ADDIS ABABA UNIVERSITY, COLLEGE OF HEALTH SCIENCES,

TIKUR ANBESA SPECIALIZED TEACHING HOSPITAL,

DEPARTMENT OF ANESTHESIOLOGY

Prevalence and cause of day of surgery cancelation in Tikur Anbesa Specialized Teaching Hospital, Addis Ababa, Ethiopia

A research paper to submitted to AddisAbabaUniversity, college of health sciences, school of medicine, and departmentof anesthesiology for partial fulfillment of the requirements for anesthesiology specialty certificate

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December, 2019

Addis Ababa, Ethiopia

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Decmber, 2019

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Acknowledgement

My sincerest and heart-felt gratitude goes to my advisor Dr. Fetiya Alferedfor unflagging support, concrete and expert advice, suggestions and assistance in all aspects of this research work.

I would like to offer my great respect and appreciation to all instructors who shaped me to the circumstances they would like to be for their immeasurable assistance and creating conducive situation during my study. Finally I would like to say thank you to all my friends (especially anesthesiology residents) and family giving me time and all rounded help.

Contents

Acronyms

AAU…… Addis Ababa University

ASA……..America Society of Anesthesiology

CT……cardiothoracic

DOS ……day of surgery

ECG…….Electrocardiography

ENT ……..ear, nose and throat

ICU …….. Intensive care unit

GS…….general surgery

MPH ……master of public health

NS……neurosurgery

OR…….. Operation room

OT…….operating time

NHS…… National Health Service

TASH……. Tikur Anbesa Specialized hospital

UK…….united kingdom

WHO……..world health organization

Abstract

Background: Day of surgery cancelation is elective surgical procedure that is not performed on the planned day of surgery despite being on the finalized operating room schedule, for any reason. Day of Surgery cancellation is a well-recognized quality problem and reflects inefficiency in management of operating room time, manpower and hospital resources and one of the sensitive quality indicators in perioperative care. Cancelation prevalence, major causes of cancellations, costs of surgical procedure cancelation vary across countries, regions and hospitals. Point prevalence varies from 1.83% to 40%. Reasons for cancellations are complex because they are related to patients, organizational issues, and clinical situations Cancellation of scheduled elective operations decreases theatre efficiency and is inconvenient to the patients, their families and the medical teams

Objectives: To assess the prevalence and causes day of surgery cancellation and suggest solutions for better patient management and effective utilization of resource in TASH.

Methods: This was hospital based prospective observational cross sectional study conductedin all major operation rooms from June 1st to June 31 2019 GC. At TASH.the study subject were all patients, of all ages, both genders, who were scheduled for elective surgical operationsfromsurgicalspecialties (Cardiothoracic, General, Neuro, pediatric, orthopedic, Uro, Gyne, obstetric) scheduled to undergo elective surgical operation.

Results: A total of 380patients were scheduled for elective surgeries during the study period, 266 patients had their operation performed at the scheduled time whereas 114(30%)patients were cancelled at the day of surgery in which 68.4% were potentially avoidable. The most common causes for cancellations were surgeon related accounts for 56 cases (49.1%) followed by administrator-related reasons, 41 (36% lowest was anesthesia related 3(2.6). lack of operating time due to preceding long operation/unanticipated complication, overscheduling, surgeon not available comprise about 70% of surgeon related cause whereaslack of OR material(36.6%), ICU bed(14.6%) and mechanical ventilator(22%) were major cause of administrative related causes patient changed mind after overnight fasting(35.7%) and acute change in medical condition(28.5%) were common patient related factorsover all 68.4%(78/114) of cancellation was avoidable. The highest percentage of cancellation related to the scheduled operations was in the NS 55.1% followed by CT and orthopedics (53.3%, 34.4%) while the lowest was Gyne and urology (15%, 14.9%) respectively .Most common cause of cancellation for NS and ortho was administrator 48% /5o% respectively followed by surgeon related (NS, 37%) causes whereas in CT surgeon related was the commonest (75%)

Conclusions:Rate of cancelation is high in our setup which wastes the already limited resources because most of causes are preventable each of the stake holders should take responsibility and strive to decrease DOS cancelation. General understanding, communication and cooperation between the surgical, anesthesiology, nursing, patient and logistic team will reducing the incidence t a minimum and increase the efficacy of the hospital. Audit carried out at regular intervals to find out the effective functioning of the OR and thorough assessment of feasibility and profitability of approaches that have been proven to be successful in other institutions, in the context of our institution characteristics and individual problems and taking proper administrative measures will decrease cancelation and its attendant adverse events.

Key words: Day of surgery Cancellations, Elective surgical operations, causes of cancelation,avoidable, TASH.

1. Introduction

1.1. Background

Definitions of day of surgery cancellation:different definitions of day of surgery cancellation exist in the international literature .most authors define 'cancellation' as only those procedures that were cancelled on the day on which surgery was scheduled (8, 910, 12, 19, 28, 32) whereas others also include those that were cancelled on the previous day (31) and some other took cancelled after the patient had entered the operation room and preparation for general anesthesia had been completed (16). The Modernization Agency Theatre Programme (National Health Service (NHS), UK)appears to define cancellations as those that occur after the patient has been notified of operation date [29].a standardized definition and classification of cancellations will facilitate data comparison between and within centers(1).

Reasons for cancellations: reasons for cancellations are complex because they are related to patients, organizational issues, and clinical situations thus differ between hospitals and regionsbecause every hospital is unique in terms of its service, staff pattern, demographics of the region and also the work-ethics and culture. Different studies reported different reasons and causes of cancellations of elective surgical operations. Some of studies group reasons for cancellations into relatively broad categories like patient, surgeon/doctor ,anesthesia, administrative/facility related(8,9,22,) some others increase category list by dividing one or more of the above or merge and decrease category to best fit their interest of study like medical, workup, nonsurgical, structure/process (1,11,21,24) while others simply list causes without grouping them [4,5,10, 16,15, 18,].Most of literatures divide causes as potentially avoidable or non-avoidable despite different way of listing them (1-10, 11, 15-25). Classification of the reasons benefits the society, as it helps in identifying and dealing with the root causes and flaws in a hospital. These flaws ought to be addressed because maintaining operating suites and having anesthetist, surgeons and theater staff available on a regular pre-determined schedule is expensive whether in a public or private hospital setting (5).

Operative care: the operating theatre is a hospital's largest cost center,most expensive facility and source of income,consuming a large part (>40 %) of their annual budget [13, 22].Within the hospitals the most important reason for hospital admission nowadays are procedure or surgical interventions, as over 310 million surgeries are conducted yearly [22].The parameters to evaluate productivity in the operating theater are the occupancy rate, the length of time spent in surgery, recovery from anesthesia, length of time between operations, rate of delay, and suspension of surgery (30).Providing a good quality of care, increasing patient satisfaction through efficient practice, Improving cost effectiveness, while maintaining a quality of care, are objectives of a health care system and also Every institution strives to be recognized for efficiency[20] .These goals imply an optimization of planning and a scheduling of the activities involved which is highly challenging due to the inherent variable and unpredictable nature of surgery, the conflicting priorities and the preferences of its stakeholders, and due to the scarcity of costly resources with The rapid development of medical technologies and their application to a continuously wider spectrum of diseases, conditions, and patients; the unstoppable growth of the health related requests of a population that is also growing in size; poverty and ageing; has all economically challenged health systems and insurance priorities around the world, to a point where their sustainability is nowadays very much questioned in every country, and where most costs have been covered by the government. These factors clearly stress the need for e□ciency and necessitate the development of adequate planning and scheduling procedures, awell-planned operating schedule is the cornerstone of the organization.In a setup where resource is limited by budget, while faced with growing demand for procedure and interventions, to deliver a better quality of care at the lowest possible cost operating room is targeted by management team [1]

1.2 Statement of the Problem

Day of Surgery cancellation is a well-recognized quality problem and reflects inefficiency in management of operating room time, manpower and hospital resources [22].Cancelation prevalence, major causes of cancellations, costs of surgical procedure cancelation vary across countries, regions , hospitals and even within specialities.Point prevalence varies from 1.83% to 40% [2-11, 13, 17] and factors contribute to the this variability include difference in patient and staff characteristics, differences in work ethic and culture, variability in hospital resource availability and sustainability, variability in surgical procedure/ surgical subspecialty, difference in the study methodology and difference in definitionof DOS cancellation.

Reasons for cancellations are complex because they are related to patients, organizational issues, and clinical situations. Majority of cancellations, revealed many underlying causes behind each apparent cause of cancellation, it was also found that the same underlying cause was mostly behind many of the apparent causes [14]. It can be non-avoidable (patient clinical change, emergency surgery priority) or Potentially avoidable (most no OT time, no postoperative bed/icu, list error, most administrative cause, equipment or transport problem, communication failure, patient not ready),avoidable reasons were the commonest [1,2,4,6,8, 9, 13, 19]. DOS cancelation, have far-reaching implication with considerable cost to the patient, community and the hospital with average cost of US$ 336.0 per cancelled case(18), cancellations cost the hospital with mean value of US$ 80 ± 48.30and patients lost mean US$ 62.70 ± 71.10 per patient (33). The suspension of a surgery impacts on the health of the team itself, with the consumption of time and material resources thereby working against the concerns of the health care administrators (30).

Day of Surgery cancellation causes significant inconvenience, emotional trauma like: anxietyfeeling of insecurity, uncertainty and increasing fear to the patients as well as their families and the community in general (33).Italso leads to an increase in patients' treatment expenses due to prolonged hospital stay and disruption of daily life, opportunity costs of lost working days and missed income, repetitions of pre-operative preparations and management, social burden caused by the good number of the patient's family members and friends who accompany the patient to support him during and after operation (8, 13, 18, 30). Cancellation also delay patient care, and can potentially affect the overall clinical outcome, increased mortality and morbidity, Prolong the postoperative rehabilitation period. Hospitals want to reduce costs and improve their financial assets, while they want to maximize the level of care at the same time but high cancellation rate dictate that rare health resources are being used ineffectively, thereby increasing costs. [1, 22]. Major Hospitals invest considerable resources in maintaining operating suites and having anesthesiologists, surgeons and theatre staff available on angered schedule. In high cancelation rate hospital suffers an economic loss due to prolonged hospitalization, high cost of the care, reduce the hospital's income(operating theatre under-occupancy), Waste disposable equipment opened for cases that are never performed, expend resources in the form of salaries and benefits for workers who remained idle and wasted investigations and blood cross-matching 18,33]. Knowledge of the rate of surgical cancellations and avoidable causes is an essential first step to developing appropriate interventions to improve operating theater efficiency.

1.3. Rationale of the Study.

My study designed to know the prevalence and causes of DOScancellation of elective surgical operations in TASH. Day-of-surgery cancellation remains an indicator of quality of care and management.Although I couldn't find specific study the incidence and impact in terms emotional trauma, money and life is most probably significant due to DOS cancelation in TASH. So in our institution where healthcare resources are limited and healthcare demand is high o reduce the rates of DOS cancelation and improve the operating theater efficiency, the reasons and causes of cancellation should be recognized, analyzed, appropriate measures should be implemented .Every hospital is unique in terms of its service, staff pattern, demographics of the region and also the work-ethics and culture, hence its causes and the process improvements required to avert them, are unique to the local environment (6). Because delay and DOS cancelation of elective surgery will always be present due to inter current diseases, work commitment, and social obligations of the health care providers and patients. The main aim of my research is to know prevalence of DOS cancelation and its causes in TASH which helps the institution to anticipate those cases in which problems might arise so that essential attention can be paid to them for better patient management, with available limited and scarce resource to the best quality and efficacy. Tikur Anbesa Hospital is the biggest referral for the whole nation with limited resource for health care, having up to dated information on magnitude and causes of DOS cancelation and possible strategy to increase quality of service, reduce unnecessary finite resource wastage and patient suffering. because The classical and simplistic approach to solving the problem of late cancellations focuses on finding the causes of these cancellations, and then to provide a solution for each cause individually, or collectively for all identified causes [1,14,15,26] . My study will proposes possible solution for identified problems to stakeholders for the quality improvement especially to address avoidable causes contributed by anesthesia and ICU to make our department leading in quality improvement initiatives in TASH.In addition to this, the result of the study will motivates and simulate for more detailed research.

1.4.Literature Review

DOS cancelation Point prevalence varies from 1.83% to 40% [2-11, 13, 17].it is because difference in study design, hospital setup, population dynamics etc. Many prospective previous studies [1, 8, 9, 1011, 16, 17, 22, 24] on cancellations have been yielding somewhat different results from retrospective data [2, 3, 5, 19, 21] as well study examined only a single surgical specialty [20] and only a single admission category [18]. Attributes of these cancellations can be avoidable and non-avoidable and avoidable cancellations were the commonest [6, 9, 13, 19]. Some of studies group reasons for cancellations into relatively broad categories [1, 6, 8, 9, 19, 22], while others simply list causes without grouping them [10, 15, 18,].

Administrative: Non-availability of operating room, Non availability of surgical / diagnostic equipment ,lack of theater space and facilities, unavailability of beds, shortage of anesthesia staff and surgeons, ICU bed/ ventilator, Non-availability of technician or other support services necessary for a particular surgical procedure, and administrative and logistics reasons. Rates as high as 82% were reported from Tanzania, 29 from India, 30.4% from Jordan, 25% from Spain, 47% from Nigeria, 21% from Sudan and from Ethiopia(Hawasa) .[22,19,11,1,7,9] .

Patient's related: not show, patient refusal, unfit for surgery, failure to follow preoperative instructions. Reported incidence rate ranges from 10% to 55% [19, 9, 13, 8, and 25].

Surgeon's/physician related: Surgeon Not available, Patient requires further surgical workup,Change in surgical plan. Reported incidence rate ranges from 35 to 44% [9, 19]

Anaesthesia /Anesthetist related cause: Patient unfit for anaesthesia [Patient requires optimization, Risk stratification, input from other medical or surgical subspecialties, senioranesthetist cover not available, and no preoperative evaluation. Reported rate range from 3.4% to 21% [9, 18, 22, and 25].

USA:Study done by Andreas R. Seim and colleagues on Causes of Cancellations on the Day of Surgery at Two Major University Hospitals ,American hospital ,MGH , in Boston and a Norwegian university hospital ,SOH, with aim of testing whether the quality of hospital administrative data on cancellations is sufficient for meaningful comparative analysis and whether causes of cancellations at these two major academic hospitals are comparable Found Norwegian hospital cancelled 14.58% of cases in 2003 and 16.07% in 2004 and The American hospital cancelled 16.52% between May 1, 2003, and April 30, 2004. Authors saymost findings at either of the hospitals do not translate easily to the other and Administrative cancellation data may only give a rough idea of the distribution of causes of cancellations and that are probably not completely representative of the real causes. Both administrative and prospective data show that the 2 hospitals are not comparable with respect to the causes of cancellations finally the authors conclude cancellations are frequent and bothersome, their causes, and hence the process improvements required to avert them, are unique to the local environment.

Europe: The research group, led by the Health Services Research Centre at the Royal College of Anesthetists and the UCL Surgical Outcomes Research Centre, examined the factors associated with last minute cancellations. Their observational cohort study used data from 245 hospitals (more than 90% of NHS hospitals across England, Wales, Scotland, and Northern Ireland) during one week in March (21-27) 2017. They found a total of 26 171 inpatient operations scheduled to take place between 21 and 27 March. Of these, 3724(14.2%) were cancelled on the day of surgery—377 (10.1%) because of insufficient bed capacity and 1029 (27.6%) for clinical reasons. In 2110 cases (56.7%) no reason for cancellation was specified. A 10th (1499) of the 14 936 patients who were to undergo elective, inpatient surgery had had the same operation cancelled at least once before. Where operations had been cancelled previously, insufficient bed capacity (31% of cancellations), insufficient operating theatre capacity (12.7% of cancellations), and other potentially avoidable non-clinical reasons, such as staff shortages or equipment failure, accounted for around half the total number of cancellations. Clinical reasons accounted for 33% of the cancelled operations. Operations at hospitals with an emergency department were five times as likely to be cancelled. Patients who were medically fit for surgery were three times as likely to have elective operations cancelled if they needed critical care afterwards [24].

Prospective study done in a public general hospital, Spain, from (Feb 2002 – May 2006), using 39 115 scheduled Operations found DOS cancellation rate to be 6.5% (2559) with relative contribution of broadcategory of reasons was 'medical reasons' in 50%, 'patient-related factors' in 23%, and due to 'administrative／logistic problems' in 25% with common specific reasons: infections／fever (18%), patient did not attend (20%) and lack of theatre time (23%). Epidemiology analysis of this study found patients aged 0–10 years (13%), 21–30 years (9%) Cancellations were less frequent in older age groups (71–80 years 5%, 61–70 years 6%). Inpatients (51%) day surgery (49%).

Asia :Retrospective Cross-sectional study done at Teaching hospital, Hong Kong,From 1 January 2009 to 31 December 2009, On Main outcome measures of DOS Cancellation and the corresponding reasons. Among 6234 schedule, 476(7.6%) canceled with this departmental distribution 20% GS, urological procedures 13%, orthopedic surgery 8%, and cardiothoracic surgery 6%. The common category for cancellation was facility (73%), work-up (17%), patient (10%), and surgeon (1%). No available operating room time the most common single reasonProspective study, in a multidisciplinary 500 bedded hospital New Delhi INDIA, from December 2009 to November 2010, to evaluate reasons for cancellation of elective surgical operation on the day of surgery from 7272 patients 1286 (17.6 %) of these were cancelled .The highest number of cancellation occurred in the discipline of general surgery (7.1%) and the least was ENT (0.35%) .Cause of cancellation was the lack of availability of theater time 63%, patients not turning up 19% patients, medical reasons 11.6%, 16 (1.2%),equipment failure 3.6% authors conclude most of causes were avoidable on the other hand Prospective Study on Reasons for Cancellation of Cases on the Day of Surgery in 1500 bedded teaching hospital New Delhi India for 6th month which was published in Indian Journal of Anaesthesia, February 2009, from 1590 schedules, 482(30.3%) cancelled. Among cause of cancelation 59% due to lack of availability of theatre time, 10.8 % due to medical reasons , 16.2% patient did not turn upon the day of surgery, 5.4% due to surgeons change in the surgical plan, 3.7% were administrative and 4.2% due to miscellaneous reasons. Authors believe most of causes were avoidable other Retrospective study done at one of university teaching hospital in India, from June 2009 to May 2010 to assess reason for cancelation with sample size of 3618 scheduled surgeries, 246 (6.8%) were cancelled with relative contribution of surgeon related 44.1%, administrative 29.5%, workup related 16.2% and patient related 10%. Overall, the most common reason for on the day cancellations was the lack of availability of theatre time. The authors recommend cancellations can be reduced by improving preoperative assessment, proper scheduling of cases and better interdepartmental coordination. Most of the on day cancellations were due to potentially avoidable reasons.

Prospectively study in Jordan from August 2005 to July 2006, cancellation was recorded in 382 (3.6%) of 10 485 scheduled elective surgical operations. Among all Day unit cancellations accounted for 27.5% and inpatient cancellations for 72.5%. Patient-related reasons, administrative and medical reasons accounted for 31.4%, 30.4% and 38.2% of all cancelled operations respectively. The most common patient-related reason for cancellation was patient non-attendance. The most common administrative reason for cancellations was unavailability of hospital admission beds. Authors believe further reduction is possible, by adopting some important interventions, especially better bed utilization other prospective study done in Beirut from January 1, 2013-August 30, 2013 found out of 5929 elective surgeries 261 cases (4.4 %) were cancelled, The most common category for DOS cancellation was work-up/medical condition related 32.6 % ,resource/facility 20 %, admission 19.2 %, patient 17.6 %, bed 8 %, and surgeon 2.7 % and The most common single cancellation reason was “no financial clearance” ,incomplete medical evaluationand “change in medical statusrespectively. 71.6 % were potentially avoidable (lack of financial clearance, incomplete medical evaluation, patient not showing up for surgery, and OR behind schedule accounted for 80 % .on the other hand A Retrospective Study done in Bahrain on DOS cancellation rate found (421) 7.3% cancelation out of 5,760 schedules, with the specific cause of cancelations 26.1% long list, 9.2% high blood pressure, 9% cardiology consultation, 5% chest infection, 4.5% upper respiratory tract infection,3.5% high glucose levels 0.5% delay by anesthesia .the anesthetist was responsible for ordering the cancellation in 35%, the patient was responsible 7%. The number of cancelled cases by each specialty were found to be 25.9% general surgery, 4.5% thoracic and vascular, 5.7% plastic, 17.8% urology, 9.7% orthopedic, 9.3% gynecology, 4.8% pediatric surgery, 1.2%gastro logy, 7.1% ENT, 2.4%

maxillofacial, 8.1%ophthalmology, and 3.5%) neurosurgery.finaly authors believe most causes are avoidable by proper preoperative assessment and control. Descriptive retrospective study don on REASONS FOR SURGERY CANCELLATION IN A PUBLIC HOSPITAL(Cancellations were classed as 'avoidable' or 'unavoidable'), IRAN, from 21stof March 2011 to 20th of March 2012 .out of 14,670cases scheduled, 274(1.87 %) were cancelled among this 184 (67.2%) was due to avoidable and 90 (32.8%) due to unavoidable reasons. Relative contribution of departments general surgical 70 (25.5%),orthopedic surgery 65 (24%), Gynecology surgery 45 (16.5%), urology 34 (12.5%) ENT 17 (6%) and neurosurgery 11 (4%). Among money causes of DOS cancelation patient medical problems (35.6%) and patient refusing the surgery (28.4%) ,problem with Facilities (4.4%), Change in treatment plan 11.8 %, Medical evaluation- Incomplete pre-op 0.8 %, Surgeon Surgery not available 4.3% .finally authors believe the low cancelation rate were due to an expandable block schedule, good communication and coordinating between surgeons, hospital administration staffs and operation room administration staffs and high bed occupancy rate of hospital (86%) which make patients to not miss their operation schedule after long waiting time. Similar retrospective study done in Finland, from 12,205 patient scheduled 551 (4.5%) were canceled. Patient-related issues caused 72.4% of cancelations, and operation no longer being necessary caused 26% of all cancelations

Prospect audit was conducted to find out the anaesthetic reasons for cancellation of surgical in patients on the day of surgery, and to plan for future suggestive corrective actions to reduce unnecessary cancellations. Aga Khan University Hospital (Pakistan) for one year from 1st January to 31st December 2003. Eight thousand, five hundred and twenty six patients were scheduled for surgery during the study period, 359 (4%) were cancelled on the day of surgery. Only 28 (8%) (Only 0.3% of total elective admissions) of all cancellation were anaesthetic cancellations, 15 of which fell in no justifiable category. Out of twenty eight cases cancelled by the anesthetists, fifteen (54%) were labeled as non-justifiable cancellation and twelve (43%) were judged as justified cancellation. Presence of medical problems accounted for majority of non-justifiable cancellations In 10 patients (67%) of this group, preoperative evaluation was done in the clinic at variable intervals, ranging from 2 to 13 days before surgery. Remaining one third of the patients (33%) was not referred to the pre-operative evaluation clinic before admission and first evaluation was done in the ward a day before surgery. In seven of these patients investigations (hemoglobin and hematocrit, blood sugar, X-ray and ECG), ordered by the anesthetist, in the preoperative clinic, were not reviewed by either anaesthesia or surgical team till the day. In another six patients medical problems pertaining to the cardiovascular, pulmonary or endocrine system were picked up in the clinic but no further action was taken for these to be optimized. In two ASA III and IV patients, the risk of anaesthesia was not explained and plan of anaesthesia whether general or regional not discussed with the surgeon and patient. When the risk was explained in the waiting area and plan for regional anaesthesia discussed, patient refused surgery at that time and wanted further discussion with the family which led to the delay in surgery for a day or two. Active evaluation clinic prior to surgery. Five (42%) were admitted a day before surgery and preoperative assessment was done in the ward. All these patients had some cardiac or respiratory problem and there was not enough time for further consultation or optimization. The age range in this group varied from 5 months to 74 years. Twenty percent were males and 80% females. Sixty six percent cases were planned for major surgery. On the other hand a retrospective chart review done on Surgery cancellations after entering the operating room in JAPAN, 30 out of 51,933 schedules from December 1, 2008, and April 30, 2016 were cancelled. Surgery cancelled before anesthesia 18 (60.0%) and cancelled after anesthesia 12 (40.0%). Causes of cancelled Cases before anesthesia are Patient health status which includes Atrial fibrillation, Shock status , Hypertension , Cardiac arrest , After PCI, Hypoxemia ,Fever, Head banging ,System reason

Necessity of pacemaker check ,Patient issue Surgery rejection among this 55.6% could have been prevented, accounting for 36.7% of the overall cancellations. Cause of cancellation after anesthesia was Anaphylactic shock 3, Arrhythmias, CAVB, Cardiac arrest, Hypoxemia and Anemia. Pattern by sub specialty found to be Orthopedic surgery 11 (36.7%), General surgery 5 (16.7%), Vascular surgery 4 (13.3%), Pulmonary surgery 3 (13.3%), Ophthalmic surgery 3 (13.3%), Gynecologic surgery 1 (3.3%) and Electric convulsive therapy 1 (3.3%).finally the authors recommend Improving the assessment of patients' medical problems and preoperative evaluations can reduce the number of surgery cancellations after the patient has entered the operating room.

Prospect audit was conducted to find out the anaesthetic reasons for cancellation of surgical in patients on the day of surgery, and to plan for future suggestive corrective actions to reduce unnecessary cancellations at Aga Khan University Hospital for one year from 1st January to 31st December 2003, 8526 patients were scheduled for surgery during the study period, 359 (4%) were cancelled on the day of surgery. Only 28 (8%) of all cancellation were anaesthetic cancellations, 15 of which fell in no justifiable category. [2-3, 11, 17, 18, 19, 21]

Africa: Prospective observational, hospital-based study conducted in one teaching hospital of Sudan between March 1, 2013, and February 28, 2014 (48 weeks) with aim of establishing magnitude and cause of DOS cancelation and proposing possible solutions with 3990 patients, found 805 (20.2%) cancelation rate.Patients' related causes of cancellation (i.e. Not attending for surgery, comorbidities, abnormal results of investigations or tests, financial reasons, refusing surgery, and patients not fasting) represented more than 2/3 (68.28%) of the reasons followed by Lack of time 9.93% and Administrationrelated 9.4%(The electrical and water cut off, sterilization, no availability of equipment/instruments, gown/towel, oxygen, and blood bags).Cancellation rate was 27.5% in NS 27.4% in PLS 24% in OS and regarding decision behind cancelation was Patients' reason(39.8) ,Anesthetist 268 (33.3) ,Surgeon 168 (20.8) and Administration's reasons 49 (6.1).finally conclude 70.25% of the reasons of cancellation were avoidable by better administrative and surgical planning and better communications with patients and families.

Prospective hospital-based study carried out to assess the incidence, causes and pattern of cancellation of elective surgical operation at Tanzania, teaching hospital from March 2009 to February 2010, with a total of 3,064 patients with mean age of 6.32 + 16.45 years with a male to femaleratio of 1.9:1 Found cancelation rate to be 21.0%. Among cancelled 92.5% were in-patients and 7.5% patients were outpatients,with relative distribution by department General surgery (31.5%), orthopedic surgery in 25.5%. Lack of theatre space and theatre facilities were main causes of cancellations in 53.0% and 28.4% of cases respectively followed by causes of cancellation relatedto the surgeons, patients and anesthetists accountedfor 8.4%, 6.2% and 3.4% of cases respectively. The majority of cancellations were attributable to hospital administration in 82.0 % and most of them were preventable in 93.8% of cases. Prospective hospital-based study done at Burkina Faso, from April 30, 2012 to July 30, 2012 to identify incidence, reasons and proposals for improvement of cancellation of Elective surgical operations using A total of 103 patients with an average age of 41. 1 years of which 36.9% (n = 38) were cancelled including 10 final cancellations (9.7%) with 28 cases postponed (27.1%), 36.9% (n = 38) of interventions were delayed. Relative contribution of causes related to Hospital- accounted for 63.9%, equipment (47.4%), patients (31.6%) or caregivers (15.8%) due to a long preceding surgical procedure 2.8%'. Cancellation was avoidable in 68.5% of cases another Prospective, observational study (March 1 and June 30, 2016) done to identify the incidence, cost and emotional impact of elective surgical cancellation in a teaching hospital in Burkina Faso with total of 1 088 cases scheduled, 239 cases (21.9%) were cancelled. The highest cancellation rate (35.9%) was found in general surgery. Cancellation was

judged avoidable in 214 cases (89.5%). The total cost of surgery cancellation to the hospital was US$ 19 147 (mean value US$ 80 per patient). Patients lost a mean of US$ 62.70, which represented 117.6% of the official average monthly income in Burkina Faso. Cancellation caused a negative emotional reaction in 205 patients (85.7%) and 'sadness' was the most frequent (54.8%; n = 131). Cancellation resulted in 163 days of work lost.Prospective study done atTeachinghospital, Nigeria from January 2003 to December 2004 on Reasons for cancellations of urologic day care surgery, found from A total of 270 (ages from 2 weeks to 100 years (median 55 years) and male to female ratio of 14:1) schedules 42(15.6%) were cancelled mainly due to the inability of the patients to come (24 , 57.1%), inadequate materials in the theatre (9 , 21.4%), power failure (4 , 9.5%), strike action (3 , 7.1%) and financial difficulties (2 , 4.8%). Authors believe most were avoidable reasons and Patient as well as physician education and provision of adequate materials and infrastructural developments reduce cancellation.

Retrospective study done a Referral Hospital, Nigeria, from September 2007 to May 2010 identified about 226 causes of case cancellations, of these, patient related causes accounted for 25.3%, and surgeon related 41%, administrative /logistics 17.5%, medical illness, 10.2% while other causes were 6%. Commonest single reasons for cancellation were unavailability of the surgeons 35.8% Administrative / logistic causes were as follows: Power outage/no generator, 7.1%, no linen/sterile instruments, 4.4%, no oxygen 3.5%, faulty equipment 0.4%, pharmacist unavailable to dispense drugs, 0.4%, wrong blood delivered to the theater, 0.4%, hospital workers strike, 0.4% and no water 0.4%. Patient related reasons also were detected and included: patient unable to provide material, 8.8%, patient failed to turn up, 6.6%, there was no blood 3.1%,patient refused surgery, 3.1%, patient ate 2.7%, and patient was discharged against medical advice 0.9%. Medical causes were due to unfit patients (10.5%), from poorly controlled hypertension, diabetes mellitus and anemia. The physician related causes (41%) were: Surgeon unavailable, 26.5% due to administrative and other problems. No reasons were given for surgeons' unavailability. In 9.3% of cases, the surgeons were late, 1.8%, late hour 1.8%, unconfirmed diagnosis 0.4%, anesthetist was ill, surgeon was exhausted and surgeons changed line of management respectively Patient related reasons also were detected and included: patient unable to provide material, 8.8%, patient failed to turn up, 6.6%, there was no blood 3.1%, patient refused surgery, 3.1%, patient ate 2.7%, and patient was discharged against medical advice 0.9%.

Other causes that led to case cancellation were emergency cesarean section patients who had spontaneous vaginal delivery, 2.7%, failed intubation, 1.3%, drug failed to work, 0.4%, laryngospasm, 0.4%, another emergency developed just before scheduled surgery, 0.4%, patient could not be cannulated, 0.4% and, anesthetic technician unavailable 0.4% [7, 8, 13, 15, 22].

Ethiopia:A prospective hospital-based cross-sectional study done at HAWASSA, Ethiopia, from March 1–20, 2018 by melaku D and his colleagues. Using 462 participants. To know Incidence and causes of cancellations of elective operation on the intended day of surgery found cancelation rate to be 146 (31.6%) and The most common reasons surgeon related (35.8%), patient related (28.7%), management related (21.2%) and anesthesia related factors (14. 4%). The cancellation was mainly due to improper scheduling (20.5 %%), unavailability of surgeons (8.9%), unavailability of oxygen and blood (8%) and equipment (5.5%). Orthopedic (28.8%) and general surgery (17.1%) were the commonest cancelled cases. Authors concluded Most cancellations were preventable with proper preoperative assessment, proper scheduling, fulfilling necessary operating room equipment's and cross-matched blood by the hospital and other stakeholders, early clear communication with operating room team like surgeons was recommendedON THE OTHER HAND prospective study done at JIMAEthiopia from February 1, 2014 to June30, 2014 by Haile M.and Nega D. Using total of 1438

patients.Cancelation rate was 23.0% about 45.6 % male and 54.4 % female General surgery had the highest rate of cancellations 23% followed by orthopedic surgery 20%. In appropriate scheduling and unavailability of sterile drapes and lab sheets were the main causes of cancelation mentioned [9, 15].

3. OBJECTIVES:

3.1. General objectives:

To assess the prevalence and causes DOS of cancellation and suggest solutions for better patient management and effective utilization of resource.

3.2. Specific objectives

To determine prevalence of cancelation as whole and in different surgical specialty.

To assess cause ofcancellationand their relative contribution in different surgical specialty.

To know magnitude of anesthesia related cancelation and specific factorsrelative contribution.

4. Methodology

4.1. Study area/setting.

Tikur Anbesa specialized Hospital is located inAddis Ababa, capital city of Ethiopia which is affiliated under AddisAbaba university school of medicine. Addis Ababa, the capital city of Ethiopia with 10 sub cities located at 901'48'N38044'24'E lies at elevation of 2326 to 3000 meters above sea level[Wikipedia].

TASHis the traing center for fellows, residents, medical and paramedical under graduates .it is also aninstitution where specialized clinical services that are not available in other public or private institution are rendering to the whole nation.TASH is a very large 700 bedded referral hospital and sees approximately 370,000- 400,000 patients a yearbut the exact number is not known [Addis Ababa university website]. The hospitalhas, one main theatre which has 9operation rooms', used for general surgery, ENT, gynecology, pediatrics, cardiothoracic,neurosurgery, one table for each of above specialties and two tables for urology and one table for emergency surgery only .In another floor of same building there is One theatre for obstetrics near the labor ward and this operates both emergency and elective obstetric surgeries and inseparate building orthopedics has 4 operation room's 3for elective(currently one is not functional) and one for emergency. Our standard hospital practice (not written) is that once surgery is indicated, the surgeon routinely refers the patient with the chart to the Anesthesia Clinic where Patient will be evaluated by anesthesiology residents with or without consultant anesthesiologist. After evaluation and optimization Patients will directly assigned to the surgical waiting list where most of the time will be admitted within a week. All elective orthopedic patients and A fewother patients bypass this system since they are admitted directly to the surgical departments from the surgical clinic and scheduled for surgery, or are admitted as emergency cases via the emergency department or from other medical departments.After staying in wards for some time for different reasons surgeons will schedule for surgery and post at OR notice board patients name age, dx and type of surgery requested numbers ofunits of bloods, and surgeons name and or table number and type of anesthesia. Anesthesiology team will evaluate the patients at ward and discussed with day responsible anesthesiology consultant and final year residentat 4 pm a day or two beforesurgery, discuss anestheticplan in relation to type of surgery, medical comorbidities anesthetic risk, possible optimizations and referral

plan or even postponement of day of surgery.Again anesthesia team will reevaluate at green area for immediate fitness immediately before surgery. Most of the time WHO surgicalsafety check list will be used

4.2. Study design

A Hospital based prospective observational cross-sectional study was conducted in all majoroperation rooms at TASH from june1-31 2019GC.

4.3. Source of population

The source of population was all surgical patients at Tikur Anbesa specialized hospital during the study period.

4.4. Study Population

The study subjects included all patients, of all ages, both genders, who were scheduled for elective surgicaloperations from all surgical subspecialties to be operated at TASH major OR table during the study period.

4.5 Inclusion criteria

All electives surgical schedule patients during the time of study period.

4.6 Exclusion criteria

Listedfor elective surgery but done before the day of schedule asEmergency, Minor ambulatory surgery outside major OR theater and or referred to other hospital.

ENT schedules because I couldn't fix data collector due to unanticipated drop out of the trained one at the eleventh hour.

4.7 Sample size determination

The Sample size was calculated manually taking p value 31.6% from research done at HawasaEthiopia (9) having more or less similar setting to TASH.sample size determined using the following formula.

n=z2 *p (1-p)/w2, where;

n = required sample size

p = incidence of DOS cancelation

w = margin of error …0.05

z=95% Confidence interval: $Z_{1-\alpha/2}$ =1.96

n=1.96*1.96*0.316(1-0.316)/0.05*0.05

n=333, considering 10% non-responders sample size will become 367

4.8 Data Quality Assurance

A structured modified individual patient questionnaire considering our setup were prepared from literatures(1,4,5,6,8,9,10,13,17,17,19,21,22,24,30) and pre tested for standardization. Datawere

collected by trained anesthesiology residents assigned to the table during study period except urosurgical unit which was collected by urosurgery resident. All the data was checked weekly for completeness by principal investigator.The dependent variable of the study was the cancellation of operation and the independent variables included were age, sex and ASA class, the type of operation canceled and reasons for cancellation.

4.9 Data analysis and Interpretation

After all information collected, template developed, data was entered in to IBM SPSS version 23 software and cleared using combined tabulation and sorting technique. Both Descriptive and analytical statistics used as applicable. A Descriptive analysis was done using frequency and interpreted by Tables and graphs. For the analytical I used binary logistic regression, statistically significant association was taken for p values of <0.05.

4.10Operational definition

Elective surgery represents patients for whom the surgery can be well planned in advance.

Day of surgery (DOS) cancelation: elective surgical procedure that is not performed on the planned day of surgery despite being on the finalized operating room (OR) schedule, for any reason.

Avoidable cancellations: those cancellations that could have been avoided had there been adequate review of patients medical records and patient reassurance, communicationamong surgeons, anesthesiologists an administrators, and OR preparation ahead of day of surgery.

4.11 Ethical considerations

Ethical clearance was obtained from the Department of Anesthesiology Research and publications committee and the Institutional Review Board (IRB) of the Addis Ababa University College of Health Science. The participants were clearly informed about the purpose of the study and the information required from them. They were also told that the patient has the full right of non-involvement and the right to stop the interview at any point in time. Participant were assured about the researchimpacts on them no financial or clinical impact on their life, confidentiality was assured. Patients who refuse to take part in the study was received the same quality of health care service as the participants. All participants included in the study were kept anonymous during subsequent analysis and dissemination. Verbal consent was taken after explaining about the study and itsImportance.

5. Results:

1.Sociodemographic characteristics

A total of 380 elective surgical cases were scheduled for operation during the study period (june1-jun31) in TASH. After checking Response rate for questionnaire was more than 100% using IBM SPSS23 data was analyzed in descriptive and analytic statistics. Out of the total scheduled operation (380) 266 9(70%) were operated and 114(30%) were cancelled on the day of operation for different reasons and causes. From all canceled 83(72.8%) were male and 31(27.2%) were female (p<.004), male to female ratio was 2.7:1. Among cancelled 69(60.5%), 40(35.1%) and 5(4.4%) were ASA1, ASA2

and ASA3 respectively.Near all patients 372(98.8%) were in patient whereas only 8(2.1%) were out patient (table 1).

Table 1: Sociodemographic characteristics of elective surgical schedules at TASH, June, 2019.

Variable category		Operation done on scheduled day				
		yes	no	total	COR/CI	Pvalue
		Number/per cent	Number/per cent	Number/per cent		
ASA status of.pt	ASA1	158/59.4%	69/60.5%	227		.485
	ASA2	102/38.3%	40/35.1%	142	.524(.155-1.775)	.299
	ASA3	6/2.3%	5/4.4%	11	.471/(.136-1.629)	.234
Age of pt. .	=<14yr	51/19.2%	13/11.4%	64		.142
	14-65	190/71.4%	92/80.5%	282	.708/(.267-1.878)	.488
	>=65	25/9.4%	9/7.9%	34	1.345/(.603-2.998)	.469
Sex of pt.	male	151/64.5%	83/72.8	234		
	female	115/43.2%	31/27.2%	146	2.039/(1.264-2.39)	.004
Admission status of pt.	In patient	259/97.4%	7/2.6%	372		
	Out patient	113/99.1%	1/0.9%	8	3.054(.371-25.113)	.299

2. Who is behind the cancelation?

There were always personnel who make the decision, alone or after consultation with others, of cancellation and put the evidence and justification for it. Alone or combination of any one of the five personnel were responsible for any one of cancelations. Out of the total cancelations 41%were canceled with joint descion and the remaining was canceled by one dominant team.

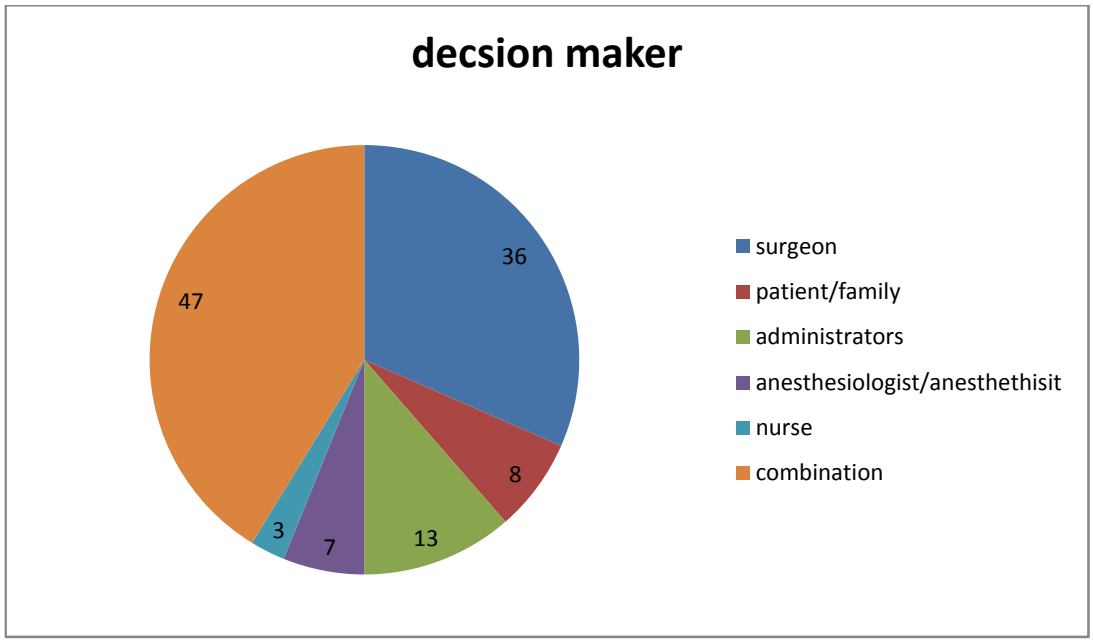

Figure 1: figure describe prominent person behind cancelation of surgery

3.Causes of cancellation of elective operation.

There were many reasons for postponement of surgery and were categorized into :patient/patient family,surgeon,anesthesia and administrator/logistics related.The most frequent causes for elective case cancellation were surgeon-related factors, which accounts for 56 cases (49.1%) followed by administrator-related reasons, 41 (36% lowest was anesthesia related 3(2.6). Regarding, the surgeon related reasons, lack of OR time (2/3of cases) due to preceding long operation (33%) and overscheduling (30%) were the commonest reason of cancellation of elective surgery. Administrative-related cause of cancellation is primarily primarily by lack of OR material(36.6%), unavailability of ICU bed(14.6%) and mechanical ventilator(22%).The frequent patient-related reasons were patient changed mind after overnightfasting(35.7%) and acute change in medical condition(28.5%).over all 68.4%(78/114) of cancellation was avoidable.(table2)

Table2: detail analysis of different category cause of cancelation in terms of possibility of prevention.

Category: Cause of cancellation	Causes in terms preventability		frequency	percent	Percent from cancelled
Administrative related	Avoidable	Shortage of OR material	15	36.6	36
		No operating time scheduling error/not considering resources	3	7.3	
		Lack of mechanical ventilator	9	22.9	
		Lack of ICU bed	6	14.6	
		Delay in induction of anaesthesia due to incomplete facility	2	4.9	
		No operating time due to high turn over time	1	2.4	
		Total	33	87.8	
	Non avoidable	Unanticipated emergency case prioritization	5	12.2	
		Total	5	12.2	
Surgeon related	Avoidable	Surgeon not available	5	8.9	
		Consultant surgeon requested further surgical workup before surgery and or changed plan of management	3	5.4	49.1
		Surgeon did not perform the surgery due to personal reason	3	5.4	
		Overscheduling (surgeons underestimating the time needed for the operation)	17	30.4	
		Surgeon was late at presentation	4	7.1	
		Blood not prepared	1	1.8%	
		Total	28	59	
	Non	Surgeon was exhausted	4	7.4	

	avoidable	Preceding long operation /unanticipated complication	19	33.9	
		Total	25	41	
Patient related	avoidable	Patient declined surgery in the morning	5	35.7	12.3
		Preoperative preparation not followed properly according to current protocol	2	14.3	
		Total	7	50	
	Non avoidable	Acute change in medical status evidenced by clinical and or deranged laboratory	4	28.6	
		Uncontrodendocrine disorder (eg.DM, toxic goitre...)	1	7.1	
		Coagulopathy (eg.low platelet, elevated INR...)	2	14.3	
		Total	7	50	
Anaesthesia related	Non avoidable	No operating time due to difficult/failed intubation /regional took beyond acceptable time.	1	33.3	2.6
		No operating time due to long preparation and induction time due to teaching practicing residents and other students.	1	33.3	
		Total	2	66.7	
	avoidable	Patient unfit for anaesthesia require further optimization due to in adequate preoperative evaluation.	1	33.3	
		Total	1	33.3	

4.Cases cancelled among elective operations in each department

The highest number of canceled operations was in the orthopedics (32) followed by NS and CT (27, 16) while the lowest was Gyne(3).The highest percentage of cancellation related to the scheduled operations was in the NS 55.1% followed by CT and orthopedics (53.3%, 34.4%) while the lowest was Gyne and urology (15%, 14.9%) respectively.Most common cause of cancellation for NS and ortho was administrator 48% /5o% respectively followed by surgeon related(NS,37%) causeswhereas in CT surgeon related was the commonest(75%)(table3).

Table 3: Distribution of scheduled surgical procedures, cancellations and cause of cancellation according to the surgical specialty involved.

Surgical subspecialty	Scheduled operations	Performed operation Numbers.	Cause of cancelation				in terms of preventability		Cancelled operations		
			Patient related factors Number/percent	Surgeon related fact Number/percentors	Administrative related facto Number/percentrs	Anaesthesia related factor Number/percent	Avoid Number/percentable	Non avoidable Number/percent	Total numbers	per cent from speciality	per cent from total canc.
General surgery	43	35	0	7/87.5	0	1/12.5	5/62.5	3/37.5	8	18.6	7
orthopaedic surgery	93	61	6/18.8	16/50	9/28.1	1/3.1	22/68.8	10/31.2	32	34.4	28.1
Paediatric surgery	32	24	3/37.5	4/50	1/12.5	0	3/37.5	5/62.5	8	25	7
neurosurgery	49	22	4/14.8	10/37	13/48.1	0	22/81.5	5/18.5	27	55.1	23.7
cardiothoracic	30	14	1/6.3	12/75	2/12.5	1/6.3	10/62.5	6/37.5	16	53.3	14
Urological surgery	67	57	0	0	10/100	0	10/100	0	10	14.9	8.8
Gyne	20	17	0	3/100	0	0	3/100	0	3	15	2.6
Obs	46	36	0	4/40	6/60	0	3/30	7/70	10	21.7	8.8
total	380	266	14	56	41	3	78	36	114	100%	100
per cent from total schedule	100	70	3.7	10.8	14.7	0.8	20.5	9.5	30	30	

6. Discussion

The studyinvestigated prevalence and causes of cancelations on the day of surgeryin TASH, Ethiopia at June 2019. Knowledge of the rate of surgical cancellations and their causes may help the institution to avoid such cancellations by better planned use of human and material resources. A total of 380 elective surgical cases were scheduled for operation during the study period (june1-jun31).out of 380, 266(70) surgeries done whereas 114(30%). there was significant association in cancelation and gender ($p<0.04$)where males were cancelled more than females in which male to female ratio was 2.7:1(83(72.8%) male and 31(27.2%) female).In previous researches the percentage of cancelled surgeries was similar between the genders (1,10,17, 30).I coudnit find the reason why males were canceled higher than females.regarding ASA status of cancelled ASA1, 69(60.5%), ASA2, 40(35.1%) and ASA3, 5(4.4%) 8 patients were out patient others were in patient.

There were always theater personnel who make the decision, alone or after consultation with others, of cancellation and put the evidence and justification for it.in my study from five group of potential personnel anesthesiologist, surgeon, administrator, patient and nurses combination of one or more of this showed about 40% of cancelations followed by surgeon in 31%and administrator 11%.Previousstudy done in Bahrium(2) showed Cancellation order by surgeon 53%cases, anesthetist 35%, patient 7%, joint decision and another research(18)showed 92% cancellations were done by the surgical team and 8% by the anaesthetic. Study in Sudan (8)found Decision behind by Anesthetist 33.3% Surgeon, 20.8%Patients' reason 39.8%and Administration's reasons 6.1 . Difference was likely due to the differences in designs of the studies, surgical subspecialties, and type of hospitals.it shows in our setup better communication before cancelation.

The elective case cancellation rate on the day of surgery is an indicator of operating theatre efficiency(35).Although there is no consensus on the acceptable case cancellation rate when defining efficient operating theatres, less than 5% is generally recommended (34, 35).My study found point prevalence of case cancellations was 30% suggests that our operating theater was inefficient which lead the general population suffers especially the lower income groups, who depend more on public or government services for most of their healthcare needs. Cancellations create significant financial, logistic, and psychological hardships for the patients and their relatives who plan their working and family lives around postponed date of operation. Varying rates of DOS cancellation have been reported, with different definition of cancellations. Studies that include cancellation of all types like my study , have reported operating room cancellation rates higher and Studies that define cancellation narrowly (like ,single reason) have reported operating room cancellation rates less (18).The result of the study is lower compared to studies done, Burkina Faso, 36.6% [36] and almost same with Hawasa Ethiopia, 31.6%, India, 30.3 %(17), Nigeria, 28.5% [20] But, this finding ishigher when compared to studies done in Jimma Ethiopia, 23% [10], Tanzania, 21% [22], Sudan, 20.2% (8) UK, 13.9% [24], Brazil 16.1% [33],Spain ,6.5%[1],india,6.8% [19].ThisDiscrepancy might be due to the fact that in different socio demographicCharacteristics, sample size, study area, study period, level of economic development and Methodological difference.

The reasons for cancellation can be grouped into broad categories(1,8,30), or just listed (10,18) in my study reason were recognized as belonging to one of four categories and no single cancellation could be assigned to more than one category These categories wereanesthesia/anesthetist/anesthesiologist, surgeon, patient /patient family and administrative/logistics related; avoidable and unavoidable categories. Classification of the reasons benefits the society and the institution as it helps in identifying and dealing with the root causes and flaws in a hospital (6, 9). My study found the most frequent causes for elective case cancellation

were surgeon-related factors, which accounts for 56 cases (49.1%) followed by administrator-related reasons, 41 (36%)lowest was anesthesia related 3(2.6).over all 68.4%(78/114) of cancellation was avoidable.

In my study surgeon-related factors were the most common cause for cancellation of elective surgical cases, accounted for 49.1% of all canceled cases in which 59% were avoidable. In this study Factors under surgeon related causes include: Surgeon not available, unconfirmed diagnosis/Patient requires further surgical workup, Surgeon was exhausted, and surgeons changed line of management, blood not prepared despite available in bank, recommendation for optimization from anesthesiology and other consulted team was not done accordingly, Surgeon not interested in doing the case by not medical reason , shortage of OT due to: the surgeons were late at presentation , Incomplete preoperative preparation and financial clearance, over scheduling, Preceding long operation / unexpected complication. Among this all reasons I found thecommon surgeon related specific cause of cancellation was shortage of OT (71.4%) due to preceding long operation/unanticipated complication (33.9%), overscheduling (30.4%) and surgeon were late at presentation 7.1%. This finding was supported by a study doneIndia [19] reported most common cause of cancelation (44.1%) were surgeon related of which majority were due to Lack of availability of OR time(29% of all causes)due to overrun of previous surgery and overbooking the schedule list other Study done Hawasa (9)surgeon related cause of cancelation was the most common cause of cancelation (35.5%) with the specific causesover scheduling of elective cases (10.9%) , unavailability of the surgeon (10.3%) and patient require further surgical work up(6.6%).but surgeon related cause of cancelation was lower than my finding in Pakistan (25) 18.2%,in Spain (1)9.4% and Tanzania (22)8.4%. the significant variability(8.4%-49%) may be explain by difference in work culture ,rules and regulations of hospital ,role of surgeon in perioperative optimization, extensiveness of surgeon related factor list .in my study list in each category were extensive which may contribute for the hither percentage. from different literatures most common specific surgeon related factors are over-booking a list(2(50%),17,22),Surgeon not available(5,22,9,)and les common ones are change line of management, late presentation of surgeon ,unconfirmed diagnosis.in our set up most common surgeon related cause of cancelation were shortage of OT due to overscheduling and long preceding surgery .Strategies to reduce the rate of case cancellations due to cases overrunning the allocated time and overscheduling improve overall operating room efficiency.Although unpredictable events during an operation can sometimes lead to list overruns, the over-ambitious surgeons may also be factor. Overbooking can be minimized by taking surgeon, anaesthesia, patient, and facility factors into account and using statistical methods to estimate the amount of time allocated to each procedure, focusing on the actual time of start, time of break between surgeries, anesthesia set-up and the availability of experienced surgeons (2).

The administration/ logistics' related causes represent the second most common reason for cancellation in my study (36%) of which 87% was avoidable. Major specific administrative related DOS cancelation reasons were shortage of OR material (32%) and lack of ICU with mechanical ventilator (32%) which was also mentioned in different literature. shortage of OR material as most common cause (22%(7),47% (33) ,13,19,22),lack of OR space (27%(24). Factors under administrator related umbrella included: Shortage of OR material, scheduling error, Delay in anesthesia due to incomplete anesthesia facility in the OR &pharmacy, high turn over time, emergency priority, Lack of mechanical ventilator,Lack of ICU bed, in-availabilityof technician or other necessary supportiveOR stuff. The administration/ logistics' related causes of cancelation in my research was lower than 82% Tanzania (22), 73% in Hong Kong (21) and it was in line with 30.4%, Jordan (11) and 29.5%,India(19)but higher than 9.4% &20.3% Sudan(8,26),1.8% Pakistan(25),3.7% India (17), 21.2%Hawasa (9).All administrative cancellations were due to poor communication and lack of

coordination between different departments involved in the efficient functioning of the OR ,These reasons can be avoided if proper administrative measures are taken(19).Cancellations of elective operations due to lack of theatre space and theatre facilities can be prevented through careful planning and efficient utilization of the already limited hospital resources with appropriate co-operation and co-ordination between the various disciplines involved in the process like the administrator,surgeon,anesthesiologist and supporting staffs.
Therequirementoftheinstruments/drugs/other equipmentnecessaryforscheduledsurgical listshould be discussed among surgeon, staff nurse and the anesthesiologistsdaypriortoplannedORlist.A long-term planning should be aimed at increasing ICU spaces and have they all equipped with enough facilities and manpower.

Patient related cancellations came out to be the third most common reason in this audit (12.3%)in which 50% was avoidable and non-avoidable 50% were all medical reasons.Patient related factor includes: patient unable to provide OR material/payment which he or she supposed to cover, absent on DOS, Changed mind after overnight fasting), Incomplete preoperative work up (patient supposed to complete), Pre-operative instructions not followed, Medically UN fit patient (Acute change in medical status,poorly controlled/Uncontrolled medical illnesses).Among specific patient related causes 35% was patient changed mind after overnight fasting, acute change in medical illness (28%), and poorly controlled chronic medical illness in 22% of cases. Patient related cause of cancelation has variable percentage of contribution for total cancelation in different literatures. Reported incidence rate ranges as high as 68% Sudan (8), 58% Pakistan (25), 55% Brazil (32), 31% Jordan (11) ,31% (33),30%ethiopia Hawasa (9) 10% India and Hong Kong (19,21),6.2% Tanzania(22).In the literatures Cancellation of the case caused by patient related factor was mainly due to medical illness (9,30,29.5%(1),30%(26),50%(1),33.3%(24))and Patients not coming to surgery (57%(7),23%(11), 25% (22), 35,5%(1),19.5%(26),20%(1). In case of optimized sick patient there is the possible and real risk of the general anesthesia and surgical trauma peri- and post-operative complications that threaten the life of the patients so postponement is recommended and this factor deemed unavoidable(8).The commonest approach to deal with the problem of cancellation on the day of surgery because the patient is not fit for the operation is the establishment of preassessment Clinics (37).since there may be different reason on the back for patient change in mind it wise to tray to reassure reputedly and identify the real cause and deal on it.

Anaesthesia /Anesthetist/anesthesiologist related cause of cancelation contributed only for 3 cases (2.6%) fromall the cancelled operations (114)2of the cases cancelled due to lack of operating time due to difficult/failed intubation /regional took beyond acceptable time and long preparation and induction time due to teaching practicing residents and other students. The 3rd patient was unfit for anaesthesia requires further optimization due to in adequate preoperative evaluation. factors under anesthesia related cause of cancelation includes: Patient unfit for anaesthesia due to no or inadequate preoperative evaluation, senior anesthesiologist cover not available, Inadequate number of anesthesiologists/anesthetists by different non administrative reason reason, Consultant handling difficult case in other room, shortage of OT due to: responsible anesthesia provider absent or come late , failed OR difficult intubation or regional took beyond accepted time, failed or difficult IV access took beyond acceptable time, long preparation and anesthesia time due teaching practicing residents and other students, a long preparation and induction time due to failure to prepare important drugs and equipment early for anticipated difficulty and complication, delay emergency and induction due to unanticipated difficulty and complication .Anesthesia related cause of cancellation prevalence and frequency of specific cause significantly vary in literatures: 21.8% Pakistan (25), 13% Ethiopia Hawasa (9),3.4% Tanzania (22), 6% Nigeria (5), 1.6% Spain (1),0% Hong Kong (21).this variability can be explained by difference availability of physician anesthesia provider,

preoperative clinic, type of hospital, institutional protocols etc..un like may finding Medical reasons (80% of non-justifiable cancellation) was the major cause of cancellation by the anesthetist, which was either not picked up earlier or if diagnosed was not optimized (36). There is plenty of evidence that preoperative clinic assessment decreases cancellation rate, discussing plan and risk of anaesthesia with the patient and surgeon during preoperative evaluation prevent day of surgery cancellation (36).i strongly believe the low anesthesia related cause of cancelation in our hospital is because of combination functional preoperative clinics, the good habit of surgeons consulting high risk cases before scheduling ,regular preoperative discussion session on a day or two before day of surgery and because usually anesthesia is administered by individual who did the evaluation. Though anesthesia related causes are less frequent we have to asses our level frequently and continuously work hard to decrease anesthesia related cause of cancelation in adtion we should contribute to decrease other cause of cancelation to so as increase hospital quality of care.

The study found most of the on day cancellations were due to potentially avoidable reasons 68.4 %(78/18% Nigeria(36)14). Specifically long preceding case, over scheduling from surgeon related shortage of OR material, lack of ICU bed/mechanical ventilator from administrator related and patient changed mind after overnight fasting comprises of above 60% of avoidable cause of cancelation. This rate is comparable to the literature findings in Burkina Faso 13&33 (68.5%, 89.5%) but Lower than (93.8%) in Tanzania22.
AuditshouldbecarriedoutatregularintervalstofindouttheeffectivefunctioningoftheOR, The feasibility and profitability of approaches that have been proven to be successful in other institutions, should be assessed thoroughly in the context of our institution characteristics and individual problems before a decision for implementation is made.

When analyzing surgical specialties cancelation rate and common causes of cancelationmy study found Surgery specialties had different cancelationpercentage from scheduled operations in the specific specialty anddifferentreason proportions. Highest cancel ion was in the NS 55.1%,Cardiothoracic 53.3%, orthopedics, 34.4%, lowest was urology 14.9%.the prevalence found in Neuro ,cardiothoracic and orthopedic surgery specialtieswas higher than reported in previous literatures(1,8,9,30,33).

the most common cause of cancellation for NS was administrator related 48%,surgeon related 37% with common specific causes lack of ICU bed and mechanical ventilator from administrator related and overscheduling and lack of OR time due to long preceding cases from surgeon related causes in which above 80% is was avoidable causes.

In the cardiothoracic specialty surgeon related cause of cancelation was common with 75% prevalence in which about 60% of causes was potentially avoidable. The specific common causes were over scheduling, lack of OR time due to prolonged preceding surgery and surgeon exhaustion with equal frequency account for above 50% 0f cancelation.in the orthopedic 50% and 28% of cancelation was surgeon and administrator related respectively in which above 60% was potentially preventable .the common specific cause were shortage of OR material, lack of time due to long preceding surgery contribute for near 50% of cancellation.

A study carried by Josiane Harumi etal (30) found cancelation rate to be 16.1% and main reasons for cancelled surgery were patient related (57%) from which nonappearance of the patient was most common. In analyzing the rate and cause of surgical cancelation in each specialty shows rate and the

main causes for cancellation vary according to the surgical service: Orthopedic17%, NS 16%, and URO 16%, general surgery 16% and CT 7% cancelled of their elective surgeries. Patient-related reasons were mainly responsible cancelled orthopedic (50%), Urological and general surgery operations. The specific main causes were not appearing for admission, refusal to authorize the operation, and the patient not having the required clinical conditions to undergo the procedure. Cardiovascular and Neuro Surgery lack of beds on wards or in ICU accounted for around 50% and 45%of their cancelation. study done in Spain (1) found Non-surgical medical causes were the most common reasons for cancellation in urology (39%), gynecology (38%), orthopedics and trauma (32%), vascular surgery (32%) and general surgery (29%).the variability can be due to the difference in hospital services provided, personnel and infrastructures, administration and management, population served, and healthcare system in which the hospital functions.My results suggested that quality-improvement strategies are necessary in those specialties susceptible to case cancellations due to facility factors, so as to maximize the completion of surgical operating lists. E.g. for problem related to ICU and mechanical ventilator communicate potential availability before scheduling and as a long term increase number of ICU beds mechanical ventilator to meet the demand.

The main limitation of my research is study period was short to really assess causes behind cancelation and incidence in each specialty because I know that reason for cancelation are seasonal like for some days absence of ORmatherial,anesthesia drug, shortage of staff, breakage of power, shortage of water, renewing the building etc. Other limitation data were collected by anesthesia residents so there may be biases to avoid this I try to see the nurse log book but it was not complete and I just not used.The other limitation is ENT was not included because of lack of reliable data collector.

7. Conclusion and recommendation:

Rate of cancelation is high in our setup which wastes the already limited resources because most of causes are preventable each of the stake holders should take responsibility and strive to decrease DOS cancelation. General understanding, communication and cooperation between the surgical, anesthesiology, nursing, patient and logistic team will reduce the incidence to a minimum and increase the efficacy of the hospital. Audit carried out at regular intervals to find out the effective functioning of the OR and thorough assessment of feasibility and profitability of approaches that have been proven to be successful in other institutions, in the context of our institution characteristics and individual problems and taking proper administrative measures will decrease cancelation and its attendant adverse events.

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I Dr.Zemene Eyayu declare that this is my original work for partial fulfillment of anesthesiology specialty certificate on 2019gc.

Signature

Date

I Dr.Fetiya Alferid Dr.Zemene eyayu's research advisor and his teacher declare that this is his original work for partial fulfillment of anesthesiology specialty certificate on 2019gc.

Signature

Date