

## Prevalence of Post Caesarean Wound Infections and Associated Factors among Mothers Delivering from Kampala International University Teaching Hospital

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### ABSTRACT

Caesarean section simply is an operative technique by which a fetus is delivered through an abdominal and uterine incisions after a minimum period of 28 weeks of amenorrhea, whilst a post caesarean section wound infection (PCWI) is an infection that occurs after a C- section, usually due to a bacterial infection in the surgical incision site. The purpose of this study was to determine the prevalence of post caesarean wound infections among mothers who delivered from KIU-TH, and to identify common factors associated with post caesarean wound infections among these mothers. Descriptive statistics were used to characterize and highlight the difference among the post-caesarean patients. Data was entered and analyzed using SPSS version 16. The analyzed data was then presented using tables and charts. The results indicate that the prevalence of post-caesarean wound infection at Kampala International University-Teaching Hospital is still low (3.2%) but may increase if the steps are not taken to initiate its prevention and eradication. The results indicate that post-caesarean wound infection is positively and significantly associated with age ( $X^2 = 10.747$ ,  $P < 0.05$ ), the cause/reason of caesarean section ( $X^2 = 62.000$ ,  $P < 0.05$ ), color of liquor ( $X^2 = 45.983$ ,  $P < 0.05$ ), duration of labor ( $X^2 = 10.067$ ,  $P < 0.05$ ) and amount of blood lost ( $X^2 = 3.844$ ,  $P < 0.05$ ). The prevalence of PCWIs at KIU-TH was 3.2% and the factors associated were the reason for caesarean section, color of liquor, duration of labor, amount of blood lost. Based on the results and the findings, the study recommends that recognition of the consequences and the building of the strategies to prevent and treat Post-caesarean wound infections at Kampala international university-teaching hospital is essential for reducing post- caesarean maternal morbidity and mortality. In addition, the study also recommends the recognition of the associated risk factors particularly the modifiable and their modification to reduce the occurrence of Post-caesarean wound infection.

Keywords: Prevalence, Post Caesarean, Wound Infections and Mothers Delivering

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### INTRODUCTION

A post caesarean section wound infection (PCWI) is an infection that develops after a C-section and is typically caused by a bacterial infection in the surgical incision site. A Caesarean section is simply an operation in which a fetus is delivered through an abdominal and uterine incision(s) after a minimum period of 28 weeks of

amenorrhea. According to [1], a surgical site infection (SSI) is an infection that manifests within 30 days of a procedure or within a year if an implant was inserted. If at least one of the following symptoms is present within 30 days of surgery, according to CDC studies, post-caesarean wound infection should be suspected; localized

edema coupled with or without fever, discomfort, soreness, redness, odor, or purulent discharge from the wound [2]. The incidence of cesarean deliveries, both primary and repeat, has increased significantly over the past few decades with the goal of saving the lives of both mothers and fetuses. According to [3], there were 22.9 million cesarean deliveries worldwide in 2012.

Although caesarean sections have become a more popular and safe surgical procedure, they still have a high rate of morbidity and mortality and have a five to twenty-fold higher risk of infection than vaginal deliveries [4]. In developed nations, SSI has been reported to affect from 5% to 15% of hospitalized patients in regular wards and as many as 50% or more of patients in intensive care units (ICUs), while in developing nations the magnitude of the problem remains largely underestimated [3]. Surgical site infection rates, which include PCWI, have been reported to range from 2.5% to 19% globally. Studies that looked at risk variables revealed that the majority of SSIs were caused by patient-related issues as opposed to procedure-related factors. By reducing neutrophil bactericidal activity and impairing the body's natural defenses against microbes, these substances directly reduce the patient's immunity and capacity to recover from surgical incisions. These include pre-existing conditions such as diabetes mellitus, smoking, alcoholism, cancer, chronic renal failure, jaundice, obesity, advanced age, poor physical condition, medications such as steroids and antineoplastic drugs and prior radiotherapy or chemotherapy, malnutrition, pre-existing infections, preoperative hospital stay, immunodeficiency and colonization with *Staphylococcus aureus* or other potential pathogens, the patient's pre-morbid condition, nutritional status, and maternal health.

Studies involving analysis of risk factors indicate that most SSIs are attributable to patient-related factors rather than procedure-related factors. These factors directly suppress the patient's immunity and patient's ability to recover from surgical incisions by decreasing neutrophil bactericidal activity, thereby making the body's natural defense system impotent in the face of microbial contaminants. These factors include diabetes mellitus, smoking, alcoholism, cancer, chronic renal failure, jaundice, obesity, advanced age, poor physical condition, medications such

as steroids and antineoplastic drugs and previous radiotherapy or chemotherapy, malnutrition, pre-existing infections, preoperative hospital stay, immunodeficiency and colonization with *Staphylococcus aureus* or other potential pathogens, the pre-morbid condition of the patient, nutritional status, maternal age, virulence of organism, premature rupture of membranes and surgical techniques used, etcetera. One of the most common complications associated with cesarean section is infectious morbidity out of which wound infection or Surgical Site Infection (SSI) is being diagnosed in 2.5 to 16% of cases, although the causes of cesarean wound infection are similar throughout the world, with slight regional variations, the relative cause differs from region to region and from City Centre to City, [4, 5, 6].

The prevalence of post Caesarean section surgical site infection varied from 5-18% globally, the magnitude of the problem in developing countries was underestimated or even unknown largely for the reason that hospital associated infection diagnosis is complex and surveillance activities to guide interventions require expertise and resources, in Ethiopia, the incidence of surgical site infection was 51% and another study revealed surgical site infection rate among obstetric cases to have been 11.4%, [7].

An incidence of 9.1% was reported by Jido *et al* in Kano, Nigeria, Morhason-Bello *et al.* reported an incidence of 16.2% in Ibadan, and Fasubaa and colleagues in South West of Nigeria showed that post caesarean wound infection was not only the leading cause of prolonged hospital stay but also a major cause of widespread aversion to caesarean section in the region, [8]. In Uganda, there is no published research specific for prevalence of PCWIs, however, caesarean section rates at the Bwindi community Hospital are 30% of the total deliveries, and although pre-surgical optimization, intra operative asepsis and quality post-operative care are adhered too for prevention of surgical site infection after cesarean section, of the 481 total caesarean sections in 2017, 17 (3.5%) mothers got post caesarean wound sepsis [7] while in Mbarara Regional Referral Hospital, research done to determine the incidence of SSI among elective surgeries on the surgical ward in 2007 found the postoperative incidence density to be 15.9%, [7].

#### AIM OF THE RESEARCH

To determine the prevalence of post caesarean

section wound infections and associated factors

among mothers who deliver from KIU-TH.

### Specific objectives

1. To determine the prevalence of post caesarean wound infections among mothers who deliver from KIU-TH
2. To identify common factors associated with post caesarean wound infections among these mothers.

### Research questions

What is the prevalence of post caesarean wound infections among mothers delivering at KIU-TH?  
What are the common factors associated with

### Significance of the Study

Information gathered from this study helps to reduce the incidence of post-caesarean wound infection and improve prognosis of PCWIs in affected patients in KIU-TH, by helping the stake holders of the facility to derive/strengthen possible preventive measures in order to better health service delivery at the obstetrics and gynecology department, in terms of mothers' education at antenatal clinic, and mothers' adequate preparations for the outcome of c/s delivery. These will reduce the hospital charges and hospital stay, as well as obstetricians' lost time in management of these infections.

### Justification of the study

KIU-TH Maternity ward has on average 225 monthly admissions for delivery, and an average of 86 mothers are delivered by caesarean section compared to 99 who deliver by SVD monthly, (KIU-TH-HMIS maternity ward, august 2018-18th January 2019); however, there is no research done yet to expound the prevalence of post caesarean section wound infection and associated factors.

### Scope of the study

#### Geographical scope

The study was done at obstetrics and gynecology ward and OBGYN OPD at KIU-TH, located along Mbarara-Kasese highway, ward (ii) in Ishaka-Bushenyi municipality, western Uganda.

#### Time scope

The study was conducted between the months of August and September 2019.

#### Content scope

This study focused on the prevalence, and associated factors for post caesarean wound infections amongst mothers who deliver at KIU-TH.

### Methodology

#### Study design

A cross-sectional descriptive study was conducted using a pretested questionnaire based on literature review.

#### Study area

The study was conducted at obstetrics and gynaecology wards, at KIU-TH located in Ishaka- Bushenyi municipality in south-western Uganda, KIU-TH Is located approximately 65kms from Mbarara town, and 360kms from Kampala capital city. The main occupants of the area are majorly the Bantu-Banyankole speaking Runyankole as their main language. KIU-TH is a private institution serving about 241,500 people in Bushenyi district and the neighboring districts, thus the area is chosen because its high population density of 282 people per square kilometer. The Obstetrics and Gynecology Department of KIU-TH has 66 beds, 18 specialists, 14 midwives, 9 intern nurses and 5 senior nurses. Maternity ward has an average of 225 monthly admissions for delivery, and an average of 86 mothers are delivered by caesarean section compared to 99 who deliver by SVD monthly, (KIU- TH-HMIS maternity records, 2018/ 2019).

#### Study population

The study involved women of reproductive age who deliver by caesarean section at KIU-TH during the study period.

#### Sample size

The minimum sample size for this study was 62 patients.

**Sample size determination**

The sample size was determined Using formula; [5] for prevalence.

$$n = \frac{(z_{\alpha} + z_{\beta})^2 \times p(1-p)}{(d)^2}$$

Where;

n = Desired sample size

$Z_{\alpha} + Z_{\beta} = Z$  = Standard normal deviate

at 95% level of confidence; z= 1.96

p = expected prevalence of post-cesarean wound sepsis, 16.4%, at Mbarara Hospital [9].

d = level of precision (in proportion of one,

if 5% d=0.05)

$$n = \frac{(Z_{\alpha})^2 \times p(1-p)}{(d)^2}$$

Therefore, our sample size

was; n =

$$\frac{(1.96)^2 \times \{(0.164)(1-0.164)\}}{(0.05)^2}$$

$$= \frac{3.8416 \times 0.137104}{0.0025} = 210.67949056$$

However using the “Finite Population Correction for Proportions” formula (For population

<10,000)  $n = \frac{n1}{1 + \left[\frac{n1-1}{N}\right]}$ , where N is

the population size (for this case

number of patients at the hospital, e.g. 86 per month) and n1 is the sample obtained above; Sample size was; 61.27728424397891 Thus approximately, 62 patients was sampled

**Research instruments**

These involved the use of computers, papers, pens, calculators and technical staff amongst others. Legible patients were informed about the purpose of this study and assured of confidentiality of the information they gave and their consent obtained by the consent forms which were written in English (for the literates) and Runyankole translator-assisted (for the “illiterates”). The recruitment then took on immediately for the eligible patients who consented to participate in this study. Socio-demographic, obstetric, hospital, and intervening factors as previously illustrated in the conceptual frame work were recorded through questionnaires and the study participants were postoperatively monitored for SSI, wound

hygiene, and antibiotic treatment before discharge. Infections were identified clinically, during hospital stay or within 30 days following cesarean section by re-admission to the hospital or after discharge by sharing phone contacts, asking them; to report if they fell sick from surgical site related problems, and about their general health and the state of their surgical wound using a standard format based on the obstetrician’s questionnaire and tracing them at outpatient department for the treatment of SSI or if re-admitted to the hospital. If it was not possible to contact the patient, the outpatient medical records of those patients who were known to have returned to KIU-TH were reviewed.

**Data analysis**

Data entry, coding and analysis was performed using SPSS version 16 software package, to explain the study population in relation to the

variables, prevalence, and frequencies of associated factors. The prevalence was computed following the number of patients who reported

PCWIs via the phone calls. The associated factors were computed using cross tabulation in SPSS

and the chi-square, difference of freedom and p-value were presented.

#### **Data presentation**

Data was presented through the use of numbers, pie-charts, frequency distribution tables.

#### **Ethical considerations**

Permission to proceed with this study was sought out from the school of allied health sciences upon submission of this research proposal, then from the KIU-TH administrator, head of department of obstetrics and gynecology whilst Permission from the participants was obtained

through consent forms. The participants were assured of confidentiality over the information that they gave, obtained from their medical forms, and adequately informed of their right to withdraw from the research if they wished so, without any implication.

#### **Study limitations**

This study was bound to mothers' compliance to participate, mothers were biased-asking for discharge and claimed to be tired, the time wasn't enough to cover the sample size (within

one month) as it required following up participants yet I (the researcher) was in other academic programs as well.

### **Results and Discussion**

#### **Socio-Demographic Characteristics of Respondents**

The biggest proportion of respondents aged 21-35 years (67.8%), while 16.1% were aged below 21 years and another 16.1% were above 35 years with the mean age of 28 years. Data on the place of residence shows that most of the respondents (72.6%) were from the rural centers compared to the few who were from the urban centers. The majority of women in this study were married (72.6%) followed by the ones who were single (24.5%) and the divorced ones (3.2%) were of the least. Data on the occupation of the respondents

indicates that most of these respondents were unemployed (61.3%) followed by the ones who were employed (25.8%) and lastly the ones who were self-employed (12.9%). Among the women in this study, the majority (58.1 %) had a monthly income below Ushs100,000/=, 37.1% had a monthly income ranging from Ushs100,000-500,000/= and only a few (4.8%) of the respondents had a monthly salary which was greater than Ushs500,000. The above information is represented in table 1 below.

**Table 1: Socio-demographic characteristics of the respondents**

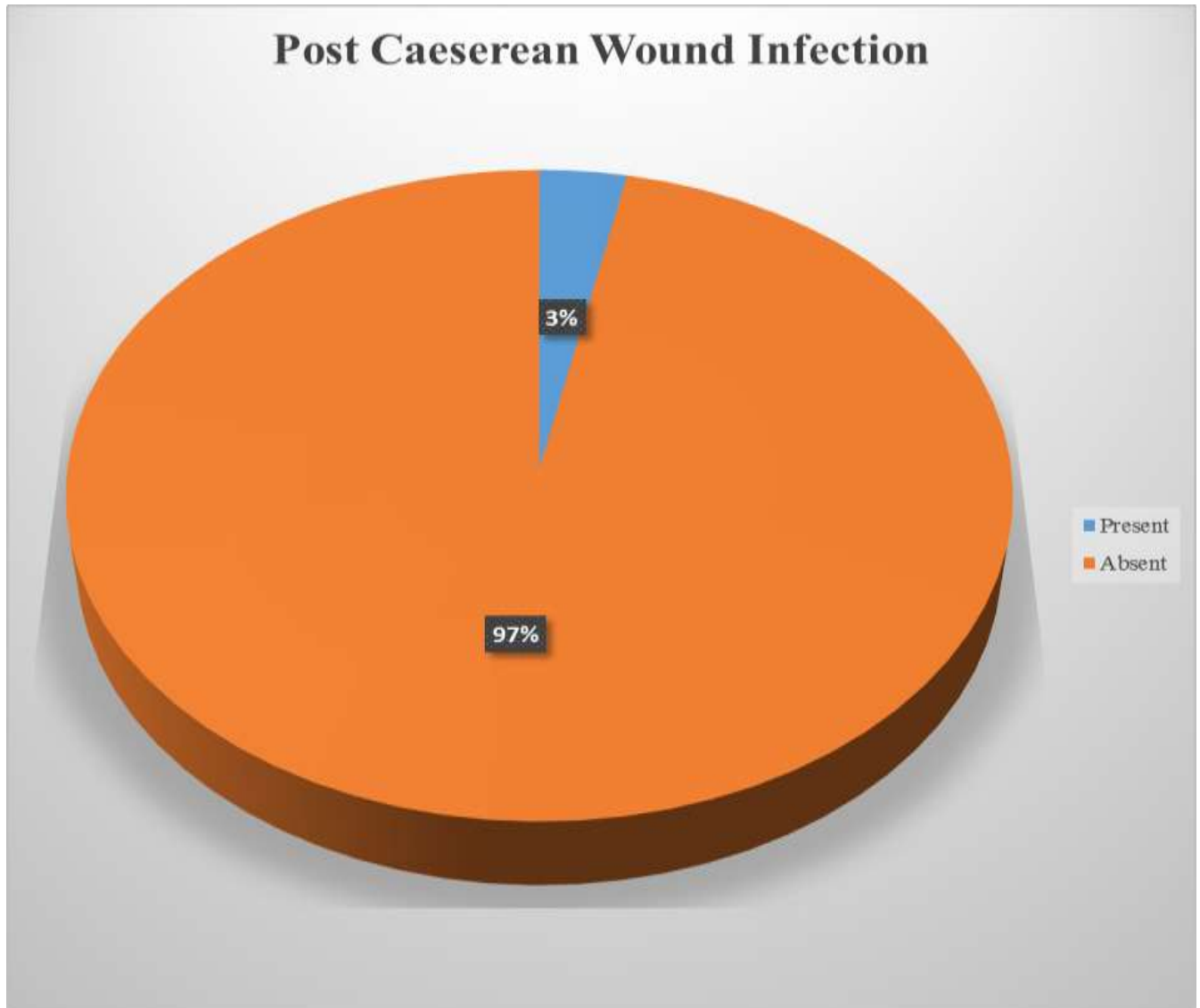
|                    |                     |           | N=62           |
|--------------------|---------------------|-----------|----------------|
|                    | Category            | Frequency | Percentage (%) |
| Age                | <21 years           | 10        | 16.1           |
|                    | 21-34 years         | 42        | 67.8           |
|                    | >35 years           | 10        | 16.1           |
| Place of residence | Rural               | 17        | 27.4           |
|                    | Urban               | 45        | 72.6           |
| Marital status     | Single              | 15        | 24.2           |
|                    | Married             | 45        | 72.6           |
|                    | Divorced            | 2         | 3.2            |
| Occupation         | Employed            | 16        | 25.8           |
|                    | Unemployed          | 38        | 61.3           |
|                    | Self-employed       | 8         | 12.9           |
| Monthly Income     | < Ushs100,000       | 36        | 58.1           |
|                    | Ushs100,000-500,000 | 23        | 37.1           |
|                    | > Ushs500,000       | 3         | 4.8            |

### Prevalence of Post Caesarean Wound Infection

Among 62 post caesarean patients, 2 patients reported back about wound infection and the prevalence of post caesarean wound infection at Kampala International University-Teaching

Hospital was found to be 3.2%. Below is the Pie-Chart showing the prevalence of post caesarean wound infection at Kampala International University-Teaching Hospital.

**Figure 2: Pie-Chart showing the prevalence of Post Caesarean Wound Infection**



### **Association of Socio-demographic characteristics with Post Caesarean Wound Infection**

A great significance of association was seen with the age of the patient and Post Caesarean wound infection whose chi-square, degree of freedom and P-value were 10.747, 2 and 0.005 respectively. Compared to other age groups, post caesarean wound infection was found to be more prevalent in the women who were 35 years and above and among these 8 women of 35 years and above 2 women were known to have got the post caesarean wound infection. Although there was no significant association between Marital Status and Post Caesarean wound infection ( $X^2 = 0.529$ , P-value = 0.467), being married, compared to other relationship statuses had some degree of association with post caesarean wound infection because 2 out of 45 women who were married

reported the infection. There was no significant association between the occupation of the participants and post caesarean wound infection ( $X^2 = 1.305$ , P-value = 0.521) but the results show that being unemployed was somehow associated with post caesarean wound infection because the 2 patients who reported the infection of the wound were unemployed. Women whose monthly income was below Ushs100,000 were somehow linked with post caesarean wound infection because 2 out of 36 women reported an incisional wound infection but the Pearson chi-square and the calculated P-value ( $X^2 = 1.493$ , P-value = 0.474) did not show a significant association between patients' monthly with Post Caesarean wound infection.



**Table 2: The association between socio-demographic characteristics of the patients with Post Caesarean Wound Infections.**

|                    |                    |                                |        |            |    | N=62    |
|--------------------|--------------------|--------------------------------|--------|------------|----|---------|
|                    |                    | Post Caesarean Wound Infection |        |            |    |         |
| Variable           | Category           | Present                        | Absent | Chi-square | df | P-VALUE |
| Age                | <21                | 0                              | 10     | 10.747     | 2  | 0.005   |
|                    | 21-35              | 0                              | 42     |            |    |         |
|                    | >35                | 2                              | 8      |            |    |         |
| Place of residence | Urban              | 1                              | 16     | 0.529      | 1  | 0.467   |
|                    | Rural              | 1                              | 44     |            |    |         |
| Marital status     | Single             | 0                              | 15     | 0.781      | 2  | 0.677   |
|                    | Married            | 2                              | 43     |            |    |         |
|                    | Divorced           | 0                              | 2      |            |    |         |
| Occupation         | Employed           | 0                              | 16     | 1.305      | 2  | 0.521   |
|                    | Unemployed         | 2                              | 36     |            |    |         |
|                    | Self-employed      | 0                              | 8      |            |    |         |
| Monthly income     | < Ushs100,000      | 2                              | 34     | 1.493      | 2  | 0.474   |
|                    | Ushs100,000-500000 | 0                              | 23     |            |    |         |
|                    | > Ushs500,000      | 0                              | 3      |            |    |         |

### **The factors associated with post-caesarean wound infection**

Post caesarean wound infection was seen to be strongly associated with the cause of caesarean section ( $X^2 = 62.000$ , P-value = 0.000), colour of liquor ( $X^2 = 45.983$ , P-value = 0.000), duration of labour ( $X^2 = 10.067$ , P-value = 0.039) and amount of blood lost ( $X^2 = 3.844$ , P-value = 0.050). As the information above indicates, the cause of caesarean section is strongly associated with post-caesarean wound infection and among these causes, prolonged first stage of labour was strongly associated with post-caesarean wound infection because 2 women who reported the presence of post caesarean wound infection had prolonged labour as the reason for caesarean delivery. Colour of liquor was also strongly associated with post-caesarean wound infection especially for women whose liquor was red and green. 1 woman who had red-coloured liquor suffered post-caesarean wound infection and another woman of two whose colour of liquor was green also suffered post caesarean wound infection. The duration of labour was strongly associated with post caesarean wound infection

but it was especially reported in women who were aged below 5 hours and the ones above 13 hours. Amount of blood lost was also strongly associated with post caesarean wound infection; women whose blood loss was between 751-1000ml are so susceptible to post caesarean wound infection because 1 woman out of 5 women reported of post caesarean wound infection compared to the ones whose blood loss was 501-700ml where only one woman out of 55 reported the presence of post caesarean infection. Parity (Number of children) was not strongly associated with Post caesarean wound infection ( $X^2 = 4.035$ , P-value = 0.133) but the presence of infection was reported by women who had more than five children (2 women out of 21). Although the number of vaginal examinations is not significantly associated with post-caesarean wound infection ( $X^2 = 4.340$ , P-value = 0.227), 2 women who had 5-6 vaginal examinations performed on them reported the presence of post caesarean section.

**Table 3: The factors associated with Post-Caesarean wound infections**

N=62

| Variable                      | Category                      | Post-caesarean woundinfection |        | Chi-squar e | df | P-value |
|-------------------------------|-------------------------------|-------------------------------|--------|-------------|----|---------|
|                               |                               | Present                       | Absent |             |    |         |
| Number of children(Parity)    | 1                             | 0                             | 13     | 4.035       | 2  | 0.133   |
|                               | 2-5                           | 0                             | 28     |             |    |         |
|                               | >5                            | 2                             | 19     |             |    |         |
| Number of vaginal examination | 2                             | 0                             | 2      | 4.340       | 2  | 0.227   |
|                               | 3-4                           | 0                             | 38     |             |    |         |
|                               | 5-6                           | 2                             | 18     |             |    |         |
|                               | >6                            | 0                             | 2      |             |    |         |
| Reason for C-section          | Non-reassuring fetalstatus    | 0                             | 5      | 62.000      | 6  | 0.000   |
|                               | Prolonged first stageof labor | 2                             | 0      |             |    |         |
|                               | Obstructed labor              | 0                             | 14     |             |    |         |
|                               | Cephalo-pelvic disproportion  | 0                             | 10     |             |    |         |
|                               | Malpresentation               | 0                             | 12     |             |    |         |
|                               | Failed induction              | 0                             | 1      |             |    |         |
|                               | Previous CS scar              | 0                             | 18     |             |    |         |

|                      |            |   |    |        |   |       |
|----------------------|------------|---|----|--------|---|-------|
|                      |            |   |    |        |   |       |
| Duration of labour   | 1-4        | 1 | 8  | 10.067 | 4 | 0.039 |
|                      | 5-7        | 0 | 3  |        |   |       |
|                      | 8-10       | 0 | 19 |        |   |       |
|                      | 11-13      | 0 | 28 |        |   |       |
|                      | > 13       | 1 | 2  |        |   |       |
|                      |            |   |    |        |   |       |
| Amount of blood lost | 501-750ml  | 1 | 55 | 3.844  | 1 | 0.050 |
|                      | 751-1000ml | 1 | 5  |        |   |       |
|                      |            |   |    |        |   |       |
| Colour of liquor     | Red        | 1 | 0  | 45.983 | 2 | 0.000 |
|                      | Green      | 1 | 1  |        |   |       |
|                      | Yellow     | 0 | 59 |        |   |       |

## DISCUSSION

### Prevalence

The prevalence of Post-caesarean wound infection was found to be 3.2%, this is much lower than the prevalence of post-caesarean wound infection from the previous studies that were done in Nnamdi Azikiwe University Teaching Hospital in 2015 (12.5%) [7] and Mizan Tepi University Teaching Hospital in 2018 (12.9%) [4], this big discrepancy could be attributed to a number of factors which are; difference in regions and socio-economic factors since, a study survey carried out at Bwindi community hospital in western Uganda reveals that the prevalence of Post-caesarean wound infection was 3.5%, this is slightly in line with the prevalence post-caesarean wound infection found in this study (3.2%) [5]. Factors associated with Post-caesarean wound infection

As seen in the results section, Age was the main socio-demographic factor associated with post-caesarean wound infection and was seen with increasing maternal age, that is, the age above 35 years. The same result was indicated in the previous studies like the studies done by Gedefaw and friends in 2018 who reported that the increase in age lead to the increase in the prevalence of post caesarean wound infection, above 45 years. Non-demographic factors which are strongly significantly associated with Post-caesarean wound infection are causes of caesarean section, duration of labour, colour of liquor and amount of blood lost [5]. Some studies have reported that prolonged labour especially if it seen in the first stage of labour is a risk factor for both maternal and neonatal infections. The mother will become colonized by the infectious agents especially the bacteria such as maternal Group B streptococcus and staphylococcus aureus because there will be high risk to developing chorioamnionitis. In this study, we

The findings of the study suggest that the level of post-caesarean wound infection is still low at Kampala international university-teaching hospital compared to other hospital within the same region. Post-caesarean wound infection

Recognizing the consequences and building strategies to prevent and treat Post-caesarean wound infection at Kampala international university-teaching hospital is essential for reducing post-caesarean maternal morbidity and

see that the two women who were operated on due to prolonged second stage of labour reported post caesarean wound infection.

Duration of labour was also found to be strongly associated with post caesarean wound infection, women whose length of labour was very long (> 13 hours) had 50% chances getting wound infection. This was also reported by Gedefaw and friends in 2018. The reason behind this could be attributed to the time given to the microbes to colonise the maternal blood system. Colour of liquor was found to be another associated factor to post caesarean wound infection since the colour of liquor indicates the whether there is an infection or prolonged labour. Women whose liquor was red-green reported the presence of post caesarean wound infection because red liquor indicates infections and green liquor indicates meconium staining which is a sign of prolonged labour. The more the blood that was lost, the higher the incidence of post-caesarean wound infection, this could be explained in context of anemia because anemia leads to poor wound healing which in turn exposes to infections.

### Summary of Findings

Study findings show that the prevalence of post-caesarean wound infection is 3.2% and it is significantly associated with the reason for C-section, duration labour, colour of liquor and amount of blood lost. As the duration of labour increases, the risk of post-caesarean wound infection also increases. The risk of post-caesarean wound infection also increases with increase in the amount of blood lost. The risk also increases with C-section due to prolonged first stage of labour, this is also true with colour of liquor being Red-green.

## CONCLUSION

level is more in post-operative patients who are married, unemployed, old, whose labour lasts long, whose colour of liquor is red-green, whose first stage of labour was prolonged and who lose more than 700ml of blood during the operation.

## RECOMMENDATIONS

mortality. Recognizing the associated risk factors particularly the modifiable one is also an essential step for reducing the occurrence of Post-caesarean wound infection.

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