

# Blood transfusion trends in obstetrics at the Federal Teaching Hospital in Abakaliki, South-East Nigeria

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**Background:** Obstetric hemorrhage has been repeatedly implicated as a leading cause of maternal mortality in Nigeria, yet there are very few studies that evaluate the practice of blood transfusion in obstetrics as a life saving measure.

**Objectives:** The aim of this study was to evaluate the practice of obstetric blood transfusion, the mean decision-transfusion interval, and the outcome in parturients who had blood transfusions.

**Methods:** This was a prospective descriptive study conducted at the Federal Teaching Hospital, Abakaliki, South-East Nigeria, between 1st January, 2012 and 31st December, 2012. Statistical analysis was done using SPSS version 15.0 for Windows.

**Results:** Out of 151 parturients who received blood transfusion, 141/151 (97.4%) were knowledgeable about blood transfusion, while only 10/151 (2.6%) had no knowledge of it. The hospital was the source of information for 120/151 (80.8%) of the participants. Blood transfusion rate was 7.04% of all parturients. The mean decision-transfusion interval was  $12.0 \pm 4.3$  hours. All participants were transfused with either whole blood or sedimented cells. The mean number of blood units transfused was  $1.77 \pm 0.93$  units. The indications for transfusion were: anemia, 109/151 (72.2%); shock, 13/151 (8.6%); postpartum hemorrhage, 23/151 (15.2%); antepartum hemorrhage, 6 (4%). Six (4%) women died; mortality was due to renal failure in 3/6 (50%) and disseminated intravascular coagulopathy in 3/6 (50%). These deaths were due to delays and difficulty in securing blood for transfusion, while those who got transfused on time were salvaged with minimal morbidity, 21/151 (14%), or with no morbidity, 130/151 (86%).

**Conclusion:** Excessive blood loss and anemia still complicate most pregnancies in our practice and the mean decision-transfusion interval is unacceptably long with debilitating maternal morbidity and mortality that can be improved with safe and effective blood transfusion with minimal or no risk.

**Keywords:** blood, hemorrhage, obstetrics, transfusion, trend

## Introduction

Blood transfusion in obstetric practice has been found and documented to be life-saving and obstetric conditions associated with the need for blood transfusion can lead to morbidity and mortality if not managed appropriately. In sub-Saharan Africa, blood supply is critically inadequate and severe hemorrhage is a leading cause of maternal deaths. Each year more than 528,000 women worldwide die from complications of pregnancy and childbirth, up to 80% of these maternal deaths are directly due to five complications: hemorrhage, sepsis, eclampsia, ruptured uterus from obstructed labor, and complications of abortion.<sup>1</sup> Although reliable information about the individual medical causes of maternal mortality is scarce, especially in sub-Saharan Africa, hemorrhage during labor, delivery, and postpartum period accounts for one-third of

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all obstetric deaths in the world and is the leading cause of maternal deaths in Africa (34%) and Asia (31%).<sup>2</sup> Obstetric hemorrhage is a leading cause of maternal morbidity and mortality in both developed and developing world.<sup>3</sup> The World Health Organization estimates that hemorrhage at the time of delivery complicates around 10% of all live births globally.<sup>3</sup> It is the leading direct cause of maternal death (28%), followed by sepsis, hypertensive disorders, and obstructed labor.<sup>3</sup>

Nigeria makes up only 1.7% of the total world population, but accounts for about 10% of the global estimate of maternal mortality mainly related to hemorrhage (25%), hence its significant contribution to the country's high maternal mortality rate estimated at 800–1000 per 100,000 live births.<sup>4–6</sup> Nigeria thus ranks among the nations with the highest number of maternal deaths.<sup>6</sup>

Blood transfusion is not without risk. The major risk associated with blood transfusion is a patient receiving an “incorrect” blood component. The increasingly important issues in blood transfusion are adverse events or risk such as blood transfusion reactions, infections, the development of red blood cell antibodies, and iron overload in different organs of the body from frequent blood transfusion. Transfusion reactions could occur due to allergic (hypersensitivity) reactions following blood transfusion. Other common concerns include acquiring blood borne infections such as hepatitis B and C, human immunodeficiency virus, and malaria.<sup>7–9</sup> A third risk may result from inherited red blood cell traits which results in rejection of blood cells due to the development of antibodies.<sup>9</sup>

This study aims to review the practice of blood transfusion in obstetric care in a major referral hospital in South-East Nigeria with a view to contributing to the formulation of an effective blood transfusion policy to combat the high rate of mortality associated with obstetric hemorrhage in the study area and other developing nations with similar clinical settings.

## Material and methods

This was a prospective descriptive study conducted at the Federal Teaching Hospital, Abakaliki (FETHA), Ebonyi State, South-East Nigeria between 1st January, 2012 and 31st December, 2012. Informed written consent was obtained from all participants and ethical clearance was also obtained from the hospital ethical committee. A consecutive sample of women who presented for obstetric care and had blood transfusions during the study period was taken. Data were collected using an interviewer-administered questionnaire

by trained doctors. Data were collected at the point of admission for those who were admitted with complications or at the point of diagnosis of complications for those who developed complications after being admitted. Information sought in the questionnaire included biodemographic characteristics of patients, awareness of the possibility of blood transfusion before and after delivery, reason for blood transfusion, number of units transfused, and outcome of blood transfusion including any complications. All subjects and transfused blood were screened for human immunodeficiency virus types I and II and hepatitis B and C pretransfusion and 3 months after transfusion. Those who defaulted or had risky exposure to these infections during follow up were excluded from the study. However, participants were not screened for cytomegalovirus (CMV) infection due to lack of facilities. Statistical analysis was performed using Statistical Package for the Social Sciences version 15.0 for Windows (SPSS; IBM Corporation, Armonk, NY, USA) and the process involved descriptive statistics. Main outcome variables were the proportion of women who had transfusions and were aware of the possibility of transfusion and indications before the procedure, the proportion of all patients who had blood transfusion, and the major types of blood products transfused. Secondary outcome measures were the mean decision-transfusion interval as well as the prevalence of major complications of blood transfusion.

## Results

A total of 151 women participated in this study. The mean age of participants was  $27.97 \pm 5.30$  years. Table 1 shows that the majority were Christians (145/151; 96%), 3/151 (2%) were Muslims, and 3/151 (2%) practiced traditional African religion. Among the Christians, Pentecostal denomination accounted for 63/145 (41.7%), Catholics 60/145 (39.7%), Anglicans 22/145 (14.6%), none were Jehovah witnesses.

Table 1 also shows that 38/151 (25.8%), 36/151 (23.2%), 42/151 (28.0%), and 35/151 (23.0%) had none, primary, secondary, and tertiary education respectively and that 65/151 (43%) resides in urban areas, while 86/151 (57%) resided in rural areas. There was no significant difference between the antenatal booking status, with booked and unbooked participants accounting for 75/151 (49.7%) and 76/151 (50.3%), respectively as depicted in Table 2.

Table 3 shows that awareness of blood transfusion was very high (147/151; 97.4%), while only 4/151 (2.6%) had no knowledge of it. In the vast majority, the hospital (122/151; 80.8%) was the source of information while other sources were: friends in 33/151 (21.9%), electronic media in 17/151

**Table 1** Biodemographic characteristics of participants

Characteristics	Number (n = 151)	Percentage (%)
<b>Age (years)</b>		
Less than 20	10	6.6
20–24	46	30.4
25–29	41	27.2
30–34	30	19.9
35–39	23	15.2
40 and above	1	0.7
Total	151	100
<b>Educational level</b>		
None	38	25.8
Primary	36	23.2
Secondary	42	28.0
Tertiary	35	23.0
Total	151	100
<b>Marital status</b>		
Married	120	79.5
Single	28	18.5
Separated	3	2.0
Divorced	0	0.0
Total	151	100
<b>Occupation</b>		
Farmer	24	15.9
Hairdresser	2	1.3
Trader	30	19.9
Public servant	60	39.7
Student	20	13.3
House wife	15	9.9
<b>Religion</b>		
Christian	145	96
Muslims	3	2
Traditional African religion	3	2
Total	151	100
<b>Christian denominations</b>		
Catholics	60	39.7
Pentecostal	63	41.7
Anglican	22	14.6
Jehovah witness	0	0.0
Total	145	96
<b>Residence</b>		
Urban	65	43
Rural	86	57
Total	151	100

(11.3%), school in 13/151 (8.6%), church in 8/151 (5.3%), and book/newspaper in 7/151 (4.6%), as shown in Table 3. A total of 2146 pregnant women delivered in the facility during the study period. One hundred and twenty-seven (84%) delivered at term, while 24/151 (16%) had preterm deliveries. Vaginal delivery was the most common mode of delivery in 82/151 (54.3%), followed by caesarean section in 54/151 (35.8%), while 15/151 (9.9%) had exploratory laparotomy for ruptured uteri. There were nine instrumental deliveries all of which were by vacuum extraction. A total of 43/151 (28.5%)

**Table 2** Antenatal booking status and parity

	Number (n = 151)	Percentage (%)
<b>Booking status</b>		
Booked	75	49.7
Unbooked	76	50.3
Total	151	100
<b>Parity</b>		
Para 0	67	44.4
Para 1	25	16.6
Para 2	15	10.0
Para 3	25	16.6
Para 4	20	13.4
Para 5 and above	9	6.0

of the parturients had episiotomy, while 18/151 (11.9%) sustained genital tract laceration comprised of 12/151 (7.9%) and 6/151 (2%) 1st and 2nd degree lacerations, respectively. There were no 3rd or 4th degree lacerations. Amongst the transfused parturients, blood loss was >500 mL in 99/151 (65.6%) in those who had vaginal delivery and >1000 mL in 52/151 (42.1%) in those who had surgery for abdominal delivery or ruptured uteri.

The transfusion rate was 7.04% (151/2146). The mean decision-transfusion interval was  $12.0 \pm 4.3$  hours. All participants were transfused with blood either as whole blood (70%) or sedimented cells (30%) with 67/151 (44.4%), 66/151 (43.7%), and 18/151 (11.9%) receiving 1, 2, and  $\geq 3$  units of blood, respectively, as shown in Table 4. Four hundred and fifty milliliters of whole blood constitutes a unit of blood. The mean number of blood units transfused was  $1.77 \pm 0.93$  units. The minority (62/151; 41%) received blood transfusion for a life threatening obstetric emergency within 24 hours of admission, while the majority (89/151; 59%) had the procedure after 24 hours of presentation. Most of the blood units were transfused postpartum (109/151; 72%), while only 42 (28%) were transfused antepartum. The indications for transfusion as shown in Table 5, were anemia

**Table 3** Level of awareness and source of information

	Number (n = 151)	Percentage (%)
<b>Awareness</b>		
Aware	147	97.4
Unaware	4	2.6
Total	151	100
<b>Source of information</b>		
Hospital	122	80.8
Friends	33	21.9
Electronic media	17	11.3
School	13	8.6
Church	8	5.3
Books/newspaper	7	4.6

**Table 4** Blood products transfused and amount transfused

	Number (n = 151)	Percentage (%)
<b>Blood products</b>		
Whole blood	106	70.0
Sedimented cells	45	30.0
Total	151	100
<b>Units of blood transfused</b>		
1 unit	67	44.4
2 units	66	43.7
≥3 units	18	11.9

(109/151; 72.2%) with postpartum anemia accounting for 98/109 (90%) of these and antepartum anemia for 11/109 (10%), postpartum hemorrhage (PPH) 23/151 (15.2%), shock 13/151 (8.6%), and ante partum hemorrhage 6/151 (4%) in the presence of maternal hemodynamic instability and fetal compromise (fetal heart rate irregularities). All those who had shock also had severe anemia with their packed cell volume <12%. The pretransfusion pack cell volume revealed that 21/151 (14%) had mild anemia, 52/151 (34.3%) moderate anemia, and 78/151 (51.7%) severe anemia. The majority of those with anemia (136/151; 90.2%) had it corrected after transfusion before discharge from the hospital, while 15/151 (9.8%) still had mild anemia before discharge despite being transfused, which was due to the inability of the patient to provide the required amount of blood needed to optimally correct their anemia. The mean pack cell volume pre and post transfusion was  $16\% \pm 3.82\%$  and  $32\% \pm 5.12\%$ , respectively. A few (6/151; 4%) had transfusion reactions, all of which were hypersensitivity reactions in the form of urticaria with chills and rigors, while another 6/151 (4%) had malaria infection following blood transfusion. These complications were noted in those who had multiple blood transfusions. There were no other reported cases of other blood borne infections. Strict adherence to correct labeling of blood products, as well as cross-match and administration procedures, are helpful in preventing such transfusion reactions.

The index pregnancy was complicated in 82/151 (54.3%) of patients, the complications were antepartum hemorrhage

**Table 5** Indications for transfusion

	Number (n = 151)	Percentage (%)
<b>Indications</b>		
Anemia	109	72.0
Antepartum anemia	11	7.3
Postpartum anemia	98	64.7
Postpartum hemorrhage	23	15.2
Shock	13	8.6
Antepartum hemorrhage	6	4.0

(APH); 35/151 (22.9%) mainly from placenta previa; 32/151 (20.8%) and abruption placenta; 3/151 (2.1%) between 28–34 weeks gestation requiring multiple transfusion and all the women surviving without any major maternal morbidity or mortality. Other complications were PPH; 46/151 (30.2%), ruptured uterus; 22/151 (14.5%), severe preeclampsia; 18/151 (12%), malaria and anemia; 16/151 (10.8%), ectopic pregnancy; 15/151 (9.6%). Post-partum morbidity occurred in 21/151 (14%) of participants, morbidity include hypovolemic shock; 50/151 (33%), wound infections; 45/151 (30%), puerperal sepsis; 35/151 (23%), anemic heart failure; 12/151 (7.6%), renal failure; 5/151 (3.2%) and disseminated intravascular coagulopathy; 5/151 (3.2%) as shown in Table 6. Six of the one hundred and fifty-one participants died, this represents 4% of the sample. The deaths were as a result of complications of renal failure; 3/6 (50%) and disseminated intravascular coagulopathy; 3/6 (50%). The mean duration of hospital stay was  $8.25 \pm 5.12$  days.

## Discussion

The knowledge of blood transfusion was high amongst the subjects. This may have been due to the fact that counseling was offered before transfusion and information on transfusion was also given during health talks at every antenatal visit. This is also supported by the fact that the majority cited the hospital as their source of information on blood transfusion.

Several studies have shown that obstetric care is still very poor in this part of the world and that hemorrhage and anemia necessitating blood transfusion complicates most pregnancies in Africa.<sup>1,2,8,10</sup> This is pertinent because many women managed in the studied institution present with obstetric morbidity and mortality related to hemorrhage and anemia.

The transfusion rate of 7.04% in this study is far higher than rates of 0.16% to 2.6% reported by other researchers.<sup>11–18</sup>

**Table 6** Complications associated with blood loss and anemia

	Number (n = 151)	Percentage (%)
<b>Complications</b>		
Hypovolemic shock	50	33.0
Wound infection	45	30.0
Puerperal sepsis	35	23.0
Anemic heart failure	12	7.6
Renal failure	5	3.2
Disseminated intravascular coagulopathy	5	3.2
Death	6	4.0
Total	151	100

Obstetric hemorrhage still remains a major issue for safe motherhood in Nigeria as shown in this study where 65.6% and 42.1% of our sample who had vaginal delivery and surgery for abdominal delivery/exploration, respectively, had PPH and thus received blood transfusion as a life saving measure, this is at variance with reports from some developed countries.<sup>16,17</sup> Since several studies in Nigeria have reported PPH as being responsible for about 25% or more of maternal deaths,<sup>4,11,18,19</sup> it was therefore not surprising that the major indications for transfusion were anemia, PPH, shock and APH. These indications were similar to those from the United States and Canada.<sup>15,16</sup> The findings that some of the studied subjects had morbidities such as wound infection, puerperal sepsis, anemic heart failure, shock, renal failure, and disseminated intravascular coagulopathy related to blood loss, transfusion reaction, and anemia often arising from difficulties in timely securing the right type of blood product were similar to those noted by other researchers.<sup>17,18</sup> These were mainly as a result of late presentation to hospital, non-availability of blood and blood products, cost, and financial handicap as seen in similar studies in Africa.<sup>18,19</sup> Strict adherence to correct labeling of blood products, as well as cross-matching and administration procedures as done for all the cases we managed is of paramount importance in preventing transfusion reactions, even in emergencies.<sup>7</sup>

Those who had transfusions for mild and moderate anemia were transfused for a coexisting third trimester viable pregnancy close to or at term (35–40 week gestation) with ongoing bleeding from APH or ruptured uteri taking into consideration the recommendations of the departmental protocol which prescribes blood transfusion for this category of patients and also considering the decision-intervention interval of 6–24 hours for emergency surgeries in our center.

The large volume of blood needed to prevent the morbidity and mortality related to blood loss as depicted in this study, places a great demand on the poorly funded blood bank services as well as increases the cost of health care services.<sup>11</sup> Thus, the need is emphasized for an effective and safe blood transfusion system, which has been shown to be life-saving in both developed and developing countries like Nigeria, where PPH is a major cause of maternal and perinatal morbidity and mortality.<sup>3,4,7,11,17–19</sup> If blood transfusion services are provided in line with best practices, it will impact positively on our obstetric practice where the major challenges include the fact that patients are made to individually source blood from government or private owned blood banks, as well as the inability of patients to procure this blood which is often sold at exorbitant prices where and when available.

If the world hopes to achieve the goals of the safe motherhood initiatives and millennium development goal five as recommended by the World Health Organization and the United Nations, then we must begin to work on how to optimize the blood transfusion services in our healthcare facilities in order to make blood transfusion safe and effective. This can be achieved by establishing national blood transfusion services within the reach of all, as well as ensuring 24-hour services with availability of safe blood and blood products at all times and at no cost with the aim of making blood safe, accessible, free, and available within the shortest possible time. Individuals should also be encouraged to voluntarily donate blood to stock such banks and every obstetric unit should develop a blood transfusion protocol taking into consideration the specific challenges of the region or locality.

## Disclosure

The authors declare no conflicts of interest in this work.

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