

**POST CAESEREAN SECTION WOUND SEPSIS AT MNAZI MMOJA
HOSPITAL (ZANZIBAR)**

RESEARCH THESIS

IN

OBSTETRICS

SUBMITTED BY

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| Table of contents | page |
|-------------------------------------------------------------------------------|-------------|
| Contents----- | 1 |
| Dedication----- | 2 |
| Acknowledgement----- | 3 |
| Declaration ----- | 4 |
| Certification ----- | 5 |
| Abbreviations ----- | 4 |
| Research thesis:----- | 6-33 |
| Post caesarean section wound sepsis at Mnazi Mmoja Hospital (Zanzibar) | |
| Appendix I – Data collection questionnaire----- | 34-36 |
| Appendix II – Post Operative Follow-up----- | 37 |
| Appendix III – Information and consent form----- | 38-42 |
| Appendix IV – Research approval----- | 43 |

Certificate of Authenticity

This is to certify that this dissertation is the original work of Dr. Omar Issa Mgongo, MMED student, Registration number H58/7862/06 in the obstetrics and Gynaecology department, University of Nairobi (2006-2010). This research was carried out in the department of Obstetrics and Gynaecology, School of Medicine, College of health Sciences.

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DEDICATION

This book is dedicated to my lovely mother Harusi Omar and father Issa Mgongo and my late aunt Dua.

ACKNOWLEDGEMENT

I humbly thank God the Almighty, for enabling me to reach this far and to complete this book. His blessings were abundant.

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Nothing would have been possible without the cooperation of all the patients that went through my hands during the training, and for that I am most grateful.

I thank my parents and siblings for providing their support in one way or another

.

DECLARATION

I declare that the long commentary in this book is my original work and have not been presented for a degree in any other university.

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CERTIFICATION OF THE SUPERVISORS

This is to certify that **Dr. Omar Issa Mgongo** researched upon the long commentary presented in this book under our guidance and supervision and that this book is submitted with our approval.

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ABBREVIATIONS

C/S - CESAREAN SECTION

HB - HAEMOGLOBIN

LSCS - LOWER SEGMENT CESAREAN SECTION

KNH - KENYATTA NATIONAL HOSPITAL

SUMI - SUBUMBILICAL MIDLINE INCISIONAL

VBACS - VAGINAL BIRTH AFTER CESAREAN SECTION

ARM - ARTIFICIAL RUPTURE OF MEMBRANE

LUSC - LOWER UTERINE SEGMENT CESAREAN SECTION

HIV - HUMAN IMMUNE DEFICIENCY VIRUS

CDC - CENTER FOR DISEASE CONTROL

AZT-ZIIDOVUDINE

PMTCT-PREVENTION OF MOTHER TO CHILD TRANSMISSION

ARVs-ANTIRETROVIRUS DRUGS

MMR-MARTENAL MORTALITY RATIO

WHO - WORLD HEALTH ORAGNIZATION

TITLE

**POST CAESEREAN SECTION WOUND SEPSIS AT MNAZI MMOJA
HOSPITAL (ZANZIBAR)**

ABSTRACT

Background: Sepsis after caesarean section is still a major problem in hospital setup. A big percentage of this arise from preventable causes which if addressed would significantly reduce rate of wound sepsis.

Objective: To determine incidence of post caesarean section wound sepsis.

Design: Prospective descriptive study.

Setting: Mnazi Mmoja Hospital – Zanzibar.

Participants: All women who had caesarean section done in the hospital over a period of 2 months irrespective of indication.

Outcome measures:

- 1.** Incidence of wound sepsis in women undergoing c/s
- 2.** Isolated pathogens causing wound sepsis.
- 3.** HIV- serostatus in women with wound sepsis.
- 4.** Hospital stays in relation to wound sepsis.

Results: Total number of deliveries was collected; two hundred patients who underwent caesarian section were evaluated. The caesarean section rate was 13.7%. Out of the 200 women who were included in the study 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%).Only 21 of the bacterial culture had any form of growth. Staphylococcus aureus and E.coli had the highest proportion of growth 48% and 14% respectively. Wound sepsis was associated with prolonged hospital stay ($p= 0.001$).HIV serostatus was not found to have any influence on wound sepsis. The relationship between wound sepsis and type of caesarean section was not statistically significant ($p=0.530$)

1. INTRODUCTION AND LITERATURE REVIEW

Cesarean section is one of the commonest hospital based surgical procedure in obstetric mainly done to facilitate delivery in case where vaginal delivery is either not feasible or poses undue risk to mother, baby or both. (1,2) The procedure has gone long way in reducing both maternal and fetal morbidity and mortality associated with child birth, though it tends to be expensive due to theatre charges and long hospital stay

Cesarean delivery is defined as the birth of a fetus through incisions in the abdominal wall (laparotomy) and the uterine wall (hysterotomy). This definition does not include removal of the fetus from the abdominal cavity in the case of rupture of the uterus or in the case of an abdominal pregnancy. In some cases, and most often because of emergent complications such as intractable hemorrhage, abdominal hysterectomy is indicated following delivery. When performed at the time of cesarean delivery, the operation is termed *cesarean hysterectomy*. If done within a short time after vaginal delivery, it is termed *postpartum hysterectomy*. The appalling maternal mortality rate of cesarean delivery continued until the beginning of the 20th century. In Great Britain and Ireland, the maternal death rate from the operation in 1865 was 85 percent. In Paris, during the 90 years ending in 1876, not a single mother survived cesarean delivery.

The turning point in the evolution of cesarean operations came in 1882, when Max Sänger, then a 28-year-old assistant of Credé at Leipzig, introduced suturing of the uterine wall. The long neglect of so simple an expedient had not been from oversight, but stemmed from a deeply rooted belief that sutures in the uterus were superfluous as well as harmful by virtue of serving as the site for severe infection. In meeting these latter objections, Sänger, who had himself used sutures in only one case, documented their value not from the sophisticated medical centers of Europe but from frontier America. There, in outposts from Ohio to Louisiana, 17 cesarean deliveries had been reported in which silver wire sutures had been used, with the survival of eight mothers—an extraordinary record in those days. Thus, hemorrhage was the first and most serious problem to be solved.

There are several types of Caesarean section (CS).It include the following:

- The *classical Caesarean section* involves a midline longitudinal incision which allows a larger space to deliver the baby. However, it is rarely performed today as it is more prone to complications.
- The *lower uterine segment section* is the procedure most commonly used today; it involves a transverse cut just above the edge of the bladder and results in less blood loss and is easier to repair.
- An *emergency Caesarean section* is a Caesarean performed once labour has commenced.
- A *crash Caesarean section* is a Caesarean performed in an obstetric emergency, where complications of pregnancy onset suddenly during the process of labour, and swift action is required to prevent the deaths of mother, baby (babies) or both.
- A *Caesarean hysterectomy* consists of a Caesarean section followed by the removal of the uterus. This may be done in cases of intractable bleeding or when the placenta cannot be separated from the uterus.
- Traditionally other forms of Caesarean section have been used, such as extra peritoneal Caesarean section or Porro Caesarean section.
- a *repeat Caesarean section* is done when a patient had a previous Caesarean section. Typically it is performed through the old scar.

The differences between them lie primarily in the deep incision made on the uterus, apart from the type of laparotomy used to access the uterus.

The World Health Organization estimates the rate of Caesarean sections at between 10% and 15% of all births in developed countries. In 2004, the Caesarean rate was about 20% in the United Kingdom, while the Canadian rate was 22.5% in 2001-2002.[21]

In the United States the Caesarean rate has risen 46% since 1996,[22] reaching a level of 30.2% in 2005.[22] A 2008 report found that fully one-third of babies born in Massachusetts in 2006 were delivered by Caesarean section. In response, the state's Secretary of Health and Human Services, Dr. Judy Ann Bigby, announced the formation of a panel to investigate the reasons for the increase and the implications for public policy.[23]

Among developing countries, Brazil has one of the highest rates of caesarean sections in the world. In the public health network, the rate reaches 35%, while in private hospitals the rate approaches 80%.

Studies have shown that continuity of care with a known carer may significantly decrease the rate of Caesarean delivery[24] but that there is also research that appears to show that there is no significant difference in

caesarean rates when comparing midwife continuity care to conventional fragmented care.[25]

In a study done at Muhimbili national hospital in Tanzania in 2004 shows that Caesarean section rates increased from 15.8% in 1999 to 31.8% (38).

At KNH, a teaching and referral hospital handling mainly high risk cases, the rates had stabilized at about 20% over a period of 17yrs(1975-1992. This rate has almost doubled to 42%currently (20, 21).

Pumwani Maternity Hospital has shown a steady rise in cesarean rate from 4.3% in 1983 to 6.8 in 1990(22)The current data show that in 2008 in total deliveries 17752, 3527 were due to caesarean section i.e. at the rate of 19.868%

The Nairobi Hospital, had a relatively high rate of 28.2% for the period of 1995-1997 and an published study found a rate of 29% in the same institution(24, 25).Currently it is reported to have a rate of 46%(21).while at Mater Hospital, Wahome in 2000 reported a rate of 25.3%(26) as that of Aga Khan Hospital was noted by Wanyonyi and Seguera to have risen by 12.2% in 4yrs(25.9% in 2001 to 38.1% in 2004).

At Kericho District Hospital, Kudoyi reported a rate of 8.2% in 1992, while Oyire reported a rate of 13% at Nyeri Provincial General Hospital in 2007(27, 28).

Benefit of cesarean delivery on perinatal, maternal morbidity and mortality are well documented. Maternal morbidity and mortality following cesarean delivery vary greatly from series to series, but are consistently higher than vaginal delivery both in developed and developing countries(1, 35, 39 40). But this is attributable not only to the surgical procedure itself, but also to indications. Risk factors for cesarean related morbidity and mortality include un-booked status, emergency compared to elective procedure, use of general anesthesia, anemia, and dehydration, prolong labour and repeated vaginal examination. Most cesarean section are performed as emergency procedures with an elective rate of less than 4 %(23, 28, 30, 33).

Wound sepsis represents one of the most formidable threats to successful wound healing. It can present as a local bacteria colonization of the incision site with minimal systematic reaction or as a systematic inflammatory response syndrome. Sepsis after caesarean section is a major cause of morbidity especially in the developing countries. The rates of febrile morbidity following caesarean section reported range from 13-15%. Studies done locally at the Kenyatta National Hospital, Sinei (1981) found a febrile morbidity of 22% and 6.5% of wounds were infected. While Wanjohi (1989)

reported rate of wound infection to be 13.3% in the same hospital. Mohamed in his study reported wound sepsis rate of 37% in a hospital in Zimbabwe. Nielsen and associates reported wound infections of rates of 2.5% for elective caesarean section and 16.1% for emergency caesarean sections in USA. Meads reported 4.7% for elective and 24.2% for emergency caesarean sections respectively similar findings to those of meads were reported by Sweets.

Rupani (1991) reported a caesarean section rate of 7.1% at the Coast General Hospital of these 10% developed wound sepsis.

Kudoyi (1993) reported c/s rate of 8.22% at Kericho District Hospital of these 25% developed wound sepsis.

Kabare (2002) reported c/s rate of 7.8% at Kiambu District Hospital of these 19% developed wound sepsis.

Wound infection is interplay of many factors which may be related or in combination technical factors under the surgeon's control can significantly contribute to altered healing and wound problems. This includes tissue contusion, excessive or poorly chosen suture material, excessive tension and poorly opposed edges. In majority of cases, failure of a wound to heal is a consequence of failure of decision making and technique. Both patient and surgical staff pre-operative preparations are important in wound infection prevention. The duration of pre-operative hospital stay correlates with the risk of wound infection. Cruse and ford reported that clean wound infection rates in patients operated on, after more than 24 hours in the hospital were double those in patients operated on, the day of admission. The risk is likely related to hospital acquired alteration in bacteria flora leading to more pathogenic strains.

Proper hand washing prior to procedures and pre-operatively is important in decreasing the risk of infection despite use of gloves. Glove puncture occurs in as many as 60% of all surgical procedures. This risk is increased in direct proportion to needle handling. It's also influenced by emergency procedure, longer operative time, inadequate muscle relaxation, and number of sutures and wound depth. Thus the surgical team bacteria flora is exposed to the incision and the patient's disease exposed to the surgical team. It's also important to adequately prepare surgical site by cleaning and application of suitable antiseptic. Wound healing and outcome may be related to an incision placement. Which relate to a number of factors, the diagnosis, urgency of operation, presence of a previous incision and cosmetic preference. A transverse incision heals with an almost invisible scar and clinically performs very well.

In repeat incision, new parallel incision or new incision that transect previous scars at an acute angle compromise blood supply and predispose to poor healing. This second or repeat incision should be made at the same site if possible. The incision should be made by a single bold stroke to decrease subcutaneous dead space. A series of knife sweeps through the subcutaneous tissue and fascia increases devitalized tissue in the wound and increases dead space.

Presence of dead space increases the risk of wound infection and poor outcome. Use of suture material to close the dead space may further increase the risk of infection and poor wound healing.

Achievement of good homeostasis is also important in wound healing. Serum and tissue fluid collect in the incision as a requisite first step in wound repair in the inflammatory phase. However, excessive blood and fluid is not desirable.

Blood is an excellent culture medium and the incidence of experimental wound infections relates to the hemoglobin concentration of wound fluid. The electrosurgical cautery is useful for achieving wound homeostasis.

Choice of appropriate surgical suture material is important. The suture's chemical composition is more important than the physical configuration in determining wound outcome. The ideal suture should lose its tensile strength over a time interval in which the injured tissue regains tensile strength, have adequate knot security and cause minimal tissue reaction. The amount of foreign body in a wound correlates with infection risks. Thus excessive use of suture materials or bigger size than necessary should be avoided.

Methods of wound closure may affect wound outcome. On the uterus achievement of homeostasis is most important; properly securing the lateral angles of the wound enhances homeostasis. The abdominal and pelvic cavity should be inspected and clots and debris removed prior to abdominal closure. No apparent benefit has been attributed to parietal peritoneal closure, as it has been shown to exhibit mesothelial integrity at 48 hours and undistinguishable at 5 days, even when left open. Peritoneal closure at cesarean section only increases operation time, with no effect on infection risk, or analgesic requirement. Skin closure can be achieved by using non-reactive suture, clips or tape.

Use of antibiotic prophylaxis has been shown to decrease number of patients who develop post operative wound infections. The antibiotic used for prophylaxis should have activity against potential infective pathogens. Antibiotic prophylaxis given just before or during creation of the incision is more effective than antibiotics administered several days before operation or

post operatively. Short term regimes are effective and it's not necessary to give multiple day regimes.

There are other factors specific to caesarean section. The most important is presence of labour and its duration. Duration of labour influences the number of vaginal examinations and period of drainage of liquor if membranes were ruptured in early labour. Yobekura pointed out that indigenous patients in the USA had longer labours, more vaginal examinations and less skilled surgeons with poor surgical technique, longer operating times and perhaps greater blood loss. This is comparable to community served in a district hospital in Kenya. Prolonged drainage of liquor is an important factor and especially when chorioamnionitis has set in.

Other factors are maternal diseases including anemia, unsterile vaginal manipulations at home before admission.

It's estimated that more than 6,000 women of child bearing age mostly living in the developing world acquire HIV infection every day. Globally over 90% of people living with HIV infection live in the developing countries. The overall prevalence of pregnant women with HIV is rising. Thus the number of HIV positive patients undergoing caesarean section is also rising. This is also affected by the fact that, elective caesarean section delivery has been shown to significantly lower the risk of mother to child transmission of HIV -1 infection. The need for proper wound management in these patients cannot be under estimated.

The host resistance, which depends on host immune system, is important in wound healing.

Reduced immunity is considered as a vulnerable gateway through which trauma and sepsis exert their deleterious effect on the wound healing process, resulting in increasing morbidity and mortality. Human Immunodeficiency Virus (HIV) has been shown to progressively reduce the host immunity. Greater post caesarean section morbidity has been found in HIV positive women compared to the control women.

There is evidence that patients with more advanced disease WHO group III and IV have impairment of wound healing, whether this is merely the consequence of their general state or of a specific effect of the virus is unclear. HIV positive patients who are otherwise well and CDC group II, their outcome in terms of wound healing or septic complications is similar to HIV negative patients.

The causative organism for wound infection has been found to be mainly gram-positive cocci both aerobic and anaerobic. Gill trap and Cunningham found that wound and pelvic infection following caesarean section were caused by the same organism that cause other pelvic infections and were the same as those grown from amniotic fluid obtained at operation. Emmons and colleagues produced similar results. The organisms mainly recovered are aerobes; streptococci groups A,B,and D, staphylococcus aureus, enterococcus species , peptostreptococcus, bacteroidis species, clostridium species and fusibacterium. Others are mycoplasma hominis and Chlamydia trachomatis.

The wounds are regarded as infected when there is reddening and discharge of frank pus or copious exudates from which pathogens can be cultured. This criterion was used by Ljungquist (1964) Gilmore et al (1975) et al (1973) and Kelly et al (1978).

The consequences of wound infection after caesarean section are wound abscess, wound dehiscence, pain, increased expenditure, and increased hospital stay, interference with infant care, subsequent incision hernias, adhesions and un cosmetic scar.

Puerperal sepsis is an infection of the genital tract (perineum, vagina, cervix and uterus) which occurs as a complication of delivery. Puerperal pyrexia is considered to be due to genital tract infection unless proved otherwise. Predisposing factors of puerperal sepsis include; malnutrition and anaemia, premature rapture of membrane, prolonged rapture of membrane, repeated vaginal examination, dehydration and keto acidosis during labour, traumatic operative delivery, haemorrhage antepartum or post partum, retained bits of placenta tissue or membrane and caesarian delivery.

2. RATIONALE

Sepsis after caesarean section is still a major problem in our setup. A big percentage of this arise from preventable causes which if addressed would significantly reduce rate of wound sepsis. Failure of decision making and techniques on the part of the surgeon is major contributing factor; this is enhanced by poor supervision and inadequate training. Creating patient and staff awareness and observing hygienic practices like hand washing would also be of great benefit in reducing incidence of wound sepsis.

No study has been done in Zanzibar to give a picture of post-caesarean section wound sepsis.

3. BROAD OBJECTIVES

To evaluate post-caesarean section wound sepsis at Mnazi Mmoja Hospital (ZANZIBAR).

4. SPECIFIC OBJECTIVES

1. To determine the incidence of wound sepsis following caesarean section
2. To determine the rate of cesarean section.
3. To determine factors that contributes to wound sepsis.
4. To determine types of pathogens (bacteria) causing wound sepsis.
5. To determine impact of wound sepsis on duration of hospital stay.
6. Determine the HIV sero-status in women undergoing caesarean section and it's relation to wound sepsis.

5. Hypothesis/Research question

What is the incidence of wound sepsis among patient undergoing caesarean section at Mnazi Mmoja Hospital

6. METHODOLOGY

6.1 STUDY DESIGN

This is a prospective descriptive study on post-caesarean section wound sepsis. Subjects were women who had c/s and developed wound sepsis. In this study socio-demographic characteristic as well as pre-operative and intra-operative events are considered in relation to post -operative wound sepsis. The impact of HIV infection on wound sepsis was examined. The duration of hospital stay of patient as a result of wound sepsis is also evaluated.

6.2 Study area:

- Mnazi Mmoja hospital is a public referral hospital situated in Zanzibar town. It is a main hospital in Zanzibar and owned by government.
- The hospital has a bed capacity of 420.
- Obstetric & gynecology department has 52 beds.
- Obstetric wing divided into 3 main areas.
 - i. Antenatal & post natal wards.
 - ii. Labour ward.
 - iii. Labor theatre with 2 operating rooms.

- Antenatal mothers are seen at the hospital which also acts as referral centre.
- The hospital has adopted focus antenatal care
- Those pregnant women who do not meet criteria of focus antenatal care are followed under traditional ANC.
- Antenatal profile (Hb, Blood group & Rhesus factor, VDRL, HIV, urinalysis) are taken.
- Referred patient and unbooked client are seen in the labour ward.
- Patients who present with labour pain, APH, PROM, PPRM, pre-eclampsia/eclampsia, postterm, IUFD are admitted to labour ward. After evaluation those who are not having indication for delivery are taken to antenatal ward for management.
- Elective caesarean section are done by consultants and most of emergencies are carried out by medical officers.
- Prior to conducting elective C/s the following laboratory test; TBC, U/E/CR, grouping and crossmatch, HIV are mandatory while for emergency C/s Gxm is taken.
- As part of infection prevention, spirit and Betadine solution are used for skin preparation. Pre-operative antibiotics are not given to both elective and emergency C/s.
- The maternity wing is busy with high turnover new data shows that there were 7339 deliveries in 2007 and 8886 delivery in 2008. An average of 676 deliveries per month.

- The hospital has five consultant obstetrician & gynecologist and several medical officers.
- The midwives monitor and conduct all normal deliveries after initial physical & vaginal examination by the medical officer.
- The medical officers and consultants are called to review and conduct complicated deliveries and caesarean sections
- Currently the MMR is 281 per 100,000 hemorrhages, sepsis and hypertensive disorders during pregnancy (pre eclampsia-eclampsia) remain the main cause of maternal death.

6.3 Study population:

The study population was mothers admitted to the maternity ward of Mnazi Mmoja Hospital and delivered by cesarean section during 2 month period.

6.4 Sample size:

The incidence rate of Wound Sepsis is estimated to be 14% (as shown in some studies done in developing countries).

The sample size was calculated using the following formula.

$$N = \frac{Z^2 \times P(1-P)}{D^2}$$

Where N= Sample size

Z= the standard error from the mean corresponding to 95% confidence interval, which is 1.96

P= the incidence of wound sepsis which is 14%

d= the absolute precision which is 5% (0.05)

$$N = \frac{1.96^2 \times 0.14 \times 0.86}{0.05^2}$$

N = 164 increase this figure by 10% for non response N=180

Sample size was 200.

6.5 Inclusion criteria;

- Mothers who were delivered by cesarean section at Mnazi Mmoja Hospital during the study period. .

6.6 Exclusion criteria;

- **M**other who underwent cesarean section elsewhere then transferred /referred to Mnazi Mmoja Hospital.
- Mother who refused consent.

6.7 Study instruments

A precoded structured questionnaire was used to gather information from the patients. The questionnaire was administered by principal investigator, two research assistants who were trained. The questionnaire was first pretested in a pilot study prior to beginning actual study.

6.8 Outcome measure.

1. Incidence of wound sepsis in women undergoing c/s
2. Isolated pathogens causing wound sepsis.
3. HIV- serostatus in women with wound sepsis.
4. Hospital stays in relation to wound sepsis.

6.9 Data collection

Patients were recruited by principle investigator or trained midwife (research assistants) once decision to deliver by caesarean section was taken.

They were informed in intended study and consent taken pretest counseling was done by a midwife trained in counseling and blood sample for HIV was taken. Patients were assured of confidentiality in handling the HIV results. Results were disclosed to the patient after post-test counseling.

Research assistants filled in the data collection sheets attached to the patient file and surgeon requested to fill in the theatre part data sheet, the principal investigate then compiled collected data for each patient daily.

All patients were given post operative prophylactic antibiotics. Patients were followed and examine after c/s while in the wards. Those who developed wound sepsis identified and microbiological profile was done for both aerobic and anaerobic organizations. The wounds are regarded as infected when

there is reddening and discharge of frank pus or copious exudates from which pathogen can be cultured (criteria for wound sepsis).

On 3rd post operating day wound were exposed and examine whether healing well or infected. If not infected and no other medical complication patients were allowed home and came back on 10th post operating day for assessment of wound

However when patient are at home and notice any problem in the wound or any other problem before 10th day should come back to hospital.

The patient's culture results were availed to the doctors managing the patients to help them adjust treatment accordingly.

Since 2007 Mnazi Mmoja Hospital implements a policy of P.M.T.C.T. All pregnant mothers are counseled and tested for HIV during antenatal visits. Counseling and testing continue during intra-partum and postpartum for those who were not tested at their antenatal period antenatal mothers who tested positive for HIV is given ARVs.

If CD4 count is >350 antenatal mothers are given AZT 300 BID from the 28th week of pregnancy. Also AZT+ Nevirapine are given when labour started (for P.M. T.C.T).

If CD4 count is <350 antenatal mothers are given HAART (for treatment of mother and (PMTCT)

A child who is exposed to HIV is given ARVs prophylaxis.

7. Ethical considerations:

The proposal was presented to the KNH research and ethics committee for approval prior beginning the study. Also the proposal was presented before the ministry of health and social welfare Zanzibar for permission to carry out the study. The study was carried out in accordance with existing ethical guidelines. Informed consent was sought from every patient before the questionnaire is administered. Confidentiality was held at all cost; no information was divulged to any other than the researchers. All the information obtained from the study was treated with utmost confidentiality and used only for intended purpose. The study was not harmful to post-cesarean section mothers in any way.

8. Data management and Analysis

The questionnaires were stored in a lockable cabinet. The data was then entered into an MS Access database. The patient names were omitted so as not to compromise on confidentiality. Each participant was assigned a unique identification number.

The data was then transferred into the Statistical Package for Social Scientists Version 17.0 (SPSS, Chicago) for analysis.

Demographic & clinical characteristic were displayed in the form of tables and graphs. Categorical variables were summarized as proportions and continuous variables as either means (SD) or medians (Range).

Association between sepsis and delivery characteristics was determined using the Fishers exact test and Pearson Chi-square test. A p-value of <0.05 was considered statistically significant.

9. Study limitations

- Lack of standardized surgical procedures
- Level of surgical skills as per qualifications and experience.
- Variable pre-operative preparation
- Variable intrapartum event prior to caesarean section
- Lack of follow up for patients who develop peuperal sepsis.

10. Results

A total of 200 women consented to be recruited into the study. The results showing the demographic data, patients characteristic the distribution of cesarean section, the results of wound sepsis after cesarean section, factors that contributing to wound sepsis. HIV serostatus in women undergoing cesarean section and it relation to wound sepsis. Microbacterial culture and organism isolated.

Results are depicted in the following tables, graphs and charts.

Table 1: Demographic data.

| | n(%) |
|-------------------|-----------|
| Age | |
| <20 years | 17 (8.5) |
| 21-25 years | 48(24) |
| 26-30 years | 70 (35) |
| 31-35 years | 33(16.5) |
| 36-40 years | 27(13.5) |
| >40 years | 5(2.5) |
| Marital status | |
| Married | 191(95.5) |
| Single | 8(4) |
| Separated/Widowed | 1(0.5) |
| Education level | |
| None | 28(14) |
| Primary | 52(26) |
| Secondary | 115(57.5) |
| Post secondary | 4(2) |

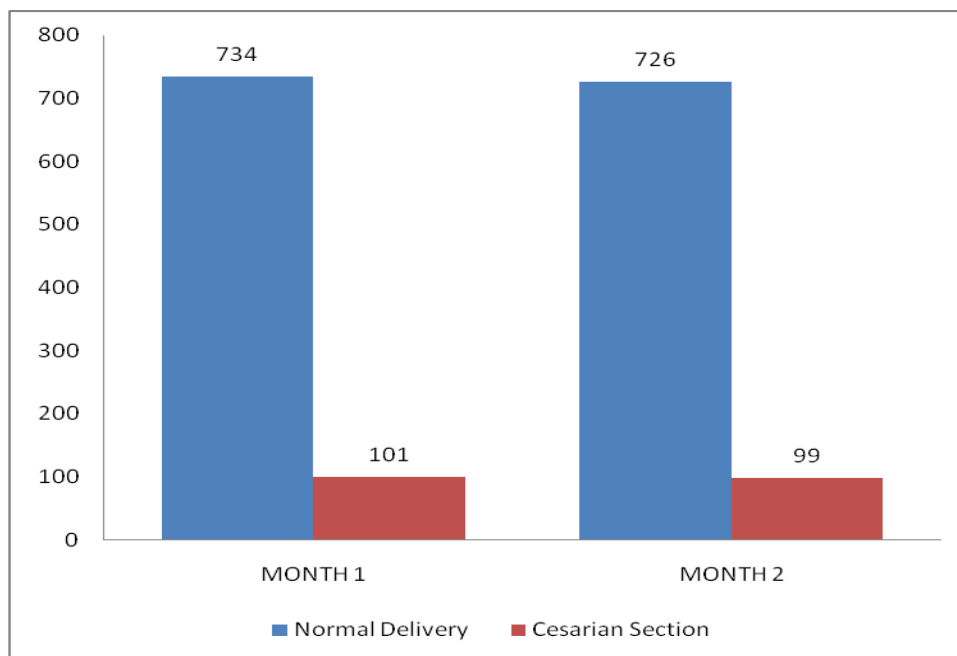
Table 1: depicts the demographic data of study participant. This shows majority were age between 26-30yr were married and had secondary education.

Table 2: Obstetric data

| Clinical characteristics | Median (min, max) |
|----------------------------------|-------------------|
| Previous deliveries | 2 (0, 13) |
| Previous caesarian sections | 1 (0,2) |
| Number of antenatal visits | 2 (1,2) |
| Pre-op hemoglobin levels (mg/dl) | 10 (4, 75) |

Table 2 shows the patient obstetric data most of the women had at least two antenatal visits and their hemoglobin level checked.

Figure1: The rate of cesarean section.



The following figure shows the rate of cesarean section during two months period of study. The average rate was 13.7%.

Figure 2: Cesarean section type.

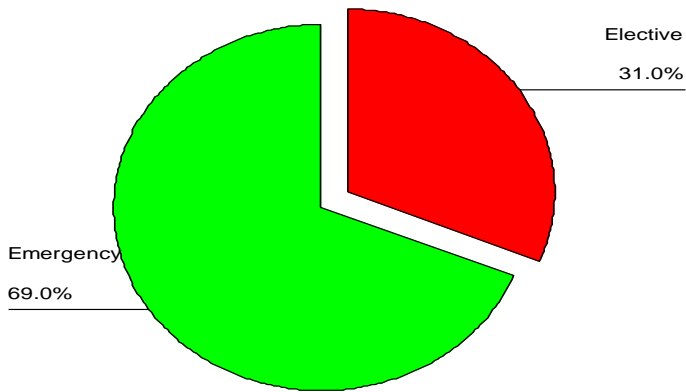


Figure 2: shows the types of cesarean sections during the study period, and most of them were emergencies.

Figure 3: Cumulative incidence of post operative wound sepsis.

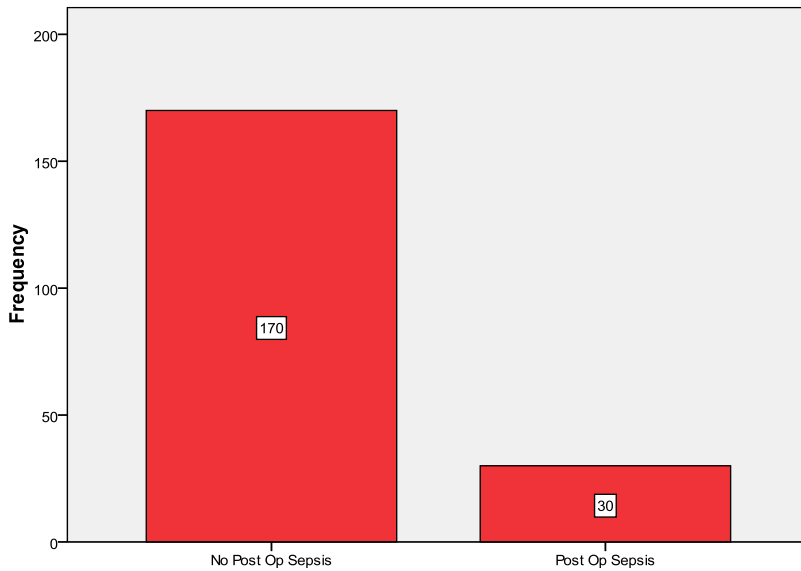


Figure 3: depicts cumulative incidence of wound sepsis after cesarean section. Out of 200 women who were included in the study 30 of them developed post c/s wound sepsis.

Figure 4: Growth of micro organism

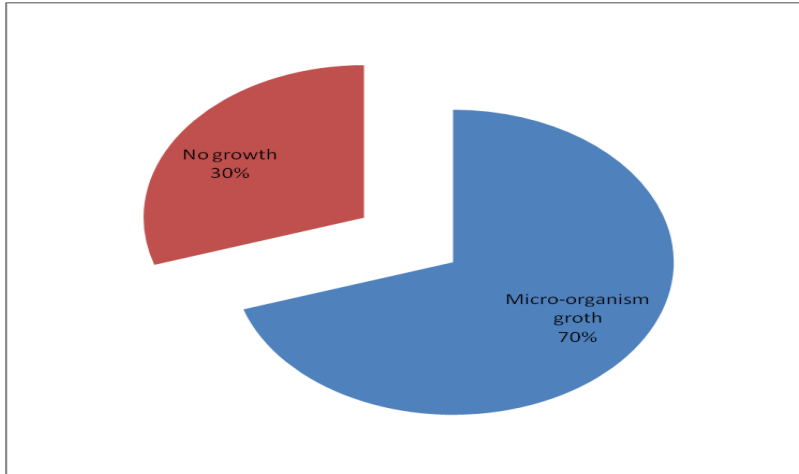


Figure 4 : shows micro bacterial culture only 21 out of 30 had any form of growth as shown in the figure.

Figure 5: Types of bacteria.

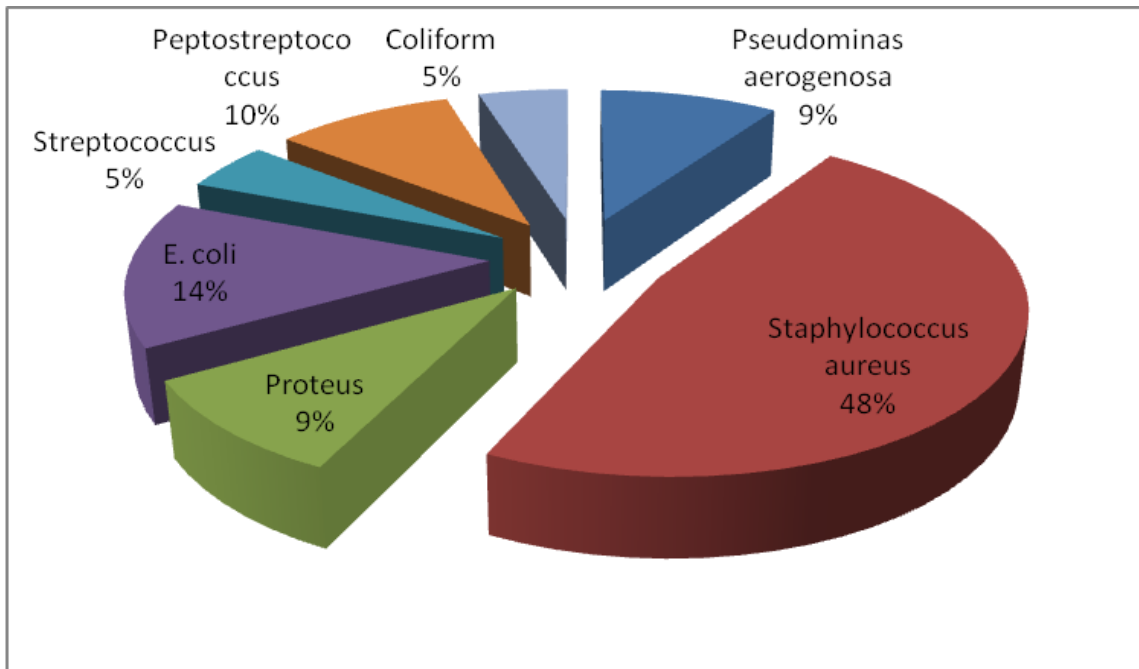


Figure 5: indicates type of bacteria isolated from culture growth. Staphylococcus aureus followed by E coli had the highest proportion. Bacteria were shown to be sensitive to penicillin/beta lactamase inhibitor (Augmentin) and Ceftriaxone.

Table 3: The following table shows various factors in relation to wound sepsis after cesarean section

| | No sepsis n(%) | Sepsis n(%) | p-value |
|------------------------------------------------------------------|-----------------------------------|-------------------------------|---------|
| Type of anesthesia Spinal General | 162(84.8) 8(88.9) | 29 (15.2) 1(11.1) | >0.999* |
| Antiseptic solution Betadine Spirit + Betadine | 3 (100) 167 (84.8) | 0 (0) 30 (15.2) | >0.999* |
| Abdominal incision SUMI Pfannestiel | 49 (83.1) 121 (85.8) | 10 (16.9) 20 (14.2) | 0.618‡ |
| Type of uterine incision Transverse Longitudinal | 132 (84.1) 38 (88.4) | 25 (15.9) 5 (11.6) | 0.632* |
| Gestational age at CS Preterm(<36) Term (>36) | 8 (80) 160 (85.1) | 2(20) 28 (14.9) | 0.650* |
| Colour of liquor Clear Meconium stained Not categorized | 33 (82.5) 11 (68.8) 6 (100) | 7 (17.5) 5 (31.2) 0 (0) | 0.226* |

Note: *Fishers Exact test ‡Pearson Chi Square test. Significance level set at p<0.05

Table 4: Distribution of sepsis by the type of caesarean section

| | No sepsis n(%) | Sepsis n(%) | p-value |
|--------------------------------------|-------------------------|------------------------|---------|
| Type of C/S Elective Emergency | 51 (82.3) 119 (86.2) | 11 (17.7) 19 (13.8) | 0.467 |

Table 4 shows that elective caesarean section has a sepsis rate of 11(17.7) compared to 19(13.8) among the women who had emergency caesarean section. However this was not statistically significant (P=0.467)

Table5: Distribution of wound sepsis by ruptured of membranes

| | | No sepsis n(%) | Sepsis n(%) | p-value |
|--------------------|-----|----------------|-------------|---------|
| Membranes ruptured | No | 105 (89) | 13 (11) | 0.067 |
| | Yes | 44 (78.6) | 12 (21.4) | |

As shown in the table 5 44(78.6) of the women who had c/s after ruptured of membrane 12(21.4) developed wound sepsis compared to 13(11) among the ones who had no ruptured of membrane. This was not statistically significant $p[=(0.067)$

Table 6: Association between number of vaginal exams and wound sepsis

| | Number of vaginal exams | | | Total |
|-----------|-------------------------|-----------|----------|-------|
| | None | 1-2 exams | >3 exams | |
| No sepsis | 78 | 56 | 36 | 170 |
| Sepsis | 11 | 12 | 7 | 30 |
| Total | 89 | 68 | 43 | 200 |

Overall, a total of 111 (55.5%) of the mothers underwent vaginal exams and only 30 out of the 111 women got post partum wound sepsis. The Pearson Chi-square test demonstrated that there was no association between the number of vaginal exams and post partum sepsis among the mothers seen at Mnazi Mmoja Hospital ($p= 0.633$).

Table 7: Blood loss/duration of operation to wound sepsis relation.

| | | Blood loss (ml) | Duration of the operation(min) |
|-------------------|---------|-----------------|--------------------------------|
| No wound sepsis | Median | 200.0 | 35.0 |
| | Minimum | 100 | 5 |
| | Maximum | 700 | 50 |
| Those with sepsis | Median | 200.00 | 32.50 |
| | Minimum | 110 | 20 |
| | Maximum | 310 | 55 |

Table 7 shows the relationship between blood loss/duration of operation to the development of wound sepsis. Blood loss the Mann Whitney test established that the difference in the amount of blood lost among those with sepsis and those without was not statistically significant($p=0.898$). The difference in duration of operation between the patient with sepsis and those without was not statistically significant($p=0.389$).

Table 8: Impact of sepsis on hospital stay.

| | No sepsis | Sepsis |
|--------------------|-----------|--------|
| Median stay (days) | 3.00 | 5.00 |
| Minimum days | 0 | 1 |
| Maximum days | 14 | 15 |

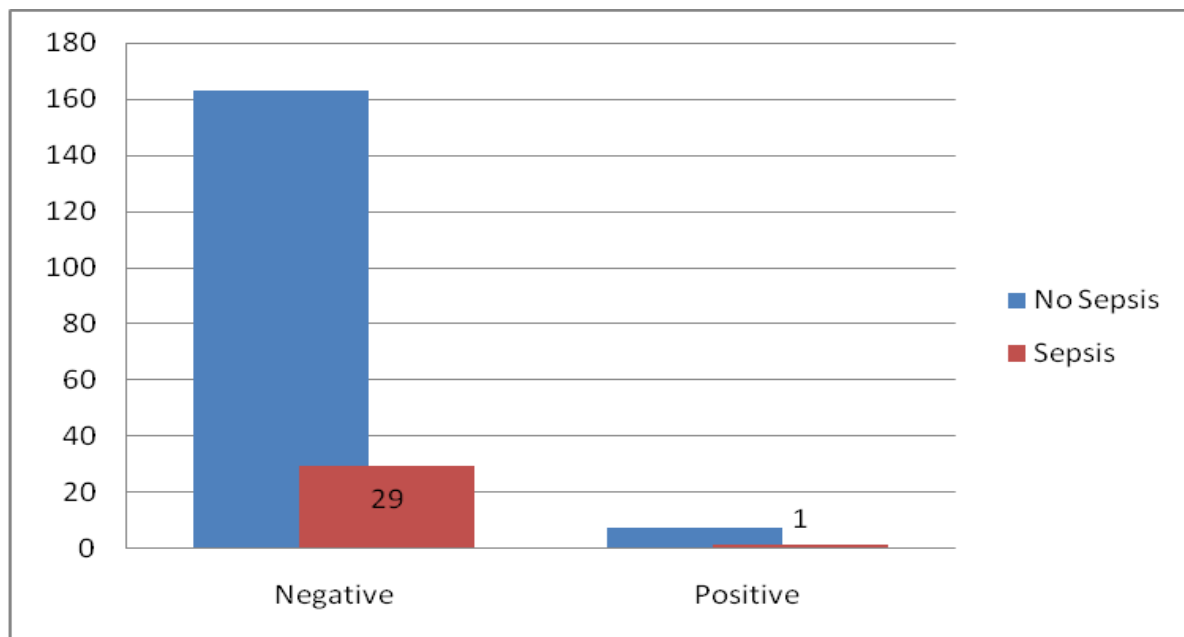
Table 8 shows the impact of wound sepsis on duration of hospital stay. The Mann Whitney test demonstrated there was significant in the number of days that was spent in hospital with sepsis ($p=0.001$)

Table 9: Occurrence of sepsis grouped by HIV status.

| | No sepsis n(%) | Sepsis n(%) | P value |
|--------------|----------------|-------------|---------|
| HIV negative | 163 (84.9) | 29 (15.1) | >0.999* |
| HIV positive | 7 (87.5) | 1 (12.5) | |
| Total | 170 (85) | 30 (15) | |

*Fishers Exact test

Figure 6



The table 9 and figure 6 shows the HIV serostatus in women undergoing c/s and its relation to wound sepsis. Seven among 200 women tested positive for HIV and only one had wound sepsis

DISCUSSION

In this study, the cesarean section rate of 13.7% was lower than that of Kenyatta National Hospital (KNH), Pumwani Maternity Hospital and Muhiambili. However, this rate correlates with that of World Health Organization of 10%-15%.

Wound infection after cesarean delivery occurs in 2%-16% of patient depending on factors such as antibiotic prophylaxis. Length of labor, duration of rupture of membranes and number of vaginal examination ^(1,2) Out of 200 patients who had cesarean section 30 patients (15%) developed wound sepsis. 21 patient had microbial culture growth where staphylococcus aureus followed by E.coli had the highest proportion of growth. Both types of bacterial showed to be sensitive to ampicilin, augmentin, and ceftriaxone. In this study, the incidence of wound sepsis was found to be high (15%). This compares unfavorably with other institutions with higher rates of cesarean section. Despite Kenyatta National Hospital being a National referral centre and thus having patients with more complications being managed there. The wound sepsis rates are much lower (6.5%-13.3%) ^{13,14}. Some centers in Kenya, East Africa and Africa have similarly shown very high wound sepsis rates (19-37%) ^{11,15,16,67}

The disparity between cesarean section rate and wound sepsis rate could be an indication of a serious problem in management of labour, intra-operative and post-operative care.

The wound sepsis rate in United States of America and other developed countries has been shown to be low (3-15%) and thus further reduces to less than 2% with antibiotic prophylaxis ^(17,18,19) This is attributed to better management of labour, intra-operative and post-operative care.

During the study period 31.0% of caesarean section done were elective. It was shown that emergency caesarean section were associated with higher wound sepsis rate than elective caesarean

Other studies have shown that duration of operation of more than 1 hour and excessive blood loss associated with significantly high rate of wound infection. But in this study minimum and maximum duration of operation was 35 and 55 minutes respectively and maximum blood loss was 700ml, so these factors were not significant contribution of wound sepsis.

Those patients who stayed more than 5 days in hospital after caesarean section had high rate of wound infection.

Two hundred patients in the study were screened for HIV. The proportion of mothers who tested HIV positive on screening was 3.5%. On post cesarean

section wound sepsis rate, there was no statistical difference between HIV negative and HIV positive mother. The important inference here is that positive HIV status without full blown AIDS may not be an important factor in post cesarean section wound sepsis ^(49,50,51,65.)

Conclusion.

1. The rate of cesarean section is in the range of WHO recommendation
2. The incidence of post cesarean section wound sepsis in the study hospital is high
3. Presence of wound sepsis was associated with longer duration of hospital stay.
4. HIV sero-status is not an important factor in the incidence of wound sepsis in this population.

Recommendations

1. Evaluate and improve pre and post operative care through further training and supervision involving more qualified person to do caesarean section.
2. Pre-operative antibiotics should be given to all patients scheduled for C/s whether emergency or elective.
3. Effort should be done to reduce length of hospital stay after caesarean section.
4. Infection prevention procedure in order to reduce the risk of wound sepsis should be followed appropriately

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10. Number of antenatal clinic visits

11. Antenatal illness 1. Yes

(Specify).....

2. No

12. Preoperative hemoglobin levels on mg/dl

13. Caesarean section type 1. Elective

2. Emergency

14. Gestation at caesarean section 1. Preterm (< 36)

2. Term (> 36)

15. Patient has been in labour before caesarean section

1. Yes

2. No

If yes,

a). Duration in hours

b). No. of vaginal examinations done

c). Membranes ruptured 1). Yes

2). No

If (C) is yes (i) Duration membranes rupture in hours

(ii) Colour of liquor

1. Clear

2. Meconium stained

3. Not categorized

16. Indication for Caesarean section

(Specify).....
.....

17. HIV status

1). Positive

2). Negative

3) Un know

OPERATIVE DATA

1. Type of anesthesia

1. Local

2. Spinal

3. Epidural

4. General

2. Type of antiseptic solution used for skin preparation

1. Spirit

2. Betadine

3. 1+2

4. Others _____

3. Abdominal incision

1). SUMI

2). Pfannestiel

4. Type of uterine incision

1. Transverse

2. Longitudinal

5. Estimated blood loss of milliliters

| | | |
|--|--|--|
| | | |
|--|--|--|

6. Duration of operation in Minutes

| | | |
|--|--|--|
| | | |
|--|--|--|

POST OPERATIVE FOLLOW-UP

1. Prophylactic antibiotics used 1. Yes

2. No

| Generic name of Antibiotic | Mode of administration (e.g. oral/IV) | Intended duration of course (days) |
|----------------------------|---------------------------------------|------------------------------------|
| | | |
| | | |
| | | |
| | | |

2. Wound infected 1. Yes

2. No

Post-operative day sepsis noted

If yes, cultures obtained

1. No growth

2. Organism (Specify).....

2. Period of hospital stay from date of operation to date of discharge in days.

PATIENT INFORMATION AND CONSENT FORM

-Study on the post caesarean section wound sepsis.

Study investigator: Dr. Omar Issa Mgongo master of medicine and student in the department of obstetrics & Gynecology, School of medicine, collage of health sciences.

University of Nairobi Tel No: +254712246725

Supervisors

1. Dr. Eunice Cheserem MB, CHB, MMED (U.O.N).
& Senior lecturer department of Obs/Gyn (U.O.N) consultant obstetrician Gynecologist Kenyatta National Hospital-Cell No: 0722722440
2. Dr. J. Wanyoike Gichuhi MB, CHB, MMED (U.O.N). Infertility (Tel Aviv-Israel) & Senior lecturer department of Obs/Gyn (U.O.N) consultant obstetrician Gynecologist Kenyatta National Hospital. Cell No:0722522234

-Ethical review committee chair person Prof K.M Bhaft

Tel No: 0202726300

Research's statement

-The purpose of this consent form is to give you information about a fore mentioned.

-This information will help you decide whether to be in the study or not. Please read the form carefully. You may ask questions about the purpose of the research what we would ask you to do, the possible risk and benefits your rights as a volunteer and any thing else about the research or this form that is not clear. When we answered all your questions, you can decide if you want to be in the study or not. This process is called informed consent. If you wish we will give you a copy of this form for your records.

Study participants rights

-You have a right as a volunteer to decide whether you would like to participate in this study. You have a right to ask any questions concerning this study only when all your questions have been answered you may decide to participate or not to.

-You have a right to ask any question about this study at any time and contacts have been put in this consent form for any further queries or complain you may have. Once you have been enrolled in this study you can drop out at any time. It is your right. You will not be denied any treatment you require if you decide not to participate.

Study purpose

-The purpose of this study is to determine how many pregnant women undergo abdominal delivery at Mnazi Mmoja Hospital have their surgical wounds infected by germs.

Study procedure

-Once the doctor attending you here at Mnazi Mmoja Hospital decides that you are going to be operated on to safely deliver your baby. I will check your records to see whether you have been tested for HIV. If you have been tested I will not test you again.

-If you have not been tested I will explain to you about HIV/AIDS including the danger of this disease to you and your baby and that you can be positive (+ve) or Negative (-ve).

-If you choose to be tested for HIV I will withdraw a small amount of your blood for testing. After testing I will give the results and talk to you about the possible outcomes that are positive or negative. After this I will give you the results.

-After the result I will further talk to you about the meaning of a positive or negative result. If positive you and your baby will be treated, if you choose not to be tested I will not test you for HIV it is your right. No treatment will be denied to you because of your refusal to be tested.

- You will be treated in the usual way it is your rights. You will be taken to theatre to be operating you to deliver your baby. After you have been operated on you will be admitted to the ward.

- On the third day post operation we will remove the bandage on your wound and check whether it is healing well. If we find that it has pus discharge we will take a sample of the pus to see what germs are in the wound. It will take three days to get the results from the laboratory about the germs. In the mean time as we wait for results we will be cleaning your wound every day. We will give you medicine to take care of the germs as we wait for results. After we get the result we will continue treating you as per the results.

-If we expose the wound and it appears alright we will allow you to go home and come back on 10th post operation day to assess the situation of your wound.

-However when you are at home and you notice any problem in the wound or any other problem before 10th day you should come back to the hospital immediately.

-If you notice pus in the wound we will take a specimen to the laboratory and you will be treated accordingly.

Benefits

-There will be no financial or material inducement to participate in this study. Participation will be by informed consent. If found HIV positive you and your baby will be treated (PMTCT).

If your wound is discharging pus it will be taken to the laboratory and examine to find the germs. Then will be treated depending on the results. There no rules in participating in this study.

Confidentiality

-The information given to researchers will be kept in confidence. No names only numbers will be used to identify you. This information will be part of your clinical records.

- However no information by which your identity can be revealed will be released or published.

Signature of investigator_____

Date_____

Signature of research assistant_____

Date_____

Participants Statement

I voluntarily agree to participate in the study on the evaluation of how many pregnant women undergoing abdominal delivery at Mmazi mmoja Hospital have their wounds infected by germs

I have been informed that the information obtained will be treated with at most confidentiality and any treatment will not be compromised if I decline participation or withdraw from the study.

I have a chance to ask questions, If I have questions later I can ask the researcher.

If I have questions about my rights on a research subject I can call the ethical review committee at KNH telephone no +254202726300 Nairobi Kenya

Signature of participant_____

Date_____

HABARI KWA MGOJWA NA CHETI CHA KUKUBALI KUSHIRIKI KATIKA UTAFITI

Huu ni utafiti wa kuchunguza idadi ya kinamama ambao wamejifungua kupitia njia ya upasuaji ambao majeraha yao ya upasuaji hushabuliwa na vimelea vya maradhi.

Mtafiti ni DR. OMAR ISSA MGONGO, daktari mwanafunzi wa maswala yanayohusu uzazi katika chuo Kikuu cha Nairobi Nambari ya simu- +254712246725

Atakuwa akisimamiwa na

Dr. J. Wanyoike Gichuhi- Nambari ya simu-0722722440

Dr. Eunice Cheserem- Nambari ya simu-0722522234

Ambao ni Madaktari bingwa katika fani ya maradhi ya kinamama na uzazi katika chuo kikuu cha Nairobi na Hospitali kuu ya Kenyatta.

Mwenyekiti wa kamati ya utafiti katika Hospitali Kuu ya Kenyatta-Prof K.M Bhat +254202726900

Maelezo ya utafiti

Maana kuu ya cheti hiki cha kukubali ni kukupasa habari kuhusu huu utafiti. Maelezo haya yatakuwezesha kuamua kushiriki au la.

Tafadhali yasome maelezo haya kwa makini.

Unaweza kuuliza maswali kuhusu huu utafiti faida na athari zake kwako, Haki zako, uko huru kuuliza lolote lila kuhusu utafiti huu.

Sababu na manufaa ya utafiti huu

Sababu hasa ya kufanya utafiti huu ni kuangalia miongoni mwa kinamama ambao wamezaa kupitia njia ya upasuaji ni wangapi majeraha yao hushambuliwa na vimelea vya maradhi na kutoa usaha.

Pia kujua ni aina gani ya vimelea huota Katika hayo majeraha

Ikiwa utakubali kushiriki tutakupima kuangalia kama umeathiriwa na ukimwi baada ya kupata ridhaa yako. Ukiwa umepimwa hatutakupima tena.

Siku ya tatu baada ya kufanyiwa upasuaji wa kuzalisha mtoto wako

tutaangalia jeraha lako la upasuaji kama linapona viziri au limeshabuliwa na vimelea vya maradhi na kutoa usaha. Habari tutazozipata tutaziweka siri na hakuna mtu mwingine ataejulishwa. Jina lako halitatumika wakati utafiti huu utapochapishwa

sahihi ya mtafiti

_____Tarehe_____

Maelezo ya mgonjwa mshiriki

Mimi nimekubali kushiriki katika utafiti huu.

Nimeelezwa kwamba habari zangu zitawekwa siri, matibabu yangu hayataathiriwa ikiwa nikiataa kushiriki au kujiondoa kwenye utafiti huu.

Nimekua na nafasi ya kuuliza maswali na kama nitakua na maswala zaidi ninaweza kuuliza watafiti wakati wowote.

Sahihi ya
mgonjwa(mshiriki)_____Tarehe_____

Kidole gumba_____

tarehe_____