

**Original Research Article****Analysis of Reasons for Discarding whole blood in a blood bank of District hospital of Himachal Pradesh: A Five Year Retrospective Study**

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District Hospital, Solan, Himachal Pradesh, India**Abstract**

Background: Blood is the most common organ donation that can be done by an ordinary healthy person. It plays an important role in saving human life. Since there is no blood substitute available till date, blood so collected during voluntary (blood donation camps) and replacement donations, should be used in a proper and judicious manner. The aim of all the blood banks should be to have discarded rate/wastage of zero or to keep it to a minimum level.

Aim: The aim of the present study was to know about the causes of blood wastage, calculate the discard rate and to plan or formulate the strategy to reduce the wastage of blood at the district hospital.

Materials and Methods: It is a retrospective study carried out over a period of 5 years (1st January 2015 to 31st 2019) at a blood bank in a district hospital of Himachal Pradesh. The data was collected and analysed.

Results: A total of 7306 units of blood were collected over the period of 5 years with 6824 (93.3%) units through voluntary donations and majority (n=6911, 94.6%) of them being males. One hundred and two (1.39%) units of blood were discarded due to the various reasons with seropositivity for transfusion transmitted infection (TTIs) (70.6%) being the most common. Under collection (20.5%), expiry date (4.6%) lipemia plasma, hemolysis of blood and blood clots in the bag were the other rare causes for discarding blood.

Conclusion: To reduce the discard rate and have minimal wastage of blood, it is important to do proper and strict donor selection as per the WHO guidelines and to have trained phlebotomists, experienced and motivated staff in the blood bank. There should be proper coordination between the clinicians and the blood bank staff.

Keywords: Transmission transmitted infection (TTIs), blood donors, seropositivity, discard rate.

Introduction

Since there are no substitutes for human blood till date, every drop blood and its components are of incalculable value in saving human life.^{1,2} In our country, where blood is required every 2 seconds its supply tends to fall too short of its demand.^{3,4} Every third patient admitted in the intensive care unit requires blood transfusion at one time or the other.⁵ It is very important to have the proper and rational use of blood and its components in a very judicious manner so as to achieve zero or without minimal wastage if possible.⁶ In order to achieve this, it is very important for us, to have an efficient blood transfusion system wherein the available limited resources are utilized to increase the blood collection, better storage facilities, quick and safe transportation and above all avoiding unnecessary and unwarranted use of blood.⁷ The blood transfusion should be used as a mode of treatment when all the other means of treatment have been exhausted.⁸ A proper blood transfusion policy should be framed and followed at the each institution to reduce wastage. This will help in using the available resources in a proper manner and at the same time decreasing the wastage to a minimal level.⁹ Self audit and getting an audit done by a team from other blood bank, can help us to calculate the discard rate and at the same time valuable suggestions can be received from the visiting team to reduce the discard rate. The various alteration and corrections can be made accordingly to reduce the discard rate.¹⁰ The present study was carried out at a district hospital of the hilly state of Himachal Pradesh to find out the reason for the discard of blood units and steps taken that can reduce the same.

Material and Methods

It is a retrospective study carried out at a district hospital in the hilly state of Himachal Pradesh over a period of 5 years (1stJanuray 2015 to 31 December 2019). Donors who fulfilled the donor selection criteria laid down by the WHO were included in the study. Persons belonging to the high risk group (professional blood donors,

dialysis patient, thalassemia patients, above 65 years age and pregnant females) were excluded from the study. Blood units collected were screened for the TTIs and blood grouping was done. The units were labelled as per the standard protocol and stored in the blood storage refrigerator at 2-8 C. The blood units were given as per demand and requirement to the various wards. The blood units were stored for 35 days and discarded after that. The blood units testing positive for the TTIs were also discarded. The bags showing evidence of leakage, clots, hemolysis, and abnormal plasma were also discarded. Units meant to be discarded, were first autoclaved and then discarded.

Results

During the study period 7306 units of blood were collected through the voluntary and replacement donations. Out of total 7306 units, 6824(93.3%) were through voluntary donations and the rest 482(6.7%) were through replacement donations (Table 1). Majority of the blood donors were males (6911/94.6%) and females contributing to 6.4 % (395) only (Table 2).

Table 1: Distribution of donors based on the type of donation

Donation	Voluntary	Replacement	Total
Number	6824 (93.3%)	482 (6.7%)	7306 (100%)

Table 2: Gender wise distribution of blood donors

Sex	Males	Females	Total
Number	6911(94.6%)	395(5.4%)	7306(100%)

The number of units discarded during the study period was 102 (1.39%) units. Of the total 102 units discarded, 72 units (70.6%) were discarded due to the seropositivity for TTIs. Failed tap or under collection was the second most common cause for discard accounting for 22 (21.6%) cases. Expired due to non utilization was seen in 5(4.9%) cases. (Table3).

Table 3: Reasons for discard

Reasons for discard	Number	Percentage
TTIs positive	72	70.6
Under collection blood	22	21.6
Unutilized blood	5	4.9
Clotted blood	1	0.9
Hemolysed blood	2	2.0
Others	NIL	0
Total	102	100

Seropositivity for HBV Ag was seen in 31 (43.5%) cases followed by HCV in 22 (30.5%) cases, malaria in 13 (18.0%) and STS in 6 (8.5%) cases. Hemolysis and clotted blood were seen in 2 and 1 units respectively (Table 4).

Table 4: Discarding due to seropositivity for TTIs

TTIs	Number	Percentage
HBV	31	43.5
HCV	22	30.5
Malaria	13	18.0
STS	06	8.5
Total	72	100

However there was no discarding of units due to HIV seropositivity and due to leakage of blood bags. The year wise collection and the discard rate is shown in tables 5 and 6.

Table 5: Year wise reasons for discarding blood

Year	TTIs	Fail tap	Expiry	Plasma	Clotted
2015	9	9	1	1	1
2016	32	4	2	0	0
2017	10	4	1	0	0
2018	9	3	1	0	0
2019	12	2	0	1	0
	72(70.6%)	22(21.6%)	5(4.9%)	2 (1.98%)	1(0.9%)

Table 6: Year wise discard rate

Year	Total units collected	Total units discarded	Percentage
2015	1517	21	1.38
2016	1468	38	2.58
2017	1348	15	1.08
2018	1506	13	0.86
2019	1437	15	1.04
Total	7306	102	1.39

Discussion:

In our study, out of the total 7306 units of blood collected, 102 (1.39%) units were discarded which can be compared to the discard rate observed by Mahpatra et al (1.6%).¹¹ This rate is much lower

than the discard rates as observed by Patil et al (7.7%)¹², Arora et al (3.5%)¹³, Sharma et al (4.4%)⁴, Kumar et al (3.7%)⁶, Suresh et al (5.70%)¹⁴ and Lakum et al(4.09%).¹⁵

Transfusion transmitted infections was the most common cause of discarding blood in our study, accounting for 72 (70.6%) units of the total 102 bags discarded. Kumar et al,⁶ Thakare et al,¹⁶ Suresh et al¹⁴ and Sharma et al⁴ in their studies had observed that transfusion transmitted infections as the most common cause of discarding blood, reporting in 74.3%, 68.86%, 58.5% and 60.7% cases respectively. In our study, TTIs were responsible for discarding in 0.98% cases of the total collection. This rate is much lower in comparison to Lakum et al (1.6%)¹⁵ Gauravi et al (2.86%)¹⁷ and Patil et al (4.7%)¹². Among the transfusion transmitted infections, we had found seropositivity for HBV Ag in 31 (43.5%) cases followed by HCV in 22(30.5%) cases. This is very much similar to the observations made by Kumar et al⁶, Duarah et al¹⁸ and Mukherjee et al¹⁹ who also observed HBV and HCV to be the most common cause of wastage of blood units due to TTIs. Malaria was detected in 13 (18%) cases and STS was reactive in 6 (8.0%) cases. Both these findings were much higher than the observations made in other studies by Kumar et al⁶ and Duarah et al.¹⁸ No case was discarded due to seropositivity for HIV. The discarding due to TTIs could be prevented if the guidelines laid by NACO are properly followed and strict compliance is maintained during donor selection.^{4,9,20} Predonation history taking and counselling in proper manner is must.²¹ Encouragement should be given for voluntary donation since the prevalence of TTIs in the voluntary donation is much less as compared to replacement donations.²² Biometric identification of professional donors and persons seropositive for TTIs can be done.¹³ We can also use easy, cheap, cost effective and reliable screening tests as a part of predonation screening to select healthy and safe donor.¹³

Under collection or fail tap was the second most common cause of discard in our blood bank. It accounted for 21.6% (n=22) of the total wastage. Duarah et al¹⁸, had reported 19.6% of wastage due to under collection very similar to our observation while Sharma et al⁴ and Lakum et al¹⁵ had observed discarding due to fail tap/under collection in 34.5% and 27.1% cases respectively. The said blood collected is unsuitable for any transfusion since this tends to alter the ratio of blood and the anticoagulant in the bag. Hence it is important to have optimal collection in the bag for proper use.¹⁴ The under collection could be due to the acute donor reaction, failure of the phlebotomy due to the selection of the small vein by untrained new staff¹³. Healthy donor and proper counseling before donation is must to decrease the acute donor reaction.¹¹ A trained phlebotomist is a must, who would help us to reduce the wastage due to fail tap.¹⁴ A good quality of weighing instrument (spring balance) and along with shaker is a must at the time of collection.⁹ Techniques may be developed or the unit may be processed in such a manner to make the under collected unit suitable for optimum use.²³

Five (4.9%) blood units were discarded due to expiry or non utilisation. This is very much similar to the finding of Sharma et al⁴ who had found that discarded units due to expiry was 5.5%. However some studies have shown a wide range of discard rate due expiry ranging from 11.4% to 88.45%. Kumar et al 11.4%,⁶ Arora et al 51.4%¹³ and Chavan et al 88.4%.²⁴ The reasons for non utilisation could be due failure of implementation of the policy of first in and first out. This would require daily monitoring of the available blood stock by the blood bank technicians or blood bank incharge.¹¹ Regulate or discourage bleeding of donors with rare group or with Rh negative factor in the blood donation camps since the requirement of these units low.¹⁵ But the record of these donors should be maintained and requested told to donate as and when required as per the demand. Planning with the NGO and other welfare

organizations involved in blood donation camps in organization of blood donation camps as per demand and stock of the blood bank.¹² Creation of the blood storage unit in the various civil hospital and community health centres of the district could helps us to provide the units to the pregnant female and accident victims at the doorstep of the people and they need not be shifted to district hospital for transfusion. This could also help us to utilize the blood units properly. A strict watch or regulation is a must by the mother unit. There should be proper communication, coordination and data sharing between the various blood banks of the state so as to facilitate the transfer of excess or near expiry blood bags to the higher centre where demand exists.¹² There should be proper implementation of the policy of "First in First out".¹¹

Discarding due to hemolysis and clotted blood was seen in 2 (1.96%) and 1 (0.98%) units respectively. This could be prevented by proper collection, transportation, storage and of the blood bags.¹⁴ Some time the visual examination by the technician for hemolysis and blood clots may be deceptive and may give a false belief leading to the units being discarded unnecessary. Hence proper technique to be developed to avoid such mistake.²⁵

Every single unit discarded is a financial and social burden to the blood bank and the nation as a whole.²⁶ Hence there should be a rational and judicious use of blood units. A regular meeting of the blood transfusion committee may be held to reduce unwanted and nonjustifiable use of blood.¹² Self Audit may be done regularly to look for the avoidable and unavoidable causes of waste in the institution and steps may be taken to prevent the same.²⁷

Conclusion

Blood an irreplaceable life saving material which needs to be utilized in a proper and judicious manner so as to have minimal wastage. A through clinical examination, proper history, stringent donor selection and proper screening criteria as

per the WHO guidelines must be followed to reduce TTIs related discarding. Proper inventory management register with data based formation is necessary to reduce wastage. Better quality control in collection, storage and testing must be adopted. Avoidable causes of blood wastge like failed tap, leakage, expiry of blood, can be reduced if we follow the policy of “First in First out”, have permanent trained and motivated technical personal and staff recruited for the blood bank only.

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