



*College of Medicine and Health Sciences*

*School of Health Sciences*

**HIGH RATE OF POST CAESAREAN SECTION INFECTION IN MATERNITY WARD  
IN RWAMAGANA PROVINCIAL HOSPITAL**

A dissertation submitted in partial fulfilment of the requirements for Master of Hospital and  
Health Care Administration

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## **DECLARATION**

I KAREMERA Peter hereby declare that:

- This capstone dissertation is my own original work;
- The contribution of the supervisors and others to this capstone dissertation was consistent with normal supervisory practice;
- External contributions to the research are acknowledged.

Candidate Signature \_\_\_\_\_ Date \_\_\_\_\_

## **DEDICATION**

Firstly, I dedicate this capstone to Almighty God.

I dedicate this work to my dear wife, brothers and sisters who supported me in my academic endeavour and provided many encouragements.

I also dedicate this thesis to my friends and other family members who helped to sustain my academic progress.

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# **ABSTRACT**

## **Background**

Post caesarean infection occurs after delivery by caesarean section. It is an important problem that increases maternal morbidity, mortality, cost and length of stay in the hospital.

Post caesarean section infection occurs when pathogenic organisms multiply in a wound at the site of caesarean section giving rise to local signs and symptoms such as heat, redness, pain and swelling. In more serious cases, post caesarean section infection is accompanied with systemic signs of fever or a raised white blood cell count. Infection in the surgical wound may prevent healing taking place and sometimes it may cause an abscess formation in the deeper tissues. There are three types of surgical site infections: superficial, space and organ involvement.

According to Rwamagana Hospital data of the year 2015, it was observed that PCSI rate was 5.1%. The aim of this study was to reduce post PCSI rate in the maternity ward of Rwamagana Provincial Hospital from 5.1% to 3.1% from December 2016 to March 2017.

## **Methodology**

A pre and post intervention design was used in this project to increase the awareness of wound dressing through compliance with the policies and procedures and this helped to decrease the rate of post caesarean section infection.

## **Results**

The impact of good wound dressing reduced post caesarean section infection rate.

Before the intervention, the rate of caesarean section infection was 5.1% then, after intervention there was a significant decrease of post caesarean section site infections from 5.1% to 2.3%

## **Conclusion**

The intervention successfully reduced the rate of post caesarean section infection from 5.1% to 2.3%. Further research is recommended to work on other risk factors such as uncleaned bed, work overload, staff motivation, behaviour and attitude of staff.

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## **ABBREVIATIONS AND ACRONYMS**

**CS:** Caesarean Section

**HAIs:** Hospital Acquired Infections

**IPC:** Infection Prevention and Control

**MHA:** Master in Hospital and Health Care Administration

**OPD:** Outpatients Department

**PCSI:** Post Caesarean Section Infection

**RCA:** Root Cause Analysis

**QI:** Quality Improvement

**WHO:** World Health Organization

**SVD:** Spontaneous Vagina Delivery

**CPD:** Continuous Professional Development

**UK:** United Kingdom

## **DEFINITION OF KEY TERMS**

**Caesarean Section:** Caesarean Section is the delivery of a baby through an incision made in the mother's abdomen and uterus.<sup>2</sup>

**Hospital Acquired Infection:** Hospital Acquired Infection is the infection acquired in hospital by a patient who was admitted for a reason other than that infection. It is also defined as the infection occurring to a patient in a hospital or other health facility in whom that infection was not present at the time of admission.<sup>3</sup>

# CHAPTER 1: INTRODUCTION

## 1.1: Background

Rwamagana Hospital is a Public Hospital located in the Eastern Province of Rwanda. It was founded in 1949 as a Dispensary for people who worked in mines. In 1952, it became a public district hospital and, it later became a provincial hospital as announced in ministerial order gazetted in 2014.

Rwamagana Provincial Hospital has a capacity of 218 beds and offers a variety of outpatient and inpatient services, as well as supervision of 14 health centres. It has 217 employees including 18 medical doctors, 14 of which are general practitioners and four are specialists; it has also 94 nurses, 18 midwives, 59 administrative staff and 28 technicians. It has a catchment area of 369,674 people. Rwamagana Provincial Hospital offers ambulatory services within the outpatient department (OPD), inpatient services and emergency services. Each of these services is divided into functional units including dentistry, ophthalmology, mental health, internal medicine ward, paediatrics, surgery, and gynaecological-obstetrics departments. Gynaecology and Obstetrics Department has 58 beds including 3 delivery rooms, 1 waiting room, 1 theatre and recovery room, post caesarean ward, post - partum ward, gynaecological ward, private room and family planning. All information on back ground are stated in strategic plan 2012-2018 The burden of Post Caesarean Section Infection (PCSI) is not only in Rwanda precisely in Rwamagana Provincial Hospital but there were many incidences of PCSI in Ireland where in 2012 there was a rate 7.7% was registered. Research has also shown PCSI rate of 9.8% in Kano Hospital (Nigeria).<sup>5</sup>

### **1.3 Problem Statement**

High rate of post caesarean section infection rate of 5.1% in maternity ward in Rwamagana provincial.<sup>6</sup>

### **1.4. Objective of the study**

Is to reduce the post caesarean section infection from 5.1% to 3.1% from December 2016 to March 2017 at Rwamagana Provincial Hospital.

### **1.5 Hypotheses**

**H<sub>0</sub>:** Creating a new wound dressing policy and procedure based on the standard of appropriate wound dressing does not decrease the rate of Post Caesarean Section Infection.

**H<sub>1</sub>:** Creating a new wound dressing policy and procedures based on the standard of appropriate wound dressing decreases the rate of Post Caesarean Section Infection.

### **1.6. Justification of the project**

The success of this project will help to reduce PCSI and contribute to the improvement of quality care and patient safety standard in the maternity ward.

Findings of this study could be used by the infection prevention and control unit (IPC). Findings from this study will also serve as a basis for further studies in the area of management of Post Caesarean Section Infections. Also, findings from this study will help hospital management in decision making and continuous quality improvement.

## **1.7 Organization of the project**

This project is divided into six chapters. Chapter 1 is an introduction in which the settings and the background, the statement of the problem, objectives, magnitude of the problem, hypothesis, and justification of the project and the organization of the study are presented. Chapter 2 reviews relevant literature, which covers prevalence of PCSI, causes of PCSI, prevention and management of PCSI. Chapter 3 discusses the methodology used, chapter 4 presents findings from this study, and chapter 5 covers the discussion of results, while chapter six covers conclusion and further recommendations.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1. Introduction**

This chapter tackles what has so far been written by various authors in the area of caesarean section, especially concerning PCSI. During literature search, a number of resources and electronic databases were consulted using the following keywords: “caesarean section” AND “infection”, “infection AND “post- caesarean delivery”. Prevalence, causes, risk factors, prevention and management of post-caesarean infections are discussed in this chapter.

Caesarean section saves millions of lives worldwide and is an essential surgical procedure that should be available to rich and poor women alike it is necessary because it saves many pregnant women who cannot deliver through spontaneous vagina delivery such as a case of big baby, transverse lie, multiple pregnancy, severe abruption placenta and placenta previa. Thus, as recommended by WHO, caesarean section procedure should be accessible to all health care settings. <sup>1,6</sup>

PCSI occurs after a pregnant woman delivers by caesarean section, and is one of the major causes of high rate of morbidity, and mortality, a long hospital stay, and decrease financial income in the family.<sup>6</sup>

PCSI is categorised into three types: superficial infection, deep infection and infection involving adjacent organs. Superficial infection is defined as infection of the skin and superficial tissues. Deep infection is the infection involving the deep tissues such as fascia and muscles layers. Infection involving adjacent organs is the infection that affects the internal organ such as gall bladder, ovaries, intestines and peritoneum. <sup>1</sup>

Signs and symptoms of PCSI include fever, pain, and purulent discharge, and dirty wound dressing. A study conducted in Ireland from January 2012 to June 2012 found that 13% of caesarean cases had post caesarean section infections, 92.3% of them were diagnosed in post discharge period and 7.7% acquired the infections while in the hospital before discharge.<sup>7</sup>

## **2.2. Prevalence**

A study conducted in Ireland from January 2012 to June 2012 found that 13% of caesarean cases had PCSI, 92.3% of them were diagnosed in post discharge period and 7.7% acquired the infection while in the hospital before discharge.<sup>7</sup> A study conducted in USA<sup>19</sup> to find out what the prevalence of PCSI, revealed a prevalence of 8.9%. No similar study has been conducted so far in Rwanda to determine the prevalence of PCSI.

## **2.3. Causes of PCSI**

PCSI can be caused by maternal pre-operative obstetric condition such as a higher Body Mass Indexes (BMIs) of 35 and above, hypertension, mild preeclampsia and severe preeclampsia, type of surgical procedure, and the absence of antibiotic prophylaxis.<sup>8</sup>

According to WHO, the extent of contamination during the procedure of caesarean section could be due to dirty material leading to post caesarean section infections. This also sometimes depends on the length of the operation and the patients' general condition (diabetes, malnutrition, cancer and acquired Immunodeficiency syndrome).<sup>8</sup>

## **2.4. Risk factors of PCSI**

Caesarean section is one of the major risk factors of PCSI. Literature shows that the risk of infection in post-partum is eight times higher following caesarean section than in normal delivery. A study done in Estonia University Hospital in 2002 showed that reducing chances of delivery by caesarean section could reduce the risk of post caesarean infection.<sup>9</sup>

The incidence of PCSI widely reported with the range of 0.3% in Turkey to 17% in Australia.<sup>9</sup>

Other risk factors include obesity, skin closure material (monocryl) grade of operator, and type of Anaesthesia. Addition risk factors include diabetes, steroids, length of labour and a previous caesarean delivery.

## **2.5. Prevention**

According to the literature the key elements of prevention of PCSIs is a safer health care that focuses on the availability of the following elements: antibiotic prophylaxis, appropriate antiseptic skin preparation, appropriate hair removal, maintaining normal temperature, and appropriate glucose level. The second key is the patient's education which provides clear, consistent information on the risks of PCSI, how reduce them, how to manage surgical wounds after discharge, how to recognize a PCSI and who to consult with concerns about wound healing, to patients, family, and caregivers.<sup>8</sup>

It has also been reported that proper hand-washing, collaboration of microbiologists, and wound-care practitioners could help in control and prevention of PCSI.<sup>5</sup> Preventive measures used include continuous and accurate monitoring, implementation and auditing appropriate guidelines for surgical prophylaxis, as well as sampling of patients diagnosed with PCSI.<sup>10</sup>

## **2.6. Management**

According to the literature, the treatment of PCSI requires both carefully monitoring and communication between staff such as obstetrician/gynaecologist, surgeons, internist, nurses, microbiologists and primary care team<sup>4</sup>

The patients with PCSI should be treated with antibiotics, and other supporting treatment such as antimicrobial skin preparation, topical skin adhesive, scrubbing before procedure, gowning and gloving. Monitoring of proper wound dressing, prevention of complications of wound dressing encourage on nutritional diet and health education control on PCSI<sup>16</sup>

## **CHAPTER 3 METHODOLOGY**

### **3.1 Study Design**

This study used a pre and post-intervention study design. During the pre-intervention phase, the collected data were used to plan interventions by finding and implementing appropriate solutions to the problem. In the post intervention phase, a reassessment of the effectiveness of the interventions for PCSI reduction was made. A pre intervention assessment was conducted between January and December 2015; a retrospective audit of patients' files was done and midwives were interviewed.

### **3.2 Baseline Data Collection Procedure**

After discussion with the hospital senior management committee, the research topic was approved and the researcher was authorised to conduct the study in the hospital. A detailed root cause analysis was conducted between June and September 2016, and an evaluation to assess the change of PCSI rate was conducted in the post intervention evaluation from January to march 2017.

#### **3.2.1 Tools**

Observation tools (appendices 6-10) were developed and used to collect, compare and analyse pre- and post- intervention data.

#### **3.2.2 Sample**

A sample of 1547 patient files from January to December 2015 was selected during the pre-intervention phase, while a sample 226 files from December 2016 and January 2017 was selected

during the post-intervention phase. A sample of 18 midwives and 18 wound dressing procedures was also selected.

### 3.3. Measuring the magnitude

Magnitude of the problem was measured by auditing retrospectively patient files from January 2015 to December 2015. The PCSI infection rate was 5.1% according to the data collected in maternity department at the post-operative caesarean section ward. The number of operated patients was 1547 in year 2015 (January to December) among these, 79 patients were infected according to post caesarean infection register. The methods used to collect the required information include inpatient medical file records review and interviewing health care providers (Midwives).

**Table 1: Data summarizing the magnitude of PCSI in year 2015**

Month	Number of C/S	Number of PCSI	Annual Rate
January/2015	108	6	0.46%
February/2015	118	4	0.28%
March/2015	114	11	0.8%
April/2015	140	16	0.95%
May/2015	128	11	0.7%
June/2015	139	10	0.6%
July/2015	144	7	0.4%
August/2015	152	0	0%
September/2015	137	4	0.24%
October/2015	137	5	0.3%
November/2015	112	3	0.23%
December/2015	118	2	0.14%
Total	1547	79	5.1

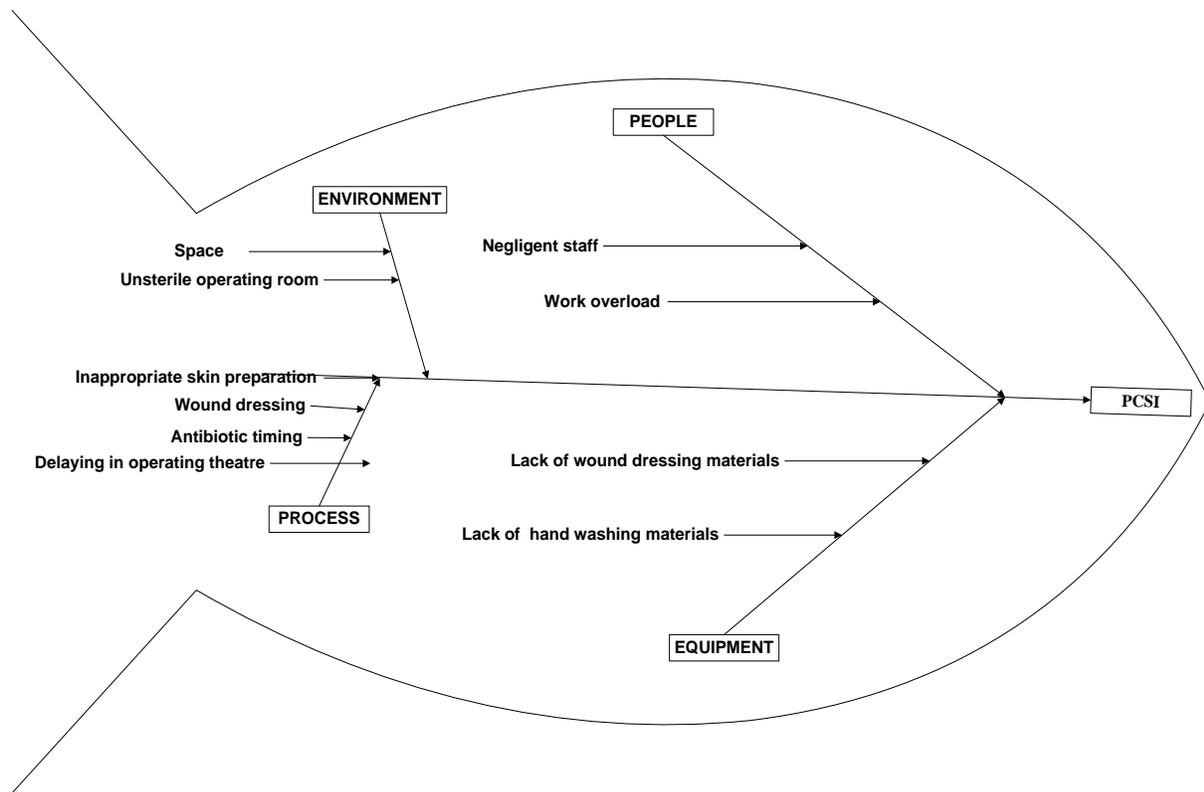
Source: Maternity register

The table 1 shows that the annual rate of PCSI is 5.1%.

### 3.4 Root Cause Analysis

A root cause analysis was made in June and September 2016 in order to find out the root cause of PCSI. A meeting with the staff in the maternity unit and IPC was conducted to identify some possible root causes. The main possible causes suggested were presented on the fishbone below.

**Figure 1: Fishbone**



### **3.4.1 Verification Process**

During verification, the following tools were used to exhaustively observe how procedures were performed: tally sheet, questionnaire, checklists and protocols.

#### **3.4.1.1 Staff Negligence**

Staff negligence has been discussed in literature and some measures such as punishments were drawn.<sup>14</sup> In our case, there was no staff negligence observed. Eighteen midwives were observed performing wound dressing procedure for PCSI wounds, by observing 18 midwives who performed 18 procedures of wound dressing during working hours three times a week. In addition, we reviewed files audited retrospectively about wound dressing procedure ordered by Doctors we found that the midwives followed proper doctors instructions on wound dressing.

#### **3.4.1.2 Skin Preparation**

Concerning skin preparation, data were collected through observation method in working hours three times a week in the maternity ward. Out of 30 observations made concerning skin preparation, only 10 were performed appropriately (33%).

Before anaesthesia, the surgeon should evaluate the site of the intended skin incision. The intended area need not be shaved automatically unless the hair will interfere with approximation of the skin edges.<sup>13</sup> If the hair is to be removed, it should be clipped immediately before surgery. Shaving appears to be associated with a slightly increased risk for infection. The use of chlorohexidine and povidone iodine solution is associated with a decrease risk of both superficial and deep wound infection.<sup>13</sup>

### 3.4.1.3 Work Overload

There was no work overload. According to the literature, the patient/midwife ratio is as follow:

- ❖ 1 patient to 2 midwives in delivery room
- ❖ 6 patients to 1 midwife in post caesarean ward
- ❖ 6 patients to 1 midwife in waiting room
- ❖ 4 patients to 1 midwife in labour room
  
- ❖ According to collected data from Rwamagana Provincial Hospital maternity services, the appropriate standards were complied with (Patient /nurse ratio) <sup>2</sup>. The table 2 shows the workload of Rwamagana provincial hospital maternity services.

**Table 2: Workload of Rwamagana Provincial Hospital in Maternity Ward**

DATE	Delivery room		Post cesarean ward		Gynecology ward		Waiting room		Private room	
	Number of staff	Number of patients	Number of staff	Number of patients	Number of staff	Number of patients	Number of staff	Number of patients	Number of staff	Number of patients
1/6/2016	2	1	2	12	2	16	1	4	1	3
2/6/2017	2	0	2	12	2	16	1	5	1	3
3/6/2017	2	2	2	15	2	16	1	6	1	3
4/6/2017	2	1	2	15	2	16	1	7	1	3
5/6/2017	4	2	2	16	2	16	1	4	1	3
6/6/2017	2	1	2	10	2	16	1	5	1	3
7/6/2017	2	1	2	10	2	14	1	6	1	1
8/6/2017	2	1	2	11	2	14	1	7	1	1
9/6/2017	4	2	2	12	2	15	1	4	1	1

10/6/2017	2	1	2	12	2	15	1	5	1	1	
11/6/2017	2	1	2	12	2	16	1	6	1	1	
12/6/2017	2	1	2	13	2	12	1	4	1	1	
13/6/2017	2	1	2	8	2	12	1	5	1	2	
14/6/2017	2	1	2	8	2	12	1	6	1	2	
15/6/2017	2	1	2	8	2	12	1	7	1	2	
16/6/2017	2	1	2	8	2	8	1	4	1	2	
17/6/2017	4	2	2	6	2	8	1	5	1	2	
18/6/2017	2	1	2	6	2	9	1	6	1	2	
19/6/2017	2	1	2	6	2	9	1	7	1	2	
20/6/2017	2	1	2	12	2	12	1	10	1	2	
21/6/2017	2	1	2	12	2	13	1	4	1	2	
22/6/2017	2	1	2	15	2	13	1	4	1	2	
23/6/2017	4	2	2	15	2	12	1	4	1	4	
24/6/2017	2	2	2	16	2	11	1	4	1	4	
25/6/2017	2	1	2	10	2	11	1	4	1	4	
26/6/2017	2	2	2	10	2	12	1	10	1	4	
27/6/2017	2	1	2	11	2	8	1	10	1	4	
28/6/2017	2	1	2	12	2	7	1	10	1	4	
29/6/2017	2	1	2	12	2	7	1	10	1	4	
30/6/2017	4	2	2	12	2	8	1	7	1	4	
<b>Total</b>	<b>70</b>	<b>37</b>	<b>60</b>	<b>305</b>	<b>60</b>	<b>356</b>	<b>30</b>	<b>180</b>	<b>30</b>	<b>76</b>	
<b>Ratio</b>	<b>2</b>		<b>1/1.89 ≈</b>		<b>1/5</b>		<b>1/6</b>		<b>1/6</b>		<b>1/ 2.5 ≈ 3</b>

Source: Register of Handover in Maternity service

In Rwamagana Provincial Hospital, there were 1 patient to 2 midwives in delivery room, 12 patients to 2 midwives in post caesarean ward, 6 patients to 1 midwife in waiting room, 3

patients to 1 midwife in private room, and 6 patients to 1 midwife in gynaecology. In the maternity services, 18 midwives were scheduled as follow: 6 midwives assigned to work on the day duty, 6 midwives were assigned to work on night duty, and the remaining 6 would be off duty.

Gynaecology and Obstetrics Department has 58 beds including 3 in the delivery rooms, 1 in the waiting room, 1 in the theatre and recovery room, post caesarean ward, post - partum ward, gynaecological ward, private room and family planning.

#### **3.4.1.4 Wound Dressing**

Information on wound dressing was collected through observation by using a checklist, tally sheet and follows the guidelines. The observation was conducted during working hours 3 times a week in post caesarean ward. Out of the performed 70 wound dressing procedures, only 20 (28.5%) were well and 50 (71.5%) were not.

According to literature, there are three basic principles which underlie wound healing such as to identify and control as best as possible the underlying causes, support patient centred concerns, and optimize local wound care management, prevention of complications, encourage on good nutritional diet and health education .<sup>15</sup>

**Table 3: Inventory of wound dressing procedures (pre-intervention)**

<b>Procedures done</b>	<b>Procedures not done</b>
Clean wound first then it's surrounding.	Inform patient about procedure
Apply sterile dressing with fresh paste of forceps.	Wheel trolley near bed and provide privacy
Leave patient comfortable	Dresser arranges bedclothes in order to gain access to the wound
	Wash hands with tap running water
	Assistant helps to remove lids of bowls and kidney dish on top shelf of pour out location.
	Using a pair of dissection forceps and 2 with antiseptic lotion.
	Discard cotton wool swabs used in cleaning after each wound dressing
	Place dressing towel and mackintosh

**Table 4: Inventory of wound dressing procedures (post intervention)**

<b>Procedures done</b>	<b>Procedures not done</b>
inform patient about procedure	Using a pair of dissection forceps and 2 with antiseptic lotion
wheel trolley to bed and provide privacy	
the dresser arranges bed clothes in order to gain access to the wound	
Wash hands with tap running water	
inform patient about procedure	
wheel trolley to bed and provide privacy	
the dresser arranges bed clothes in order to gain access to the wound	
Wash hands with tap running water	
Assistant help to remove lids of bowls and kidney dish on top shelf of pour out location	
Clean wound first then it's surrounding	
Discard cotton wool swabs used in cleaning after each wound dressing	
Apply sterile dressing with fresh paste of forceps	
Place dressing towel and mackintosh	

#### **3.4.1.5 The antibiotic timing**

The antibiotic timing was collected using a tally sheet, through patient file audited retrospectively. The percentage of patients who received antibiotics and patient who did not receive antibiotics was established. It was found out that 60% of patients received antibiotics while 40% did not. According to literature, antibiotics are recommended in infection prophylaxis.<sup>11</sup>

#### **3.4.1.6 Clean Operating Theatre**

Regarding the operating theatre sterility, information was collected through observation using a tally sheet. The operating theatre was found to be in conformity with the required standards: sterile technique is a method by which a contamination by micro-organisms and spores that was achieved by using sterile instrument and equipment from sterilization unit and disinfect operating room by antiseptic and used formalin to the disinfect operating rooms once weekly.<sup>18</sup>

#### **3.4.1.7 Water Availability**

Running water was available in both the operating theatre, and the wards.

#### **3.4.1.8 The delaying in operating room**

The duration of the caesarean operation was analysed using patient file audit and the tally sheet. The percentage of patients whose operation took longer was determined. This analysis was done once with retrospective file audit. It was found that 5 (6%) of the surgeries took more than the standard 1 hour.

#### **3.4.1.9 The size of the theatre**

According to WHO, the minimum measures of the theatre are 45 square meter and the maximum 121 square meter.<sup>3</sup> The size of the theatre was collected by measuring of `the operating theatre

using mapping chart and use of protocol to see if the room was truly small or not. The space was in normal range:  $8 \times 6 = 48\text{m}^2$ .

**Table 5: Summarized the Results during RCA**

<b>Root Causes</b>	<b>Percentage</b>
Dedicated staff	100%
Appropriate skin preparation	33%
Standard duration of the caesarean section	94%
Adequate size of operating theatre	100%
Appropriate wound dressing	28.5%
Compliance with of Antibiotic prophylaxis	60 %
Operating Theatre sterility	100%
Water availability	100%

According to the above results the major root cause was inappropriate wound dressing.

### **3.5 Intervention**

After identifying the root causes of the problem, the following alternative solutions were suggested and comparative analysis was conducted:

- 1) Continuous education;
- 2) Staff Training on awareness on wound dressing policies and procedures;
- 3) Effective clinical role models;
- 4) Standardization of accepted practice;

Based on comparative analysis, staff training was selected as the best solution because of its ability to enhance a high quality care, its cost effectiveness, fast to deliver, and generally the most feasible solution.

### **3.6 Implementation**

The implementation of the staff training on policies and procedures of wound dressing was composed by the tasks detailed in the Gantt's chart.

The compliance of maternity staff to wound dressing by respecting the standards was raised by training done in early December 2016. There was availability of training manual including the wound dressing manual, policy, procedures and wound dressing evaluation form. Also a regular follow up of well documented of PCSI in the register and evaluation of performance of wound dressing in order to reduce the PCSI was established.

### **3.7 Measures (Indicators)**

To evaluate the effectiveness of our intervention, the PCSI rates were measured both before and after the intervention.

**Table 6: Summary of Indicators**

<b>Indicator</b>	<b>Definition of indicator</b>	<b>Who will collect the indicators</b>	<b>Where to get information</b>	<b>When</b>	<b>Achievement status</b>
# of wound dressing performed	# of wound dressing performed correctly	Researcher	Observation study	3 months (December 2016, January and February 2017)	95%
% of staff trained in wound dressing.	The rate of staff trained in wound dressing	Chief nurse	Training reporting form	Quarterly	89%
% Post caesarean section infection	Infection occurs after pregnant woman delivered under operation.	Data manager	Maternity service through register/patient file.	December 2016, January, February and first week of march 2017	2.3%

Three indicators were measured (one outcome indicator and two process indicators).

### **3.7.1 Process Indicators**

1) The staff trained in wound dressing increased from 17/28 (61%) in the pre intervention to 25/28 (89%) in post intervention, with P-value <0.001.

2) Performance in wound dressing increased from 20/70 (28.6%) in pre intervention to 67/70 (95.7%) in post intervention.

### **3.7.2 Outcome Indicator**

The rate of PCSI decreased from pre intervention 5.1% to 2.3% post intervention, with P-value < 0.001. There was 2.8 % decrease in the rate of PCSI, with a statistical significance (<0.001).

### **3.8 Data analysis Procedure**

The pre and post intervention PCSI rates and awareness of wound dressing rates were analysed using chi-square test. Data were analysed using Statistical Package for Social Sciences (SPSS) version 20.0. The level of statistical significance was 0.05

### **3.9 Ethical Consideration**

Before reviewing patient files, authorization was obtained from the hospital administration. The accreditation committee and quality improvement committee were consulted before data collection and implementation. They also participated in evaluation process.

## CHAPTER 4: RESULT

In the pre intervention period, among 1547 Caesarean sections, 79 (5.1%) developed PCSI. In the post intervention period, 5 out of 226 developed post Caesarean infection (2.3%).

The rate of PCSI decreased from pre intervention 5.1% to 2.3% post intervention, with P-value < 0.001. There was 3.2% decrease in the rate of PCSI, with a statistical significance (<0.001). 60% of the staff we trained in wound dressing in the pre intervention period and they increased to 89% in post intervention period, with P-value <0.001. The performance in wound dressing was 28.5% in pre intervention and increased to 95% in post intervention, despite of not significant with a p-value of 0.194.

**Table 7: Comparing the Pre and Post Intervention Data**

Indicator	Pre intervention May and December 2015	Post intervention (December 2016 and January 2017)	P-value
Woman Underwent C/S	246	226	<0.001
Number of women who developed infection	13	5	<0.001
post caesarean section site infection rate (PCSI)	5.2%	2.3%	<0.001
Staff trained on wound dressing	61%	89%	<0.001
# of wound dressing performed	28.5%	95%	0.194

**Table 8: Summary of the PCSI according to age**

AGE GROUP	NUMBER OF CS	NUMBER OF PCSI	PERCENTAGE OF PCSI /Age Group
16-19 years old	97	5	6.3%
20-24 years old	294	15	19%
25-29 years old	274	14	17.7%
30-34 years old	352	18	22.8%
35-39 years old	294	15	19%
40-44 years old	216	11	14%
>45 years old	20	1	1.3%
<b>Total</b>	<b>1547</b>	<b>79</b>	<b>100%</b>

Source: Register of post cesarean section infection in maternity ward

Table 4 shows the PCSI according to age groups, 5 patients out of 97 developed PCSI cases, (6.3%) and they were in the 16-19 years old age group. In the age group of 20-24 years old, 15 patients out of 294 developed PCSI (19%), whereas in the group of 25-29 years old, 14 patients out of 274 developed PCSI (17.7%). In the age group of 30-34 years old, 18 patients out of 352 developed PCSI (22.8%); and in the age group of 35-39 years old, 15 patients out of 294 developed PCSI (19 %). In the age group of 40-44 years old, 11 patients out of 216 developed PCSI(14%) ; and in the age group above 45 years old only 1 patient out of 20 developed PCSI (1.3%) .

## CHAPTER 5: DISCUSSION

Findings from this study revealed that when sterile wound dressing is done appropriately, there is significant reduction in PCSI. Within three months of intervention post caesarean section infection reduced by 2.8% this is in line with findings in other studies. For example a study done in Wales UK revealed that when midwives are trained properly on wound dressing management reduced the PCSI rate<sup>19</sup>. According to literature the following prevention measures could also contribute in prevention of PCSI:

The safer health care, antibiotic prophylaxis, appropriate antiseptic skin preparation, appropriate hair removal (Operation site), maintaining normal temperature, and appropriate normal glucose<sup>13</sup>

The caesarean section is one of the factors of PCSI. The literature showed that infection in caesarean section is eight higher than in normal delivery. The study done in Estonia (Tartu University Women's clinic during 2002)<sup>16</sup> has shown that reduce the caesarean section could reduce the risk factors of post caesarean infection.

In this study, in the pre intervention period, among 1547 (C/S) caesarean section 79 (5.1%) developed the PCSI. the literature shows, the same research done in Kano Hospital (Nigeria) the result found was 4.5% there was also incidence of PCSI widely reported with the range of 0.3% in Turkey to 17% in Australia.<sup>9</sup> However, there is evidence in this study that , after the intended intervention to improve performance of sterile wound dressing , only five out of 226 Caesarean section developed PCSI (2.3%). Consequently, the rate of PCSI decreased from pre intervention 5.1% to 2.3% post intervention, with P-value <0.001.

**Table 9: Comparison of the PCSI Pre and Post Intervention Data**

<b>Indicator</b>	<b>Pre intervention May &amp; December 2015</b>	<b>Post intervention December/2016 &amp; January 2017</b>
Woman who had C/S	246	226
Number Of Women Who Got Infection	13	5
post caesarean section site infection rate (PCSI)	5.1%	2.3%

The important risk factor for post-partum maternal infection after caesarean section is higher eightfold done Spontaneous Vagina Delivery (SVD) <sup>16</sup>

Also, the results of this study have shown that continuous professional development programmes in form of periodic training is essential improving the quality of services. Staff training in wound dressing reduced the infection rate from 5.1% to 2.3% in a period of only 3 months. This is consistent with findings in other studies <sup>20</sup> where staff training and use of wound care guidelines has helped to reduce the rate of post caesarean infection significantly.

As the lessons learned during this project, the staff needs Continuous Professional development (CPD), mentorship and supervision, working with them plan together, involve them in implementation as well as evaluation and provides them the directive support when needed.

The pre-intervention data collection was for one year and the post intervention was for 3 months. Despite the short period, the PCSI was reduced in that 3months, and with high rate significance reduction with P-value of <0.001.

The results of the following study have proven that it is important that PCSI data be collected and analysed annually and the measures be taken. The further researches will need to explore the factors which could be associated to the PCSI, other than contributing factors.

As the PCSI is preventable, it is necessary to reduce a number of elective caesarean section, though the strategic preventive measures should be maintained by all maternity ward staff for all the time.

**Table 10: Comparison of the training on wound dressing pre and post intervention data**

	Number staff trained on wound dressing	Rate (%)
Staff trained on wound dressing in pre intervention period	17/28	61%
Staff trained on wound dressing in post intervention period	25/28	89%

## **CHAPTER 6.CONCLUSION AND RECOMMANDATION**

### **6.1 Conclusion**

The study findings revealed that staff training significantly reduces the rate of post caesarean site infection and within a period of only 3 months, the rate of infection reduced from 5.1 to 2.3%. The quality of wound dressing procedures as well as the number of procedures was also significantly increased as a result of this study.

### **6.2 Recommendation**

Improving the quality of wound dressing procedures as well as ensuring that all procedures are done correctly reduces the incidence of PCSI, periodic staff training sessions through continuous professional development are recommended in order for the hospital to maintain and improve on the quality of wound dressing and reduce the occurrence of PCSI.

Also, although this study targeted wound dressing as the most significant root cause of PCSI, appropriate skin preparation and prophylaxis with antibiotics were other possible causes that might need to be attended to. Other quality improvement projects are recommended to address the problem of skin preparation before surgery and prophylaxis with antibiotics in order to further reduce the rate of PCSI.

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## APPENDICES

### APPENDIX 1: COMPARATIVE ANALYSIS

<b>CRITERIA</b>	<b>IMPACT</b>	<b>COST</b>	<b>TIME</b>	<b>FEASIBILITY</b>
Continuous staff education	Advanced knowledge in wound dressing	For example school fees for 1 nurse/year is 900,000 frws *19= 17,100,000	10 years	According to budget it is not easy to train all nurses at the same time
Staff Training on awareness of the wound dressing	Providing high quality care on wound dressing	It is cost effective because in service training doesn't require tuition fees	3 months	In capacity building/short term seminars. In service training

Effective clinical role models	Increase quality of wound dressing	No tuition fee required	3 months	In service training, use of standard policy and procedures
standardization of accepted practices	Increase of high quality wound dressing because of presence of policies and standard protocols	Low cost to establish them	1 month	Is feasible because protocols & policies are available and easy to use

## APPENDIX 2: MATRIX TABLE

<b>CRITERIA</b>	<b>IMPACT/5</b>	<b>COST/5</b>	<b>TIME/5</b>	<b>FEASIBILITY/5</b>	<b>TOTAL/20</b>
Continuous education	3	1	1	1	6
Staff Training	4	4	5	4	<b>17</b>
Effective clinical role models	2	3	3	2	10
standardization of accepted	4	5	3	4	16

**APPENDIX 3: GANTT'S CHART/IMPLEMENTATION**

TASKS	RESPONSIBLE PERSON	TIME															
		DECEMBER 2015				JANUARY 2016				FEBRUARY				MARCH			
		Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4	Week 1	Week 2	Week 3	Week 4
Invite trainers	Researcher																
Prepare training materials	Researcher and trainers																
Invite participants	Researcher																
Book conference room	Researcher																
Print handouts	Researcher																
Acquire training materials	Researcher																
Training	Trainer/Researcher																
Implementation	Midwives/Researcher																
Evaluation	Researcher/Midwife																

#### APPENDIX 4: Process indicators

<b>Indicator</b>	<b>Definition of indicator</b>	<b>Who will collect the indicators</b>	<b>Where to get information</b>	<b>When</b>	<b>Achievement status</b>
# of wound dressing performed	# of wound dressing performed correctly	Researcher	Observation study	3 months (December 2016, January and February 2017)	95%
% of staff trained in wound dressing.	The rate of staff trained in wound dressing	Chief nurse	Training reporting form	Quarterly	89%

## APPENDIX 5: OUTCOME INDICATOR

<b>Indicator</b>	<b>Definition of indicator</b>	<b>Who will collect the indicators</b>	<b>Where to get information</b>	<b>When</b>	<b>Achievement status</b>
% Post cesarean surgical site infection	Infection occurs after pregnant woman delivered under operation.	Data manager	Maternity service though register/ patient file.	December 2016, January, February and first week of march	2.3%

**APPENDIX 6: Observation tool for overload in post caesarean section infection ward**

<b>Date of observation</b>	<b>Number of patient in the ward</b>	<b>Number of patients</b>



**APPENDIX 8: Observation tool for pre & post intervention data**

<b>Indicator</b>	<b>Pre intervention</b>	<b>Post intervention</b>
Number of wound dressing well performed		
Number of wound dressing not well performed		
Number of women who developed infection (PCSI)		
post caesarean section infection (PCSI) rate		
Staff trained on wound dressing		

**APPENDIX 9: Observation tool for wound dressing procedures (pre & post intervention)**

<b>Date</b>	<b>Nurse</b>	<b>Wound dressing procedures</b>	<b>Procedure done</b>	<b>Procedure not done</b>
		Inform patient about procedure		
		Wheel trolley to bed and provide privacy		
		The dresser arranges bedclothes in order to gain access to the wound		
		Wash hands with tap running water		
		Assistant help to remove lids of bowls and kidney dish on top shelf of pour out location		
		Using a pair of dissection forceps and 2 with antiseptic lotion		
		Clean wound first then it's surrounding		
		Discard cotton wool swabs used in cleaning after each wound dressing		
		Apply sterile dressing with fresh paste of forceps		
		Place dressing towel and mackintosh		
		Leave patient comfortable		

**APPENDIX 10: Observation tool for operating room sterility**

Date	Procedures	Yes	No
	1. Prevent contamination of the use of sterile field		
	2. Ensure sterility of the item		
	3. Reduce the number of micro-organisms present on the staff member's skin		
	4. Gloves are handled through the fabric of the gown sleeves		
	5. Prevent airborne contamination		
	6. Avoid contaminating the sterile gown		
	7. Prevent a sharp injury		
	8. A sterile forceps may be used as an extension of the scrub practitioner's hand		
	9. Prevent contamination of the object		
	10. Prevent the label expiry date being obscured in the event of spillage		
	11. Reuse of opened containers may contaminate the solutions		
	12. Prevent personal shedding over the sterile field		

REPUBLIC OF RWANDA

Rwamagana, le 04/05/2017  
N°14.660/HOP/RGNA/2017



EASTERN PROVINCE  
RWAMAGANA DISTRICT  
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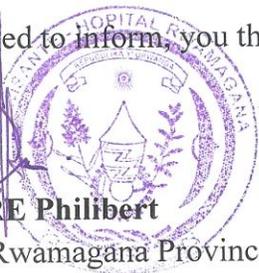
Dear Sir,

RE : Your Request for Conducting a Quality Improvement Project

Reference made to your request for permission to implement intervention study Quality Improvement Project in Rwamagana Provincial Hospital on post coesareane section infection,

We are pleased to inform you that your request was accepted.

Sincerely,

  
  
**Dr. MUHIRE Philibert**  
Director of Rwamagana Provincial Hospital

Cc : -Clinical Director

-Direction Nursing