THE PREDICTORS OF BLOOD TRANSFUSION IN OBSTETRIC PRACTICE IN A LOW RESOURCE ECONOMY: AN INSTITUTIONAL STUDY IN THE NIGER DELTA, NIGERIA

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Abstract

Background: Obstetric hemorrhage is a common but preventable cause of maternal mortality in sub-Saharan Africa. Safe blood transfusion is an effective panacea to save maternal lives in these circumstances. This study aims to investigate factors associated with blood transfusion amongst parturient at the Niger Delta University Teaching hospital, Okolobiri, Nigeria.
Methods: Data was collected from the medical records of 200 parturient who delivered in the hospital in 2019 in a cross-sectional retrospective study. Demographic information like age, obstetric features like parity, booking status, mode of delivery and data on transfusion was collected using a structured proforma. Univariate analysis was carried out to uncover parity, booking and transfusion status among parturient. Those transfused were categorized as 'transfused', otherwise was classified 'not transfused'. Associated factors with transfusion status were explored in bivariate analysis using Chi-square test. Level of significance was set at $p<0.05$.
Results: Mean age of parturient was 30.8 ± 6.0 years, while median parity was 1 ranging between 0 and 10. Most of the parturient were booked (61.0%), delivered by spontaneous vaginal delivery (79.0%). Eighty-seven women (43.5%) who delivered were transfused with 134 pints of blood in all. Parity (χ^2 =10.56; p-0.016), booking status (χ^2 =5.56;p-0.018) and mode of delivery (χ^2 =12.93;p-0.001) were significantly associated with transfusion among parturient.

Conclusion: There is a higher tendency to transfuse women with parity>4, unbooked women and those delivered by caesarean section. Institutional blood banks should be established and operated in manners that makes blood readily available for high-risk obstetric cases.

Key words: Obstetric hemorrhage, Blood transfusion, Maternal mortality and morbidity, predictors

Introduction

Sub-Saharan Africa and South-East Asia countries accounts for 86 % of global maternal deaths of 295,000/100,000 live births according to the WHO estimates in 2017.[1] Nigeria, the most populous country in sub-Saharan Africa also share a large burden of these maternal deaths.[2] Obstetric hemorrhage has been identified as one of the forerunners of these maternal deaths in sub- Saharan Africa.[3] The availability and safe blood for transfusion in cases of emergencies therefore is a major requirement for best obstetric practice not only in sub-African region but globally to avoid the dire consequences of acute blood loss like hemorrhagic shock, acute anemia, acute renal failure and finally maternal death. "Blood transfusion is ce.an indivisible part of obstetric practice".[4]

The objective of this study is to allow the Obstetrician the hindsight to predict cases that are more at risk of hemorrhage, both at elective, emergencies, intraoperative, postoperative, intrapartum and postpartum procedures so that adequate preparation for blood transfusion can be made before these interventions can be made.

Methodology

This was a descriptive retrospective observational study carried out at the Obstetric Department of the Niger Delta University Teaching Hospital. Okolobiri, from January 1st to December 30th, 2020.The subjects of this study were obstetric patients who delivered within the time frame of the study by either spontaneous vaginal delivery or by Caesarean section through elective or emergency procedures. The subjects were randomly selected by choosing every third occurring hospital number from the labor ward and theatre registers and the folders were retrieved from the hospital medical records. A pre-prepared proforma was used to extract relevant information from selected folders. The data collected were entered into SPSS Version 23 and analyzed usingChi^{x2} and bivariate logistic regression. Statistical significance was set at p<005.

Results

Demographic characteristics and Obstetric features of parturient in the period under review

The mean age of parturient in the period under review was 30.8 ± 6.0 years (Table 1). Table 1 also shows that above half (55.0%) of parturient were aged 30 – 39 years of age. Parity ranged from 1 to 10, while there were 94 primiparous women (47.0%) who attended the facility for delivery in the period under review. About 2 in 5 women (39.0%) were unbooked for antenatal care in the index pregnancy (Table 1).

Table 1: Age and Parity of study respondents

Characteristics	Frequency (N = 200)
Age of Participants	
<20 years	7 (3.5)
20 - 29 years	71 (35.5)
30 - 39 years	110 (55.0)
>40years	12 (6.0)
Mean age (SD) in years	30.8 ± 6.0
Parity	
Nulliparity	29 (14.5)
Primiparous	94 (47.0)
Multiparity	54 (27.0)
Grandmultiparity	23 (11.5)
Median parity (Range)	1.0 (0.0 – 10.0)
Booking status	
Booked	122 (61.0)
Unbooked	78 (39.0)

Features of delivery among study participants

Of the 200 parturient 42 (21.0%) were delivered via spontaneous vaginal delivery and 158 (79.0%) were delivered via Caesarean section. Majority of those who had Caesarean section were emergency caesarean section (84.8%). Mean duration of surgery was 71.5 ± 22.3 minutes and duration of hospital stay was 7.5 ± 4.8 days (Table 2).

Table 2: Features of delivery among study participants

Variable	Frequency N = 200
Mode of delivery	
CS	158 (79.0)
SVD	42 (21.0)
Type of Caesarean section	**N = 158**
Emergency	134 (84.8)
Elective	24 (15.2)
Mode of Anesthesia	
Spinal	152 (96.2)
General	6 (3.8)
Mean duration of labor before CS (±SD) in hours	10.7 ± 15.5
Mean blood loss during vaginal delivery (±SD) in ml	384.0 ± 315.1
Mean duration of surgery (±SD) in minutes	71.5 ± 22.3
Mean duration of hospital stay (SD) in days	7.5 ± 4.8

Blood Transfusion in Obstetric care

In the period under review, 87 parturient (43.5%) were transfused with a total of 134 pints of blood (Table 3). Urticarial rash was the most common blood transfusion reaction occurring in 57 (65.5%) among those parturient who were transfused (Table 3).

Of the total blood transfused, 101 pints (75.4%) were transfused to parturient who had emergency caesarean section, 17 pints (12.7%) transfused to women delivered by elective caesarean section while those delivered by spontaneous vaginal delivery had a total of 16 pints (11.9%) of blood (Figure 1).

Table 3: Transfusion and transfusion reaction among participants

Characteristics	Frequency (N = 200)	Percent (%)
Transfusion Status		
Transfused	87	43.5
Not Transfused	113	56.5
Transfusion reaction	**N = 87**	

urticarial rash	57	65.5
Itching	1	1.1
Acute renal failure	1	1.1
No reaction	28	32.3

Table 4: Number of Transfused blood pints and Mode of Delivery

Number of pints of Blood Transfused	SVD		Elective CS		Emergency CS	
	Frequency N = 42 (%)	Total Number of pints	Frequency N = 24 (%)	Total Number of pints	Frequency N = 134 (%)	Total Number of pints
Zero pint (No transfusion)	36 (81.0)	0	13 (54.2)	0	66 (49.3)	0
1 pint transfused	3 (7.1)	3	6 (25.0)	6	41 (30.5)	41
2 pints transfused	2 (4.8)	4	4 (16.7)	8	23 (17.2)	46
3 pints transfused	3 (7.1)	9	1 (4.2)	3	2 (1.5)	6
4 pints transfused	0 (0.0)	0	0 (0.0)	0	2 (1.5)	8
		16		**17**		**101**

Table 4 shows that 1 pint of blood each was transfused to 3 parturient (7.1%) who had spontaneous vaginal delivery, 6 parturient (25.0%) delivered by elective caesarean section and 41 (30.5%) delivered by emergency caesarean section. Three women (7.1%) delivered via spontaneous vaginal delivery were transfused with 3 pints of blood and 2 parturient (1.5%) delivered by emergency caesarean section got as high as 4 pints of blood (Table 4).

Associated factors with blood transfusion at delivery

Table 5 shows that, of 87 parturient who were transfused 19.5% were grand multiparous women, while there were only 6 grand multiparous women (5.3%) among the 113 women who were not transfused. The parity of the women was significantly associated with transfusion (χ^2 =10.25; p-0.016). In relation to grand multiparous women, nulliparous women (OR – 0.29; p – 0.039), primiparous women (OR – 0.23; p – 0.005) and multiparous women (OR – 0.21; p – 0.004) were less likely to be transfused.

Booking status (χ^2 =5.56; p-0.018) and mode of delivery (χ^2 =12.93; p-0.001) were also found to be significantly related to blood transfusion among parturient in the period under review (Table

5). There is a 99% increase in the chance of being transfused among unbooked patients (OR – 1.99; p – 0.19) when compared to their booked counterpart and women delivered by caesarean section were 4 times more likely to be transfused (OR – 4.25; p – 0.001) than those delivered by spontaneous vaginal delivery (Table 5).

Parturient who had spontaneous labor (OR – 0.43; p-0.029) and those who had Induction/Augmentation of labor (OR – 0.45; p – 0.021) had a significantly reduced odd of being transfused than their counterpart who were sectioned with labor. Type of CS ($\square^2$=0.19; p-0.658), the Surgeons' cadre ($\square^2$ = 5.25; p – 0.072) and type of Anesthesia ($\square^2$=0.00; p-1.000) were not significantly associated with cross-matching and blood transfusion (Table 5).

Table 5: Association between Transfusion status and obstetric and delivery features

Characteristics	Total N = 200 (%)	Transfusion status YES N = 87	NO N = 113	Chi-square (P-value)	Crude OR (95%CI)	P-Value
Parity						
Nulliparous	29 (14.5)	13 (14.9)	16 (14.2)	10.25	0.29 (0.09 – 0.94)	0.039
Primiparous	94 (47.0)	37 (42.5)	57 (50.4)	(0.016)	0.23 (0.08 – 0.63)	0.005
Multiparous	54 (27.0)	20 (23.0)	34 (30.1)		0.21 (0.07 – 0.61)	0.004
Grand multiparous	23 (11.5)	17 (19.5)	6 (5.3)		1	
Booking Status						
Booked	122 (61.0)	45 (51.7)	77 (68.1)	5.56	1	
Unbooked	78 (39.0)	42 (48.3)	36 (31.9)	(0.018)	1.99 (1.12 – 3.56)	0.019
Type of Labor						
Spontaneous labor	54 (27.0)	20 (23.0)	34 (30.1)	6.74	0.43 (0.20 – 0.92)	0.029
Induction/Augmentation	89 (44.5)	34 (39.1)	55 (48.7)	(0.034)	0.45 (0.23 – 0.89)	0.021
No Labor (CS)	57 (28.5)	33 (37.9)	24 (21.2)		1	
Mode of delivery						
SVD	42 (21.0)	8 (9.2)	34 (30.1)		1	

CS	158 (79.0)	79 (90.8)	79 (69.9)	12.93 (0.001)	4.25 (1.85 – 9.75)	0.001
Type of CS	**N = 158**	**N = 79**	**N = 79**			
Emergency CS	134 (84.8)	68 (86.1)	66 (83.5)	0.19	1.22 (0.51 – 2.91)	0.658
Elective CS	24 (15.2)	11 (13.9)	13 (16.5)	(0.658)	1	
Cadre of Surgeon						
Consultant	97 (61.4)	52 (65.8)	45 (57.0)	5.25	0.63 (0.22 – 1.84)	0.399
Senior Registrar	44 (27.8)	16 (20.3)	28 (35.4)	(0.072)	0.31 (0.09 – 1.00)	0.051
Registrar	17 (10.8)	11 (13.9)	6 (7.6)		1	
Type of Anesthesia						
Spinal	152 (96.2)	76 (96.2)	76 (96.2)	0.00		
General	6 (3.8)	3 (3.8)	3 (3.8)	(1.000)		

Discussion

Obstetric hemorrhage and blood transfusion are inseparable as prompt blood loss replacement saves maternal lives during deliveries especially in low resource economies as obtains in sub-Saharan Africa, Nigeria inclusive. In this region of the world, every process in making the blood ready for transfusion including grouping and crosshatching donor and recipient blood, testing donor and recipient blood for both compatibility and blood borne transmissible infection, and paying for the unit of blood itself all are cost-related. This is why the Obstetrician must have a hind sight of the cases that are at high risk of transfusion before surgery or intervention.

In our study, 2 out of every five women managed during the study period received blood transfusion in a region of the world where free blood donors are scarce or unavailable, some blood units could be infected with blood transmissible infections.

This prevalence of blood transfusion in our institution is similar to a study done in South- West Nigeria where 40 % of their subjects were also were transfused.[5]

In our study, subjects whose parities ≥ 5 were significantly associated with blood transfusion. This is because from evidence-based studies, grand multiparous women with age < 35 years are prone

to postpartum hemorrhage due to uterine atony consequent upon changes in the uterine anatomy that are responsible for achieving hemostasis with subsequent births.[6,7]

By definition and from evidence based medicine, intrapartum blood loss during Caesarean of 1,000ml or more are termed obstetric hemorrhage as against 500ml for vaginal delivery. In our study, Caesarean section was statistically significantly associated with blood loss and transfusion in the Chi square and bivariate logistic regression done in the study. Our caesarean section rate of 79 % is much at variance with national prevalence of 3%.and in another study done in Nigeria that reported a Caesarean prevalence of 2.1% .[8,9] This high caesarean section rate may have been so high more so as our center is a referral center, secondly 84.8% of the were Caesarean sections were Obstetric emergencies who may have labor somewhere in settings lower than our institution and exhausted and the only way to save such a dire medical emergency is by Caesarean section. Thirdly, the maternal mortality ratio in Nigeria currently stands at 814 per 100,000 live births. Our MMR are some of the highest in the world. Based on this, our dictum at the Niger Delta University Teaching Hospital, Okolobiri is that any woman that walks into the Institution and in such emergencies with a live baby must be salvaged by an urgent delivery either by emergency Caesarean section or other means expedient to save mother and baby's lives.

The unbooked patient is renowned for poor health seeking behavior, plagued by poor fetal and maternal outcomes.10, 11. In this study, unbooked patients constituted 39% of the subjects and they were significantly associated to with blood transfusion the X^2 test and bivariate logistic regression.

The experience of the doctor whether a junior or senior Resident or a consultant that perform the operation, this variable was not significantly associated with blood transfusion. This finding was also similar to a study done at the same center in 2017 by the author.[12] "This results are so because before any resident is allowed to operate on a patient he must have satisfied the guidelines of the West African college of surgeons, the training body for Surgeons in the West African region and the supervising consultant must also be satisfied with the proficiency of such a resident before he or she is allowed to operate on patients.

In this study, women who had induction of labor as against spontaneous labor were significantly associated with blood transfusion because they are more prone to Post-Partum Hemorrhage. These results are similar to a study done on parturient in French Maternity units.[13] This is because prolong use of oxytocin to stimulate uterine contractions during induction of labor causes relaxation of the uterine muscles that are responsible for achieving hemostasis after birth leading to uterine atony and postpartum hemorrhage.

In this study also, the type of an aesthesia the subject received was not significantly associated with blood transfusion. This was similar to a study done in South Korea where there was no association between blood loss and type of anesthesia administered to the subject during surgery.[14]

Conclusion

This study backed by evidence- based medicine was able to statistically isolate some predictors of obstetric hemorrhage, a forerunner of maternal mortality and morbidity in sub-Saharan Africa and consequently blood transfusion. This study, therefore will guide Obstetricians when to group and - cross-match blood pre-surgery peradventure the need arises for blood replacement.

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