

# Analysis of Causes of Discarding Blood and its Components in a Blood Bank: A Cross-sectional study.

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## ABSTRACT

**Abstract:** In a developing country such as India, each unit of blood/blood component should be considered indispensable and be used judiciously to avert misuse and wastage. Hence, proper utilisation of blood is crucial. This study aims to identify the lacunae in procedures and protocols in blood banks and ascertain measures to minimize wastage of precious blood and blood components. A cross-sectional study was conducted in a regional blood bank in Western Maharashtra over a time duration of 4 years. Highest discard was seen in Random donor platelet unit (46.5%), followed by whole blood units (23.1%) and packed cell volume (3.1%). Expiry was the main reason or discard in PCV (59.9%), RDP (97.2%), and SDP (100%). TTIs were the most common cause of discarding blood unit in FFP (77.3%) and WB (82.6%). The findings of this study emphasize on the need for strict adherence to Standard Operating Protocols (SOP) and donor selection criteria, meticulous history taking, thorough counselling and exhaustive record keeping.

**Key words:** Blood, Component, Discard, TTI.

## Introduction

An efficiently functioning blood bank unit forms the cornerstone of any hospital-based surgical unit and contributes vastly to patient care and adequacy of other services rendered out to the public in general.<sup>1</sup> Thus, quality and safety of blood components, their usage, supply and disposal constitute an imperative part of its smooth running. In a developing country such as India, each unit of blood/blood component should be

considered indispensable and be used judiciously to avert misuse and wastage. Some Western studies estimate the wastage of blood and their components in hospitals to be varying between 0-6.7%.<sup>2-3</sup> However due to a dearth of similar data for the Indian scenario, the degree, nature and reasons for wastage have largely gone unnoticed. This study aims to identify the lacunae in procedures and protocols in blood banks, and thus will help us make amends in patient management, improve economic competence and ascertain measures to minimize wastage of precious blood and blood components.

**Materials and Methods:** A cross-sectional study was conducted in a regional blood bank in Western Maharashtra over a time duration of 4 years, from January 2017 to December 2020. Electronic data was mined from records stored with the blood bank. Blood collection was carried out from donors who satisfied the WHO criteria for donor selection.<sup>4</sup> The donors accepted were voluntary donors. Medical history and clinical examination were done by the Medical Officer. Blood collected was further screened for Transfusion Transmitted Infections (TTIs) like HIV-1 & 2, Hepatitis B, Hepatitis C, Syphilis and Malaria. Blood was also screened for irregular antibodies. Any blood bag which tested positive for the above TTIs and irregular antibody was discarded. Blood bags were also discarded for low quantity of collected blood, passing their expiration date, change in physical qualities of blood such as presence of turbidity, signs of haemolysis, clotting of blood and leakage of blood bags. Discard rate of the blood bags was calculated as

the percentage of blood bags discarded of collected blood bags = (Total number of blood units discarded/Total number of blood units collected) × 100. Data was analysed in MS Excel sheet.

**Results:** A total of 27663 blood bags were collected during the study period. Of these, 27312 were Packed Cell (PCV), 9975 were Random Donor Platelet (RDP), 27126 were Free Frozen Plasma (FFP), 343 were Single Donor Platelet (SDP) units and 199 were Whole Blood (WB) packs. Out of these, 858 Packed cell, 4636 Random Donor Platelet, 405 Fresh Frozen Plasma, 1 SDP and 46 whole blood were discarded. Highest discard was seen in Random donor platelet unit (46.5%), followed by whole blood

units (23.1%) and packed cell volume (3.1%). The Table 1 shows the discard rates by type of blood unit. Discard rates of blood and their components according to their cause has been tabulated in Table 2. In this study, no components were discarded due to low quantity. Expiry was the main reason or discard in PCV (59.9%), RDP (97.2%), and SDP (100%). TTIs were the most common cause of discarding blood unit in FFP (77.3%) and WB (82.6%) and were the second most common reason or discard in PCV (36.6%), and RDP (2.2%). About 20.5% FFP and 4.3% WB were discarded due reasons other than TTIs, low quantity, expiry, and haemolysis.

Table 1. Discard rate of Whole blood and Components.

Type of Blood unit	Total blood units (N)	Discarded units (n)	Discard rate (N/n%)
Packed Cell	27312	858	3.1%
Random Donor Platelets	9975	4636	46.5%
Fresh Frozen Plasma	27126	405	1.5%
Single Donor Platelet	343	1	0.3%
Whole Blood	199	46	23.1%

Table 2. Distribution of reasons for discard by type of blood component.

Reason for discard	PCV		RDP		FFP		SDP		WB	
	n	%	n	%	n	%	n	%	n	%
TTIs	314	36.6	104	2.2	313	77.3	0	0	38	82.6
Low-quantity	0	0	0	0	0	0	0	0	0	0
Expired	514	59.9	4505	97.2	8	2	1	100	6	13
Hameolysed	9	1	24	0.5	1	0.2	0	0	0	0
Other	21	2.4	3	0.06	83	20.5	0	0	2	4.3

Table 3. Review of discard rates in different studies.

Study	Total components	Discard	Discard rate
Mahapatra et al (2018)	78929	1264	1.6%
Kanani et al (2017)	66255	4604	6.95%
Suresh et al (2015)	24847	1747	7%
Morish et al (2012)	390634	8968	2.3%
Present study	64955	5946	9.15%

**Discussion:**

Blood is a vital commodity which makes blood bank an essential part of the health care system. The requirements of blood and its components have been steadily increasing with improved patient care, diagnosis and newer treatment modalities. Hence, proper utilisation of blood is crucial. This study helps us understand the factors governing blood bank management. Our study showed that on an average 9.15% (5946/64955) of blood and its components were discarded. Average discard rate in other studies like by Kumari et al.,<sup>5</sup> was 22.8%, Mukherjee et al.,<sup>6</sup> was 3.76%, Mahapatra et al.,<sup>7</sup> was 1.6%, Kanani et al.,<sup>8</sup> was 6.95% and Suresh et al.,<sup>9</sup> was 7%.

The major cause of discard in these studies, other than Kanani et al., was due to TTIs, which was different from our study where the major cause of discard of blood and their components was due to expiry, which was 7.7% (5034/64955), followed by TTIs which was 1.1% (731/64955). Total component collection with total number of discard and discard rates have been tabulated in Table 3. Our study also noted that the discard rate of whole blood was 23.11% (46/199) which was higher than that seen in the studies of Mukherjee et al.<sup>6</sup> (3.76%), Kanani et al.,<sup>8</sup> (3.15%), Mahapatra et al.,<sup>7</sup> (1.75%) and Suresh et al.,<sup>9</sup> (5.7%). The most common cause of discard in whole blood was low quantity of blood collected (38/199). The major reason were phlebotomy failure and donor anxiety along with perspiration and fainting. This can be resolved by ascertaining the donor's motivation and compliance. Other causes for discard of whole blood in our study were passing of expiry date (6/199) and leakage from blood bags (2/199).

Discard rate of Packed cells was 3.14% (858/27312) which was similar to other studies conducted in India such as Kumari et al.,<sup>5</sup> (10.2%), Kanani et al.,<sup>8</sup> (2.26%), Mahapatra et al.,<sup>7</sup> (1.35%), Suresh et al.,<sup>9</sup> (3.3%) and Kumar et al.,<sup>10</sup> (2.78). The most common reason was discarding in this aspect was passing of expiration date (514/27312). The most sizable portion of these discarded units was a direct consequence of the Covid-19 pandemic and the extended lockdown that followed. Disposal of RDP stood at 46.47% (4636/9975) which was similar to other studies conducted in India: Kumari et al., (69.45%)<sup>5</sup>, Kanani et al.,<sup>8</sup> (28.39%), Mahapatra et al.,<sup>7</sup> (1.76%), Suresh et al.,<sup>9</sup> (16.3%) and Kumar et al.,<sup>10</sup> (37.11%). The major reason for discard in our study and other studies where due to passing expiration date. This was because of a low shelflife and unpredictable demand. Discard rate of FFP was 1.49% (405/27126) which was again similar to other studies like Kumari et al.,<sup>5</sup> (10.66%), Kanani et al.,<sup>8</sup> (5.36%), Mahapatra et al.,<sup>7</sup> (1.49%), Suresh et al.,<sup>9</sup> (5.5%) and Kumar et al.,<sup>10</sup> (7.25%). The major reason for discard was TTIs. TTIs can be reduced by proper history taking and clinical examination during donor selection. Discard rate of SDP was 0.29% (1/343) which was similar to Morish et al.,<sup>11</sup> where it same 0.29%. Reason for

discard of the SDP was passing of expiration date. This was due to low shelf life of SDP which should be utilized within 5 days of collection.

**Conclusion:**

The findings of this study emphasize on the need for strict adherence to Standard Operating Protocols (SOP) and donor selection criteria, meticulous history taking, thorough counselling and exhaustive record keeping which can help recognise TTIs positive donors and suspected professional donors who may have been screened in the past. To minimise the discard rate, apart from the aforementioned measures, appropriate scheduling of blood donation camps as per the availability of blood units should be carried out. Lending of excessive blood components to blood banks of regions with low blood collection will also help in utilization of excessive stores and minimizing wastage. Managing a blood group wise segregated data of voluntary donors can help reach out to them when required. Additionally, to alleviate the number of professional donors and hence curtail the risk of TTI positivity in blood units, we should persuade, educate and create awareness among voluntary donors to donate periodically. Competent handling of blood units and rigorous storage measures will help counter haemolysis, clotting and contamination. Robust training, technical knowhow, and proficiency in phlebotomy, preparation of components will help curtail suboptimal volume collection. Lastly internal quality assurance, self-checks and regular audits are key factors that will help sustained management and rationalization of blood and its components and aid in introducing checks wherever necessary.

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