

Decision Delivery Interval for Emergency Caesarean Section and Associated Maternal and Neonatal Outcomes in a Tertiary Hospital in South- South Nigeria

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ABSTRACT

Standard guidelines recommend that delivery by caesarean section should be initiated within 30 minutes of decision to operate to avoid adverse maternal and fetal outcome. Patient however encounter delays despite recommended time frames. The aim of the study was to determine the average decision delivery interval and its effect on perinatal outcomes in emergency caesarean sections. The study was a descriptive cross-sectional study. The study population consisted of 120 consecutive pregnant women who had emergency caesarean section who met the inclusion criteria. Data was collected using a structured questionnaire and

analyzed with SPSS version 20. Sixty – two (51.7%) of the study participants were booked. The commonest indication for CS was cephalo-pelvic disproportion (35%). The mean DDI was 209.5± 98.9 minutes. Patient factor was the leading cause of delay due to lack of funds and non-provision of surgical materials (55%). Only delay in obtaining consent was statistically significant in prolonging DDI interval. Five-minute APGAR score was normal in 91.7%. Indication for emergency CS was significantly related to fetal outcomes; asphyxia and mortality. There was lack of association between DDI, perinatal and maternal outcome, which may indicate decision delivery interval of 30 minutes or less may not be applicable to all emergency CS, especially in developing countries with infrastructural challenges. However, decision- delivery interval should be considered as an important contributing factor for adverse neonatal outcomes. Therefore, clinical judgment is required to assess the urgency of caesarean section to prevent neonatal morbidity and mortality.

Keywords: Decision-delivery interval, Emergency caesarean section

INTRODUCTION

Caesarean section (CS) is a surgical procedure in which incisions are made on the anterior abdominal wall and uterus to deliver the fetus, placenta and fetal membranes after the age of fetal viability. [1] It is usually performed when vaginal delivery would put the health or life of the baby or mother at risk and in recent times performed for maternal request. When it is done for immediate life-threatening condition of the fetus or mother, it is called emergency cesarean section. [2]

National guidelines in the United States and the United Kingdom recommend a decision-delivery interval (DDI) at of 30-minutes for emergency CS. [3,4]. However, achieving these timelines may not be feasible in low resource nations with busy obstetric settings [5] and there is little evidence to support these guidelines. [6] It is widely accepted that the DDI should be kept to the minimum achievable time because preventing adverse neonatal outcomes is critically time-dependent [7], and inability to meet these targets has been the basis for many medico-legal suits. [5]

Achieving this standard in developing countries, is a highly difficult task and as literature states, the current recommendations for the interval between decision and delivery are not being achieved in routine practice, also failure to meet these recommendations does not seem to increase neonatal morbidity and mortality. [8] An insight into decision delivery interval and identifying factors responsible or delay and also devising means to minimise delays. This objective evidence would also enable us in setting up realistic standards and clinical guidelines in order to provide good care to our patients. Though reports from various studies have shown that in reality a standard 30-minutes decision to delivery interval may not be feasible, a workable approach would be to conduct a local study evaluating fetal outcomes from emergency caesarean sections and make recommendations locally regarding optimal decision to delivery interval.

The present study was thus designed to identify factors and areas which affect the decision to delivery interval and also evaluate maternal and fetal outcome with respect to this interval.

METHODOLOGY

Study Design/Setting

This was descriptive cross sectional study conducted in Federal Medical Centre Yenagoa. It is one of the two tertiary health facilities in Bayelsa State, South-South Nigeria. The hospital has an obstetric unit with a labor ward in the same floor with two operating theatres for elective and emergency CS. The unit has around 800 deliveries annually including inpatient and referrals.

Study Participants

The study participants consisted of in-patient women who had emergency caesarean section from 1st of January, 2020 to 30th of April, 2020. These were parturients who were admitted into the labour ward of the hospital and had emergency CS. In this study, women who underwent Emergency CS with a preterm fetus, uterine rupture before the decision, intrauterine fetal death, and fetuses with gross congenital anomalies were excluded.

Data Collection Method and Materials

Properly designed, structured, and interviewer-administered questionnaires and checklists were used to collect the data. The tool was prepared after reviewing related literature. [5,9-15] and was modified and validated by experts to fit the local situation and research objectives. Six research assistants were trained and assisted with data collection. An interviewer-administered questionnaire was used to collect socio-demographic characteristics and obstetric characteristics. Data were collected from the time of the decision to the time of discharge to home or death of neonates captured by an observational checklist. Before collecting the actual data, a pre-test was done on 10% of the samples, and training for research assistants was provided to ensure data quality. The trained research assistants were supervised during data collection, and each questionnaire was checked for completeness daily.

Data Processing & Analysis

Data collected using a structured questionnaire was entered into SPSS version 20 for analysis. Bivariate logistic regression analysis was done for each independent variable. The strength of association between independent and dependent was interpreted using adjusted odds ratio with a 95% confidence interval. Variables with a p-value <0.05 in the multivariate logistic regression were considered statistically significant.

Ethical Clearance

Ethical clearance was obtained from the hospital ethical committee. Verbal consent preoperatively and then written consent after stabilization was obtained from each participant. Participation in the study was voluntary and participant's information was kept confidential.

RESULTS

Sociodemographic Characteristics of Study Participants

Between the 1st of February 2020 and 31st of July 2020, a total of 194 caesarean sections were performed and 146 (75.2%) were for emergency caesarean sections, out of which 120 (82.1%) patients fulfilled the eligibility criteria and were enrolled for the study. The mean age of women enrolled in the study was 31.62 ± 5.78 . Majority (95%) were married while six (5%) were single. Sixty-two (51.7%) of the women were booked while fifty-eight (48.3%) were unbooked. Majority of them had either Tertiary (68%) or Secondary (42%) level of education with a few

having Primary (10%) level of education. Forty (33.3%) were nulliparous; forty-two (35%) were multiparous; twenty-four (20%) were primiparous while fourteen (11.7%) were grandmultiparous women. One hundred and seventeen (98%) were Christians. The majority of the study participants were Ijaws (65%) followed by Igbos (20%) with the remaining 15% drawn from other tribes (Urhobo, Isoko, Yoruba, Nembe). Most of the women were married to men with skilled or unskilled employment (78.4%) while twenty-six (21.6%) were unemployed. Only twenty-two (18.3%) had health insurance coverage with majority (81.7%) of study participants were not covered under the health insurance scheme. (Table 1)

Table 1: Sociodemographic characteristics of study participants

Characteristics	Frequency N = 120	Percent (%)
Age		
< 20 years	6	5.0
20 – 24 years	8	6.6
25 – 29 years	28	23.3
30 – 34 years	36	30.0
35 – 39 years	36	30.0
≥ 40 years	6	5.0
Mean age ± SD in years	31.6 ± 5.8	
Marital Status		
Married	114	95.0
Single	6	5.0
Booking Status		
Booked	62	51.7
Unbooked	58	48.3
Parity		
Nulliparous	40	33.3
Primiparous	24	20.0
Multiparous	42	35.0
Grandmultiparous	14	11.7
Educational Status		
Primary	10	8.3
Secondary	42	35.0
Tertiary	68	56.7
Tribe		
Ijaw	78	65.0
Igbo	24	20.0
Others	18	15.0
Religion		
Christianity	117	97.5
Islam	3	2.5
Spouse Occupation		
Professional	47	39.2
Unskilled	47	39.2
Unemployed	26	21.6
Health Insurance		
Insured	22	18.3
Not insured	98	81.7

Indications for Emergency Caesarean Sections in Federal Medical Centre

Figure 1 shows that the commonest indication for emergency CS during the study was cephalopelvic disproportion in labour (35%) followed by pre-eclampsia/eclampsia (23.3%), suspected fetal distress (16.7%), antepartum haemorrhage (10%) and obstructed labour (5%). Others were accounting for 10.0% include previous CS in labour, breech in labour, and cord prolapse.

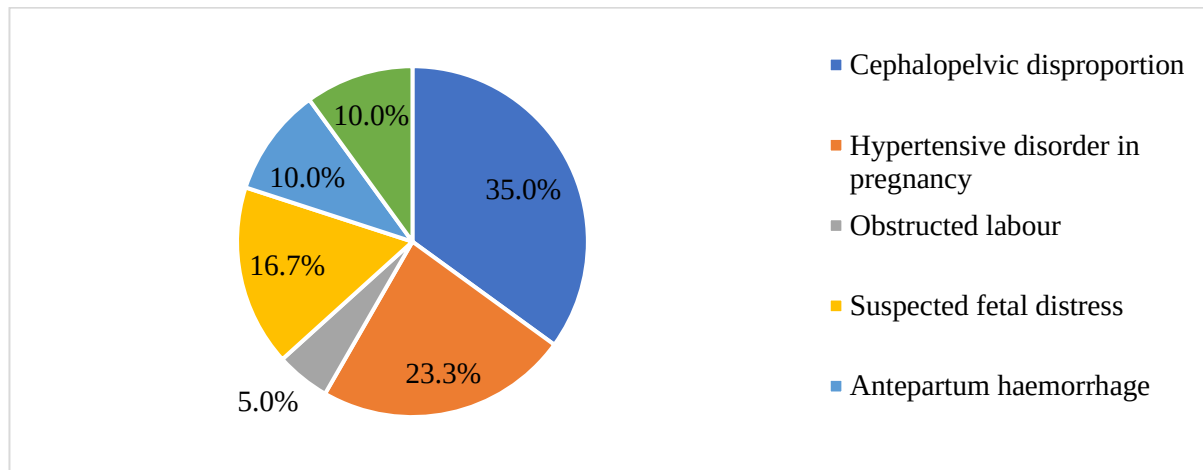


Figure 1: Pie chart showing indications for emergency caesarean section during the study.

Features of Emergency Caesarean Sections

Table 2: Features of Caesarean section at FMCY

Features	Frequency (N = 120)	Percent (%)
Category of Caesarean section		
Category 1 (Emergency)	36	30.0
Category 2 (Urgent)	84	70.0
Types of Caesarean section		
Primary Caesarean section	88	73.3
Repeat Caesarean section	32	26.7
Type of Anaesthesia		
Spinal Anaesthesia	112	93.3
General Anaesthesia	8	6.7
Rank of Surgeon		
Consultant	6	5.0
Senior Registrar	114	95.0
Mean Duration $\pm$ SD of Caesarean section in minutes		
	75.6 $\pm$ 21.9	

*SD – Standard deviation

As presented in Table 3, Primary CS accounted for 73.3% of cases while 26.7% of cases were repeat CS. Of the 120 emergency CS cases, six cases (5%) were done by consultants, while 114 cases (95%) were done by senior registrars. Majority of the cases (93.3%) were done under spinal anaesthesia while 6.7% were done under general anaesthesia (Table 2). Mean duration of surgery was 75.6 ± 21.9 minutes (Table 2).

THE AVERAGE DECISION TO DELIVERY INTERVAL AMONG PARTURIENT WHO HAD EMERGENCY CAESAREAN SECTION IN FMC YENAGOA.

Average Decision to Delivery Interval

Table 3 reveals that the overall mean decision to delivery interval was 209.5 ± 98.9 minutes with a range of 53 minutes to 540 minutes. The mean DDI for Category 1 indications was 194.3 ± 96.5 minutes and shorter than the mean DD1 for Category 2 indications (216.1 ± 99.8 minutes).

The shortest mean DDI was 107.2 minutes among parturients who had cord prolapse as the indication for their emergency CS. This was followed by parturient with antepartum hemorrhage (141.0 minutes) and fetal distress (186.0 minutes). Table 3 also shows that parturient with Pre-eclampsia/Eclampsia had the longest mean DDI (254.9 minutes).

Factors Responsible for Delay

Figure 3 reveals that inability to procure surgical requirements/blood and delay in getting consent were the major causes of delay and contributed 55% and 35% respectively. Other contributors to delay include busy theatre suites (1.7%), and unavailability of anaesthetist (8%).

Decision to Delivery Interval for Emergency Caesarean Section in FMC

Variable	Number	Decision-Delivery Interval (in minutes)	
		Mean $\pm$ SD	Range
Total	120	209.5 ± 98.9	53.0 – 540.0
Category of Caesarean section			
Emergency	36	194.3 ± 96.5	53.0 – 420.0
Urgent	84	216.1 ± 99.8	80.0 – 540.0
Type of Caesarean section			
Primary	88	198.1 ± 84.3	53.0 – 420.0
Repeat	32	241.0 ± 127.4	93.0 – 540.0
Indication			
CPD	42	198.4 ± 75.7	80.0 – 345.0
Preeclampsia	28	254.9 ± 115.1	145.0 – 540.0
Obstructed labour	6	240.0 ± 149.1	91.0 – 420.0
Fetal distress	20	186.0 ± 66.3	98.0 – 283.0
APH	12	141.0 ± 81.2	53.0 – 287.0
Others	12	235.8 ± 121.0	93.0 – 407.0

SD – Standard deviation; CPD – cephalopelvic disproportion; APH – Antepartum haemorrhage

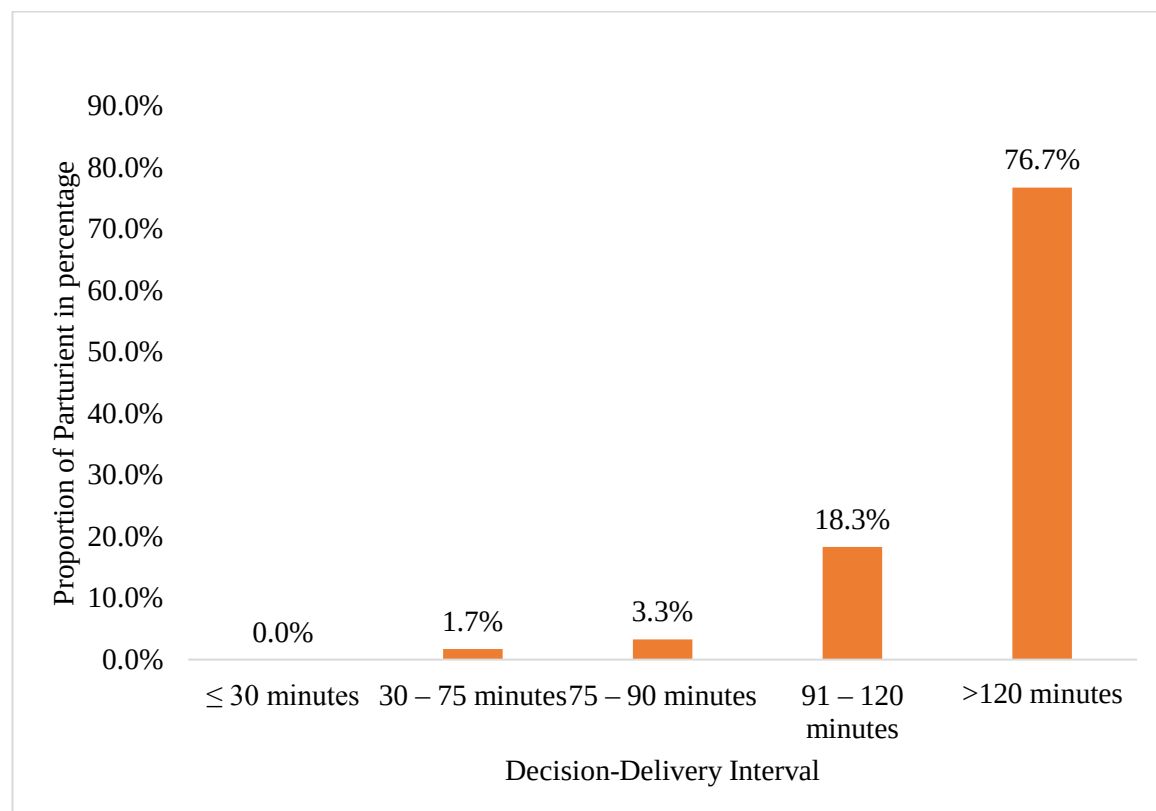
However, from the logistic regression analysis only delay in giving consent (OR – 2.10; p – 0.046) was a statistically significant factor in prolonging the DDI beyond 120 minutes (Table 4)

Table 4: Factors affecting the decision delivery interval for Emergency caesarean Section

Factors influencing Delay (Reference group)	OR	95%CI		pValue
		Min	Max	
Delay due to Consent (No)				
Yes	2.10	1.03	4.93	0.046*
Delay due to Procurement of material (No)				
Yes	2.07	0.88	4.83	0.094
Delay due to Theatre space (No)				
Yes	3.21	0.19	53.07	0.414
Delay due to No Anaesthetist (No)				
Yes	1.05	0.20	5.51	0.955

Delay in Carrying Out Emergency Caesarean Section.

Out of the 120 participants studied, none of the CS was done within 30 minutes, only two (1.7%) were done within 75 minutes with the majority (76.7%) of emergency CS performed after 120 minutes of the decision to operate (Figure 2)



SHORT-TERM NEONATAL OUTCOMES FROM EMERGENCY CAESAREAN SECTION WITH DECISION TO DELIVERY INTERVAL AND INDICATION FOR CAESAREAN SECTION

Neonatal Outcomes

Ten (8.3%) babies had asphyxia out of the 120 babies delivered. Twenty-six (21.7%) of the babies delivered were admitted into SCBU. Majority of these cases were admitted for asphyxia (38.5%) and fetal macrosomia (15.4%). Two (1.7%) of the babies suffered early neonatal demise (Table 5).

RELATIONSHIP BETWEEN SHORT-TERM NEONATAL OUTCOMES FROM EMERGENCY CAESAREAN SECTION WITH DECISION TO DELIVERY INTERVAL, INDICATION FOR CAESAREAN SECTION AND EARLY FETAL MORTALITY.

Table 6 shows that DDI ($X^2 = 4.69$; $p = 0.195$) and indication for emergency CS ($X^2 = 9.23$; $p = 0.100$) are not statistically related to the admission of babies into the special baby care unit in this study. However, Tables 7 and 8 shows that the indication for emergency CS was statistically significant in other fetal outcomes like Asphyxia ($X^2 = 20.26$; $p = 0.001$) and mortality ($X^2 = 10.45$; $p = 0.020$).

Table 5: Neonatal outcomes following emergency caesarean section in the study.

Features	Frequency (N = 120)	Percent (%)
Gender		
Male	64	53.3
Female	56	46.7
First minute APGAR Score		
No need for resuscitation	108	90.0
Need for Resuscitation	12	10.0
APGAR Score at 5minutes		
Asphyxia (≤ 7 minutes)	10	8.3
No Asphyxia (> 7 minutes)	110	91.7
Mortality		
Early neonatal death	2	1.7
Survived	118	98.3
Admission into Special baby care Unit (SCBU)		
Admitted	26	21.7
Not admitted	94	78.3
Indication for admission into SCBU	N = 26	
Asphyxia	10	38.5
Low birth weight	4	15.4
Neonatal jaundice	4	15.4
Macrosomia	8	30.8

Table 6: Relationship between Fetal Outcome (Admission to Special care baby unit) and Decision-Delivery Interval, Indication for caesarean section

	Total N = 120	Admitted N = 26	Not Admitted N = 94	Chi- square	pValue
Decision-Delivery Interval					
≤ 75 minutes	2 (1.7)	0 (0.0)	2 (2.1)	4.69	0.195
76 – 90 minutes	4 (3.3)	0 (0.0)	4 (4.3)		
91 – 120 minutes	22 (18.3)	8 (30.8)	14 (14.9)		
>120 minutes	92 (76.7)	18 (69.2)	74 (78.7)		
Indication					
CPD	42 (35.0)	8 (30.8)	34 (36.2)	9.23	0.100
Preeclampsia	28 (23.3)	2 (7.7)	26 (27.7)		
Obstructed labour	6 (5.0)	2 (7.7)	4 (4.3)		
Fetal distress	20 (16.7)	8 (30.8)	12 (12.8)		
APH	12 (10.0)	4 (15.4)	8 (8.5)		
Others	12 (10.0)	2 (7.7)	10 (10.6)		

DISCUSSION

The study showed that the mean decision-delivery interval is 209.5 ± 98.9 minutes which is still a far cry from the recommended 30-minutes interval. Furthermore, none of the emergency CS were done within 30-minutes interval with only 1.7% carried out within 30 – 75 minutes interval. This time interval is longer than what was observed in similar studies by Chukwudi et al in Benin [16], Bello et al in Ibadan [17] and Yakasai et al in Kano Nigeria [18] where the mean DDI were 106, 119 and 137 minutes respectively. This may be due to the fact that these centres are older and well equipped with highly skilled manpower. In addition, health insurance coverage in this centre is better than what is obtained in FMC Yenagoa. However, this mean DDI was an improvement over what was observed by Onah et al in Enugu [19] and Onwudiegwu et al in Ife Nigeria [20] where the mean DDIs were 264 and 511 minutes respectively. This improvement may not be unconnected to the fact that these studies were carried out many years ago and there has been much improvement in the health care service delivery.

Conversely, Kolas et al [21] and Sayegh et al [22] in separate studies in Europe reported mean DDI of 39.5 minutes and 52.4 minutes, respectively. This huge difference between the DDI in Nigerian studies and those in foreign counterparts may be due to improved facilities, effective co-ordination among the surgical team and more importantly is the practice of post service billing and availability of health insurance, education and socio-economic development in those parts of the world. Irrespective of the indication, none of the emergency caesarean sections were performed within 30 minutes from this study with only 1.7% performed within 75 minutes. This is similar to what was observed in other Nigerian studies [19,23] and suggests that the recommended 30 minutes DDI is currently not feasible in Nigeria.

Decision to delivery interval is a critical period because preventing adverse neonatal outcome is critically time dependent. Our study demonstrated that there is no statistically significant association between delayed DDI (> 30 minutes) and neonatal admission, stillbirth, less than

1st and 5th minutes APGAR scores and perinatal death. This result is similar to findings in other Nigeria studies as well as studies [11,16,24] done in Ethiopia, Tanzania, India [25,26,10]. From this study, two neonatal deaths were recorded which is similar to finding in an Indian study. [10] There may be several possible explanations especially in resource limited setting with busy obstetric units. These include inability to procure surgical materials and blood, delay in giving consent, busy theatre suites, unavailability of anaesthetist. This study demonstrated that DDI ($X^2 = 4.69$; $p = 0.195$) and indication for emergency CS ($X^2 = 9.23$; $p = 0.100$) are not statistically related to the admission of babies into the special baby care unit as well as between DDI ($X^2 = 3.73$; $p = 0.292$) and birth asphyxia. Although this is contrary to findings from some studies [27,28] several other studies [19,29,30] could not demonstrate any correlation between DDI and perinatal outcome. Birth asphyxia was the commonest indication for SCBU admission which was similar to findings by Onwudiegwu et al [20], Onah et al [19]. Bloom et al [31] and Tuffnell et al [32].

Cephalo-pelvic disproportion and antepartum haemorrhage contributed mostly to admissions into SCBU from this study. Antepartum hemorrhage and obstructed labour contributed mainly to birth asphyxia and this may be because these two conditions are associated with acute life threatening fetal and maternal compromise. Indication for CS rather the DDI was associated with birth asphyxia and this is similar to findings in other studies done in Nigeria [16-18]. A striking finding from this study was that all babies delivered to parturients who had CS for suspected fetal distress did not have birth asphyxia. This indicates that many of our obstetric units do not have facilities for electronic fetal monitoring or fetal scalp blood sampling as these would have avoided unnecessary interventions. The indication for CS for the two perinatal mortalities recorded in this study were antepartum haemorrhage and obstructed labour. This was not surprising as these indications are usually associated with increased perinatal morbidity and mortality.

Inability to procure surgical materials and blood due to lack of funds was the leading cause of delay in this study. As post service billing is not available in our centre, patients' relatives usually buy required materials before surgery can be performed. Patients are also required to provide blood before surgery is performed because haemorrhage is a common complication of caesarean sections. Majority of patients are unable to procure blood, which is relatively expensive in this centre, and this contributes to delay. Though there is contributory health insurance scheme operational in Bayelsa state, majority (98%) of study participants are not covered under the scheme. Quite apart from that, procurement of blood is partly covered under the scheme as patient have to pay a portion of the cost of blood out of pocket. This contributes significantly to delay in DDI and it's similar to findings of Bello et al. [16]

Delay in getting consent for CS was the second commonest cause of delay from this study and this may be related to strong aversion for caesarean section among women of African origin due to socio-cultural and religious factors. Late consent was either due to the patient's husband not being available to give consent for the surgery or, in a minority of cases, the patient herself not persuaded or willing to give consent in time. The problem is a reflection of women's low socio-cultural status in our society and their helplessness even in critical health conditions.

The most common indications for emergency CS were cephalopelvic disproportion (35%), pre-

eclampsia/eclampsia (23.3%), and fetal distress (16.7%). This is similar to findings in other studies in Nigeria. [16-18].

Majority (93.3%) of cases were performed under spinal anaesthesia. This is because it has been found to be safer and the technique of choice. There was no evidence to suggest that adverse perinatal outcome resulted from delays occasioned by spinal anaesthesia as these occurred only in few cases. Most anaesthetic delays were as a result of too few anaesthetist available, being mostly engaged elsewhere in the hospital when required for emergency CS and having to be waited for. Only 6.7% of the CS were done under general anaesthesia, usually for cord prolapse, potential bleeding cases (APH), acute fetal conditions or when spinal anaesthesia failed.

CONCLUSION

In a low resource West African maternity setting, the mean decision delivery interval is longer than the recommended time intervals as compared with developed countries. This study demonstrates that there is no direct association between decision-delivery interval and adverse maternal and perinatal outcomes. Although, 30 minutes may remain the gold standard, achieving it in low resource setting may not be feasible. Finally, since prolonged decision-delivery interval beyond 30 minutes was not found to be the cause of any adverse perinatal outcome or maternal outcome, litigation on this ground may be unjustified. However, there is still need to reduce the decision-delivery interval so as to help reduce the delay in receiving definitive care at the hospital by women with complications in labour.

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