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Discard Pattern of Blood and Blood Components in Uttarakhand: A Single-Centre Teaching Hospital Based Study.

Tanuja Pangtey[1], Roshan Chaudhary[2], Saloni Upadhyay[3]

[1]Assistant Professor, Department of Pathology, Government Medical College, Haldwani, Uttarakhand.
[2]Senior Resident, Department of Pathology, Government Medical College, Haldwani, Uttarakhand.
[3]Associate Professor, Department of Pathology, Government Medical College, Haldwani, Uttarakhand.

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ABSTRACT

Background: A well developed and functioning blood bank service is the backbone of any medical institute. A proper working system and management is necessary for its smooth functioning. Every unit of blood or its component is a precious commodity and should be treated with careful handling with minimal wastage. There are, however, many units discarded due to various reasons in the audit. The following study tries to explore the causes and pattern of discard of human blood and its component in a tertiary care center. It also tries to discuss various reasons for the discard and the possible steps to minimize the loss. **Methods:** A discard register was kept to record relevant details of every discarded blood or blood product and included key reasons like seropositivity, expiry of blood products, low volume of blood unit, contamination of blood products, leakage of blood unit, clot formation among others. **Results:** Total number of donation during the period May 2018 to April 2019 was 8314 units. Total number of voluntary and replacement donor was 7687 and 627 units out of which 8062 were male and 252 were females. 2028 units (24.3%) were discarded for various causes like seropositivity, low volume, expiry and leakage in case of blood. Expiry, contamination and low volume were key causes for platelet and contamination and leakage for fresh frozen plasma. Low volume, expiry and leakage were among preventable causes while seropositivity demands sophisticated equipments and donor screening to avoid discard rate. **Conclusion:** Blood and blood products are essential and resourceful items which should be carefully handled at various steps whether it is collection, processing, storage, issuing or discard and each step is important for its proper utilization and minimal wastage.

Keywords: Blood Bank, Blood Transfusion, Blood Discard, Blood safety.

INTRODUCTION

Blood transfusion services (BTS) is important to ensure that safe and quality blood product is procured and provided to appropriate donor. Blood collected from non-remunerated, low risk, voluntary donors and procured as precious resource as standard techniques for safe delivery to the donors.[1] Blood discard rate can serve as important quality indicator and is proportion of total number of product discarded against the total collected units. The blood can be discarded following many guidelines like W.H.O (World Health Organization), AABB (American Association of Blood Banks) and BTS (British Transfusion Services, UK).[1-3] Better collection policies coupled with proper utilization of collected resources is critical to match the need for blood and ensure availability of safe blood.[4] There is demand supply mismatch in LMIC (Low and Middle Income Countries) as there is need for area-specific knowledge of contributing factors.[5]

Name & Address of Corresponding Author
Dr. Tanuja Pangtey,
Assistant Professor,
Department of Pathology,
Government Medical College,
Haldwani, Uttarakhand.

Knowledge of discard rates and reasons in a particular region is thus essential to curtail its prevalence by appropriate strategy.

MATERIALS AND METHODS

The current study was conducted to evaluate the discard pattern within a period of May 2018 to April 2019. The discard register maintained included consecutive discarded units of all blood and blood products during the tenure and included relevant details. The key details noted were the type of product, type of bag, its blood group and donor details like age, sex and sero-positivity if any for each discarded unit. The separate tables were made describing discard pattern for each type like whole blood, packed red blood cells (PRBC), platelet and fresh frozen plasma (FFP). The reason for the discard were noted and annotated for each category. All data were recorded in Google docs and Sheets.

RESULTS

Total number of donations during the tenure of the study was 8314 out of which 7687 (92.4%) were voluntary and 627 (7,54%) replacement donors. Males (8062, 96.9%) outnumbered females (252,

3.03%) as donors. Single and quadri-bags were used in 2466 and 5848 instances. Total of discarded units were 2028 units (24.3%).

Whole blood:

Total number of whole blood was 2466 units out of which 164 (6.65%) units of whole blood was discarded. The key reasons for whole blood discard were seropositive whole blood in 77 packs (3.12%), Low volume in 58 (2.35%), expired in 24 (0.97%) and leakage in 5 packs (0.20%) that is shown in tabulated form in the [Table 1].

Packed red blood cells (PRBC):

Total number of PRBC made were 5848 units out of which 308 units were discarded making a total percentage of 5.26% for discarded PRBC. The key reasons for discard were low volume in 2.7 % (158), seropositivity in 2.01% (118), expiry of PRBC in 0.27 % (16), leakage of PRBC in 0.25 % (15) and clot in 0.01 % (01) cases [Table 2].

Overall, the following causes for blood discard were noted and can be summarized as below

A. Pathogenicity-

Total no. of seropositive blood (whole and PRBC) was 195 units out of which discard rate due to causes, in descending order of frequency, were HCV in 1.39 % (116/8314), HBsAg in 0.81% (68/8314), HIV in 0.04 % (4/8314) and VDRL in 0.084 % (7/8314). No malarial antigen positivity was observed during the time period of the study.

B. Expiry, leakage and low volume:

A total of 40 units of blood (whole and PRBC) expired making it 0.48% (40/8314) whereas the discard due to leakage was 20 units with a percentage of 0.24% (20/8314). A total of 216 units were discarded due to low volume of blood accounting for 2.59% of total discard.

Table 1: Pattern and number of whole blood discarded

Discarded Whole blood reasons	Number of units
Low volume	58
Expiry	24
Leakage	05
Clot	0
Seropositivity	
HCV	43
HBsAg	30
HIV	01
Syphillis	03
Total units	164

Table 2: Pattern and number of PRBC discarded

Discarded PRBC reasons	Number of units
Low volume	158
Expiry	16
Leakage	15
Clot	01
Seropositivity	
HCV	73
HBsAg	38
HIV	03
Syphillis	04
Total units	308

Platelet and FFP:

Total units of platelets made were 5000 units out of which 1174 units platelets were discarded (23.48%). The reasons for their discard were expiry in 754 units (15.08%), contamination with RBCs in 402 units were (8.04%) and low volume in18 units (0.36%).

Total units of FFP made were 5000 units out of which a total of 377 units were discarded (7.54%). 179(3.58%) units of FFP were contaminated with RBCs and 198 units were discarded due to leakage of FFP (3.96%) [Table 3].

Table 3: Pattern and number of platelet and FFP discarded

Discarded platelet reasons	Number of units
Expiry	754
Contamination	402
Low volume	18
Total platelet	1174
Discarded FFP reasons	
Leakage	198
Contamination	179
Total units	377

DISCUSSION

The status of blood banks in India requires systemic upgrading and backing by government to ensure quality of service and appropriate monitoring of each processes.[6] In a recent study regarding annual blood discard rate in Kuala Lumpur revealed discard rate of 6%, 3.7%, 2.5% and 2% for platelet, whole blood, FFP and cryoprecipitate respectively. Platelet contamination with RBC was key cause followed by leakage, lipemia and underweight.[7] Another study from an Indian transfusion center spanning 4 years of discard data of whole blood or red cell units showed 6.605 of discard rate of whole or red cell units. Expiry, infection, hemolysis, insufficient collection and leakage were chief causes.[8] A very high (25.4%) of wastage of blood was noted in a study from Guyana highlighting need for educative efforts to staff regarding blood wastage. Expired units were commonest cause of wastage in year-wise distribution data.[9] In another recent work, 9.85% wastage was noted (range 1.93 to 30.7 % among hospitals) related to expired blood and component in a multi-center study from Iran among 12 hospitals.[10] The three common causes cited in the study were expiration, patient's lack of need and non-use in the hospital.

The occult seropositivity to hepatitis B antigen has been a cause of concern in many studies. In one study from central Saudi Arabia, the prevalence of occult infection was to the tune of 0.2% and HBV molecular testing was advocated along with serological assay for screening purposes.[11] In another study from Colombia,1.98% of occult infection was noted.[12] In our study discard rate due to sero-positivity was 2.3% and most of it were due

to Hepatitis C. The sero-prevalence of HIV, HBV, HCV was found to be about 0.39%, 1.41% and 0.84% in an Indian study of 8097 samples. These are important TTIs and warrant all efforts to minimize their transmission. Nucleic acid testing (NAT) has improved the reduction in risk of TTI by shortening the window period thus providing higher sensitivity.[13] The availability of NAT in resource constrained environment makes many blood banks, including our center, devoid of this advantage. Availability of NAT and trained personnel should be a part of healthcare reforms. Hepatitis E is usually not tested in India but is estimated to be potential threat. A small pilot study revealed prevalence of 4.78% in western India.[14] These data highlight updating of screening guidelines. Clots are another problems that may hamper transfusion due to flow problems. Various factors like personnel related, machine and material related and technique related may influence formation of clots.[15] Besides it, no guidelines exist for packed red cells regarding prolonged collection time in contrast to that with platelets and plasma components. However, various preventable causes like improper mixing may be improved by education, monitoring and regular appraisal of functioning of the blood bank. Adequate skin preparation which is beneficial to avoid bacterial contamination for which platelets are prone along with bacterial screening is advocated to decrease burden of contaminated platelets.[16] Low volume, expiry, leakage and clotting are partially amenable to enhanced education and training to blood banking staff about existing guidelines and periodic recent advances. The contamination can be improved through proper skin preparation ahead of venipuncture along with donor screening. The seropositivity in the community requires systemic reforms with multiple players working in tandem.

Before collection a through and proper counseling can reduce the number of transfusion transmitted infection in donors as well as orientation and lectures on voluntary donation can reduce the rate of infection to a maximum extent. Secondly during collection a lot of care should be taken to minimize the low volume blood by proper training of the technical staff and measures taken to reduce the rate of low volume blood as it also adds to financial loss. Thirdly to reduce the expiry of blood and blood products old blood should be issued first and the fresh should be issued according to the date of collection which can reduce the non-utilization of blood products and maximum utilization of blood products can occur.

CONCLUSION

Blood and blood products are essential and resourceful items which should be carefully handled at various steps whether it is collection, processing, storage, issuing or discard and each step is important for its proper utilization and minimal wastage.

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