POST-CAESAREAN SURGICAL SITE INFECTION: AN INCIDENCE AND ASSOCIATED DETERMINANTS STUDY AT KIRYANDONGO GENERAL HOSPITAL

BY

FRED ABDON NAIBEI

BMS/0029/141/DF

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DECLARATION

I hereby declare that this research dissertation is the product of my own efforts and to the best of my knowledge and conviction, has never been presented to any institution for any award or qualification whatsoever. Wherever the works of other people have been included, due acknowledgement to this has been made in accordance with the appropriate referencing and citations. The findings and the analysis that will result from this research project will be my original information.

Researcher: **FRED ABDON NAIBEI, BMS/0029/141/DF**

Signature ……...

Date ……...….

APPROVAL

This is to certify that this research dissertation has been prepared under my supervision and has never been presented anywhere for any other purpose and is now ready for submission to the Faculty of Clinical Medicine and Dentistry of Kampala International University for further consideration.

Supervisor: **DR. JOHNIE MULWANA, CONSULTANT OBSTETRICIAN AND GYNECOLOGIST**

Signed…….

Date……..……

ACKNOWLEDGEMENT

I would like to thank Father God Almighty, for the gift of life so far. To my parents and siblings, I say thank you for ever being a reliable pillar upon which I can always lean on. To my supervisor, **Dr. Johnie Mulwana,** through whose contributions this research work became a success, I say thank you so much doctor. To my colleagues and friends, it has been quite a journey, made even more interesting and bearable with you at every step.

LIST OF ABBREVIATIONS AND ACRONYMS

ANC	**:**	Antenatal Care
BMI	**:**	Body Mass Index
CAR	**:**	Central African Republic
CI	**:**	Confidence Interval
CS	**:**	Caesarean Section
DM	**:**	Diabetes Mellitus
HAIs	**:**	Hospital Acquired Infections
HIV	**:**	Human Immunodeficiency Virus
KIU	**:**	Kampala International University
LMICs	**:**	Low and Medium Income Countries
MDGs	**:**	Millennium Development Goals
PCS	**:**	Post Caesarean Section
PCS-SSI	**:**	Post Caesarean Section Site Infection
PROM	**:**	Premature Rupture of Membranes
SDGs	**:**	Sustainable Development Goals
SSI	**:**	Surgical Site Infection
VEs	**:**	Vaginal Examinations
USA	**:**	United States of America
WHO	**:**	World Health Organization

OPERATIONAL DEFINITIONS

Advanced maternal age **:** Age at pregnancy of equal to or older than 35 years.

Low maternal age **:** Age at pregnancy and delivery lower than 16 years

Sepsis **:** Life –threatening organ dysfunction caused by a dysregulated host response to an infection (Third International Consensus, 2016).

Surgical site infection **:** Infection that occurs within 30 days after the operation and might Involve only skin and subcutaneous tissue of the incision or deep tissue (CDC, 2016).

Caesarean section **:** Use of surgery to deliver a baby or babies (Merriam Webster, 2017).

ABSTRACT

Prevalence of surgical site infections has risen with increased Caesarean section rates. Global estimates for post-CS SSIs range between 3 – 15% (highest rates in resource-poor countries) (Zuarez-Easton, Zafran, Garmi, & Salim, 2017). SSIs cause significant morbidity among post-CS mothers. Many factors have been associated with post-CS SSIs although little data exist on the matter in Kiryandongo. Therefore, the study was about the prevalence, factors and outcomes of Post-Caesarean Section Surgical Site Infections at Kiryandongo General Hospital. A descriptive cross sectional study was used which involved record and surgical notes review of 320 women delivered through caesarean section. 40 (12.5%) of the women developed surgical site infections. Strong significance was seen in rural residence, Chorioamnionitis, emergency CS and DM/pre-diabetes and post-CS SSIs. Other factors were obesity, smoking, HIV/AIDS coinfection, nulliparity and unsatisfactory prenatal care. Singleton pregnancy was also significant while corticosteroid use and hypertension had no significance. Bacteraemia/sepsis and wound dehiscence were the main complications seen. The prevalence of post-caesarean section surgical site infection in Kiryandongo General Hospital was 12.5%, a value high enough to warrant urgent intervention. Risk factors for post-caesarean surgical site infections were rural residence, Chorioamnionitis, DM/pre-diabetes, extremes of maternal age, obesity, tobacco use, HIV/AIDS coinfection, nulliparity, unsatisfactory prenatal care and emergency caesarean sections. Corticosteroid use and hypertension were not significant whereas singleton (rather than twin) gestation was found to be significant. Prolonged post-op hospital stay with rise in cost of care were the outcomes necessitated by complications that mainly included bacteraemia/sepsis and wound dehiscence.

Keywords: Maternal age, surgical site infection, Caesarean Section

CHAPTER ONE: INTRODUCTION

1.0.Background

A cesarean section, C-Section or Cesarean delivery is the delivery of a fetus through surgical incisions made through the abdominal wall (laparotomy) and the uterine wall (hysterotomy) (Louis, 2017). Among the indications for a CS include; labor is not progressing as it should. This may occur if the contractions are too weak, the baby is too big, the pelvis is too small, or the baby is in an abnormal position, the baby's heart rate suggests that it is not tolerating labor well, the baby is in a transverse (sideways) or breech position (buttocks first) when labor begins, heavy vaginal bleeding. This can occur if the placenta separates from the uterus before the baby is delivered (called a placental abruption) or a medical emergency threatens the life of the mother or infant. Among many more (Berghella, 2017).

CS is a commonly performed surgical operation in women and its prevalence is rising every year (World Health Organization Human Reproduction Programme, 2015)(Betrán et al., 2016). Though it has become increasingly a safe and common surgical operation, it is still associated with significant morbidity and mortality (Conroy et al., 2012).

Global statistics have it that SSI rates range from 6% to 27.2% (Betrán et al., 2016). In addition, obstetric infections result in increased health costs related to prolonged hospital stay, re-admission and the use of oral and parenteral antibiotics. The rate of post caesarean wound infection varies across localities and countries. The incidence of SSI varies from type of operation, region to region and country to country. For example, the incidence rates reported in the period ending 2011were; for (20%), Europe (17%), Algeria (12%), Nigeria (16 – 31%), CAR (18%), Kenya (19%), Tanzania (24%) and Uganda (10%) (Allegranzi, 2014).

CS falls in the category of major abdominal surgeries. It is often done under stressful conditions as it is indicated in the setting of hemorrhage, fetal distress, hypertensive disease, and cephalo-pelvic disproportion, and in LMICs, is often performed by underqualified, poorly trained personnel with little surgical experience. As such, it is not surprising that despite it being performed in generally high-risk patients who have an increased baseline risk of adverse outcomes, CS can exacerbate those outcomes even further (Harrison & Goldenberg, 2016). Among the adverse outcomes are excessive blood loss, injury to pelvic viscera, increased risks for thrombo-embolic events, post-surgical site infection and even sepsis.

Despite the employment of standard aseptic technique during caesarean delivery, post-partum infection remains a significant cause of maternal morbidity and mortality. Infection is estimated to be the second highest cause of maternal death in the world (Say et al., 2014)(WHO, 2015)(WHO, UNICEF, UNFPA, World_Bank_Group, & UNPD, 2015).

Infection of the surgical site is dependent on interaction between various risk factors. These can be divided into; patient factors and surgery factors (preoperative, intraoperative and postoperative conditions) (citation). Patient factors may include underlying medical conditions such as diabetes mellitus, sickle cell anaemia, obesity, prolonged corticosteroid use, immunosuppressed state etc. Other patient-associated factors include patient's socio-economic demographic factors (citations). The preoperative conditions which could predispose to post caesarean wound infection include prolonged rupture of membranes, multiple vaginal examinations during labour, amnionitis, previous meconium passage and internal foetal monitoring during labour, prolonged preoperative hospital stay, pubic hair removal (Alishaq et al., 2011)(Harrop et al., 2012).

The intra-operative factors include hazardous surgical techniques such as extensive dissection with de-vascularization of tissues, rigorous handling of tissues and inappropriate use of suture material (Alishaq et al., 2011). The duration of surgery especially when longer than one hour has been proposed as a risk factor for surgical site infection (Alishaq et al., 2011). Postoperative care of the incision site before and after discharge from the hospital may also contribute to post caesarean wound infection (Alishaq et al., 2011).

Due to the interplay of so many factors at various times and stages in CS patients, knowledge on the risk factors is important so as to put preventive measures where possible. The aim of the study was to determine the incidence, risk factors and common outcomes of post-caesarean infections at KGH.

1.1.Problem Statement

Surgical site infections (SSIs) are potential complications associated with any type of surgical procedure. Although SSIs are among the most preventable HAIs, they still represent a significant burden in terms of patient morbidity and mortality and additional costs to health systems and service payers worldwide (WHO, 2016). Post-caesarean SSI is an important Health problem. It is a common cause of maternal mortality, second only to birth related haemorrhage (Say et al., 2014). Millennium Development Goal 5A (MDG_{5A}) aimed to reduce maternal death by ¾ by 2015, a goal that was later incorporated into the Sustainable Development Goal 3.1 ($SDG_{3.1.}$) (United Nations,

2015). The rates of SSIs has been increasing each year both globally and LMICs, more so in sub-Saharan countries (Allegranzi, 2014). For the targets envisioned in the MDGs and SDGs to be realized, interventions need to be made so as to curb the increasing incidence of post-caesarean SSI. No such study has been conducted at Kiryandongo General Hospital and thus data on this is scanty prompting the researcher to propose such a study as to contribute in bridging the information gap that existed on the subject matter.

1.2.Study Objectives

1.2.1. Broad Objective

To assess the prevalence, risk factors & outcomes of post-caesarean surgical site infections at Kiryandongo General Hospital.

1.3.2. Specific Objectives

1. To determine the prevalence of post-caesarean surgical site infection at Kiryandongo General Hospital.
2. To identify the various risk factors associated with post-caesarean surgical site infection at Kiryandongo General Hospital.
3. To assess the various outcomes of post-caesarean SSIs at Kiryandongo General Hospital.

1.3.Research Questions

1. What is the prevalence of post-caesarean surgical site infection at Kiryandongo General Hospital?
2. What are the various risk factors towards post-caesarean surgical site infection at Kiryandongo General Hospital?
3. What are the various outcomes of post-caesarean SSIs at Kiryandongo General Hospital?

1.4.Significance of the Study

This study aims to provide much needed data on the incidence of post-caesarean SSI, the second most cause of maternal mortality world-wide. This information is aimed to influence decision making and policies at various concerned levels. First and foremost, to the hospital administration, the information aims to provide a snapshot of the state of affairs as far as incidence of post-caesarian SSIs are concerned, the underlying risk factors so as to inform on the steps needed to act appropriately. To the government policymakers and ministry of health, this information will add to their much needed statistics for surveillance and monitoring plus planning. To the global relevant bodies, the information will have a similar usefulness as to that of the ministry of health

(MOH). Lastly, the research will contribute to the information pool from which other researchers can draw from while conducting similar or related studies either within or without the same study population and area.

1.5.Study Scope

1.6.1. Geographical Scope

The study was conducted at Kiryandongo General Hospital. The hospital is on the Kampala–Gulu highway, in Kikube Parish, Kiryandongo sub-county, Kibanda County, in Kiryandongo District, about 50 Kilometres (31 mi), north-east of Masindi General Hospital. This is approximately 211 Kilometres (131 mi) north of the Mulago National Referral Hospital, the largest hospital in the country. The coordinates of the hospital are 01°52'46.0"N, 32°03'43.0"E (Latitude:1.879439; Longitude:32.061950)

1.6.2. Content Scope

The study concerned incidence, risk factors and common outcomes of post-caesarean surgical site infections. The risk factors specifically included host-related factors e.g. socio-economic factors, pregnancy-related factors and nature of caesarean section (elective versus emergent). Procedure-related factors such as duration of surgery, pre- and intra-operative factors e.g. antibiotic prophylaxis, number of VEs, prolonged trial of labour prior to surgery, need for blood transfusion, epidural use and use of internal fetal monitoring were outside the scope of this study.

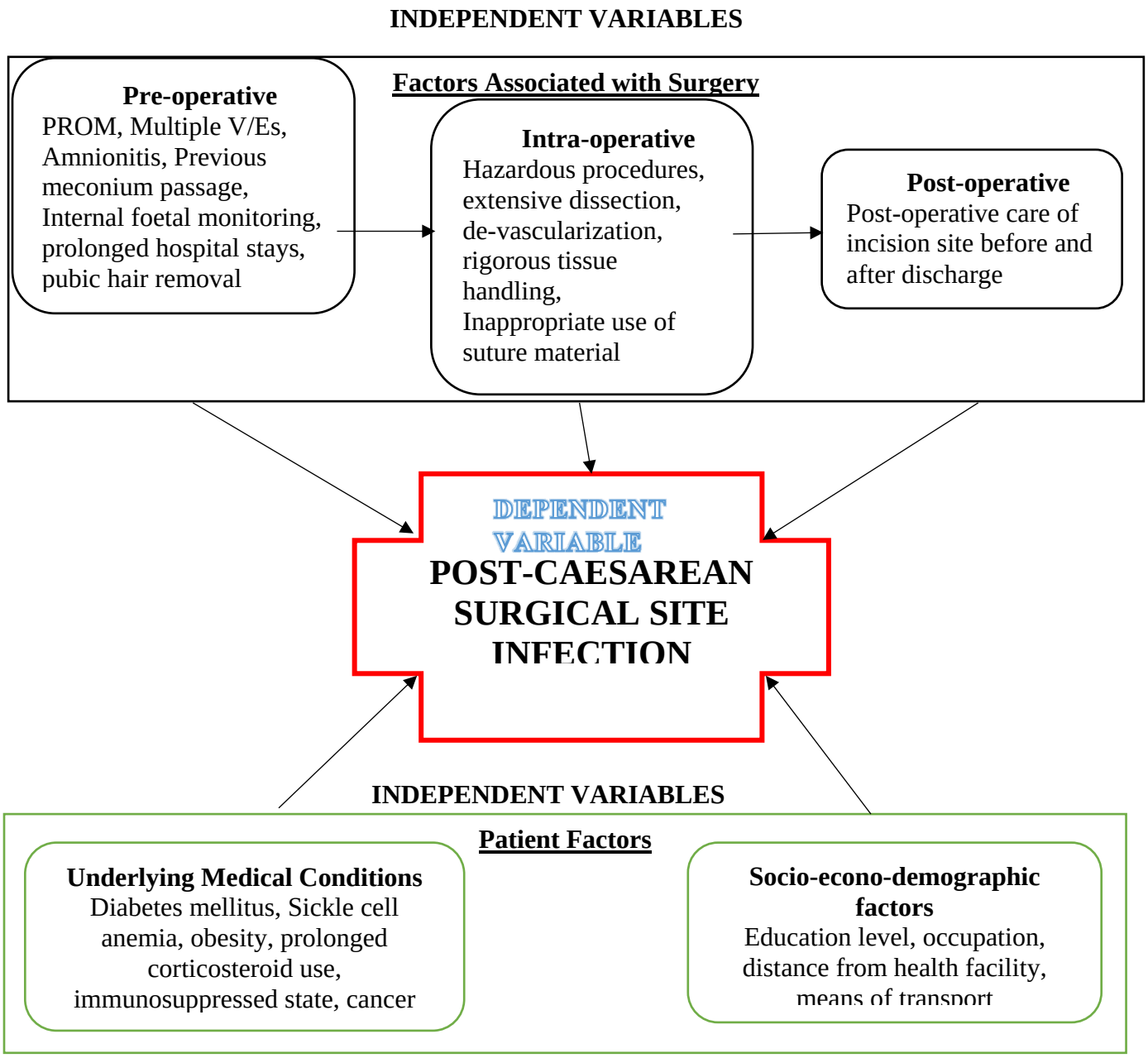
1.6.3. Time Scope

The data collection for the study ran from the month of January through June, in the year 2018.

1.7. Conceptual Framework

The dependent variable, post-caesarean surgical site infection, is influenced either through interplay or directly by patient factors and surgery associated factors (independent or modifiable factors). Patient factors further include underlying conditions such as immunological state of the patient and comorbidities as well as socio-economic demographic factors such as distance from a health facility, level of income etc.

Figure 1: Conceptual Framework on risk factors for Post-Caesarean Surgical Site Infections; Researcher's view



CHAPTER TWO: LITERATURE REVIEW

2.0. Introduction

This chapter deals with the literature reviewed on the incidence, risk factors and common outcomes of post-caesarean surgical site infection.

2.1. Incidence of Post-Caesarean Surgical Site Infection

The rate of PCS-SSI ranges from 3% to 15% worldwide with an associated maternal mortality rate of up to 3% (Sivan Zuarez-Easton, Noah Zafran, Gali Garmi, 2017).

In resource-poor countries wound infection rates following childbirth can be as high as 20%. These infections usually begin at the site of an episiotomy, perineal laceration or caesarean section (The Global Health Network, 2014).

A retrospective study conducted in Switzerland in 2011 got the following results; during the two-year study period, 1806 patients underwent CS, of those 82 patients met the case definition for SSI with onset of infection within 30 days after CS. Over the study period, of those 82, 74 (90.2%) were classified as superficial incision, 6 (7.3%) had deep incision SSI, and 2 (2.4%) had organ space infection. Over the study period, 82 infected CS cases, 65 were underwent emergency CS, giving an overall SSI incidence (79.2%) (Alishaq et al., 2011).

In the United States of America, SSIs complicate a significant number of patients who undergo Caesarean delivery – 2-7% will experience sound infections and 2-16% will develop endometritis (Kawakita, 2017).

In India, the incidence of postoperative infection in various hospitals ranges from 10 to 25%. Study findings elsewhere in the same country were an incidence of 9% (Dahiya, Gupta, Pundir, & Chawla, 2016), and in Kerala South India it was 4.1% (Vijayan, Mohandas, & Nath, 2016).

In Chris Hani Baragwanath Academic Hospital, Johannesburg, out of 272 women who were followed up after CS, four (1.5%) were readmitted with puerperal sepsis, and 30 (11.0%) had possible mild wound infection (Johnson, 2012).

A case-control study on the risk factors for sepsis following caesarean section was conducted in Ulaanbaatar and 47.4% (361/ 761) of cases were found to have been complicated by wound infection (Dagshinjav, Tudevdorj, Davaasuren, & Gurjav, 2017).

In a retrospective study conducted in Nizwa Hospital in Oman, 211 cases of PCS-SSI. This gave an incidence rate of 2.66% at the time (Dhar, Al-busaidi, et al., 2014).

In yet another study in Nnewi Nigeria, the incidence of post caesarean wound infection was found to be 12.5%. Among emergency caesarean patients it was 20.0% whereas among those who received elective surgery it was 5% (Onyegbule et al., 2015a), while in Kano, Nigeria CS was complicated by SSI at an incidence rate of 9.1% (Jido & Garba, 2012).

These results were not far from those from Mnazi Mmoja Hospital in Zanzibar. Out of the 200 women who were included in the study and followed up for 10 days after c/s 30 of them developed post caesarean section wound sepsis making cumulative incidence of 15% (95% ci:10.0%-20.0%) (Dr. Omar Issa Mgongo, 2010), while in Bugando Medical Center in Mwanza the overall cumulative incidence of SSI was 10.9% with an incidence rate of 37.5 per 10,000 people/day (95% CI, 26.8-52.4) (Mpogoro, Mshana, Mirambo, Kidenya, & Gumodoka, 2014).

In a prospective hospital based study conducted in 2014 at Mbarara Regional Referral Hospital, Southwestern Uganda, the overall SSI incidence was 16.4%: 5.9% superficial and 47.1% deep and organ space SSIs each (Lubega, Joel, & Lucy, 2017).

2.2. Risk Factors for Post-Caesarean Surgical Site Infections

The risk factors for developing post-caesarean surgical site infection are numerous. Studies have cited, prolonged rupture of membranes, compromised skin integrity, poor suturing or incision repair techniques, insufficiently achieved hemostasis during repairs among others. The risk factors documented include maternal factors (e.g. tobacco use; limited prenatal care; obesity; corticosteroid use; nulliparity; twin gestations; and previous caesarean delivery), intrapartum and operative factors (such as chorioamnionitis; premature rupture of membranes; prolonged rupture of membranes; prolonged labor, particularly prolonged second stage; large incision length; subcutaneous tissue thickness > 3 cm; subcutaneous hematoma; lack of antibiotic prophylaxis; emergency delivery; and excessive blood loss), and obstetrical care (Kawakita, 2017).

In a study that tried to assess the significance of 10 risk factors in SSIs, only emergency CS and obesity were found to be of high significance. Diabetes, PROM, prolonged operative time, length of stay pre/post-surgery, lack of implementing SSI bundle such as Chlorohexidine skin preparation and hair removal had minimal significance (Alishaq et al., 2011).

Priyanka Dahiya and colleagues in a study they conducted in an Indian referral hospital implicated high incidence of SSI to low socio-economic class, un-booked status, irregular visits and with leaking per vaginum of more than 24 hours, duration of surgery more than one hour, prolonged labor, pre-operative antibiotic prophylaxis (before two hours of surgery)(Dahiya et al., 2016) while

another study showed that obesity, prolonged stay in hospital before operation and hypertension in pregnancy had more significance (Vijayan et al., 2016).

In the study conducted in Oman, it was found that people who had diabetes or premature rupture of membranes (PROM) had higher risks of developing SSI post-caesarean (15.16% and 17.53%) respectively (Dhar, Al-busaidi, et al., 2014).

In Hani Hani Baragwanath Hospital in Johannesburg, socio-economic status, ANC attendance, anaemia, sero-status, pre-term delivery, type of CS done (whether elective or emergency) or type of incision made were found to have no significance in post-caesarean SSI development (Johnson, 2012).

In case-control study in Ulaanbaatar, emergency CS (95% CI = 2.8; P = 0.35); 2) multiple pregnancy (95% CI = 5.8; P = 0.2); 3) PROM (95% CI = 6.4; P = 0.26) and; 4) failed induction (95% CI = 4.6; P = 0.5) were associated with increased risks of SSIs (Dagshinjav et al., 2017).

A study from Kano, Nigeria cited labour duration before CS, Prolonged PROM, postoperative anemia, surgeon's skill, duration of operation, many VEs emergency CS, booking status, internal fetal monitoring and maternal age as factors that increased chances of SSI occurrence (Jido & Garba, 2012).

Dr. Omar Issa Mgongo in his Thesis on post-caesarean wound sepsis in Mnazi mmoja documented that prolonged hospital stay had a significant correlation with wound sepsis. On the other hand HIV sero-status and type of Caesarean section had no significance (Dr. Omar Issa Mgongo, 2010).

2.3. Outcomes of Post-Caesarean Surgical Site Infection

Post-caesarean infectious complications result in significant maternal morbidity and mortality as well as increased readmissions and increased health care cost worldwide (Pierson, Scott, Briscoe, & Haas, 2018). Some of the complications include wound dehiscence, bacteremia, osteomyelitis, endocarditis, necrotizing fasciitis (Gur et al., 2015).

CHAPTER THREE: METHODOLOGY

3.0.Introduction

This chapter describes the study area focusing on population structure and many other aspects including Study design, sample size determination, sampling method, selection criteria, data Collection, data analysis, data presentation, data quality control, study limitation and Ethical consideration.

3.1. Study Design

Descriptive cross sectional study was used applying both qualitative and quantitative components.

3.2. Study Population

All women who delivered through caesarean section.

3.2.1. Inclusion Criteria

Women who delivered via caesarean section and who consented to participate in the study.

3.2.2. Exclusion Criteria

Women who delivered via caesarean section but who refused to consent.

3.3. Sample Size Determination

The sample size was determined using Fishers et al., 2006 formula. The formula is used to estimate the smallest possible categorical sample size. i.e. $N=Z^2PQ/D^2$:

Where N is the desired sample size

Z is the standard normal deviation taken as 1.96 at a confidence interval of 95%.

P is the proportion of the target population estimated to develop post-caesarean surgical site infection = 16.4% (estimated from Mbarara study by Lubega et al, 2017)

D is the degree of accuracy= 0.05.

Q= (1-P) which is the population without the desired characteristics.

Therefore, $N= 1.96^2 \text{ X } 0.164 (1-0.164) / (0.05)^2= 211$

211 was the sample sized used

3.4. Sampling Technique

Consecutive sampling technique was employed in carrying out the study. All the participants were recruited as they met the inclusive criteria until the required sample size was obtained.

3.5. Data Collection Method

The researcher utilized chiefly patients' records and surgeon's operation notes.

3.6. Data Collection Tools and Procedure

Patient's details were obtained from the patient's file. Surgical details specifically from the surgeon's report.

3.7. Quality Control

Patient demographic data and bio data was counterchecked by asking the patient. Researcher ensured that they followed-up the patients throughout their management.

3.8. Data Analysis

Each questionnaire was checked for completeness, missed values and unlikely responses and then manually cleaned up on such indications. Data was exported to SPSS version 17. Using double entry, the data was cross-checked for consistency and accuracy. Responses and observations given points and tallied then recorded to obtain means then presented in statements, graphs, charts and tables.

3.9. Ethical Considerations

Clearance was obtained from Kampala International University-Western Campus faculty of clinical medicine & dentistry through IREC. Informed consent from the respondents was sought both verbally and in writing. Participants were assured of confidentiality and use of the information obtained only for the purpose of the research. Participation was fully out of the respondents' choice with the right to pull out at any time, whenever they no longer felt comfortable to continue. Their participation, or its lack thereof, did not in any way influence any condition-related services they were already getting or were bound to get at any time from the Hospital or staff involved.

CHAPTER FOUR: STUDY FINDINGS

4.0.Introduction

This chapter presents the study results as per objective and in the form of statements, tables, graphs and charts.

4.1. Prevalence of Post-Caesarean Surgical Site Infection

A total of 320 caesarean sections were conducted during the six months' period of the study. Out of this number, 40 cases of SSIs were reported giving a post-CS SSI prevalence of 12.5%.

4.2. Factors Associated with Post-Cs SSIs

Among the 40 cases of post-caesarean section surgical site infections reported, a univariate analysis of the various risk factors was done so as to determine the existence of any statistical significance of each factor. The factors were categorized into three: maternal/host factors, pregnancy-associated factors and procedure-related factors.

4.2.1. Host Related Factors Associated with Post-Cs Ssis (N=40)

The host-related factors included residence (rural v/s urban), maternal age, whether obese or not, presence of comorbid conditions such as DM, HIV/AIDS, hypertension, tobacco use, corticosteroid use and Chorioamnionitis. The analysis was presented in table 1 below.

Variable	**Frequency (N)**	**Percentage (%)**
Maternal Age		
Low (less than 16 years) Advanced (35 years & above)	12 9	30 22.5
BMI Class		
Obese / morbidly obese	8	20
Tobacco Use		
Positive	6	15
Residence		
Rural Urban	37 3	92.5 7.5
Comorbidity		

Chorioamnionitis	24	60
Corticosteroid use	0	0
DM, pre-diabetes	22	55
Hypertension	0	0
HIV/AIDS	9	22.5

Table 1: Host-related risk factors for post-CS SSIs (N=40)

It is important to know that univariate analysis was done for the various factors, and that in some mothers, there were more than one of the risk factors at play. It is the occurrence of a certain risk factor that was important in this case rather than the magnitude per-se.

It follows, from table 1 above therefore, that maternal age, high BMI, residence, tobacco use and presence of a comorbid condition were found to be of some statistical significance as risk factors for post-CS SSIs. It is apparent, however, that those found to have a strong statistical significance were rural residence (92.5%), Chorioamnionitis (60%) and DM, pre-diabetes (55%).

4.2.2. Pregnancy-Related Factors Associated with Post-CS SSIs (N=40)

The pregnancy-related factors assessed included parity, gestation type (singleton versus multiple or twin) and prenatal (ANC) care. Previous literature has Nulliparity, twin gestation, and unsatisfactory pre-natal care as risks.

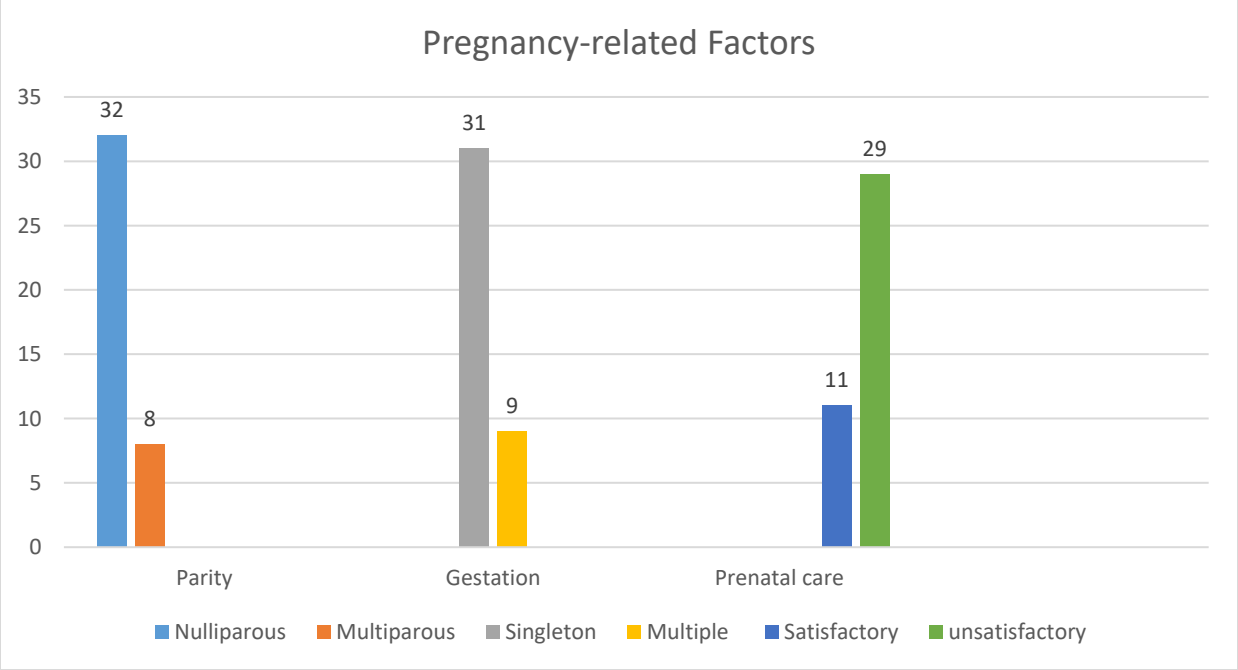


Figure 2: Pregnancy-related risk factors to Post-CS SSIs (N=40)

The pregnancy-related factors found significant were Nulliparity (32, 80%) and unsatisfactory pre-natal care (29, 72.5%). Multiple (twin) gestation did not stand significant in this study as reported in earlier studies. This is shown clearly in Figure 2 above.

4.2.3. Nature of Caesarean Section as a Factor in Post-CS SSIs (N=40)

The caesarean sections were categorized into two; elective versus emergent. The prevalence of post-CS surgical site infections was then compared between the two categories. This is presented in Figure 3 below.

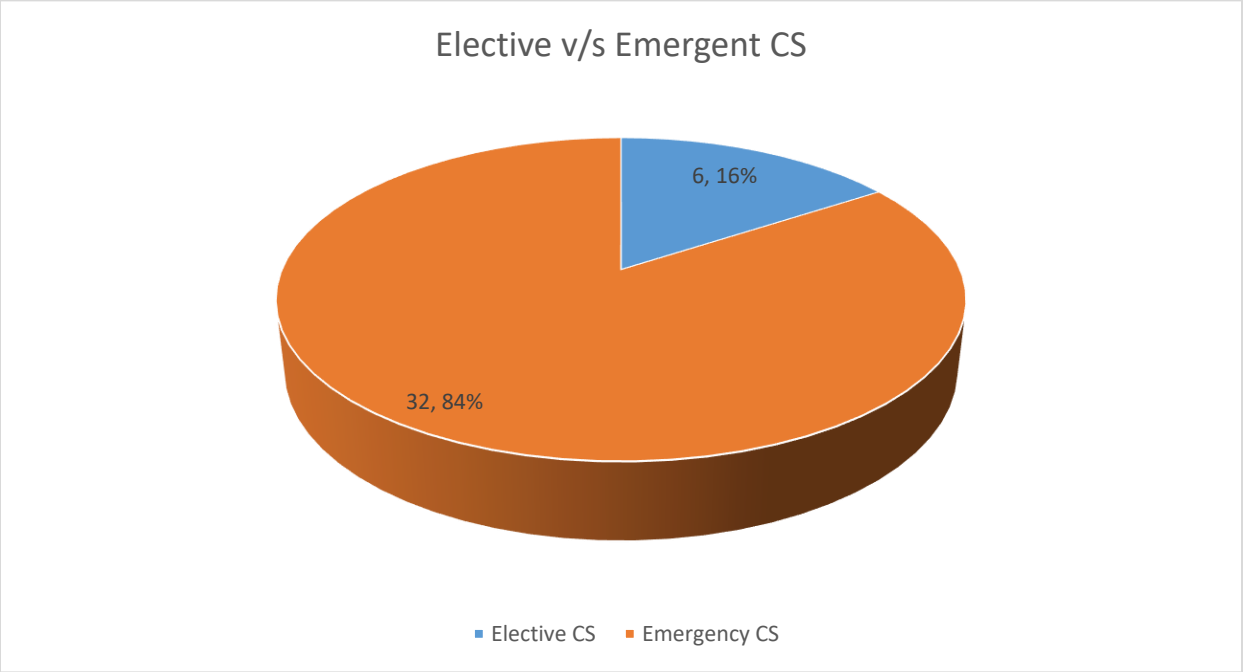


Figure 3: Nature of Caesarean Section and Prevalence of SSIs (N=40)

Most cases of surgical site infections followed emergent caesarean sections. 84% of the post-CS SSIs occurred among those women who had had an emergency Caesar as opposed to only 16% that followed elective CS.

4.3. Outcomes/Complications Following Post-CS SSIs (N=40)

In all the 40 cases some sort of complication was observed which prolonged the duration of post-operative stay and cost of treatment. All were, however, managed and discharged. The complications that were reported were bacteremia/sepsis and wound dehiscence as shown in figure 4 below.

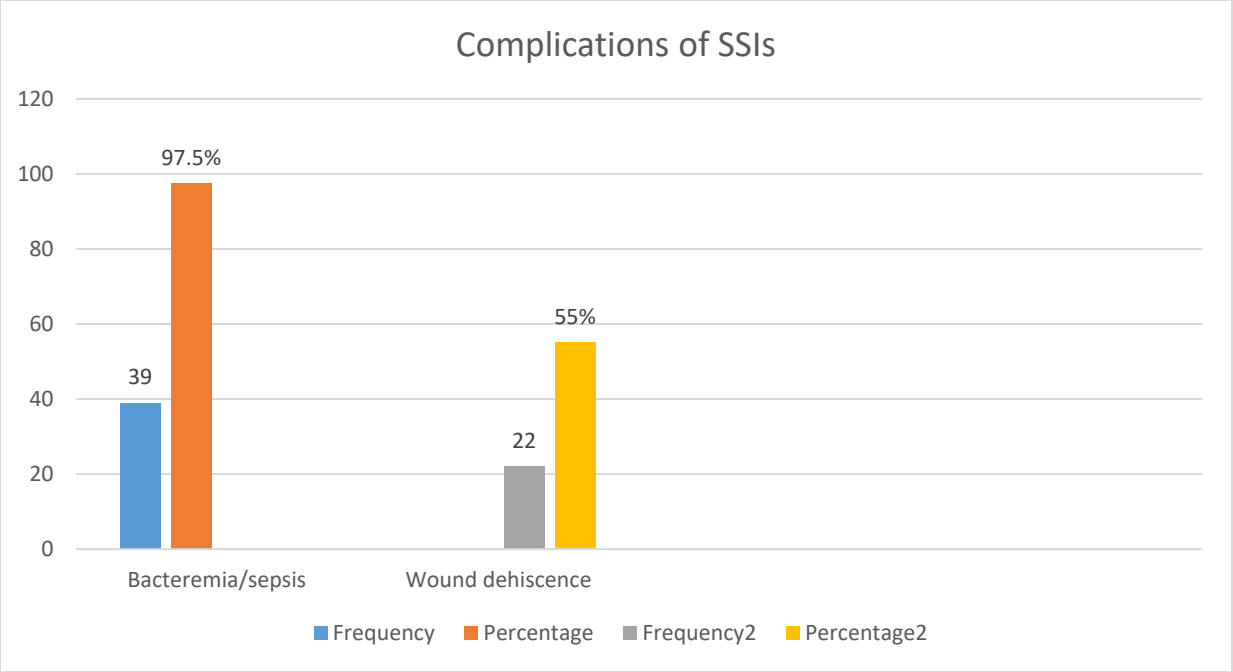


Figure 4: Complications of SSIs (N=40)

97.5% of the complications reported were bacteremia/sepsis while 55% had wound dehiscence.

CHAPTER FIVE: DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.0.Introduction

This chapter discusses the study findings as per objective, concludes on the findings and offers some recommendations to the various stakeholders based on the findings.

5.1. Discussions

5.1.1. Prevalence Of Post-CS Surgical Site Infections

The prevalence of post-CS SSIs was 12.5%. This falls within the global estimated range of 3 – 15% reported by (Zuarez-Easton et al., 2017). That range probably shows the difference between the resource-rich countries (prevalence of 3%) and the resource-poor countries (prevalence of 15%). The value of 12.5% obtained in this particular study is tending towards the resource-poor countries' value.

The argument of high prevalence of SSIs in resource-poor countries as opposed to resource-rich countries is supported by the low values found in countries such as Switzerland (Alishaq et al., 2011), Oman (Dhar, Al-Busaidi, et al., 2014), and The USA (Kawakita, 2017). Whereas in the resource-poor countries such as India (Dahiya et al., 2016), Johannesburg in South Africa (Dagshinjav et al., 2017), Nigeria (Onyegbule et al., 2015) and Mnazi Moja in Zanzibar (Mpogoro et al., 2014).

Of more importance, though, is the fact that the values obtained in this particular study was lower than the 16.4% obtained in Mbarara Regional Referral Hospital by (Lubega, Joel, & Justina Lucy, 2017). This value difference could be attributable to a larger population size in the Mbarara study.

5.1.2. Factors associated with Post-CS SSIs

The factors predisposing to post-caesarean section surgical site infections were assessed after being grouped into three; host-related factors, pregnancy-related factors and nature of Caesarean done.

The host-related actors found to be of strong statistical significance were rural residence, Chorioamnionitis, and DM/pre-diabetes. Others were extremes of maternal age (more low maternal age than advanced maternal age), obesity, tobacco use, and other comorbid conditions in particular HIV/AIDS infection. Corticosteroid use and hypertensive disorders were not found to be statistical significance.

Among the pregnancy-related factors, nulliparity and unsatisfactory prenatal care were found significant. On the other hand, singleton (rather than twin) gestation was found to be significant contrary to reports from other studies.

Emergency Caesarean sections (84%) were found to be significantly associated with post-CS SSIs as opposed to elective (16%).

These findings mirror results from several studies conducted prior; (Kawakita, 2017), (Alishaq et al., 2011), (Dahiya et al., 2016), (Vijayan et al., 2016), (Dhar, Al-Busaidi, et al., 2014), and (Chakwana & Nkiwane, 2014) among others, are some of the studies whose findings this study supports.

What stands out, though, apart from all the other factors studied that this study tends to agree with in (Jido & Garba, 2012) study, the issue of multiple gestation as a predisposing factor to post-CS SSIs was not supported. On the contrary, singleton pregnancies were found to make large contributions of SSIs. This could be attributable to a number of things among them being differences in population size, or more importantly, the interplay of other risk factors such as rural residence, Chorioamnionitis, and DM/pre-diabetes. As seen earlier, quite a number of the cases had more than one risk factor.

5.1.3. Outcomes/Complications of Post-CS SSIs

The outcome common to all the cases was prolongation of duration of post-operative stay accompanied by increased costs of care. The complications found were bacteremia/sepsis and wound dehiscence. Save for the prolongation of the post-op stay, all were discharged without sequelae.

5.2. Conclusions

The prevalence of post-caesarean section surgical site infection in Kiryandongo General Hospital was high at 12.5%, a value high enough to warrant for urgent remedial intervention.

The risk factors for post-caesarean surgical site infections in Kiryandongo were rural residence, Chorioamnionitis, DM/pre-diabetes, extremes of maternal age, obesity, tobacco use, HIV/AIDS coinfection, nulliparity, unsatisfactory prenatal care and emergency caesarean sections. Corticosteroid use and hypertensive disorders were not found to be significant whereas singleton (rather than twin) gestation was found to be significant.

Prolonged post-op hospital stay with consequent rise in cost of care were the general outcome necessitated by complications that mainly included bacteremia/sepsis and wound dehiscence.

5.3. Recommendations

To the women of Kiryandongo

Early and full attendance of ANC as good prenatal care is a key preventive measure against SSIs. Proper nutrition and weight management to maintain normal weight since obesity is a key factor associated with SSIs. Have their blood sugars monitored and properly controlled and also avoid smoking while pregnant. Lastly, to protect themselves against HIV/AIDS that also increases chances of SSIs.

To the staff of Kiryandongo District Hospital

Health education on HIV/AIDS prevention to be offered regularly to the clients of the facility especially women attending family planning and ANC. More awareness creation on SSIs and more specifically education on the modifiable risk factors such as obesity and cigarette smoking. Lastly, but most definitely not the least, health outreaches and camps to reach those of rural areas remote from the health facility and provide services to them to prevent cases of Chorioamnionitis brought about by for example prolonged rupture of membranes.

To fellow researchers

This study dwelt mainly on the host and pregnancy-related factors associated with SSIs and did not dwell much on healthcare-related factors or provider-related factors which also may contribute to SSIs.

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APPENDICES

APPENDIX ONE: CONSENT FORM

CONSENT FORM

STUDY TITLE: POST-CAESAREAN SURGICAL SITE INFECTION: AN INCIDENCE AND ASSOCIATED DETERMINANTS STUDY AT KIRYANDONGO GENERAL HOSPITAL.

I have read and understood the research topic above on the planned study and the explanations given to me. I understand what I have been requested to do in respect to this study. I have asked questions and gotten clarifications about the study and I am satisfied. I have, after due consideration, willingly consented to take part in this study as explained.

Participant's signature …… Date ……...

Investigators name …… Signature ……

Investigator's Contacts: +256751405562

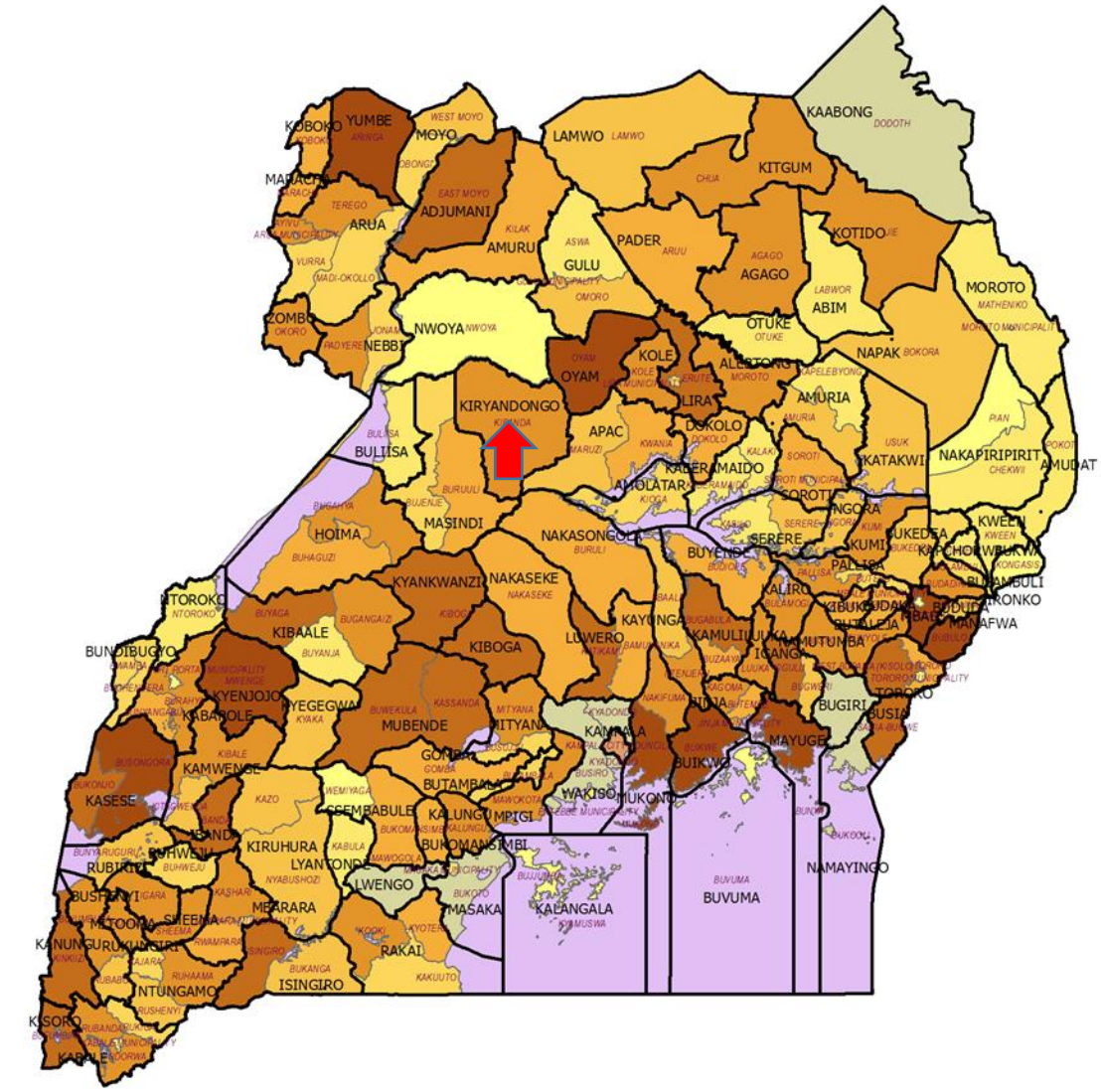
Date ……

APPENDIX TWO: CHECKLIST

MATRERNAL AGE	✗✓	**SCORE (1) for every risk factor**
Low maternal age (< 16 years) Advanced maternal age (35 yrs. and above)		
PARITY		
Nulliparous Multipara		
BMI SCORE		
Non-obese Obese/Morbidly obese		
GESTATION TYPE		
Singleton Multiple		
ANC/PRE-NATAL CARE		
Satisfactory Unsatisfactory		
COMORBIDITIES		
Diabetes Hypertension HIV/AIDS Chorioamnionities Corticosteroid use		
HISTORY OF TOBACCO		
Positive Negative		
HISTORY OF PAST CS		
Positive Negative		
NATURE OF CS		
Elective		

Emergency		
RESIDENCE		
Rural Urban		
OUTCOMES/COMPLICATIONS OF SSIs		
Full recovery without sequelae Complications (wound dehiscence, ruptured abdomen, bacteremia, osteomyelitis, endocarditis, necrotizing fasciitis) Prolonged post-operative stay Increased cost of healthcare		
TOTAL		

APPENDIX THREE: MAP OF UGANDA SHOWING THE LOCATION OF KIRYANDONGO DISTRICT (RED ARROW & RED INSET)



APPENDIX FOUR: APPROVAL LETTER

KAMPALA INTERNATIONAL UNIVERSITY – WESTERN CAMPUS

EXPLORING THE HEIGHTS

P O BOX 71, ISHAKA UGANDA
Tel: +256 200923534
www.kiu.ac.ug

OFFICE OF THE DEAN
FACULTY OF CLINICAL MEDICINE & DENTISTRY

29/11/2018

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: FRED ABDON NAIBEI (BMS/0029/141/DF)

The above named person is a fifth year student at Kampala International University pursuing a Bachelor of Medicine, Bachelor of Surgery (MBChB) Programme.

He wishes to conduct his student research in your hospital.

Topic: Post caesarian site infection on incidence study at Kiryandongo general hospital

Supervisor: Dr. Mulwana Johnie

Any assistance given will be appreciated.

Accord him the necessary assistance

Yours Sincerely,

29 NOV 2018

Dr. Akib Surat
Assoc Dean FCM & D

KIU TEACHING HOSPITAL ASSOCIATE DEAN FCMED

31/12/2018

MEDICAL SUPERINTENDENT
Kiryandongo Hospital
31 DEC 2018
P. O. Box 128, Kigumba

"Exploring the Heights"
Assoc. Prof Ssebuufu Robinson, Dean (FCM & D) 0772 507248 email: rssebuufu@gmail.com
Dr. Akib Surat Associate Dean FCM & D) email: doctorakib@yahoo.com