

# **A CLINICAL AUDIT OF EMERGENCY CAESAREAN DELIVERIES AT KENYATTA NATIONAL HOSPITAL**

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## **DECLARATIONS**

I hereby declare that this research in part fulfilment of the M.Med degree in Obstetrics and Gynaecology is my original work and has not been presented to any other University forum.

Sign \_\_\_\_\_

Date \_\_\_\_\_

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H58/71915/08

M.B.Ch.B.

## **CERTIFICATE OF SUPERVISION**

This is to certify that Dr. Mwangi Lilian Wangui researched upon this dissertation under my guidance and supervision and this book is submitted with my approval.

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## **DEDICATION**

To my parents Mr. and Mrs James Mwangi Wagura and my husband Nicholas Ngigi

## **ACKNOWLEDGEMENT**

I am indebted to both my supervisors: Prof. Ojwang and Dr. Jaldesa. I wish to thank Prof. Ojwang for his fatherly guidance, attention to detail and resourcefulness. I am also highly indebted to Dr. Jaldesa for having tirelessly accorded me his resources, time, skill and guidance coupled with patience. I cannot forget the inspiration he has given me constantly, even to think and work methodically thus making this book become a reality.

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## **ABBREVIATIONS**

APGAR.....Appearance Pulse Grimace Activity Respiration

APH.....Ante-Partum Haemorrhage

A&E.....Accident and Emergency

CD.....Caesarean Deliveries

CSR.....Caesarean Section Rate

DDI.....Decision to Delivery Interval

ERC.....Ethics and Research Committee

ECV.....External Cephalic Version

FSB.....Fresh Still Birth

GA.....General Anesthesia

GFA.....Ground Floor A

GFB.....Ground Floor B

KNH.....Kenyatta National Hospital

MSB.....Macerated Still Birth

NRFS.....Non Reassuring Foetal Status

PMTCT.....Prevention of Mother To Child Transmission

PROM.....Premature Rupture of Membranes

PPH.....Post Partum Haemorrhage

PS.....Previous Scar

SA.....Spinal Anaesthesia

S.H.O.....Senior House Officer

SPSS.....Statistical Program for Social Science

SUMI.....Sub-Umbilical Midline Incision

SOPs.....Standard Operating Procedures

UON.....University Of Nairobi

VBAC.....Vaginal Birth After Caesarean section

## **SUMMARY**

**BACKGROUND:** The rate of emergency caesarean deliveries is increasing worldwide beyond the recommended rate of 15% of all deliveries in spite of well-documented evidence of increased maternal morbidity and mortality associated with caesarean delivery (CD). In addition, high CD rates lead to high cost of healthcare, increased workload and challenges in ensuring improved quality of care. These issues continue to weigh heavily on the health sector especially in developing countries. The recommended decision to delivery time interval for performing emergency caesarean deliveries is sixty minutes locally and thirty minutes internationally a target that has remained elusive. Before any medical strategies can be designed to improve the total quality of emergency CD care the current clinical practice needs to be audited and the optimal institutional rate of caesarean deliveries identified factoring in it's population characteristics.

**OBJECTIVE:** To audit the indications, responsiveness and immediate outcomes of emergency caesarean deliveries at Kenyatta National Hospital (KNH).

**STUDY DESIGN:** Descriptive retrospective study.

**SETTING:** Kenyatta National Hospital, Nairobi, Kenya.

**MAIN MEASURE OF OUTCOME:** Indications of emergency CD, decision to delivery interval (DDI), association between indications and DDI, association between indications and perinatal outcome and association between DDI and perinatal outcome.

**PARTICIPANTS:** All women delivered by emergency CD at KNH during the period from 1<sup>st</sup> April 2011 to 30<sup>th</sup> June 2011 inclusive.

**RESULTS:** During the study period, there were 2754 deliveries, 930 were emergency CD giving an emergency caesarean delivery rate of 33.8%. Quality of records was poor with a file retrieval rate of 95.2% yielding 885 files, 45 (4.8%) files could not be traced. Of the retrieved files, 56.7% had complete data and were analyzed. The leading indications of emergency CD were, NRFS (27.3%), Failed VBAC (16.1%), dystocia (13.9%), malpresentation/malposition (9.4%),  $\geq 2$ PS in labour (9.2%) and pre-eclampsia/eclampsia (6.4%) in that order. The overall responsiveness was poor with decision to delivery time interval of less than thirty minutes being achieved in only 5.4% of the participants. 76.9% of the participants were delivered more than 90minutes after the decision. Even in extremely urgent indications the response was poor with only 60% and 75% of participants with cord prolapsed and uterine rupture respectively being delivered in less than sixty minutes. 523 babies were delivered of whom 25.8% were preterm, 1.9% were asphyxiated and 6.3% were stillbirths. Fresh Still Births (FSB) comprised 56.3% of the stillbirths. DDI did not demonstrate a statistically significant impact on immediate perinatal outcome (p-value $>0.001$ ). APH, Pre-eclampsia/eclampsia and uterine rupture had a statistically significant impact on the neonatal outcome (p-value $>0.001$ ).

**CONCLUSION:** Record keeping was far from optimal and responsiveness in emergency CD was poor. NRFS, Failed VBAC and dystocia were the leading indications of emergency CD. DDI had no significant impact on the neonatal outcome. Perinatal mortality rate was 6.3%.

**RECOMMENDATIONS:** There is need to ensure the compliance to the local decision to delivery interval (DDI) standard of 60 minutes with an eventual aim of getting within the 30 minutes international recommended response time. A record keeping protocol ought to be established to guide and improve on the record keeping. There is also need for regular clinical audits to ensure continued improvement in the quality of care in emergency CD.

## **INTRODUCTION**

A clinical audit is a systematic review of the quality of clinical care based on standards agreed upon by all the relevant health care workers.(1) The standards spell out the ideal and locally relevant care, based on currently available evidence on the subject. These standards, further, specify the minimum structure, the processes and the expected relevant outcome. Clinical audits are often intra-institutional, based on the management principles of total quality management and continuous quality improvement. (2)

Clinical audits improve quality of healthcare provided, outcomes of care, access to and timeliness of service and the local reputation of the facility. They also clearly identify problems or areas of concern, both administrative and clinical and encourage teamwork among the health care providers. Clinical audits make the clinical practice more efficient by ensuring that everything is done in the best way by the person most suited to the task.(1) This reduces both the stress and the workload for the members of the team. In addition, they enable members of the team to deepen the outcomes of their roles, increasing job satisfaction and morale and finally form the framework for future planning within the practice.

## **1.0 LITERATURE REVIEW**

In recent years, medical audit has become an accepted concept in the context of health services and is now a regular part and routine practice in many hospitals. There is still much confusion in what the word ‘audit’ actually means however as Crombie and Davies (1) state: “There are many approaches to audit, and almost as many views on how an audit should be conducted as there are authors on the subject. The ultimate aim of audit that it should lead to improvements in patient care is perhaps the only aspect in which there is consensus.” The most commonly quoted definition of audit is, “Clinical audit is the systematic and critical analysis of the quality of clinical care, including the procedures used for diagnosis, treatment and care, the associated use of resources and the resulting outcome and quality of life for the patients” (3). The audit process is generally represented in the form of a closed circle, called the audit cycle. The first step is observation of current practices, followed by setting standards with which the practice can be measured. The final steps of the cycle are to compare current practice to the standards, suggest solutions for the deficiencies identified and implement the changes to improve the delivery of care.

A variety of methods can be used to audit care; these include case presentation, case-note reviews, ad hoc studies, criterion-based audit, occurrence screening and use of routinely collected data. The method used in this research was criterion-based audit. Criterion based audit involves a review process whereby clinicians first agree on a number of explicit and realistic criteria of good quality, adapting external guidelines to take into account the local resource context. Criteria are selected based on their relevance to the audited topic, the strength of the research evidence in their support, their ease of measurement using hospital case notes, and the capacity of the facility in terms of human and other resources. To assess current against standard practice an auditor reviews a large number of case notes for their conformity with the set criteria. Using the proportions of cases in

which the relevant criteria are met as a starting point for discussion, improvement in care are recommended and realistic targets set. Changes in care are suggested and the audit cycle is closed by implementing the changes and re-evaluating practice. (4)

Emergency caesarean deliveries are an important component of emergency obstetrics care which reduces maternal mortality and perinatal morbidity and mortality.(5) The rates of caesarean deliveries have been increasing worldwide, except in Sub-Saharan Africa. This increase is credited to the advent of electronic foetal monitoring and indications shifting from urgent to prophylactic.(6,7) The increasing rate has been associated with a rise in caesarean delivery associated peri-operative morbidity and mortality and increased cost of delivery, making it necessary to maintain CD as a preserve of important and urgent indications.(8) This necessitates periodic review of compliance to local and international recommended standards in performance of emergency caesarean deliveries as an aspect of quality control.(9)

### **1.1 Rate of caesarean delivery**

The continuing worldwide increase of the rate of caesarean deliveries especially in resource rich countries is a continuing subject of debate in many obstetrics forums.(7,10,11) To the contrary, the rates of caesarean deliveries have largely remained the same in Sub-Saharan Africa.(5,6,12) The rates in developing nations, Kenya included, where electronic foetal monitoring is still low, show lots of variation between rural and urban areas.(13) In rural Africa, the indications of CD are stringent and tend to be maternal.(14,15) Foetal indications are often neglected. In economies like Kenya, with a large gap between the poor and the rich, rates of caesarean deliveries may also vary between different levels of hospitals, private or public hospitals and with referral centres and

private hospitals having the highest level of caesarean rate.(16) The overall CD rate in Kenya was 6% in 2009, with higher rates recorded among women residing in urban areas compared to their rural counterparts.(17) In 1997 rates in Pumwani hospital, Kenyatta and Nairobi hospitals were 9%, 27% and 26% respectively.(18) Overall CD rate was 38.1% in 2004 at the Aga Khan University hospital a private teaching and referral hospital in Kenya.(19) Monetary incentives, convenience, defensive practice or inexperience may be implicated. In addition, an unknown number of rich and well-insured mothers seem to prefer operative delivery as a convenient high tech method of childbirth. This discrepancy between the rural poor settings with the rich urban settings in Africa has always brought the concept of caesarean paradox, where those with great need may not receive it while those who do not need caesarean deliveries leisurely have them. (5) Caesarean delivery confers an increase in maternal mortality and morbidity as well as having considerable financial implications. (20) Caesarean delivery is usually justified by the assumed benefit for the mother or the foetus or both. These benefits are often unquantifiable and are based on scanty evidence. In Kenya, the rate of population-based caesarean section indicate a significant unmet need for obstetric care in the rural areas and may be a useful tool for monitoring progress on safe-motherhood initiatives in poor settings.(18,21)

## **1.2 Indications of emergency caesarean deliveries**

Dystocia, breech presentation, non-reassuring foetal status and failure to progress have almost always led to caesarean delivery.(22,23) In 2001 75% of CD in sub-Saharan Africa was due to six main maternal reasons; protracted labour, abruption placenta, previous CD, eclampsia, placenta previa and malpresentation.(21) These indications are further complicated by multiple foetal pregnancies, maturity of the foetus, parity of the mother, clinician's acumen and maternal choice intensifying the urgency.(24) There may be ethnic differences in the indications of emergency caesareans, due to for example variation in the size of the pelvis or the foetal head. The common indications of caesarean deliveries at KNH are likely to be similar. As a referral centre in an African city, mothers may have urgent needs of caesarean deliveries rather than the preventive ones.

## **1.3 Decision to delivery time interval**

As an emergency procedure, the decision to delivery time interval and the duration between incision and birth of baby should be expedited. These durations are measures of the obstetric emergency response ability of a centre.(25) The World Health Organization recommends a decision to delivery time interval of less than 30 minutes.(25,26) This time interval also determines the neonatal condition at birth and may be influenced by the level of training and experience of the operating surgeon.(25) Indeed consensus decisions by different obstetrics and gynaecological bodies have devised guidelines on the safe interval for performing emergency CD. This include The Royal College of Obstetricians and Gynaecologists, The American College of Obstetricians and Gynaecologists, and The Canadian National Consensus Conference which recommend that obstetrical services are to be capable of performing a caesarean delivery within a time interval of

30 minutes, whereas The German Society of Gynaecology and Obstetrics favours a 20 minute time interval. (27, 28) The national standards for maternal care in Kenya recommend that 100% of all emergency CD be operated within one hour of the decision.

The compliance, feasibility and reasonability of this 30-minute interval has been questioned in view of mandatory preoperative preparations and human resource scarcity in the larger sub-Saharan Africa. (29,30) Compliance to the recommended 30 minute interval is beneficial in the short and long term to both the mother and the baby, and should be desired in all units irrespective of the location.(31) Delays in performing caesarean delivery after the prescription have been found to be counterproductive. Caesarean Delivery after 75 minutes of indication is associated with poorer maternal and baby outcomes and should be avoided. (32)

#### **1.4 Newborn APGAR score.**

The measures of immediate outcomes of caesarean deliveries include the APGAR score, the total blood lost during the procedure and the maternal well-being. The APGAR scoring system was proposed in 1952 for evaluating the physical condition of neonates at 1, 5 and 10 minutes after delivery.(30) This scoring system is still found accurate and relevant today in predicting perinatal morbidity and mortality.(33) This score can easily predict the benefit received by the neonate from the emergency caesarean delivery.(34) A five minute APGAR score predicts neonatal wellbeing and possible long term complications in the infant.(35) Considering maternal mortality after CD, there is a much higher mortality for mother and baby in Africa than in the developed countries.(36) Outcomes of the caesarean delivery should not be viewed in isolation. They are often affected by the indication of the CD, the maternal status, the decision to delivery time interval, the duration of the CD and the technique used. (35)

When monitored closely in labour, accurate diagnosis, indication, skill and expedite performing of a CD will result in good immediate outcomes. These parameters will be variable across centres with differing capacities for handling obstetric emergencies.

### **1.5 Role of audits in caesarean deliveries**

The challenges of caesarean deliveries in developing countries are different when compared to the developed countries. (18) These include limited resources, low-trained work force, poor transport facilities and low compliance to the international standards of care, which is associated with high maternal and perinatal mortality. Improving the quality of obstetric care in developing countries is therefore an urgent priority. (37) This will require regular obstetric audits and revision of management strategies and techniques. (2)

## **2.0 STUDY RATIONALE**

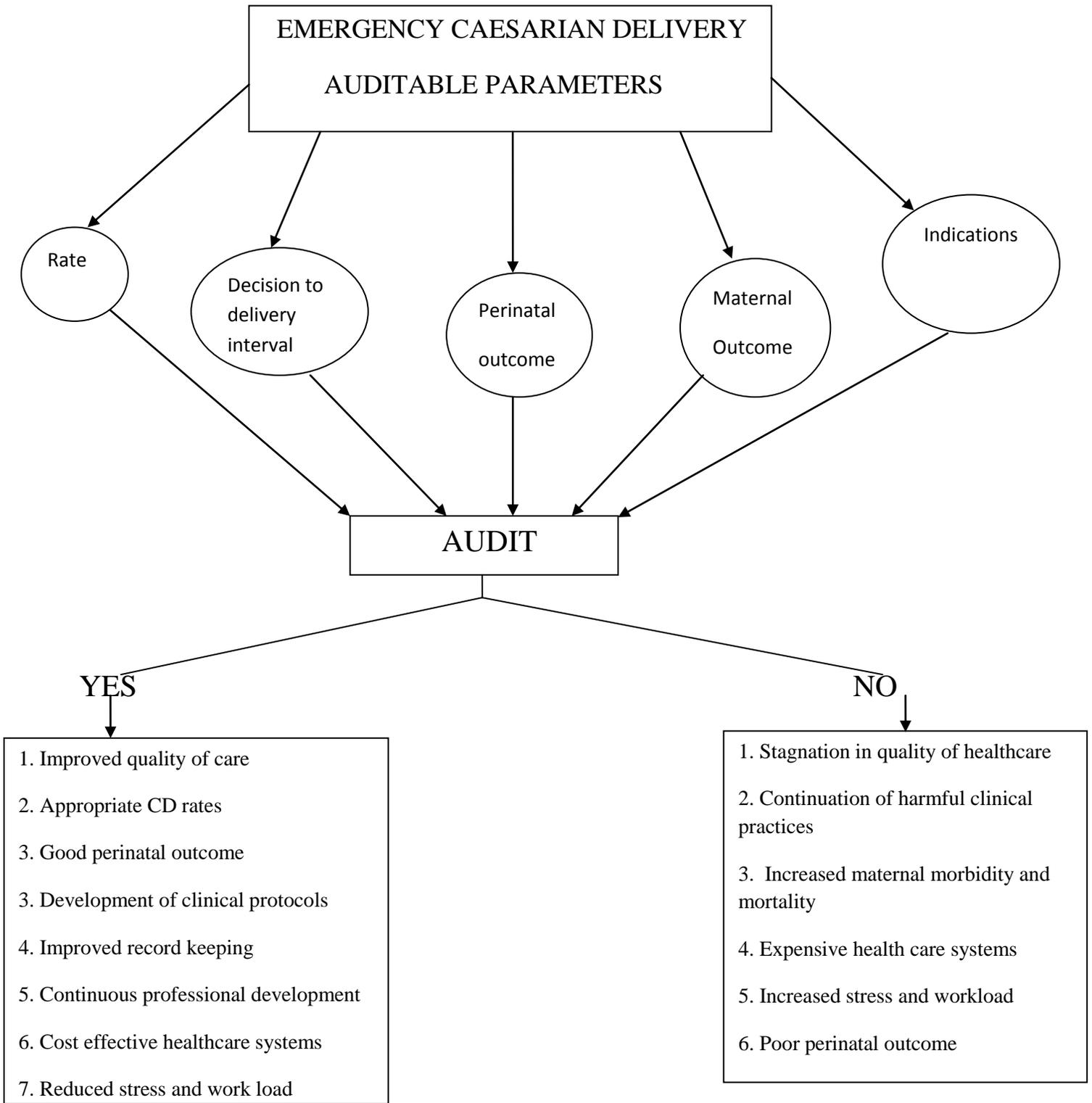
Emergency caesarian deliveries have been on a steady increase in KNH in the last three decades. This increase has generally been attributed to the fact that KNH being a teaching and referral hospital handles high-risk pregnancies that are more likely to end up with caesarian delivery. With the rising rates, concerns about the quality of care given has often been questioned particularly during consultants ward rounds and monthly departmental mortality meetings. The issues raised have been varied e.g. why the decision to perform emergency CD, failure of recording time of decision and operation, long delays between the decision and delivery and the subsequent perinatal outcomes. This audit sought to examine the current hospital practices surrounding emergency CD and identify gaps hence create awareness and promote discussion, which can then be tailored to develop standard operating procedures as a mechanism of ensuring quality of care. As a teaching and referral hospital, KNH is well positioned to be in the forefront in setting standards of care based on evidence and best practices.

### **3.0 CONCEPTUAL FRAMEWORK**

#### **3.1 Narrative;**

The essence of clinical audit is improving health care practice, something that practitioners have aspired to do for generations. Through audit, institutional, national and even regional practices are identified. After these, practices are compared with available evidence then standards can be developed, tailored to individual institutions. In addition to improving patient care, clinical audit leads to improvements in record keeping, development of clinical protocols, continuous professional development, cost effectiveness management and increased accountability and responsibility. Failure or laxity in carrying out regular clinical audits/reviews of practice will result in the stagnation of quality of care, or even a continuation of harmful practices in light of emerging new evidence.

### 3.2: DIAGRAMATIC REPRESENTATION:



## **4.0 STUDY QUESTIONS**

1. What is the pattern of clinical practice regarding emergency caesarian deliveries at Kenyatta National Hospital?
2. What is the level of compliance to the national and international standards of care for emergency caesarian deliveries at Kenyatta National Hospital?

## **5.0 OBJECTIVES**

### **5.1 Broad objective**

To establish the pattern of clinical practice in regards to emergency caesarian deliveries and its' impact on perinatal outcome at Kenyatta National Hospital.

### **5.2 Specific Objective**

At Kenyatta National Hospital;

1. To determine the indications of emergency caesarean deliveries
2. To determine responsiveness to emergency caesarean deliveries
3. To determine the relationship between indications of emergency caesarian deliveries and decision to delivery interval
4. To determine the relationship between indications of emergency caesarian deliveries and perinatal outcome
5. To determine the relationship between decision to delivery interval and perinatal outcome

## **6.0 METHODOLOGY**

### **6.1 Study design**

This was a descriptive retrospective study based on existing data within a specified period. It sought to evaluate selected aspects of care for emergency caesarean deliveries. It was designed to describe the level of responsiveness to emergency CD. In describing the status, the study design provided possibilities of eliciting discussions geared at developing standard operating procedures for emergency CD.

### **6.2 The study area:**

The study area was Kenyatta National Hospital labour ward and maternity theatre. The hospital is a national referral and teaching hospital. It is situated in Nairobi, 4 kilometres west of the Central Business District. It is also the main teaching hospital for the College of Health Sciences, University of Nairobi. The hospital caters for patients from Nairobi and its environs as well as referrals from other hospitals in the country and the greater Eastern Africa region.

The Kenyatta National Hospital is a teaching hospital for both undergraduate and postgraduate medical and nursing students of the College of Health Sciences, University Of Nairobi. It is also the training centre for other allied medical courses for the Kenya Medical Training College (KMTC).

KNH has one labour ward and three antenatal/postnatal wards i.e. GFA, GFB and 1A. It also has two maternity theatres within labour ward for caesarean deliveries and other obstetric procedures. Senior House Officers (Postgraduate Registrars) man these around the clock with attending

consultants within easy reach to be consulted and attend to cases requiring senior input. There is also a dedicated team of midwives.

The labour ward handles between 30-45 deliveries per day, about 10-15 of whom are delivered by emergency caesarean section. All patients in labour from the antenatal clinic, antenatal wards and A&E department are admitted into the labour ward.

Being the national teaching and referral hospital it is ideal for setting of standards based on evidence and best practices and a good starting point for the monitoring and evaluation of these standards before they are disseminated downwards to the lower level health facilities.

### **6.3 Study participants**

The study participants comprised of all patients delivered by emergency caesarean section at KNH between 1st April 2011 and 30<sup>th</sup> June 2011.

### **6.4 Inclusion Criteria**

All emergency CD at KNH performed during the study period with complete medical records.

### **6.5 Exclusion Criteria**

- a) Elective CD at KNH performed during the study period
- b) Files with incomplete data
- c) Files that could not be traced

## 6.6 Sample Size Determination

All complete and traceable files of patients who underwent emergency caesarean delivery during the study period were studied. The table below gives the breakdown of the caesarian deliveries for the previous three years (2008-10).

**Table 6.6.1: Trends of caesarian deliveries (2008-2010)**

Year	No. of CD	Percentage	Total
2008	3,276	38.0	8,615
2009	3,776	36.7	10,279
2010	4,535	47.1	9,629

Using the above information the sample size was calculated as follows;

$$n = \frac{z^2 p(1-p)}{d^2}$$

Where:

Z = Standard normal value for 95% (1.96)

P = expected proportion (CD) set at 37% from the estimate from the labor records in 2009.

q= 1 – P

d= precision level of the study set at 5% ( $\pm 0.05$ ).

Z = 1.96 with 95% confidence interval,

D is “desired precision” (the desired width of the confidence interval) ( $\pm 5\%$ ).

P = Expected probability of variable of interest (proportion of labor deliveries in KNH) = 37 %.

n = 358

358= minimum study participants

## **6.7 Data collection procedure**

All file tracing and data collection was carried out by the researcher.

The in-patient numbers of patients who had underwent emergency CD during the study period were obtained from the theatre register daily. These files were then traced during working hours in the labour ward and the post-natal wards within 72hours of the emergency CD. The files that met the inclusion criteria were recruited according to the sequence of occurrence in the register. The information sought in the files was from the doctor's notes, partogram, theatre notes, anaesthetist chart, nursing theatre reports and the cardex.

The study instrument comprised a pre-structured data collection sheet which had 6 sections; social demographic characteristics, obstetric history, gestation, labour and operation and foetal and maternal outcome (see Appendix A). Pre-testing of the data collection sheet was done to determine suitability. Data was extracted from the files and filled manually into the data collection sheet.

## **6.8 Quality control of data**

Data was entered after thorough scrutiny and validation of any information that may have been incomplete or conflicting. In order to avoid double participant recruitment, the participants' in-patient numbers was entered into a register upon recruitment for serialization. This register was counter-checked on a daily basis for any double entries and if it was so discovered, one of the data collection sheets was withdrawn and discarded and the serialization rectified before recruitment was continued.

## **6.9 Ethical considerations**

Ethical approval to conduct the study was sought from the Kenyatta National Hospital/University of Nairobi – Ethics and Research Committee (KNH/UON-ERC). This study did not pose any ethical issues of significance, however, confidentiality was ensured by collecting the data within the wards and no names were recorded on the data collection sheets. The information obtained from the records was used only for the purpose of this study.

## **6.10 Data management and statistical analysis**

The pre-structured data collection sheets were checked for any missing entries after which a data base was designed in MS Access which allowed for setting of controls and validation of the variables. On completion of the data entry exercise the data was exported to a Statistical Package (SPSS – Version 18.0) for analysis.

The data was presented in tables and figures where applicable. Non-parametric tests (Mann Whitney U Test) were used to examine whether there was any significant association between the continuous variables e.g. age, while chi-square was used to establish the significant associations between the categorical variables.

Odds Ratios (OR) and associated 95% Confidence Intervals (CI) were calculated to identify the factors that were more likely to explain the explanatory variable (e.g. relationship between indications of CD and perinatal outcome).

Chi-square Test was used to establish whether there were any significant association between the indications of CD, DDI and the outcomes of the procedure.

A P-value of less than 5% ( $P < 0.05$ ) was considered statistically significant.

## **7.0 STUDY LIMITATIONS**

The main challenge was in the quality of records, with incomplete and inaccurate records occurring frequently. Missing and physically distorted files were encountered. It is possible that not all emergency CD were recorded in the theatre register.

A single delivery could be associated with multiple indications e.g. one previous CD with foetal distress and PROM. In such instances the diagnosis whose presence automatically leads to a caesarian delivery was categorized as the indication of the emergency caesarian delivery.

Being a retrospective study there was no way of verifying the recorded data e.g. the time recorded, were the clocks synchronized e.t.c. and hence these may have had a negative impact on the quality of data.

## 8.0 RESULTS

During the study period there were 2754 deliveries of which 930 (33.3%) were emergency caesarean deliveries. The results obtained are presented below:

### 8.1. File retrieval and analysis

**Table 1: Rate of file retrieval and analysis**

<b>Population</b>	<b>No.</b>	<b>%</b>
Number of deliveries	2754	n/a
Emergency CD	930	33.8
File retrieval(n=930)	885	95.2
Files analyzed(of the retrieved)	502	56.7

Table 1 shows that during the study period there were 2754 deliveries of which, 930 were emergency CD giving an emergency CD rate of 33.8%. Of these 885 (95.2%) files were retrieved, 45 (4.8%) files could not be traced due to incorrect in-patient number.

Of the retrieved file 56.7% had completed data and were analyzed the other 43.3% had incomplete data mainly lacking timing of various events.

## 8.2. Social demographic characteristics of study population

**Table 2: Sociodemographic characteristics of study the population (N=502)**

<b>Characteristic</b>	<b>No.</b>	<b>(%)</b>
<b>Age (in Years)</b>		
<20	14	2.8
20-24	117	23.3
25-29	169	33.7
30-34	122	24.3
>=35	80	15.9
<b>Marital Status</b>		
Single	46	9.2
Married/Cohabiting	450	89.6
Separated/Divorced	4	0.8
Widowed	2	0.4
<b>Occupation</b>		
Unemployed/Housewife	256	51
Self-Employed	134	26.7
Salaried	104	20.7
Other	8	1.6
<b>Patient Type</b>		
Hospital Patient	364	72.5
Referral	138	27.5

Table 2 shows the sociodemographic characteristics of the study population. The age range was 16-43 years with a mean age of 28.5 years. Majority of participants were below 30 years (59.8%). Teenagers comprised 2.8% and elderly mothers comprised 15.9% of the study population.

On marital status, majority were married (89.6%). Approximately half (51%) were economically dependent either reporting to be housewives or unemployed.

Nearly one third of the participants were referrals for other health facilities (27.5%).

### 8.3. Parity and previous caesarian deliveries

**Table 3: Distribution of study population in Parity and Previous CD (N=502)**

<b>Characteristic</b>	<b>No.</b>	<b>(%)</b>
<b>Parity</b>		
One	188	37.5
Two	173	34.5
Three	82	16.3
Four	43	8.6
>Four	16	3.2
<b>Number of Previous CD</b>		
None	391	63.5
Once	133	26.5
Twice	38	7.6
Thrice	10	2.9
>Thrice	2	0.4

Table 3 shows the distribution of the study participants in regards to parity and number of previous CD. For majority of the participants (37.5%) this was their index viable delivery and for 63.5% of the subject this was their index caesarian delivery.

## 8.4. Indications of emergency CD

**Table 4: Indications of emergency CD (N=502)**

<b>Indication</b>	<b>No.</b>	<b>%</b>
Non-reassuring fetal status	137	27.3
Failed VBAC	81	16.1
Labour Dystocia	70	13.9
Malpresentation/malposition	47	9.4
>= 2ps in Labour	46	9.2
Pre eclampsia/eclampsia	32	6.4
Failed Induction	23	4.6
Ante partum Hemorrhage	22	4.4
PMTCT	16	3.2
PROM	6	1.2
Cord Prolapse	5	1.0
Uterine rupture	4	0.8
Others	13	2.5
<b>TOTAL</b>	<b>502</b>	<b>100</b>

Table 4 shows the distribution of participants as per the various indications of emergency caesarian delivery. NRFS was the leading indication comprising 27.3% of the participants. Failed VBAC and dystocia were the second and third commonest indications each comprising 16.1% and 13.9% of the participants respectively. Laparotomy for uterine rupture was performed in 0.8% of the cases.

## 8.5. Time intervals, Anesthesia, abdominal incision and grade of surgeon

**Table 5: Time intervals from decision to delivery and operation details (N=502)**

<b>Characteristic</b>	<b>No.</b>	<b>%</b>
<b>Decision to arrival in theatre (minutes)</b>		
<15	15	3
15-30	26	5.1
31-45	18	3.6
46-60	37	7.4
61-75	30	6
76-90	20	4
> 90	356	70.9
<b>Arrival in theatre to commence of surgery(minutes)</b>		
<15	146	29.1
15-30	335	66.7
31-45	5	1
46-60	3	0.6
61-75	2	0.4
76-90	0	0
>90	11	2.2
<b>Decision to delivery time (minutes)</b>		
<15	5	0.9
15-30	22	4.4
31-45	8	1.6
46-60	12	2.4
61-75	32	6.4
76-90	37	7.4
>90	386	76.9
<b>Duration of CD (minutes)</b>		
<15	5	1
15-30	400	79.7
31-45	85	16.9
46-60	11	2.2
61-75	0	0
76-90	0	0
>90	1	0.2
<b>Anesthesia Used</b>		
GA	114	22.7
SA	385	76.7
BOTH	3	0.6

### Type of incision

	Pfannenstiel	375	74.7
	SUMI	127	25.3
<b>Surgeon</b>			
	Medical officer intern	9	1.8
	S.H.O.	488	97.2
	Consultant	5	1.0

Table 5 shows the distribution of participants in relation to time intervals between various events following the decision to operate. It also shows distribution of the participants in regards to the type of abdominal incision, type of anesthesia and the surgeon.

The main point of delay was between the time of decision and the patient arriving in theatre. 70.9% of the participants were received in theatre more than ninety minutes from the time of the decision.

On arrival in theatre, 29.1% of the operations were begun within thirty minutes however in the majority (66.9%) the operation begun between thirty and forty-five minutes.

For the actual operation time, majority of the operations lasted between fifteen to thirty minutes (79.7%).

For the overall DDI, only 5.4% of the participants were delivered within thirty minutes of the decision, 9.4% were delivered within one hour but the majority were delivered after more than ninety minutes (76.9%).

Spinal anesthesia was the most commonly used method (76.7%). 97.2% of the emergency CD were performed by the Senior House Officers who commonly used pfannenstiel incision for abdominal entry (74.7%).

## 8.6. Indications of emergency CD and DDI

**Table 6: Relationship between indication of emergency CD and Decision to Delivery**

Interval.	Decision to Delivery Interval			
	<60 minutes		>60minutes	
	No.	%	No.	%
<b>Indications</b>				
Non-reassuring foetal status	6	4.4	131	95.6
Failed VBAC	8	9.9	73	90.1
Labour Dystocia	4	5.7	66	94.3
Malpresentation/malposition	5	10.6	42	89.4
>=2ps in labour	4	8.7	42	91.3
Pre-eclampsia/eclampsia	4	12.5	28	87.5
Failed induction	5	21.7	18	78.3
Antepartum Haemorrhage	3	13.6	19	86.4
PMTCT	1	6.3	15	93.7
PROM	1	16.7	5	83.3
Cord prolapse	3	60	2	40
Uterine rupture	3	75	1	25
Others	0	0	13	100

Table 6 shows that only 60% of the participants with cord prolapse and 75% with uterine rupture were delivered within sixty minutes of the decision. 86.4% of participants with APH were delivered after sixty minutes of the decision.

95.6% of the participants with NRFS, 94.3% with labour dystocia and 91.3% with 2 or more previous scars in labour were delivered after more than sixty minutes of the decision.

## 8.7. Type of anesthesia and DDI

**Table 7: Relationship between Decision to Delivery Interval and type of anesthesia**

Decision to delivery (minutes)	Anesthesia Used				OR (95%)	P-value
	GA N=114		SA N=385			
	No.	%	No.	%		
< 15	2	1.7	3	0.8	Ref.	
15 – 30	13	11.4	9	2.3	0.5 (0.0 - 4.6)	0.628
31 – 45	1	0.9	7	1.8	4.7 (0.2 - 209.5)	0.51
46 – 60	3	2.6	9	2.3	2.0 (0.1 - 31.8)	0.6
61 – 75	13	11.4	19	4.9	1.0 (0.1 - 8.8)	1
76 – 90	7	6.2	27	7.1	1.6 (0.2 - 15.7)	0.636
> 90	75	65.8	311	80.8	2.7 (0.3 - 20.2)	0.264

Table 7 shows the relationship between DDI and type of anesthesia used. 1.7% of participants under GA had a DDI of less than 15 minutes compared to 0.8% under spinal anesthesia.

16.6% of the participants under general anesthesia were operated within one hour of decision as opposed to 7.2% under spinal anesthesia.

Though general anesthesia was associated with a shorter DDI as compared to spinal anesthesia the difference was not statistically significant in any of the time intervals ( $p$ -value  $>0.05$ )

## 8.8. Type of abdominal incision and DDI

**Table 8: Relationship between Decision to Delivery Interval and type of incision**

Decision to delivery (minutes)	Type of Incision				OR (95%)	P=Value
	Pfannenstiel N=375		SUMI N=127			
	No.	%	No.	%		
< 15	2	0.5	3	2.4	Ref.	
15 – 30	12	3.2	10	7.9	0.6 (0.1 - 5.5)	0.648
31 – 45	7	1.9	1	0.8	0.1 (0.0 - 2.3)	0.218
46 – 60	9	2.4	3	2.4	0.2 (0.0 - 3.0)	0.28
61 – 75	28	7.5	4	3.1	0.1 (0.0 - 1.0)	0.037
76 – 90	31	8.3	6	4.7	0.1 (0.0 - 1.3)	0.057
> 90	286	76.2	100	78.7	0.2 (0.0 - 1.7)	0.016

Table 8 shows the relationship between DDI and type of abdominal incision. 2.4% of subject operated via SUMI had a DDI of less than 15minutes compared to 0.5% with the pfannenstiel incision.

Within the one hour DDI, 13.5% with the SUMI had been operated compared to 8.9% with pfannenstiel incision.

In four out of the six time intervals, SUMI was associated with a shorter DDI as compare to pfannenstiel incision the difference was statistically significant in the 61-75minutes and >90 minute intervals (p=value<0.05)

## 8.9 Perinatal outcome

**Table 9: Perinatal outcome (N=523)**

<b>Perinatal outcome</b>	<b>No.</b>	<b>%</b>
<b>Sex</b>		
Male	279	53.3
Female	244	46.7
<b>Gestation</b>		
28-31	30	5.7
32-34	25	4.8
35-37	80	15.3
<37	388	74.2
<b>Apgar score</b>		
7-10	481	92
1-6	10	1.9
0	32	6.1
<b>Perinatal mortality</b>		
FSB	18	56.3
MSB	14	43.7

Table 9 shows the immediate perinatal outcome of emergency CD. There were 483 singleton deliveries, 17 sets of twins and 2 sets of triplets giving 523 babies. 25.8% were preterm and 1.9% were asphyxiated. There were 32 (6.3%) stillbirths of which 56.3% were FSB.

## 8.10. Perinatal outcome in various indications

**Table 10: Relationship between indications of emergency CD and perinatal outcome**

Indication	Perinatal Outcome		OR (95% CI)	p-value
	Apgar score			
	<7 N=20 No. (%)	7-10 N=482 No. (%)		
Non-reassuring foetal status	0	137 (28.4)	Ref.	-
Labour Dystocia	2 (10)	68 (14.1)	0.4 (0.1 - 1.7)	0.269
Malpresentation/malposition	0	47 (9.8)	-	-
Ante partum Haemorrhage	6 (30)	16 (3.3)	13.5 (3.9 - 44.8)	0.001
Pre eclampsia/eclampsia	3 (15)	29 (6.0)	0.04 (0.0 -0.2)	<0.001
Cord prolapsed	0	5 (1.0)	-	-
Uterine rupture	2 (10)	2 (0.4)	28.3 (2.6 - 305.2)	<0.001
Other	2 (10)	11 (2.3)	1.2 (-)	0.569
>= 2ps in Labour	2 (10)	44 (9.2)	3.8 (-)	0.267
PMTCT	2 (10)	14 (2.9)	0.8 (0.3 - 2.7)	0.782
FVBAC	1 (5)	80 (16.6)	-	-
Failed Induction	0	23 (4.8)	-	-
PROM	0	6 (1.2)	-	-

Table 10 shows that APH, pre-eclampsia and uterine rupture had statistically significant impact on the perinatal outcome (p-value <0.001). 30% with apgar score <7 compared with 3.1% with apgar score 7-10 had APH, 15% with apgar score <7 compared with 6% with apgar score 7-10 had pre-eclampsia and 10% with apgar score <7 compared with 0.4% with apgar score 7-10 had uterine rupture.

The majority of neonates with apgar score <7 had APH (30%) and those with apgar score 7-10 had NRFS (28.4%).

## 8.11. DDI and Perinatal outcome

**Table 11: Relationship between DDI and perinatal outcome**

Decision to delivery (minutes)	Perinatal outcome				OR (95% CI)	p-value
	Apgar score					
	<7 N=19		7-10 N=483			
	No.	%	No.	%		
<15	0	-	5	1.0	Ref.	
15-30	1	5.3	21	4.3	1.2 (-)	0.267
30-45	1	5.3	7	1.4	3.8(0.0-30.5)	0.267
45-60	2	10.5	10	2.1	5.6(0.0-30.1)	0.071
60-75	0	-	32	6.6	-	
75-90	1	5.3	36	7.5	0.7(0.0-5.1)	1
>90	14	73.7	372	77	0.8(0.3-2.7)	0.782

Table 11 shows the relationship between DDI and neonatal outcome. DDI had no statistically significant impact on the neonatal outcome in all the time interval brackets ( $p > 0.001$ )

## 9.0 DISCUSSION

The aim of this clinical audit was to describe the common clinical practices relating to emergency CD and identify any existing gaps. These can then be used as a baseline from which standards and clinical protocols can be developed targeted at improving clinical care of emergency CD. The main results of this study demonstrate that the standard of record keeping is far from optimal and there is a major gap in reaching the recommended target interval between the decision to perform an emergency CD and the delivery, even in a national referral and teaching hospital. It therefore, highlights the need to explicitly develop mechanisms to improve documentation and record keeping. Secondly, to identify the factors contributing to the non-compliance with the recommended DDI, in order to devise mechanisms of improving the quality of care.

The study revealed an unacceptable low quality of documentation with only 56.7% of the retrieved file having accurate and complete data. Similar findings have been found in previous studies. (38, 39) A study in Pakistan highlighted that record keeping was non-standardized and records were of poor quality and that important information was often missing from records, even in teaching hospitals in Karachi. (40) In this study, incompleteness of data contributed 43.3% while inaccurate data contributed 4.8% to the poor quality of data. Certain items were well recorded (e.g. sociodemographic characteristics, type of anaesthesia, surgeon and perinatal outcome) whereas others (e.g. time of decision, time of incision and precise indication) were frequently missing. This finding underscores the need to urgently improve on documentation and record keeping, bearing in mind the fact that quality records are important in providing high quality care and are today frequently used as legal documents in the event of legal proceedings. One of the frequently cited benefits of clinical audit and feed back is improvement in documentation and record keeping. (41, 42)

The fact that only 56.7% of the emergency CD were studied may create a bias on the results assuming that the 43.3% unstudied participants were managed differently.

There was a significantly slow responsiveness with only 5.4% of the operations achieving the thirty minutes DDI goal. Similar findings have been found in previous local studies.(43, 44) In the developed countries the findings are strikingly different with several studies meeting the thirty minutes DDI.(45) A study in Germany by Hillemanns et al found that 100% of emergency CD were performed within the target interval, less than twenty minutes.(31) These discrepancy can be attributed to the limited workforce, infrastructure challenges and poor monitoring and reporting systems in developing countries.

In this study, majority of cases were operated on more than ninety minutes after the decision (76.9%). Even in extremely urgent cases, delay was present, 2 out of 5 cases of cord prolapse and 1 out of 3 cases of uterine rupture were operated more than sixty minutes after the decision. This falls way below international standards. The perinatal guidelines by The American Academy of Pediatrics and The American College of Obstetricians and Gynecologists state in relevant part, “Conversely, examples of indications that may mandate more expeditious delivery (less than 30 minutes) include hemorrhage from placenta previa, abruption placentae, prolapse of umbilical cord, and uterine rupture.” (46)

The delay in DDI was mainly influenced by the time taken to get the patient to theatre with 70.9% of participants going in over ninety minutes after the decision. The actually time spent performing the operation was less than one hour with 99.8% of participants meeting this time.

There was a clinically significant difference in DDI concerning the type of anesthesia used with GA being associated with a shorter DDI; however, this difference was not statistically significant.

Overall SUMI was associated with a shorter DDI that was statistically significant in the 61-75minutes and >90minutes time interval bracket (p-value <0.001).

Many factors may influence the DDI such as the degree of urgency (which is not perceived in the same way by all members of the healthcare team), type of anesthesia with general anesthesia taking shorter time to administer, type of abdominal incision and organisational factors. Overall, this obvious delay poses a potential risk of medico-legal consequences in the event of poor fetal-maternal outcome.

The prematurity rate was 25.8%, which is comparable with the 24.3% figure of the general obstetric population in Nairobi. (47) Prematurity is known to cause perinatal morbidity and mortality. The crude perinatal mortality rate was 63 per 1000 live births, which was slightly higher than 33 per 1000 live births found in the Kenya Demographic Health Survey, which is a whole population figure. (17)

In this population, APH, Pre-eclampsia/eclampsia and uterine rupture had a statistically significant impact on neonatal outcome. On the other hand DDI did not demonstrate any statistically significant impact on the neonatal outcome, a finding that has been demonstrated in other studies.(48) Even if prolonged DDI had no demonstratable negative impact on perinatal outcome effort to narrow the DDI may reduce maternal anxiety and reduce the physician's liability.

## **CONCLUSION**

1. The overall decision to delivery interval is below locally and internationally recommended standards with only 9.4% and 5.4% of the of the participants being delivered within thirty and sixty minutes of the decision respectively.
2. The results show that record keeping in the KNH labour ward and maternity theatre is far from optimal with only 56.7% of the file having complete and accurate data
3. Decision to delivery interval did not demonstrate a statistically significant impact on the perinatal outcome.

## **RECOMMENDATIONS**

1. There is an urgent need to hasten the response time to emergency CD .
2. Consideration should be given to developing a policy amongst the staff relating to record keeping.
3. Another research should be conducted to identify the causes of delay
4. This audit and its finding should be disseminated widely to all the staff working in labour ward and maternity theatre to highlight the problems in record keeping and responsiveness.
5. Clinical audits of this nature should be made regular and routine to improve the standard of care over time.

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**APPENDIX A: DATA COLLECTION SHEET FOR EMERGENCY CAESAREAN DELIVERY**

1) a) Study Serial Number ..... b) In-patient number .....

**Social demographic characteristics**

2) Age

3) Marital status

a) Single    b)Married/cohabiting    c)Separated/Divorced    d) Widowed

4) Occupation

a) Unemployed/housewife    b) Self employed    c) Salaried employment    d) Others

**Obstetric history**

5) Parity  abortions

6) Number of previous CD

**Study gestation**

7) Gestation at delivery by dates/ultrasound

8) Type of patient

a) Hospital patient    b) Referral

**Labour and operation details**

9) Duration of active labour

- a) < 4hours      b) 4-8hours      c) 8-12hours      d) >12hours

10) i) Indication of CD

- a) Non reassuring foetal status  
b) Dystocia  
c) Malpresentation/malposition  
d) Ante partum Haemorrhage  
e) Pre eclampsia/eclampsia  
f) Cord prolapse  
g) Uterine rupture  
h) Others (specify).....

11) Decision to being received in theatre

- a) <15mins      b) 15-30mins      c) 30-45mins      d) 45-60mins      e) 60-75mins  
f) 75-90mins      g) >90mins

12) Arrival in theatre to commencement of surgery

- a) <15mins      b) 15-30mins      c) 30-45mins      d) 45-60mins      e) 60-75mins  
f) 75-90mins      g) >90mins

13) Decision to delivery time

- a) <15mins    b) 15-30mins    c) 30-45mins    d) 45-60mins    e) 60-75mins  
f) 75-90mins    g) >90mins

14) Duration of CD

- a) <30mins    b) 30-60mins    c) 60-90mins    d) >90mins

15) Anaesthesia used

- a) GA    b) SA

16) Type of Incision

- a) Pfannenstiel    b) SUMI

17) Surgeon

- a) Medical Officer    b) Resident    c) Consultant

### **Foetal outcome**

18) Foetal Outcome

i) Sex

- a) Male    b) Female

ii) APGAR Score at 5 Min

- a) 7-10    b) 4-6    c) 1-3    d) 0

### **Maternal outcome**

19) Maternal outcome

a) Stable    b) unstable    c) deceased