartile range. Data was presented using frequency tables, and charts.

LOS was categorised into Normal and prolonged using a cut off of ≤7days and >7 days. This cut off is similar to what was used to categorise a set of surgical inpatients studied in the Niger delta area of Nigeria (Dienye et al. 2011). Chi-square test was used to test for association between categorical variables and LOS. Logistic regression analysis was used to know the determinants of prolonged LOS. Variables that were significant at 20% were introduced into the logistic regression model. Pearson correlation was used to determine the correlations of selected variables with LOS. The Student t–test and Analysis of variance (ANOVA) were used to compare mean cost of care across selected variables. Linear regression analysis was used to identify the determinants of cost of care. Level of statistical significance was set at 5%.

3.7 Ethical considerations

- Consent: Approval for the study was gotten from the UI/UCH ethical review Committee.
- Permission for the study was received from the Chairman Medical Advisory Committee of UCH, Ibadan.
- Confidentiality: Data collected was used only for research purposes and was kept confidential on a password protected computer. Names and addresses were not included in the data collection instrument and thus collected data cannot be linked with any person.
- Beneficence: Findings of the study will be relayed to the Hospital Management, submitted for the award of Masters of Science in Epidemiology and Medical Statistics of University of Ibadan and published in a peer review journal. The study will help in decision making on ensuring optimal surgical patient management in the University College Hospital, Ibadan.

3.8 Operational definitions

For the purpose of this study the following operational definitions were used.

Day Surgery: Surgery done on the same day the patient arrives the hospital, he/she has the operation and goes home on the same day.

Elective surgery: Operations that are planned in advance.

Emergency surgery: Operations that require immediate admission to the hospital, usually through the accident and emergency department. They are usually performed within 24 hours, and may be done immediately or during the night for serious or life-threatening conditions. Examples include acute appendicitis; haemorrhage, perforation or obstruction of the intestines; major trauma, including many fractures; and a ruptured spleen or aneurysm.

LOS: referred to the total days of hospitalization per patient from the day of admission to discharge.

Normal LOS: Patients with length of stay less than seven days from the day of admission to the day of discharge were categorized as spending normal stay

Prolonged LOS: Patients spending more than seven days from the day of admission to the day of discharge were categorized as spending prolonged stay.

CHAPTER FOUR

RESULTS

Out of 3,312 patients that had surgery in the main theatre of University College Hospital, Ibadan from January to December 2010, only 1,571 cases met the inclusion criteria. In all, 420 case notes were available and retrieved out of which 16 case notes contained incomplete information on key variables of interest. Only 404 case notes were analysed, while the remaining 1,167 were not. However, the mean age of analysed cases when compared with un-analysed cases had no significant difference as shown in table 1. The Sex distributions of analysed and un-analysed cases are as showed in table 2, no significant difference exists in the two groups.

Table 1: Comparison of mean age between analysed and un-analysed case notes

Variable	*Age in years*	*t-test*	*P-value*
	Mean ± Standard deviation		
Age(N)			
Age of analysed cases (404)	30 ± 20	1.327	0.185
Age of un-analysed cases (1167)	28 ± 18		

Table 2: Sex distribution between analysed and un-analysed case notes

Variable	*Analysed Cases*	*Un-analysed Cases*	*Chi-square*	*P-Value*
Sex				
Male	257(63.6%)	745(63.8%)	0.007	0.935
Female	147(36.4%)	422(36.2%)		

4.1 Socio-demographic characteristics of patients

Table 3 shows the Socio-demographic characteristics of patients. The median age of patients was 30 years with inter-quartile range of 13-42 years. Most patients 88(21.8%) were between 30 to 39 years, males were 257(63.6%). Currently married patients were 183(45.3%). More than half were Christian 261 (64.6%) while students were 125(30.9%).

Table 3: Socio-demographic characteristics of patients

Variables	*Frequency N=404*	*Percent*
Age group		
0-9	74	18.3
10-19	56	13.9
20-29	64	15.8
30-39	88	21.8
40-49	52	12.9
50-59	26	6.4
60 and above	44	10.9
Sex		
Male	257	63.6
Female	147	36.4
Marital Status		
Single	208	51.5
Married	183	45.3
Widow(er)	13	3.2
Religion		
Christianity	261	64.6
Islam	143	35.4
Occupation		
Student	125	30.9
Business/Trader	85	21.0
Civil Servant	61	15.1
Infant/Child	43	10.6
Others*	20	5.0
Retired Civil servant	16	4.0

*Others were house wives, clergies, and farmers

4.2 Department/unit of patient entry into UCH

Figure 1 below shows the department/unit of patient entry into UCH.

Most patients were first seen at the Surgical out Patient (SOP) 178 (44.1%) while 16(4.0%) were first seen at the Medical out Patient (MOP), others 22(5.4%) were first seen at Children out Patient (CHOP), Gynaecology Clinic, Staff Clinic and Eye Clinic

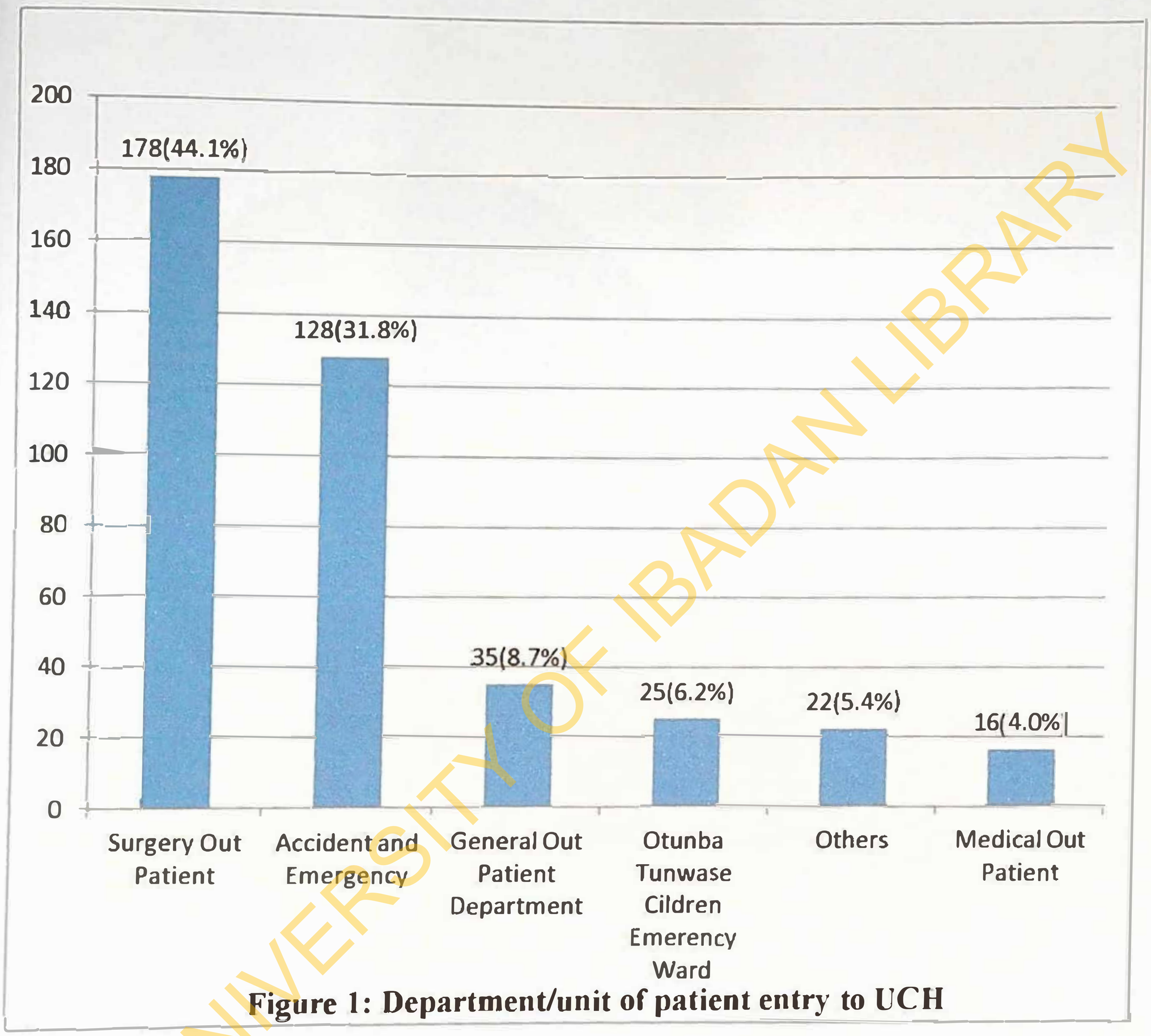


Figure 1: Department/unit of patient entry to UCH

*Others were Children out Patient, Gynaecology Clinic, Staff Clinic and Eye Clinic

4.3 Duration of main symptoms before presentation

Figure 2 shows the duration of main symptoms before presentation. More than half 280(69%) of patients had their main symptom for less than 6 months before presenting in the hospital while 86(21%) had the symptom for 1 year or more.

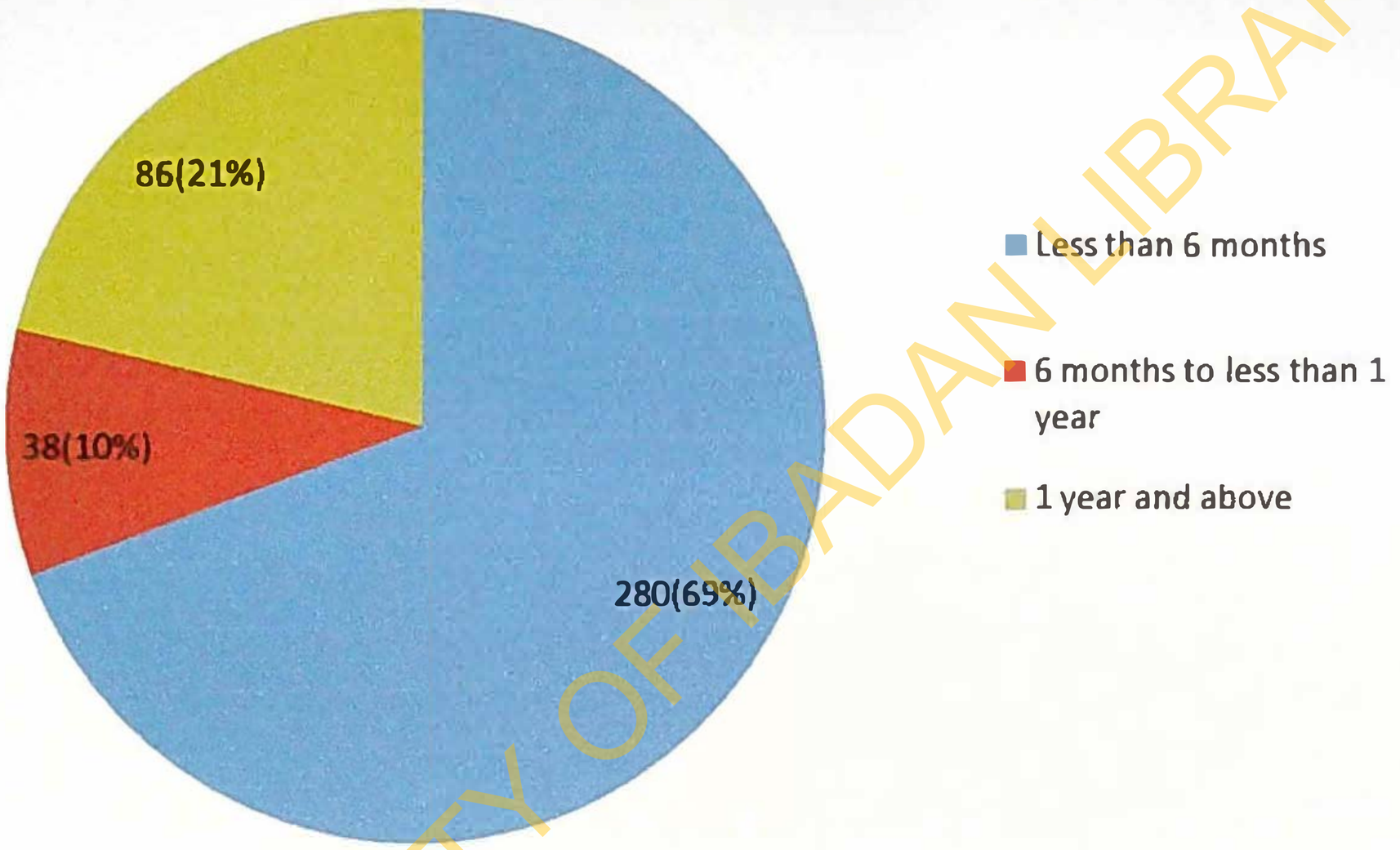


Figure 2: Duration of main symptoms before presentation

4.4.1 Surgical characteristics of patients

Table 4 shows the surgical characteristics of patients. More than half 216(53.5%) had Elective Surgery while 188(46.5%) had Emergency Surgery. General surgery group were 209(51.7%) while Neurology was 40(9.9%). Surgery on the Thorax and Abdomen were done in 151(37.4%) patients. Almost half of the surgeries were done by consultants 199(49.3%). In all 42(10.4%) patients had their surgeries delayed or postponed from the initial surgery date recorded in the patient's case notes.

Table 4: Surgical characteristics of patients

Variables	*Frequency N=404*	*Percent*
Surgery type by group		
Elective Surgery	216	53.5
Emergency Surgery	188	46.5
Surgery group		
General	209	51.7
Orthopaedics	56	13.9
Urology	41	10.1
Plastic	58	14.4
Neurology	40	9.9
Anatomical location of surgical procedure		
Head/neck	77	19.1
Upper limbs	41	10.1
Thorax/abdomen	151	37.4
Perineum	92	22.8
Lower limb	43	10.6
Rank of Surgeon		
Consultant	199	49.3
Resident	205	50.7
Delayed/Postponed surgery		
Yes	42	10.4
No	362	89.6

4.4.2 Reasons for delayed or postponed surgery

The reason for the delay or postponement is as showed below in figure 3. Among the 42(10.4%) patients who had their surgeries delayed or postponed from the initial surgery date recorded in the patient's case notes 24 (5.9%) had delayed surgery due to lack of funds. The remaining reasons were as shown in figure 3.

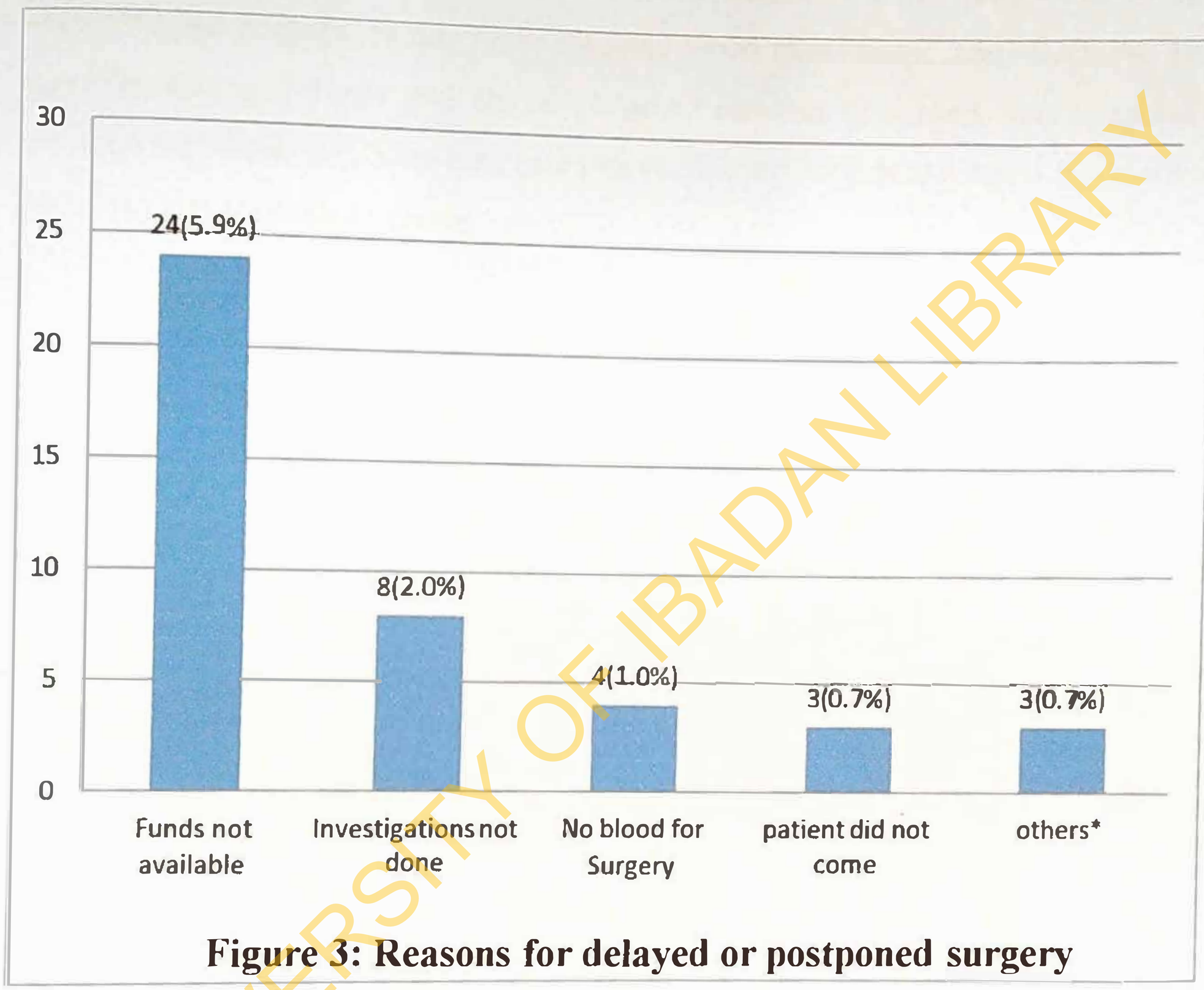


Figure 3: Reasons for delayed or postponed surgery

*Others were no space in the theatre, faulty anaesthetic machine, and patient lateness for admission.

4.4.3 Anaesthesia, Number of drugs prescribed during hospital stay, blood transfusion, duration of surgery in hours, estimated blood loss during surgery

Table 5 shows Anaesthesia, Number of drugs prescribed during hospital stay, blood transfusion, duration of surgery in hours, estimated blood loss during surgery. More than half had General Anaesthesia 281(69.6%). Concerning the number of drugs prescribed during hospital stay 52(12.9%) had only one drug while close to half 182(45%) had 2 drugs. In all, 79(19.6%) had blood transfusion. Only 23(5.7%) had surgeries lasting 3 hours and above. However duration of surgery was adequately recorded for 91 patients. Less than half 196(48.5%) lost 100mls and below blood while 19(4.7%) lost 1000mls or above.

Table 5: Anaesthesia, Number of drugs preseribed during hospital stay, blood transfusion, duration of surgery in hours, estimated blood loss during surgery.

Variables	*Frequency n=104*	*Percent*
Anaesthesia		
General Anaesthesia	281	69.6
Local Anaesthesia	74	18.3
Other types of Anaesthesia	49	12.1
Number of drugs prescribed during hospital stay		
1	52	12.9
2	182	45.0
3	93	23.0
4 and above	77	19.1
Blood transfusion		
Yes	79	19.6
No	325	80.4
Duration of surgery in hours*		
≤1hour	21	5.2
Above 1 hour and less than 3 hours	47	11.6
≥3 hours	23	5.7
Estimated blood loss during surgery		
Less than100 mls	196	48.5
100mls and above to below 500 mls	136	33.7
500mls and above to below 1000 mls	53	13.1
1000 mls and above	19	4.7

Other types of anaesthesia were spinal, regional block, and conscious sedation.

*n=91

4.4.4 American Society of Anaesthesiologist (ASA) grading before surgery

Figure 4 shows the American Society of Anaesthesiologist (ASA) grading of physical status of patients before surgery. More than half 227(56.2%) had ASA I while higher ASA were assigned to lesser patients ASA II [99(24.5%)], ASA III [68(16.8%)], ASA IV [10(2.5%)]

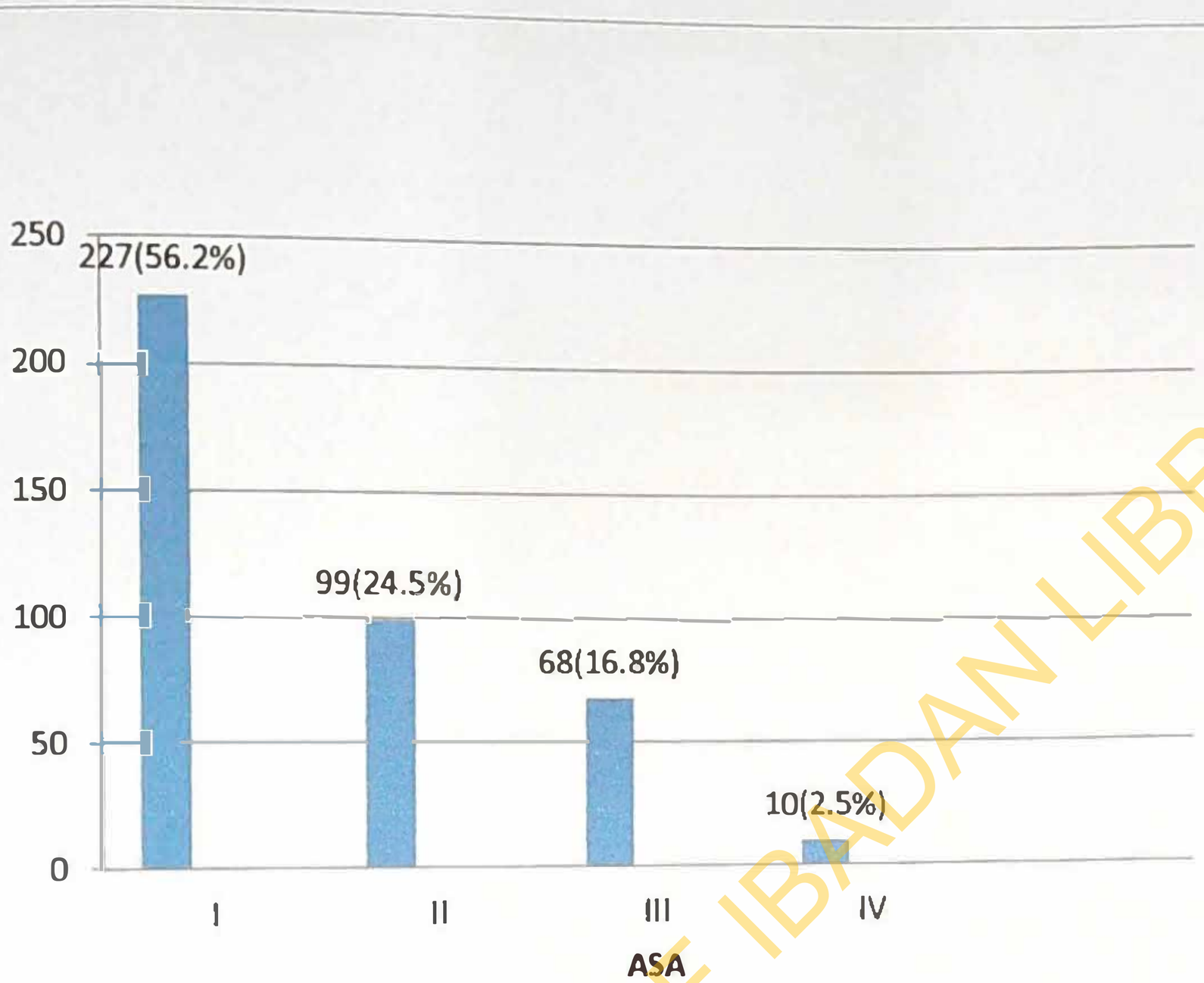


Figure 4: American Society of Anaesthesiologist grading before surgery

4.4.5 Investigations documented before and after surgery

Table 6 shows the Investigations documented before and after surgery. The majority 386(95.5%) had Laboratory investigations, 211(52.2%) had two laboratory investigations documented. Radiological investigations were done by 158(39.1%). In all 120(29.7%) had one radiological investigation. Combining laboratory and radiological investigations 173(42.8%) had two investigations done.

Table 6: Investigations documented before and after surgery

Investigations	*Frequency N=404*	*Percent*
Laboratory investigations		
Yes	386	95.5
No	18	4.5
Number of Laboratory Investigations documented		
Nil	18	4.5
1	56	13.9
2	211	52.2
3	94	23.3
4 and above	25	6.1
Radiological Investigations		
Yes	158	39.1
No	246	60.9
Number of Radiological Investigation documented		
Nil	246	60.9
1	120	29.7
2	36	8.9
3	2	0.5
Total Number of Investigations Documented (Radiology and laboratory)		
1	32	7.9
2	173	42.8
3	132	32.7
4 and above	67	16.6

4.4.6 Total cost of Care

Table 7 shows the total cost of care in three categories. The mean cost of care was ₦66,938 ± 31,983. Categorising the total cost of care shows that 142(35.1%) spent less than ₦50,000 while close to half 199(49.3%) spent between ₦50,000 and ₦100,000.

Table 7: Total cost of Care

Cost	*Frequency N=404*	*Percent*
Less than ₦50,000	142	35.1
₦50,000-less than ₦100,000	199	49.3
₦100,000 and above	63	15.6

4.4.7 Reason for patient exit from admission

Figure 5 shows the reason for patient exit from admission 6(1.5%) were Discharged Against Medical Advice (DAMA) while the majority 398(98.5%) were discharge when deemed fit by the managing team.

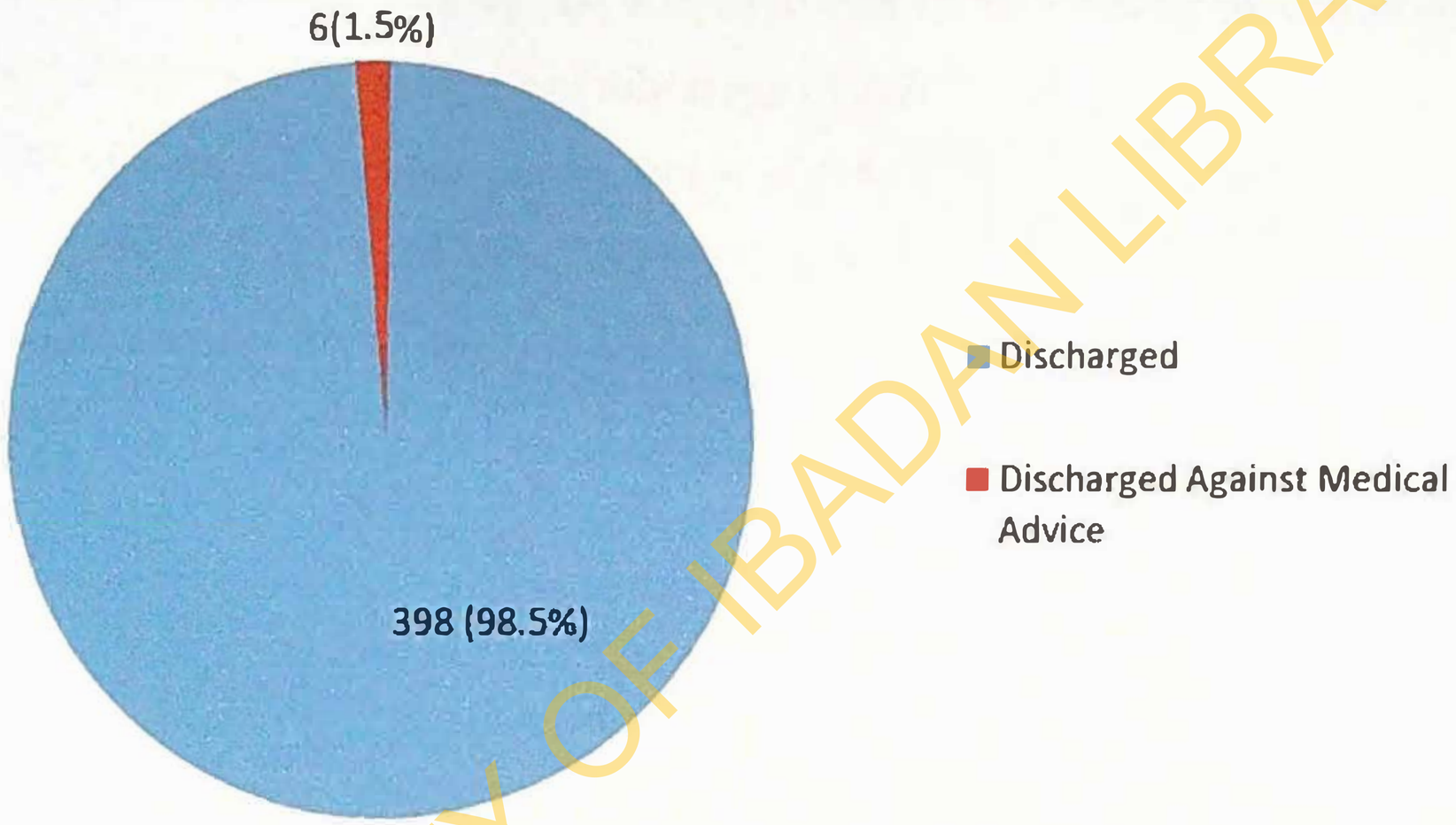


Figure 5: Reason for patient exit from admission

4.5 Median duration of stay of days between first visit and admission, admission to surgery, surgery to discharge and total LOS in different surgical groups

Table 8 shows the median duration of stay of days between first visit and admission, admission to surgery, surgery to discharge and total LOS in different surgical groups.

The overall median LOS was 11 days with an inter-quartile range of 5-20 days Median days between first visit and admission were 29 days with an inter-quartile range of 0-99 days among patients who had Urological Surgery while the median was zero days among patient who had Neurological Surgery with an inter-quartile range of 0-22 days.

Median days between the day of admission to surgery was 4 days with an inter-quartile range of 1-9 days among patients who had Orthopaedic Surgery.

Median days spent between surgery and discharge was 12 days among patient who had Neurological Surgery with an inter-quartile range of 7-20 days.

Median LOS of 8 days and inter-quartile range of 4-16 days was found among patients who had Urological Surgery while Neurological patients had a median LOS of 17 days and inter-quartile range 11-27 days.

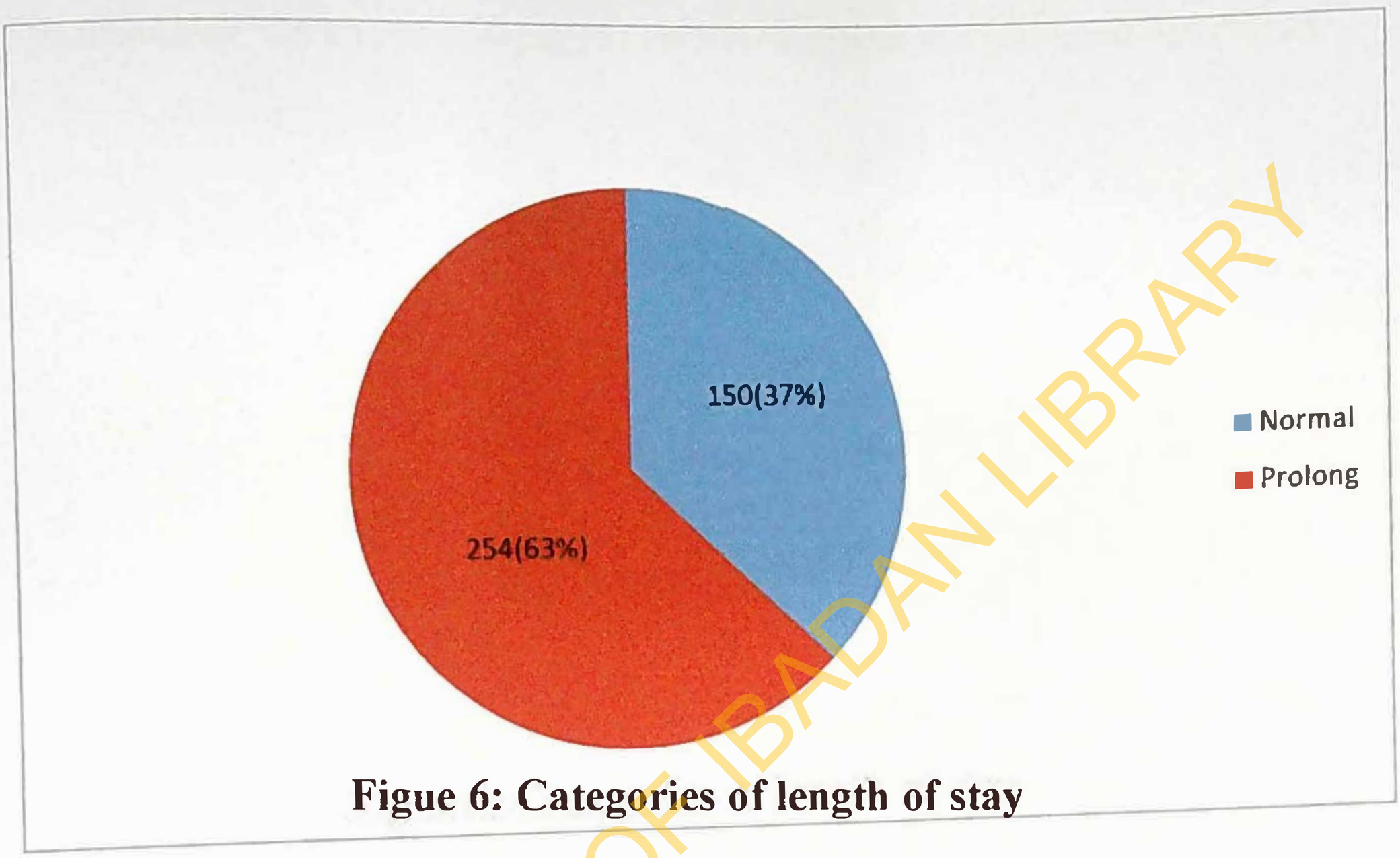
Table 8: Median duration of various periods encountered in different surgical groups

Duration	*All Cases (Overall) Median (Q_1-Q_3)**	*General Surgery Median (Q_1-Q_3)**	*Orthopaedic Surgery Median (Q_1-Q_3)**	*Urological Surgery Median (Q_1-Q_3)**	*Plastic Surgery Median (Q_1-Q_3)**	*Neurological Surgery Median (Q_1-Q_3)**
Days between first visit and admission	3 (0-57)	3 (0-49)	3(0-57)	29(0-99)	1(0-60)	0(0-22)
Days spent from admission to surgery	2(1-7)	2(0-7)	4(1-9)	1(0-5)	3(1-7)	2(1-6)
Days spent from surgery to discharge	6(2-11)	6(2-10)	8(3-14)	5(1-9)	5(1-12)	12(7-20)
LOS	11(5-20)	10(4-18)	14(6-24)	8(4-16)	10(5-20)	17(11-27)

*(Q1-Q3) means inter-quartile range

4.6 Categories of Length of Stay

Figure 6 shows the categories of LOS. Patients who spent ≤7days on admission 150(37%) were categorised to have spent normal duration while 254(63%) spent > 7 days on admission and they were categorised to have had prolonged stay.



Figue 6: Categories of length of stay

4.7 Relationship between socio-demographic variables and LOS

Table 9 shows the relationship between socio-demographic variables and LOS. Among patient less than 40 years 121 (62.4%) had prolonged stay, almost the same number of patient 133 (63.3%) had prolonged stay among those that were 40 years and above. This difference is not statistically significant P >0.05. A higher proportion of Christians 103(72.0%) compared to 151 (57.9%) Muslims had prolonged stay P<0.05.

Table 9: Table showing relationship between socio-demographic variables and LOS

Variables	*Normal* *N (%)*	*Prolonged* *N (%)*	*Chi-Square*	*P- Value*
Age group				
Less than 40 years	73(37.6)	121(62.4)	0.40	0.841
40 years and above	77(36.7)	133(63.3)		
Sex				
Male	93(36.2)	164(63.8)	0.268	0.604
Female	57(38.8)	90(61.2)		
Marital Status				
Single	77(37.0)	131(63.0)	1.646	0.439
Married	66(36.1)	117(63.9)		
Widow(er)	7(53.8)	6(46.2)		
Religion				
Christianity	110(42.1)	151(57.9)	7.950	0.005
Islam	40(28.0)	103(72.0)		
Occupation				
Artisan	12(22.2)	42(77.8)	8.281	0.281
Business/Trader	29(34.1)	56(65.9)		
Civil Servant	24(39.3)	37(60.7)		
Infant/Child	20(46.5)	23(53.5)		
Retired Civil servant	7(43.8)	9(56.3)		
Student	49(39.2)	76(60.8)		
Others*	9(45.0)	11(55.0)		

Others* were house wives, clergies and farmers.

4.7.1Relationship between the department/unit of patient entry and LOS

Table 10 shows the relationship between department/unit of patient entry and LOS. Prolong stay were recorded in 95(74.2%) of patients that were first seen at the Accident and Emergency unit of the hospital while it was 94(52.8%) of those seen at SOP, P<0.05.

Table 10: Relationship between the department/unit of patient entry and LOS

Variable	*Normal* N (%)	*prolonged* N (%)	*Chi-Square*	*P- Value*
Department/unit of Entry				
Accident and Emergency	33(25.8)	95(74.2)	16.467	0.006
GOPD	11(31.4)	24(68.6)		
MOP	7(43.8)	9(56.3)		
OTCHEW	7(28.0)	18(72.0)		
SOP	84(47.2)	94(52.8)		
Others*	8(36.4)	14(63.6)		

Others* were Children out patient, Gynaecology Clinic, Staff Clinic and Eye Clinic

4.7.2 Relationship between duration of main symptom(s) before presentation, surgery type, surgery group, anatomical location, rank of surgeon and whether patient had delayed/postponed surgery and LOS

Table 11 shows the relationship between selected surgical characteristics and LOS. In all 141(75.0%) of patients that had emergency surgery spent more than 7 days compared with 113(52.3%) of those who had elective surgery $P< 0.05$. The majority of patients that had Neurological Surgery 35(87.5%) had prolonged stay while almost half 20(48.8%) of Urologic Surgery patients had prolonged stay $P<0.05$. Of all patients who had surgery in the head and neck region 56(72.7%) had prolonged stay while 43(46.7%) patients with perinea surgery had prolonged stay $P<0.05$.

Table 11: Table showing relationship between duration of main symptom(s) before presentation, surgery type, surgery group, anatomical location, rank of surgeon and whether patient had delayed/postponed surgery and LOS.

Variables	*Normal N (%)*	*Prolonged N (%)*	*Chi-Square*	*P- Value*
Duration of main Symptom(s) before presentation				
Less than 6 months	96(34.3)	184(65.7)	3.501	0.174
6 months to less than 1 year	18(47.4)	20(52.6)		
1 year and above	36(41.9)	50(58.1)		
Surgery Type				
Elective	103(47.7)	113(52.3)	22.159	0.000
Emergency	47(25.0)	141(75.0)		
Surgery Group				
General Surgery	87(41.6)	122(58.4)	17.471	0.002
Orthopaedics	16(28.6)	40(71.4)		
Urologic Surgery	21(51.2)	20(48.8)		
Plastic surgery	21(36.2)	37(63.8)		
Neurosurgery	5(12.5)	35(87.5)		
Anatomical Location				
Head/neck	21(27.3)	56(72.7)	15.592	0.004
Upper limbs	17(41.5)	24(58.5)		
Thorax/abdomen	49(32.5)	102(67.5)		
Perineum	49(53.3)	43(46.7)		
Lower limb	14(32.6)	29(67.4)		
Rank of surgeon				
Consultant	66(32.2)	133(66.8)	2.638	0.104
Resident	84(41.0)	121(59.0)		
Delayed/postponed surgery				
Yes	11(26.2)	31(73.8)	2.402	0.121
No	139(38.4)	223(61.6)		

4.7.3 Association between Anaesthesia type, ASA, reason for exit, number of drugs, duration of surgery, blood transfusion, estimated blood loss and LOS.

Association between type of Anaesthesia, ASA, reason for exit, number of drugs, duration of surgery, blood transfusion, estimated blood loss and LOS are shown in table 12. The reason for exit from the hospital, the number of drugs documented during hospital stay, duration of surgery in hours, did not significantly affect the LOS. Patients with General anaesthesia had the highest proportion with prolonged LOS ($P<0.05$), patients who had ASA grade of higher value are more likely to spend more time on admission ($P<0.05$). Patients who had blood transfusion 64(81%) had prolonged LOS compared with 190(58.5%) of those who did not have blood transfusion ($P<0.05$).

Table 12: Association between Anaesthesia type, ASA, reason for exit, number of drugs, duration of surgery, blood transfusion, estimated blood loss and LOS.

Variables	*Normal N (%)*	*Prolonged N (%)*	*Chi-Square*	*P- Value*
Anaesthesia type				
General Anaesthesia	93(33.1)	188(66.9)	8.427	0.015
Local Anaesthesia	38(51.4)	36(48.6)		
Others	19(38.8)	30(61.2)		
American Society of Anaesthesiologist Grading(ASA)				
I	107(47.1)	120(52.9)	22.620	<0.001
II	26(26.3)	73(73.7)		
III	15(22.1)	53(77.9)		
IV	2(20.0)	8(80.0)		
Reason for exit from admission				
Discharged	148(37.2)	250(62.8)	0.038	0.604
Discharge Against Medical Advice	2(33.3)	4(66.7)		
Number of Drugs				
1	23(44.2)	29(55.8)	5.282	0.152
2	63(34.6)	119(65.4)		
3	41(44.1)	52(55.9)		
4 and above	23(29.9)	54(70.1)		
Duration of Surgery in hours (n=91)				
≤1 hour	8(38.1)	13(61.9)	0.787	0.675
>1-<3	14(29.8)	33(70.2)		
≥3	6(26.1)	17(73.9)		
Blood Transfusion				
Yes	15(19.0)	64(81.0)	13.845	<0.001
No	135(41.5)	190(58.5)		
Estimated Blood loss				
Less than 100 mls	87(44.4)	109(55.6)	16.364	0.001
100 to less than 500 mls	49(36.0)	87(64.0)		
500mls to less than 1,000 mls	13(24.5)	40(75.5)		
1,000mls and above	1(5.3)	18(94.7)		

4.7.4 Association between Investigations documented, cost of care and Length of Stay

Association between Investigations documented and Length of Stay is as shown in table 13. Request for laboratory or radiological investigations did not have significant effect on LOS. The Majority of those who had a total direct cost of care of ₦100,000 and above 62 (98.4%) had prolonged stay (P<0.05).

Table 13: Association between Investigations documented, cost of care and Length of Stay

Variables	*Normal*	*Prolonged*	*Chi-Square*	*P- Value*
	N (%)	*N (%)*		
Laboratory investigations				
Yes	145(37.6)	241(62.4)	0.706	0.401
No	5(27.8)	13(72.2)		
Radiological Investigations				
Yes	52(32.9)	106(67.1)	1.977	0.160
No	98(39.8)	148(60.2)		
Cost of Care				
Less than ₦50000	105(73.9)	37(26.1)	135.766	0.000
Between ₦50,000 and less than ₦100,000	44(22.1)	155(77.9)		
₦100,000 and above	1(1.6)	62(98.4)		

4.8 Correlation of selected variables with LOS

Correlation of selected variables with LOS is shown in table 14. LOS was found to have a weak positive correlation with duration of surgery r = 0.25 ($p<0.05$).

Table 14: Correlation of selected variables with LOS

Variables	*Pearson Correlation (r)*	*P-Value*
Age in years	0.044	0.374
Duration of Surgery	0.253	0.015
No of radiological investigations	0.089	0.074
No of laboratory investigations	-0.023	0.652
Total number of investigations	0.052	0.295
Number of drugs	-0.012	0.056

4.9 Determinants of prolonged LOS

As shown in table 15a and 15b, the determinants of prolonged LOS were Islamic religion [OR: 1.7 (1.04- 2.92)] versus Christianity, plastic surgery [OR: 4.5 (1.3-15.3)], emergency surgery [OR: 2.1 (1.2- 3.8)] versus elective surgery, ASA grade II [OR: 2.2 (1.2- 4.2)], and presence of blood transfusion [OR: 2.1 (1.01- 4.53)] versus no blood transfusion.

Table 15a: Determinants of prolonged LOS

Variables	*Odds Ratio*	*95% CI for EXP (B)*		*P- Value*
		Lower	*Upper*	
Religion				
Christianity	1.00			
Islam	1.745	1.044	2.915	0.034
Surgery Group				
General Surgery	2.779	0.873	8.839	0.083
Orthopaedics	1.335	0.542	3.293	0.530
Urology	1.641	0.747	3.605	0.218
Plastic surgery	4.544	1.348	15.321	0.015
Neurological Surgery	1.00			
Duration of symptoms before presentation				
Less than 6 months	1.00			
6 months to less than 1 year	0.745	0.325	1.708	0.487
1 year and above	1.213	0.661	2.227	0.533
Anatomical Location				
Head/neck	1.901	0.550	6.569	0.310
Upper limbs	1.551	0.510	4.710	0.439
Thorax/abdomen	2.198	0.654	7.388	0.203
Perineum	1.266	0.364	4.400	0.711
Lower limb	1.00			
Source of Entry				
Accident and Emergency	0.633	0.203	1.971	0.430
GOPD	1.581	0.447	5.586	0.477
MOP	0.815	0.195	3.405	0.779
OTCHEW	0.513	0.121	2.183	0.366
SOP	0.538	0.193	1.502	0.237
Others*	1.00			

Others* were Children Outpatient, Gynaecology Clinic, Staff Clinic and Eye Clinic.

Table 15b: Other determinants of prolonged LOS

Variables	*Odds Ratio*	*95% CI for EXP (B)*		*P- Value*
		Lower	*Upper*	
Surgeon				
Consultant	1.428	0.869	2.346	0.160
Resident	1.00			
Surgery type				
Elective	1.00			
Emergency	2.103	1.180	3.750	0.012
Delayed/postponed surgery				
Yes	1.971	0.867	4.479	0.105
No	1.00			
Anaesthesia				
GA	1.196	0.561	2.550	0.644
LA	0.780	0.319	1.906	0.586
Others	1.00			
Number of Drugs prescribed during hospital stay				
1	1.00			
2	1.420	0.677	2.980	0.353
3	0.906	0.396	2.074	0.815
4 and above	1.773	0.728	4.315	0.207
ASA Grading				
I	1.00			
II	2.214	1.179	4.158	0.013
III	1.928	0.940	3.954	0.073
IV	3.487	0.543	22.411	0.188
Estimated Blood loss				
<100	1.00			
100 to<500 mls	0.146	1.518	0.864	0.146
500-999mls	0.192	1.747	0.755	0.192
1000 and above	0.106	6.002	0.683	0.106
Blood Transfusion				
Yes	2.139	1.011	4.526	0.047
No	1.00			
Radiological Investigation				
Yes	1.056	0.622	1.794	0.839
No	1.00			

4.10.1 Comparison of mean cost of care across socio-demographic variables

The mean overall cost of care was ₦66,983 ± ₦31,985. Comparison of mean cost of care across socio-demographic variables is as shown in table 16. The overall mean cost of care is higher for patients 40 years and above ₦74,233 ± ₦31,422 compare to patient less than 40 years ₦59,136 ± ₦30,788 (P<0.05). The highest mean cost of care was paid by the married followed by the widow(er) and least among the singles (P<0.05). The mean cost of care was smallest among the infant/child (P<0.05).

Table 16: Comparison of mean cost of care across socio-demographic variables

Variables	*N*	*Mean± Standard Deviation* ₦	*Test statistic*	*P-Value*
Age group				
<40	194	59,136 ± 30,788	-4.872*	0.000
≥40	210	74,233 ± 31,422		
Sex				
Male	257	68,723 ± 33,118	1.448*	0.149
Female	147	63,941 ± 29,766		
Marital Status				
Single	208	60,868 ± 30,949	8.468**	0.000
Married	183	73,967 ± 31,986		
Widow(er)	13	66,517 ± 30,422		
Religion				
Christianity	261	64,834 ± 30,978	-1.830*	0.068
Islam	143	70,906 ± 33,501		
Occupation				
Artisan	54	80,465 ± 28,101	7.752**	0.000
Business/Trader	85	71,735 ± 30,740		
Civil Servant	61	65,524 ± 27,765		
Infant/Child	43	43,526 ± 23,734		
Retired Civil servants	16	76,713 ± 44,496		
Student	125	63,112 ± 31,700		
Others+	20	81,688 ± 35,243		

T-test *

F-test (ANOVA) **

Others+ were house wives, clergies and farmers

4.10.2 Comparison of mean cost of care across department/unit of patient entry to UCH

Table 17 shows the comparison of mean cost of care across department/unit of patient entry to UCH. Patients admitted via the Accident and Emergency had a total direct cost of care of ₦83,216 ± ₦32,018 followed by patients first seen at the MOP ₦64,616 ± ₦22,522

Table 17: Comparison of mean cost of care across department/unit of patient entry to UCH

Department / Unit of patient entry to UCH	*N*	*Mean± Standard Deviation ₦*	*Test Statistic*	*P-Value*
Accident and Emergency	128	83,216 ± 32,018	11.227**	0.000
GOPD	35	56,040 ± 23,577		
MOP	16	64,616 ± 22,522		
OTCHEW	25	58,823 ± 35,905		
SOP	178	60,393 ± 30,327		
Others	22	54,265 ± 22,770		

F-test (ANOVA) **

Others were Children Outpatient Clinic, Gynaecology Clinic and Eye Clinic

4.10.3 Comparison of mean cost of care across duration of main symptoms before presentation

Table 18 compares the mean cost of care with duration of main symptoms before presentation. Highest mean cost was found in patients whose duration of symptoms is for less than 6 months (P<0.05).

Table 18: Comparison of mean cost of care with duration of main symptoms before presentation

Duration	*N*	*Mean± Standard Deviation* ₦	*Test statistic*	*P-Value*
Less than 6 months	280	71,515 ± 32,879	9.545**	0.000
6 months to less than 1 year	38	56,453 ± 30,930		
1 year and above	86	56,883 ± 25,794		
F-test (ANOVA)**				

4.10.3 Comparison of mean cost of care across duration of main symptoms before presentation

Table 18 compares the mean cost of care with duration of main symptoms before presentation. Highest mean cost was found in patients whose duration of symptoms is for less than 6 months (P<0.05).

Table 18: Comparison of mean cost of care with duration of main symptoms before presentation

Duration	*N*	*Mean± Standard Deviation*	*Test statistic*	*P-Value*
		N		
Less than 6 months	280	71,515 ± 32,879	9.545**	0.000
6 months to less than 1 year	38	56,453 ± 30,930		
1 year and above	86	56,883 ± 25,794		
F-test (ANOVA)**				

4.10.4 Comparison of mean cost of care across surgical characteristics of subjects

Table 19 compares the mean cost of care across surgical characteristics of subjects. Having emergency surgery, neurological surgery and Head and Neck surgery increases the cost of care significantly ($P<0.05$).The differences in the mean cost of care of patients operated on by consultant are not significantly different from patients who were operated on by residents. Likewise, patients who had delayed or postponed surgery did not have significantly different cost of care compared with those who had no delay ($P<0.05$).

Table 19: Comparison of mean cost of care across surgical characteristics of subjects

Characteristics	*N*	*Mean± Standard Deviation* ₦	*Test Statistic*	*P-Value*
Surgery type by group				
Elective	216	58,770 ± 30,227	-5.748*	0.000
Emergency	188	76,420 ± 31,414		
Surgery Group				
General Surgery	209	62,901 ± 29,650	28.771**	0.000
Orthopaedics Surgery	56	77,540 ± 27,126		
Urological Surgery	41	46,575 ± 22,435		
Plastic Surgery	58	58,850 ± 25,882		
Neurological Surgery	40	106,245 ± 31,355		
Anatomical Location of Surgical Procedure				
Head/neck	77	81,350 ± 38,350	16.379**	0.000
Upper limbs	41	58,240 ± 23,301		
Thorax/abdomen	151	70,357 ± 28,264		
Perineum	92	48239 ± 25,714		
Lower limb	43	77,852 ± 31,110		
Rank of Surgeon				
Consultant	199	68,820 ± 33,673	1.137*	0.256
Resident	205	65,201 ± 30,232		
Delayed/Postponed surgery				
Yes	42	73,310 ± 27,203	1.356*	0.176
No	362	66,249 ± 32,447		

T-test *

F-test (ANOVA) **

4.10.5 Comparison of mean cost of care across selected characteristics of subjects/ surgeries performed

Comparison of mean cost of care across selected characteristics of subjects/ surgeries performed are seen below in table 20. Increasing ASA, General Anaesthesia, increasing duration of surgery and increasing estimated blood LOSs during surgery were associated with high mean cost of care ($P<0.05$).

Number of drugs prescribed during hospital stay did not have significant effect on the mean cost of care ($P<0.05$).

Table 20: Comparison of mean cost of care across selected characteristics of subjects/ surgeries performed

Characteristics	*N*	*Mean± Standard Deviation* ₦	*Test Statistics*	*P-Value*
ASA				
I	227	57,738 ± 28,916	17.679**	0.000
II	99	74,902 ± 31,189		
III	68	82,876 ± 29,710		
IV	10	90,384 ± 47,832		
Anaesthesia				
General Anaesthesia	281	71,776 ± 33,071	18.268**	0.000
Local Anaesthesia	74	47,595 ± 21,676		
Other types of Anaesthesia+	49	68,782 ± 27,884		
Number of Drugs prescribed during hospital stay				
1	52	65,822 ± 37,412	0.402**	0.752
2	182	67,238 ± 29,899		
3	93	64,693 ± 32,984		
4 and above	77	69,932 ± 31,987		
Blood transfusion				
Yes	79	85,440 ± 31,279	5.598*	0.000
No	325	62,498 ± 30,557		
Duration of Surgery in hours (n=91)				
1hour and below	21	58,701 ± 24,683	3.842**	0.025
Above 1 hour and less than 3 hours	47	73,391 ± 32,264		
3 hours and above	23	84,027 ± 30,984		
Estimated Blood Loss during surgery				
Below 100 mls	196	59,470 ± 28,958	14.573**	0.000
100 to below 500 mls	136	68,596 ± 32,903		
500and below 1000 mls	53	78,324 ± 28,808		
1000 mls and above	19	101,309 ± 32,349		

T-test *

F-test (ANOVA) **

Other types of Anaesthesia+ were spinal, regional block and conscious sedation.

4.10.6 Comparison of mean cost of care across investigations documented before and after surgery

Table 21 shows the comparison of mean cost of care across investigations documented before and after surgery. The overall mean cost of care was significantly different across presence of radiological investigations, numbers of radiological investigations, numbers of laboratory investigations and total number of investigations requested($P<0.05$).

The difference in cost of care among those who had laboratory investigations and those who did, was not statistically significant ($P>0.05$).

Table 21: Comparison of mean cost of care across investigations documented before and after surgery

Investigations	*N*	*Mean ± Standard Deviation ₦*	*Test Statistics*	*P-Value*
Laboratory investigations				
Yes	386	66,447 ± 31,834	-1.564*	0.119
No	18	78,488 ± 33,979		
Radiological Investigations				
Yes	158	74,634 ± 74,634	3.921*	0.000
No	246	62,070 ± 62,070		
Number of Radiological Investigation				
Nil	246	62,069 ± 32,119	7.750**	0.000
1	120	71,550 ± 30,287		
2	36	82,381 ± 26,974		
3	2	120,225 ± 47,624		
Number of Laboratory Investigations Documented				
0	18	78,488 ± 33,979	3.076**	0.016
1	56	73,074 ± 35,472		
2	211	61,890 ± 29,849		
3	94	71,020 ± 32,470		
4 and above	25	72,868 ± 32,895		
Total Number of investigations documented (Radiology and laboratory)				
1	32	64,423 ± 33,498	4.570**	0.004
2	173	61,075 ± 32,022		
3	132	70,717 ± 31,611		
4 and above	67	76,105 ± 29,276		

T-test *

F-test (ANOVA) **

4.11 Linear regression analysis for determinants of cost of care

4.11.1 Linear regression analysis for socio-demographic determinants of cost of care

Linear regression analysis for socio-demographic determinants of cost of care is as shown in table 22. After adjsusting for other variables respondents who were civil servant had a significantly lesser mean cost of care of ₦15,382 compared to artisan (95% CI: -₦26,757.26 to -₦4,007.30). Infants/Children also had a significantly lower mean cost of care of ₦29,942.67 compared to artisan (95%CI: - ₦44,166.92 to -₦15,718).

Table 22: Linear regression analysis for socio-demographic determinants of cost of care

Variables	*B* ₦	*P-value*	*95% Confidence Interval for B*	
			Lower Bound	*Upper Bound*
Age ≥ 40 years versus < 40 years	10,239.96	0.081	-1,280.902	21,760.816
Female versus Male	-4,350.67	0.189	-10,847.073	2,145.726
Married versus Single	-555.31	0.912	-10,453.359	9,342.740
Widow(er) versus single	-7,029.98	0.496	-27,314.245	13,254.281
Business /Trader versus Artisan	-8,511.33	0.118	-19,192.889	2,170.225
Civil servant versus Artisan	-15,382.28	**0.008**	-26,757.260	-4,007.298
Infant/Child versus Artisan	-29,942.67	**0.000**	-44,166.915	-15,718.423
Retired Civil servants versus Artisan	-4,520.46	0.618	-22,320.646	13,279.723
Students versus Artisan	-9,974.85	0.102	-21,922.709	19,73.008
Others versus Artisan	641.45	0.937	-15,195.708	16,478.600

4.11. 2: Linear regression analysis for surgical characteristics that determine cost of care

As shown in table 23, after adjusting for other surgical characteristics respondents that were first seen at the Accident and Emergency had a significantly higher mean cost of care of ₦11,986 compared to others that were first seen at Children Outpatient Clinic, Gynaecology Clinic and Eye Clinic. (95% CI: ₦297 to ₦23,674). Patients who had Neurological Surgery had a significantly higher mean cost of care of ₦ 29,755 compared to patient who General Surgery. (95% CI: ₦19,415 to ₦40,095). Other determinants of high cost of care were ASAII, III and IV compared to ASAI and presence of blood transfusion versus no blood transfusion and Estimated Blood loss of 500-999mls versus below 100mls. Also General Anaesthesia and other types of Anaesthesia also had higher mean cost of care compared to patients who had local Anaesthesia as shown in table 23.

Table 23: Linear regression analysis for surgical characteristics that determine cost of care

Variables	*B* ₦	*P-value*	*95% Confidence Interval for B*	
			Lower Bound	*Upper Bound*
First seen at A and E vs others*	11,986.03	**0.044**	297.40	23674.66
First seen at GOPD vs others	6,197.623	0.350	-6830.56	19225.82
First seen at MOP vs others	14,742.72	0.062	-764.03	30249.47
First seen at OTCHEW vs others	-7,225.63	0.335	-21934.16	7482.90
First seen at SOP vs others	5,453.09	0.320	-5307.12	16213.29
Duration of symptoms less than 6 months vs One year and above	2,160.95	0.501	-4149.77	8471.66
Duration of symptoms 6 months to less than one year vs One year and above	-6,679.53	0.171	-16246.54	2887.48
Orthopaedic Surgery Vs General	11,130.70	0.057	-341.68	22603.08
Urology Vs General Surgery	-2,266.79	0.636	-11674.40	7140.81
Plastic Surgery Vs General	-6,508.82	0.118	-14685.87	1668.25
Neurological Surgery Vs General	29,755.57	**0.000**	19415.99	40095.16
Head and neck Surgery Vs lower limb	7,501.91	0.241	-5051.04	20054.86
Upper limb Surgery Vs lower limb	-5,433.48	0.348	-16795.44	5928.49
Thorax/Abdominal Surgery Vs lower limb	4,198.28	0.499	-7999.78	16396.34
perinea Surgery Vs lower limb	-8,428.19	0.196	-21215.99	4359.62
Surgery done by Consultant Vs resident	693.63	0.785	-4311.99	5699.26
Delay/postponed surgery Vs No Postponement of surgery	7,570.11	0.060	-311.19	15451.41
ASAII versus ASAI	12,382.97	**0.000**	6289.66	18476.29
ASAIII versus ASAI	16,116.99	**0.000**	9157.87	23076.11
ASAIV versus ASAI	16,489.23	**0.043**	488.39	32490.07
General Anaesthesia Versus Local	14,513.55	**0.000**	7865.54	21161.56
Other types of anaesthesia Versus Local	15,234.82	**0.001**	5888.35	24581.28
Duration of Surgery of above one hour to 3 hours versus one hour and less	24.47	0.995	-7663.06	7711.99
Duration of Surgery of three hours and above versus one hour and less	7,018.52	0.190	-3502.78	17539.824
Estimated Blood loss of 100-499 mls versus below 100 mls	2,916.65	0.455	-4755.81	10589.094
Estimated Blood loss of 500-999 mls versus below 100 mls	15,922.53	**0.012**	3540.07	28304.997
Blood transfusion vs no Blood transfusion	14,437.01	**0.000**	7656.02	21217.995
Emergency vs Elective Surgery	1,808.36	0.546	-4071.87	7688.592

*Others were Children Outpatient Clinic, Gynaecology Clinic and Eye Clinic

4.11.3 Linear regression analysis for investigational determinants of cost of care

After adjusting the radiological variables, more laboratory, radiological or overall investigation increases the cost of care after comparision. However, the increase seen were not statistically significant. as shown in table 24. Investigations done did not significantly increase the cost of care.

Table 24: Linear regression analysis for investigational determinants of cost of care

Variables	*B*	*P-value*	*95% Confidence Interval for B*	
	N		*Lower Bound*	*Upper Bound*
One radiological investigation Vs Nil	5,584.94	0.405	-7599.22	18769.10
Two radiological investigation Vs Nil	12,781.50	0.305	-11694.32	37257.32
Three radiological investigation Vs Nil	49,091.80	0.068	-3644.25	101827.85
Presence of Lab investigation vs none	-14,125.58	0.275	-39545.47	11294.32
One laboratory investigation vs Nil	9,645.41	0.184	-4610.34	23901.16
Three laboratory investigation vs Nil	5,111.43	0.503	-9888.16	20111.02
Four laboratory investigation vs Nil	6,783.18	0.638	-21557.54	35123.90
Two Overall investigations Vs One	5,015.31	0.535	-10860.10	20890.71
Three Overall investigations Vs One	10,347.57	0.403	-13949.63	34644.77
Four Overall investigations Vs One	12,144.01	0.520	-24938.93	49226.95

4.11.4 Linear regression analysis for days between first visit and admission, days spent from admission to surgery and LOS as a determinant of cost of care

As shown in table 25, increase of one day in LOS will significantly increase cost of care by ₦ 2,372.57. Days between first visit and admission and days spent from admission to surgery will both significantly reduce cost of care by ₦15.32 and ₦936.52 respectively.

Table 25: Linear regression analysis for days between first visit and admission, days spent from admission to surgery and LOS as a determinant of cost of care

Duration	*B* ₦	*P value*	*95% Confidence Interval for B*	
			Lower Bound	*Upper Bound*
Days between first visit and admission	-15.32	**0.030**	-29.165	-1.467
Days spent from admission to surgery	-936.52	**0.000**	-1323.898	-549.144
LOS (from admission to discharge)	2,372.57	**0.000**	2120.219	2,624.918

CHAPTER FIVE
DISCUSION

5.1 Median LOS among surgical inpatients.

Study on hospital LOS is needed to know the areas where hospital performance must be reorganized and restructured to meet future demands (Schulz et al. 2004). Effective reduction of a hospital's average length of stay is not a question of simply discharging patients earlier. Instead, it is ensuring that patients recover more quickly and reach the point at which they are ready to leave hospital sooner. The overall median LOS among surgical inpatient was 11 days with an inter-quartile range of 5-20 days. This is similar to the mean duration of hospital stay of 13.11 days among patient with post traumatic bowel injury in the same centre (Dongo et al. 2011). The LOS among surgical inpatient in UCH is less than the LOS reported in another teaching hospital in South Western Nigeria that ranged from 1 to 127 days (mean 17 days) among paediatric patients (Thanni et al. 2005). This LOS is higher than what was documented in the developed countries (Sato and Fushimi, 2009). About two third of the surgical patients studied had prolonged stay on admission. This finding contrast sharply with findings in a secondary health care facility in the Niger Delta area of Nigeria that reported about 37% of the surgical inpatients spending more than seven days on admission (Dienye et al. 2011). The Niger delta study did not include Orthopaedic, Plastic and Neurosurgery that contributed to the Median LOS in this study.

5.2 Determinants of prolonged LOS among surgical inpatients

Understanding the factors that influence LOS is very important. LOS is a key performance indicator for hospital management and a key measure of efficiency of the health system. In this study just above half of the female patients spent above 7 days in the hospital. A high percentage of women (80.95%) spent more than 7 days following admission to a secondary health care facility in the Niger Delta area of Nigeria (Dienye et al. 2011). Male patients in this study spent longer time on admission though it is not statistically significant. However, it is similar to a previous study that documented greater LOS among males (Vânia Aparecida et al. 2011).

A higher proportion of older patients aged 40 and above had prolonged LOS. A study done in New Zealand also reported a significantly prolonged LOS among older patients (Vather et al. 2007). About 75% of emergency cases had prolonged stay this is higher than the (56.25%) from the Niger Delta study (Dienye et al. 2011). This is also similar to a study that documented shorter LOS for patient that had elective surgical procedure (Schwierz et al.2011). Plastic Surgery patients had prolonged stay. The influence of procedures performed on LOS has been previously documented (Kjekshus, 2005). ASA II was a significant determinant of prolonged LOS in this study similar to a study done in Saudi Arabia (Carey et al. 2006). Other studies documented prolonged LOS and increase in co-morbidities in ASA groups three and four compared with groups one and two (Daabiss, 2011; Siegmeth et al. 2005). Patients that had blood transfusion had prolonged LOS and the more the estimated blood loss the higher the LOS.

5.3 Direct cost of hospital stay to surgical inpatients

The cost of surgery is available in the hospital`s billing document while the total cost of care is usually difficult to predict. Patient are often faced with the question of how much will be needed for their care. This study has shown that cost of surgery is about 50% of the total cost of care this information will help in advising the patients appropriately on the total cost of care.

After adjusting for other socio-demographic variables civil servants and infant/children had significantly lesser mean cost of care compared to artisan. In this study, age 40 years and above had higher mean cost of care compared to those aged <40years. However, it is not statistically significant. Aging has been shown to be a significant predictor of health care cost due to increasing cardiovascular diseases (Felder, 2001). Patients that were first seen at the Accident and Emergency had a significantly higher mean cost of care compared to others that were first seen at Children Outpatient Clinic, Gynaecology Clinic and Eye Clinic. Patients who had Neurological Surgery had a significantly higher mean cost of care compared to patient who General Surgery. Patient with ASA II, ASA III and ASA IV incurred higher cost of care compared to patient with ASA I. This is similar to findings of Daabiss that higher ASA is associated with higher cost of care (Daabiss, 2011). General Anaesthesia and other types of anaesthesia like spinal, regional block and conscious sedation had more cost compared to patients that had Local Anaesthesia. Patients with highest blood loss versus lowest

blood loss and those who had blood transfusion versus those without blood transfusion incurred higher mean cost of care. This is similar to a previous study and it has led to seeking of alternatives to blood transfusion in the surgical setting to reduce the rising costs of care (Waters et. al. 2007). Request for investigations and the number of investigations done did not significantly increase cost of care. Similar to other studies in both developing and developed countries increasing LOS is also a significant predictor of cost of care (Emi and Kiyohide, 2009; Fontaine et al. 2011; Gilliard et al. 2006; Lena et al. 2010; Tara et al. 2011; Dienye et al. 2011).

5.4 Limitations

1. Missing case notes were encountered. The 16 patient with important missing variables were added to the unanalysed case notes. Missing case notes were not part of the analysis. However, comparison shows that no significant difference exists between the group analysed and the Un-analysed. Hence, the outcome of the study can be generalized to all the surgical inpatients.
2. Another limitation of this study is a lack of information on the severity of cases. However, the ASA grading of patient`s physical status pre-operative can be used in lieu of this.
3. Hospital related variables like the number of health personnel that attended to the patient could not be ascertained. Hence, the level of care received was not determined. However, the cadre of the surgeon that performed the surgery was captured in the theatre register.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study found that the overall median LOS among surgical inpatient was 11 days with an inter-quartile range of 5-20 days. More than half, of the surgical inpatients studied had prolonged stay. The factors associated with prolonged LOS were Islamic religion, admission of patient through the Accident and Emergency, having to do emergency surgery, Neurosurgery, and surgeries located in the head and neck region of the body. Others are use of General Anaesthesia, ASA above category II, estimated blood loss above 1000mls, having to be transfused with blood, and duration of surgery of 3 hours and above. The significant determinants of prolonged LOS were Islamic religion, Plastic surgery, emergency surgery, patients with ASA II, and blood transfused.

This study has shown that cost of surgery is about 50% of the total cost of care. The factors determining increase mean cost of care were being civil servants, infant/Children, being first seen at the accident and emergency. ASA II and above and General Anaesthesia were also significant determinant of cost of care. Neuro-surgery, blood loss above 500mls, blood transfusion and longer length of stay led to increase cost of care in this study.

6.2 Recommendations

Based on the findings of this study the following recommendations are made

1. The evidence evaluated here suggests that costs and LOS are interrelated. Strategies and attempt at reducing LOS will reduce the costs of care as well.
2. Strategy to reduce blood loss will prevent blood transfusion and further reducing the LOS and cost of care.
3. Future research to examine directly the relationship between patient health outcomes as well as LOS and direct costs is needed.
4. Most of the factors associated with LOS are non modifiable. There is therefore an urgent need for a prospective research to follow up patients from admission to discharge to identify hospital related factors responsible for prolonged LOS and make recommendations.

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APPENDIX 1: PROFORMA FOR SECONDARY DATA COLLECTION

HOSPITAL LENGTH OF STAY AND DIRECT COST OF CARE AMONG SURGICAL PATIENTS AT UNIVERSITY COLLEGE HOSPITAL, IBADAN

1. Serial no / identification no.....

2. Date of Birth.....

3. Sex

1. Male 2. Female ☐

4. Marital status

1. Single 2. Married 3. Others (Specify)..... ☐

5. Religion

1. Christianity 2. Islam 3. Others ☐

6. Level of education

1. No formal education 2. Primary 3. ☐

Secondary

4. Tertiary

5. Others (Please specify).....

7. Occupation:.....

8. Height (M^2).....

9. Weight (Kg).....

10. Disease/Type of Surgery .....

11. Anatomical location of surgery 1. Head and neck 2. Upper limbs 3. Back 4. ☐

Thorax 5. Abdomen 6. Perineum 7. Lower limb

12. Is the Surgery Emergency or Elective? ☐

1. Emergency 2. Elective

13. Any delay /postponement of surgery/procedures ☐

1. Yes 2. No.

14. If yes to question 13, what are the reasons for delay/postponement?

1. No money for procedure
2. Strike during admission
3. No water in the hospital
4. No expert to perform the procedure
5. Delay in getting investigation(s) done. Specify the investigation(s).....
6. Others

Specify.....

PERIOPERATIVE/ POSTOPERATIVE CONDITIONS

15. Pre-operative ASA Grade .....

16. Post operative ASA Grade.....

17. Comorbidities .....

18. Intraoperative complications recorded.....

19. Estimated intra-operative blood LOSs.....

20. Operator`s Rank 1. Consultant 2. Resident

21. Was Intensive Care Unit utilized? 1. Yes 2. No

22. If yes, duration of stay in ICU (days)?.....

23. Post operative complications

1. Wound Infection
2. Haemorrhage
3. Pneumonia

4. Bed sore

5. Others (Specify).....

24. Any discontinuation of treatment due to inability to provide medications / other consumables? 1. Yes 2. No

25. Reason for/ circumstances surrounding exit from the hospital.

1. Discharged home after full recovery
2. Discharged with complications
3. Death
4. Referral
5. Discharge to continue follow up until next surgery
6. DAMA
7. Others (Specify) .....

DURATION OF HOSPITAL STAY

26. Duration of symptoms before 1st presentation.....

27. Date Patient was first seen in University College Hospital.....

28. Date of Admission.....

29. Date surgery was done.....

30. Duration of surgery (in minutes).....

31. Date of Discharge.....

32. Date died (if death Occurred).....

33. Date of re-admission(If any).....

34. Date of 2nd surgery was done.....

35. Duration of 2nd surgery (in minutes).....

36. Date of 2nd Discharge

ESTIMATION OF DIRECT COST OF CARE

ITEMS PAID ONCE

SN	ITEMS	COST
1.	Registration	
2.	Consultation	
3.	Investigations(List Investigations)	
	e.g FBC	
	Total investigation cost	
4	Drugs (List Drugs)	
	Total drug cost	
5.	Cost of surgery	
6.	Payment for Oxygen	
7	Discharge fee	
8.	Others (Specify)	

ITEMS THAT ARE PAID FOR DAILY

Sn	Item	Cost/day	No of days	Total Cost
1.	Bed charges			
2.	Cost of Feeding			
3.	Other fee paid daily(specify)			
4.	Other fee paid daily(specify)			

Total direct cost of care.....

INSTITUTE FOR ADVANCED MEDICAL RESEARCH AND TRAINING (IAMRAT)
COLLEGE OF MEDICINE, UNIVERSITY OF IBADAN. IBADAN, NIGERIA.

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UI/UCH EC Registration Number: NHREC/05/01/2008a

NOTICE OF EXPEDITED REVIEW AND APPROVAL

Re: Hospital Length of Stay and Direct Cost of Care among Surgical Patients at University College Hospital, Ibadan

UI/UCH Ethics Committee assigned number: UI/EC/11/0274

Name of Principal Investigator: **Dr. O. S. Ilesanmi**

Address of Principal Investigator: Department of EMSEH,
College of Medicine,
University of Ibadan, Ibadan

Date of receipt of valid application: 23/11/2011

Date of meeting when final determination on ethical approval was made: N/A

This is to inform you that the research described in the submitted protocol, the consent forms, and other participant information materials have been reviewed and given *expedited approval by the UI/UCH Ethics Committee.*

This approval dates from 12/12/2011 to 11/12/2012. If there is delay in starting the research, please inform the UI/UCH Ethics Committee so that the dates of approval can be adjusted accordingly. Note that no participant accrual or activity related to this research may be conducted outside of these dates. *All informed consent forms used in this study must carry the* UI/UCH EC *assigned number and duration of* UI/UCH EC *approval of the study.* It is expected that you submit your annual report as well as an annual request for the project renewal to the UI/UCH EC early in order to obtain renewal of your approval to avoid disruption of your research.

The National Code for Health Research Ethics requires you to comply with all institutional guidelines, rules and regulations and with the tenets of the Code including ensuring that all adverse events are reported promptly to the UI/UCH EC. *No changes are permitted in the research without prior approval by the* UI/UCH EC *except in circumstances outlined in the Code. The* UI/UCH EC *reserves the right to conduct compliance visit to your research site without previous notification.*

UI/UCH EC
12 DEC 2011
APPROVED
COLLEGE OF MEDICINE, U.I.

Prof. A. Ogunniyi
Director, IAMRAT
Chairman, UI/UCH Ethics Committee
E-mail: uiuchirc@yahoo.com

UNIVERSITY COLLEGE HOSPITAL, IBADAN

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CABLE & TELEGRAM: TEACHOS, IBADAN. E-mail: uchib@infoweb.abs.net

Ref No. HSD / 08

22nd December, 2011

Dr Olayinka Stephen Ilesanmi,
Department of EMSEH,
College of Medicine,
University of Ibadan,
Ibadan.

Dear Sir,

RE: PERMISSION TO USE SURGICAL PATIENTS CASE NOTES FOR RESEARCH

I have been directed to acknowledge the receipt of your letter on the above subject and to convey Management's approval for you to commence your Research titled: "HOSPITAL LENGTH OF STAY AND DIRECT COST OF CARE AMONG SURGICAL PATIENTS AT UNIVERSITY COLLEGE HOSPITAL" in the University College Hospital, Ibadan.

The terms of the approval, allows you to have access to hospital numbers of patients who have undergone surgical procedures from January to December, 2010 and to have access to the case notes of patients who have undergone surgical procedures from January to December, 2010.

Kindly liaise with the matron in charge of the Theatre and the Deputy Director, Health Information Management in this regard.

Thank you.

Yours faithfully,

A.Adekanmbi
For: Director of Administration
For: Chief Medical Director

Mr Odunsanya, Sue in batches
9/15 kept
5/1/12