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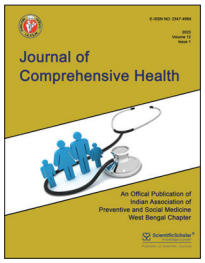

Original Article

Pattern of Utilization and Indications of Use of Blood and Blood Products in a Tertiary Care Hospital of West Bengal

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ABSTRACT

Background: Blood cannot be artificially manufactured, nor have we found a proper, well-rounded substitute. This makes proper utilization of the donated blood a task of immense value. Contamination of the blood makes it non-utilizable; hence, proper use of blood and blood products is extremely important to avoid any wastage of these scarce resources.

Objectives: The objective of this study was to assess the utilization pattern of blood and blood components and the indications of use of blood components in a tertiary care hospital.

Material and Methods: An observational cross-sectional study was conducted for a period of months (July 2023 – September 2023) in the blood bank department of a tertiary care hospital in North Bengal. Secondary data were collected by reviewing the records, registers, and computer-stored data at the blood bank and pre-designed, pre-tested data collection schedule. Data were organized and presented using the principles of descriptive statistics for demographic and clinical variables.

Results: There were a total of 4965 transfusion requisitions during the study period. Packed red blood cells (RBCs) were the most demanded blood component (42%), followed by fresh frozen plasma (24%), platelets (23%), and then whole blood (11%). The commonest indication for blood transfusion was pregnancy/childbirth-related cause (27%) followed by elective surgery (23%). Requisition of the blood components was found to be maximum by the medicine department (43%), followed by the gyne and obstetrics department (16.5%).

Conclusion: Periodic review and audit of blood component usage is very much essential to assess the blood utilization pattern in any hospital.

Keywords: Audit, Blood components, Blood transfusions, Utilization pattern

INTRODUCTION WITH OBJECTIVES

Blood transfusions are frequently an essential life-saving intervention. With the changing demographics and increasing life spans, the demand for blood is increasing. Even though blood shortages are common due to increased demand or lower donation rates, blood is sometimes used unnecessarily, which creates greater pressure on blood supplies and widens the gap between demand and supply. Thus, blood, being a scarce and expensive human resource, should be given only when true benefits are likely.[1-3]

The blood transfusion service in the country is highly decentralized and lacks many vital resources such as manpower, adequate infrastructure, and a financial base. The main component of an integrated strategy includes collection of blood only from voluntary, non-remunerated blood donors, screening for all transfusion transmitted infections, and reduction of unnecessary transfusion.[4] In spite of the sophisticated blood banking service, many studies have documented the indiscriminate use of blood components with either no indications or inappropriate indications.[5,6] Various studies from various regions of the world, including West Bengal, depicting blood audits in hospitals evaluating the indications of blood transfusions have been published.[7-9] With the above background, the present study was designed to assess the utilization pattern of blood and the indications of the use of blood components.

MATERIAL AND METHODS

A record-based observational and cross-sectional study was conducted at the Blood Bank of Maharaja Jitendra Narayan Medical College & and Hospital (MJNMCH), Cooch Behar, during a period of three months from June to September 2023. This medical college is a 600 bedded hospital located in the center of reference of the northern region of West Bengal, Assam, and some parts of Bangladesh.

Study participants were all admitted patients in the various wards of MJNMCH during the reference time who were transfused with blood or blood components during their stay in the hospital, excluding the subjects who were transfused blood issued outside of the studied hospital.

Before conducting the study, permission was obtained from the principal and superintendent of MJNMCH. Records, registers, and computer-stored data at blood banks and pre-designed, pre-tested pro forma were used as study tools. A review of different records and registers was done to record the following information –- age, gender, current diagnosis, type and number of blood or blood components requisitioned, purpose/indications of transfusion (elective, emergency, etc.), etc.

Collected data were checked for consistency & and completeness and entered in an Excel date sheet built by Microsoft Corporation. Further, analysis was done with the help of the software IBM SPSS for windows, version 22: IBM Corporation. Data were organized and presented using the principles of descriptive statistics for demographic and clinical variables, transfusion status, and the type and number of components transfused.

The study protocol was submitted before the Institutional Ethics Committee of MJNMCH, Cooch Behar, for approval, and the cooperation of the director and staff of the blood bank of this institution was sought. The study was conducted in accordance with the ethical principles that have their origin in the Declaration of Helsinki. The study protocol, the subject information, and the consent form were reviewed and approved by an "Institutional Ethics Committee" of MJN Medical College and Hospital. There is no role of any funding source in the present study.

Operational definitions

Blood product

Any therapeutic substance prepared from human blood.

Whole blood

Unseparated blood collected into an approved container containing an anticoagulant-preservative solution.

Blood component

A constituent of blood separated from whole blood, such as red cell concentrate, red cell suspension, plasma, and platelets. Plasma or platelets collected by apheresis* (*Apheresis: A method of collecting plasma or platelets directly from the donor, usually by a mechanical method). Cryoprecipitate prepared from fresh frozen plasma (FFP): Rich in Factor VIII and fibrinogen.[10]

RESULTS

In the present study, during the study period, the total number of the blood components utilized by various hospital units was 4965, including whole blood, packed red blood cells (PRBC), platelets, and fresh frozen plasma (FFP), with a monthly average of 1655 units. A detailed breakup of the supply for all blood components revealed that PRBC was the maximum utilized blood component (42%), followed by FFP (24%), platelets (23%), and then whole blood (11%) [Figure 1]. Among all patients receiving blood components,

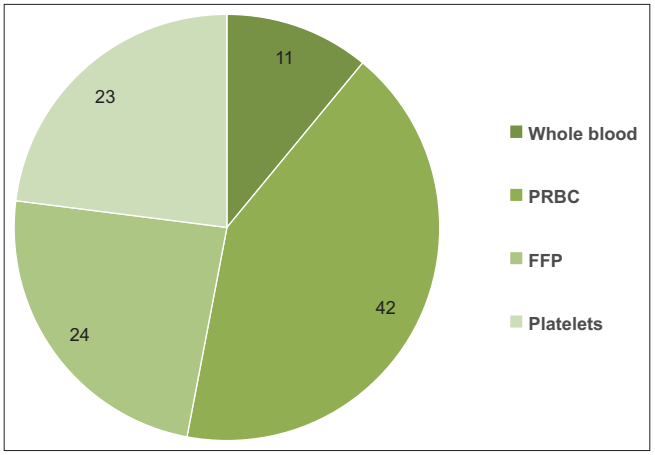

Figure 1: Utilization of blood and its different components. PRBC: Packed red blood cell, FFP: Fresh frozen plasma

57% were male while 43% were female [Table 1] and most of the recipients belonged to the age group between 21 and 40 years (33%), followed by recipients more than 60 years [Table 1].

The commonest indication for blood transfusion was pregnancy/childbirth-related cause (27%) followed by elective surgery (23%) [Table 2]. Kidney and liver disorders accounted for 16% of the total requisite blood. Requisition of the blood components was found to be maximum by the medicine department (43%), followed by the gyne and obstetrics department (16.5%) [Table 3]. Demand for whole blood was maximum from the gynae and obstetrics department (36%), followed by the surgery and orthopedics department (24%). Requirements of different blood components were highest from the medicine department, including PRBC at 41%, FFP at 39%, and platelets at 61% [Table 3].

Table 1: Distribution of the blood recipients according to their age and gender (n=4965).

Variables	Frequency	Percentage
Age group (years)		
Infant	546	11
1–20	894	18
21–40	1638	33
41–50	844	17
>60	1043	21
Gender		
Male	2830	57
Female	2135	43
Total	4965	100

Table 2: Distributions of the recipients according to the indications for transfusion.

Indications	Frequency	Percentage
Pregnancy-related cause*	1340	27
Blood disorders	745	15
Elective surgery	1142	23
Bleeding due to injury	646	13
Kidney disorders	546	11
Liver disorders	248	5
Others*	298	6
Total	4965	100

*Pregnancy-related cause includes-anemia in pregnancy and related blood loss, Other include malignancy in any site.

DISCUSSION

Blood and its components play a pivotal role in patient care and supply, which is limited with considerable risks of infections and reactions. The pattern of utilization of blood and its components and transfusion practices varies from center to center in different countries. The present study provides detailed information on the utilization of whole blood and blood components for patients in a tertiary care hospital in North Bengal, India. Transfusions should provide a therapeutic benefit, while their inappropriate uses may cause adverse reactions in patients. It is the clinician's responsibility to properly indicate the use of blood components, while the blood bank is responsible for its safe supply. Good transfusion practice should regularly evaluate these components of the transfusion chain.

In the present study, it was found that most of the blood component transfused was PRBC (42%), followed by FFP (24%) and platelets (23%), and the least number of transfused was whole blood (11%) [Figure 1]. Similar findings were recorded by Handa *et al.*[11], where 61% of the utilized blood components were PRBC, and Alkhaldy HY *et al.*[12], where 74.1% of the used blood products were PRBC. Contrary to this finding, some previous studies conducted by Koju *et al.*[13] and Giriyan *et al.*[14] showed that most of the blood transfused was whole blood.

Packed RBC was demanded maximum from the medicine department in cases of chronic anemia as red cell transfusion causes an increased oxygen-carrying capacity of blood by raising the hemoglobin concentration of patients with acute or chronic anemia.[15] Similarly, severe thrombocytopenia in cases of dengue patients was an indication of transfusing platelet, while FFP was majorly transfused in patients with coagulopathy, hypovolemic, and exchange transfusion, and these blood components were mostly demanded from the medicine department. In contrast to this, a study done by Riaz *et al.*[16] showed that most of the blood products were

Table 3: Distribution according to utilization of blood and its product in various departments (*n*=4965).

Blood and its products	Medicine	Surgery and orthopedics	Gyne and obstetrics	Pediatrics	Others	Total
Whole Blood	115 (21)	131 (24)	197 (36)	60 (11)	43 (8)	546 (11)
PRBC	854 (41)	292 (14)	356 (17)	271 (13)	312 (15)	2085 (42)
FFP	465 (39)	203 (17)	166 (14)	215 (18)	143 (12)	1192 (24)
Platelets	696 (61)	80 (7)	104 (9)	137 (12)	125 (11)	1142 (23)
Total	2130 (43)	706 (14)	823 (16.5)	683 (14)	623 (12.5)	4965 (100)

PRBC: Packed red blood cells, FFP: Fresh frozen plasma

demanded from the pediatric department, and Koju *et al*.[13] observed in their study that the highest demand for blood was from intensive care units. Whole blood was found to be majorly indicated for blood loss during gynecological cases, elective surgery, and bleeding from an injury site [Table 3].

CONCLUSION

Periodic assessment of blood component utilization is essential to assess the blood utilization pattern in any hospital. This is useful for blood transfusion services to provide a safe, sufficient, and timely supply of blood and blood products among needy patients. Regular educational sessions for clinicians are recommended that will help in the proper utilization of blood components. Every institute should develop blood transfusion guidelines for the effective utilization of blood components.

Ethical approval

The Institutional Review Board approval is not required.

Declaration of patient consent

Patient's consent was not required as there are no patients in this study.

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Nil.

Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

REFERENCES

1. Nathan DG, Oski FA. Hematology of Infancy and Childhood. Netherlands: Elsevier; 1994.
2. Strauss R. Risk of Blood Component Transfusions. In: Nelson Textbook of Pediatrics. Netherlands: Elsevier; 2003. p. 1646-50.
3. World Health Organization. Universal Access to Safe Blood Transfusion. Geneva: World Health Organization; 2008.
4. NACO, NBTC. Role of Voluntary Blood Donor Organization in Voluntary Blood Donation Programme-An Operational Guideline. New Delhi: National AIDS Control Organisation, Ministry of Health and Family Welfare, Government of India; 2007.
5. Wade M, Sharma R, Manglani M. Rational Use of Blood Components-An Audit. Indian J Hematol Blood Transfus 2009;25:66-9.
6. Schmidt PJ. Red Cells for Transfusion. N Engl J Med 1978;299:1411-2.
7. Mitra J, Mitra K, Nandy S, Roy RN, Mandal PK, Biswas R. Utilisation Pattern of Blood in a Teaching Hospital of Kolkata. Indian J Public Health 2004;48:205-9.
8. Mollison PL. Blood Transfusion in Clinical Medicine. Oxford, UK: Oxford Blackwell Scientific Publications; 1951.
9. Stehling L, Luban NL, Anderson KC, Sayers MH, Long A, Attar S, *et al*. Guidelines for Blood Utilization Review. Transfusion 1994;34:438-48.
10. Emmanuel JC. The Clinical Use of Blood in Medicine, Obstetrics, Paediatrics, Surgery and Anaesthesia, Trauma and Burns. Geneva: World Health Organization; 2001.
11. Handa A, Bundas S, Pal A. Utilization Pattern of Blood and Its Components in a Tertiary Care Super Speciality Hospital. Int J Community Med Public Health 2020;7:4526-9.
12. Alkhaldy H, AlShahrani B, Alkhaldi AM, Alqahtani A, Muhayya I, Alqahtani M, *et al*. Patterns of Blood Products Utilization at A Tertiary Care Center in the Southern Region of Saudi Arabia. J Appl Hematol 2021;12:6.
13. Koju S, Karmarcharya RM, Makaju R. Pattern of Blood Component Utilization in Tertiary Care Hospital of Central Nepal. Kathmandu Univ Med J 2019;65:20-4.
14. Giriyan SS, Chethana HD, Sindhushree N, Agarwal A, Nirala NK, Bajpai R. Study of Utilization of Blood and Blood Components in a Tertiary Care Hospital. J Blood Lymph 2017;7:169.
15. Murphy MF, Wallington TB, Kelsey P, Boulton F, Bruce M, Cohen H, *et al*. Guidelines for the Clinical Use of Red Cell Transfusions. Br J Haematol 2001;113:24-31.
16. Riaz H, Shah MA, Idrees M, Ayaz K, Shah H. Pattern of Blood Components Utilization in Hayatabd Medical Complex. Int J Health Sci 2022;6:5949-57.

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