UNIVERSITY of RWANDA

COLLEGE OF MEDICINE & HEALTH SCIENCES

SCHOOL OF HEALTH SCIENCES

REDUCING THE EMERGENCY CESAREAN SECTION WAITING TIME ON DECISION TO INCISION AT MATERNITY WARD OF KINIHIRA PROVINCIAL HOSPITAL

A Capstone dissertation submitted in partial fulfillment of the requirements of the Master of Hospital and Healthcare Administration (MHA)

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DECLARATION

I, Jean Berchmas BOLINGO hereby declare that this dissertation entitled ‘’Reducing the emergency cesarean section waiting time on decision to incision at maternity ward of Kinihira Provincial Hospital ‘’, is my own original work and it has never been submitted to any other degree or part of degree at this or any other university. All sections that described an argument or concept developed by other authors have been referenced as well as secondary data used.

Signature: ---------- Date : ----------

Supervisor’s Declaration

I confirm that the best my knowledge :

The study was carried out under my direct supervision. It was conducted in accordance with the degree regulations; This capstone dissertation represents the orginal work of the candidate and contrubutions made by me, by other members of the supersory team and staff of university were consistent with normal supervisory practrice ,

External contributions to the research were acknowledge .

Supervisor---------- Date ----------

DEDICATION

This capstone dissertation is dedicated to my wife Viviane UWUMUKIZA, our son ISHEJA BOLINGO Vivien, our daughter INEMA Precious Mabel BOLINGO and friends whom I deprived my presence during my studies. I also dedicate this work to Kinihira Provincial Hospital management and to clinical staff for their unwavering support and encouragement throughout the learning process.

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Particularly, I would like to thank the team of Doctors, Midwives, nurses and anesthetists especially the head of departments of maternity, surgery, Neonatology and Anesthesia for their support and assistance from the start up to the end of this project, without their contribution and collaboration this work could not have been accomplished.

ACCRONYMS AND ABBREVIATIONS

ECs Emergency cesarean section

DNM Director of Nursing and Midwifery Unit

KUTH Kigali University Teaching Hospital

BUTH Butare University Teaching Hospital

LDR Labor and Delivery Rooms

OR Operating Room

QIFP Quality Improvement Focal Person

SPSS Statistical package for social sciences

ACOG American College of Obstetricians and Gynecologists

LSAS Life Saving Anesthesia Skills

ET Emergency Trolley

EmOC Emergency obstetric care

WISN Workload staffing Needs

WHO World health Organization

CS Cesarean section

COVID-19 Corona Virus Disease of 2019

P&P Policy and Procedure

DG Director General

HMIS Health Management Information System

MHA Master in Hospital and healthcare Administration

QI Quality Improvement

DEFINITION OF KEY TERMS

Decision time : Refers to the interval between when healthcare providers decided until the Mother consented for an emergency caesarean section (1)

Preparedness : The knowledge and capacities developed by professionals and or organisation to effectively anticipate, respond to and recover from imminent emergency situation (2)

Incision time : The time when a surgeon made the first incision (cut) to start surgery

Maternity : A section of hospital that provides care for women and newborns

Emergency caesarean section : Refers to a surgical procedure that is performed for immediate threat to the life of fetus and/or woman (3)

Clinical indications : Reasons for deciding cesarean sections (4)

A surgical kit : Refers to a collection of tools that can be used to aid a surgical team in the performance of surgery in order to save operating room time(5)

Policy : A formally advocated statement or understanding adopted to direct a course (6)

Delay : Long waiting time because of system inefficiency (7,8)

Standard: Statement of quality expected

ABSTRACT

Background: Achieving 30 minutes guideline of the American College of obstetricians and Gynecologists and the Royal College of Obstetricians and Gynecologists (RCOG) is still a challenge in low limited resource settings in developing countries. In maternity ward at Kinihira provincial hospital; baseline data showed that from January to December 2019; only 10.1% (46/454) of emergency cesarean sections were executed in 30 minutes.

Objective of the study: The objective of the study was to reduce the emergency caesarean section waiting time on decision to incision from 89.9 % to 60 % by May 2021.

Methodology: This study used pre and post interventional study design to reduce the emergency caesarean section waiting time on decision to incision by using strategic problem-solving steps

Results: The waiting time of emergency cesarean sections was reduced from 89.9% to 68.7% (P=0.03) after the intervention, the total median time on decision to incision was also dropped from 60 2.to 37.2 minutes (p=0.01). Similarly, none reassuring fetal heart rate cesarean indications performed within 30 minutes was also significantly increased from 6.1% to 16.9% (p =0.01)

Conclusion: Given to the complexity of emergency cesarean section; a well-trained obstetric team is required, teamwork skills and availing clinical guideline for emergency supplies and surgical materials organization are also essential to reduce long waiting time on decision to incision time.

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CHAPTER ONE: INTRODUCTION

1.1 Background

Despite of many interventions undertaken in maternal and child healthcare ; quality of maternity care in low income countries was given little attention for achieving 30 minutes guideline recommended by American college of obstetricians and Gynecologists for emergency cesarean sections(9).The maternity ward of Kinihira provincial hospital offers obstetric care services which include; antenatal services, intrapartum services, postnatal services and supervising eight health centers in the catchment areas . Maternity ward was selected as the study setting as it is one of critical areas where mothers and newborns experience serious complications or loose their lives when serious measures are not taken to anticipate barriers to high quality of care. This maternity ward has total 35 beds capacities, 3 labor beds 6 recovery beds and staffed with 13 midwives and it has enough rooms with its own operating room for obstetric cases. The hospital has 118 employees which include 4 anesthetists, 10 doctors, 50 nurses, 13 Midwives, 19 allied health professionals and other 28 administrative staff.

TABLE 1: FACILITY GENERAL INFORMATION (SECONDARY DATA) (10)

Facility characteristics	Number
Number admission in a year	45, 299
Number of outpatient patients in a year	21,220
Number of total deliveries in a year	1500
Bed occupation rate	46.1%
Cesarean section rate	51.6%
Number of operating rooms (OR)	2

1.2. Problem statement

There is a long waiting time on decision to-incision for the emergency cesarean section in maternity ward of Kinihira Provincial Hospital.

1.3 Objective of the study

The objective of this study was to reduce the long waiting time of emergency cesarean sections on decision to incision from 89.9% to 60% from January 2020 to May 2021(12 months).

1.4 Hypothesis statement

-H0: There is no significant delay on decision to incision time for emergency cesarean section in maternity ward of Kinihira Provincial Hospital.

-Ha: There is a significant delay on decision to incision time for emergency cesarean section in maternity ward of Kinihira Provincial Hospital.

1.5. Justification of the study

Rwanda has made a significant progress in addressing barriers to high quality of care on maternal and neonatal health however, improving the quality of practice in maternity and operating room to minimize unnecessary delays to respond to obstetrics emergencies is still suboptimal. Moreover, the emergency cesarean section may happen at any time in any maternity ward and decision to incision time is one critical time in medical field for the concern of mother and newborns' health. In responding to such emergency situation, a surgical team must be well prepared without unnecessary delay to prevent life threatening clinical complications. Despite of lack of evidence, many patients in obstetrics or other health services complain for delays to receive care or treatment even when the decision was taken in reasonable time not necessarily because the staff do not want to help or not around but due the complexity of working environment and processes to undertake before the implementation of a decision taken therefore, this project assessed barriers that impending timely responding to emergency cesarean section and proposed solutions to address those barriers by using strategic problem solving approach .

1.6. Organization of Dissertation

The capstone dissertation is organized into six chapters. Chapter one is introduction, it describes background of hospital setting and information related to the project. It also describes the objective of the study, hypothesis and justification of the study and its potential impacts to the hospital. Chapter two is a literature review, it provides an overview on decision to incision time for emergency cesarean section, impact of decision to incision time, and different interventions to improve emergency cesarean section response time on decision to incision at different settings from different researchers. Chapter three is study methodology; it describes all procedures used to conduct our study from the beginning to its final step. It also demonstrates study design, sample size, sample techniques, data collection tools, root cause analysis, how the results were analyzed, interventions, indicators measure and ethical considerations. Chapter four presents the findings of the project. Chapter five contains discussion based on findings of the project. It also includes some challenges, lesson learned and limitation of the project. Chapter six is the conclusion and recommendations as well as challenges, Key to success and Lesson learned and appendix with list of references.

CHAPITER TWO: LITERARURE REVIEW

This chapter provides an overview on decision to incision time guideline, impact, factors contributing factors and different interventions and best practices to improve emergency Caesarean section response time at different settings from different researchers in developing and developed countries. The emergency Caesarean section efficiency has been defined by using the American College of Obstetricians and Gynecologists guidelines of decision to incision time of less or equal to 30 minutes and this standard was made based on data from hospitals surveyed in united states that were questioned about the minimal time to initiate emergency cesarean section within or less than 30 minutes but the usual standard is between 60-75 minutes for category 2 ; Subsequent studies showed that it remains a common challenge in developing countries to achieve this obstetric critical time and to meet 30 minutes requires a room full of healthcare professionals and great deal of organization (12).

2.1 Decision to incision time for surgical emergencies

A study conducted in three hospitals Kigali University Teaching Hospital(KUTH) ,Butare University Teaching Hospital (BUTH) and Kibagabaga District Hospital about responsiveness to life threatening obstetrical emergencies , found that it took 33.4minutes ,31.2minutes and 31.5 minutes from decision to enter theatre at each site ; and after entering the theatre to incision it was found that it takes 24.6minutes , 25.6minutes and 18.1 minutes respectively at each site .The interval time from decision to incision then was 57.7minutes , 55.7 minutes and 49.3 minutes respectively at each site .The reason of delay were such as delay in getting blood (11.8%), no sterile surgical kits (2.7%), surgeon not available (4.4%) , busy theatre(6.6%) , difficult to get special consultant (3.9%) , patients related issues (3.7%) , no challenges (66.7%) and other study analyzed three delays to access emergency maternal services which shown that 85% of emergency Caesarean sections were performed beyond 30 minutes and concluded that long decision to incision time was associated with less risk poor neonatal out comes (13,14).

In Lilongwe, Malawi. Decision to incision time was one of quality indicators of a cesarean delivery assessed at Bwaila maternity hospital in 2015 and the average decision to incision time was 1.69 hours. The most delays were attributed to busy operating 49.1% and delayed to transfer to the operating room 26.9% and the decision with or without neonatal deaths was similar,

infrastructure and personnel was major barriers to the improvement of quality of cesarean section in Cameroun , Yaoundé only 19.6% emergency Caesarean section were performed within 30 minutes (15).

A similar study conducted in Ivory Coast and Cameron showed that decision to incision time was around 3hours and 55 minutes and 3hours 45 respectively and also indicated that fetal outcome was worsened with lengthening of time between decision and incision and suggested that decision makers should provide a single Caesarean section kit, rehabilitate operating room, institute insurance or pooling system to shorten this third delay (16). Similar Studies in Kenyan public hospitals based in urban settings showed an adherence rate of 0% to 3.8%, with private hospitals reported slightly higher achievements ranging from 8.6% to 20.4% and concluded that delays in preparing the mother for the caesarean section which resulted in not meeting the global standards and delays were health facility-related and not patient related (17).

2.2 Decision to incision time for surgical emergencies: The practice and challenges in low-income settings

A study conducted in university of Port Harcourt Teaching hospital in Nigeria showed that a prompt attention to emergency had always been the standard of care which intends to improve outcomes and anticipate negative consequences. This study was aimed at exploring both human, material and administrative challenges encountered by surgical and anesthesia teams to respond to emergency surgery including caesarean section. The findings revealed that the shortest decision to incision time was found in obstetric patients compared to other surgeries, however the organizational challenges encountered at the point of duty were among the major cause of delay to respond to in surgical emergencies. Further results showed that the practice of emergency response was hindered by the challenges met at the point of duty ,despite of the high awareness of the providers, 81.9% respondents agreed on delays while preparing surgical emergencies and 98.1% of respondents confirmed delay in operating room(14,18,19) .

A systematic review out of 34 studies, only 36% of urgent emergency cases deliveries were achieved within 30 minutes. Details of these studies indicate that in the United Kingdom and the United States had adherence from 55% to 65%. On the other hand, studies conducted in Africa showed much lower adherence levels, ranging from 1% to 6%. In Great Britain, the recommended

decision to incision time was 75 minutes for all emergencies and under 30 minutes for extreme emergencies (20).

2.3 Factors contributing to emergency surgical procedures delays

F.L Cavallaro et al outlined factors contributing to emergency obstetric surgical delays in developing countries and grouped them into three categories: resource-related factors, Staff related factors, and institutional related factors as described below in figure (21).

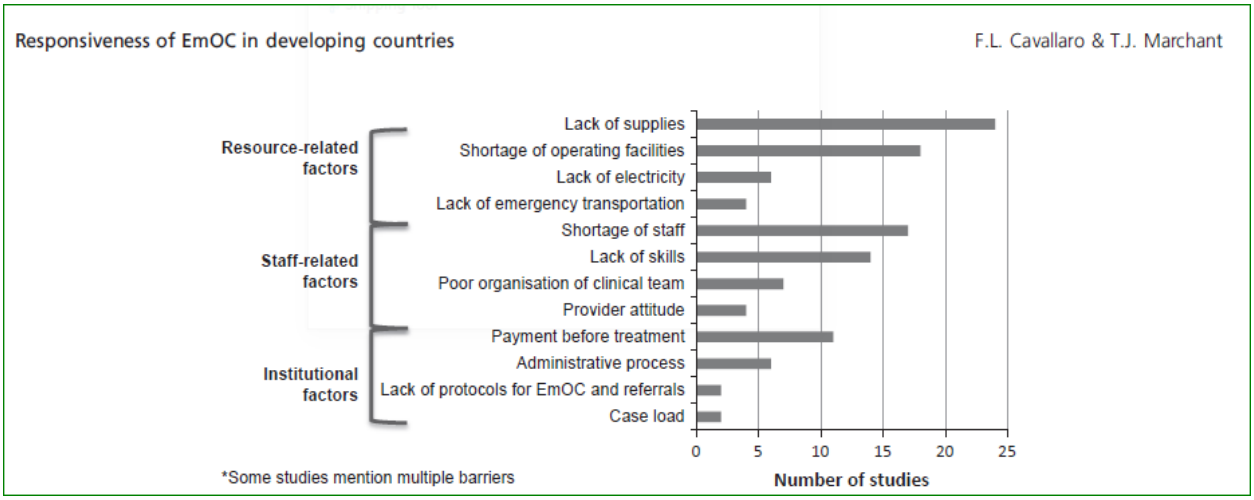

FIGURE 1: FACTORS AFFECTING RESPONSIVENESS OF EMERGENCY OBSTETRIC CARE IN DEVELOPING COUNTRIES

Figure 1 shows that lack supplies, shortage of operating room facilities, and shortage of staff and lack of skills were the major causes of delays in responsiveness of emergency obstetric care among 25 studies conducted in developing countries. Various factors have been also identified by other studies such as shortage of staff, poor electricity supply, inadequate supply of equipment, poor planning, incomplete kit and poor communication among concerned staff was a prominent factor among them however, poor working environment was associated with effect on the surgical procedures delay (21–24).

2.4 Standardizing and documenting decision –to- Incision intervals for ECs deliveries

An emergency cesarean section can occur at any time and for wide reasons which makes this type of delivery complex and challenging. Knowing how long time the team has to prepare for surgical intervention is a key to ensuring that the timing works well. The ideal of the length of

this interval has been discussed for decades following a recommendation by American college of obstetricians and Gynecologists (ACOG) early in the 1987, ACOG has maintained as suggestion to ensure an unit can deliver an emergency caesarean section in 30 minutes or less (25,26). The study conducted in Sierra Leone for the period from 2016 up to 2018, showed that the documentation of decision time and incision time was not common and there was no record for documenting both decision time and incision time. Both times were recorded in a separate file stored at different places, a decision time was recorded on in patient file charts, while the incision time was recorded in the cesarean section register.

The results showed that the documentation of incision time was improved from 95.1% to 98.3%(p=0.01), the completed decision time documentation was at 72.2% and the overall documentation of decision to incision time increased from 69% to 71.6% and the difference was not significant (p=0.61) , among patients whose decision to incision time were found among the following indications of emergency cesarean sections , 36.5% for obstructed labor , 21.1% for CPD and 9.8% for antepartum hemorrhage and about three quarter 73.9% of emergency cesarean sections were performed during the day and weekend.

The results showed that the decrease of median time was observed among emergency cesarean sections performed during the night shift between 05:pm to 08:am compared to those performed during day shifts between 08:00 am to 05pm (24).

2.5 Interventions and best practices to improve the emergency CS response time on decision to incision

The joint commission on accreditation of healthcare organization (JCHO,2004) recommended the emergency cesarean section drills and other recent studies found that trained in perioperative nursing team training was associated with shorter decision to incision time compared to the team which was not trained. Unpublished project entitled improving emergency cesarean section decision to incision time conducted by Ayele Teshome a medical doctor obstetrician and Gynecologist in Saint Peter Specialized hospital et al conducted a study to improve the decision to incision time for emergency cesarean deliveries and results revealed that availing emergency supplies in maternity ward and installing the stock monitoring system on shifts have improved the emergency cesarean section response time from 64.5 minutes at round 30 minutes.

Timely availability of all multidisciplinary team members, adequate supply of drugs and supplies needed for the procedure, stock out monitoring , effective communication system, organization's standardized classification for cesarean section describing the scale of emergency, standardized call process, response plan /back up, standardized list of supplies for cesarean section, remove unnecessary steps or tasks impacting decision to incision time, use of simulation drills for extreme obstetric emergencies and support ongoing alignment between policy , resource realities were identified as interventions.

The study revealed that both small and large maternity ward from hospitals peer review survey, and litigation review that many hospitals do not have a clear plan to respond to emergency cesarean section. In order to achieve 30 minutes rule, number of clinical practices need to be agreed upon by responsible departments: administration, anesthesia, midwifery, nursing, obstetrics and neonatology (3):

1. Equipment and supplies must be available on labour ward rather than in central location
2. Trolley or beds should be transferred quickly in operating room including the use the elevator if necessary
3. Fetal heart rate monitor should be quickly moved to the operating room
4. Accept "all hands-on deck "approach so that all personnel (medical, midwifery, nursing) assist in the transfer of patients and equipment in operating room rather than small team
5. Operating room clothing in an emergency, personnel need not change to full operating room scrubs: Put on gowns, hair caps, foot covers, masks, rule up your sleeves / scrub's gloves
6. Limit or omit scrub time
7. Scrub nurse if full operating room personnel are not available, any nurse or midwife should be able to the initial set up and scrub for cesarean section
8. Skin preparation "accept splash and dash approach "
9. A starter kit '" must include enough instruments to get the baby delivered.
10. Limit preoperative checklists (WHO surgical Safety checklist)/ preoperative multiple questions on checklists is time consuming for surgical team
11. Use verbal consent only. Provide a clear, sympathetic and decisive explanation of the need of an emergency cesarean section.

12. A time for decisive pelvic examinations (a nurse or Midwife must quickly insert a Foley catheter into the bladder

Delay in surgical preparation has a significant consequence in the perioperative system and it has been referred to as a sign of inefficient and imperfect system. At Maiduguri University Hospital; various factors such as shortage of staff, poor electricity supply, inadequate supply of equipment, poor communication among theatre personnel were causes of surgical delay and the study concluded that poor conditions of working environment has a serious consequences on outcome of the surgical operations(7) .

CHAPITER THREE: METHODOLOGY

3.0 Study design

This study used pre and post interventional study design to reduce the emergency caesarean section waiting time on decision to incision by using strategic problem-solving steps.

3.1 Sample size

A total of 454 and 377 emergency cesarean sections performed on spinal anesthesia, pregnancy without any diseases associated and whose decision time and incision time documented were respectively included in this study. The interventions were developed and implemented and the evaluation was done to assess their impact on decision to incision time for the emergency caesarean section.

3.2 Defining the problem

The decision to incision time, is one of critical time and most misunderstood in obstetrics. Challenges issues faced by obstetric teams today and are certainly arised in many medical malpractice's cases throughout case investigation and clinical audit findings are hospital delays related despite lack of evidences. Kinihira Provincial Hospital through deaths audit findings of the period 2018 to 2019;23% of recommendations reported by the audit committee (appendix 19) were associated with hospital delays to provide appropriate care (Third delay), also the routine data showed that 25 % (14/55) of maternity birth asphyxia cases were associated with Caesarean sections and contributing factors were not yet identified. The scope of this project was determined by the audit committee.

3.2 Baseline Data Collection Procedure

To have a better understanding of the baseline, we gathered information on the cesarean section process (appendix 9). The baseline assessment started from January to December 2019 among 454 cesarean deliveries who met inclusion criteria (a single pregnancy and emergency, without any diseases associated and time of decision and incision documented). The calculation of

duration of delay was done by making a difference between incision time decision times and converts the results into minutes to all emergency cesarean deliveries performed throughout the

study period from January to December 2019. The waiting time was also calculated based on locally defined clinical indications of emergency cesarean sections.

The proportion of emergences caesarean deliveries performed within 30 minutes were calculated by using the following formula

1. Proportion of Caesarean section started on time = Number of Caesarean sections performed within 30 minutes / Total Number Caesarean section selected as sample size

2. Number of labor beds calculation steps:

Step1: Determine number of labor and delivery event in a year i.e. Number of vaginal deliveries per year + Projected number of unplanned c- section per year

Step2. Take 0.33 days or 8 hours (4 hours for pre-delivery preparation and 4 hours for recovery and labor room cleaning as average length of stay

Step3. 75 % or 0.75 is recommended occupancy rate for health facilities

Step 4. Insert the number obtained from above steps and calculate number of laboring bed required therefore for Kinihira provincial hospital maternity ward, laboring beds required are = (1500*0.33)/ 365*0.75= 1.8 = Approximately 2 laboring beds

The team utilized time studies, process mapping, frequency and percentage tables and controls chart as tools to determine the magnitude of the problem. In order to ensure the constituency, these tools were also used in post intervention period. The figure 2 below describes the process from decision to incision time.

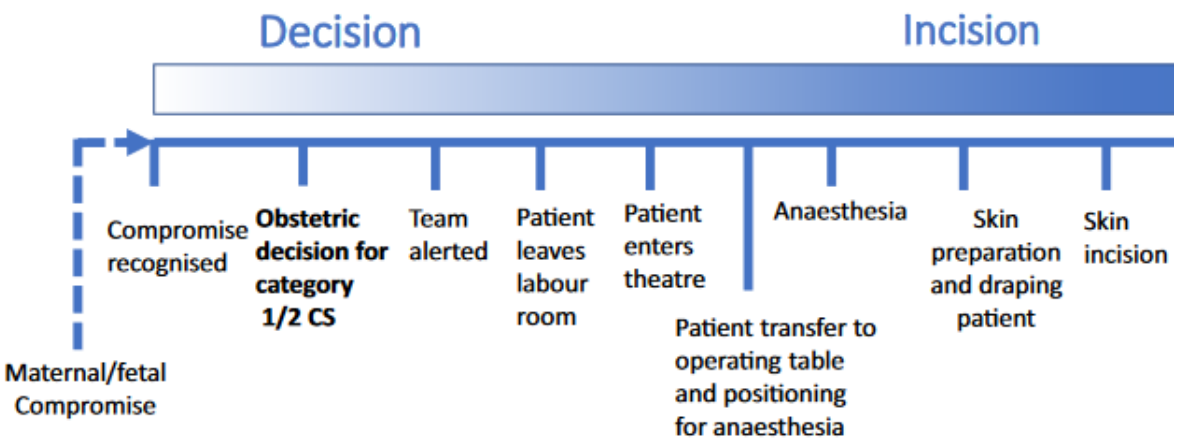

Figure 2: Decision to Incision Time for Emergency Caesarean Section Process

The figure 2 above describes the process from when the maternal / fetal compromise was recognized until the skin incision is made on mother's abdomen in operating room. Despite of numerous procedures to be taken place the time from decision (recognition of the emergency to begin skin incision should be done within or less than 3o minutes.

3.3. Magnitude of the problem

The project was initiated to identify barriers and put in place system changes to improve emergency cesarean section response time on decision to incision time in maternity ward at Kinihira provincial hospital. In order to accomplish this quality improvement project; a team includes Doctors, nurses, midwives and anesthetists involved in cesarean section process was formed to deeply study causes delays in response of emergency Caesarean section and propose solutions. The researcher found that the average time between decision and incision was 60.2minutes (1hour 2 minutes) which two folds of 30 minutes recommended by American college of obstetricians and gynecologists. The proportion of cesarean sections performed within 30 minutes was shown in figure 3 below:

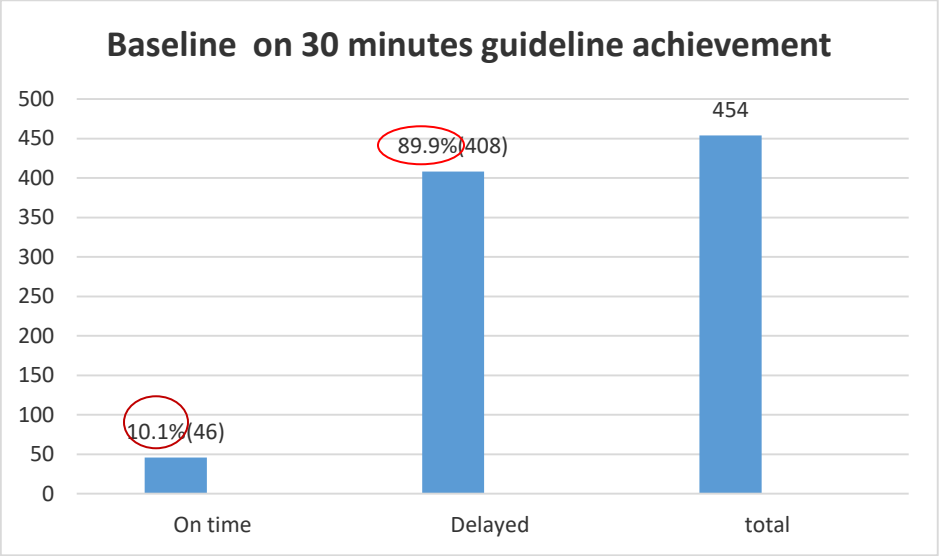

Figure 3 Baseline data on 30 minutes achievement

The figure 3 above shows that only 10.1 % of emergency cesarean sections were performed within 30 minutes on decision to incision. Emergency caesarean sections response according to caesarean indications was shown in the figure 4 below:

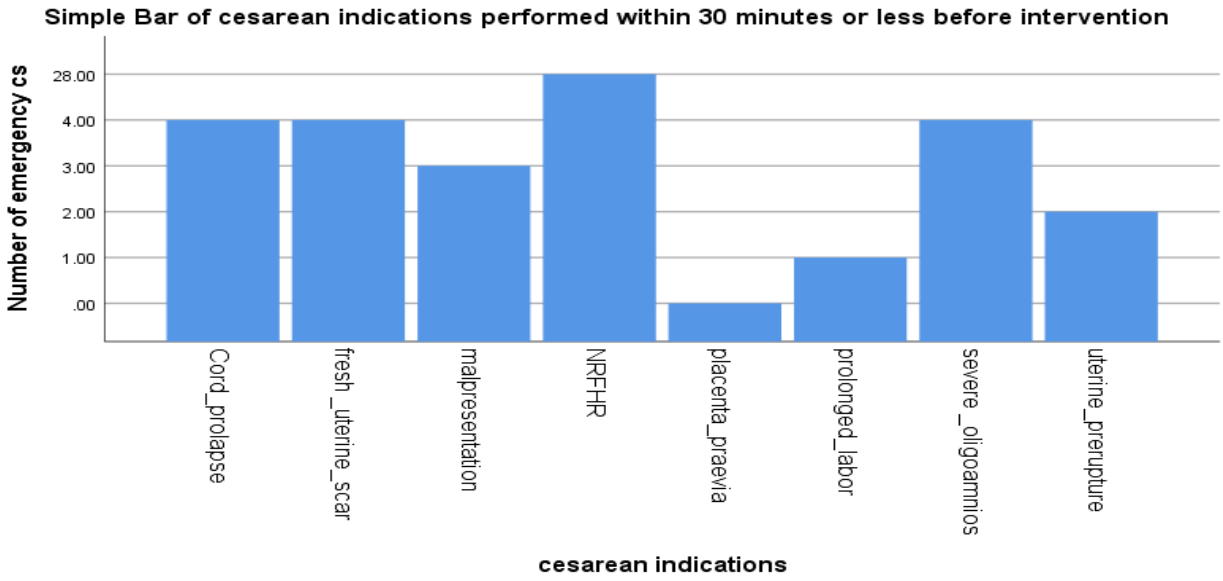

Figure 4: Summary of results of cesarean sections performed within 30 minutes

Figure 4 shows that among 454 emergency cesarean deliveries, only 46(10.1%) were performed within 30 minutes or less from decision to incision time and the majority among them were None-reassurance fetal heart rate 28/46 (61%).

Emergency cesarean section response time according to time of shifts was shown in figure 5 below:

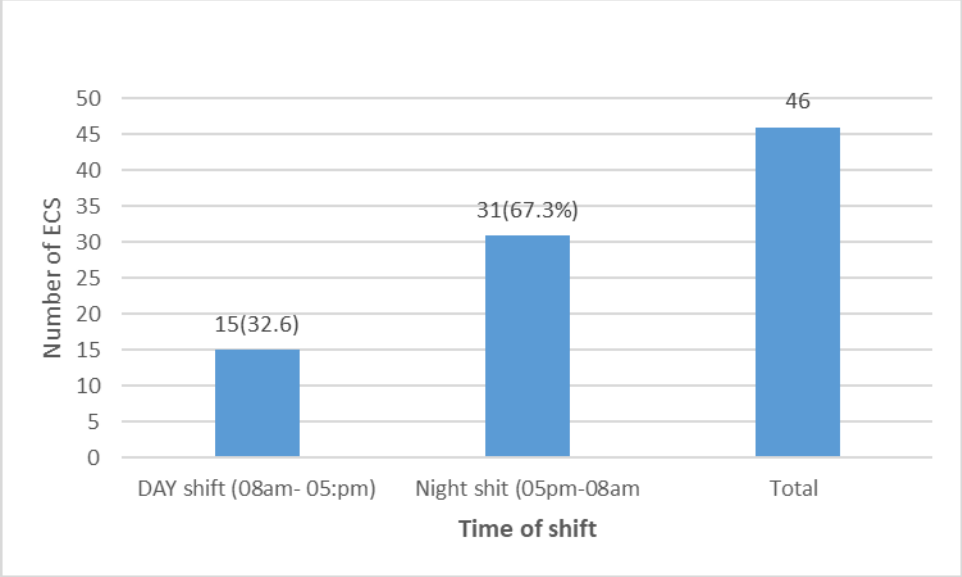

Figure 5. Emergency caesarean section response time according to time of shift

The figure 5 above shows that the majority performed within 30 minutes were done during night shift (05:pm -08am) at 67.3% compared to 32.6 % done during the day shift (08:am-05:pm).

3.4 Root cause analysis

In conducting root causes analysis, a researcher together with quality improvement focal person convened a meeting of doctors, nurses and midwives working in maternity and operating room. The process of root cause analysis went through these steps: collection of possible causes, verification of possible root causes and identification of real root cause.

34.1. Collection of possible root causes

Activities or processes within any organization contain two major components: (1) what is done (what care is being provided) and (2) how is done (where, when and by whom care is delivered). The improvement can be achieved by addressing either one component however the greatest improvement is achieved impact when both are addressed at the same time (27).

To find out the gaps on above components in maternity ward at Kinihira Provincial hospital, the researcher and hospital quality improvement team organized a meeting to present baseline findings on emergency cesarean sections waiting time on decision to incision for the period of 12 months (January – December 2019), discussed and brainstormed on possible causes of long waiting time on decision to incision. Various literature review was used to compare and gauge possible causes mentioned by staff and those from different publications; the possible causes were classified into People, environment, policy and procedures or process and equipment and then displayed on the fishbone (fig 6 below).

The possible root causes collected in the meeting were:

1. Shortage of staff
2. Untrained staff on emergency caesarean section response
3. Long travel time between services
4. Unorganized surgical instruments and supplies
5. Poor information flow
6. Lack of clinical protocol/tools

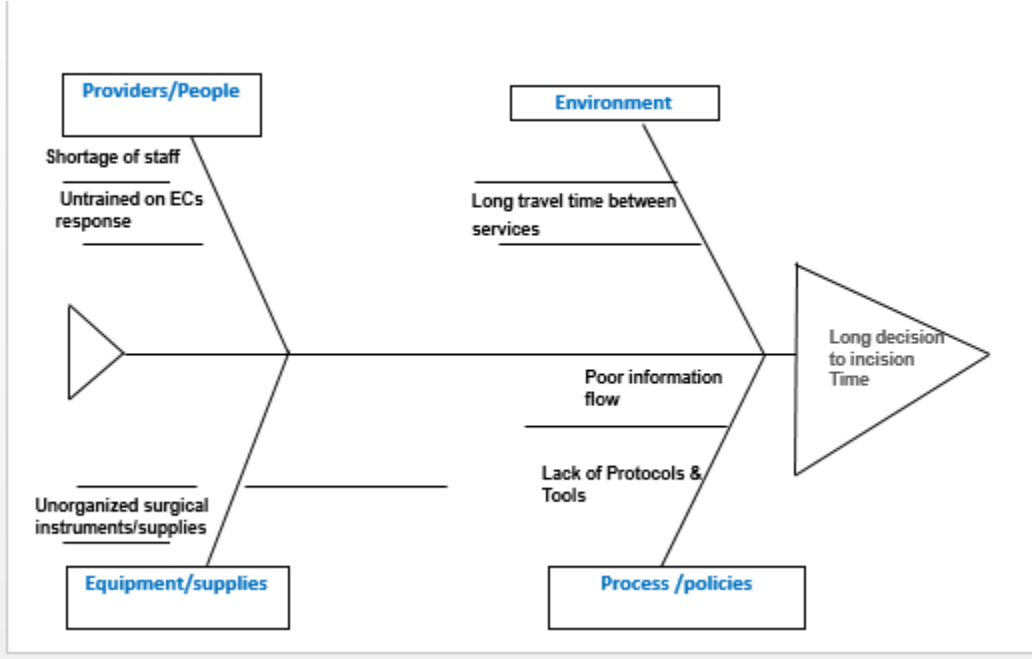

FIGURE 6: FISHBONE DIAGRAM SUMMARIZING COLLECTED POSSIBLE ROOT CAUSE

34.2 Verification of possible root causes

As the major part of the project, various methods were used in order to find out the root cause of long time on decision to incision for emergency cesarean section in maternity ward of Kinihira Provincial hospital. We first designed the process through which the emergency cesarean section undertakes from the time of decision to the time of incision in operating room (appendix 2).

Each possible cause was verified and deliberated separately by using different methods such as: Observation survey, process mapping, and checklist, brainstorming sessions, and focused group discussion.

1. Environment

Good working environment in obstetric services, provides conditions that enable health workers to perform effectively in order to achieve high-quality health services. Organizational of rooms and travel time between key services such as Labor and delivery rooms, dispensing pharmacy, central sterilization, laboratory and operating rooms were deliberately studied as follows (table 2& table 3):

1.1 Long travel time between key services (Layout)

How long and how far the clinical team travels to get supplies within health facilities have the impact on service utilization and delay

1.1.1 Operating room and Labor and Delivery room travel time

To verify the room design constraints and travel time between services, a focused group discussion, an observation survey and time study (appendix 22) was conducted in maternity ward with the team was also done. The staff showed that the Labour and Delivery room (LDR) design is one of possible cause in evacuation of an emergent case to the operating room, because there was no direct connection between LDR and Operating room (OR).

Various literature were reviewed and showed that the Labour room in every delivery point should be standardized for delivering high quality services by focusing on layout, space and staff required but its implication in delays was not mentioned (28).

The International Health Facility standard part B version 5, 2017 describes that the time to move from labour and delivery room (LDR) to operating room (OR) should not exceed 3 minutes and these room should be accessible and interconnected to allow intra-transfer processes of patients from the room to another(8).

The time required to move from LDR was timed and calculated from LDR to OR and found that it required only 1minute 30 seconds in considering all circumstances of a mother transportation. Therefore, the layout of LDR and OR was not real root cause of the long time on decision to incision of the emergency caesarean section.

1.1.2 Dispensing pharmacy and LDR travel time

To verify this a time was calculated by timing departed from Labor and delivery room up to dispensing pharmacy which took 6: 27seconds (200m) by foot (departure and return) which was relatively long distance between these services and could be one cause of long decision to incision time in case there a need of emergency supplies from dispensing pharmacy for emergency interventions.

1.1.3 Central sterilization and LDR travel time

Central sterilization room as one key services in processing surgical instruments was located in main operating in other block which took 6 minutes 13 seconds by foot from labour and delivery room (departure and return). This travel time between central sterilization and LDR was relatively long in case there is a need to assemble surgical instruments for an emergency caesarean section 1.

1.1.4 Laboratory and LDR travel time

Laboratory as one key service to carry out laboratory investigations necessary in emergency caesarean sections and other emergencies is located near maternity in the same block building. The travel time by walking was 3 minutes 2seconds (departure and return) which was relatively good and meet standards. Table 2 below shows that moving from LDR to CSSD and pharmacy 00: 6: 27 and 00: 6: 13 respectively:

TABLE 2: TIME STUDY ON TRAVEL TIME BETWEEN KEY SERVICES

Services	Departure time	Return	Total time used
LDR and CSSD	00:00 :00	00:06:27	00: 6: 27
LDR and Dispensing pharmacy	00:00 :00	00: 06: 13	00: 6: 13
LDR and OR	00:00 :00	00:01 :30	00:1:30
LDR and Laboratory	0:00:00	00:03:2	00: 3:2

Area for emergency delivery organization

Score of area for emergency delivery organization was evaluated based on the following

- Very poor: No ward infrastructure
- Poor < 50% of all standards scoring yes
- Fair 50-79% of all standards scoring yes
- Good 80-99% of all standards scoring yes
- Very Good all standards scoring yes

Evaluation of standards for emergency delivery areas are described in the table below:

TABLE 3: EVALUATION OF STANDARDS FOR EMERGENCY DELIVERY AREAS

Standards on physical structure	YES/NO	Comments
Room/s for emergency delivery are well designed (no physical barriers/ easy access, enough light and enough plugs for power supply	Yes	No impact on waiting time for emergency caesarean section
Room for emergency delivery is well equipped	No	Unavailability of some equipment and supplies
The equipment and supplies are orderly and ready	NO	No list of emergency equipment and supplies
There are posters and job aids on emergency care	Yes	Only in maternity but not found in operating room and sterilisation
Physical distance between units permits adequate care during transport	NO	Long distance between CSSD and maternity ward

Findings show that YE/ NO *100= 2/5*100= 40% which is poor score (below 50%) and delivery areas was not well organized as per standard requirements (cfr table 3)

2. Procedure/ policy /process

2.1. Lack of cesarean section Protocol

According to Rwanda accreditation standards 2nd edition, risk areas 4, standard 9, 2014 recommends to avail protocols of high-risk patients and clinical procedures developed by multidisciplinary team and cesarean section was included. Cesarean section would describe

decision making process, role and responsibilities of each staff category from admission to patient discharge and outline the list of materials/supplies required for a cesarean section practice within a health facility.

Lack of cesarean protocol of cesarean section verification was carried out by using the tally sheet guided (Appendix 16) in asking the staff, the view of master list of protocols of maternity ward to ascertain that there was no protocol availability.

The results showed that cesarean protocol was not on master list. All staff (23) involved in cesarean section process, reported that there was not clinical protocol to guide them on their daily practice. Therefore, the lack of clinical protocol was one of cause's long waiting time on decision to incision.

2.2 Information flow process issues

Information flow is one cause of delay during healthcare process and this made difficult professionals to become proactive and prepared in their follow up of patients' needs. however ; the information continuity and reaction on it depends on individual perception and It was evidenced that information flow issues happened due to failure in technology and inter-organizational governance(29,30).

We verified this possible cause by using a guided sheet of communication tools in case of emergency communication by brainstorming concerned staff Nurses, doctors, Anesthesia technicians and midwives about the process used to inform an emergency cesarean section to the team. The results showed that in maternity ward there are effective communication tools (interdepartmental toll-free phones and use of Situation Background Assessment Recommendation (SBAR) tool was available and used by staff to communicate an emergency situation to their colleagues while calling for help.

2.3 Lack of tools for operation time monitoring

Monitoring of the operation time helps to tracking the work process and quality control among the team. We conducted a structured mini -survey to brainstorm a surgical team and find out that 23 /23 study participants showed that there was no tool to monitor the operation time, the

available surgical safety checklist was not showing time as element to assess (Appendix17). Therefore, this could lead to long waiting time on decision to incision.

3. Equipment/supplies

In order to verify the emergency equipment and supplies organization and availability we conducted a mini –survey in OR and in LDR by using guided tool to understand the surgical instrument processing and monitoring mechanisms.

3.1 Surgical instruments in Operating room

It was evidenced that management surgical instruments and supplies is important for improving safety of surgical care and saving time of surgical procedure especially in case of emergencies however it was ignored by researchers (31).

The sterilization and processing of surgical instruments took place in main operating room which is block B of the hospital and it took 6:27 minutes and the distance from LDR to main operating room was 200 meters (go and return) from maternity ward. Further findings revealed that to perform one caesarean section, it was required to collect 6 kits of surgical instruments 6 sets (picture, figure 6) from the Main operating room to the maternity operating room.. In addition, there were no monitoring plans of sets availability and handover process among nurses. Therefore, this was ascertained as one of causes of long time on decision to incision.

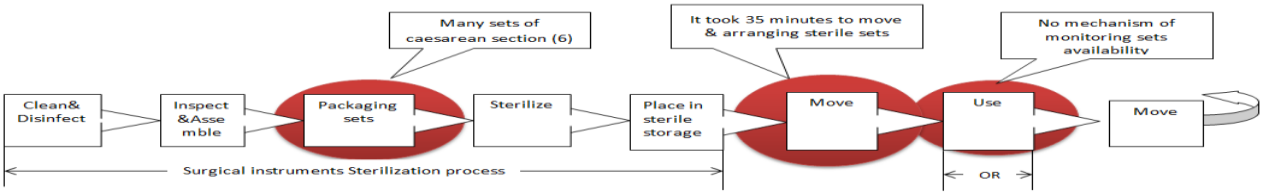

FIGURE 7: STERILE INSTRUMENT CYCLE WITHIN A HOSPITAL

Figure 7 above shows the process of surgical instruments preparation and gaps identified (in red).

3.2 Emergency supplies and equipment in Labor and Delivery room

In order to verify this possible cause, an observation survey a checklist was used (see table below) to assess the availability of all required supplies for emergency caesarean deliveries preparation.

TABLE 4:COUNTS OF MISSING EMERGENCY MATERIALS /SUPPLIES IN LDR

Rooms	Total required	Missed emergency supplies	#Available equipment and supplies	% of missing
Labor and delivery room	21	8	13	38%

The table 2&3 show that 38 % of required supplies were missing in maternity during preparation of mother prior to emergency Caesarean section. It required to travel from Labor room to dispensing pharmacy to acquire needed supplies where by it took 6 minutes 13seconds.

Therefore, we have identified that missing of some supplies in labor could be one of possible causes of delay to transfer a mother in operating room.

The table below shows the status of availability of emergency surgical equipment / supplies and the inventory in working areas in labor room and delivery rooms prior caesarean delivery:

TABLE 5:CHECKLIST FOR SUPPLIES ASSESSMENT IN LABOR AND DELIVERY ROOM

Required supplies	Available	Missing	Comment
Nasal cannula	✓		No record
Clean Gloves		✓	No in-service stock
Sterile glove		✓	No in-service stock
Tourniquet	✓		
Gowns	✓		No record
Iv- line set	✓		No record
Syringes			No record
Spinal Needles	✓		No record
Complete cesarean kit	✓		Unorganized
concentrator		✓	Insufficient
Disinfectant	✓		
Urinary bag		✓	
Prophylaxis drugs		✓	
Baby balance	✓		
Tetracycline	✓		
Vitamin K inj.	✓		
Surgical blade		✓	No record
Oxytocin inj.	✓		
Baby warmer		✓	Insufficient
Scotch	✓		
Urinary catheter	✓	✓	
Wheel chair	✓		

4. Providers /people

4.1. **Untrained staff on emergency obstetric response**

It is imperative for the surgical team to be trained on emergency obstetric including caesarean section response. To verify maternity staff training, a self-administered tally sheet was used to collect information from each staff whether he/she was trained or not in the last 2 years on emergency obstetrics. The information received was cross checked in Human resource office on the same staff working in maternity to verify the proof of their trainings on obstetric emergency response and other related trainings.

The results (Table4) showed that 5/11 (54.5%) were not trained on any of training mentioned on checklist (appendix18). Further findings revealed that there was one staff attended 3 trainings (attended a meeting, CPR training and first aid skills training) and another one attended 2 trainings (CPR training and first aid skills training). First aid skills training was attended by 2 staff, Cardiopulmonary resuscitation 4 staff, emergency response Team training (CERT) and 5 showed that they didn't attend any training about obstetric emergency response

TABLE 6:MATERNITY WARD STAFF TRAINING ON EMERGENCY OBSTETRIC RESPONSE

Type of training	Frequency	Percentage
Obstetric emergency obstetrics	2	18.1%
First aid skills	1	9.1%
Attended meeting	2	18.1%
CPR	2	27.2%
Untrained at all above	4	36.3%
Total	11	100%

At least 36.3% of participants reported that they were not trained on any clinical emergency and 9/11(81.8%) were not trained on obstetrical emergencies.

4.2 Knowledge of staff on emergency caesarean indications

Staff working in maternity ward should have an adequate knowledge on emergency caesarean section indications so that the team can quickly intervene in order to prevent both maternal and new-borns complications. A study conducted to determine the rate of and clinical indications for emergency Caesarean section by Mohammed Naeem et al in tertiary care Hospital Peshawar in 2015 revealed top six indications for caesarean section as follows : NRFHR 17.1%, obstructed labour / failure to progress 16.1%, previous Caesarean section 15.2%,breech presentation 9.5%, cephalopelvic disproportion 6.1%, failed induction 5.7% and pregnancy hypertension 5.7% , prolonged labour 8% and revealed that most of caesarean section indications were emergency (24). Literatures revealed that number of caesarean sections are raising and their benefits to both mothers and foetus are explained by their indications(9).

The following are the major caesarean indications in maternity ward at Kinihira provincial hospital:

Non-reassurance foetal heart rate (NRFHR)

Non-reassurance foetal heart rate has been shown as one the most cause of emergency Caesarean sections. It is diagnosed when foetal heart rate is are < 120 beats per minutes and when foetal heart rate is >160 beats/minute. This indication is very critical and need quick intervention immediately after a decision for emergency Caesarean section in order to save a new-born from Birth asphyxia (Apgar score below 6 at 5^{th} minute) which is the second cause of death worldwide after prematurity.

Placenta abruption

Placenta abruption is one of late bleeding disorders on pregnancy and it is painful (placenta detaches itself from uterine wall) that results in excessive bleeding. In the presence of major placenta abruption, even when the foetus is alive at presentation, the outlook of the foetus is poor and the baby should be saved by an emergency Caesarean section. When placenta abruption happens, a baby can't get the necessary nutrients and oxygen inside the uterine and it requires an emergency Caesarean section.

Placenta praevia

Placenta praevia is one of the late bleeding disorders on pregnancy, (low lying placenta where it covers or reaches internal os of cervix. Its diagnosis is usually an indication for emergency c-section sections in major placenta praevia (Type III-IV).

Obstructed labour/Failure to progress

The presenting part of the baby is blocked is not progressing over time of labor (>20-24hours hours) for primipara and is above 12hours for multipara, cervix does not open (dilate) for the baby to pass through Labour on uterine fresh uterine scar. There is excessive contractions on fresh uterine scar (>6months of previous Caesarean section delivery).

Umbilical prolapses

Umbilical cord has dropped out through the cervix

Uterine rupture: The rupture of uterus is a major obstetric emergency with potential high morbidity and mortality for mother and foetus. Is a separation of the entire thickness of uterine wall including serosa, with or without expulsion of the foetus and it is a rare event, with incidence being reported as 1/12,960 deliveries to 1/17,000 deliveries and studies revealed that neonates delivered within 18 minutes after a suspected uterine rupture had a normal PH levels or 5-mminute Apgar score greater than 7 (32).

Malpresentation

Usually, foetal presentation is cephalic but sometimes unusual presentations occur such as oblique transverse and breech presentations which require an emergency Caesarean section in order to save the baby or the mother.

In order to verify staff ‘s knowledge on emergency caesarean indications, we used to structure a checklist to assess and gauge 23 staff knowledge on emergency caesarean section indications out of 12 marks and the pass marks was set to be 6/12 (50%). Findings are described in the table below:

TABLE 7:STAFF ANSWERS ON EMERGENCY CAESAREAN SECTION INDICATIONS KNOWLEDGE

Emergency Caesarean section Indications	Correct Answers		False Answers		Total	
	f	%	f	%	f	%
NRFHR	20	87.0%	3	13.0%	23	100.0%
Abruption Placenta	22	95.7%	1	4.3%	23	100.0%
Labour on the uterine scar	14	60.9%	9	39.1%	23	100.0%
Bleeding placenta Praevia	18	78.3%	5	21.7%	23	100.0%
Obstructed labour	19	82.6%	4	17.4%	23	100.0%
Uterine pre-rupture	21	91.3%	2	8.7%	23	100.0%
Umbilical Cord prolapse	22	95.7%	1	4.3%	23	100.0%
Active labour on malpresentation	18	78.3%	5	21.7%	23	100.0%

Participants reported that umbilical cord prolapse, placenta abruption, uterine /pre-rupture were known by the staff at 91.3 and 95.7 % respectively and the least known clinical indication was labour on uterine scar followed by active labour on malpresentation and bleeding placenta praevia at 60.9 % and 78.3 % respectively.

4.3 Shortage of staff

Shortage of staff is one of causes in initiating emergency interventions however, there is less information on how this impacts on obstetrics care providers in low income countries and staff ratio for midwife per a laboring woman in maternity should be one to one (1:1) in order to meet 30 minutes guideline (33). Cerbiskait et al in 2021 studied the time taken to enter operating room for emergency cesarean section and found this to be reduced when more midwives were present and he further showed that the transfer time to operating room for grade 1 cesarean section was achieved within 15 minutes for 81/82(99%) cases where staffing was one to one (

1:1) or better compared to 34/40(85%) and decision to delivery time below 30 minutes were 77/82(94%) if staffing ratio was 1:1 in labor ward compared to 29/43(67%) when staffing ratio was less than 1:1(34) .In order to verify the shortage of staff in maternity ward at Kinihira provincial hospital, we used secondary data on workload indicators staffing Needs (WISN) report (Table 5).

The findings per each staff category indicated that there was a gap of 2 midwives, WISN ratio was 0.9 and work pressure was 10%. For Nurses there was no gap instead, there was excess of 2 nurses, Workload indicator Staffing Needs ratio of 1.1, and work pressure was -10%, for Laboratory technicians, the staffing gaps was 4, WISN ratio was 0.5 and work pressure was 50%. Among General Practionners; staffing gaps of 5, WISN ratio of 0.6 and work pressure was 40%.

The overall staffing gaps was 11 and average work pressure was 28%. Considering staff responsible in the process from decision to incision time nursing staff (Nurses and Midwives) were found more involved and their activities may delay this process of pre-operative preparation of surgery compared to other category of staff therefore, we discovered that this was not cause long time on decision to incision as the midwife to laboring woman ratio was 1:1 as per standard required in order to achieve 30 minutes.

It was evidenced that WISN ratio of 0.9 was considered to be a normal situation compared to maternity staffing requirement as the excess of nurses would cover the gaps among midwives in certain tasks of preoperative preparation prior to cesarean section (35–37). Staffing needs of Kinihira provincial hospital was calculated as shown in the table below:

TABLE 8:SECONDARY DATA OF WORKLOAD STAFFING NEEDS AT KINIHIRA PH (35)

Staff category	Existing staff (A)	Calculated required staff (B)	Staffing gaps (A-B)	WISN ratio(A/B)	Work pressure (1-ratio*100)
Anesthetists	3	6	3	0.5	50%
General practionners	8	13	5	0.6	40%
Laboratory technicians	4	8	5	0.5	50%
Midwives:	14	16	2	0.9	10%
Nurses	41	37	-4	1.1	-10%

TABLE 9:DECISION SUMMARY OF VERIFICATION OF SUGGESTED CAUSES

Possible root cause	Verification results	Conclusion
Travel time between services (LDR and OR)	Required travel time: 3 verified travel time 00:1:30	Rejected
Unorganized surgical instruments and supplies	Required cesarean kits: 1 verified available cesarean kits: 6 different Kits	Accepted
Shortage of staff	Required midwife to a laboring woman: 1:1 Verified Midwife to laboring woman ratio 3: 3 (day) & 2: 3 (night shift)	Rejected
knowledge of emergency caesarean section indications	Staff knowledge score 83.4%	Rejected
Lack of cesarean section protocol	protocol for cesarean section was not available in master list	Accepted
Lack of tools for operation time monitoring	There is gap to monitor operation time on surgical safety checklist 23/23=100 %	Accepted
Information flow process	23/23 = 100% confirmed that there were no issues in information flow	Rejected
Untrained staff on Emoc	9/11 staff were not trained	Accepted

3.4 Identification of real root cause

After a deep analysis of all suggested root causes, we substantiated these causes and concluded that the real root cause was: **untrained staff on emergency obstetric care and lack of cesarean clinical protocol** in maternity ward of Kinihira Provincial hospital.

3.5 Interventions

After identification of real root cause, the team proposed a set of interventions. The comparative analysis on the alternative interventions based on different criteria such as; impact, cost, feasibility, and time on each proposed intervention (Appendix12). The final intervention was to conduct on-site training among staff on surgical instruments organization and develop clinical protocol for cesarean section.

3.5.1. Staff training on surgical instrument Materials/ supplies organization

Surgical instruments should be, cleaned, packed in a single kit, sterilized and labelled and monitored on each shift for their availability (appendix 3, 4 &5). The operating room staff were consulted to make a list of all required supplies in cesarean sections and the draft was sent to Infection prevention and control committee through quality improvement focal person to validation and approval of new change.

3.5.2 Development of cesarean protocol/tools

A cesarean section protocol describes, staff involved, the role of each staff in the surgical team and a mother and or family and decision-making process in case of emergency cesarean section as well as tools to monitor the compliance with developed protocol.

3.6 Ethical consideration

The study did not involve patient contact, we did patient file audit after an approval hospital administration and ethical committee accepted to access patient file as all information obtained remained unanimously and did not affect the treatment of patients under study

3.7 Measures /indicators

Two main indicators were used in the study to evaluate the results of the interventions. First, number of staff trained on emergency obstetrics response (Emoc) and utilization rate of emergency cesarean audit tools.

3.7.1 Measure of outcome indicators

Indicator	Definition
ECs audit checklist utilization rate	Number of checklist well completed / number of all emergency cesarean sections in x time *100
The rate of ECs performed within 30 minutes	Number of ECs performed within 30 minutes / total number of ECs in x time *100

3.7.2 Measures of process indicators

Indicator	Definition
Number of staff trained on Ecs waiting time	Number of staff involved in cesarean section
Number of shits monitored for emergency supplies availability	Number of day and night shifts monitored for emergency supplies (kits) min OR and LDR

3.8. Data analysis

3.8.1 Emergency cesarean audit checklist utilization rate

The utilization rate of emergency cesarean audit checklist (appendix 8), data was collected using a developed tool (appendix 8). The information was put in frequency table and Microsoft excel for analysis.

3.8.2 The rate of ECs performed within 30 minutes on decision to incision time

The rate of ECs performed on time was calculated by using a checklist tool used to collect data (appendix 2)

3.8.3 EmCs waiting time according to indications

The same checklist used in pre- a post intervention gathered data were entered in Microsoft excel and imported in SPSS 25 to compare pre- and post-intervention; the Chi Square test were used with a p-value set at 0.05. Also, the unpaired t-test was used to compare two means of emergency cesarean sections waiting time according to specific indications.

CHAPTER FOUR: Project results

Descriptive statistics and SPPS 25 version were used to compare pre and post intervention the time between decisions to- incision time for emergency section. Data revealed that from January to December 2019 only 10.1% (46/454), (p=0.03) of emergency cesarean section were performed within 30 minutes while after the intervention from January 2020 to May 2021 was increased from 10.1% to 31.2% (p=0.02). The total median time was also dropped from 60.2 to 37.2 minutes (p=0.04). Equally, emergency response to NRFHR indications performed within 30 minutes was also increased from 6.1% (28/454) to 16.9% (64/377), p=0.01. The results also showed that emergency sections performed within 30 minutes on day shift increased from 15(32.6%) to 56(47.4%), on night shift was also increased from 31(67.3%) to 62(52.6%).

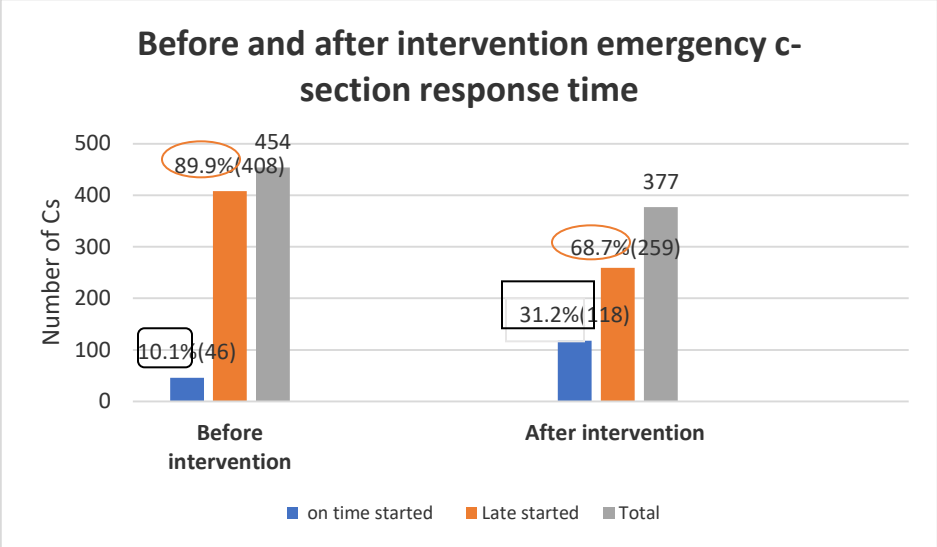

FIGURE 8: PROJECT IMPLEMENTATION OUTCOMES

Figure 8 shows that the % of ECs performed on time has been increased from 10.1% to 31.2% (p=0.03).

TABLE 10:CESAREAN SECTIONS PERFORMED WITHIN 30 MINUTES ACCORDING TO THEIR CLINICAL INDICATIONS

Cesarean indications	Before intervention (n=46)	After intervention(n=118)	Change	P-value
NRFHR	28(60.9%)	64(54.2%)	36 (50%)	0.001
Cord prolapses	4(8.7%)	5(4.2%)	1(1.3%)	0.049
Uterine/pre-rupture	2(4.3%)	2(1.7%)	0(0.0%)	0.067
Fresh uterine scar	4(8.7%)	4(3.4%)	0(0.0%)	0.067
Severe oligoamnios	4(8.7%)	8(6.8%)	4(5.6%)	0.044
Malpresentation	3(6.5%)	18(15.3%)	15(20%)	0.023
Placenta praevia	0(0.0%)	2(1.7%)	2(2.8%)	0.048
Prolonged labour	1(2.1%)	15(12.7%)	14(14.4)	0.043

Table 10 above shows that non-reassuring fetal heart rate (NRFHR) caesarean indications were highly significantly improved in pre-post intervention (p=0.001) and only uterine pre- rupture indications were not changed after intervention (p=0.067).

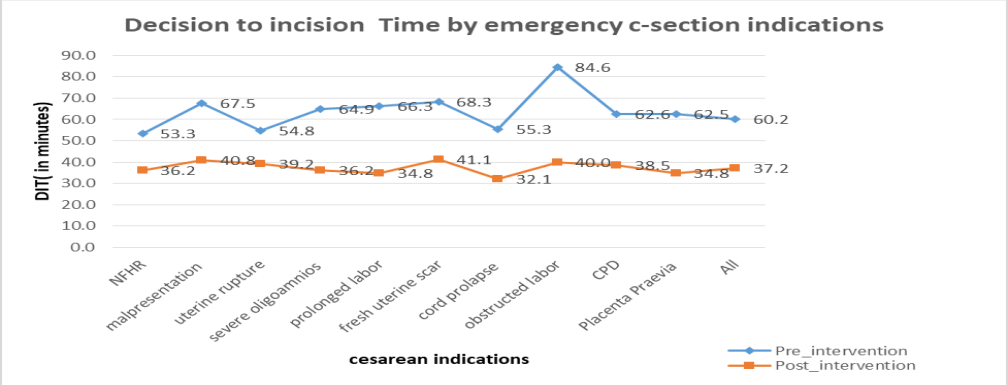

FIGURE 5: COMPARISON OF DECISION TO INCISION TIME PRE-POST INTERVENTION BY THE INDICATION OF CESAREAN SECTION

Figure 8 shows that a significant decrease of decision to incision time per indications, the minimum time was 32.1 minutes in post intervention while in the pre-intervention was 53.3

minutes and the overall median time in pre –intervention and post intervention was 60.2 and 37.2 minutes respectively.

TABLE 11:CORRELATIONS OF PRE AND POST INTERVENTION

		Pre-intervention	Post _intervention	change
pre_intervention	Pearson Correlation	1	.947**	.845**
	Sig. (2-tailed)		.000	.008
	N	8	8	8
Post _intervention	Pearson Correlation	.947**	1	.972**
	Sig. (2-tailed)	.000		.000
	N	8	8	8
Change	Pearson Correlation	.845**	.972**	1
	Sig. (2-tailed)	.008	.000	
	N	8	8	8

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

CHAPTER FIVE: DISCUSSION

The results of this project showed 89.9 % emergency cesarean sections performed beyond 30 minutes guideline which similarly to the study conducted in Rwanda by Martin et al in 2016 on responsiveness of emergency surgeries and results revealed that 85 % of emergency cesarean sections were performed beyond 30 minutes. On decision to incision was also increased from 60.2 to 37 .2 with no difference with the study conducted in Rwanda in three hospitals Kigali university Teaching hospital (KUTH), Butare University Teaching Hospital and Kibagabaga whereby decision to incision time was 33.4, 31.2 and 31.5 minutes respectively.

Shorter time interval was observed among emergency cesarean section indicated by none – reassuring fetal heart rate pattern from 6.1 to 16.9 % which is likely to the study conducted in United Kingdom ,in Thailand and United states showed that emergency deliveries indicated by none -reassuring fetal were performed within 30minutes were between 40% to 65% in developed countries and for in developing countries was only 0% to 20% (38) .

Surgical instrument packing and tracking system have been proven to save time for emergency cesarean section response on decision to incision time which is in line with the study conducted by Aeolian Zhu et al revealed that wrong instrument specifications were primary packing error identified and recommended to standardize the instruments packing procedures for reducing errors in high risk times such as emergency caesarean section , instrument assembly reduction time from 34 minutes to 20 minutes ,15 seconds , instrument set up in the OR went from 24 minutes ,9 seconds to 2 minutes , 29 seconds while at Kinihira provincial hospital; the time used to assemble and set up surgical instruments was also tremendously dropped from 35 minutes to 2 minutes in OR (from 58.3% to 5%) of total time used on decision to incision time(31).

The major cause of delay identified at Kinihira provincial hospital was unavailability of complete cesarean kits which in line with the study conducted by Onyebuchi, A et al on determinants of decision to intervention time in the management and therapeutic outcomes of emergency gynecological surgeries in south east Nigeria(15,26)[.] . Likely to the study conducted by David Komotho et al in low resource rural Kenyan public Hospitals among 330 patients to investigate extent to which 30 minutes rule can be achieved in limited resource hospital,

revealed that from a systematic review out of 34 studies only 36% of emergency cesarean sections were performed within 30 minutes and the details of this study indicated that in United states and United Kingdom the adherence was between 55 % and 65% , and the studies conducted in Africa showed much low adherence 1% to 6% . The study conducted in Kenyan urban hospitals showed adherence was 0 % to 3.8 % while in private hospitals the adherence was 8.6% to 20.4%.

Further results showed that 74% of mothers who gave a consent to be operated within 30 minutes guideline, only 3% were prepared to be operated within this time and concluded that 30 minutes rule was not achieved and that there was evidence of post-operative complications due to non-compliance with that guideline.

In contrast to the study conduct by One et al on 224 consecutive emergency cesarean deliveries in two Nigerian hospitals which found that there was no emergency cesarean section performed within 30 minutes of decision to incision time and the time of shift in reponse to emergency cesarean was not considered and use of low-cost interventions with high yield in literature reviewed were rarely implemented to bring change which is particularity of this study. The most frequent caesarean section indications showed low waiting time compared to rare and critical indications which is not in line with other studies conducted worldwide. Results of each step of our project was presented to senior staff members of Kinihira provincial hospital whose experience helped us to weigh up each idea whereby efficient solutions were set to address gaps into system and processes that hamper quick response to emergency caesarean sections.

5.1. Challenges

Despite of the disruption of the project continuity due to COVID -19 pandemic, all the planned activities were implemented but a bit later according to the project plan because the hospital under study, its normal activities were interrupted due to the huge number of COVID-19 cases in the countries for period between late July and early December 2020, the hospital was only working as COVID-19 treatment center which eventually led to relocate the majority of staff in neighboring health facilities. Kinihira Provincial Hospital normal activities were resumed on 07 December 2020; in fact, this elapsed time consequently affected the project implementation

timeline. Other challenges were staff turnover, poor clinical documentation of time, different appellation of clinical cesarean indications, resistance to change of some staff and limited related literatures in Africa and in Rwanda in particular.

5.2. Key to success

The project turned out success by involving staff to identify barriers to high quality care and work with them to determine solutions to the identified barriers through defining individual tasks as the smaller efforts enables the project team to more easily understand when task is complete, assigning specific time to accomplish each task to fewer resources and track and provide feedback monthly to celebrate success along the way.

When the project was underway, unintended challenges due to COVID-19 pandemic on hospital under study but the project team kept a close eye on tasks provided that had a great impact in improving emergency cesarean section response time by applying continuous practical training on surgical instrument organization, monitoring of departmental emergency trolleys.

Keeping initial competency test among staff rotated from different departments to gauge their knowledge and skills and update them on perioperative nursing about emergency surgical response through regular quality improvement meetings and on job training were major strategies to overcome those challenges and sustain the changes made. All of these were possible because of supportive leadership from top management of the hospital organizational culture of staff and conducive environment that enabled improvement efforts to take place.

5.3 Lesson learned

Different lessons have been acquired during QI project implementation; strategic Problem-Solving steps were well understood. We learned that high quality of care cannot only be achieved by involving more resources but also by using low-cost interventions with small changes over time a high impact can occur.

Institutionalizing the teamwork, routine measuring the quality of care by using data as ongoing feedback and optimum organization of available resources is a fundamental approach for a successful quality improvement project.

5.4. Limitation of the study

The study was only limited to improving the emergency cesarean section on decision to incision time and did not evaluate the positive impact of the project on maternal and newborn outcomes.

CHAPITER SIX: CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

Increasing resources was given attention to improve access on emergency surgical care in low-income countries but the efficient organization of available resources such as equipment, surgical instruments and supplies to minimize intra-hospital waiting time for the emergency cesarean section response remained a critical gap in developing countries.

There is a need of appropriate continuing practical training for obstetric team on surgical emergency preparedness and response, availing reliable system for adequate monitoring of emergency trolleys readiness in departments and putting in place a consistent quality system to monitor the compliance with available operating procedures and clinical guidelines on surgical emergency response in low limited resource health facilities.

6.2 Recommendations

6.2.1 Recommendations to future researchers

1. Similar study research should be performed to assessing project impacts on maternal and neonatal outcomes.
2. There is a need to avail a harmonized protocol for management of emergencies cesarean section and standardize the classification of cesarean indications

6.2.2 Recommendation to Kinihira Provincial Hospital

1. Review staffing in maternity ward and advocate for obstetricians and gynecologists' employment for adequate staffing and skill mix.
2. Longer term perioperative training for nursing staff is needed

3. Renovation of labor room as well as availing staff facilities (restaurant) inside the hospital would help to minimize time spent for lunch time during day shift

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APPENDICES

Appendix 1. Gantt's chart

TASK	PERSON RESP	DEC-20	Jan-21	Feb-21	Mar-21	April-21	May-21	June-21
Gather information	Researcher/QIFP							
Acquire supplies	HOD							
organize a consultative meeting	Researcher							
Avail a single kit for surgical materials	Researcher							
Develop quality tools	Maternity in charge/OR							
Training (Inform staff about the Quality tools	DNM							
Develop Caesarean section clinical protocol	Team of maternity &QI							
Training on clinical protocol	Research/Dr Mentor							
Approval of clinical protocol	DG							
Implementation begins	Team							
collect data to evaluate impact	Researcher							
report and feedback								

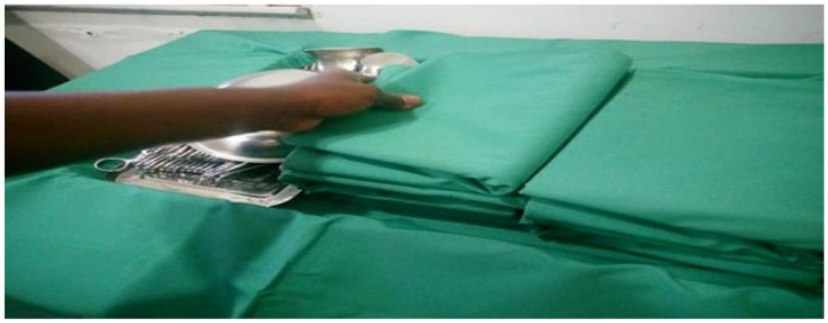
Appendix 2. Data collection on decision to incision time for emergency cesarean sections

No of Caesarean	Decision time	Incision time	D-I-time	Indications of Caesarean	Comments

section			interval	section	

Appendix 3: Surgical instruments Packing new process

C/S Surgical pack setting up Step by step



After cleaning, drying surgical instruments and supplies, Operating room nurse packs the cesarean single kit which contains : Forceps (different types), drapes (different size), gowns and gauzes. After having a completed kit and labelled, the kit must be sterilized and store them in sterile storage areas in maternity.

Appendix 4. C – Section kit supplies

NO	ITEMS	QUANTINTY
1	Pince pour disinfection	1
2	Ciseau a fil	1
3	Ciseau a dissequer	1
4	Ecarteur de faraboeuf	2

5	Manche de bistourie	1
6	Pince fixe – champs	4
7	Pince anatomique	1
8	Pince chirurgical avec dent et sans dent)	2
9	Pince porte aiguilles	2
10	Valves	2
11	Pince hemostatiques	5
12	Kocher avec dent	4
13	Kocher sans dent	3
14	Pince a Coeur	3
15	Bassin uniforme	1
16	Compresse abdominale	4
17	Tampon	30
18	Aleze	6
19	Champ troues	1
20	Blouses (Gown)	2

NB: Make sure while packing the kit is composed of above items

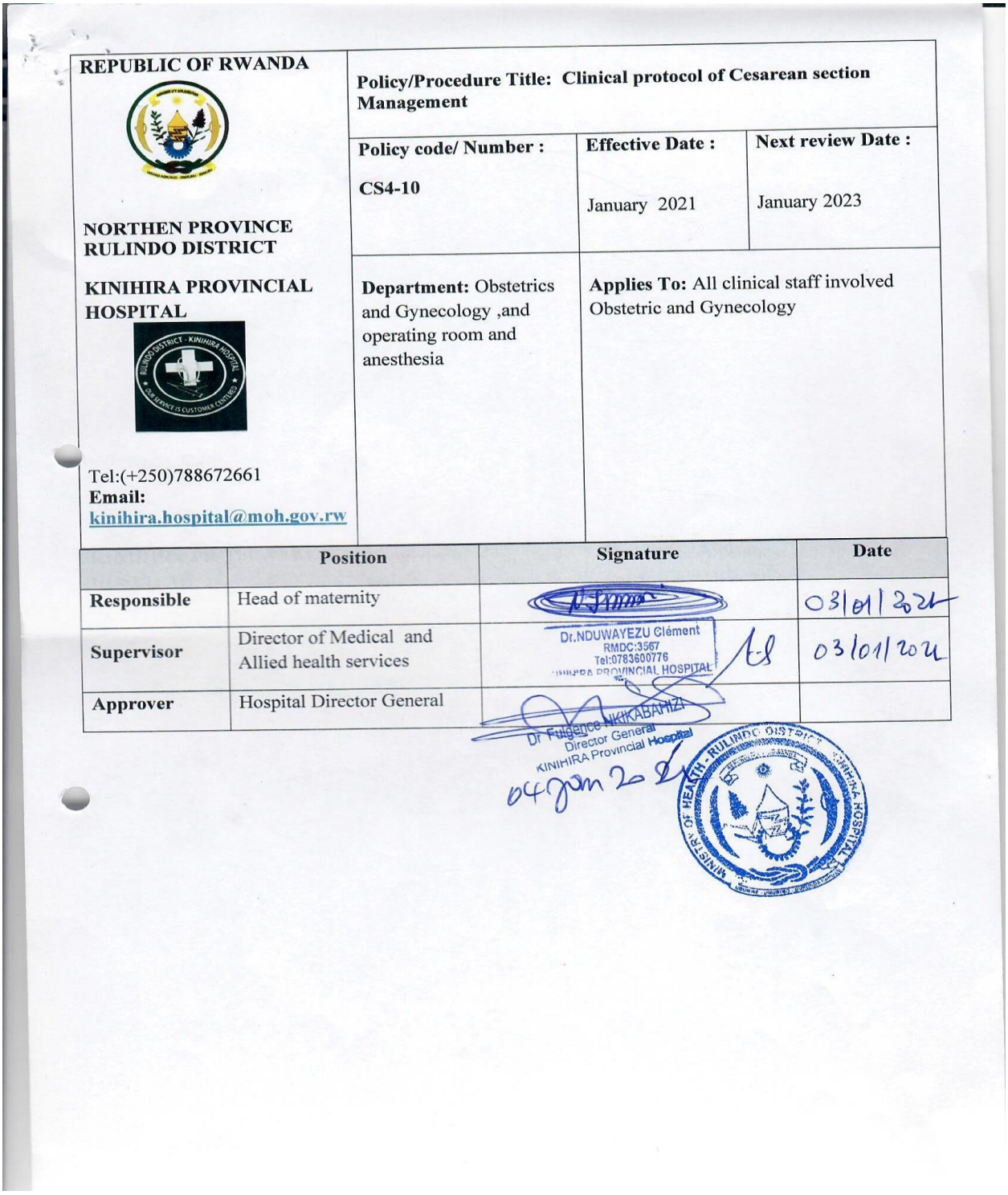
Appendix 5: Organization of surgical instruments in single cesarean kits

Organizing surgical instruments

Comparison before and after intervention

Packing steps of caesarean kit

Appendix 6. Developed caesarean policy



REPUBLIC OF RWANDA NORTHEN PROVINCE RULINDO DISTRICT KINIHIRA PROVINCIAL HOSPITAL Tel:(+250)788672661 **Email:** kinihira.hospital@moh.gov.rw	**Policy/Procedure Title: Clinical protocol of Cesarean section Management**		
	Policy code/ Number : **CS4-10**	**Effective Date :** January 2021	**Next review Date :** January 2023
	Department: Obstetrics and Gynecology ,and operating room and anesthesia	**Applies To:** All clinical staff involved Obstetric and Gynecology	

	Position	Signature	Date
Responsible	Head of maternity		03/01/2024
Supervisor	Director of Medical and Allied health services	Dr.NDUWAYEZU Clément RMDC:3567 Tel:0783600776 KINIHIRA PROVINCIAL HOSPITAL	03/01/2024
Approver	Hospital Director General	Dr Fulgence NKIKABAHIZA Director General KINIHIRA Provincial Hospital 04 jan 2024	

This Protocol was developed by Multidisciplinary Team:

S/N	Names	Position
1	Dr. SERUGENDO Sylvestre	Medical Doctor
2	NYIRIGIRA Pascal	Midwife, Ag. Head maternity
3	BOLINGO Jean Berchmas	Ag. DNM
4	Dr.NDIKUBWIMANA Innocent	Medical Doctor
5	Dr. HABUMUGISHA Gustave	Medical Doctor
6	MUKAMANA Marie Jeanne	Midwife
7	DUSABAMAHORO Angelique	Midwife, MCCH Supervisor
8	MUSENGE Olivier	Accreditation Focal person
9	CYUBAHIRO Jean Bosco	Head of Anesthesia
10	NYIRANDIKUBWIMANA Valentine	Midwife, Head Neonatology

Guideline Objectives

The objective of the guideline is to provide excellent care to women and their babies, with the overall aim of reducing maternal and neonatal morbidity and mortality associated with the surgical procedure of caesarean section.

CAESAREAN SECTION

❖ Definition

Cesarean section is a surgical procedure in which incisions are made through a woman's abdomen and uterus to deliver the foetus.

Making the decision for Cesarean section

1. Communication and information should be provided in a form that is accessible.
2. Consent for Cesarean section should be requested after providing pregnant women with evidence-based information.
3. .Document factors affecting decision especially which is most influential.
4. Discuss the risks and benefits of Cesarean Section and vaginal birth with women, taking into account their circumstances, concerns, priorities and plans for future pregnancies
5. A competent pregnant woman is entitled to refuse the offer of treatment such as CS, even when the treatment would clearly benefit her or her baby's
6. A decision time should be documented in patient file by the provider showing the indication for cesarean section either elective or emergency

Indications for cesarean sections

- **Foetal**
  - Non reassuring fetal heart pattern

- Malpresentations
- Cord prolapse
- Macrosomia,
- Congenital anomalies,
- Multiple pregnancy

- **Maternal-Foetal**
    - Obstructed labor
    - Placental abruption
    - Complete Placenta praevia
    - Perimortem
    - Maternal-fetal disproportion
- **Maternal**
    - More than 1 previous Cesarean delivery
    - Contracted/limited pelvic cavity
    - Obstructive tumors
    - Active genital herpes virus
    - Elective cesarean section
    - Abdominal cerclage
    - Reconstructive vaginal surgery, eg. fistula repair
    - Medical conditions.

Roles in theatre

I. The peri- operative communication checklist occurs at the start of the elective or emergency Cs.

II. The WHO surgical safety checklist (maternity) is completed before and at the end of every case to confirm counts are correct.

III. A count must be undertaken and documented for all procedures where swabs, instruments and sharps could be retained: refer to HEFT 'Policy on accounting for swabs, packs, sharps and instruments.' A retained foreign body is a 'never event' (DoH 2011).

Note: A practitioner skilled in the resuscitation of the newborn should be present at CS with a general anaesthetic, presumed fetal compromise or preterm baby.

Midwife role

The midwife retains overall responsibility as below with assistance from appropriately trained staff e.g. theatre team, maternity care assistant.

a. Confirm woman understands proposed operation, including consent

b. Auscultate fetal heart if not done on ward area (see note below re urgent CS)

c. Re-check pre-operative checklist/documentation: haemoglobin, allergies, gown, thorough shave, name bands, jewellery, nail varnish removed.

d. Instruct birth partner on procedure and escort woman to theatre

e. Ensure theatre team have a complete handover and remain with woman in theatre for suppoet.

f. checks pre-operative sheet

g. Bleep neonatologist/neonatal unit support if needed at delivery.

h. Check resuscitation apparatus is equipped and in working order

i. Catheterize woman once anaesthetic is effective

j. Take the baby once delivered, and/or support neonatal team

k. Promote maternal and paternal bonding once baby has been assessed

l. Check placenta is complete

m. The delivering doctor and attending midwife must ensure results of investigations are written in the intrapartum notes

5

- Clotting profile

- Patient education and obtain consent
- Signing of the consent form
- Materials and supplies needed for cesarean section must be constantly monitored and handed over between shifts for their readiness to prevent unnecessary waste of time when emergency cesarean section arises .

- **Post operative Management**
  - Monitoring of
    - vital signs and fundal status q4-8h for 24 hours
  - Uterus massages and report extra lochia.
  - Monitor
    - fluids intake and output q4h for 24 hours
  - Encourage early activity
  - Give fluids and soft diet after 6 hours
  - Antibiotics if indicated and not routinely recommended after C-section .
  - Pain relief medication.
  - Discuss contraception and infant feeding
  - If infant cord blood indicates Rh incompatibility,
    - Administer anti Rh Immunoglobulin (Rhogam 300mcg IM).

Care of the woman and her baby after CS delivery

a. Provide additional support to help women to breastfeed as soon as possible*
b. Offer non-steroidal anti-inflammatory analgesics to reduce need for opioids**
c. Women who are feeling well and have no complications can eat and drink when they feel hungry or thirsty
d. After regional analgesia remove catheter when woman is mobile
e. Remove wound dressing after 48 hours; keep wound clean and dry

8

Procedure for Emergency CS

a. Include a consultant obstetrician in the decision-making process unless doing so would be life threatening to the woman or the fetus. Document this discussion.

b. The person making the decision must document at the time in the notes: Grade of urgency, indication for caesarean section, any reasons for delay in undertaking the caesarean section

c. Relay level of urgency to all involved staff members. Good teamwork is vital in order to achieve the standards in the box above.

d. Take into account condition of the woman and baby when making decisions about rapid delivery. Remember rapid delivery may be harmful in certain circumstances

e. In cases emergencies coincidence or other surgical team members are not around, the attending staff call for help through head of departments by using departmental communication user group (CUG) or through personal phones contact.

❖ Management

- **Pre-Operative Management**
  - Anesthesia consultation
  - Monitoring vital signs
  - Nil per Os when elective ceserean section
  - Intravenous:
    - Ringer lactate or Normal Saline 500 ml
  - Antibiotics
    - Ampicilline 2g IV bolus single dose, or
    - Cefotaxime 1g IV (if allergic to penicillins)
  - Urinary bladder catheterization
  - Lab:
    - FBC,
    - blood type and screen

f. Discuss reasons for CS and implications for future pregnancy before discharge from hospital. Provide both verbal and printed information about birth options for any future pregnancies. If the woman prefers, provide this at a later date.***

g. Offer earlier discharge (after 24 hours) to women who are recovering, are apyrexial and have no complications (see below for more details)

h. Postpartum family planning for the woman

i. Postnatal care consultation for woman and newborns

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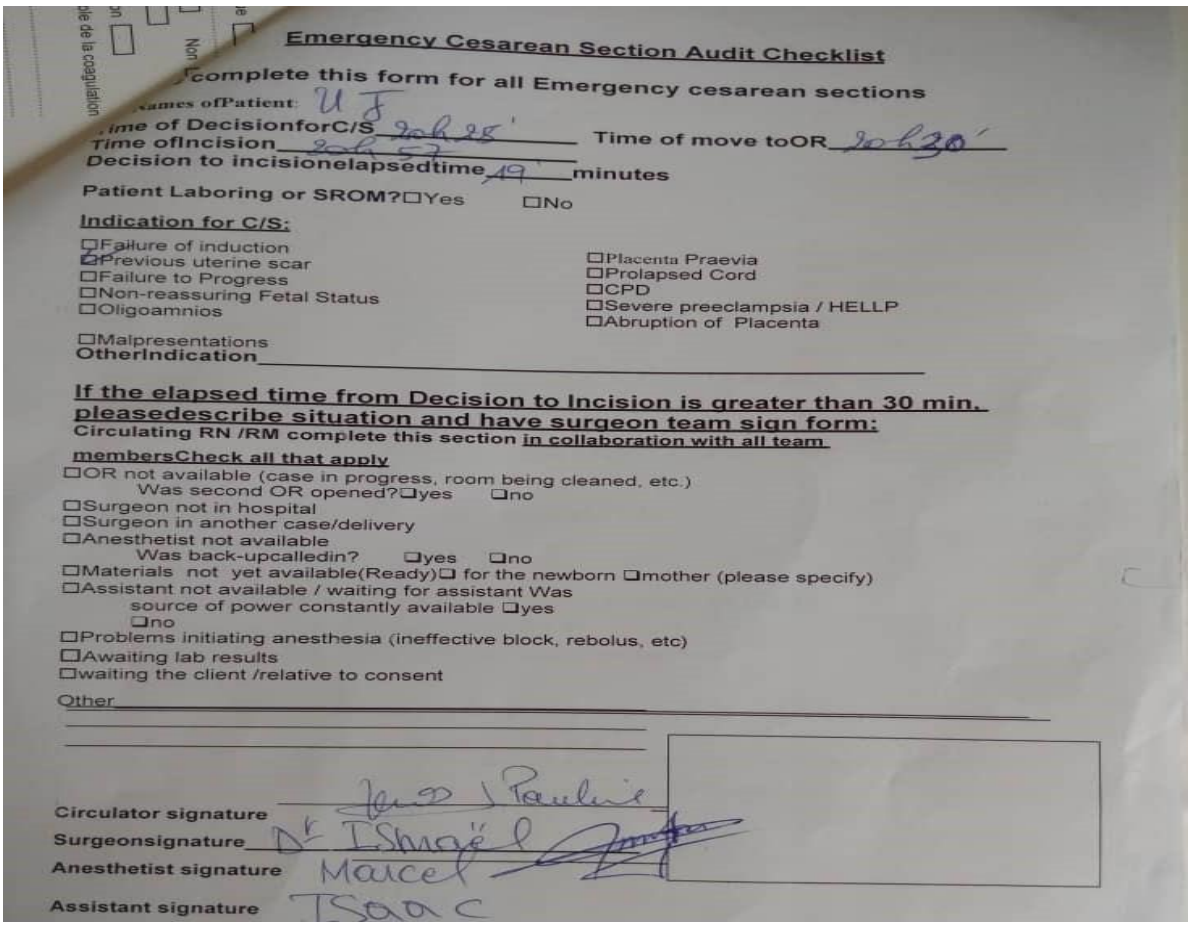
Appendix 7. Emergency trolley

Shift monitoring of Emergency trolley(ET)

.

Appendix 8. Emergency caesarean section audit checklist



Emergency Cesarean Section Audit Checklist

complete this form for all Emergency cesarean sections

Names ofPatient: UJ

Time of DecisionforC/S 20h25' **Time of move toOR** 20h30'

Time ofIncision 20h57

Decision to incisionelapsedtime 19' **minutes**

Patient Laboring or SROM? ☐Yes ☐No

Indication for C/S:

☐Failure of induction
☑Previous uterine scar
☐Failure to Progress
☐Non-reassuring Fetal Status
☐Oligoamnios
☐Placenta Praevia
☐Prolapsed Cord
☐CPD
☐Severe preeclampsia / HELLP
☐Abruption of Placenta
☐Malpresentations

OtherIndication_____

If the elapsed time from Decision to Incision is greater than 30 min, pleasedescribe situation and have surgeon team sign form:

Circulating RN /RM complete this section in collaboration with all team membersCheck all that apply

☐OR not available (case in progress, room being cleaned, etc.)
Was second OR opened?☐yes ☐no
☐Surgeon not in hospital
☐Surgeon in another case/delivery
☐Anesthetist not available
Was back-upcalledin? ☐yes ☐no
☐Materials not yet available(Ready)☐ for the newborn ☐mother (please specify)
☐Assistant not available / waiting for assistant Was source of power constantly available ☐yes ☐no
☐Problems initiating anesthesia (ineffective block, rebolus, etc)
☐Awaiting lab results
☐waiting the client /relative to consent

Other_____

Circulator signature Jean Pauline

Surgeonsignature Dr Ismaël

Anesthetist signature Marcel

Assistant signature Isaac

Adopted Bev. Vanderwal, RNC, MN, SECTION ECTION AUDIT 2010

Emergency Cesarean Section Audit Checklist

Please complete this form for all Emergency cesarean sections

Time of Decision for C/S_____ **Time of move to OR**_____
Time of Incision_____
Decision to incision elapsed time_____**minutes**

Patient Laboring or SROM? ☐ Yes ☐ No

Indication for C/S:

☐ Failure of induction
☐ Previous uterine scar
☐ Failure to Progress
☐ Non-reassuring Fetal Status
☐ Oligoamnios
☐ Placenta Praevia
☐ Prolapsed Cord
☐ CPD
☐ Severe preeclampsia / HELLP
☐ Abruption of Placenta

☐ Malpresentations
Other Indication_____

If the elapsed time from Decision to Incision is greater than 30 min, please describe situation and have surgeon team sign form:
Circulating RN /RM complete this section in collaboration with all team members

Check all that apply
☐ OR not available (case in progress, room being cleaned, etc.)
Was second OR opened? ❑ yes ❑ no
☐ Surgeon not in hospital
☐ Surgeon in another case/delivery
☐ Anesthetist not available
Was back-up called in? ❑ yes ❑ no
☐ Materials not yet available(Ready) ❑ for the newborn ❑mother (please specify)
☐ Assistant not available / waiting for assistant
Was source of power constantly available
❑ yes ❑ no
☐ Problems initiating anesthesia (ineffective block, rebolus, etc)
☐ Awaiting lab results
☐ waiting the client /relative to consent

Other _____

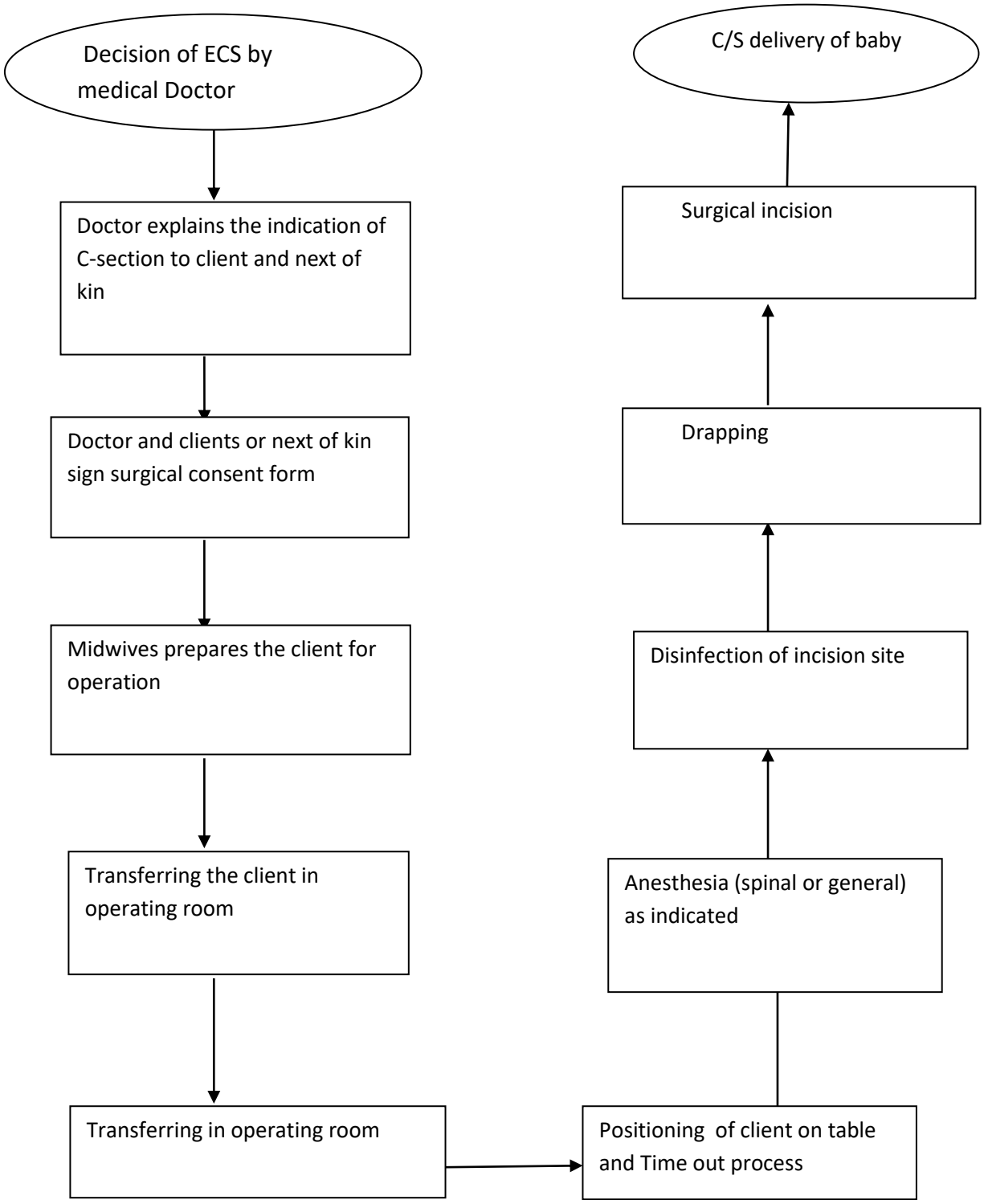
_____
_____
_____

Circulator signature
Surgeon signature_____
Anesthetist signature

Assistant signature

Thank You

Appendix 9: Key steps of Emergency Caesarean section process



Appendix 10. Human resource exclusively for labor room (standardized staffing plan

Number of deliveries per month	Nurses staff (Facilities with LDR)	Nurses staff with (Non – LDR facilities)	Midwives	Medical officer	Sweeper
100-200	4 Nurses + 1 cleaner +1 Medical officer +1 anesthetist	4	4	4 Medical officer 1 Obstetrician Gynecologist /Emoc 1Anesthetist 1 Pediatrician	4
200-500		8	4	1Obstetrician Gynecologist /Emoc (mandatory + 4 obstetrician Gynecologist /Emoc +1 Anesthetist + 4LSAS 1 Pediatrician	4
>500		10	6	3 Obstetrician Gynecologist +4 EmoC) +1 anesthetist+4LSAS +1 Pediatrician	4

Appendix 11. Kinihira Provincial maternity ward staffing

Number of deliveries per month	Nurses staff (Facilities with LDR)	Midwives	Medical officer	Sweeper
100-200	3 Nurses	2	1 Medical officer 0 Obstetrician Gynecologist /Emoc 1Anesthetist 0 Pediatrician	3

Appendix 12 Criteria # 1 cost

Alternatives solutions	Cost	Total score
Develop and disseminate cesarean section clinical protocol	Printing cost 100,000 francs and internet cost for literature review	4
Organize on –site training to initiate a single C/s kit	We believed that there was no additional cost to organize available supplies and instruments into a single kit	5
Organize emergency simulation drills for team performance	We believed that to organize a simulation drill	3

assessment	would require additional resources and it would involve more than one department and stakeholders which would require high effort in terms of cost to the hospital	

TABLE 12: CRITERIA *#2 TIME*

Alternatives solutions	Time	Total score
Develop and disseminate cesarean section clinical protocol	Developing protocol would require almost 3 0 days to have it approved by hospital leadership and ready to be used by concerned departments	2
Organize a training for nursing staff on surgical instruments supplies preparation	Organizing surgical instruments and supplies in both LDR and OR would require 2 weeks and ready to be used as it would be done by staff and head of departments and IPC team for assessment standards compliance.	4

Organize a Simulation drills for Emergency caesarean section	From preparation of a simulation drills to the time it would be ready to be done it could take 90days as it involves different professionals, resources, prepared areas and look for a convenient time for all required professionals (Anesthesia, maternity, OR nurses and Doctors working in those departments)	2

TABLE 13: CRITERIA #4 FEASIBILITY

Alternatives solutions	feasibility	Total score
Develop and disseminate cesarean section clinical protocol	it can be done by obstetric team within hospital without external support as a part of accreditation standards required	5
Organize on-site training to initiate a single c/s kit	it can be done without external support	5
Organize a Simulation drills for emergency c/s	it can be done under external both technical and financial	2

TABLE 14: CRITERIA # 5 IMPACT

Alternatives solutions	Impact	Total score
Develop Caesarean section protocol	This guideline and training will help in providing directly the information, to staff as well as the areas for improvement in the process in everyone role and responsibilities	3
Organize on-site training for nursing staff to initiate single c/s kit	a single kit will easy the materials preparation, assembling and speed up the time spent in Operating room in	4

	sterile field set up. instead of assembling all six kits, the operating room staff will pick up only one kit containing all needed supplies in Cesarean section	
Organize simulations drills for emergency c/s	this process will facilitate the team to do self- assessment which may improve team performance but it will require continuous sessions to make staff familiar with emergency preparedness and response	3

Appendix 11: Prioritization matrix

	Evaluation criteria 5=Best, 1=Worst				
Alternatives solutions	Cost	Time	Feasibility	Impact	Total score
Organize on-site training for nursing staff to initiate a single c/s kit	5	4	5	4	18/20
Develop and disseminate cesarean section clinical protocol/ tools	4	2	5	3	14/20
Organize a simulation drill for emergency c/s	1	2	2	3	8/20

NORTHERN PROVINCE
RULINDO DISTRICT

KINIHIRA PROVINCIAL HOSPITAL
E-mail: kinihira.hospital@moh.gov.rw

Review of Root cause and proposed interventions with Project Working Team on 05th October, 2020

NO	Names	Gender	Job position	Telephone	e- mail	signature
1	HAGANURIMA Theoneste	M	AgHOD/Surgery&Theatre	0788890609	theoneste480@gmail.com	
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5	Dr BUKUNDANE Blandine	M	Clinical Director	0788276439	dukundanegatheidine@gmail.com	

Appendix 12: Knowledge assessment checklist on Ecs indications

Checklist to assess Knowledge of staff about indications of emergency C-section,

Please tick **(YES) or NO** considering your category

Indication / staff	**Nurse/or midwife**	**Doctor**	**Anesthetist**
NRFHR			
Abruption placenta			
Labor on uterine scars			
Bleeding placenta praevia			
Failure of induction of labor			
Previous uterine scar			
obstructed labor			
uterine pre-rupture/uterine rupture			
term pregnancy in transverse lie			
Cord prolapse			
Maternal request			
active labor on malpresentation			

Thank you for your participation

Appendix 13. Documentation of Decision to incision time

Period	elective (6.4%)	Total Cs performed	Eligible Ecs	sample taken (ECS	ECS rejected	Not documented	% Not Documented
Jan	0	53	53	35	18	11	20.8
Feb	0	52	52	37	15	0	0.0
March	2	59	57	45	12	11	19.3
April	0	63	63	50	13	0	0.0
May	9	66	57	49	8	5	8.8
June	5	81	76	50	26	19	25.0
July	1	63	62	41	21	9	14.5
Aug	6	46	40	32	8	8	20.0
September	4	49	45	36	9	5	11.1
October	7	49	42	29	13	10	23.8
November	8	51	43	28	15	9	20.9
Dec	1	34	33	22	11	6	18.2
Total	43	666	623	454	169	93	23

Appendix 14: QI project plan

QI Project Plan

Change ideas to be tested

N◦	What	who	When	How	Where
1	Reducing number of kits for a cesarean section	Head of OR & researcher	end Dec-19	organizing kits	OR team
2	Develop tools for monitoring of emergency supplies /equipment availability	maternity team	early Jan-20	each shift ET monitoring sheet, handover report	LDR/ OR
3	QI meeting	Researcher & Team	monthly	presentation /demonstration	Meeting hall
4	Develop cesarean policy	selected team	end Jan-20	presentation /demonstration attendance list and report	OR/LDR
5	Training and dissemination of tools developed	Researcher & team	end Feb-20	Focused discussion	LDR/ OR

Evaluation plan (tracking system)

	N	What	Baseline	achieved	verification
Process		number of QI meetings conducted	0	8	minutes
		number of staff trained on tools and Policy	0	23	attendance list
		number of staff trained on tools and Policy	0	38	attendance list
		number of shifts with completeness of monitoring sheets	0	365	Register
Outcome		Decreased % of Ecs performed above 30 minutes	89.9	68.7	report
Balan ce		Achieving level 1 of accreditation standards	87	91	assessment report 2021

Appendix 15. Ethical Clearance Letter

UNIVERSITY of RWANDA
COLLEGE OF MEDICINE AND HEALTH SCIENCES
DIRECTORATE OF RESEARCH & INNOVATION

CMHS INSTITUTIONAL REVIEW BOARD (IRB)

Kigali, 22/06/2020
Ref: CMHS/IRB/203/2020

BOLINGO Jean Berchmas

Masters in Hospital and Healthcare Administration,
School of Health Sciences, CMHS, UR

Dear BOLINGO Jean Berchmas,

RE: ETHICAL CLEARANCE

Reference is made to your application for ethical clearance for the study entitled *"Improving the Emergency Cesarean Section Response Time at Kinihira Province Hospital."*

Having reviewed your application and been satisfied with your protocol, your study is hereby granted ethical clearance. The ethical clearance is valid for one year starting from the date it is issued and shall be renewed on request. You will be required to submit the progress report and any major changes made in the proposal during the implementation stage. In addition, at the end, the IRB shall need to be given the final report of your study.

We wish you success in this important study.

Professor GAHUTU Jean Pasco
Chairperson Institutional Review Board
College of Medicine and Health Sciences, UR

Cc:

- Principal College of Medicine and Health Sciences, UR
- University Director of Research and Postgraduate studies, UR

Email: researchcenter@ur.ac.rw P.O Box 3286 Kigali, Rwanda www.ur.ac.rw

UNIVERSITY of RWANDA
COLLEGE OF MEDICINE & HEALTH SCIENCES
OFFICE OF THE PRINCIPAL

Kigali, ...03./...04./2020
Ref. No12./UR-CMHS/2020

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

This is to certify that **Mr. Jean Berchmas BOLINGO** has been admitted in the Master's program of Hospital and Healthcare Administration (MHA) at University of Rwanda, College of Medicine and Health Sciences with reference number: 220018390. He will study for a period of two years (2019-2020 and 2020-2021) and expected to graduate in November 2021.

Mr. Jean Berchmas BOLINGO will be coming to attend face to face courses at the College of Medicine and Health Sciences, Remera Campus depending on the schedule set by MHA Program, but this will cover only 25% of the total credits. Since 75% of his studies are mainly field work in his hospital, the hospital management is expected to collaborate with him and MHA program in all steps of his quality improvement research project. For more details, refer to the Admission Letter attached or contact the MHA program coordinator, Dr Jean Baptiste Sagahutu on this contact: jeanbaptisol@gmail.com; Tel: 0788800152.

Best regards,

Assoc. Prof. Jeanne KAGWIZA
Acting Principal, College of Medicine and Health Sciences-University of Rwanda

Cc:

-Dean, School of Health Sciences, UR-CMHS
-Coordinator, Postgraduate Studies, UR-CMHS-SHS

Appendix 16. Tally sheet to assess maternity protocol availability

Protocol required	Yes	NO
Normal delivery protocol		x
Cesarean section		x
Post-partum hemorrhage		x
Post-partum sepsis		x
Pre-eclampsia		x

Appendix 17. Assessment quality tools availability

Tools	Yes	NO
Emergency C-section audit checklist		X
Surgical safety checklist	x	
Handover emergency supplies monitoring sheet		X

Appendix 18. Project Activity plan

Date	ACTIVITY	PARTCIPANTS
23 /07/2020	QI meeting on emergency medications / health supplies	Concerned HOD
15/12/2020	QI meeting	Maternity staff
9/01/2021	QI meeting and initiate a single caesarean section kit	Operating room staff
19/01/2021	QI maternity	Maternity staff
20-27/01/2021	Update of accreditation standards	Clinical team
31/03/2021	QI project Consultative meeting	MCCH Team
14/04/2021	Audit committee meeting and consultative meeting	Members
16/04/2021	QI project consultative meeting	HOD
20/04/2021	Refresher on maternal, perinatal death audit forms	Members of audit committee
29/04/2021	QI project meeting	Maternity

30/04/2021	QI meeting	OR –Surgery Staff
05/05/2021	DTC Meeting	Members
3/06/2021	QI meeting	Maternity +OR staff
7/10/2021	PPT on Evidence based caesarean section	Joint team
15/07/2021	PPT on assessment of emergency caesarean section:	MCCH Team

Appendix 19. List Of Emergency Supplies and Medications mimum requirement for emergency surgey

No	Supplies	Required	status/QT per shift
1	Bandelette Code Free	5	
2	Urinary Catheter	2	
3	Urinary Bag	2	
4	Adhesive Plaste	1	
5	Clean Gloves	100	
6	Sterile Gloves	5	
7	Suction Catheter	5	
8	Seringue 5ml	2	
9	Seringue 2 Ml	2	
10	Seringue 10 Ml	5	
11	Seringue 20 Ml	5	
12	Iv Cather G 16,18,20	10	
13	Infusion Tube (Trousse)	3	
14	Drum with sterile gauzes	1	
15	Drum with sterile towels	1	
16	Delivery kits	5	
17	Dressing kits	5	
18	Cs complete kits	3	
19	absorbable sutures	50 pieces	
20	non-absorbable sutures	100pieces	
	Medications		
1	Salbitamol inj	5	
2	Nifedipine tab 10mg	5	
3	Ampicillin 1gr	10	

4	Water for inj	10	
5	Dexamethasone inj	5	
6	Oxytocin	10	
7	Normal saline	2	
8	Lactate ringers	2	
9	Tramadol inj	5	
10	Diclofenac inj	5	
11	MgSO4	10	
12	Ca gluconate	2	
13	Hydralazine inj	5	
14	Artesunate	3	
15	Paracetamol tab 500 mg	5	
16	Dextrose 50%	2	
17	Aspegic inj	2	
18	Adrenaline	2	
19	suxamethanium inj.	3	
20	Ketamine inj.	5	
21	Propofol	3	
22	Thiopentane sodium	2	
23	ART prophylaxis	small quantity	all types
24	Disinfectant	5	
25	Vitamin K inj.	10	

Appendix 19. Death audit findings (Deaths audit reports 2018 to mid-2020)

contributing factors	Number, n=108	%
poor clinical care documentation	13	12%
poor inadequate labor monitoring	16	15%
ANC related factors	20	18.5%
shortage of staff	2	0.8%
miss management	9	8.3%
misdiagnosis	5	5%
ambulance related delays	1	0.9%
teamwork and collaboration	3	3%
inadequate clinical investigation	5	5%
insufficient materials /equipment	4	

		4%
use of trational medicine /treatment	5	5%
intrahospital related delays	25	23.1%

Appendix 20. Birth asphyxia findings from January to December 2019(secondary data /register)

		HIE ADMISSIONS		CLINICAL OUT COME OF ADMITTED HIE	
MONTH	TOTAL ADMISSION	Hospital maternity	Health centers transfers	IMPROVED	DIED
JANUARY	29	6	2	7	1
FEBRUARY	36	6	0	6	0
MARCH	25	1	1	2	0
APRIL	23	7	2	8	1
MAY	21	5	0	4	1
JUNE	36	2	1	2	1
JULY	29	3	0	3	0
AUGUST	31	6	1	5	2
SEPTEMBER	22	6	1	6	1
OCTOBER	26	4	0	4	0
NOVEMBER	32	5	1	4	1
DECEMBER	30	4	2	4	2
TOTAL	340	55	11	55	11

Appendix 21. checklist

No	Tick in the appropriate bar ‘’YES or NO	Yes	NO
01	Is there a process of monitoring of essentials supplies, or kits readiness prior to Emergency c- section?		
02	Is there mechanism of handing over –off duties materials of Cs among the team in last 12hmonths?		
03	Is the communication of emergency between frontline staff involved in caesarean section adequate?		
04	Is there policies and procedures for a management emergency Cs?		
05	Is there a backup arrangement for essential life lines including water, power and oxygen in operating room?		
06	Are materials/supplies for emergency C-section monitored in delivery room?		
07	Is a staff number in your department enough?		
08	Have you ever been trained in emergency preparedness and response? if yes mention them		
09	Does a time out process affect the length of ECs response time in OR?		
10	Do medical equipment in your department affect the emergency C-section time response outcomes?		
11	Does environmental work place affect emergency section outcomes?		

Appendix 22 Time study on travel time between key services

Services	Departure time	Return	Total time
LDR and CSSD	00:00 :00	00:06:27	6minutes 27seconds
LDR and Dispensing pharmacy	00:00 :00	00: 06: 13	6minutes 13 seconds

LDR and OR	00:00 :00	00:01 :30	1minute 30 seconds
LDR and Laboratory	0:00:00	00:03:2	3minutes 2 seconds

Appendix 23: Baseline standard compliance for January to December 2019

Month	No ECs	No within 30minutes	% of compliance
January	35	5	14.1
February	37	7	18.9
March	45	3	6.6
April	50	6	12
May	49	4	8.1
June	50	3	6
July	41	2	4.8
August	32	1	3.1
September	36	3	8.3
October	29	5	17.2
November	28	5	17.8
December	22	2	9.0
Total	454	46	10.1%