

Pattern of Blood Component Request and Utilization in a Tertiary Hospital in Nigeria

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Abstract

Background: Blood transfusion being a life-saving procedure plays a vital role in the management of patients in the clinical practice. The challenges of inadequate voluntary blood donors and poor storage facilities made availability of sufficient safe blood difficult in developing countries. All efforts should therefore be put in place to ensure judicious use of the available blood by separating each unit of blood donated into components and giving individual patient only the required blood component rather than giving whole blood. **Aim:** This study was conducted to look into the pattern of blood components request and utilization in a tertiary hospital in Nigeria to assess its effectiveness in reducing blood wastage. **Materials and Methods:** This is a hospital-based retrospective study. Blood Bank registers for blood component request and utilization were analyzed over a period of 20 months. Units of blood products requested and units used were considered during this period with emphasis on request to transfusion ratio. **Results:** Highest blood product request was from pediatrics ward. Total blood product request for male was higher than for female. Highest blood product request was packed cell with request to transfusion ratio of 1.01, followed by fresh-frozen plasma, request to transfusion ratio 1.0 and platelet, request to transfusion ratio 1.14. **Conclusion:** Appropriate blood product request maximizes utilization, minimizes wastage, thereby increasing efficiency of the blood bank staff by reducing the unnecessary workload of cross matching, issuing of blood and wastage of reagents.

Keywords: Blood products, blood utilization, cross match, transfusion

INTRODUCTION

Blood transfusion being a life-saving procedure plays a vital role in the management of patient in both medical and surgical practice.^[1] The challenge of inadequate voluntary blood donors, poor storage facilities due to irregular power supply made availability of sufficient safe blood difficult in developing countries such as Nigeria.^[2-5] All efforts should therefore be put in place to ensure judicious use of the available blood to avoid wastage.^[1]

Globally, 10 units donation per a 1000 population are required to meet a nation's blood supply demand.^[2] Nearly 120 million units of blood are donated every year and this is not sufficient to meet the global need.^[4] Physicians requesting for blood often depend on hemoglobin threshold level of the patient, anticipation of blood loss during surgery which is often subjective rather than evidence based.^[3]

Blood can save lives but can also be a vector for harmful infectious diseases such as HIV and hepatitis; hence, the need

to request for blood only when it is absolutely necessary. Globally, it is estimated that 1.8 million blood donations collected were discarded in 2013 due to the positive reaction to transfusion transmissible infections.^[4]

There is a significant difference in the pattern of blood use between high-, middle-, and low-income countries.^[6] Transfusion is most commonly used for supportive care in cardiovascular and transplant surgery, massive trauma and therapy for solid and hematological malignancies in high-income countries while most transfusion request in low income countries are used to treat pregnancy-related complications and severe childhood anemia.^[6]

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The most frequently transfused age group in high-income countries is aged over 60 years which also account for about 79% of all the transfusion in such countries.^[6] The children under the age of five years followed by females aged between 15 and 45 years constitute up to 67% of all transfusions in low-income countries.^[6] Whole blood is rarely used for transfusion in high-income countries while about 85% of blood often transfused is whole blood in low-income countries.

It is worthy of note that blood component therapy is gradually being advocated for in the clinical management of patients due to advancement in the health system globally. However, the financial burden and lack of appropriate technology and storage facilities have always been a serious challenge in the developing countries.

Fresh-frozen plasma (FFP) and platelet transfusion request and utilization have a very wide range between high-income countries and low-income countries. FFP has a median transfusion rate of 7.6 per 1000 in high-income countries compared to 0.06 per 1000 in low-income countries.^[6]

This study looked into the pattern of request for blood products transfusion and utilization at a tertiary hospital in suburban community of Southwest, Nigeria. The findings will help in the education of the physicians who order blood components and inadvertently result in the reduction of inappropriate use of blood components and wastage.

MATERIALS AND METHODS

Study design

This is a hospital-based retrospective study. Blood Bank registers for blood component request and utilization at Federal Teaching Hospital, Ido Ekiti was analyzed over a period of 20 months (September 2018–April 2020). Age, gender, ethnicity, blood group of patient, number of units of blood

products requested, and number of units of blood products eventually utilized were considered during this period with emphases on request to utilization transfusion ratio.

Study instrument and data collection method

Data collection was done by a research assistant using a structured pro forma to extract the relevant sociodemographic variables: Age, gender, sex, blood group of patients, number of units requested, and number of blood eventually used were considered with emphases on request to transfusion ratio.

Data management

Data analysis

Descriptive and inferential statistics were used in this study.

Data were analyzed using the IBMSPSS Statistics for windows, version 27 (IBM Corp; Armonk, N.Y; U.S.A). Level of statistical significance was predetermined at a $P < 0.05$.

Ethical approval

Ethical approval for this study was obtained from the Health Research and Ethics Committee of our hospital anonymity, and confidentiality of all information was ensured and maintained.

RESULTS

A total of 612 blood products were requested for 325 patients over 20 months' study period. Table 1 shows the sociodemographic of blood products recipients during this period. Table 2 shows ward and frequency of blood products given to recipients. The highest blood products request was made for the patients in the age group of 25–64 years which constituted 43.4% of the total request. This is followed by the age group <15 years which constituted 33.8%, followed by age group 65 years and above which constituted 16.3% and the least request was for age group 15–24 years which constituted 6.5%.

Table 1: Sociodemographics of blood recipients distributed by quarters under review

Variable	Quarter					Total (n=325), n (%)
	Q3, 2018 (n=55), n (%)	Q1, 2019 (n=65), n (%)	Q2, 2019 (n=83), n (%)	Q3, 2019 (n=82), n (%)	Q1, 2020 (n=40), n (%)	
Age group (years)						
<15	26 (47.3)	25 (38.5)	29 (34.9)	22 (26.8)	8 (20.0)	110 (33.8)
15-24	1 (1.8)	2 (3.1)	9 (10.8)	8 (9.8)	1 (2.5)	21 (6.5)
25-64	16 (29.1)	23 (35.4)	39 (47.0)	39 (47.6)	24 (60.0)	141 (43.4)
≥65	12 (21.8)	15 (23.1)	6 (7.2)	13 (15.9)	7 (17.5)	53 (16.3)
Statistical test (χ^2 , P)	28.393, 0.005					
Sex						
Male	32 (58.2)	32 (49.2)	49 (59.0)	49 (59.8)	18 (45.0)	180 (55.4)
Female	23 (41.8)	33 (50.8)	34 (41.0)	33 (55.0)	22 (55.0)	145 (44.6)
Statistical test (χ^2 , P)	3.998, 0.406					
Ethnicity						
Yoruba	49 (87.3)	59 (90.8)	67 (80.7)	71 (86.6)	37 (92.5)	282 (86.8)
Hausa	2 (3.6)	3 (4.6)	2 (2.4)	1 (1.2)	1 (2.5)	9 (2.8)
Ibo	4 (7.3)	3 (4.6)	10 (12.0)	6 (7.3)	2 (5.0)	25 (7.7)
Others	1 (1.8)	0	4 (4.8)	4 (4.9)	0	9 (2.8)
Statistical test (χ^2 , P)	11.248, 0.508					

Blood product request for male was found to be more than the request for female during this study period. Request for male constituted 55.4% while the female 44.6%.

Most requests were from pediatrics 36.3% followed by medical ward 25.5%, then accident and emergency 24.3%, surgical wards 7.4%, O and G 3.7%, and others 2.8%.

Table 3 shows the blood group of the patient and the frequency of blood products request during the study period.

Table 2: Ward/unit of blood products recipients in the period under the review

Variable	Frequency (n=325), n (%)
Ward/unit	
Pediatrics	118 (36.3)
Medical ward	83 (25.5)
Accident and emergency	79 (24.3)
Surgical ward	24 (7.4)
Obstetrics and gynecology	12 (3.7)
Hematology	7 (2.2)
Intensive care unit	2 (0.6)

Table 3: Blood group of patients in the period under review

Variable	Frequency (n=325), n (%)
Blood Group	
A+	60 (18.5)
A-	2 (0.6)
B+	56 (17.2)
AB+	7 (2.2)
O+	178 (54.8)
O-	22 (6.8)

The highest request of 54.8% was for blood Group O-positive patients. The least request of 0.6% was for blood Group A-negative patients.

Table 4 shows the number of blood products requested and the percentage utilized/transfused. A total of 612 units of blood products were requested during the study period out of which 602 units, 98.4% were utilized or transfused. Packed red blood cell was mostly requested and transfused followed by FFP and then platelet concentrate.

Table 5 shows the request transfusion ratio of the blood products during the study period. The ratio of the total 612 units of blood products requested to the 602 units of the blood products transfused during the study period was 1.02. Platelet had the highest request to transfusion ratio of 1.14, followed by packed cells 1.01 and FFP 1.0.

DISCUSSION

One of the major goals of any functional effective blood banking is to ensure effective usage of high-quality blood components without wastage. Inappropriate and over requisition of blood and its products in clinical practice has been well documented in the literature.^[4,7,8]

In the western world, whole blood is separated into components unlike what obtains in the developing countries where whole blood is often being utilized to meet the needs of the patients.^[9-11] In view of the poor blood bank reserve due to low level of voluntary blood donors in developing countries such as Nigeria, judicious use of the few available blood units has to be encouraged.^[12]

This study showed that the highest blood product transfusion request came from pediatrics which correlates with the findings

Table 4: Number of blood products requested and the number utilized in the period under review

Variable	Blood products requested				Blood products utilized/transfused				Percentage utilized
	Packed cells	FFP	Platelets	Total	Packed cells	FFP	Platelets	Total	
Quarter									
Q3, 2018	106	9	1	116	105	9	0	114	98.3
Q1, 2019	112	8	2	122	110	8	2	120	98.4
Q2, 2019	119	4	8	131	116	4	7	127	96.9
Q3, 2019	150	3	4	157	149	3	4	156	99.4
Q1, 2020	85	0	1	86	84	0	1	85	98.8
Total	572	24	16	612	564	24	14	602	98.4

FFP: Fresh-frozen plasma

Table 5: Request/transfusion ratio

Variable	Total number of units requested	Total number of units transfused	Request/transfusion ratio
Packed cells	572	564	1.01
FFP	24	24	1.00
Platelets	16	14	1.14
Total	612	602	1.02

FFP: Fresh-frozen plasma

in some other developing countries.^[13] This might be explained by the recurrent anemia associated with malaria infestation in children, especially in malaria endemic areas such as Nigeria. Packed red cells constituted the major request for transfusion followed by FFP and platelet.

It is obvious in this study that utilization of blood products in our hospital is very effective. This is evidenced by 98.4% usage of the total 612 units of blood products requested during this study period with request/transfusion ratio of 1.02. This finding is quite different from the reports from a lot of developing countries where a wide range of cross match/transfusion ratio up to 3:6 have been reported.^[14] This indicates degree of inappropriate blood usage and sometimes wastage. A cross match/transfusion ratio of >2.5 is regarded as an indicator of inappropriate blood usage as seen in some African countries, Tanzania, Malaysia, Egypt, and Zambia with cross match/transfusion ratio of 3.7, 2.3, 5.0, 3.9, and 2.8 respectively.^[15-19] The effective use of blood products in our institution is as a result of collaborative efforts championed by the hematology department.

The age distribution of the blood recipients in our study was consistent with what obtained in the western world in which age range 25–64 constituted the bulk percentage of the blood recipients.^[20-24] However, this finding is worrisome if it continues as it may make getting donors in future a challenge since this age range encroach deeply into the acceptable donor fitness age of 17–65.

Our findings showed that 55.4% and 44.6% of the blood products were given to male and female respectively. This finding was in keeping with the report from developed countries where men received more blood than women.^[23,25] The finding was also consistent with a study in India where 57% and 43% of the component users were found to be male and female respectively.^[26] However, this finding differed from the study carried out in Zimbabwe where the females constituted 63.2% and 65.3% of these females were of the reproductive age of 15–49 years.^[27] The findings in our study which considered only blood product transfusion may be attributable to a higher indication and preference for the transfusion of whole blood to blood products in acute blood loss often associated with obstetrics complications in Nigeria.

Limitation

Our data was derived from a single center and represents only a small proportion of the south western Nigeria.

CONCLUSION

Appropriate blood request and utilization which entails giving the patient exact blood product that is needed rather than giving whole blood maximizes the usage of blood, minimizes wastage, and increases efficiency of the blood bank staff by reducing the unnecessary workload of cross match, issuing of blood and wastage of reagents as evidenced by the findings in this study.

Unnecessary blood request and wastage can be reduced to barest minimal by formulation and adherence to transfusion guidelines.

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Conflicts of interest

There are no conflicts of interest.

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