

Analysis of Reasons for Discarding Blood and Blood Components in the Blood Bank of a Tertiary Care Hospital - A Seven Years Study

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ABSTRACT

BACKGROUND

Transfusion of blood and its components has a vital role in managing emergency conditions. Hence, it is important to maintain the quality of blood and also at the same time manage its quantity, so that the requirement of patients is fulfilled with minimal or no wastage of blood and blood products. The present study was conducted to find out the main causes for discarding whole blood or blood components and its frequency. We also wanted to analyse what can be done to minimize wastage.

METHODS

This retrospective study was done in the blood bank of a tertiary care hospital and data was collected with the help of records from the year 2013 to 2019. Reasons for discarding blood or blood components was observed and analysed.

RESULTS

Out of 13068 blood units collected, 1300 were whole blood, and the remaining 11768 blood units were made into components: 11768 packed red blood cells, 11768 fresh frozen plasma and 1995 units of platelet concentrate. Among them 2389 (8.9%) units of blood and blood components were discarded. Platelet concentrate was having highest discard rate of 56.7%. Expired units formed the major reason for discarding units (84.97%).

CONCLUSIONS

Blood and blood components should be utilized judiciously to minimize wastage. Stringent guidelines have to be followed such as use of advanced software in blood bank to alarm near expiry units, proper scheduling of blood donation camps, use of apheresis technique and using sensitive tests to detect transfusion transmitted infections.

KEYWORDS

Apheresis, Blood Components, Discard

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BACKGROUND

Blood and its components are very significant for human life and therefore blood transfusion can be a life-saving intervention.¹ Hence each unit of blood is precious and has to be utilized judiciously. It has been estimated that one-third of all patients admitted to intensive care units in the developed world receive a blood transfusion.² By analysing the data, the reasons for discarding blood and blood components can be found out; it also helps to improve performance of blood bank through educating and training of staff and introducing new measures in order to minimize the number of discarded blood to a reasonable rate.³

METHODS

This is a retrospective study conducted at the blood bank of a tertiary care hospital, Adichunchanagiri Institute of Medical Sciences, Bellur, Mandya district, to analyze various causes of discard of blood and blood components. It was carried out from 2013 to 2019 with the help of various records available in the blood bank which includes donor record, Transfusion Transmitted Infections (TTI) testing record, component preparation record and discard record. The bags that were sero-positive for transfusion transmitted diseases (TTI) i.e., HIV, HBV, HCV, syphilis and malaria using standard methods were discarded. Also the expired blood bags, those having inadequate quantity of collected blood, bags showing signs of haemolysis or turbidity or blood bags with evidence of leakage were discarded. Results were analyzed with appropriate statistical tests.

RESULTS

A total of 13068 blood bags was collected during the study period 2013- 2019. 13033 donors were males and 95 were females. 10362 were voluntary donations and 2706 were replacement donations.

Out of 13068 blood units collected, 1300 were whole blood (WB), and the remaining 11768 blood units were made into components such as 11768 packed red blood cells (PRBC), 11768 fresh frozen plasma (FFP) and 1995 platelet concentrate (PC). (Figure 1). Out of 13068 blood units collected from donors, 2389 units of blood and blood components were discarded from year 2013-2019. (Table 1)

Year	Discarded Units of Blood and Its Components				Total No. of Blood and Its Components Discarded
	WB	PRBC	FFP	PC	
2013	44	137	17	65	263
2014	34	55	27	101	217
2015	24	135	33	199	391
2016	2	153	37	249	441
2017	6	168	81	236	491
2018	1	74	40	104	219
2019	1	99	89	178	367
Total	112	821	324	1132	2389

Table 1. Year Wise Distribution of Discarded Units of Blood and Its Components

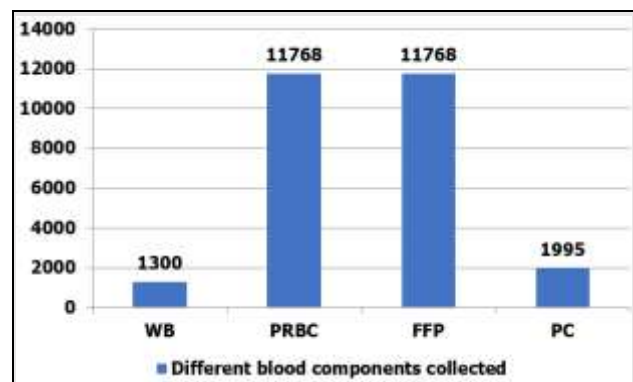


Figure 1. Total Units of Blood and Blood Components Collected

Out of 26831 units of both blood and its derived components, 2389 units were discarded during the study period. Overall discard rate of all components was 8.9%, in that platelet concentrate was having highest discard rate of 56.7% as shown in table 2.

Component	No. of Blood and Its Components Prepared	No. of Blood and Its Components Discarded	Discard Rate
WB	1300	112	8.6%
PRBC	11768	821	6.9%
FFP	11768	324	2.7%
PC	1995	1132	56.7%
Total	26831	2389	8.9%

Table 2. Distribution of Prepared and Discarded Units of Blood and Blood Components

On analysing the data, reasons for discarding blood and its components were expired units, sero-positive infection positivity, inadequate quantity of blood, damage/leakage in the blood bags and haemolysed units. In that expired units due to non-utilization formed the major bulk of blood and blood components discarded constituting 84.97%. Other causes were seropositivity (4.48%), not sufficient quantity (4.44%), damaged bags (6.03%) and haemolysed units (0.08%). (Table 3. Figure 2 and 3) Among the blood units discarded because of sero-positive infection, HBV was the most common infection found (71%), followed by HIV infection (15%).



Figure 2. Overall Reasons for Discarding Blood and Its Components

Year	Reasons for Discarding Blood and Its Components					Total No. of Blood and Its Components Discarded	Total No. of Blood Units Collected
	Expired	Sero-Positive	Less Quantity	Damage bags	Haemolysed		
2013	234	21	8	51	0	314	1781
2014	212	18	9	48	0	287	1683
2015	345	12	8	20	0	385	1950
2016	408	20	9	11	0	448	1783
2017	384	17	25	9	0	435	2810
2018	168	9	19	4	0	200	1545
2019	279	10	28	1	2	320	1516
Total	2030	107	106	144	2	2389	13068
%	84.97	4.48	4.44	6.03	0.08	100	

Table 3. Analysis of Reasons for Discarding Blood and Its Components

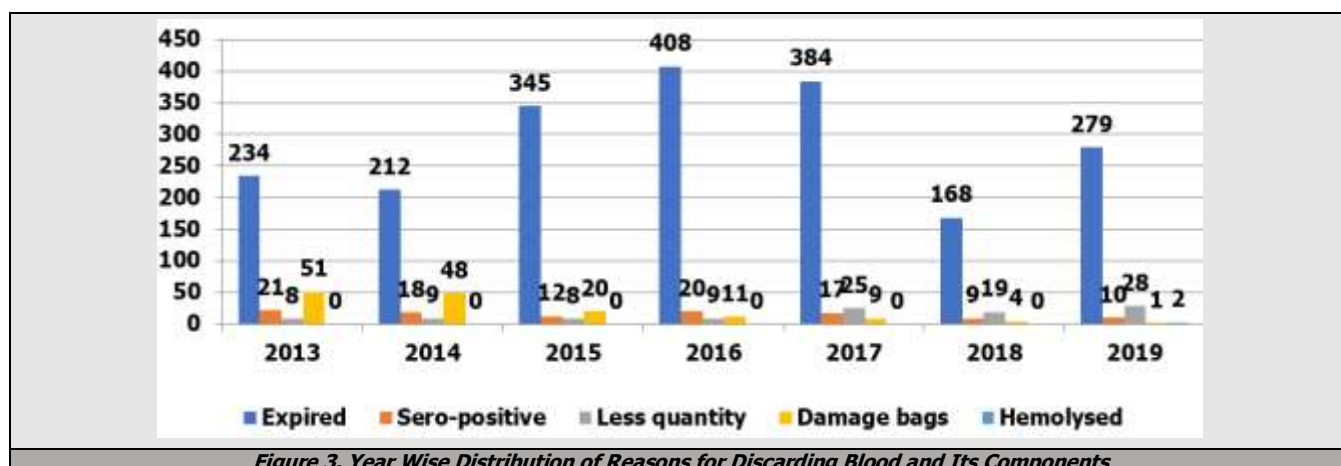


Figure 3. Year Wise Distribution of Reasons for Discarding Blood and Its Components

Seropositive Infections	Total No. of Blood Units discarded	%
HIV	15	14
HBV	76	71
HCV	14	13
VDRL	2	2
Total	107	100

Table 4. Analysis of Discarded Blood Units Due to Sero-Positive Infection Positivity

DISCUSSION

Blood and blood components are precious and always lifesaving; hence, it should not be wasted. The demand for blood transfusion in modern day health care and surgical procedures is increasing with the improvement in diagnosing the complex diseases and assessing accurately the need for blood replacement.⁴

During the study period out of 13068 blood units collected, 1300 units were used as whole blood and remaining 11768 were prepared into blood components units such as PRBC (11768), FFP (11768) and Platelet concentrate (1995). Of these, 2389 (8.9%) units were discarded. It is comparable to the studies conducted by Kumar et al 8.4%,⁵ Sharma et al 8.69%⁶ and Suresh et al 7.0%.⁴ Platelet Concentrate was the most common component discarded during the study period and the average discard rate was 56.7%, which is almost similar to study done by Kaur H et al⁷ (56.31%), lower than that obtained by Ghaflez et al⁸ (58.1%) but higher than Sharma N et al⁶ (43.6%) and Bobde et al⁹ (26.2%). The most common reason for discard of PC among other components was date of expiry as it has short shelf life of 5 days. The average discard rate of Whole Blood was 8.6%, which is lower than observed by Kaur H et al⁷ (10.11%) but higher

than quoted by Suresh et al⁴ (5.7%) and Bobde et al⁹ (6.63%). The average discard rate of Packed red blood cells was 6.9%, which is almost similar to study done by Kaur H et al⁷ (6.86%) but higher than quoted by Suresh et al⁴ (3.3%) and Sharma N et al⁶ (3.2%). Fresh Frozen Plasma had average discard rate of 2.7%, which is comparable to study done by Duarah et al¹⁰ (2.68%), lower than that obtained by Kaur H et al⁷ (7.96%) and Sharma N et al⁶ (6.2%) and Suresh et al⁴ (5.5%) but higher than Roy D et al¹¹ (1.5%) In the present study, the most common reason for discarding blood and blood components was expired units (84.97%), followed by damaged bags (6.03%), seropositivity (4.48%), not sufficient quantity (4.44%) and haemolysed units (0.08%). (Table 3, Figure 2 and 3)

The shelf life of platelet is 5 days. Hence, their chance of expiry due to non-utilization was highest among blood components. In the present study also, the platelet concentrate (PC) formed the major bulk for discard due to expiry. The wastage of PC can be reduced by preparing it as per the requirement, urgency, and increased use of apheresis technique. Also discard due to expiry of shelf life could be attributed to mass blood donation camps during Independence Day, Gandhi Jayanthi etc... leading to more collection than utilisation.

Kumar et al⁵ also observed that the most common cause of discarding the blood components was expiry of date due to non-utilization (87%).

The main reason for discarding was positivity for transfusion transmitted infections in case of studies conducted by Thakare et al¹² (68.86%) and Suresh et al⁴ (49%). Morish et al³ in their study concluded under collection as the main reason for discarding blood units (52%).

CONCLUSIONS

The present study revealed that on an average, 8.9% blood bags were discarded, of which Platelet Concentrate (PC) formed the major bulk with 56.7% discard rate. Platelets were the most commonly discarded blood component due to short shelf life and non-utilization in time as demand cannot be predicted. Blood and blood components being an irreplaceable resource should be utilized judiciously and to minimize wastage steps like using advanced software in blood bank so that blood units are arranged in the order of expiry to notify the staff regarding near expiry units, so that they can be used on first in first out basis, proper scheduling of blood donation camps, coordinating as per the stock available in blood bank, use of apheresis technique to prevent wastage of platelets as its demand cannot be predicted (it should be prepared on demand and urgency), strict donor selection criteria, using sensitive tests to detect transfusion transmitted infections, use of calibrated blood collection monitor even in camps for 350/450 volume collection, proper storage and checking of blood and blood components to avoid clotting, haemolysis and bacterial contamination, should be followed. And importantly every hospital should have blood transfusion council to conduct self-audit and monitor the wastage of blood and blood components.

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