

ANALYSIS OF DISCARDING OF BLOOD AND IT'S COMPONENTS IN BLOOD CENTRES IN WESTERN MAHARASHTRA

Pathology

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ABSTRACT

Introduction: Blood transfusion is essential to healthcare as there is no blood substitute available till date. Thus, each unit must be used in a proper and judicious manner. With rise in demand minimizing blood wastage is crucial. This study analyses the causes of discarding of blood and its components in Western Maharashtra. **Material and Methods:** It is a retrospective study carried out over a period of one year (2024) at blood centre in Solapur District in Western Maharashtra. The data was collected and analysed. **Results:** Among 1,59,941 total units of blood and its components, 27,224 (17.02%) units were discarded. The main cause for discarding was expired shelf life for 5.61% (8978) followed by leakage 2.25% (3602) and transfusion-transmitted infections 1.80% (2890). Out of 2890 blood units of seropositivity, hepatitis B surface antigen (HBsAg) positivity 1781 (1.11%) was the most common cause for discarding the blood units followed by positive for syphilis in 471 (0.29%), HCV in 418 (0.26%) and HIV in 220 (0.14%) respectively. None of the blood units positive for malarial parasite. **Conclusion:** To minimize blood discard and wastage, strict donor selection as per WHO guidelines, along with trained phlebotomists and well-coordinated blood centre staff, is essential. Pre-donation counselling, proper screening, and notification of deferred donors help to reduce transfusion transmitted disease positive units. Continuous staff training, effective clinician-blood centre coordination, adherence to transfusion policies will reduce the overall discard rate of blood units.

KEYWORDS

Blood And It's Component, Blood Donors, Discard Rate, Transfusion Transmitted Infections (ttis).

INTRODUCTION

Blood transfusion is an essential component of modern healthcare system and plays a vital role in saving lives.^{1,2,3,4,5,6} As there is no substitute for human blood, every unit must be carefully screened, tested, and used judiciously to prevent transfusion-transmitted infections such as HIV, HBV, HCV, syphilis, and malaria.^{5,7,8,9,10} Blood transfusion services are responsible for ensuring a safe, adequate, and effective supply of whole blood and its components, including PCV, FFP, platelets, and cryoprecipitates.⁹

With increasing demand and limited availability especially in India, where supply often falls short rational use and minimal wastage are crucial.¹¹ Blood, classified as a drug under the Drugs and Cosmetics Act (1940), requires proper collection, storage, and utilization.^{12,13} As per WHO, the poor management, poor storage and transportation are the most common reasons of blood components wastage.^{9,14} The other factors like shelf-life expiry, quality control issues, sero-positivity also lead to blood components discard.^{9,15} In the present study transfusion-transmitted infections, leakage, shelf-life expiry were the reasons of blood and blood components discard. The multistep approach is needed to minimize the blood components wastage. The areas of donor management, blood storage, blood transportation, communication between blood bank staff and hospital staff, seminars for rational use of blood etc. are needed to achieve minimum discard of blood components.

AIM AND OBJECTIVES

- 1) To analyse different reasons of discarding of blood and its components.
- 2) To determine rate of transfusion-transmitted infections in blood donors at blood centres.

METHODS

This retrospective analytical study was conducted from January to December 2024 at Blood Centre, Chhatrapati Shivaji Maharaj Sarvopchar Hospital. Blood was collected from voluntary donors (in-house and outdoor camps) and screened as per the Drugs and Cosmetics Act and National AIDS Control Organization (NACO) guidelines.

Blood components- packed red cells, fresh frozen plasma, and platelets

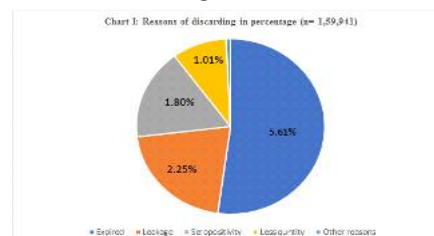
were prepared under aseptic conditions following Food and Drug Administration (FDA) guidelines. All units were tested for transfusion-transmitted infections. 3rd generation ELISA for HBsAg, HCV, 4th generation ELISA for HIV and RPR for syphilis were used for testing. Confirmed positive blood units were discarded, and donors were counselled. Peripheral smear for malaria was done. Data of total collection of blood units, discard of blood units was collected from all blood centres in Solapur district. The data was analysed. Statistical tests were applied wherever necessary.

RESULTS AND DISCUSSION

Blood transfusion is a potential lifesaving procedure. Wastage of blood and its components is an alarming issue. Blood discard rate is an important quality indicator as per World Health Organization (WHO) guidelines. Proper blood bank management, donor screening, staff training, FIFO policy, audits, and appropriate storage practices help to reduce blood component wastage.

This retrospective analytical study was conducted from January to December 2024 in 2024 at Blood Centre, Chhatrapati Shivaji Maharaj Sarvopchar Hospital. Data from other blood centres in Solapur district was collected and analysed. Total 1,59,941 blood units were collected in Solapur District during the study period of one year with male predominance.

Chart 1: Reasons of discarding



The number of blood bags discarded during the study period was 27,224 (17.02%) out of 1,59,941 blood bags collected. It was higher as compared to studies done by Kora SA et al¹⁶, (4.48%), Jariwala K et al¹⁷ (6.59%), Bashir F et al¹¹ (8.87%), Hayer SS et al¹³ (26.6%). The various

reasons of discarding of blood units with percentage were shown in chart no. 1. The chart depicts most common cause for discard of blood component was the expiry of date, accounting for 5.61% (8978) of total discarded bags. Leakage was the second reason, accounting for 2.25% (3602) of total discarded bags. Seropositivity for transfusion-transmitted infections (TTIs) was the third most common cause of discarding blood components, accounting for 1.80% (2890) of all discarded bags, followed by less quantity accounting for 1.01% (1608) and other reasons like haemolysis, or discoloration of plasma, which accounted for 0.08% (120) of all discarded bags.

Table 1: Distribution of discarded whole blood/blood components according to the causes other than transfusion-transmitted infections

Components	Expiry	Leakage	LQ	Other	Total
Whole blood	117	-	10	-	127
PCV	3672	602	798	115	5187
FFP	5	3000	800	5	3810
Platelets	5184	-	-	-	5184
Total	8978	3602	1608	120	14308

LQ- Less quantity, WB: Whole blood, PRBC-Platelet rich blood cells, FFP- Fresh frozen plasma.

The shelf life of platelets is only 5 days, Packed cell volume (PCV) 35 days, whole blood 35 days, Fresh Frozen Plasma (FFP) one year. So, due to short shelf life of platelets, their wastage rate was high (3.24%) in the present study. It was similar to study conducted in north Karnataka by Kulkarni KR et al¹⁰ (45.03%) and by Hessah A et al¹⁸ (52.67%). Wastage of platelets is minimised by optimal preparation according to the clinical requirement. Also blood centre should arrange the blood units of near expiry in front shelves of refrigerators according to component storage temperature guidelines.

Seropositivity was seen in 2890 (1.80%) blood units. Out of 2890 units of seropositivity, hepatitis B surface antigen (HBsAg) positivity 1781(1.11%) was the most common cause for discarding the blood bags followed by positive for syphilis in 471(0.29%), HCV in 418 (0.26%) and HIV in 220 (0.14%) respectively. None of the blood units positive for malarial parasite.

Table 2: Comparison of percentage of transfusion transmitted diseases with different studies

Studies	HbsAg	Syphilis	HCV	HIV	Malaria	Total
Gupta et al19(2004)	0.66	0.85	1.09	0.08	-	2.68
Bhawani et al20 (2004-2009)	1.41	0.08	0.84	0.39	-	2.72
Chandra et al21 (2009)	1.96	0.01	0.34	0.23	-	2.54
Jasani et al 22 (2012)	1.35	0.90	0.85	0.25	-	3.35
Patel et al23 (2012)	0.3	0.06	0.09	0.08	-	0.50
Devraj Arya et al24 (2016)	1.60	0.89	0.18	0.10	-	-
Madhumita et al25 (2025)	0.54	1.0	1.14	0.41	0.01	3.1
Present study	1.11	0.29	0.26	0.14	0	1.80

Seroprevalence of HBV in Present study correlates with the Bhawani et al²⁰, Chandra et al²¹, Jasani et al²² and Devraj Arya et al²⁴ study. There is changing trends of HCV and HIV in downward direction which is also seen in Jasani et al²² and Patel et al²³ studies. This is because of stringent screening of blood donors due to which donors with high risk behaviour are eliminated at basic level of pre donation screening and important counselling. Post donation counselling also helps in preventing repeat blood donation by donors who know their seropositivity status. Donors who are anaemic due to poor/inadequate nutrition status, are rejected for blood donation during screening.

According to a published report on the assessment of blood centres in India (2016), the overall prevalence of transfusion transmitted

infections in India was 1.58%, with the prevalence of HBV, HCV, HIV, malaria, and syphilis being 0.87%, 0.34%, 0.14%, 0.06%, and 0.17%, respectively²⁵. However, the present study observed higher prevalence of transfusion transmitted infections (1.80%), with a significantly higher prevalence of HBsAg (1.11%), and syphilis (0.29%) compared to the report. Conversely, a decreased prevalence of HCV (0.26%) and malaria (0%) was observed in present study.

In present study the prevalence of transfusion transmitted infections (1.80%) was lower than other countries like Brazil (4.04%), Pakistan (5.33%), North western Ethiopia (5.43%), Eastern Ethiopia (7.06%), the western region of Saudi Arabia (7.93%), Equatorial New Guinea (18.7%), Burkina Faso (24%) and Mozambique (37.39%)²⁵.

In present study prevalence of transfusion transmitted infections (1.80%) is in concordance with Odisha (1.89%). It was higher than prevalence of transfusion transmitted infections reported in other parts of India, such as Gujarat (0.77%), Telangana (0.96%), Central India (1.43%), and Ranchi (1.59%) but highest prevalence of transfusion transmitted infections in India was observed in Assam (3.1%) and Puducherry (3.13%)²⁵.

The higher prevalence of transfusion transmitted infections observed in the present study can be attributed to several factors, including a lack of public awareness, lack adherence to guidelines and SOPs, inadequate pre-donation counselling, insufficient medical screening to identify high-risk donors, and the use of highly sensitive screening tests. Despite the higher overall prevalence of transfusion transmitted infections, the lower prevalence of HBV in present study compared to most previous studies may be due to community-based awareness campaigns emphasizing the chronic nature of the disease and its transmission.

In present study male donor predominance is seen in seropositivity. All other studies also showed male donor predominance. This is because of the fact that most of the time due to some social limitations and cultural misbeliefs females usually do not come forward for blood donation. Also in developing country like India, large numbers of females are anaemic due to poor nutrition. So, maximum numbers of females are unfit for blood donation.

CONCLUSION

Blood and blood components are non-replaceable lifesaving resources that should be utilized judiciously to minimize wastage. Proper blood transfusion policies, effective coordination between hospital and blood centre staff, careful collection and storage practices, regular training, periodic audits, and inventory management using the First In, First Out policy help reduce avoidable wastage due to expiry, leakage, haemolysis, or inadequate collection.

Strict donor selection and comprehensive screening as per World Health Organization (WHO) guidelines are essential to reduce transfusion-transmitted infections (TTIs). Encouraging regular voluntary blood donation further improves blood safety and optimal utilization of blood components.

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