

## Original Research Article

# Analysis of the total wastage of blood bags and various blood components in a blood bank of a tertiary care hospital

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## ABSTRACT

**Background:** Majority of the medical and surgical emergency procedures being dependent on Blood and blood components, it has played a vital role in patient management. This enlightens the importance and need of proper utilization of blood and its components by ensuring minimal wastage. Aim was to determine the percentage of blood and blood component wastage in a blood bank of a tertiary care hospital.

**Methods:** A retrospective study of donors from January 2015 to December 2020 was done in a blood bank of a tertiary care hospital located in western Maharashtra.

**Results:** Out of the total blood bags collected, 411 (2.8%) blood bag units were discarded due to seropositivity, 373 whole blood bags and 2588 platelet bags had to be discarded. The most common reason for discard of platelet bags were due to expiry; 1789 FFP (fresh frozen plasma) bags, 131 bags of PRBC (packed red blood cells), 85 bags of plasma and 235 cryoprecipitate bags were discarded due to various reasons.

**Conclusions:** Blood being an irreplaceable and important resource, needs to be properly utilized and ideally zero percent wastage should be encouraged. Training programmes for doctors on usage of blood / blood components is highly recommended.

**Keywords:** Blood, Blood components, Expiry, Seropositivity, Wastage

## INTRODUCTION

In this era of modern medicine, blood and blood components have been playing a vital role in patient management.<sup>1</sup> Majority of the medical and surgical emergency procedures depend on the Blood Transfusion Services (BTS).<sup>2</sup> A well-organized and efficient BTS would contribute toward better patients care and contribute toward the development of healthcare in the country.<sup>3</sup> There are multiple factors that contribute to shortfall in provision of blood including deficient donor recruitment, poor stock management and transportation.<sup>2</sup> This highlights the need for appropriate utilization of blood and its components.<sup>4,6</sup>

Common factors leading to wastage of blood products are broken bag, broken seal, expired units, clotted blood or miscellaneous reasons which is most importantly due to lack of proper knowledge and awareness.<sup>3</sup> Blood wastage is a worldwide economic and ethical problem, ranging between zero and 6%.<sup>7</sup> Only around 100 countries in the World, have and follow national guidelines for clinical use of blood and blood products.<sup>5</sup> The rate of discarded blood components or “wastage rate” is one of the indicators which has been listed third among the ten quality indicators recommended by National Accreditation Board for Hospitals and Health Care providers.<sup>8</sup>

The objectives of this study were to determine the percentage of blood and blood component wastage, to identify the various causes leading to its discard.

## METHODS

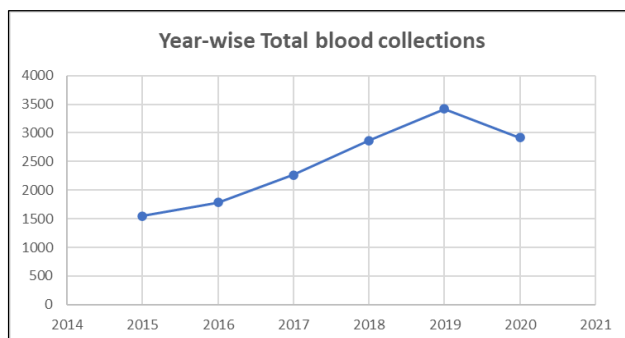
A retrospective study was conducted involving the analyses of discarded blood bags and blood components data in a blood bank of a tertiary care hospital located in Western Maharashtra. Data was collected after obtaining permission from the Blood bank and ethical clearance before the study, respectively. The data of donors from January 2015 to December 2020 was taken from the records of blood bank. Voluntary and replacement donors, whose blood was not discarded, were excluded from the study.

The present study includes blood units discarded for reasons, which include transfusion transmitted infection (TTI) positivity, expired, suboptimal volume, leakage, clotted, haemolyzed, contamination of RBCs, not utilize after issue, lipemic and icteric blood units discarded during the study period.

Data collection and analysis was done through Microsoft Excel spreadsheet (Microsoft Corporation, Redmond, WA, USA).

## RESULTS

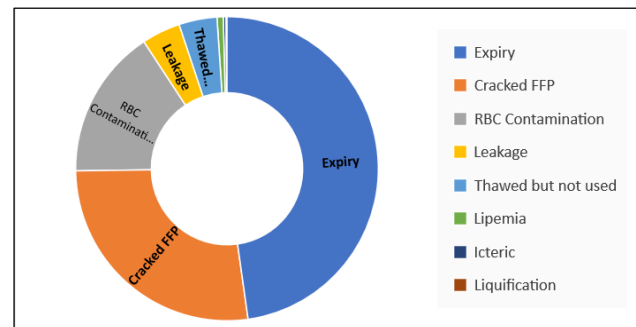
Total number of blood bags collected (from both voluntary and replacement donors) from January 2015 to December 2020, were 14799 blood bags and maximum donations were in the year of 2019, as seen in the Figure-1. The overall discard rate of blood and blood components was 27.9% (5628/ 20139).



**Figure 1: Year-wise total blood collection.**

Out of the total blood bags collected, 411 (2.8%) blood bag units were discarded due to seropositivity and 16 blood bags had low quantity, and thus discarded. A low rate of seropositivity was seen in the collected blood bags as the donors are already screened for known seropositivity by proper history taking before donating blood. Hepatitis B surface antigen (HBsAg) positivity (256 blood bags) was the most prevalent cause of blood bag disposal due to seropositivity, followed by Hepatitis

C virus (HCV) (72 bloods bags), human immunodeficiency viruses (HIV) (63 blood bags) and lastly followed by venereal disease research laboratory (VDRL) (16 blood bags).



**Figure 2: Reason for FFP bag discard.**

Out of the remaining 14372 blood bags, 5968 blood bags were preserved as whole blood. Three hundred and seventy-three (6.25%) whole blood bags had to be discarded due to various reasons, ranging from discard due to expiry of 331 (88.74%) whole blood bags, followed by, discard due to clotting of 42 (11.26%) whole blood bags. The remaining 7934 blood bags, collected in triple bag or quadruple blood bags were segregated into platelets, fresh frozen plasma (FFP) and PRBC (packed red blood cells) according to the guidelines published by Ministry of Family welfare, Government of India.<sup>9</sup>

Out of the 5411 segregated platelet bags, 2588 (47.8%) platelet bags had to be discarded. Being the most prevalent and unavoidable situation, expiry of platelet bags consisted of 2571 (99.34%) unused, expired bags. The rest 17 platelet bags were discarded due to RBC contamination. Total 1789 FFP bags were discarded during the study period. The maximum discard of FFP bags were seen in the year 2018 (575 discarded FFP bags) and 2019 (529 discarded FFP bags). FFP bag disposal consisted of a spectrum of reasons for discard, the most common being expiry of FFP bags (47.8%), followed by cracked FFP (27.1%), RBC contamination of FFP bags (16%) and followed by leakage (4.14%), thawed but not used (4.08%) and various other reasons (0.88%) (Figure 2).

Only 131 bags of PRBC and 85 bags of plasma were discarded, the main reasons of discard being expiry of the PRBC (74.8%) followed by cryo-poor plasma (98%). The other causes of PRBC discard were polycythaemia and ictericity. Two hundred and thirtyfive cryoprecipitate bags that were discarded, out of which 150 (63.8%) bags were disposed due to expiry.

## DISCUSSION

Discarding of collected blood units is an important cause of wastage of precious resources in a transfusion centre.

Indian blood bankers have been paying relatively less attention to these facts.<sup>11</sup>

This study aimed to determine the various causes for discard of blood and blood components discarded so that this can help in formulating new guidelines for processing and storage of blood and blood components. The overall discard rate of blood and blood components in our study area was 27.9% (5628/ 20139), which was very high as compared to other studies. Out of the total blood bag units collected, 800 blood bags were discarded due to reasons like seropositivity, expiry, low quantity and clotting. The findings show noticeable and urgent need of change of protocol of storage and handling of the blood. In a study from South India, calculated discard rate was 5.7% of total 5261 units collected, a large amount of which was related to seropositivity (49%) and only one-third of the discarded bag was due to expiry.<sup>13</sup> A Regional Blood Transfusion Centre in Western India, reported their discard of blood and blood components due to positive infectious disease serology varied between 202 and 360 bags/year.<sup>12</sup> Before collection of blood in camps or in blood bank of our study setup, detailed history of the previous blood donations and known illnesses is taken. This is done with the help of a questionnaire which was developed by research team in consultation with blood bank officer and pathologists of the tertiary care hospital. The low seropositivity rate seen in our study, highlights the success of detailed history taking by trained personnel.

Our study showed 2571 (99.34%) platelet bags out of total 2588 discarded platelet bags, were discarded due to expiry. Forty seven percent of FFP, 74.8% of PRBC and 63.8% of cryoprecipitates were also discarded due to their expiry. This can be prevented through continuous monitoring and proper implementation of First In First Out (FIFO) policy with maintaining stock inventory on a regular basis. A record-based study of voluntary blood donors, conducted for 4 months, stated main reason for overall whole blood and components discard as non-utilization and expiry 41.9% (165/393).<sup>14</sup> Similar findings were also seen in studies conducted by Ishaan Arora, Jariwala et al and Chavan.<sup>5,12,15</sup>

The most important reason for discarded of FFP in National blood centre, Kuala Lumpur, was lipemia (44%).<sup>3</sup> In this study, the most common components with various reasons of discard were platelets.<sup>11,16</sup>

This study was limited to record-based data from a single blood bank. COVID-19 pandemic had hit India in the month of March 2020, which resulted in decreased number of blood camps and blood donors during the whole year. The hospital admissions had decreased as the hospital was converted to COVID Care Hospital, due to which there was decreased demand of blood and blood components thereby leading to expiry of blood and blood components.

## CONCLUSION

Blood being an irreplaceable and important resource, needs to be properly utilized and ideally zero percent wastage should be encouraged. The most common cause for discard of blood and blood components were identified to be non-utilization and expiry of blood and blood components. Training programmes for doctors on usage of blood/blood components is highly recommended. Proper maintenance of records, following FIFO method and a proper donor selection and deferral guidelines will help in better utilization of the blood bags. The blood bank needs to put in enormous efforts to collect enough safe blood from voluntary, non-remunerated, healthy, and low-risk donors.

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