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DECISION TO DELIVERY INTERVAL OF EMERGENCY CAESAREAN SECTION AND ASSOCIATED MATERNAL AND NEONATAL OUTCOMES IN A COUNTY HOSPITAL IN KENYA
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ABSTRACT

***Objective*: The objective of the study was to determine the decision to delivery interval and the associated maternal and neonatal outcomes at Thika level five hospital.**
***Design*: Ambidirectional study**
***Setting*: Secondary Level Hospital in Kenya**
***Subjects*: Four hundred and nineteen mothers who underwent emergency caesarean section and their newborns**
***Main outcome measure*: Decision to delivery interval, maternal and neonatal outcomes.**
***Results*: The median decision to delivery interval was 248 minutes. Only 1% attained the recommended decision to delivery interval of ≤30 minutes. Majority of the participants (40.1%) had a decision to delivery interval above 300 minutes. Six percent of the mothers developed complications among which postpartum haemorrhage accounted for 1.9% (n=8), wound sepsis 0.7% (n=3), ruptured uterus 0.5% (n=2) and maternal deaths recorded were 0.5% (n=2). There was no significant association between DDI and maternal complications. Of the newborn admissions, meconium aspiration syndrome accounted for 17.6%, respiratory distress syndrome 17.6% and birth asphyxia 12.0%. Perinatal deaths recorded were 1.4%, fresh and macerated still births were 2.6% and 1%,**

respectively. There was a significance association between prolonged DDI and neonatal outcome (p=0.024)

***Conclusions*: Decision to delivery interval at Thika Level Five Hospital was longer than the recommended. There was no significant association between the decision to delivery interval and the maternal complications and prolonged duration of hospital stay. Prolonged decision to delivery interval significantly influenced the neonatal outcome.**

INTRODUCTION

An emergency caesarean section (EMCS) is conducted on a pregnant woman in the advent of an immediate threat to life of the mother or the foetus or both. Decision to delivery interval (DDI) refers to the duration between the time a decision to an perform emergency caesarean section is made to the time the neonate is delivered.

American College of Obstetricians and Gynaecologist (ACOG) suggests that the DDI should not exceed 30 minutes in EMCS and not more than 75 in the event of maternal and/or fetal compromise since this can result in poor outcomes (1). A hospital providing obstetric care should be able to respond within the suggested moment to an obstetric emergency since DDI is a measure of hospital preparedness for EMCS (2).

A study in India showed that a mean DDI exceeding 75 minutes had 4-6-fold increase in neonatal morbidity and mortality (3). Other studies in low-income countries suggest a DDI of 60-75 minutes as they are unable to hit the optimal target. In Nigeria 5.1% neonatal deaths were significantly correlated with DDI's above 75 minutes (4). A study in Tanzania reported increased maternal & fetal compromise and lengthened hospital stay with delayed DDI (5). In Kenya, prolonged DDI was associated with high incidences of birth asphyxia & extended hospital stay post-operatively (6).

Neonatal mortality rate in Kenya stands at 21/1,000 live births which is still high (7). The major causes of death being birth asphyxia & birth trauma (31.6%), prematurity (24.6%) and sepsis (15.8%) (8). According to Kenya Demographic and Health Survey (2014), the maternal mortality rates in Kenya stand at 362 deaths per 100,000 live births (9). According to WHO, 2015, over 300,000 women worldwide died due to complications in pregnancy and labour with ninety nine percent (99%) of these being from middle- and low-income generating countries. Sustainable development goal 3 aims at reducing maternal mortality to less than 70 per 100,000 live births and neonatal mortality to less than 12 per 1,000 live births by the year 2030 (10). The aim of this study was to determine the DDI and the associated maternal and neonatal outcomes at Thika Level Five Hospital.

MATERIALS AND METHODS

The study was conducted at Thika Level V hospital, Kiambu County, Kenya. The study participants were all mothers who underwent emergency caesarean section and their newborns. A total of 419 mothers met the inclusion criteria for the study. An ambidirectional study design was conducted. Retrospective data was abstracted from the health records department for the months of June, July and August 2019 and the prospective data was collected from the obstetric wards, maternity theatre and the new-born unit within the period of 30th September to 4th October, 2019 to validate the data. The participants were followed on a twenty-four-hour basis that is from the time the EMCS was prescribed up to the third day post-operation. Data was analysed using

SPSS version 21.0 and presented using tables, charts and graphs. Median and percentiles were used in analysis of DDI. Chi-square test was used to measure association between DDI and maternal and neonatal outcome.

Ethical approval was sought from JKUAT Institutional Ethics Review Committee and Thika level V hospital {REF: MOH/TKA/GEN/VOL.111 (919)}; and permission to collect data was gotten from Thika Level V Hospital. For the prospective data, participation was voluntary, and an informed consent was sought from study participants.

RESULTS

The study participants who met the inclusion criteria were 419 mothers who underwent emergency caesarean section and their neonates.

Decision to delivery interval

The median decision to delivery interval was 248 minutes. The 25th percentile for the DDI was 138 minutes, 50th percentile was 248 minutes while 75th percentile was 425 minutes respectively (this is shown in Table 1).

Table 1

Median and percentiles of decision to delivery interval in minutes

	Time in minute
Median	248
Percentiles	
25	138
50	248
75	425

Only 1% of the participants attained the recommended DDI of 30 minutes. Majority of the participants (40.1%) had a DDI above 300 minutes (This is shown in Table 2).

Table 2

Distribution of Decision to Delivery Interval in minutes

Time in minutes	(%)
0-30	1.0
31-60	3.8
61-90	9.3
91-120	7.1
121-150	7.9
151-180	6.5
181-210	8.6
211-240	4.7
241-270	7.7
271-300	3.3
>300	40.1

Reasons hindering timely conducting of emergency caesarean section

The cause of delay was not indicated in 44.3 % of the study participants. In 41.1%, unavailability of ready theatre for EMCS was cited as reason for delay, followed by theatre team not ready (this included lack of sterile packs, unavailability of the anaesthetist, nurse or the surgeon) in 7.4% and 7.2% was due to the patient(s) not being fully prepared for theatre (this included lack of consent, lack of necessary laboratory results, lack of necessary medications and patient not fit for theatre according to pre-anaesthetic review).

Maternal Outcome

This was measured using presence of perioperative complications, maternal death(s) and prolonged postoperative hospital stay (greater than 3 days). Majority (94%) of the women who underwent EMCS did not suffer any post-operative complications.

The study participants who developed complications were 6%. Postpartum haemorrhage accounted for 1.9% (n=8), wound sepsis 0.7% (n=3), ruptured uterus 0.5% (n=2) and maternal death recorded were 0.5% (n=2). There was no significant association between DDI and maternal complications.

Participants with prolonged hospital stay (more than 3 days post operatively) due to maternal complications accounted for 4.6%. These complications included puerperal sepsis, ruptured uterus, severe anaemia and wound sepsis. Majority of the women who underwent EMCS had unremarkable postoperative hospital stay (95.4%). There was no significant correlation between prolonged duration of hospital stay with the DDI (p=0.957).

Neonatal Outcome

The following aspects were used to measure for the neonatal outcome: perinatal mortalities (perinatal death, fresh and macerated stillbirths), admission to newborn unit and the neonatal morbidities.

Of the NBU admissions, meconium aspiration syndrome accounted for 17.6%, respiratory distress syndrome 17.6% and birth asphyxia 12.0%, Neonatal deaths recorded were 1.4%, fresh and macerated still births were 2.6% and 1%, respectively. There was a significance association between prolonged DDI and neonatal outcome (p=0.024).

DISCUSSION

The results showed that only 1% of the participants attained the recommended DDI of 30 minutes and majority (40.1%) had a DDI of greater than 300 minutes. Similar studies in Kenya showed that a DDI of ≤30 minutes was achieved in 1% of the study population at Kenyatta National Hospital and Pumwani Maternity Hospital, 2.2% and 20.4% at Mater Hospital and St. Mary's Mission Hospitals, respectively (6,11); while another study in Nigeria showed that there was no DDI ≤30 minutes (12). A study conducted by Habib et al showed that majority of the study subjects (37%) had a DDI of ≥300 minutes (6).

The median DDI for this study was 248 minutes. This is comparable to a study conducted by Habib et al in which the median DDI was 178 and 290 minutes at Kenyatta National Hospital and Pumwani Maternity Hospital, respectively (6). For 41.1% of the participants, theatre being used for another emergency was cited as the reason hindering the timely conduction of the EMCS. This is similar to a study by Kamotho et al 2018, in which the major contributing reason for delay was that the theatre was busy (2).

The most common post-operative complication was post-partum haemorrhage (1.9%). This is similar to a study by Nakintu et al, (2016) which reported postpartum haemorrhage as one of the major obstetric

causes of maternal morbidity (13). The maternal reason(s) for prolonged hospital stay was mainly associated with the newborn admission to the NBU (17%) and newborn monitoring (12.4%) and only in less than 4.6% was the prolonged hospital stay attributed to maternal complications which included wound sepsis, postpartum haemorrhage, severe anaemia and ruptured uterus. Maternal deaths accounted for 0.5% (n=2). Majority of the women who underwent EMCS did not suffer any post-operative complications similar to the results of the study by Habib et al, 2010 (6).

Out of 419 EMCS conducted, 95% neonates were born alive. The 5% deaths were distributed among the perinatal deaths (1.4%), fresh stillbirths (2.6%) and macerated stillbirths (1%). There were 6 recorded neonatal deaths during the study period and the major cause of the neonatal death was birth asphyxia. All the cases had prolonged DDI. These results are similar to those reported by UNICEF, 2015 that asphyxia is among the leading cause of neonatal deaths (8). This is similar to a study conducted by Habib et al which showed that there were 7 cases of perinatal deaths and severe birth asphyxia was among the leading cause of neonatal death (6). A similar study in Nigeria revealed that the perinatal deaths were 7.3% which was relatively high as compared to this study (14).

The study showed that there were 2.6% fresh stillbirths and 1% macerated stillbirths. This is higher compared to the study conducted in Tanzania which reported 7 cases of fresh still births and 1 macerated still birth probably because the study recorded a shorter median DDI of 60 minutes compared to the 248 minutes recorded in this study (5).

Among the neonatal morbidities necessitating admission into NBU meconium aspiration syndrome accounted for 17.6%, respiratory distress syndrome 17.6% and birth asphyxia 12.0%, prematurity 2.6% and the least was low birth weight with associated complications at 1.4%. A similar study conducted in Uganda showed that the neonatal morbidities necessitating admission to newborn units included birth asphyxia (42%), meconium (13) aspiration syndrome (26%), macrosomia (3%), fever (20%) and others accounted for 9% (3). There was a significance association between prolonged DDI and neonatal outcome (p=0.024). Inadequate documentation and short duration of the study were the major study limitations.

In conclusion, Thika Level Five Hospital did not meet the recommended decision to delivery interval of 30 minutes. There was no significant association between the DDI and the maternal complications and prolonged duration of hospital stay. Prolonged DDI significantly influenced the neonatal outcomes (p=0.024).

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