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ABSTRACT

Objectives: To compare the 72 hour post delivery maternal and neonatal outcomes among patients undergoing unscheduled Caesarean section during the night and day.

Design: Prospective cohort study.

Setting: Kenyatta National Hospital (KNH), Nairobi, Kenya.

Subjects: Two hundred and forty Post-natal mothers who had undergone unscheduled Caesarean section.

Results: Between the months of February 26th and April 2nd 2015, a total of two hundred and forty patients undergoing unscheduled Caesarean sections at the KNH were recruited into the study including 120(50%) patients who had an operation performed during the night shift and 120(50%) during the day shift. Data were collected prospectively. There was no significant difference in the socio-demographic characteristics of patients according to shifts. Most procedures were conducted under regional anaesthesia with no significant differences between day and night surgeries. The leading indications for unscheduled CS during the day and night were: Non Reassuring Foetal Status (NRFS), obstructed Labour and elective CS converted to emergency CS in that order. Conversion of Elective Caesarean section to Emergency CS was significantly more common during the night compared to during daytime. Poor maternal and neonatal outcomes did not show a significant difference depending on time of surgery.

Conclusion: The study showed that there was no significant difference in pregnancy outcomes between unscheduled Caesarean section done during the day compared to those done during the night.

INTRODUCTION

Caesarean section, a surgical procedure for abdominally delivery can either be elective or emergency. The unscheduled Caesarean sections are performed in obstetric emergencies where swift action is required to prevent neonatal and maternal morbidity and mortality. Good maternal and perinatal outcomes can be ensured through essential obstetric and newborn care provided by skilled attendants during pregnancy and childbirth. In many resource- poor settings, access to skilled care and crucial interventions is limited. Caesarean delivery is a marker for the availability and use of obstetric services in these situations.

The global burden of Caesarean section stands at 46% in China, 40% in Italy, 33% in both Europe and Latin America, 25% in Asia and 14% in Nordic

countries, Sub- Sahara Africa 6.2% (1).

At KNH, the rates of Caesarean sections which is higher than the national average, stands at 40% with maternal complications of 9.7% (2,3,4). The high Caesarean rates have led to high cost of healthcare, increased workload and challenges in ensuring improved quality of care.

Though Caesarean sections are considered relatively safe, they pose a higher risk as they have more complications than vaginal deliveries. Studies suggest that sleep deprivation among health caregivers has been shown to adversely affect performance by impairing neurobehavioral activities (5). Studies on actual surgical performance show increase in poor outcome at night (6). Some studies have shown an increased rise of maternal morbidity in Caesarean sections done at night, with others suggest that sleep deprivation has adverse affect on

performance by impairing neurobehavioral activities (1,5). However, very few studies have measured its effect on medical errors.

This study therefore aimed to determine if the time of day that the Caesarean section was performed affected pregnancy outcomes and the requisite interventions thereof at Kenyatta National Hospital.

MATERIALS AND METHODS

The study was conducted at KNH in which the exposed group was those patients who had undergone unscheduled Caesarean section during the night while the control group was those patients who had undergone unscheduled Caesarean section during the day. The inclusion criterion was all Post-natal mothers who had consented and had undergone emergency Caesarean section and were within 72 hours post operation at Kenyatta National hospital.

The incidence of poor maternal and neonatal outcomes within the first 72 hours post Caesarean section was compared between the two groups. The sample size was 240 and was calculated using EPI info version. Post-natal mothers, who had undergone unscheduled Caesarean section at KNH, were recruited into the study through their own consent. They were voluntarily recruited to the study after signing an informed written consent form.

Mothers were directly interviewed by the principal investigator on a daily basis at 24 hour

intervals in the morning during or after the daily ward rounds, history taken, examined physically and a questionnaire filled during the interview. Further information was retrieved from theatre notes, nurse's cardex, Laboratory and radiology test results.

The outcomes of the procedures were documented in a questionnaire. Data were coded entered into an excel data base, validation and cleaning was performed and analysis was done using Statistical Package for social sciences (SPSS) version 17.0. T-tests, chi-square and logistic regression were used to determine the variable for association in maternal and neonatal outcome.

RESULTS

A total of 240 patients undergoing unscheduled Caesarean sections were recruited into the study between the months of February and April 2015 including 120 (50%) patients who had an operation performed at night and 120 (50%) day time procedures. There were a total of 1435 deliveries during the study period of which 574 (41%) were Caesarean sections while 861 (59%) were vaginal deliveries. Of the 574 Caesarean section deliveries 537 (93%) were unscheduled while 37 (7%) were scheduled. Two hundred and sixty-four 264 (55%) of the unscheduled CS were carried out during the day while 243 (45%) were done at night.

Table 1

Intra-operative information of surgery in mothers undergoing unscheduled Caesarean section in KNH according to time of the day for procedure

	Time of day CS conducted		OR(95% CI)	P-value
	Night	Day		
	No. (%)	No. (%)		
Order of surgery				
First	72(60.0)	76(63.3)	1.00	
Second	34(28.3)	39(32.5)	0.92(0.5-1.68)	0.771
Third	14(11.7)	5(4.2)	2.96(1.0-10.9)	0.04
Anaesthesia				
General	0(0.0)	3(2.5)	1.00	
Regional	120(100.0)	117(97.5)	NA	NA

As shown in Table 1, significant differences were observed in the Intra-operative procedures in surgeries conducted during the day compared to surgeries done at night. Out of all the night surgeries 72 (60.0%) were first order surgeries while 76 (63.3%) daytime surgeries were also first order surgeries. Third

order surgeries were more likely to be performed during daytime (OR = 2.96, 95%CI 1.0-10.9; p = 0.04) compared to first order surgeries. Most procedures were conducted under regional anaesthesia with no significant differences between day (97.5%) and night (100%) surgeries.

Table 2
Indications unscheduled Caesarean section in KNH according to time of the day for procedure

	Time of day CS conducted		OR(95% CI)	P-value
	Night No. (%)	Day No. (%)		
NRFS				
No	77(64.2)	71(59.7)	1.00	
Yes	43(35.8)	49(40.3)	0.81(0.46-1.41)	0.426
Placenta previa				
No	115(95.8)	116(96.9)	1.00	
Yes	5(4.2)	6(3.1)	0.85(0.1-3.41)	0.779
Placenta abruption				
No	120(100.0)	117(97.5)	1.00	
Yes	0(0.0)	3(2.5)	NA	NA
High blood pressure				
No	111(92.5)	109(90.8)	1.00	
Yes	9(7.5)	11(9.1)	0.80(0.28-2.23)	0.640
Obstructed Labour				
No	86(71.7)	78(65.0)	1.00	
Yes	34(28.3)	42(35.0)	0.73(0.41-1.31)	0.267
Elective CS converted to emergency CS				
No	94(75.0)	110(91.7)	1.00	
Yes	26(25.0)	10(8.3)	3.04(1.33-7.42)	0.004

The indications for unscheduled Caesarean sections are shown in table 2, according to the time of the day for the procedure. The leading indications for unscheduled CS during the day and night were: NRFS (40.3 and 35.8%), obstructed Labour (35.0 and 28.3 %) and elective CS converted to emergency CS (8.3 and 25.0%). Conversion of Elective Caesarean section to Emergency Caesarean section as an indication for unscheduled Caesarean section was significantly more common during the night compared to during daytime (Table 3). Conversion of elective to emergency CS was more common at night OR = 3.04(95% CI, 1.33-7.42).

Table 3
Labour onset and patient condition prior to unscheduled Caesarean section in KNH according to time of the day for procedure

	Time of day CS conducted		OR(95% CI)	P-value
	Night No. (%)	Day No. (%)		
Labour onset				
Labour at home <1 hr.	11(10.2)	14(12.7)	1.00	
Labour at home 1-3 hrs.	29(26.9)	35(31.8)	1.05(0.38-3.0)	0.911
Labour at home >3-6 hrs.	49(45.3)	44(40.0)	1.41(0.53-3.84)	0.441
Labour at home >6 hrs.	19(17.6)	17(18.7)	1.42(0.45-4.5)	0.500
Prior moribund state				
Yes	18(15)	21(17.5)	1.00	
No	102(85.0)	99(82.5)	1.20(0.57-2.59)	0.600

Table 3: The patients undergoing surgery during the day did not differ significantly from those operated on at nights with regard to labour onset of pre-existing moribund status. The proportion of patients in a moribund state prior to the procedure during daytime and the night were 17.5% and 15.0%. Duration of labour onset prior to procedure did not vary significantly among patients operated for during the day and night.

Table 4
Poor maternal outcomes following unscheduled Caesarean section in KNH according to time of the day for procedure

	Time of day CS conducted		OR(95% CI)	P-value
	Night	Day		
	No. (%)	No. (%)		
Haemorrhage				
No	115(95.8)	116(96.7)	1.00	
Yes	5(4.2)	4(3.3)	1.26(0.26-6.51)	0.734
Wound infection				
No	120(100.0)	119(99.2)	1.00	
Yes	0(0.0)	1(0.8)	NA	NA
Hysterectomy				
No	119(99)	119(99)	1.00	
Yes	1(1.0)	1(1.0)	1.0(0.01-79.1)	1.000
Pain				
No	98(81.7)	102(85.0)	1.00	
Yes	22(18.3)	18(15.0)	1.27(0.61-2.68)	0.488
Organ injury				
No	118(98.3)	117(97.5)	1.00	
Yes	2(1.7)	3(2.5)	0.66(0.05-5.89)	0.651

Table 4 represents the maternal outcomes of the patients undergoing unscheduled Caesarean sections. Maternal outcomes did not show a significant difference depending on time of surgery. Pain was the most common outcome in both groups of patients in the post-operative period (15.0% and 18.3% for daytime and night surgeries, respectively). The remaining outcomes namely; haemorrhage; hysterectomy, wound infection, surgical trauma and dialysis were rare in both groups affecting less than 5% of patients. No maternal deaths occurred in the study.

Table 5
Outcomes of neonates delivered by mothers undergoing unscheduled Caesarean section in KNH according to time of the day for procedure

	Time of day CS conducted		OR(95% CI)	P-value
	Night	Day		
	No. (%)	No. (%)		
Neonatal death				
No	112(93.3)	116(96.7)	1.00	
Yes	8(6.7)	4(3.3)	2.1(0.54-9.64)	0.236
Respiratory difficulties				
No	95(79.2)	97(80.8)	1.00	
Yes	25(20.8)	23(19.2)	1.11(0.56-2.2)	0.747
Trauma				
No	117(97.5)	117(97.7)	1.00	
Yes	3(2.5)	3(2.3)	1.0(0.13-7.62)	1.000
Neonatal sepsis				
No	119(100.0)	118(99.2)	1.00	
Yes	0(0.0)	2(0.8)	NA	NA

Table 5 presents the neonatal outcomes in unscheduled Caesarean sections conducted in KNH at night and during the day. The rate of complications was not significantly different depending on the time of surgery. The most prevalent neonatal outcome in both night and day surgeries was respiratory difficulties (20.8 and 19.2%). There were eight (6.7%) neonatal deaths during night surgeries and four (3.3%) deaths during the day, OR 2.1 (95% CI, 0.54-9.64). Trauma and neonatal sepsis were rare affecting less than 3% of neonates delivered during both day and night surgeries.

DISCUSSION

There were a total of 1435 deliveries during the study period of which 574 (41%) were Caesarean sections while 861 (59%) were vaginal deliveries. Of the 574 Caesarean section deliveries 537 (93%) were unscheduled while 37 (7%) were scheduled. Two hundred and sixty-four (264, 55%) of the unscheduled CS were carried out during the day while 243 (45%) were done at night. This trend was also similar in other studies done in sub-Saharan Africa (9, 10, 12). The study also showed no significant differences in Intra-operative procedures in surgeries conducted during the day compared to surgeries performed at night.

This study found that there were no significant differences in age, parity, or employment status of mothers who underwent surgery during the day and those during the night, though it has been shown that pregnancy outcomes depend on various factors which interplay together and especially to achieve desired pregnancy outcomes both maternal and neonatal.

Out of all the night surgeries 60.0% were first order surgeries while 63.3% daytime surgeries were also first order surgeries. Third order surgeries were more likely to be performed during daytime as compared to first order surgeries. This was significantly different in other studies done in Europe where first order surgeries were significantly low (7,8). Most procedures were conducted under regional anaesthesia with no significant differences between day (97.5%) and night (100%) surgeries.

The leading indications for unscheduled Caesarean section during the day and night were; Non-reassuring Foetal status (40.3 and 35.8%), obstructed Labour (35.0 and 28.3 %) and elective CS converted to emergency CS (8.3 and 25.0%) in that order. Conversion of elective Caesarean section to emergency Caesarean section as an indication for unscheduled Caesarean section was significantly more common during the night compared to during daytime. This was probably attributed to patients scheduled for elective surgeries missing theatre during the day and developing complaints at night, which necessitated immediate intervention. This was in line with a study done at the Kenyatta National

Hospital in 2006 which showed that the leading indication for unscheduled Caesarean section was Non-reassuring Foetal status (27.3%) followed by failed VBAC (16.1) and Dystocia (13.1%) in that order (2). Other studies done in southern Africa also demonstrated the same trend (11).

The study also found that patients undergoing surgery during the day did not differ significantly from those operated on at night with regard to Labour onset of pre-existing moribund status. The proportion of patients in a moribund state prior to the procedure during daytime and the night were 17.5% and 15.0% respectively. Duration of Labour onset prior to procedure did not vary significantly among patients operated for during the day and night.

Adverse maternal outcomes did not show a significant difference depending on time of surgery. Pain was the most common outcome in both groups of patients in the post-operative period (15.0% and 18.3%) for daytime and night surgeries, respectively. The remaining outcomes namely haemorrhage; hysterectomy, wound infection, surgical trauma and dialysis were rare in both groups affecting less than 5% of patients. This was discrepant with a study done at the Kenyatta National Hospital in 2011, which showed that post-partum haemorrhage was the leading maternal complication (13). This would probably be attributed to pain not being considered as a complication of unscheduled Caesarean section.

The study showed that the rate of neonatal complications was not significantly different depending on the time of surgery. The most prevalent neonatal outcome in both night and day surgeries was respiratory difficulties (20.8 and 19.2%). There were 6.7% neonatal deaths during night surgeries and 3.3% during the day, which was consistent with another study at the KNH, which placed the perinatal mortality rate at 6.3% (13). Trauma and neonatal sepsis were rare affecting less than 3% of neonates delivered during both day and night surgeries. Fewer studies have however been done to compare emergency Caesarean section and their effect on neonatal outcomes. Some have reported increased neonatal mortality rates (13), while some have shown no significant differences in neonatal outcomes (14).

The main finding of this study was that there was no significant difference in pregnancy outcomes between unscheduled Caesarean sections done during the day as compared to those done during the night. This was similar with large multicenter studies done in teaching hospitals in USA and Europe which showed no important differences in maternal and neonatal morbidity after unscheduled Caesarean section delivery according to work shift, although some have shown increased risk of maternal but not neonatal morbidity in Caesarean sections done at night (15).

In conclusion, the study found out that there

was no significant difference in pregnancy outcomes between unscheduled Caesarean section done during the day compared to those done during the night. Patients scheduled for elective Caesarean section should be operated on as planned to reduce the high numbers of unscheduled Caesarean section done at night due to conversion of these elective cases to emergency cases.

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