

A J Journal of
Medical Sciences

AJ Journal of Medical Sciences

ORIGINAL ARTICLE

Retrospective Study of Usage and Wastage of Blood and Blood Components in Blood Centre of a Tertiary Care Hospital in Coastal Karnataka

S Katheejathul Maqsooda¹, Niranjan P Khadilkar^{2,*}, B V Mamatha³, Preeval Shreya Crasta⁴¹Kanachur Institute of Medical Sciences, Mangaluru, Karnataka, India²Professor, Department of Pathology, Kanachur Institute of Medical Sciences, Mangaluru, Karnataka, India³Professor and Head, Department of Biochemistry, Kanachur Institute of Medical Sciences, Mangaluru, Karnataka, India⁴Assistant Professor, Department of Community Medicine, Kanachur Institute of Medical Sciences, Mangaluru, Karnataka, India

ARTICLE INFO

Article history:

Received 30-09-2025

Accepted 14-10-2025

Published 22-11-2025

* Corresponding author.

Niranjan P Khadilkar

npkhadilkar@gmail.com

<https://doi.org/10.71325/ajjms.v2i3.25.47>

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ABSTRACT

Background: There is no substitute for human blood. Blood and its components are essential for patient care, yet wastage remains a challenge. Identifying discard patterns helps optimize resource use. **Objectives:** 1. To evaluate the usage and wastage of blood components. 2. To determine optimum usage of blood components with minimal wastage. **Materials and Methods:** This retrospective study reviewed all 7765 blood donations collected/components prepared during the study period - January 2021 to December 2024. Blood units collected were processed and separated into components using cold centrifugation as per standard procedure. The separated components include packed red blood cells (PRBCs), fresh frozen plasma (FFP) and platelet concentrates. Reasons for discarding included expiry date, less collection volume, bag breakage and seropositivity, which were recorded and analyzed. **Results:** Of the 7765 units collected, 596 components (7.6%) were discarded. Discard rates component wise were - 3.8% PRBCs, 1.7% FFP and 52.2% platelets. Expiry date accounted for 87% of discards (519/596 units), followed by low volume collection (31 units), bag breakage (34 units), seropositivity (16 units: 4 HBsAg, 9 VDRL, 2 HIV, 1 HCV) and hemolysis (1unit). **Conclusion:** Platelet concentrates were the highest component discarded due to their short shelf life. Although overall discard rate was 7.7%, most losses especially due to date expiry are not preventable. Improved stock rotation, accurate demand forecasting and enhanced quality control can reduce wastage and ensure more efficient use of blood resources.

Keywords: Blood Centre, Blood components usage, Wastage

INTRODUCTION

Blood is the sole fluid connective tissue in the human body and is often revered as the elixir of life. It cannot be synthesised artificially, and the human body remains the exclusive source of blood. Consequently, blood for transfusion must be procured from voluntary human donors through a well-regulated donation process. The science and practice of blood transfusion have seen remarkable advancements over the past few decades,

leading to significant improvements in safety, efficacy and accessibility. Acknowledging its vital therapeutic role, human blood is legally designated as a drug under Section 3(b) of the Drugs and Cosmetics Act, 1940, as amended and enforced in 1945 by the Government of India ^{1,2}.

Blood and its components constitute a vital therapeutic resource in modern medicine, particularly in emergency and critical care settings. They play a pivotal role in the management of trauma, major surgeries, hematological



disorders, and various systemic illnesses. Consequently, their rational and judicious utilization is imperative to optimize patient outcomes and conserve this limited resource. However, the increasing demand for blood components has been accompanied by growing concerns regarding their appropriate use and the need to minimize wastage. Evaluating the patterns and causes of blood component discard is crucial for enhancing transfusion practices, improving inventory management and ensuring effective resource utilization within healthcare systems.

Wastage or discarding of blood can be due to several factors namely hemolysis, expiry of the collected blood/component, ordered but unused blood/component, clotting of blood, unused and returned component after half an hour, broken blood bag, leakage problem, and many more³. These result in unnecessary wastage of blood and resources leading to increased costs and reduced patient safety.

The present study aims to assess the extent of blood and blood component wastage in the blood bank of a tertiary care hospital, thereby highlighting areas for quality improvement and efficient resource management⁴⁻⁶.

The objective of the study is to evaluate the usage and wastage of blood components, and to determine optimum usage of blood components with minimal wastage.

MATERIALS AND METHODS

The present study is a retrospective, record based, observational cross sectional descriptive study conducted in a blood centre of a tertiary care teaching hospital, which caters to a large and diverse patient population, providing both emergency and routine transfusion services. The study was conducted in the Blood centre under the Department of Pathology from 1st January 2021 upto 31st December 2024. The study population comprised all blood donations collected from eligible donors at the blood centre during the defined study period. All units of blood and blood components collected from voluntary donors whose blood components were collected, were evaluated. Data on blood and its component usage and wastage were collected from the records of blood centre. Data collection was done after obtaining institutional ethical clearance reference no. KIMS/ IEC/ UG 027/ 2024-EC/ NEW/ INST/2023/3522 dated 4/11/2024.

The main reasons for discarding included expiry date of blood component, inappropriate volume, haemolysis of red blood cells (RBCs), contamination of plasma or platelets with RBCs, blood bag leakage, reactive infectious disease tests and inappropriate temperature during storage or transportation. The requisition forms were analyzed for relevant details. Implied consent was obtained from donors before blood donation.

Statistical analysis

This investigation was conceived as a retrospective, record-based observational study, utilizing pre-existing data extracted from the official registers maintained by a tertiary care teaching hospital's blood center. The study population was defined as all blood donations collected from eligible donors at the center over a specified period. The inclusion criteria were explicitly restricted to all units of blood and blood components collected from voluntary blood donors, thereby forming the core dataset for analysis. The study period spanned four years, encompassing all donations from January 1, 2021, to December 31, 2024. A universal sampling technique was employed, meaning every single donation that met the inclusion criteria within this timeframe was selected for analysis, ensuring a comprehensive review without sampling bias. The active phase of data collection and analysis for this study had a duration of one month, which commenced only after formal approval was received from the institutional ethical committee, as documented in letter reference number KIMS/IEC/UG 027/2024-EC/NEW/INST/2023/3522, dated November 4, 2024.

RESULTS

During the study period January 2021 to December 2024, a total of 7,765 units of blood components were collected. Packed red blood cells (PRBCs) and fresh frozen plasma (FFP) collections were at 764 units and 1009 units each in 2021 and 2022 respectively. There was a slight decrease to 860 units in 2023 and 863 units in 2024. Platelet concentrate collections demonstrated a declining trend-starting at 219 units and 206 units in 2021 and 2022 respectively, decreasing to 201 units in 2023, and further to 141 units in 2024. The year-wise distribution of these blood components collected/prepared is summarized in [Table. 1](#).

A comparative analysis of the collected and discarded blood components over the period January 2021 to December 2024 reveals important trends in utilization and wastage. Packed red blood cells (PRBCs) and fresh frozen plasma (FFP) were the most collected components, each totaling 3,496 units across the four years. Platelet concentrates had a lower collection total of 767 units.

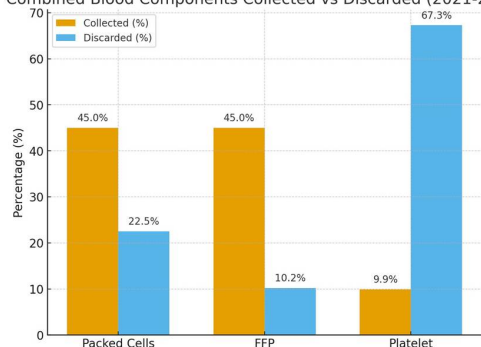
However, as shown in [Fig. 1](#), the discard rate for platelet concentrates was proportionately high at 401 units, out of 767 prepared, accounting for more than half of the total collected. In contrast, PRBCs and FFP had lower discard rates of 134 and 61 units respectively, over these four years. These findings highlight the need for improved inventory and storage practices, particularly for platelet products, to reduce avoidable wastage and enhance blood bank efficiency.



Table 1: Year-wise distribution of blood/components collected/prepared

Year	Packed cells (PC)	Fresh frozen plasma (FFP)	Platelet concentrate	Total
2021	764 (43.7%)	764 (43.7%)	219 (12.6%)	1747 (100%)
2022	1009 (45.4%)	1009 (45.4%)	206 (9.3%)	2224 (100%)
2023	860 (44.7%)	860 (44.7%)	201 (10.4%)	1922 (100%)
2024	863 (46.1%)	863 (46.1%)	141 (7.5%)	1872 (100%)
Total	3496 (45%)	3496 (45%)	767 (9.9%)	7765 (100%)

Combined Blood Components Collected vs Discarded (2021-2024)

**Fig. 1: Comparison of collected and discarded blood components**

As presented in Table 2, a total of 596 blood components were discarded between January 2021 and December 2024. The highest wastage was observed in platelet concentrates, with 401 units discarded, followed by 134 units of packed red blood cells and 61 units of fresh frozen plasma. This distribution highlights a critical area for intervention, particularly in the management of platelet inventory, given their limited shelf life and high discard rate. Strengthening storage protocols and improving demand prediction may help minimize such losses in the future.

An analysis of the reasons for discarded blood components revealed that date of expiry was the leading cause for discarding, accounting for 460 units. Among seropositive cases as shown in Table 3, hepatitis B surface antigen (HBsAg) was positive in 4 units, HIV in 2 units, hepatitis C virus (HCV) in 1 unit, and VDRL reactivity in 9 units. Malaria was not identified.

Table 2: Blood components discarded year wise

Blood components discarded				
Year	Packed red cells	Fresh frozen plasma	Platelet concentrate	Total
2021	45 (24.5%)	5 (2.7%)	133 (72.7%)	183 (100%)
2022	31 (23.1%)	21 (15.7%)	82 (63.4%)	134 (100%)
2023	46 (28.0%)	20 (12.2%)	98 (59.7%)	164 (100%)
2024	12 (10.4%)	15 (13.0%)	88 (76.5%)	115 (100%)
Total	134 (22.5%)	61 (10.2%)	401 (67.3%)	596 (100%)

Table 3: Seropositivity in blood components discarded year wise

Year	Hepatitis B	Hepatitis C	HIV	Malaria	VDRL	Total
2021	1	0	0	0	4	5
2022	2	0	1	0	2	5
2023	0	0	1	0	2	3
2024	1	1	0	0	1	3
Total	4	1	2	0	9	16

Non-serological causes as shown in Table 4, included broken and leaking blood bags (34 units), insufficient collection volume (31 units) and hemolysis (1 unit). This data highlights the need for stricter adherence to blood handling protocols and optimized inventory management to minimize preventable wastage.

Table 4: Other causes for discarding blood components year wise

Year	Less collection	Breakage	Hemolysis	Total
2021	2	4	0	6
2022	9	13	1	23
2023	14	4	0	18
2024	6	13	0	19
Total	31	34	1	66

DISCUSSION

The present study, conducted at the blood centre of a tertiary care hospital in coastal Karnataka of South India, evaluated the utilization and wastage of blood and blood components between January 2021 and December 2024. Out of a total of 7,765 units collected, 596 units (7.7%) were discarded. Component-wise, platelet concentrates accounted for the highest number of discarded units (401 units; 67.3%), followed by packed red cells (134 units; 22.5%) and FFP (61 units; 10.2%). This trend reflects the challenge of managing short-shelf-life products like platelets, especially in centers with fluctuating demand and unpredictable emergencies.

The most common cause of discard was date of expiry of blood component, which alone contributed to 460 of the 596 discarded units (81.4%). Expiry is particularly prevalent in platelet concentrates due to their short 5-day shelf life, and this was evident in our study as well – platelet discarded units (401 units; 67.3%). This finding is consistent with other Indian studies ³. Mathur *et al.*, reported that 91.6% of discarded components were platelets, mostly due to date of expiry ⁷. Agarwal *et al.*, in Western Uttar Pradesh found that 38.4% of platelet units were discarded due to expiry ⁸. Joshi *et al.*, in South Gujarat noted platelet expiry as the leading discard cause (27.4%) ⁹. And another South Indian study by Radhika *et al.*, reported 74.6% of all discards were due to date expiration ¹⁰.

Various solutions to tackle this problem of expiry of platelet concentrates are proposed by many authors, namely using additive solutions for platelet preservation, cryopreservation techniques and specially designed storage bag ³.

Other significant causes of discard in our study included bag breakage/leakage (34 units), insufficient collection volume (31 units) and seropositivity for infections (16 units). Among the seropositive discards, HBsAg accounted for 4 units, VDRL for 9, HIV for 2 and HCV for 1. There were no discards for malaria positivity in this study period. These findings reinforce the importance of not only biological screening but also quality control during collection and storage ¹¹.

Blood wastage rates range is reported from 0.1% to 25% in various national and international studies. The discard rate of 7.68 % in this study is relatively lower than that reported in some earlier Indian studies, where rates ranged from 9% to 17%, especially some blood centres with limited cold storage or with logistics problems for redistribution. The lower rate in our present study could reflect improvements in inventory management, demand forecasting and clinical coordination.

It should be emphasized that, in our blood centre, we started using Saline Adenine Glucose Mannitol (SAGM) blood bags from April 2023 which has increased the shelf life of packed cells particularly upto 42 days, thereby increasing usage and decreasing wastage. However, a significant portion might still be avoidable; particularly those discarded due to technical issues such as breakage and due to under-collection. Continuous training of phlebotomy staff, use of more sophisticated automated component separators and centralized transfusion management systems might help reduce these losses further.

CONCLUSION

In conclusion, the blood component discard rate at our center is better than some prior benchmarks. Emphasis on real-time tracking, efficient utilization, and donor scheduling can significantly enhance transfusion practices. Future interventions should focus on strengthening demand-supply prediction models and adopting national policies for blood inventory sharing between centers ¹².

Blood is a vital therapeutic resource, and every unit collected carries the potential to save a life. This study highlights that although the overall discard rate was relatively low at 7.68%, a significant portion of the discarded blood components were lost due to causes like expiry (especially platelets), bag leakage and under-collection. These findings reflect similar challenges documented in various Indian settings, underscoring the need for improved inventory control and technical precision ¹². Strengthening key areas such as real-time demand forecasting, staff training in their technical skills and better interdepartmental coordination might further reduce wastage. Ultimately, adopting proactive transfusion practices not only enhances efficiency but also upholds the ethical responsibility to preserve the integrity of every donated unit of blood ⁷, so that it is used appropriately without being wasted.

DISCLOSURE

Acknowledgement

Authors gracefully acknowledge the support given by the Institutional management, particularly, Dean of the Institution, Medical Superintendent and the Head of the Department of Pathology and all Blood Centre Staff for conducting the study.

Funding: None.

Conflict of interest: None.

References



1. National Blood Transfusion Council. Standards for Blood Banks and Blood Transfusion Services 2nd Ed. New Delhi: Ministry of Health and Family Welfare, Government of India; 2007.
<https://naco.gov.in/sites/default/files/Standards%20for%20Blood%20Banks%20and%20Blood%20Transfusion%20Services.pdf>
2. Government of India. The Drugs and Cosmetics Act, 1940 and Rules, 1945 (as amended), New Delhi: Ministry of Health and Family Welfare. 2016; .
3. Jairajpuri ZS, Sehgal S, Khetrpal 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 Journal of Health Allied Sciences*. 2022; 21 (2) :1-5 .
4. Simon K, Ambroise MM, Ramdas A. Analysis of blood and blood components wastage in a tertiary care hospital in South India. *Journal of Current Research in Scientific Medicine*. 2020; 6 (1) :39 . Available from: https://doi.org/10.4103/jcrsm.jcrsm_9_20
5. Kori S, Yadav YR, Banerjee S, Bari V. Analysis of the total wastage of blood bags and various blood components in a blood bank of a tertiary care hospital. *International Journal Of Community Medicine And Public Health*. 2024; 11 (2) :904-907 . Available from: <https://doi.org/10.18203/2394-6040.ijcmph20240285>
6. Kumar A, Sharma SM, Ingle 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. *International Journal of Medicine and Public Health*. 2014; 4 (1) :72 . Available from: <https://doi.org/10.4103/2230-8598.127161>
7. Mathur A, Tiwari AK, Kakkar N, Choudhary RK. Pattern of discards of blood and blood components in a tertiary care hospital, *International Journal of Research in Medical Sciences* 2023; 11(4):1023–7
8. Agarwal P, Kumar S, Pandey A, Agarwal A. Study of discard of blood and blood components in a tertiary care hospital in Western Uttar Pradesh, *International Journal of Research in Medical Sciences*. 2023; 11(2):502–5
9. Joshi R, Nair S. Analysis of blood component wastage in a tertiary care hospital of South Gujarat. *National Journal of Community Medicine*. 2015; 6 (1):137–40
10. Radhika B, Ramesh T, Sandhya P: A retrospective study on the reasons for discarding blood and its components at a tertiary care center , *Annals of Pathology & Laboratory Medicine*. 2021; 8(5):C37–C41
11. Shivaraj NS. Blood unit discards due to transfusion-transmitted infections at a tertiary care center in North Karnataka: A five-year retrospective study. *Journal of Laboratory Physicians* 2023; 15(1):58-62
12. Kumari S, Jain R, Tiwari A. A study on discard of blood and blood components in government blood bank: Problems and solutions, *International Journal of Medical and Public Health*. 2020;10(1):10-14

