

EVALUATION OF WHOLE BLOOD AND BLOOD COMPONENTS DISCARD IN A GOVERNMENT HOSPITAL – A TERTIARY CARE HEALTH FACILITY

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Received: 08 January 2025, Revised and Accepted: 22 February 2025

ABSTRACT

Objectives: There is no artificial substitute for blood to date. The discard of blood and its components remains a persistent challenge for maintaining adequate blood inventory. The present study was conducted to analyze the various reasons for discarding whole blood (WB) and blood components in a blood bank attached to a tertiary care setup. It is also intended to introduce various possible strategies for minimizing blood wastage.

Methods: A retrospective study of 3 years with effect from January 2021 to December 2023 was carried out and data were collected from records available with the blood center.

Results: During this study, a total of 16874, 22590, and 22676 blood units were collected during 2021, 2022, and 2023, respectively. It was observed that out of the total collection of 62140 units, 1686 (2.71%) were discarded as WB+Packed red blood cells. The discard rate for platelets and fresh frozen plasma was 45.4% and 10.9%, respectively. The various reasons for discard were seropositivity, expiry, suboptimal volume, non-utilization after issue, red cell contamination, lipemia, leakage, and hemolysis.

Conclusion: To minimize discard of blood and its components, a multifaceted approach is required. It includes improving blood collection practices, proper storage and processing techniques, regular audits, following first in first out policy, and rational use of blood and its components.

Keywords: Blood, Blood components, Packed red blood cells, Fresh frozen plasma, Platelets, Discard rate.

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INTRODUCTION

Modern healthcare systems essentially need a safe and adequate blood supply for its smooth functioning. Human blood is categorized as a drug under section 3(b) of Drugs and Cosmetic Act 1940 in India [1]. Blood transfusion is an integral part of various medical settings from emergency surgeries to the management of chronic conditions.

Blood transfusion services (BTS) are responsible for providing safe and adequate blood supply. Therefore, an efficient BTS is crucial for providing better patient care and contributing toward the development of better healthcare in the country [2].

As of yet, there is no artificial blood equivalent. Therefore, maintaining the ever-increasing demand for life-saving blood transfusions requires effective management of blood and its components. The performance of BTS can be increased either by increasing the resources used in collection and production of blood components or by utilizing existing resources more efficiently [3]. The discard of blood and its components remains a persistent challenge for maintaining adequate blood inventory. Therefore, every unit of blood and its components must be utilized judiciously with minimal wastage [4].

The rate of discarded blood components is defined as the proportion of total number of blood components discarded from the total number of blood units collected. When the rate of discarded blood is high, the level of efficiency of collection and component preparation is low [5]. By analyzing the reasons for discards, BTS can develop new measures to minimize the rate of discard of blood units through education and training of staff [2].

Aim and objective

1. To evaluate the causes that lead to discard of blood and its components
2. To suggest strategies that can be used to minimize the number of discarded blood units and improve efficiency and performance of our transfusion services.

METHODS

Three-year retrospective study was carried out in a tertiary care hospital's blood center between January 2021 and December 2023. Records of many registers, including the donor register, the transfusion-transmitted infection register, the component preparation register, and the discard register, were used to gather information on the collection and use of blood and its components parts. To determine why blood units were discarded, the data were tallied and examined. The study excluded therapeutic phlebotomy bags and platelets obtained using the apheresis process (single donor platelets).

$$\text{Discard rate} = \frac{\text{The total number of blood and blood component discarded}}{\text{The total number of blood and blood components prepared}} \times 100$$

The quality of whole blood (WB) and its components was assessed as per the National Accreditation Board for Hospitals and Healthcare Providers (NABH) Guidelines. Parameters under which the discarded blood and blood components were categorized are as follows: Suboptimal volume, expiry, non-utilization after issue, red cell contamination, lipemia, hemolysis, breakage, and leakage. After classifying each component under these categories, data were tabulated and analyzed.

RESULTS

A total of 16874, 22590, and 22676 units were collected during 2021, 2022, and 2023, respectively, from various blood donation camps and in-house collection. These units were subjected to component formation including packed red blood cells (PRBC), fresh frozen plasma (FFP), and platelets. In 2021, a total of 16375 units (97.04%) of PRBC, 8487 units (50.29%) of platelets, and 16375 units (97.04%) of FFP were prepared. In 2022, 22072 units (97.7%) of PRBC, 7302 units (32.3%) of platelets, and 22072 units (97.7%) of FFP were prepared. Similarly in 2023, 22216 units (97.7%) of PRBC, 8405 units (37.06%) of platelets and 22150 units (97.6%) of FFP were prepared.

The discard rate of various components was noted year wise and then the average discard rate was calculated. Out of the total collection of 62140 units, 1686 (2.71%) were discarded as WB+PRBC as shown in Table 1.

The discard rate of platelets and FFP was 45.4%, and 10.9%, respectively, as shown in Table 2.

Average discard rate of blood and its components was calculated as;

$$\frac{\text{The total number of blood and blood component discarded}}{\text{The total number of blood and blood components prepared}} \times 100$$

It was observed that the average discard rate of blood and its components for 3 years was 13.1%. The discard rate of WB+PRBC, Platelets, and FFP was 2.71%, 45.4%, and 10.9%, respectively.

The various reasons for discard are shown in Table 3.

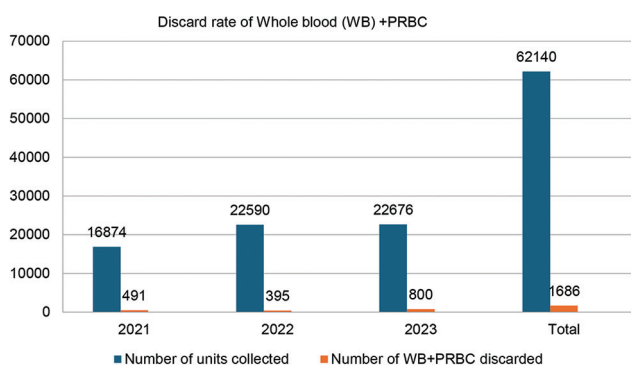
DISCUSSION

Blood transfusion has become an integral part of patient management in modern medicine [6]. Out of the various quality indicators of NABH, discard rate is one of them [4]. Thus, the rate at which blood and its components are discarded is a crucial component of BTSS, especially in medical facilities such as government hospitals where there may be a significant demand for blood products and resource management is sometimes difficult. Hence, it is essential to determine the various causes of discard and focus on these causes particular to that blood center. It helps us to formulate and develop certain guidelines targeting these causes [7].

Table 1: Discard rate of WB+PRBC

Year	Number of units collected	Number of WB+PRBC discarded (%)
2021	16874	491 (2.9)
2022	22590	395 (1.74)
2023	22676	800 (3.5)
Total	62140	1686 (2.71)

WB: Whole blood, PRBC: Packed red blood cells



The present study showed that average discard rate of blood and its components was 13.1%. The average discard rate in studies by Jairajpuri *et al.* [8], Hayer and Gotekar [9], Kulkarni *et al.* [10], Navyashree *et al.* [11], Bashir *et al.* [12] was 18.5%, 9.8%, 23.3%, 8.9%, 8.8%, respectively.

The average discard rate of WB+PRBC was 2.71%. The most common reason for discard was TTI-positive units (58.8%). It can be minimized by strictly following donor selection criteria. Another reason for discarding WB+PRBC in our study was suboptimal volume (26.3%). The reasons can be phlebotomy failure which can be prevented by selection of healthy donors and by training of phlebotomy staff. The reason for suboptimal volume of PRBC was aliquots prepared for pediatric and thalassemia patients. In the present study, 8.7% units were discarded due to non-utilization after issue. To prevent this, sensitization of doctors and residents should be done regarding the rational use of blood and its products and by instructing them to maintain cold chain and send back unused units within 15–30 min of issue.

The average discard rate of platelets in the present study was 45.4% which was much lower than studies by Jairajpuri *et al.* [8] (53.7%), Navyashree *et al.* [11] (56.7%), Bashir *et al.* [12] (53.9%) while it was 16.6% and 19.1% in studies by Nair *et al.* [13] and Dhote *et al.* [14], respectively.

Based on the current observations, the platelet discard rate was the highest of all the components. The most common reason for discarding platelets was expiry (95.6%), due to its short shelf life of only 5 days. Similar findings were observed by Kumar *et al.* [4], Singh *et al.* [15], and Anitha *et al.* [16]. It can be prevented by their preparation according to the requirement and also by increased use of apheresis technique. In our study, the discard rate of platelets was brought down to 45.3% in 2022 as compared to 55.2% in 2021. It was further lowered in 2023 to 35.6%.

The average discard rate of FFP in the present study was 10.9% while the studies by Bhardwaj *et al.* [17] Jairajpuri *et al.* [8], Mamatha *et al.* [18], Bashir *et al.* [12] showed 8.41%, 20.2%, 6.65, 14.7%, respectively. The most common reason for discard in our study was leakage (24.9%). Other reasons for discard were lipemic units (19%), not utilized after issue (17.8%), red blood cells contamination (17.3%), and TTI positive units (13.4%). By handling them carefully and storing them in protected containers, leaks can be avoided. One of the causes for non-utilization after issue is the quantity of units sought exceeding the requirement.

Table 2: Discard rate of Platelets and FFP

Year	Number of components prepared		Number of components discarded (%)	
	Platelets	FFP	Platelets	FFP
2021	8487	16375	4689 (55.2)	1950 (11.9)
2022	7302	22072	3308 (45.3)	2426 (10.9)
2023	8405	22150	2998 (35.6)	2239 (10.1)
Total	24194	60597	10995 (45.4)	6615 (10.9)

FFP: Fresh frozen plasma

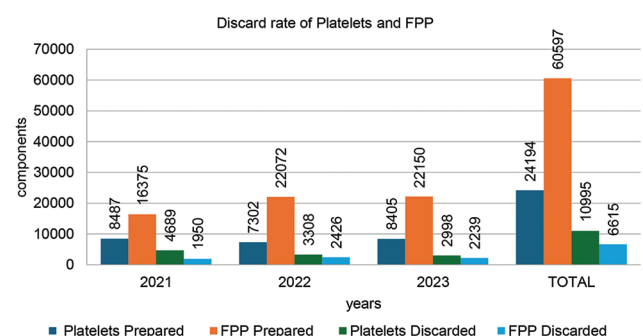
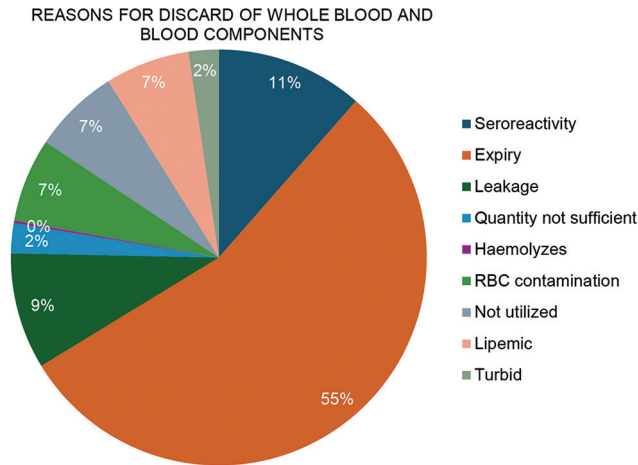


Table 3: Reasons for discard of WB and blood components

Components	Sero reactivity	Expiry	Leakage	Quantity not sufficient	Hemolyzed	RBC contamination	Not utilized after issue	Lipemic	Turbid
WB+PRBC (%)	993 (58.8)	13 (0.7)	43 (2.5)	445 (26.3)	41 (2.4)	-	147 (8.7)	-	-
Platelets (%)	317 (2.8)	10,516 (95.6)	40 (0.36)	-	-	103 (0.9)	17 (0.1)	-	-
FFP (%)	889 (13.4)	38 (0.5)	1651 (24.9)	-	-	1146 (17.3)	1181 (17.8)	1262 (19.07)	448 (6.7)
Total	2199	10567	1734	445	41	1249	1289	1262	448

WB: Whole blood, PRBC: Packed red blood cells, RBC: Red blood cells, FFP: Fresh frozen plasma



CONCLUSION

The pace at which blood and its components are discarded is a serious problem for healthcare systems, especially in government institutions with limited resources. In addition to wasting precious blood, high discard rates can affect patient care and lead to blood shortages. It is impossible to completely prevent the waste of blood and its components, but it must be reduced. A multifaceted strategy is needed to address this problem, including bettering inventory management, first in first out policy observance, upgrading storage and processing methods, improving blood collection procedures, and more precise clinical protocols. Reducing blood waste allows hospitals to make better use of their resources, increase patient access to blood, and improve the overall quality of healthcare they provide.

ACKNOWLEDGMENT

Our sincere appreciation goes out to the blood center of Government Medical College, Patiala, for all their assistance and support during this research.

AUTHORS CONTRIBUTIONS

All the authors have equally contributed to the article.

CONFLICT OF INTEREST

None.

AUTHORS FUNDING

Nil.

REFERENCES

1. National AIDS Control Organization. An Action Plan for Blood Safety. New Delhi, India: National AIDS Control Organization; 2007.

2. Morish M, Ayob Y, Naim N, Salman H, Muhamad NA, Yusoff NM. Quality indicators for discarding blood in the National Blood Center, Kuala Lumpur. *Asian J Transfus Sci.* 2012;6:19-23.
3. Pitocco C, Sexton TR. Alleviating blood shortages in a resource-constrained environment. *Transfusion.* 2005;45(7):1118-26.
4. Kumar A, Sharma SM, Ingole NS, Gangane N. Analysis of reasons for discarding blood and blood components in a blood bank of tertiary care hospital in Central India: A prospective study. *Int J Med Public Health.* 2014;4:72-4.
5. Veihola M, Aroviita P, Kekomäki R, Linna M, Sintonen H. Discarded cellular components and the technical efficiency of component preparation. *Eur J Health Econ.* 2007;9:325-31.
6. Smita M, Binay B, Gopal K, Debasish M, Rashmita P, Pankaj P. Discard of blood and blood components with the study of causes-A good manufacture practice. *World J Pharm Med Res.* 2017; 3:172-5.
7. Collins RA, Wisniewski MK, Waters JH, Triulzi DJ, Yazer MH. Effectiveness of multiple initiatives to reduce blood component wastage. *Am J Clin Pathol.* 2015;143:329-35.
8. Jairajpuri ZS, Sehgal S, Khetrapal S, Jetley S, Rana S. Evaluation of causes and rate of wastage of blood and its components-an important quality indicator in blood banks. *Online J Health Allied Sci.* 2022;21(2):7.
9. Hayer SS, Gotekar YR. Evaluation of rate and causes of wastage of blood and blood components in a teaching hospital. *Int J Curr Med Appl Sci.* 2018;18(3):79-83.
10. Kulkarni KM, Kulkarni P, Jamkhani U. The rationale for discarding blood and its components in a tertiary care Hospital Blood Bank in North Karnataka. *Cureus.* 2022 Nov 4;14(11):e31112. doi: 10.7759/cureus.31112
11. Navyashree N, Prakash VB, Shankar VS. Analysis of reasons for discarding blood and blood components in the blood bank of a tertiary care hospital-a seven years study. *J Evid Based Med Healthc.* 2020;7(35):1889-92.
12. Bashir F, Khalid A, Iqbal S, Ghafoor T, Ahmed M. Exploring the causes of wastage of blood and its components in a tertiary care hospital blood bank. *Cureus.* 2021 Dec 18;13(12):e20500. doi: 10.7759/cureus.20500
13. Nair AR, Sheeladevi KS, Gupta D. Analysis of discard rates of blood and blood components as a quality indicator to improve the blood transfusion services of a tertiary care hospital in South India. *J Haematol Stem Cell Res.* 2021;1(2):74-8.
14. Dhote SW, Srivastava AR, Singh I. Analysis on discard of blood and blood components in a tertiary care center: A guide to blood inventory management. *MGM J Med Sci.* 2021;8(3):277-81.
15. Singh P, Singh N, Thakur AS, Gautam A. Conditions associated with discarding of blood and its components in a blood bank of tertiary care hospital of Western Uttar Pradesh: A retrospective study. *Int J Res Med Sci.* 2024;12(5):1566-70.
16. Anitha M, Sindhuja K, Madhusudhana M. Analysis of reasons for discarding blood components in a blood bank of tertiary care teaching hospital in South India. *Int J Sci Res.* 2019;8(9):11-3.
17. Bhardwaj P, Kumari M, Singhal E, Kumar S. Analysis of discard of blood components and strategies for optimal and safe transfusion practices at a tertiary care hospital blood bank. *Int J Health Sci.* 2022;6(S1):3634-44.
18. Mamatha SV, Chaithra H, Susmitha NS, Anand R. A Retrospective study of analysis of reasons for discard of blood and blood components. *Trop J Pathol Microbiol.* 2018;4(3):276-80.