

**FACTORS INFLUENCING DELAYS OF ELECTIVE SURGICAL CASES AT
THE AGA KHAN HOSPITALS IN KENYA**

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UNIVERSITY**

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DECLARATION

Student Declaration

I declare that this thesis is my original work and that it has not been presented in any other university.

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Supervisors' Recommendation

This thesis has been submitted for examination with our approval as university supervisors.

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DEDICATION

This work is dedicated to my husband Victor Kimeu, and children Evans Mutinda and Dr. Pauline Mwia for their unwavering support without which I could not have completed this study.

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ABSTRACT

Countries face health systems challenges which in turn affect the quantity and quality of health services delivered to the people. This consequently results in poor service delivery, negative outcomes and client dissatisfaction. Globally, delays of elective surgical procedures are a major concern for all healthcare institutions and their resolution would be key in reducing waste and improving workflow efficiency. However, achieving efficiency in the performance of elective surgical cases has been marred by numerous factors especially in the developing world, and Kenya, in particular. This study sought to identify the factors influencing delays of elective surgical cases at the Aga Khan hospitals in Kisumu, Nairobi and Mombasa, Kenya. The study evaluated patient, staff, equipment and management support factors associated with delays of elective surgical cases. This research adopted a descriptive cross-sectional study design encompassing use of both quantitative and qualitative data. Quantitative data was collected through questionnaires administered to operating room staff while qualitative data was collected through Key Informant Interviews with operating room administrators. Stratified random sampling was applied to select 238 respondents from a target population of 494 operating room staff drawn from the Kisumu, Nairobi and Mombasa Aga Khan Hospitals. Two (2) Key informants from each targeted facility were purposively selected for inclusion in the study. The researcher obtained all required approvals from relevant authorities and obtained informed consent from research participants prior to conducting the study. Data was cleaned, entered into data base before commencement of analysis; Descriptive data was then analyzed using Statistical Package for Social Sciences version 23.0 to calculate the mean and standard deviation. Microsoft Excel program was used to generate percentages, frequency tables and pie-chart. Inferential statistics were calculated using Pearson's Correlation and Multi-Linear regression methods to test the relationship between variables at 95% confidence interval where *p-values of* ≤ 0.05 were considered significant. Qualitative data was analyzed thematically and was guided by the study objectives, and then the results were triangulated with quantitative findings from questionnaires. The results indicate that out of the four factors studied, only Staff and Management factors ($X_2: \beta_2 = .074, P < .007$), ($X_4: \beta_4 = .516, P < .000$) had significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya, while Patient and Equipment factors ($X_1: \beta_1 = .034, P > .267$), ($X_3: \beta_3 = .009, P > .841$) were not found to have any significant influence on delays of elective surgical cases at the Aga Khan hospitals in Kenya. The study recommended that the hospital management of the three hospitals address Operating Room staffing, timely financial clearance for booked patients, staff coordination, timely replacement of old surgical equipment and adequacy of operating theatres.

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ABBREVIATIONS AND ACRONYMS

ERC	-	Ethics and Review Committee
ICU	-	Intensive Care Unit
IT	-	Information Technology
KII	-	Key Informant Interview
OR	-	Operating Room
SPSS	-	Statistical Package for Social Sciences
TOC	-	Theory of Constraints
MoH	-	Ministry of Health
UK	-	United Kingdom
NACOSTI	-	National Commission for Science, Technology and Innovation
KEMU-SERC	-	Kenya Methodist University Scientific Ethics Review Committee
AKU-IERC	-	Aga Khan University Institutional Ethics Review Committee

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

Good population health outcomes rely not only on health protection and health improvement, but on the quality and accessibility of healthcare services provided (Care Quality Commission, 2012). A health system is more than a mix of facilities and medical examinations. It is a structure where institutions, people and organizations interact to mobilize and allocate resources for quality healthcare delivery (Lazarus and France, 2014). For a healthcare system to function well, it has to rest on certain fundamental concepts, which promote efficiency, effectiveness, accountability and monitoring. It is against this backdrop that the World Health Organization (WHO) developed the six pillars or building blocks as broad elements to strengthen health systems. The six pillars are; service delivery, health workforce, health information, access to essential medicines, financing and leadership/governance (World Health Organization [WHO], 2010). These pillars are interrelated and have defined characteristics that lead to the strengthening of particular aspect of the health care system.

Health service delivery is people-centered care that is focused and organized around the health needs and expectations of people and communities rather than on diseases. Service delivery is an immediate output of the inputs into the health system, and it is what is visible to the clients (WHO, 2010). Strengthening service delivery ensures access to quality and efficient interventions leading to improved health outcomes. One of the challenges of service delivery is the delays that patients experience at the various service

points. Such delays are a barrier to access of care, and all efforts must be put in place to minimize them. Among the delays are those associated with access to elective surgical services and are major sources of concern for all healthcare institutions (Hendy et al., 2012).

Globally, there are various health care systems that provide universal or non-universal health care to the people. In the United States of America (USA), ownership of the health care system is mainly in private hands with about 65% of total health care expenditure while Federal, state, and county governments account for the rest. 38% of the people receive health care through their employers while 17% have private insurance or co-pay arrangements (American Hospital Association, 2018). Among the developed nations the USA is the only one without universal coverage, with 12-16% of the population having no health insurance. Even so, service delivery and health outcomes are said to be good.

On the other hand, Europe is home to some of the best and most established health care systems in the world that provide universal health care (Soliman et al., 2013). In many of the European countries health care is centrally financed through taxes and to some extent through service fees. Health establishments and personnel are managed by government ministries. Noticeably, Europe has a reputation for excellent standards of care and service delivery (Orchard & McWinne, 2010).

While there are countries in Africa that have made great strides towards achieving universal health care for their citizens, general performance in service delivery and health outcomes is still low. Many of the African countries have excellent level of care provided by private healthcare facilities which is not accessible to the majority of the citizens owing to cost. Public health institutions face a myriad of challenges which include

inadequate human resources, equipment, medicines and supplies. These and other factors affect service delivery, outcomes and patient satisfaction (Brown et al., 2014).

Among the most crucial health services that present serious quality concerns are the surgical services that have been neglected in most healthcare systems in Sub-Saharan Africa, Kenya included. There is limited access to surgical services and accordingly low surgical output compared to richer nations (Ohene-Yeboah & Abantanga, 2011). The reasons for this are numerous, including but not limited to inadequate human resources especially those with expertise to conduct specialized surgical procedures, lack of specialized equipment and limited surgical supplies (Anastasius et al., 2011).

1.2 Statement of the Problem

Despite notable successes in strengthening of surgical service delivery in Kenya, delays of elective surgical cases remain a source of concern to many hospital settings across the country (Anastasius et al., 2011). These delays act as barriers to optimal patient workflow efficiency and result to piling of scheduled elective surgical cases, wastage of resources as well as dissatisfaction among staff and patients (Wong et al., 2010). For hospital administrators, delays of elective surgical cases result in loss of revenue and negative reputation for the organization (Bauer et al., 2016).

Maine et al. (2019) carried a study on the effect of in-hospital delays on surgical mortality for emergency general surgery conditions at a tertiary hospital in Malawi, where the study established an increased mortality in OR and advised on increased staffing levels and operating room availability at tertiary hospitals, especially at night, are needed. Another study by Okunu (2012) on cancellation of elective surgical cases at Kenyatta National Hospital established that cancellation of elective cases occupies a

substantial population (20.6%) of cases at Kenyatta National Hospital, Nairobi with majority of these cases being due to hospital non-clinical reasons with lack of time being the commonest. The study further stated that 60% of these cancellations were avoidable with better management.

Aga Khan Hospital, Monthly June Report (2017, p, 13) indicated that 60-70% of elective surgical cases do not start on time. While the reasons for the delays may vary from one facility to another, any delay results in loss of revenue for the health facility and client dissatisfaction with surgical care. Available studies including the above local study are scanty and therefore cannot be considered to be conclusive on the factors influencing delays of elective surgical cases. Moreover, the studies were not based at the Aga Khan Hospitals in Kenya. Therefore, this study specifically seeks to establish the factors influencing delays of elective surgical cases at Aga Khan Hospitals in Kenya.

1.3 Study objectives

1.3.1 General objective

The broad objective of this study was to establish the factors influencing delays of elective surgical cases at the Aga Khan Hospitals in Kenya.

3.2 Specific objectives

This study sought to address the following specific objectives:

- a) To determine the patient factors contributing to delays of elective surgical cases at the Aga Khan Hospitals in Kenya
- b) To establish the staff factors associated with delays of elective surgical cases at the Aga Khan Hospitals in Kenya.

- c) To identify equipment factors resulting in delays of elective surgical cases at the Aga Khan Hospitals in Kenya.
- d) To assess the contribution of management support to delays of elective surgical cases at the Aga Khan Hospitals in Kenya.

1.4 Research Questions

- i. What are the patient factors contributing to delays of elective surgical cases at the Aga Khan Hospitals in Kenya?
- ii. What staff factors contribute to delays of elective surgical cases at Aga Khan Hospitals in Kenya?
- iii. What are the equipment factors contributing to delays of elective surgical cases at the Aga Khan Hospitals in Kenya?
- iv. What are the management support factors contributing to delays of elective surgical cases at the Aga Khan Hospitals in Kenya?

1.5 Justification of the Study

Operating Rooms are complex units and affect a high percentage of a hospital's revenue. Identifying the causes of delays of elective surgical cases can have a major impact on surgical services efficiency, hospital finances, staff morale and patient satisfaction. The Aga Khan Hospitals are among the large private and tertiary referral health service providers in the country. These hospitals collectively conduct over 20,000 surgical cases per year, carrying out both simple and complex procedures across all surgical subspecialties. It was therefore necessary to understand the determinants of delays of elective surgical cases in order to improve overall operating room efficiency and reduce cost of surgical services among the Aga Khan hospitals in Kenya. Several studies on the

subject have been done abroad but there are scanty local studies on delays of elective surgical cases to provide a local perspective of the problem. The outcomes of this study will be relevant and useful across the entire healthcare sector in Kenya and the region.

1.6 Limitations of the Study

A few times when some respondents were hesitant to answer some of the questions, fearing victimization from the management. The researcher had to be innovative in engaging the respondents during data collection and assuring them that the information they provided would be treated with utmost confidentiality and that anonymity was maintained.

The study was carried out in three private hospitals which have similar management structures, staff and patient populations. For this reason, the findings may be limited to the three hospitals and similar private facilities and may not entirely be generalizable to the public hospitals in Kenya. However, the study was structured to gather as much exhaustive information as possible, that may apply to public institutions as well.

Given that some of the reasons for delays of elective surgical cases directly involved members of the surgical team, some of the respondents may not have been truthful if the reasons for delays touched on themselves or their senior colleagues. The researcher had to assure them of utmost confidentiality and that the information provided was only used for the purpose of the study and not for any other reasons.

The study had only four objectives while there could be other factors that contribute to delays of elective surgical cases in the target health facilities. The study therefore suggested further research to explore other objectives not evaluated.

1.7 Delimitations of the study

The study targeted 238 participants drawn from Aga Khan Hospitals in Nairobi, Mombasa and Kisumu counties. The respondents were drawn from all strata of staff directly involved in activities for elective surgical cases and hence the information provided was not only reliable but also representative. These staff included surgeons, anesthetists, obstetric/gynecologists, nurses, anesthesia technicians, schedulers, resident doctors and billing staff. The assurance that the information provided by the respondents would be treated with utmost confidentiality enabled them to provide the required depth and accuracy of information.

The study sites are homogenous in that they have similar management structures, use similar standards of operations and have similar cadres of staff therefore the information gathered was reliable, and the results provided comparisons of the variables under study between the three hospitals.

Pretesting of the study tools was done at Aga Khan Hospital, Nairobi to help in refining the study questions to ensure that the final tools were reliable in collecting the required information and meeting the study objectives.

1.8 Significance of the Study

The findings of this study was beneficial to the health sector stakeholders to develop strategies to achieve operating room efficiency and deliver quality surgical services. The study findings helped the Aga Khan Hospitals in identifying the causes and frequency of delays at the various stages of the operating processes. This will enable the hospital administrators to develop evidence-based strategies to reduce workflow inefficiencies and client dissatisfaction associated with delays of elective surgical cases

The findings of this study formed a knowledge base for future reference by researchers and academicians by providing an in-depth understanding of the reasons for delays of elective surgical cases. It provided a local understanding of the problem, and local findings from which comparisons can be drawn with similar studies done abroad. The findings of the study will also help health managers in major hospital in developing effective policies to guide the operations of elective surgical services to achieve more efficiency, improve quality and reduce losses associated with delays of elective surgical services.

1.9 Assumption of the study

The study assumed that the targeted respondents would participate in the study as anticipated and that the information collected from them would be adequate to draw conclusion from on the issue under investigation. The study also assumed that the time and resources allocated was adequate to complete the study.

1.10 Operational definition of terms

Operation Delay in this study refers to the start of an elective surgical procedure that starts later than it was scheduled.

Elective surgical cases refer to scheduled surgical procedures that are non-urgent or emergent

Operating room also known as operating theatre, is a facility or unit within a hospital where surgical procedures are carried out in a controlled environment.

Operating room operations refers to the activities of a surgical theatre put together to culminate in efficient delivery of quality surgical care.

Patient satisfaction refers to a personal evaluation of the outcome resulting from a particular healthcare service and the care providers collectively.

Operating room utilization is a measure of the use of an operating room that is properly staffed with people needed to successfully deliver a surgical procedure to a patient.

Operating room efficiency refers to maximizing the number of surgical cases that can be done on a given day while minimizing the required resources and related costs

Patient factors are characteristics manifested in the care receivers which play a part in delays of surgical procedures

Staff factors refers to factors attributed to individuals working in, utilizing and managing operation rooms

Equipment factors are features associated with necessary items or tools that support health care providers in performing surgical procedures

Management support factors these are factors that are associated with the daily planning, directing, and coordination of activities at the Operating Room.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter identified and evaluated theories, opinions, knowledge, attributes and findings of various studies that have been done before by different scholars and institutions on delays of elective surgical cases in health facilities. The chapter looked at the relevant literature done by the past researchers to shed more light on the factors that influence delays of elective surgical cases at Aga Khan Hospitals in Kenya.

2.2 Theoretical Review

Time spent on surgical cases is expensive, costing an estimated \$15 per minute. Approximately 40% of hospital revenue is wasted in surgical cases (Van Winkle et al., 2016). Improved efficiency in the provision of surgical services is used as a marker of quality of surgical care. It depends on the ability of the facility to overcome constraints to deliver timely operations. Therefore, hospitals are often focused on reducing preventable delays through effective scheduling of operations and timely observation of operation sessions (Bauer et al., 2016). Despite the pressing need to optimize surgical services utilization, failures attributed to inadequate supplies, equipment, information and unsupportive staff does occur (Kajja & Sibinga, 2014). Unnecessary delays in operating rooms in most health facilities contribute to the overall wastage of time in health facilities.

Literature reveals that though operational failures waste at least 10% of caregivers' time, in some facilities patient reasons are blamed for delays and untimely commencement of care (Gravely et al., 2011). Globally, Patient factors contribute to delays of elective surgical cases and disruptions of operation schedules causing delays for the next patient (Abedini et al., 2017). It is therefore significant to identify and address the underlying causes of patient factors to improve hospital performance.

Some delays of elective surgical cases are associated with last minute cancellation of procedures by patients. These Cancellations can range from 4.6% to 13% -18% at certain medical centers for outpatients (Beaudoin & Edgar, 2012). Last minute cancellation or postponement of operation schedule by patients may be due to patient indecisiveness or unavailability of consent for surgery, or lack of financial clearance. Other cancellations are associated with non-medical problems such as unavailability of critical care (ICU) beds, surgeons, or bad weather. Stavrou et al., (2014) state that on average, elective surgical cases cancellations waste at least 25% of caregivers' time.

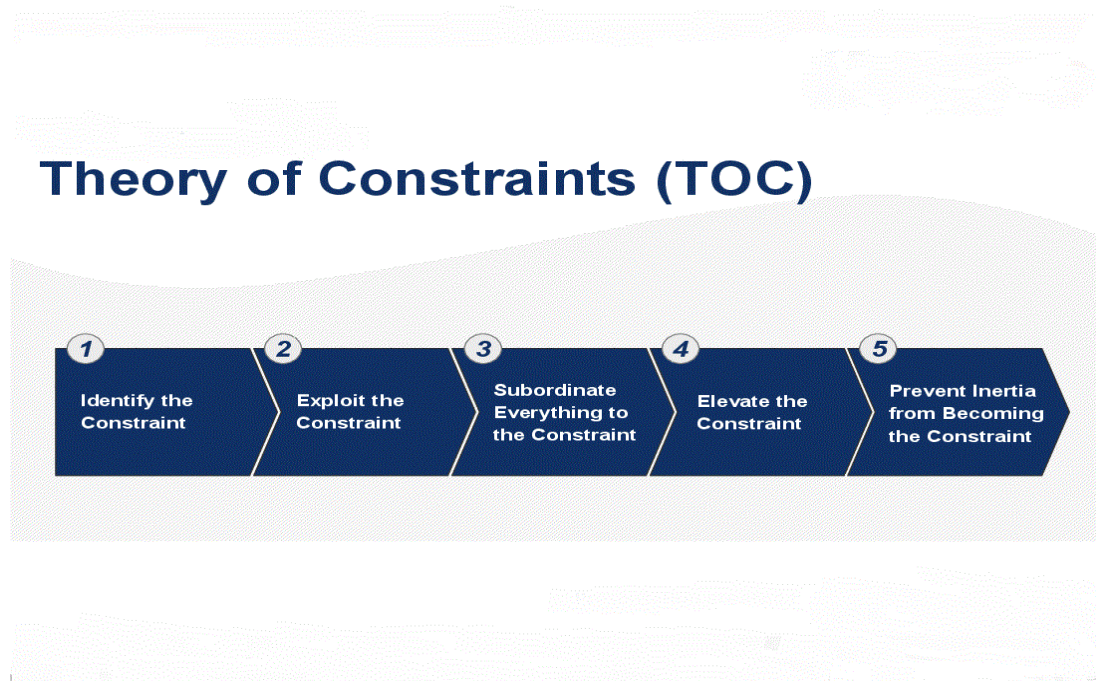
2.2.1 Theoretical framework

The theory of constraints (TOC) is a methodology that seeks to maximize the potential of any system by investigating its constraints and figuring out the critical ones (Goldratt, 1986). From there, the system can be safely expanded in directions where the constraints are not at their limit yet, allowing the company to move forward towards improved productivity while remaining within safe margins. It should not be surprising that TOC finds active use in the healthcare sector, and there are various real-world examples of how it has helped transform a facility into a more productive and organized one.

Theoretical Framework

Figure 2.1

Theoretical Framework (TOC)



Theory of Constraints (TOC)

This study is based on Theory of Constraints (TOC), which is a systems theory of extems-management philosophy developed by Goldratt in the early 1980s. The fundamental thesis of TOC is that constraints, or bottlenecks, establish the limits of performance for any system. Proponents of TOC suggest that to continuously improve the performance of organizations, it entails identifying constraints and effectively managing them. TOC is a practical guide for managers to identify what to change in the system, what to change it to, and how to cause the change.

This theory was applied in the identification of factors that affect delays of elective surgical cases at the Aga Khan hospitals in Nairobi, Kisumu and Mombasa counties.

TOC helped in highlighting the constraints in the system that hinders the organization from achieving surgical services efficiency. This further helped to alleviating the problem and apportioning to it the necessary attention it deserves and the identifying the necessary changes required in the system in order to achieve the desired outcomes.

One of the biggest challenges for healthcare facilities of any scale is the speed at which they can deliver services to their patients. It is not rare for delays of elective surgical cases to extend beyond acceptable time, and this continues to be a major issue in major hospitals. When one looks at this problem as a situation with constraints, it becomes clear that TOC can be a powerful tool for addressing delays of elective surgical cases. The theory of constraints is not a magic wand in quality improvement.

It relies on the facility's ability to accurately identify the constraints (in this case patients, management, equipment and staff factors) that are preventing the facility from reducing delays of elective surgical cases in the health facilities. When one is working with patients with varied needs, complicated equipment, large number of staff from different specialties and larger facility, it can become difficult to coordinate and bring the different pieces together in a manner that results in efficient provision of surgical services.

2.3 Conceptual framework

Operating room delays are a primary cause of inefficiencies and wasted resources. There is wide variation in the reported occurrence of delays of elective surgical cases, with rates ranging from 40% to 96% of all cases (Van Winkle et al., 2016). Some of these delays are caused by patient factors. Psychologically unprepared patients may either cancel surgery at the last minute or simply not show up on the day of the surgery. Other patients report late to the operating room. This could be as a result of transport difficulties, late

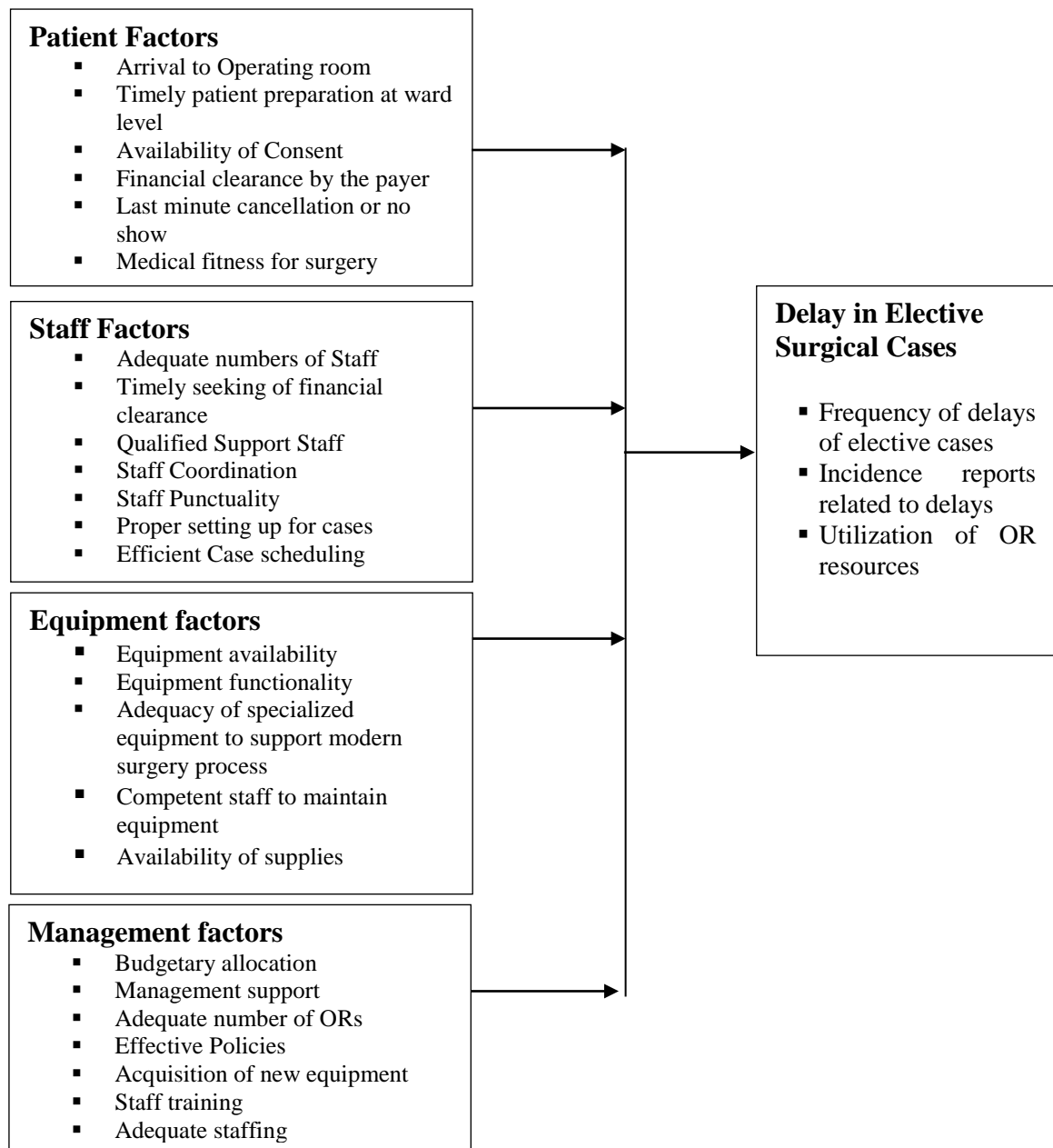
patient preparation by the nurses at ward level, and sometimes missing consents, or late financial clearance.

Significant surgical delays could also attribute to staff factors which include late arrival to the operating theatres, unpreparedness, lack of team work and communication. Elective surgical cases start time delays can also be caused by missing equipment, delays in equipment delivery to OR, equipment failure and inadequate supplies (Gupta et al., 2011). The net effect of all these factors is that operation schedule is thrown into disarray resulting in delays.

2.3.1 The conceptual framework

Figure 2.2

The conceptual framework



2.4 Factors contributing to delays of elective surgical cases

Surgical services are one of the service delivery points where critical medical interventions are conducted and where numerous delays occur. Elective surgical cases refer to planned surgical procedures conducted within a health facility in a controlled environment. Globally, many hospital systems are now pressurized to increasingly pay attention to reducing wastes and to ensure workflow efficiency (Bauer et al., 2016). Surgical services efficiency has since become a key priority for many healthcare institutions, indicating a significant potential for improved delivery of services. However, achieving this has been marred by various barriers to efficient workflow especially in the developing world (Kajja & Sibinga, 2014).

In healthcare systems, surgical services are the largest source of revenue but the costliest to run. Approximately, 60%-70% of all hospital admissions are due to surgical interventions and account for 40% of total hospital expenses (Van Winkle et al., 2016).

Demand for surgical services is on the increase as life expectancy increases and so hospitals must stay on top to meet the rising demand (Abedini et al., 2017). This has called for adoption of innovative strategies to enhance efficient and cost effective care without compromising quality and patient safety.

Delays of elective surgical cases are barriers to optimal patient flow and a source of frustration to staff and patients. For hospital administrators, delays of elective surgical cases and cancellations cause financial threat to organizations as well as reputational risk. Maximal utilization of surgical cases requires timely start times for cases, staff punctuality, working equipment and efficient room turnover (Bauer et al., 2016). Lack of

information on where delays occur and the reasons for them makes it impossible to design effective corrective actions for such failures.

2.4.1 Patient Factors

2.4.1.1 Arrival to Operating room

Callie et al. (2016) pointed out that on average an estimated 65 percent of patients booked for elective surgical cases arrive late for their appointment. This can be due to difficulties in transportation from home, or a lack of education and preparation prior to surgery. Research from Duke University School of Nursing shows that hospitals lose \$20 for every one minute of delays of elective surgical cases, and the average delay is about 20 minutes with most delays blamed on patient factors. This would mean that for every 20-minute delays of elective surgical cases, a hospital loses \$400 (Jain et al., 2015).

Bouer et al., (2016), while evaluating the first-case operating room delays, identified patterns across urban hospitals of a single health care system and established that patients arrived late to the hospital thereby delaying the elective cases. The study proposed that increasing patient adherence to recommended arrival time needed to be enhanced in order to enhance consistency in workflow patterns among OR facilities in order to reduce delays.

2.4.1.2 Timely patient preparation at ward level

Admitted patients are prepared for surgery by the ward nurses. Preparations include making sure pre-operative medications (if any) are given at the specified time, skin preparations, gowning and filling of the pre-operative checklist. Although nurses can delay this preparation, there are times when patients themselves can cause the delay if

they are getting admitted on the same day of surgery and they report late to the hospital. Patients can also take long in the shower room thus delaying the consequent preparations. Late preparation of the in-patients scheduled for surgeries vary from one age to another. The level of delay for patients from the ward as stated by Boker (2013) increases with age although there is no specific or average amount of time that the patients would be delayed with. If the timely preparation of the patient prior to surgery at ward level is not properly addressed, OR facilities will continue to experience delays. Jain et al. (2015) also advised that nursing and staff in the wards need to prepare patients and have proper coordination with the OR staff especially if the number of patient to undergo surgery is high and have to be done on the same day.

2.4.1.3 Availability of Consent to operate.

Across the world there are many instances where delays occur obtaining consent from the patient or the next of kin where the patient is unable to sign for themselves. Foglia et al., (2013) stated that while the consent for a surgical procedure and anesthesia is a standard requirement, when this vital document is not obtained in good time it can lead to cancellation of the case, or delays as staff wait for next of kin.

The process or the manner in which informed consent is achieved depends on hospital policy but way the physician and the patient share information about the procedure can determine whether the patient ultimately makes the patient decides to undergo or forgo the procedure (Weinmeyer, 2014).

On the other hand, informed consent is a legal document and it is only in dire emergencies where the surgeon can proceed to carry out a surgical procedure without it. Davoudi et al., (2017) while evaluating the challenges of obtaining Informed Consent in

Emergency Ward of one Iranian hospital pointed out that consequences of OR delays while seeking patient consent were preferable to proceeding with surgery without consent, which sometimes is used to reinforce a claim of medical malpractice or serve as an alternative point of attack when the case is otherwise weak.

2.4.1.4 Financial clearance by the payer

Medical insurers and corporate payers have a process which dictates that pre-authorization for a procedure is obtained beforehand. Sometimes this process is lengthy requiring back and forth between the patient and the payer. Where there is co-pay the patient may take time negotiating the difference with finance team on the day of surgery, causing a delay. For cash payers, patients may come to the hospital without the required deposit necessitating signing of payment agreement which might delay the surgery. Similarly, patients are likely to cancel their scheduled operation due to their inability to afford the cost required. Kaddoum et al., (2016) on the causes of cancellations on the day of surgery at a Tertiary Teaching Hospital in Beirut, established that of the 187 potentially avoidable cancellations, lack of financial clearance was one of the reasons for the cancellation.

In this case series of ten non-ICU level patients, the delay in the start time on elective surgical due to financial clearance represented a big percentage of total OR delays due to exemplified, high and potentially avoidable healthcare charges that increase the overall charges of OR services. This case series adds to the literature reflecting the high healthcare charges associated with high cost of surgery especially in the developing countries (Gupta et al., 2011).

2.4.1.5 Last minute cancellation or no show

Patients cancel procedures at the last minute for various reasons. One of them could be psychological unpreparedness where a patient feels uncomfortable to proceed and chooses to postpone or forgo the procedure. Other reasons include patients finding alternative care providers, failure to raise the required fee or choosing alternative therapies to surgery. Surgical teams get prepared waiting for the patient just to learn the patient has called to cancel. In some instances, the patients do not call to cancel the planned operation; instead they do not show up on the day of the surgery (Von Vogelsang et al., 2019).

Cancellation of operations in hospitals is a significant problem with far reaching consequences. Cancellation of elective operations is also a parameter to assess quality of patient care and quality of management system. The reported incidence of cancellation in different hospitals ranges from 10% to 40%. Kumar and Gandhi (2012) while evaluating the reasons for cancellation of operations on the day of intended surgery in a multidisciplinary 500 bedded hospital, found that 244 (19%) patients do not turn up for surgery. These two scenarios, no-show and last minute cancellation are a waste of OR resources and end up delaying the next and subsequent cases.

2.4.1.6 Medical fitness for surgery

Patients physical fitness for surgery is important for good outcomes. There are times during pre-surgery assessments where patients have been found to be unfit for surgery, forcing either a cancellation or a reschedule (Ifesanya et al., 2013).

There is a consistent relationship between patients' fitness, physical condition, clinical contexts and decision to surgical cases. Ricahrdson et al., (2017) pointed out that

physiological measurements obtained during physical exercise may be used to infer the risk of adverse outcome after major surgery. Such information may be used to inform a variety of changes in the surgical process. In order to reduce the risk of perioperative adverse events these interventions may vary from total cancelation or delay to the case start time. The establishment of a pre-anesthetic clinic for the pre-anesthetic evaluation of the patients by anesthetists and effective coordination of staff has been proved to address these situations (Van As et al., 2011).

2.4.2 Staff Factors

2.4.2.1 Adequate numbers of Staff

Health care in Africa faces difficult challenges such as shortage of health workers, increased caseloads for health workers due to migration of skilled health personnel, and the double burden of disease which affect the general health care provision in health facilities. Major services such as surgical services have been faced with shortage of staff resulting from high turnover, brain drain in the sector as health professional seek greener pastures overseas, low motivation of health workers and overall inadequate human resources (Anastasius et al., 2011).

The operating rooms are staffed by highly skilled staff that include surgeons, anesthetists, nurses, obstetricians, schedulers, biomedical among others. Shortages in any or all of these cadres create huge bottlenecks as theatres cannot operate at full capacity. Such shortages also create delays at the various stages of the surgical process and can result to negative clinical outcomes if unchecked. Mohajan (2014) advised that patients who have planned surgery and meet the criteria for such surgery should be operated on without delays to prevent harm that can lead to unnecessary stay in the health facilities.

2.4.2.2 Timely seeking of financial clearance

Financial clearance for corporate and insured patients is a lengthy process and demands that the staff dealing with it are familiar with the various requirements by the different payers. Incomplete pre-authorization forms, late submission of the forms to the payer and lack of follow-up do result in delayed financial clearance or cancellation of the cases.

Such cancellations on the day of the surgery as stressed by Slater (2012) contributes to inefficient use of OR and wastage of other resources.

Kaddoum et al., (2016) while carrying out a prospective audit of the operation theatre list over a period of eight months in a tertiary teaching hospital in Beirut identified lack of financial clearance as one of the causes for delayed elective cases in the health facility.

In most cases the patients present themselves on the day of surgery with no insurance approval, some are unable to pay, or sometimes it is the admission staff that do not complete the financial clearance of the patient in good time thereby leading to either cancelation or delay. Maru et al., (2013) noted that especially in developing countries, delays arising from lack of financial clearance was not a surprise given the absence of universal healthcare coverage in these countries.

2.4.2.3 Qualified Support Staff

The success of the day's operation list depends not only on the skilled staff available but also on support staff. Having adequate number of staff in their right mix staff is crucial in maximal utilization of the surgical services which requires on-time starts and efficient room turnover (Callie, 2016). A study done in China revealed that unavailability of the required staff to conduct operations was the main reason for cancellation, delays and postponement of surgeries (Zhao & Yeung, 2011). In fact, 11% of patients were delayed

or cancelled not just due to unavailability of surgeons, anesthesiologist, and nurses but also other support staff required to deliver effective surgical operations.

Support staff in the OR depend on the size of the hospital and type of procedures done. Generally, in busy theatres that carry out complex procedures support staff will include housekeeping to ensure cleanliness and efficient room turnover, biomedical team that prepares and maintains the highly specialized OR equipment, Supplies staff who provide surgical supplies and Radiographers who operate the image Intensifying equipment. Successful operations depend on the staff numbers, training, organization and coordination. Improper pre-operative preparation among the staff has been quoted as a major reason for case delays or cancellations (Kaddoum et al., 2016).

2.4.2.4 Staff Coordination

In practice the operating rooms are commonly intricate, high-stress environments occupied by a broad array of technological tools and interdisciplinary staff. The operating room has a unique set of team dynamics, as professionals from multiple specialties whose goals and training differ widely are required to work in a closely coordinated fashion and this may cause delays in the operating rooms if teams do not function effectively (Hull et al., 2011). Disruptions in workflow resulting from teamwork and staff communication failures have been identified as reasons that significantly contribute to serious delays in the operating rooms and late start of first or subsequent cases (Darwish et al., 2016). While it is apparent that some matters associated with staff performance may be unavoidable, there is evidence that effective communication and teamwork among care givers contribute to better patient experience and outcomes (Shouhed, 2012).

The complex setting that is OR, as stated by Mosadeghrad (2014) provides multiple opportunities for suboptimal communication, clashing motivations, and errors arising not from technical incompetence but from cognitive biases, poor interpersonal skills, and substandard environmental factors that may contribute to delays of elective surgical cases and procedures. This issue can be minimized by maintaining good communication and high levels of internal staff integration to prevent surgical cases.

2.4.2.5 Staff Punctuality

The operating room has a per minute billing model and so every minute lost as staff trickle in translates to loss of revenue. Every single operation has a team of players and therefore each team member must be present in order for the case to start on time. Preoperative briefings have the potential to increase surgical services efficiency and thereby improve quality of care and reduce costs (Khan et al., 2016). Preoperative briefings help in formulating and sharing the operative plan, promote teamwork, mitigate hazards to patients, reduce preventable harm and ensure equipment availability before start of cases. Such briefings can only be successful if all team members are present from the start.

2.4.2.6 Proper setting up for cases

Setting up for cases requires skill and knowledge of the planned case and routine requirements, and sometimes certain preferences by the surgeon. Kaddoum et al., (2016) advised that there should be a discussion of the planned OR list and arranging for the requirements should be done a day before the scheduled operations. Boker (2013), on a study about the causes of last minute cancellation of operative procedures at King Abdulaziz University Hospital, identified improper pre-operative preparation as the major

reason for cancellations, which can be minimized by good communication between the preoperative team.

Another study by Jonnalagadda and Hariharan (2005) evaluated the reasons for cancellations and delays of surgical procedures in developing countries where the study established that 89% of cancellations occurred in patients undergoing elective surgery and the leading reasons were staff related which included improper pre-operative staff preparation (13%), unavailability of nurses (11%) and anesthetists (8%).

2.4.2.7 Efficient case scheduling

Scheduling operations to meet the varying needs of patients, surgeons and sometimes payers can be challenging but it is important to ensure that OR time is scheduled efficiently to manage operating costs and ensure patient safety as well as satisfaction of the many stakeholders. When cases are well scheduled and the surgical staff adhere to the schedules there is evidence that the theatre list runs smoothly with cases starting and ending on time. Sometimes the OR schedule is changed for various reasons and this can cause major delays and dissatisfaction among key operating staff. Bhaldia et al., (2014) established that in 5.4% OR cancellations, surgery cancelled due to a change in the surgical plan, 3.7% were cancelled because of administrative reasons, and 4.2% patients were postponed because of miscellaneous reasons.

Globally, many health facilities report delays in elective cases as a result of poor case scheduling and planning. Wong et al., (2010) advised as a means of improving the efficiency of case scheduling the need to generate an implementable surgery schedule, in which physicians' preferences for back-to-back scheduling and placement of same-

surgeon cases in the same OR is encouraged, while accounting for potential delays as well as idle time of surgeons.

2.4.3 Equipment factors

2.4.3.1 Equipment availability

Technological advances in surgery has necessitated the need for highly specialized surgical equipment to be available for procedures that as a result have seen better surgical outcomes and reduced length of stay. However, in many low income countries there are shortages of vital OR equipment and supplies that affects the capacity for ORs to run efficiently. Mosadeghrad (2014) stresses that utilization of newer technology enables timely booking, adequate preparation and scheduling of cases.

A study by Oosting et al., (2019) on availability of essential surgical care in 9 African countries found a deficiency in availability of basic surgical equipment in East, Central, Western, and South African Countries especially in public hospitals. Non availability of basic equipment and supplies can cause cancellations or delays in surgical cases.

2.3.3.2 Equipment Functionality

While equipment has been identified as a frequent cause of delays of elective surgical cases in public Hospitals globally, the problem is more in developing countries compared to developed countries. In Africa, 11% of delays of elective surgical cases in health facilities are due to broken equipment, some as simple as bar code scanners used for medication administration that did not scan because a buildup accumulated on the glass surface protecting the scanning device (Tucker et al., 2014).

While the IT department may less prioritize the maintenance of bar code scanners because of other priorities such as electronic medical record software, Wright et al., (2013) advises that all equipment should be treated equally as a priority to avoid delays in patient care delivery. Wubben et al., (2010) observed that equipment- functionality related incidents occurred frequently in much hospital and may go up to 15.9% and this resulted in some extra work and additional minutes of delay per event.

2.3.3.3 Adequacy of specialized equipment to support modern surgery process

Adequacy of specialized equipment and competent staff necessary to support modern surgery process are important factors that can contribute to OR efficiency and reduction in delays of surgical cases in health facilities. Oosting et al., (2019) stressed that the nature of the specialized equipment differ depending on the nature of surgeries performed by any given facility. The specialized operating theatre equipment also require specialized healthcare professional with the necessary competence to properly use them during the surgical procedure.

In developing countries, inadequate funding result in lack of adequate modern surgical equipment, which is a hindrance towards providing timely and advanced surgical care. Chisoso et al., (2012) carried out a study on the challenges faced by hospitals in providing surgical care in Zambia. The study established that though most hospitals had basic surgical equipment, most of these were not only far from being adequate, they were also old and incomplete and therefore insufficient to support modern surgical process. The study also established that district hospitals were the most poorly stocked with only 10% of the hospitals having modern and adequate surgical equipment, and 30% having complete surgical instruments.

2.3.3.4 Competent staff to maintain equipment

Surgical processes are a complex mix of inter-related factors, such as technical and non-technical skills in each individual in the Operating Room team, teamwork and the OR environment. As technology advances in the health sector, there is need to ensure that the staff are highly equipped to handle specialized equipment that support modern surgery process.

Gupta et al., (2011) while studying Start time delays in operating room established that the preparation of the equipment and required material for the OR cases must be done well in advance to reduce delays. Utilization of newer technology and the staff ability to operate and maintain them effectively enables efficiency in the OR.

2.3.3.5 Availability of supplies

Other related reasons associated with Surgical delays are lack of crucial supplies and other support items like linen and functioning air-conditioning units. Although some do not have a very high incidence, they still have a significant impact on operations and their availability may provide more efficient support services in OR (Mosadeghrad et al., 2013).

In Kenya, lack of vital supplies can lead to cancellation of cases or improvisation which may harm the patient. Wubben et al., (2010) advised that identification of the need for surgical equipment and supplies would help in strategic investment in surgical care at local, regional and national levels. For such investment to happen, commitment by the relevant authorities is crucial to improve surgical care at all levels and this would result in financial allocation to meet the need.

2.3.4 Management Support Factors

2.3.4 .1 Budgetary allocation

Surgical services are one of the most resource-intensive areas of a hospital to run but also provide a rich source of revenue for the health facility. This requires management commitment to provide required resources so that ORs run efficiently.

While there are many other areas that require funding in both public and private hospitals, Strum and Vargas (1999) on critical areas for focus in budgeting in a publicly funded health care system in Costa Rica, pointed out that the proportion of expenditure for surgical services is more relevant, because contemporary ORs require a major proportion of the hospital's budgetary allocation. Gallivan et al., (2002) noted that many published studies pertaining to OR management support focus on costs, as there is an agreed position that ORs represent one of the sources of revenue and therefore most critical areas of a hospital for financial allocation.

2.3.4 .2 OR Management support

The operating room is one of the departments in a hospital that requires strong and efficient leadership without which coordination of OR activities and the many cadres of staff fails. Such leadership requires investment in capacity building by the senior management.

A study by Cancedda et al., (2017) titled Health Professional Training and Capacity Strengthening Through International Academic Partnerships: The First Five Years of the Human Resources for Health (HRH) Program in Rwanda pointed out that HRH Program was designed so that the Ministry of Health would utilize approximately 60% of the

funds to cover infrastructural and managements support issues in public health hospitals to improve special services in operating rooms not only to reduces delay and long waits but also to train surgical staff in modern surgical procedure using the modern equipment. The remaining funds are used to improve the equipment and supplies within the operating room service area.

2.3.4.3 Adequate number of ORs

In Kenya, health services are provided through a network of health facilities countrywide. Lack of enough ORs in both public and private health facilities across the country has contributed to delays in provision of surgical services. Moreover, specialized surgical services are only conducted at some level four, five and at the national referral hospitals. Private and some faith based health facilities located in Nairobi and major towns in Kenya have contributed greatly in filling the gap. As part of Kenya's effort to improve access to care, it is important to evaluate surgical care to include expansion of the physical facilities if delays are to be reduced (Mohajan, 2014).

A number of factors come into play in determining the timing of an elective surgical intervention, particularly in the developing world. A study by Kajja and Sibinga (2014) explores the factors that contribute to the timing of elective surgery and patients' opinions on their quality of life as they wait for surgery. The study had sought to establish the cause for delays for elective surgery in 133 patients at Mulago Hospital, Uganda's. The study established that shortage of operating space was the leading cause of surgery delay in 44 (33.1%) patients, while blood shortage followed closely in 40 patients.

2.3.4 .4 Effective Policies

Policies for OR operations are necessary to establish common understanding of the complex processes that must all culminate in successful utilization of ORs and efficient utilization of resources. Hariharan and Chen (2015) in a study on Costs and Utilization of Operating Rooms in a Public Hospital in Trinidad, West Indies established that policies that concerned with OR should be made with clear understanding of necessary data from the section. The study advised that policies need to be guided by the data analysis and encourage data-driven insight into baseline measurement and opportunities for clinical and operational improvements that can affect real change for the hospital. The study also identified surgery as an early priority to leverage analytics.

Developing policies that encourage continuous improvement in dealing with modern health challenges are issues of concern for modern health managers and practitioners. Guerriero and Guido (2011) advised that the only way to improve upon existing processes is always ensuring that effective operations through modern methods and technology are enhanced through favorable policies. Scott and Rege (2000) evaluated the challenges of health care services in Africa where the study pointed out that good policies that encourage continuous improvement provide the OR a framework for reaching the next level of excellence. Such policies require strong OR leadership to enforce.

2.3.4 .5 Acquisition of new equipment

There are many reasons ORs are resource intensive and so there is need to have capital budget to take care of replacements as well as buy new equipment based on new technology or expansion plans. Kuo et al., (2003) on infrastructural requirements of the ORs pointed out that the area consist of many engineering issues, such as OR space,

controlled temperature and humidity, sterile environment, and electricity backup systems, which require careful attention and continuous maintenance hence need enough resource allocation. Therefore, there should be enough budgetary allocation to ensure that all these requirements are available.

On the other hand, Strum and Vargas (1999) also stresses that ORs also extensively use consumables; they hold equipment requiring regular maintenance because their failure results patient safety concerns, delays and cancellations of surgical cases.

2.3.4 .6 Staff training

The human resources in ORs is large and multidisciplinary, comprising clinical and nonclinical staff members. Like Critical Care, the ORs are labor intensive departments which is another major contribution to the operating costs. Continuous training is therefore crucial in ensuring that the staffs have the necessary training to effectively conduct their work. Technology in surgical care is changing very fast and this demands continuous training of the staff. Such trainings are best included in the strategic planning for surgical services so that financial allocation is appropriately done and time.

Training for the OR staff should focus not just on the surgeons and Anesthetists but on other team members who provide skilled labor. Moorthy et al., (2005) on human factors analysis of crisis management skills among surgical trainees during a simulated crisis event in Kolkata stated that surgical nursing is considered a specialty, and nurses need extra training to work in that area. The nurse must have the required training and know how to don and doff sterile protective equipment such as gowns and gloves, how to scrub to decrease the risk of bacterial contamination, and how to manage her tools to prevent contamination of sterile instruments or dressings.

The Aga Khan Hospitals are a Not for Profit private entities owned by the Aga Khan Development Network (AKDN) which is a private agency operating in developing countries in India, East Africa and South East Asia. In East Africa the hospitals operate in Tanzania and Kenya and there are advanced plans to build one in Uganda beginning the year 2020. Aga Khan Hospitals are found in Nairobi, Mombasa and Kisumu counties. The hospitals provide comprehensive healthcare and teaching sites for medical and nursing education in East Africa. The hospitals pursuit of quality improvement as evidenced by various accreditations, advanced facilities and state-of-the-art technologies have earned them a reputation as among the best medical and teaching hospitals in the region and beyond (www.hospitals.aku.edu).

While patients benefit from the hospitals unique team-based approach to care and a diverse team of expert medical professionals, the hospital continues to experience delays of elective surgical cases where 60-70% of such cases do not start on time (Aga Khan Hospitals' records, 2017). The study also indicated that this is way above the average delays of elective surgical cases in developed countries such as UK health Centre which has only 22% of surgical cases starting late.

2.5 Summary of literature review and research gap

Delays in OR remain one of the measures for health facility inefficiency. While available literature provides a general overview of delays in health facilities, it does not specifically highlight the factors that influence OR delays. The findings from these studies are not on specific patient, staff and equipment factors; and therefore cannot form the basis of generalization to all major hospitals and more on the local health facilities in the country.

Despite heightened interest in the improvement of health care service delivery in large hospitals, there are evident biases on the choice of available studies with more focus on general inefficiency and patients' cancellation. Nearly all studies on improving surgical services efficiency and decreasing delays focus on cost and clinicians' technical tasks rather than on specific factors contributing to delays of elective surgical cases in health facilities. Some of these studies focus on the role of the anesthesiologist and propose overlapping patient inductions, using separate induction rooms, or changing induction techniques but do not address specific factors that contribute to operating room delays. Most of the studies covered cannot be generalized regarding to the factors that influence delays of elective surgical cases.

Specific health facilities face different challenges and therefore facility based study investigations are necessary for effective operating room improvements at each facility level. It is important to acknowledge individual health facilities like Aga Khan Hospitals which may face specific elective surgical cases delay challenges that are different from others. A study carried on the efficiency of the health facility operations advised that there is also need to identify specific factors that affect delivery of medical services delays in specific departments in health facilities to reduce the list of patients waiting to receive specialized treatment.

While generic studies have been done on surgical cases efficiency, more studies needed to be done to identify the specific factors that influence delays of elective surgical cases in health facilities. The choice of the Aga Khan University Hospital provided opportunity for inclusion and sectorial representativeness which is a key ingredient towards universal theory formation. Based on proposed design and methodology it was highly anticipated

that this study would induce a renewable debate in knowledge and further research on the factors that influence delays of elective surgical cases in major health facilities in Kenya. The purpose of this study was therefore to establish the factors that influenced delays of elective surgical cases, aiming at improving efficiency and quality of surgical care.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology of the study and it comprises research design, target population, sampling, preparation of data collection instruments, data collection procedures and methods of data analysis. The chapter addresses the actual methodologies used in the research process from its time of inception to the end.

3.2 Study Design

The study adopted a descriptive cross-sectional facility based study design (Kothari, 2008). This ensured determining and reporting events the way they occurred at a particular point in time. The method was cost effective and quick to use. It also quantified the problem and gave room for the selected respondents to give their views, attitudes and perceptions on the causes of delays of elective surgical cases at the Aga Khan hospitals in Kenya. This ensured accurate description of events as they are hence minimizing chances of bias (Sekerani, 2013).

3.3 Target population

Population refers to the entire group of individuals, events or objects having some common observable characteristics (Cooper & Schindler, 2011). The study population comprised of 494 members of staff directly involved with activities related to operating room processes at the Aga Khan Hospitals in Nairobi, Kisumu and Mombasa counties. The staff included; Surgeons, Obstetricians/Gynecologists, Anesthetists, anesthetic assistants, Nurses, Scheduling Staff, residents and billing staff.

3.4 Sample size determination

The sample size was determined by using the formula for populations less than 10,000. First, Fishers et al. (1998) formula was used to determine sample size for infinite populations:

$$N = \frac{z^2 pq}{d^2}$$

Second, Fishers et al (1998) formula was used to adjust the sample since the estimate population is less than 10,000.

$$nf = \left(\frac{N}{1 + \left(\frac{N}{n}\right)} \right)$$

- Where: nf = Desired sample size
n = Estimate population size (494)
N = Sample size for populations more than 10,000 by Andrew Fishers
z = Standard normal deviate at confidence interval of 95%, 1.96.
p = Assumed population estimate associated with OR delays, 50% (0.5).
q = 1 - P = 1 - 0.5 = 0.5
d = Margin of error at 95% confidence interval, 0.05.

Therefore, $n = \frac{1.96^2 \times 0.50 \times 0.50}{0.05 \times 0.05}$

$$0.05 \times 0.05$$

$$n = 384$$

$$nf = \left(\frac{N}{1 + \left(\frac{N}{n}\right)} \right)$$

$$= 384/1+ (384/494)$$

$$nf = 216$$

10% of respondents were added to cater for nonresponses. Therefore, 238 respondents were sampled for the study. The respondents were proportional to the number of each stratum selected from each study site.

Table 3.1

Proportion to size sampling of cadres per hospital branch

Hospital Branch	Nairobi		Mombasa		Kisumu	
	Target population	Sample size proportion	Target population	Sample size proportion	Target population	Sample size proportion
Surgeon/Resident Doctors	137	66	30	15	18	9
Anesthesia	41	20	11	5	3	1
Obs/Gyn	88	42	19	9	8	3
Nurses	80	39	11	5	9	4
Technicians	17	8	4	2	1	1
Schedulers	2	1	0	0	0	0
Billing	10	5	4	2	1	1
Total	375	181	79	38	40	19

$$\text{Total Sample} = 181 + 38 + 19$$

$$= 238$$

3.5 Sampling Techniques

The Aga Khan Hospitals were purposively selected because they are among the large hospitals which run busy operating theatres in Kenya and collectively conduct about 20,000 surgical cases per year (Aga Khan Hospital, 2017). Stratified random sampling method was also used to select the respondents where the population was first divided

into strata, and then proportionately selected randomly from the three Aga Khan hospitals in Nairobi, Kisumu and Mombasa. Respondents selected for study was proportional to the number of staff from each of the three Aga Khan Hospitals, to ensure representativeness. Two key informants from each targeted facility were also purposively selected for inclusion in the study.

3.5.1 Inclusion Criteria:

Staff who worked in operating theatres and were directly involved with activities of elective surgical cases at Aga Khan Hospitals in Nairobi, Kisumu and Mombasa; staff who had worked for the Aga Khan Hospitals in Nairobi, Kisumu and Mombasa for more than one year.

3.5.2 Exclusion Criteria:

Staff who worked in operating theatres in Aga Khan Hospitals in Nairobi, Kisumu and Mombasa but were not directly involved with activities of elective surgical procedures; staff that had worked for the Aga Khan Hospitals in Nairobi, Kisumu and Mombasa for less than one year.

3.6 Data collection Instruments

Primary data collected by way of self-administered questionnaires was the source of data for this study and included both quantitative and qualitative data.

3.6.1 Data Collection Methods

Quantitative data were collected using structured questionnaires that were self-administered to the respondents. The researcher employed a “drop-and-pick” approach as many of the respondents were busy to fill the questionnaire there and then. Once filled

the researcher collected the questionnaires and locked them in a cupboard to ensure data safety and to maintain confidentiality.

3.6.2 Key Informant Interview

Qualitative data was collected using Key Informant Interview guide that targeted one OR nurse manager and one Nurse educator from each hospital, forming six Key informants whose in-depth interview would supplement information obtained from respondents. The researcher employed the “drop and pick” approach with the Key Informants as well. Once filled, the Interview Schedules were kept and lock and key.

3.7 Pre-testing

The questionnaires were pretested at the Aga Khan Hospital in Nairobi. Pretesting targeted 24 operating room staff (10% of total respondents) that were purposely selected from all the categories of the respondents sampled for the study. Respondents that participated in pre-testing were not included in the main study. Any necessary adjustments, suggestions, clarifications, and errors identified after pre-testing were reviewed on the study tools. The analysis of the pre-test showed that the tools were both reliable and valid for the study.

3.7.1 Validity

Research validity in surveys relates to the extent at which the survey measures right elements that need to be measured. It refers to how well an instrument as measures what it is intended to measure. (Long, 2014). The study sought opinions experts in from the area of the study, which included research supervisors. The changes proposed by the experts were factored in the final study tools. The research tools were well structured to

capture all relevant aspects of the study variables. Their validity was ensured by random sampling techniques and uniformity of a large sampled population.

3.7.2 Reliability

Reliability refers to whether or not you get the same answer by using an instrument to measure something more than once. It can also be referred to as the degree to which research method produces stable and consistent results (Creswell, 2014). This minimizes bias and errors in data collection and analysis. In addition to pre-testing, the researcher used Cronbach’s coefficient alpha (CA) to measure reliability in inter-item consistency using SPSS Version 23.0 software. Reliability of less than 0.6 is considered poor; that in the range of 0.7 is acceptable while over 0.8 is considered good. The pretest established an overall coefficient alpha of 0.83. This was considered good as the closer the reliability coefficient hedges to 1.0 the better (Moskal & Leydens, 2012).

Table 3.2

Coefficient alpha table

Item	Scale Mean	Scale	Corrected	Squared	Cronbach
	if Item	Variance if	Item-Total	Multiple	's Alpha
	Deleted	Item	Correlatio	Correlati	if Item
		Deleted	n	on	Deleted
Patient Factors	9.1740	2.598	.363	.146	.844
Staff Factors	9.9215	2.521	.367	.188	.842
Equipment Factors	9.3694	1.775	.648	.438	.837
Management Factors	9.5320	2.030	.447	.321	.809
Average	9.4992	2.231	.456	.273	.833

The findings of the study indicated an average coefficient alpha score of 0.83. Individual coefficient alpha results indicated a coefficient alpha of .844 for patient factors; a coefficient alpha of .844 for Staff Factors; a coefficient alpha of .842 for Equipment Factors; while Management Factors registered a coefficient alpha of .809. Results indicate that all the sections of the data collection tool were reliable and that the tool was good enough to collect the required data for the study.

3.8 Data collection Procedures

The respondents were requested to give oral or written consent to participate in the study. The respondents were assured of confidentiality by ensuring that no unauthorized persons gained access to filled questionnaires. The study ensured that anonymity was observed; the researcher used questionnaires that did not prompt the respondents from disclosing their identity. The study also ensured that the collected data was used only for the purpose of the study and not for any other reason unspecified by the study. Lastly, the respondents were assured of their right to ignore questions that they did not wish to respond to and were also free to quit the process at any stage.

3.9 Data Analysis

The quantitative data collected was organized and cleaned of errors made during data collection. The data were coded, keyed in and stored in the computer Microsoft Excel Program. Data were then exported to the SPSS software version 23.0 for analysis. Descriptive statistical results were presented as percentages, frequency tables, charts and graphs. Inferential statistics was calculated using Pearson's Correlation and Multi-Linear regression methods to test the relationship between variables at 95% confidence interval where p-values less than 0.05 are considered significant. Qualitative data was analyzed

thematically and was guided by the study objectives. The results were triangulated with quantitative findings obtained from questionnaires.

3.9.1 Analytical Model

Pearson correlation analysis and multiple regression model were used, which took the form of;

$$OP = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \epsilon$$

Where: Delays of elective surgical cases = Dependent Variables

X_1 , X_2 , X_3 , and X_4 = Independent Variables

X_1 = Patient factors

X_2 = Staff factors

X_3 = Equipment factors

X_4 = Management factors

ϵ .= Error Term

$B_1 \dots B_4$ = Regression co-efficient of four variables

3.10 Ethical Consideration

The researcher obtained Ethical clearance to conduct the study was from the Kenya Methodist University Scientific Ethics Review Committee (KEMU-SERC) and Aga Khan University Institutional Ethics Review Committee (AKU-IERC). The Researcher also sought permission from National Commission for Science, Technology and Innovation (NACOSTI). The study sought approval from the respective management of the three Aga Khan Hospitals before data collection.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

The purpose of this study was to find out the factors influencing delays of elective surgical cases at the Aga Khan hospitals in Kenya. This chapter presents results and discussions of the study from the data collected through questionnaires; whereby the researcher sought views and opinions from staff working in the operating theatres on the factors influencing delays of elective surgical cases at the Aga Khan hospitals in Kenya. The study focused on the three Aga Khan hospitals in Nairobi, Kisumu and Mombasa counties.

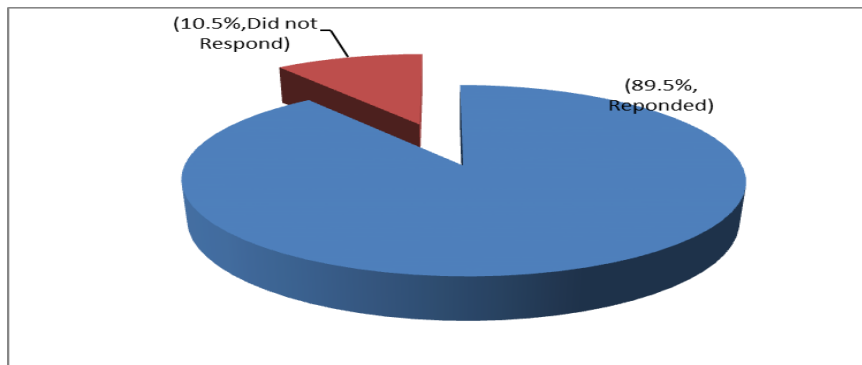
The chapter is divided into four sections; section one show the demographics of the respondents; sections two are the descriptive statistics of the variables under investigation. The third section covers the descriptive statistics analysis including all the variables while section four covers the inferential analysis.

4.2 Response rate

The findings of the study indicate that out of the 238 respondents targeted by the study, 213 of them, representing 89.5% participated in the study while only 25 (10.5%) did not respond as shown in figure 4.1. This indicates that the study was well participated in and therefore the results are representative. This is supported by Creswell (2014) who stated that a quantitative guided study that produces more than three quarters of the sample size and above or 75 percent and above, is considered as a well participated study. The high response rate was attributed to the researcher's effort in explaining the purpose of the study and following up with the respondents.

Figure 4.1

Response Rate



4.3 Demographic Findings of the Respondents

The study sought to establish the demographic characteristics of the respondents. The characteristics were as follows.

4.3.1 Gender, Years worked, age and highest education levels and the years served by the respondents Aga Khan Health facilities in Kenya.

The response on gender, years worked, age and highest education levels and the years served by the respondents at Aga Khan Health facilities in Kenya were as shown in table 4.1.

Table 4.1*Demographic Reponses*

Category	Total N (%)
Gender of the Respondents	
Male	129 (62.3)
Female	78(37.7)
Total	N=207 (100.0)
Age of the respondents	
18-25 years	1(0.5)
26-35 years	53(24.9)
36-45 years	58(27.2)
46-55 years	93(43.7)
56-65 years	8(3.8)
Total	N=213 (100.0)
Highest Education level:	
College certificate	5(2.4)
Diploma	36(17.1)
University Graduate	14(6.6)
Post graduate	156(73.9)
Total	N=211 (100.0)
Facility	
Aga Khan Nairobi	169 (79.3)
Aga Khan Kisumu	14 (6.6)
Aga Khan Mombasa	30(14.1)
Total	N=213 (100.0)
Category of Respondents	
Surgeon	76(35.7)
Obstetricians/Gynecologist	46(21.6)
Nurse	47(22.1)
Anesthesiologist	24(11.3)
Anesthesia Tech	10(4.7)
Scheduler	1(0.5)
Billing Staff	8(3.8)
Theatre Coordinator	1(0.5)
Total	N=213(100.0)
How long have you worked in theater in this facility	
Less than 2 years	1 (0.5)
2-5 years	83(39.0)
6 and above years	129(60.6)
Total	N=213(100.0)
How long have you worked at Aga Khan Facilities	
Less than 2 years	29 (13.6)
2-5 years	52(24.4)
6 and above years	131(61.5)
Total	N=212(100.0)

The study targeted the staffs who work in the operating theatres at the three Aga Khan Health facilities in Kenya. The findings indicate that out of the total number of respondents who participated in the study, 62.3% were male while 37.7% were female. From this finding it can be concluded that there are more male staff than females in the operating rooms the Aga Khan Health facilities. This is explained by the fact in many parts of the world there are more male surgeons than females. Also all the anesthetist assistants in Aga Khan Hospital Nairobi are males.

On the other hand, the findings of the study indicated that only 0.5% of the respondents were 18-25 years, 24.9% were 26-35 years old, 27.2% were 36-45 years old, another 43.7% were 46-55 years while 3.8% of the respondents were 56-65 years old. This indicated that about half of the staff that work in the operating theatres at the Aga Khan health facilities in Kenya were between 46-65 years' old. This indicated that half of the respondents were mature in their careers, which brought in professional experience in evaluation of OR operations.

On educational backgrounds, study found that 2.4% of the respondents had college certificates, 17.1% had Diplomas, while 6.6% of had attained a university degree. A very high number of about 73.9% of the respondents had post graduate training in different areas of sub-specialization. This indicated that most of the respondents had the required knowledge on the issues under investigation and therefore the answers provided were reliable.

When the study sought to establish the category of the respondents, the findings indicated that 35.7% of the respondents were surgeons, 21.6% Obstetric/Gynecologists, 22.1% were nurses while 11.3% of the respondents were Anesthetists. The findings also

indicated that 3.8% of the respondents were billing staff, 4.7% were Anesthesia Technologist/Assistants, and 0.5% were either Theatre Coordinators or Schedulers. This indicates that most of the staff in OR were surgeons.

On how long the staff had worked in their current position, the findings of the study indicated that 0.5% of the respondents had worked in their operating theatres for less than 2 years, 39.0% had worked for 2-5 years while 60.6% had worked for 6 and above years. Results indicated that most of the staff in the three health facilities were conversant with the operations of the operating room and therefore were in a good position to provide objective evaluation of processes.

Lastly the study established that 13.6 % of the respondents had worked in the Aga Khan health facilities for less than 2 years, 24.4% had worked for 2-5 years while 61.5% had worked in worked for 6 and above years. This indicated that majority of the staff in OR department at the Aga Khan Hospitals in Kenya had worked for the health facility for a period adequate to be able to evaluate hospital management support in relation to OR need for resources.

4.4 Descriptive Statistics

4.4.1 Effects of Patient Factors on delays of elective surgical cases

Patient's factors are sometimes the reason for delays in elective surgical procedures in health facilities. It was important to establish what these factors were, and the extent to which they influenced such delays (Callie et al., 2016). The study had sought to establish the patient factors that contribute to delays in elective surgical cases at Aga Khan Hospitals in Kenya. The following were the responses.

Table 4.2*Effect of patient factors on the delays of elective surgical cases*

Patient Factors	Aga Khan Hospital , Nairobi		Aga Khan Hospital , Kisumu		Aga Khan Hospital , Mombasa	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Patient factors contribute to delays in elective cases.	3.63	1.45	3.79	.80	3.40	.89
Sometimes out patients report late for operation appointments	3.80	1.04	3.79	.98	3.37	1.10
Operations are sometimes delayed due to late preparation of the patients from the wards	4.13	1.06	3.07	1.14	3.13	1.14
In some instances the patients are delayed due to lack of consent from next of kin	2.25	1.20	4.36	.84	4.13	1.07
A good number of operations are delayed due to late financial clearance by the billing staff	3.44	1.29	2.29	1.27	2.23	1.14
Some patients cancel operations last minute or do not show up in OR, causing delays of subsequent cases	1.91	.94	4.36	.63	4.60	.72
Some patients are found to be medically unfit at the time of surgery and therefore force a delay.	3.99	1.11	4.36	.63	4.70	.65

The results show that patient factors contributed to delays of elective cases in all the three facilities, and that the effect was higher at Aga Khan Hospital, Kisumu which registered with a mean of 3.79, followed by Aga Khan Hospital, Nairobi with a mean of 3.63 while

the Mombasa facility registered a mean of 3.40. On the same question, the Nairobi facility registered higher variation in responses with a standard deviation of 1.45 compared to both Mombasa and Kisumu that registered a standard deviation of .89 and .80 respectively. This indicates that in Nairobi the respondents had varying perceptions or opinions about the issue, while in the other two facilities in Kisumu and Mombasa respondents had similar opinions about patient factors contributing to delays of elective surgical procedures at the three facilities.

Results show that in all the three facilities patients report late to the hospital on the day of surgery. This was experienced more in the Nairobi facility that registered a mean of 3.80. closely followed by the Kisumu facility with a mean of 3.79 and a slightly lower effect at the Mombasa facility that had a mean of 3.37. The higher patient lateness in Aga Khan Hospital, Nairobi could be explained by the differences in transportation dynamics in the three counties, where Nairobi is known for traffic snarl ups compared to Kisumu and Mombasa counties. The differences in responses among the respondents were high in Nairobi and Mombasa facilities that registered standard deviations of 1.04 and 1.10 respectively, while Kisumu facility indicated variation in responses at .97 standard deviations.

Operations were sometimes delayed due to late preparation of the patients from the wards in the three facilities but the effect on delays was highest in Nairobi which registered a mean of 4.13, while Kisumu and Mombasa facilities registered a slightly lower mean of 3.07 and 3.13 respectively. The findings also indicated that there was a high difference in responses to the same question, where Nairobi facility indicated a standard deviation of 1.06, while Kisumu registered a standard deviation of 1.14 and Mombasa facility 1.14.

The high standard deviations indicated varying opinions about the issue under study across the three facilities.

On whether surgical procedures were delayed due to lack of consent from patients or their next of kin, the findings indicated that such delays were higher in the Kisumu facility with a mean of 4.36, followed by Mombasa facility with a mean of 4.13 and lower for Nairobi facility that registered a mean of 2.25. This finding could be explained by the fact that Aga Khan Hospital Nairobi is Joint commission accredited while the other two hospitals are not. One of the standards of accreditation focuses on surgical care with stringent timelines on when to obtain the consent for procedure and therefore staff at the Nairobi facility is much more alert about it. The findings also indicated that there was low variation in response to this question in Kisumu facility that registered a standard deviation of .84 compared to the other two facilities of Nairobi and Mombasa that registered a higher standard deviation of 1.20 and 1.07 respectfully.

On timely financial clearance, results showed that the Nairobi facility had more delays arising from financial clearance than the other two hospitals. It registered a mean of 3.44, while Kisumu and Mombasa facilities registered means of 2.29 and 2.23 respectively. This could be explained by the fact that 80-90% of the patients that seek care at the Aga Khan hospital Nairobi are insured and these insurance companies undertake a rigorous evaluation process before granting clearance to proceed with the surgery. The Kisumu and Mombasa facilities have on average about 50% of their patients insured while the other 50% are cash payers and so financial clearance in these two facilities is not as bad as it is in Nairobi Aga Khan hospital. The difference in response was high in all the three

facilities, with the Nairobi facility having a Standard deviation of 1.29, followed by Kisumu and Mombasa facilities with 1.27 and 1.14 standard deviations respectively.

In all the three facilities, results indicate that some patients cancelled operations last minute or did not show up in OR, causing delays of subsequent cases but the effect on delays was lowest in Aga Khan, Nairobi which registered a mean of 1.91. Kisumu and Mombasa registered high mean scores in comparison to the Nairobi facility at 4.36 and 4.60 respectively. This indicated that the Nairobi facility did a better job at pre-operative preparations of patients than their counterparts in Kisumu and Mombasa. The findings of the study indicated that across the three hospitals there was low variation in responses on this issue indicating a standard deviation of .72 for Nairobi, .63 for Kisumu and .94 for Mombasa.

Lastly, on the question whether frequently some patients were found to be medically unfit during assessment just before surgery therefore causing a delay, the findings established that this was a problem more in the Mombasa and Kisumu facilities that registered means of 4.70 and 4.36 while the problem was lower at the Nairobi facility that registered a mean of 3.99. This could be due to the fact that in Nairobi, frequent re-assessments of in-patients are carried out and therefore problems are identified and managed before the day of surgery. Anesthesia clinics for out-patients also help to identify change in condition and to reschedule surgical procedures early. The difference in responses to the question indicated high standard deviation of 1.11 for the Nairobi facility compared to low variation in responses in Kisumu and Mombasa that registered deviations of .63 and .65 respectively.

The study did not find statistically significant association between patient factors ($P > .267$) and delays of elective surgical cases. This finding means that delays of elective surgical cases in three Aga Khan Hospitals in Kenya cannot significantly reduce if the patient factors evaluated in the study were addressed.

4.4.2 Effects of Staff factors on delays of elective surgical cases

The study had sought to establish the staff factors that influenced to delays of elective cases at Aga Khan Hospitals. The findings from table 4.3 show that staff factors contributed to delays of elective cases in all the three hospitals but was more in Aga Khan Hospital in Kisumu which registered a mean of 2.79, followed by Aga Khan Hospital, Mombasa that registered a mean of 2.63. The effect was lowest in Aga Khan Hospital, Nairobi that registered a mean of 1.81. There was variation in responses to the question with Kisumu and Mombasa indicating a standard deviation of 1.33 and 1.12 respectively while the Nairobi facility registered the lowest standard deviation of 0.89. This indicated that the respondents from the three facilities had very varying opinions on the extent to which Staff factors contribute to delays in elective cases at Aga Khan Hospital Kisumu and Mombasa while the difference in response was lowest in Aga Khan Nairobi.

Table 4.3*Effect of Staff factors on the delays of elective surgical cases*

Staff Factors	Aga Khan Hospital , Nairobi		Aga Khan Hospital , Kisumu		Aga Khan Hospital , Mombasa	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Staff factors contribute to delays of elective cases at Aga Khan hospital in Kenya	1.81	.89	2.79	1.12	2.63	1.33
Sometimes staff present in the OR are inadequate to conduct a surgical procedure	1.74	.72	2.36	1.01	2.77	1.36
There are instances when concerned staff fails to obtain payment clearances for scheduled procedures on time.	4.36	.81	3.29	1.38	3.20	1.06
Sometimes there are no adequate trained support staff to conduct surgical procedures	3.15	1.23	2.71	1.33	3.53	1.14
Sometimes members of the core surgical team report to OR late thus delaying start of the procedure.	1.92	.82	2.79	1.31	3.23	1.25
There is poor staff coordination and this contributes to delays in the surgical process	3.05	.97	2.79	1.48	3.07	1.17
Some staff do not prepare well for the procedures, causing interruptions during procedures as they leave OR suite to pick supplies which delays the next case	2.56	1.09	2.86	1.23	2.80	1.10
There is inefficient scheduling of cases resulting in disorganized theater lists	2.95	.86	2.71	1.14	3.17	1.15

Study findings further indicated that across all the three facilities, the number of trained support staff in the OR were not adequate to support the clinical teams in conducting a surgical procedure and this caused delays of surgical cases. Vital support staff included radiographers and Biomedical staff. The effect was higher in Kisumu and Mombasa facilities which registered a mean of 2.86 and 2.77 respectively, while the Nairobi facility registered the lowest mean of 1.74. This means that the respondents at Aga Khan Nairobi felt there was trained supporting personnel were adequate in the operating theatres and so was not a major cause of delays of elective cases. Respondents from Kisumu and Mombasa facilities felt that they had inadequate number of trained support in the OR and therefore this did cause delays of surgical cases in the two facilities. The results also indicated high variation in responses to this question in both the Kisumu and Mombasa facilities that had standard deviations of 1.01 and 1.36 respectively. Aga Khan Hospital, Nairobi had the lowest a standard deviation of .72 which means that the respondents in the Nairobi facility had similar opinions about the issue in relation to influencing delays of elective surgical procedures.

When the study sought to establish whether there were instances when staff delayed to obtain financial clearance for surgery, the results indicate that failure to obtain financial clearance in good time highly contributed to delays of elective surgery in Nairobi facility which registered highest mean at 4.36, and also had the lowest standard deviation of .81. This means that the respondents had similar opinions about late financial clearance contributing to surgical delays. Aga Khan hospital in Kisumu registered a mean of 3.29 and Mombasa a mean of 3.20. The results also indicated higher variation in responses to

this question in Kisumu with a standard deviation of 1.38 while Mombasa facilities registered a standard deviation of 1.06,

Study results also indicate that lack of adequate qualified staff to surgical process contributed to delays of elective cases more in Mombasa which registered a mean of 3.53 and Nairobi facility that registered a mean of 3.15, while the effect was lowest in Kisumu that registered a mean of 2.71. There was high difference in responses on whether lack of adequate number of qualified staff to conduct surgical process contributed to delays of elective cases, that registered a higher standard deviation of 1.14 for Aga Khan hospital, Nairobi, 1.33 standard deviation for Aga Khan hospital, Kisumu and for 1.23 Aga Khan hospital, Mombasa. This indicated that the difference in responses was higher in the three facilities. The findings of the study indicated that lack of enough qualified staff to conduct surgical process would contribute more to delays of elective cases in Mombasa, followed by Nairobi and then Kisumu.

Results from the three facilities, indicated that core surgical team sometimes report to the operating theatre late therefore causing a delay in start of the procedure. This was more in Mombasa facility which registered a mean of 3.23, followed by Kisumu facility that registered a mean of 2.79 while Aga Khan hospital, Nairobi that registered the lowest mean at 1.92. This means Aga Khan Nairobi did not have a big problem in staff punctuality. In terms of differences in responses, there was a high standard deviation of 1.31 for Kisumu facility and 1.25 for Aga Khan Hospital, Mombasa while the responses were less varied in Aga Khan hospital, Nairobi that registered a standard deviation of .82. The findings of the study also indicated staff coordination contributed to surgical delays more in Nairobi and Mombasa facilities that registered means of 3.05 and 3.07

respectively, while staff coordination contributed less to delays of surgical procedures more in the Kisumu facility that registered a mean of 2.79. There was also high variation in responses that indicated a standard deviation of 1.17 for Kisumu and very high of 1.48 for Mombasa facilities respectively. Aga Khan Hospital in Nairobi indicated an average variation in response at .97 standard deviations.

While the study showed that in the three facilities staff caused delays by failing to prepare well for the procedures, the issue was higher in Aga Khan Hospital in Kisumu that registered a mean of 2.86, followed by the with Mombasa facility a mean of 2.80, and 2.56 mean for Aga Khan Hospital, Nairobi. This indicated that lack of preparedness among some surgical staff caused interruptions during procedures as staff left operating suites to pick supplies from the stores. This contributed to delays in completion of present case and delayed the start of the next case. There was high variation in responses that indicated a standard deviation of 1.10 for Mombasa and 1.23 for Kisumu facilities. Aga Khan Hospital in Nairobi indicated a lower variation in response with a standard deviation of 1.09.

Lastly, effect of poor scheduling of cases resulting to delays of elective was present in the three hospital but was felt more at the Mombasa facility that registered a mean of 3.17 cases theatre lists in the Nairobi and Kisumu facilities which registered means of 2.95 and 2.71 respectively. The findings indicate that the Mombasa facility appeared to experience delays arising from poor scheduling of elective cases more than the other two facilities in Nairobi and Kisumu and the reason could be that the facility did not have a formal scheduler, unlike the other two facilities. Study findings also that indicated a standard deviation of 1.15 for Kisumu and a standard deviation of 1.14 for the Mombasa

facilities, meaning respondents at the two facilities have varying opinions about the issue under study. Responses from Aga Khan Hospital, Nairobi registered a low variation with a standard deviation of .86.

The study established a statistically significant relationship between staff factors ($P < .007$) and delays of elective surgical cases. This indicates staff factors evaluated had a significant influence on delays of elective surgical cases in the three hospitals, and that such delays can significantly be reduced by improving the staff factors.

4.4.3 Equipment factors contribution to delays of elective surgical cases at Aga Khan Hospitals in Kenya

The study had sought to establish whether equipment factors contributed to delays of elective cases at Aga Khan Hospitals and the responses were as indicated in table 4.4.

Table 4.4

Effect of Equipment factors on delays in elective surgical cases at Aga Khan Hospitals in Kenya

Equipment Factors	Aga Khan Hospital , Nairobi		Aga Khan Hospital , Kisumu		Aga Khan Hospital , Mombasa	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Equipment factors contributes to delays of elective cases.	3.28	1.54	2.14	1.10	2.97	.96
Sometimes equipment are not tested before the procedure and end up failing during the procedures.	2.98	1.44	2.93	1.14	3.20	1.03
There is adequate number of equipment to conduct surgical procedures	2.80	1.26	2.21	1.19	3.20	.89

Theatre equipment are old and thus cannot support modern surgical processes.	3.95	.839	2.50	1.409	3.70	.99
In this facility are no qualified staffs to maintain the highly specialized surgical equipment.	3.71	1.149	3.14	1.47	3.67	.999
Sometimes the required supplies are not available at the surgical stores forcing a delay as calls are made to suppliers.	2.39	1.08	2.07	.92	2.53	.94

Results indicate that equipment factors contributed to delays of elective surgical procedures but the effect was more at Aga Khan hospital, Nairobi that registered a mean of 3.28, followed by Aga Khan hospital, Mombasa with a mean of 2.97 and lastly by Aga Khan hospital, Kisumu that registered a mean of 2.14. The reason for the higher effect in the Nairobi facility may be that since the facility had more super specialized surgeons, their need for equipment was higher than in the other two facilities. There was high variation in responses to whether equipment factors contributed to delays of elective cases in Aga Khan hospitals in Nairobi and Kisumu that registered standard deviation of 1.54 and 1.14 respectfully. Respondents from Aga Khan Hospital, Mombasa had similar views about the issue under study and so registered a lower standard deviation of .96.

On the question whether the equipment was pre-tested before surgical procedures, the respondents across the three hospitals felt that this issue did influence delays of surgical cases in the three facilities. The effects of equipment not being tested before the procedure thus failing during the procedure was highest in the Mombasa Aga Khan facility which registered a mean of 3.20, followed by Aga Khan hospital, Nairobi that registered a mean of 2.98 and a mean of 2.93 for Aga Khan hospital in Kisumu. The responses in this part indicated a very high variation in all the three facilities with a

standard deviation of 1.44 for Nairobi, followed by Aga Khan Hospital in Kisumu at 1.14 and a standard deviation of 1.03 for Aga Khan Hospital, Mombasa.

The study findings also showed that there was a good number of available equipment at the Aga Khan hospital, Mombasa that registered a mean of 3.20 compared to the Nairobi and Kisumu facilities that registered means of 2.80 and 2.21 respectively. There was high variation in response for Aga Khan Hospital, Nairobi that registered a standard deviation 1.26, followed by 1.19 for Kisumu facility while the response was slightly different in Mombasa facility at .89.

Results indicate that in the three facilities the equipment was old and unable to support modern surgery. The effect of old equipment on delays of surgical cases was more in the Aga Khan hospital, Nairobi which registered a mean of 3.95 followed by 3.70 for Aga Khan hospital, Mombasa while this was less experienced at Aga Khan hospital, Kisumu that registered a low mean of 2.50. The differences in responses in this part was more varied in Kisumu facility at 1.41 standard deviation, followed by .99 standard deviation for Aga Khan hospital, Mombasa, and the lowest standard deviation being .83 for Nairobi facility.

The low standard deviations for Nairobi and Mombasa mean that the respondents had similar opinion about the two hospitals having old equipment, a fact that contributed to delays of surgical cases as demonstrated by the higher means for the two hospitals.

The results showed that the three facilities did not have adequate number of qualified staff to maintain the highly specialized surgical equipment in the operating rooms and this did result in delays of surgical cases. Aga Khan hospital, Nairobi registered a mean of 3.71, followed closely by Aga Khan Hospital, Mombasa that registered a mean of 3.67

and lastly by Aga Khan hospital, Kisumu that registered a mean of 3.14. In terms of responses, there was high variation in responses of 1.46 standard deviation for Aga Khan Hospital, Kisumu, followed by the Nairobi facility with a standard deviation of 1.14. Aga Khan Hospital, Nairobi had the lowest standard deviation at .99, meaning that respondents in Nairobi held the same views that the facility did not have adequate number of qualified staff to maintain equipment and this was contributing to surgical delays.

On whether there were adequate supplies at the surgical stores, the findings of the study established that the effects of required supplies not being available at the surgical stores and so forcing a delay of the procedure was more experienced in Aga Khan Hospital, Mombasa that registered a mean of 2.53, followed by the Nairobi facility at a mean of 2.39, while the Kisumu facility registered a low mean of 2.07.

The findings of the study indicated that there was high variation in response at the Nairobi facility that indicated a standard deviation of 1.08 followed by Aga Khan hospital in Mombasa with a standard deviation of .94, then .92 standard deviation for Aga Khan Hospital, Kisumu.

The study did not establish a statistical significant association between equipment factors ($P>.841$) and delays of elective surgical cases at the Aga Khan Hospitals in Kenya.

4.4 Management factors contribution to delays of elective surgical cases at Aga Khan Hospitals in Kenya

Effective management support of operating theatres, both local and at senior management level is crucial in the delivery of efficient surgical care. The study sought to establish

Management factors contribution to delays of elective surgical cases at Aga Khan Hospitals in Kenya and the responses were as follows.

Table 4.5

Effect of Management factors on delays of elective surgical cases at Aga Khan Hospitals in Kenya

Management Factors	Aga Khan Hospital , Nairobi		Aga Khan Hospital , Kisumu		Aga Khan Hospital , Mombasa	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Hospital management factors do contribute to delays of elective cases	3.05	.99	2.29	.91	2.60	1.07
Senior management at this facility is supportive of surgical services	3.54	1.32	2.64	1.45	1.87	.63
There is always adequate budgetary allocation for surgical services in the hospital	2.80	.83	3.21	1.12	2.53	1.01
The hospital replaces old theatre equipment in a timely manner	3.07	1.05	3.14	1.17	2.63	.96
The management has put in place the necessary policies to support surgical services in the hospital	2.93	.99	2.57	1.22	1.73	.98
The management supports continuous training of surgical staff	3.01	.96	2.93	1.33	2.30	1.09
The management ensures adequate staffing to carry out surgical procedures.	3.59	1.15	2.64	1.15	3.40	1.33
There are adequate number of operating rooms to meet the demand for surgical services	3.60	.97	2.57	1.02	2.67	1.06

Results in this part showed that hospital management factors contributed to delays of elective cases in the three facilities though it was more in Aga Khan Hospital, Nairobi that registered a mean of 3.05, followed by Aga Khan Hospital, Mombasa that registered a mean of 2.60 and Aga Khan Hospital, Kisumu that registered a mean of 2.29. The finding could be that since the Nairobi facility had the highest numbers of surgeons, their need for resources such modern surgical equipment and the relevant training to be able to use such equipment was higher than in the other two hospitals. The same facility in Nairobi registered the low standard deviation of .99 on this question, meaning respondents had similar views about management support being inadequate and therefore contributing to delays of surgical cases. The Mombasa facility indicated a standard deviation of 1.07 and Aga Khan Kisumu a standard deviation of .91.

On the question about hospital management being supportive of surgical services, the findings of the study established that management supported the operations of surgical services more at Aga Khan Hospital, Nairobi which registered a higher mean of 3.54, followed by Aga Khan Hospital, Kisumu with a mean of 2.64 and a low mean of 1.87 for Aga Khan Hospital, Mombasa. There was a very high variation in terms of responses to the question with a standard deviation of 1.45 for Aga Khan Hospital, Kisumu and Aga Khan Hospital, Nairobi that indicated a standard deviation of 1.32 while Mombasa facility registered a very low standard deviation of only .63, which indicated a very low variation in responses. This means that respondents from the Mombasa facility had similar views that Management support for surgical services was not adequate.

The findings indicated that management in the three facilities had in place the necessary policies to direct the activities of the Operating rooms. This support was felt more at the

Nairobi facility, followed by Aga Khan Kisumu and was lowest at the Mombasa facility. Nairobi facility registered a mean of 2.93, followed by 2.57 for Kisumu facility while the lowest mean was 1.73 for Mombasa facility. The difference in responses in this part indicated a high standard deviation of 1.22 for Aga Khan hospital Kisumu, followed by .99 for Aga Khan Hospital, Nairobi and a low standard deviation of .98 for Mombasa facility.

There was more adequate budgetary allocation for surgical services in Kisumu facility that registered a mean of 3.21 compared to Aga Khan Hospital, Nairobi that registered a mean of 2.80 while Aga Khan Hospital, Mombasa registered a mean of 2.53. The findings of the study established there was a high variation in terms of responses for Aga Khan Hospital, Kisumu, of a standard deviation of 1.22 followed by 1.01 for Aga Khan Hospital, Mombasa and very low difference in response of a standard deviation of .83 for Aga Khan Hospital, Nairobi.

While the three hospitals allocated finances to replace old equipment, Aga Khan Hospital, Kisumu indicated higher support in this area with a mean of 3.14, followed by 3.07 for Nairobi facility while the lowest allocation of funds was the Mombasa facility that registered a mean of 2.63. This indicated that Kisumu facility allocated more money to replace old machines required in the surgical process, compared to Nairobi and Mombasa. The difference in responses indicated the highest standard deviation of 1.17 for the Aga Khan Hospital, Kisumu, 1.05 for the Aga Khan hospital, Nairobi and the lowest standard deviation of .96 for Mombasa facility.

The findings of the study indicated that the management in Aga Khan Hospital, Nairobi supports continuous training for surgical staff more and registered a mean of 3.01,

followed by 2.93 for Aga Khan Hospital, Kisumu and then the Mombasa facility that registered a mean of 2.30. The findings of the study in this part indicated a high response of a standard deviation of 1.33, for Aga Khan Hospital, Kisumu, and average difference in response of a standard deviation of 1.09 for Aga Khan Hospital, Mombasa, followed by the Nairobi facility that indicated a standard deviation of .96. The study can conclude that the management at the Aga Khan hospital, Nairobi highly supports continuous training for surgical staff more compared to the other two facilities. Results indicated that the management at Aga Khan Hospital, Nairobi ensured that there were adequate staffs for operating theatres to carry out surgical process. This facility registered a mean of 3.59, followed by a mean of 3.40 registered by Aga Khan Hospital, Mombasa while the lowest was 2.64 for Kisumu facility. In terms of differences in responses, the Mombasa facility registered a high difference in response of standard deviation of 1.33, followed by an averagely higher difference in response of a standard deviation of 1.15 for Aga Khan Hospital, Kisumu while the Nairobi facility also registered an averagely higher difference in response of a standard deviation of 1.15.

Lastly, the study established that there were more adequate number of operating rooms in Aga Khan Hospital, Nairobi that registered a highest mean at 3.60, followed by Aga Khan hospital, Mombasa that registered a mean of 2.67 for and while the facility with lest adequate number of operating rooms was Aga Khan Hospital, Kisumu that registered a lowest mean at 2.57. The responses in this part also indicated an averagely high variation in terms of responses with a standard deviation of 1.06 for Mombasa facility and 1.02 for Aga Khan Hospital, Kisumu, while Mombasa facility registered a very low difference in

response of a standard deviation at .97. Comparably, Kisumu facility faced less of these challenges more than the other two facilities.

The study established a significant relationship between Management factors ($P < .000$) and delays of elective surgical cases at the Aga Khan Hospital in Kenya. Such delays could significantly be reduced if the management factors evaluated could be addressed.

4.4.5 Operating Room (OR) delays factors

Effective utilization of OR facilities is important in the management of elective cases in Hospitals. The study sought to establish operating room (OR) delay factors and the response were as shown in table 4.6.

Table 4.6

Operating Room (OR) Delays Factors

	Aga Khan Hospital , Nairobi		Aga Khan Hospital , Kisumu		Aga Khan Hospital ,Mombasa	
	Mean	Standard Deviation	Mean	Standard Deviation	Mean	Standard Deviation
Elective surgical cases are frequently delayed in the Aga Khan hospitals in Kenya	2.82	1.27	2.57	1.02	2.77	1.07
A large percentage of elective surgical cases start later than their scheduled time	3.20	1.00	2.86	.86	2.77	.90
There are many incidences related to delays of elective surgical procedures in the facility	2.82	.84	2.43	1.22	2.40	.97
Delays of elective surgical procedures result in inefficient utilization of OR resources.	3.70	.85	3.07	.92	3.40	.97

The findings in this part indicated that elective surgical cases are frequently delayed in the three Aga Khan hospitals although there were more frequent delays in Nairobi facility, followed by Mombasa facility and lastly Aga Khan Hospital, Kisumu. The responses indicated a mean of 2.82 for Nairobi, 2.77 for Mombasa and 2.57 for Kisumu facilities. This indicates that although elective surgical cases were frequently delayed in the Kisumu and Mombasa facilities, the Nairobi facility had a higher rate of surgical delays. The responses indicated high differences in responses for Aga Khan Hospital, Nairobi, which registered a standard deviation of 1.27, an average difference in response of 1.02 for Aga Khan Hospital, Kisumu and 1.07 for Aga Khan Hospital, Mombasa respectively.

In the three facilities, there was a percentage of elective surgical cases started later than their scheduled time, but the problem was more in Aga Khan hospital, Nairobi with a mean of 3.20, followed by Aga Khan hospital, Kisumu with a mean of 2.86 while the least was at Aga Khan Mombasa with a mean of 2.77. The findings of the study also indicated an average standard deviation for the three facilities that indicated a standard deviation of 1.00 for Nairobi, .90 for Mombasa and .86 for Kisumu facilities.

The study results also indicated that the Aga Khan hospitals experienced incidences related to delays of elective surgical procedures, with the Nairobi facility registering a higher mean at 2.82, followed by Kisumu facility that registered a mean of 2.43 then Aga Khan Hospital, Mombasa that registered a mean of 2.40. This means that more complaints or incidences related to delays were raised in the Nairobi facility more than in the other two facilities. These incidences could be raised by the OR staff, patients or families. As for the variation in responses on whether the three facilities had incidences

related to delays of surgical procedures, Aga Khan Hospital, Kisumu registered a higher variation with a standard deviation of 1.22, while the Mombasa and Nairobi facilities registered .97 and .84 standard deviations respectively.

Lastly, results show that delays of elective surgical procedures resulted in inefficient utilization of OR resources more at Aga Khan hospital, Nairobi which registered the highest mean of 3.70, while Aga Khan hospital, Mombasa and then Aga Khan hospital, Kisumu registered 3.40 and 3.07 respectively. The study findings had also indicated that the Nairobi facility registered a highest percentage of cases that do not start time and therefore it is not surprising that the study also did find poor utilization of resources at the facility resulting from delays.

The study findings indicated low variations in responses with the Mombasa facility registering of a standard deviation of .96, .92 for Aga Khan hospital, Kisumu and .85 for Aga Khan Hospital, Nairobi. This means that respondents in the three facilities held similar views on the issue under study.

4.5 Inferential Statistical Analysis

4.5.1 Bivariate Linear Correlation Analysis

This part of the study contains the analysis to establish whether each of the independent variables: Patient factors (X1), Staff factors (X2), Equipment factors (X3) Management factors (X4) influenced the dependent variable: Delays of elective surgical cases at the Aga Khan hospitals in Kenya. The findings for each variable are given by Pearson (r). If its corresponding p-value is less than 0.05 at 95% confidence level, then the study concludes that there is a significant relationship between the variables.

Table 4.7*Bivariate Correlation*

		Y	X1	X2	X3	X4
		1				
Delays of elective surgical cases	Pearson Correlation					
	Sig. (2-tailed)					
	N	213				
Patient Factors	Pearson Correlation	.216	1			
	Sig. (2-tailed)	.418				
	N	213	213			
Staff Factors	Pearson Correlation	.581**	.038	1		
	Sig. (2-tailed)	.008	.585			
	N	213	213	213		
Equipment Factors	Pearson Correlation	.232	.280**	.550**	1	
	Sig. (2-tailed)	.045	.000	.000		
	N	213	213	213	213	
Management Factors	Pearson Correlation	.641**	-.082	-.118	-.139*	1
	Sig. (2-tailed)	.000	.234	.085	.043	
	N	213	213	213	213	213

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

The findings showed that patient factors (X1) had no significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya ($r=.216$, $P> .418$) This suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya cannot significantly be reduced by improving patient factors in this study.

The second specific objective was to determine if there was a significant influence of staff factors on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. The findings showed that staff factors (X2) had a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya ($r=.581$, $P< .008$). This

suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya can be reduced if the staff factors studied in the three health facilities can be addressed.

The third specific objective was to determine the significant influence of equipment factors on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. The findings showed that equipment factors (X3) had no significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya ($r=.232, P < .045$). This suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya cannot significantly be reduced by improvement of the equipment factors evaluated in this study.

Lastly, the fourth specific objective was to determine the significant influence of management factors on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. Results indicated that management factors (X4) had a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya ($r=.641, P < .000$). This suggests that delays of elective surgical cases at the Aga Khan hospitals in Kenya can be reduced if management factors studied are enhanced in the three health facilities.

4.5.2 Regression Analysis

Table 4.8

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.565 ^a	.367	.339	.44609

The coefficient of determinant (R-squared) of .367 that presents a 36.7% of the total variation in the delays of elective surgical cases at the Aga Khan hospitals in Kenya can be explained by patient factors, staff factors, equipment factors and management factors at the Aga Khan hospitals in Kenya. On the other hand, the Adjusted R Squared of .339 indicates that these variables in exclusion of constant variable, explained the changes in the delays of elective surgical cases at the Aga Khan hospitals in Kenya by 33.9%. The remaining (66.1%) can be explained by the factors not included in the regression model for investigation.

Table 4.9

ANOVA

ANOVA^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	16.678	4	4.169	23.395	.000
	Residual	37.069	208	.178		
	Total	53.747	212			

a. Dependent Variable: Delay of elective surgical cases
b. Predictors: (Constant), Management, Staff, Patient, Equipment

The table 4.9 above shows a regression output of patient factors, staff factors, equipment factors and management factors as valid ($F(4, 208) = 23.395, P < 0.000$). This means that the (patient factors, staff factors, equipment factors and management factors) can be used as predictors explaining the variation in the delays of elective surgical cases at the Aga Khan hospitals in Kenya. The $P < 0.000$ which is less than the critical value of 0.05 leads us to reject the null hypothesis and to accept the alternative hypothesis that (patient

factors, staff factors, staff factors and management factors) combined have a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya.

Table 4.10

Regression Coefficient

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	4.011	.212		18.963	.000
1 Patient Factors	.034	.031	.068	1.114	.267
Staff Factors	.074	.046	.113	1.617	.007
Equipment Factors	.009	.045	.015	.201	.841
Management Factors	.516	.057	.531	9.101	.000

Table 4.10 shows regression results that indicate that out of the four the factors studied (patient factors, staff factors, equipment factors and management factors) only Staff and Management factors ($X_2: \beta_2 = .074, P < .007$), ($X_4: \beta_4 = .516, P < .000$) had a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya, while Patient and Equipment factors ($X_1: \beta_1 = .034, P > .267$), ($X_3: \beta_3 = .009, P > .841$), did not have any influence on delays of elective surgical cases at the Aga Khan hospitals in Kenya. This means that improvement of staff and management factors would significantly reduce of delays of elective surgical cases at the Aga Khan hospitals in Kenya.

$$Y = 4.011 + .034X_1 + 0.074X_2 + 0.009 X_3 + 0.516 X_4 + e$$

This indicates that a unit increase of .034 in Patient Factors, of .074 in Staff factors, of .009 in Equipment Factors and of .516 in Management factors would influence a unit change in the delays of elective surgical cases at the Aga Khan hospitals in Kenya.

4.6 Qualitative Analysis

Results from all the three facilities indicate that there was agreement that patients' factors did indeed contribute to delays of elective surgical cases at the Aga Khan hospitals in Kenya. Results from the key informants (KI) from Nairobi facility indicated that patients delayed because of traffic jams within the Nairobi County. Other patients booked same day surgeries yet they lived outside Nairobi. Delays in obtaining consents for the procedure, and in-patients being delayed at the ward level were other major factors cited to contribute to delays of elective surgical cases at the Aga Khan hospitals in Kenya. Sometimes the patients changed condition at the last minute, forcing a delay or a cancellation of the case. Increased anxiety before the operation process was also cited as a patient condition that contributed to delays of elective surgical cases as doctors gave the patients' time to decide if they wished to go through with the operation.

While highlighting the patient factor as a contribution to delays stated that
'.....some patients arrive late to the theater, way after their scheduled time. Others don't show up and when called they indicate they have cancelled the surgery. This sends the theater staff into confusion, wondering whether to pull forward another case or just stay idle waiting for the right time to start the next case'.....Interviewee

Responses from KI interviews showed that in the three facilities and especially Nairobi, elective cases were frequently interrupted by emergency cases, while pre-authorization

by insurance companies was a long process and this caused delays of financial approvals, consequently delaying procedures. The Key Informants in the Nairobi facility indicated that sometimes surgeons and anesthetists who work in other hospitals within the city did report to OR late thereby leading to delays of cases. There were times when the theatre list was reorganized without proper coordination of all the stakeholders thereby causing havoc in the schedule and thus delays of cases. Notably, some surgeons in the middle of a procedure asked for supplies outside what was listed in their preference cards. This caused delays as staff went for the alternative supplies that were at times not immediately available in the OR stores. Other factors cited by the KIs to contribute to delays were miscalculation of average times per case, sick off by key support staff, and teaching during surgery.

One respondent said that ‘*some surgeons are very busy in other hospitals and sometimes do not report on time to evaluate what has been prepared for their case, which then leads to them to ask asking for supplies in the middle of surgery*’.....Interviewee.

Results from KI interviews also indicated that respondents agreed equipment factors contributed to delays of elective surgical cases at the Aga Khan hospitals in Kenya. Notably, the results indicated that equipment in OR occasionally failed during surgery indicating testing was not done in advance. In terms of the availability of surgical equipment, KIs agreed there was an annual process in all the three facilities to procure OR equipment through capital expenditure. However, the amount of funds allocated was felt to be more sufficient in the Nairobi facility. KIs in Kisumu and Mombasa indicated that they did not have qualified biomedical staff to maintain the OR equipment, while KIs

in Nairobi indicated that this was not a big issue as the facility had a group of trained Biomedical staff with one dedicated to ORs. Results from Kisumu highlighted frequent equipment failure, especially endoscopes that affected OR operations. The three facilities indicated a need for modern equipment to support modern surgery, especially in Nairobi facility that had super specialized surgeons.

One of the responses stated that ”*equipment are very old they need to be replaced with modern surgical equipment. Sometimes we are forced to refer the patients to our Nairobi facility*”Interviewee.

Finally, on management factors, results from the key informant interviews from two of the three facilities agreed that hospital management factors contributed to delays of surgical cases. This was Nairobi and Mombasa facilities. The KIs agreed that Senior Management did allocate funds for staff training and equipment but there was need upgrade the physical facilities and staff the ORs adequately. The KIs in the three facilities also indicated a need to enhance management skills of OR managers to ensure smooth running of the ORs

Response from one of the interviewee stated that ”*as much as senior management allocates funds for staff training and equipment, our theatres are few and old for the cases we do*”Interviewee.

4.7 Triangulation of Results

While results from qualitative data (Key interviews) indicated that in all the three facilities there was agreement that patients’ factors, staff factors, equipment factors and management factors contributed to delays of elective surgical cases at the Aga Khan hospitals in Kenya, the findings from quantitative (questionnaires) indicated that in all the

three facilities only staff factors and management factors contributed to delays of elective surgical cases at the Aga Khan hospitals in Kenya.

CHAPTER FIVE:

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter contains the summary of findings obtained from the study, conclusions made, recommendations and suggestions for future studies on the factors influencing delays of elective surgical cases at the Aga Khan hospitals in Kenya. The study focused on the three Aga Khan hospitals in Nairobi, Kisumu and Mombasa counties.

5.1.1 Effects of patient factors on delays of elective surgical cases at the Aga Khan hospitals in Kenya.

The results indicated that patient factors contributed to delays of elective surgical cases at the Aga Khan hospitals in Kenya. The findings concurred with Shantanu et al. (2018) who pointed that patient factors contributed to delays of elective surgical cases where 10% of procedures at certain facilities were either cancelled or delayed due to improper and inadequate pre-operative preparation of the patients.

In the three facilities, patients frequently reported late for operation appointments, with the problem having more effect on delays in the Nairobi facility, followed by the Kisumu facility. These findings support the findings by Callie et al., (2016) who pointed out that in an estimated 65 percent of elective surgical cases, patients arrived late for their appointments.

The study findings also indicated that lack of consent to operate was a frequent source of delays of elective surgical cases at the Mombasa and Kisumu facilities. Patients in all the three Aga Khan hospitals experienced delays of elective surgical cases due to delayed payment clearance by the patients' insurance companies; though the problem was slightly

lower in Kisumu Aga Khan hospital compared to the other two facilities. The findings of the study also showed that the Nairobi facility had more delayed cases as a result of last minute cancellations or no show by the patients compared to the other two while a good number of patients from the Mombasa and Kisumu facilities would be found unfit at the time of surgery and therefore force a delay; although such were fairly minimal at Aga Khan hospital, Nairobi.

The study did not establish a significant relationship between patient factors on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. This suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya cannot significantly be improved by improving patient factors in this study.

5.1.2 Effects of staff factors on the delays of elective surgical cases at the Aga Khan hospitals in Kenya.

The findings of the study indicated that in all the three Aga Khan hospitals, staff factors contributed to delays of elective cases. This finding was higher in Aga Khan Hospital, Kisumu followed by Aga Khan Hospital, Mombasa and lastly Nairobi. Notably, inadequacy of staff to conduct a surgical procedure was more experienced in Aga Khan Hospital in Mombasa, followed by Kisumu and slightly less experienced in the Nairobi facility. The findings support results by Jonnalagadda and Hariharan (2005) who established that 89% of cancellations occurred in patients undergoing elective surgery and the leading reasons were staff related.

The findings of the study also showed that staff lateness caused delays of elective surgical cases more in the Mombasa facility, followed closely by the Kisumu hospital. Poor staff coordination contributed to delays in the surgical process more in Nairobi,

followed by Mombasa facilities and lastly Kisumu facility. This finding are consistent with Hull et al., (2011) that established that team dynamics that include professionals from multiple specialties and whose goals and training differ widely but are required to work in a closely coordinated fashion may course delays in the operating rooms if teams do not function effectively.

Lastly, the findings of the study indicated that lack of proper preparation for cases among some surgical staff caused interruptions during procedures as they left OR suite to pick items. This delayed completion of present case and so caused delays of the next elective case. This issue was more experienced in Aga Khan Hospital, Nairobi, than in Kisumu and Mombasa facilities. Lastly, poor case scheduling contributed to surgical case delays more in Kisumu facility, followed by Nairobi and then Mombasa facilities.

The study established that staff factors had a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. This suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya can be reduced if the staff factors studied in the three health facilities can be addressed.

5.2.3 Effects of equipment factors on the delays of elective surgical cases at the Aga Khan hospitals in Kenya.

The findings of the study established that equipment factors contributed to the delays of elective surgical cases in all three Aga Khan Hospitals in Kenya. These findings concur with Wong et al., (2010) findings that highlighted operation delays caused by equipment challenges in health facilities, that included lack of investment in modern equipment, equipment not working or not properly maintained, and lack of staff trained to maintain the highly specialized equipment found in the operating rooms.

Study results indicated that Equipment failures contributed to delays of elective cases more in the Kisumu facility, followed by Nairobi and Mombasa. In terms of equipment testing before start of surgery, failure to test contributed to delayed procedures more in Aga Khan Hospital in Mombasa, followed by Nairobi and then Kisumu. The study also established that Aga Khan Hospital in Nairobi was better equipped to conduct modern surgical procedures than was the Kisumu and Mombasa facilities.

The study established that the Nairobi facility did have some old equipment that did not support specialized surgical procedures and thus frequently caused delays more than the other two facilities. On the other hand, the study findings established that the Aga Khan hospital in Nairobi had a team of trained Biomedical staff which was not the case in the Kisumu and Mombasa facilities. Lastly, the findings indicated that the three facilities faced supply challenges that forced delays of surgical cases as staff sourced for supplies at the last minute.

The findings of the study showed that equipment factors did not have a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. This suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya could be reduced if equipment factors were addressed in the three health facilities.

5.2.4 Effects of management support on the delays of elective surgical cases at the Aga Khan hospitals in Kenya

Results of the study indicated that hospital management factors did contribute to delays of elective surgical cases at the Aga Khan hospitals in Kenya. The effect was more experienced in the Mombasa facility, followed by Kisumu and less so in the Nairobi facility. Comparably, Aga Khan Hospitals in Nairobi and Mombasa allocated adequate

budget for surgical services than did the Kisumu facility. The findings of the study also indicated that Mombasa facility allocated more funds to replace old OR equipment than the other two facilities in Kisumu and Nairobi. While the study indicates the extent to which the three facilities have invested in equipment, the finding contradicts results by Overdyk & Fishman (2011) that suggested that successful strategy for improving surgical services efficiency means that a wide variety of surgical materials and equipment are stocked and made available when required.

The study findings indicated that Aga Khan Hospitals in Nairobi and Mombasa had put in place the necessary policies to support surgical services in the facilities compared to the Kisumu facility. Noticeably, as indicated in the study, OR staff training was supported more by the management in Nairobi and Mombasa facilities compared to the Kisumu facility. The need for management support on staff training has been emphasized by Moorthy et al., (2013), who stress that surgical nursing is considered a specialty, and nurses need extra training to work in the operating theatre. Finally, the results indicated that the management in Aga Khan Hospital Kisumu ensured adequate operating room staffing to carry out surgical processes compared to Mombasa and Nairobi facilities.

The findings of the study showed that management factors had a significant influence on the delays of elective surgical cases at the Aga Khan hospitals in Kenya. This suggests that the delays of elective surgical cases at the Aga Khan hospitals in Kenya can be reduced if management factors studied are improved or enhanced in the three health facilities.

5.3 Conclusion

The study established a significant association between Staff factors and delays of elective surgical cases at the Aga Khan hospitals in Kenya. These staff factors are timely financial clearance for patients undergoing surgical procedures, having adequate number of trained support staff clinical staff, and effective coordination of theatre activities amongst the staff.

The study also established a significant relationship between management factors and delays of elective surgical cases at the Aga Khan hospitals in Kenya. These management factors were timely replacement of old theatre equipment, adequate staffing for operating theatres and having adequate numbers of operating theatres in relation to patient load.

The application of Theory of Constraints (TOC) in the study helped in the identification of constraints that if addressed would reduce surgical delays, in effect resulting in OR efficiency and better utilization of resources.

5.4 Recommendations

The Management of each of the Aga Khan Hospital in collaboration with their respective Operating Room (OR) leaders should come up with a proper staffing plan for the various cadres of staff in the operating room

The Management of the hospital should implement a process that ensures staff accountability for financial clearance for patients undergoing surgical procedures

Leadership of the Operating theatres to come up with strategies that improve coordination of the large number of staff in the theatres.

Management of the three hospital in collaboration with stakeholders to develop a replacement plan for old or broken equipment and also evaluate the need for additional operating theatres for each hospital in relation to their volume of surgical work.

5.5 Suggestion for Further Studies

There is need for further study focusing on other variables that might contribute to delays of surgical procedures in Aga Khan hospitals in Kenya but were not evaluated in this study.

This study was carried out in private health facilities and its findings may not be generalizable to the public sector. Therefore, there is need for a similar study focusing on public healthcare institutions.

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APPENDIX I: CONSENT FORM

Introduction

My name is Jemimah Kimeu, a student from Kenya Methodist University undertaking a master's degree in Health Systems Management. I am conducting a research that "*seeks to establish the factors influencing delays of elective surgical cases at the Aga Khan Hospitals in Kenya.*". I wish to request for permission from you to participate in this study. I am humbly requesting you to provide the information requested to allow me complete the study.

Study purpose

The study aims at finding out the factors contributing to delays of elective surgical cases at the Aga Khan Hospitals in Kenya thus creating barriers to operating room efficiency. The study results will help strengthen and support decision making to improve provision of quality surgical services, ensure staff and patient satisfaction, and also ensure positive patient outcomes.

Study procedure

Participation in this research involves answering questions which were asked in a research questionnaire concerning provision of elective surgical cases in this facility. You are required to fill your responses in the spaces provided and return the questionnaires. At any given time, you are free to seek clarification on any unclear aspects related to the study.

Voluntary participation

You have the right to decline participation in this study as it is purely voluntary and thus optional. You may as well omit to respond to some questions and withdraw from the interview at any time without any dire consequences.

Discomforts and risks

This interview schedule is detailed and you might get tired underway. You may realize that a number of questions provoke your cultural and professional beliefs hence you may choose not to answer. This exercise may interfere with your daily work routine; however, I will be glad if you take your time to participate in the study.

Benefits and rewards

Your participation in the study will provide me with the necessary information to support decision making in the quality journey to increase operating room efficiency, increase staff and patient satisfaction and ensure positive patient outcomes. The study will not provide any monetary rewards to participants.

Confidentiality

The interview will be held in private settings within the facility. The information you provide will be treated with utmost confidentiality. Your identity will not be revealed and the information will be used for the purpose of this study only.

Contact information

In case of any questions regarding this study, you may contact my supervisors.

Name of Supervisor:Mr Musa Oluoch.....

Contacts:0722483909.....

Email...musadot123@gmail.com.....

Name of Supervisor:Mr Frederick Kimemia.....

Contacts:0729872543.....

Email..... kimemiafred@yahoo.com

Or Kenya Methodist University Scientific Ethics and Review Committee (KEMU-SERC)

Contacts: ...0752656006.....

Participant's statement

The information concerning my involvement in this study has been clarified to me. I have been given an opportunity to ask questions and my concerns have been addressed adequately. Participation in this research is purely optional and voluntary. I understand that the information I will give in this study shall be kept confidential. I can also choose to withdraw from participating from the study at any one given time.

Sign..... Date.....

Principal Investigator's statement

I, the undersigned, have explained to the volunteer in a language that she best understands the proceedings to be followed in the study and the risks and benefits involved.

Name: Jemimah Mutulu Kimeu:

Contact: 0736147041

Email: jemimah.kimeu@gmail.com;

Signature..... Date.....

APPENDIX II : RESEARCH QUESTIONNAIRE

SECTION A : GENERAL INFORMATION

The questionnaire below is meant to collect data to find out the factors that influence delays in elective cases at the Aga Khan Hospitals in Kenya. It will also help in identifying how delays in elective cases can be reduced. The information given herein will be treated with strict confidentiality. The identity of the respondent and all matters related will be treated with utmost confidentiality and no person shall disclose them to any other person.

Instructions

Please attempt to answer all questions. Please provide brief answers no more than two paragraphs (or as indicated). There is no right or wrong answer therefore be as spontaneous as possible.

1. Sex : Male Female
2. Age : 18-25 years 26-35 years
36-45 years 46-55 years
56-65 years 66 years and above
3. Highest Education level: Secondary certificate College (PTC) certificate
Diploma University Graduate Post graduate
4. What is your professional Category
- Nurse Surgeon Anesthesia Tech
Anesthesiologist Billing Staff
- Others, Please **Specify**.....

5. How long have you worked in theater in this facility?

Less than 2 years 5years
6 years and above

6. For How Long Have You Worked for Aga Khan Hospital?

Less than 2 years 5years
6 years and above

7. Which facility do you work at?

Aga Khan Hospital Nairobi

Aga Khan Hospital Mombasa

Aga Khan Hospital Kisumu

SECTION B: PATIENT FACTORS

8. To what extent do you agree with the following statements on patient factors that contribute to delays in elective surgical cases at Aga Khan Hospitals?

Key: 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly agree

Patient factor	Agreement level				
	1	2	3	4	5
Patient factors contribute to delays in elective cases.					
Patients sometimes report late for operation appointment especially the out patients					
Operations sometimes is delayed due to unpreparedness of the patients					
In some instances the patients are delayed due to lack of consent from next of keen					
A good number of operations are delayed due to the problem associated with payment clearance by the patients' insurance companies and cash payments for self-sponsored patients.					
Some patients cancel operations last minute or do not show up in OR, causing delays of subsequent cases					
Some patients are found to be medically unfit at the time of surgery causing cancellation					

SECTION C: STAFF FACTORS

9. To what extent do you agree with the following statements on staff factors that contribute to delays of elective cases at Aga Khan Hospitals?

Key: 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly agree.

Staff factors	Degree of agreement				
	1	2	3	4	5
Staff factors contribute to delays in elective cases at Aga Khan University Hospital					
Sometimes staff present are not adequate to conduct a surgical procedure					
There are instances when concerned staff fails to obtain payment clearances in good time.					
Sometimes there are not enough qualified support staff to conduct an surgical process					
Sometimes members of the core surgical team report to OR late delaying start of the procedure.					
There is poor staff coordination and this contributes to delays in surgical process					
Some staff do not prepare well for the procedures causing interruptions during procedures as they leave OP suite to pick items which delays the next case					
There is inefficient scheduling of cases resulting in disorganized theater lists					

SECTION D: EQUIPMENT FACTORS

10. To what extent do you agree with the following statements on equipment factors that contribute to delays in elective surgical cases at Aga Khan Hospitals?

Key: 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly agree.

Equipment Factors	Degree of agreement				
	1	2	3	4	5
Equipment failure contributes more to delays in elective cases.					
Sometimes the equipment are not tested before the procedure and end up failing during the procedures.					
There is a good number of available equipment to conduct surgical process					
The equipment are old and cannot support modern surgery process.					
In this facility are not qualified staffs to maintain the highly specialized surgical equipment in the health facility.					
Sometimes the required supplies are not available at the surgical stores forcing a delay as calls are made to suppliers.					

SECTION E: MANAGEMENT SUPPORT

11. To what extent do you agree with the following statements on Management Support factors that influence delays in elective cases at Aga Khan Hospital?

Key: 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly agree.

Management Support factors	Degree of agreement				
	1	2	3	4	5
Hospital Management factors do contribute to delay of elective cases					
Management supports the operations of surgical services at Aga Khan Hospital					
There is always adequate budgetary allocation for surgical services in the hospital					
The hospital allocates money to replace old machines required in the surgical process					
The management has put in place the necessary policies to support surgical services in the hospital					
The management supports continuous training for surgical staff					
The management ensures that those operating rooms are adequately staffed to carry out surgical process.					
There are adequate number of operating rooms to meet the demand for surgical services					

SECTION F: OPERATING ROOM (OR) DELAYS FACTORS

12.To what extent do you agree with the following statements on Operating Room (OR) delays at Aga Khan Hospital?

Key: 1 Strongly disagree, 2 Disagree, 3 Neutral, 4 Agree, 5 Strongly Agree.

Operating Room (OR) delays factors	Degree of Agreement				
	1	2	3	4	5
Elective surgical cases are frequently delayed in the Aga Khan hospitals in Kenya					
A large percentage of elective surgical cases start later than their scheduled time					
There are many incidences related to delays of elective surgical procedures in the facility					
Delays of elective surgical procedures result in inefficient utilization of OR resources.					

Thank You for your Participation

APPENDIX III: KEY INFORMANT INTERVIEW GUIDE

The interview guide below is meant to collect data to find out the factors that influence delays in elective cases at the Aga Khan Hospitals in Kenya. The findings will help in development of strategies to reduce delays of elective surgical cases. The information given herein will be treated with strict confidentiality and will be used for the sole purpose of the study. The identity of the respondent and all matters related will be treated with utmost confidentiality.

INSTRUCTIONS

Please attempt to answer all questions. Provide brief answers in the space provided below (or as indicated). There is no right or wrong answer therefore be as spontaneous as possible.

SECTION A: PATIENT FACTORS

Do you agree with the statement that patient factors contribute to delays of elective surgical cases at Aga Khan Hospital.....?

.....

In your opinion do you think that patients sometimes report to the operating room late for scheduled operation appointment

.....

Do you think that operations are sometimes delayed because in-patients are not prepared on time at ward level.....?

.....

Are there instances where the patients are delayed due to lack of consent from next of kin.....

Can you say that a good number of operations are delayed due to problems associated with financial clearance by their insurance companies or corporates.....

Would you say that some delays are caused by patients' psychological unpreparedness that leads to last minute cancellation of scheduled elective cases.....

Do you think that some patients are found to be medically unfit at the time of surgery and therefore force a delay or cancellation of the procedure.....

SECTION B: STAFF FACTORS

In your opinion do you think that staff factors contribute to delays in elective surgical cases at Aga Khan Hospital.....

Do you agree with the statement you state that sometimes Operating Rooms are inadequately staffed to conduct a surgical procedure.....

Do you think that there are instances when the staff delay to seek payment clearances with the patients' insurers or corporates thus contributing to delayed procedure.....

Can you say that sometimes some members of the core surgical team report late to the OR and therefore causing delays of scheduled procedures.....

.....

In your opinion do you think there is poor staff coordination and this contributes to delays in the surgical process.....

.....

Do you agree that sometimes staff do not prepare well for procedures causing delays during the procedure as they go in and out of the OR suite looking for supplies.....

.....

.....

Do you think there is poor scheduling of cases resulting in disorganized theatre lists that cause delays of procedures.....

.....

SECTION C: EQUIPMENT FACTORS

Do you think that there are frequent equipment failures and that this contributes to delays in elective cases.....

.....

Do you agree that there are instances when required equipment are not checked before a surgical procedure resulting in failure during the procedure.....

.....

In your opinion do you think there are enough equipment to efficiently support elective surgical procedures without delays.....

Do you believe that equipment in the ORs are old and therefore break frequently causing delays

.....
In your opinion do you think your facility has adequate qualified staff to maintain the OR equipment

.....
Would you say that sometimes required supplies for a surgical procedure are not available at the start of the procedure forcing delays.....

.....
SECTION D: MANAGEMENT SUPPORT FACTORS

In your opinion do you think that hospital management factors contribute to delays of elective surgical procedures.....

.....
Can you say that the hospital management is supportive of the operations of surgical services at Aga Khan Hospital

.....
Would you say that budgetary allocation for surgical services in the Aga Khan Hospital is adequate to provide the resources required to efficiently manage the ORs.....

.....
Do you think that the management has put in place the necessary policies to support surgical services in the hospital

In your opinion can you state that the management supports continuous training for the various cadres of surgical staff

THANK YOU FOR YOUR PARTICIPATION

APPENDIX IV: ETHICAL APPROVAL FROM KeMU



KENYA METHODIST UNIVERSITY

P. O. BOX 267 MERU - 60200, KENYA

FAX: 254-64-30162

TEL: 254-064-30301/31229/30367/31171

EMAIL: INFO@KEMU.AC.KE

20th January 2020

KeMU/SERC/HSMG/1 /2020

Jemimah Kimeu
HSMG-3-9251-2/2018
Kenya Methodist University

Dear Jemimah,

SUBJECT: FACTORS INFLUENCING DELAYS OF ELECTIVE SURGICAL CASES AT THE AGA KHAN HOSPITALS IN KENYA.

This is to inform you that Kenya Methodist University Scientific Ethics and Review Committee has reviewed and approved your above research proposal. Your application approval number is KeMU/SERC/HSMG/1/2020. The approval period is 20th January 2020 – 20th January 2021.



This approval is subject to compliance with the following requirements

- I. Only approved documents including (informed consents, study instruments, MTA) will be used.
- II. All changes including (amendments, deviations, and violations) are submitted for review and approval by Kenya Methodist University Scientific Ethics and Review committee.
- III. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to KeMU SERC within 72 hours of notification.
- IV. Any changes, anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to KeMU SERC within 72 hours.

- V. Clearance for export of biological specimens must be obtained from relevant institutions.
- VI. Submission of a request for renewal of approval at least 60 days prior to expiry of the approval period. Attach a comprehensive progress report to support the renewal
- VII. Submission of an executive summary report within 90 days upon completion of the study to KeMU SERC.

Prior to commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology and Innovation (NACOSTI) <https://oris.nacosti.go.ke> and also obtain other clearances needed.

Yours sincerely,



Dr. A. WAMACHI
Chair, SERC



THE AGA KHAN UNIVERSITY

Faculty of Health Sciences
Medical College

Ref: 2020/IERC-67 (v2)
July 7, 2020

Ms. Jemimah Kimeu – Principle Investigator,
Masters Student - Kenya Methodist University
Chief Nursing Officer, Nursing Administration Office
Aga Khan University Hospital

Dear Ms. Kimeu and team,


RE: FACTORS INFLUENCING DELAYS OF ELECTIVE SURGICAL CASES AT THE AGA KHAN HOSPITALS IN KENYA

The Aga Khan University, Nairobi Institutional Ethics Review Committee (IERC), is in receipt of your protocol resubmitted to the Research Office on July 03, 2020. With reference to the IERC letter Ref: 2020/IERC-67 (v1) dated June 10, 2020, the IERC reviewed and approved this project *{as per attached official stamped protocol and attachments - version Ref: 2020/IERC-67 (v2)}*. You are authorized to conduct this study from July 07, 2020. This approval is valid until July 06, 2021 and is subject to compliance with the following requirements;

1. The conduct of the study shall be governed at all times by all applicable national and international laws, rules and regulations. IERC guidelines and Aga Khan University Hospital policies shall also apply and you should notify the committee of any changes that may affect your research project (amendments, deviations and violations)
2. Researchers desiring to initiate/reinstate/continue research activities during COVID-19 pandemic must comply with the [COVID-19 SOPs for Research](#) as well as submit to the Research Office a [Request Form to Initiate, Reinstate or Continue Research During COVID-19 Pandemic](#).
3. You will be expected to ensure compliance with relevant national research regulations. Besides, please obtain a [research licence](#) from the National Commission for Science, Technology and Innovation (NACOSTI), a [site approval](#) from the M.P Shah Hospital and [Administrative approvals](#) from Aga Khan Hospitals in Kisumu and Mombasa. As applicable, prior to export data, ensure a Data Transfer Agreement (DTA), is in place as well as seek transfer authority/permit from the relevant government ministry. Copies of these approvals, should be submitted to the Research Office for records purpose.
4. As applicable, all Serious Adverse Events and the interventions undertaken should be reported as soon as they occur but not later than 48 hours. A report from the Hospital Patient Safety Committee should also be submitted.
5. All consent forms must be filed in the study binder
6. Further, you must provide an interim Progress Report Form 60 days before expiration of the validity of this approval and request extension if additional time is required for study completion.
7. You must advise the IERC when this study is complete or discontinued and a final report submitted to the Research Office for record purposes. The hospital management should be notified of manuscripts emanating from this work.

If you have any questions, please contact Research Office at research.support@aku.edu or 020-366 2148/1136.

With best wishes,


Dr. Wangari Waweru-Siika,
Chair - Institutional Ethics Review Committee (IERC)
[Aga Khan University, \(Kenya\)](#)

APPENDIX VII: MAP OF KENYA SHOWING STUDY SITES

