

ORIGINAL ARTICLE

Analysis of Discard of Blood And Its Components As A Quality Indicator of Blood Utilization In A Tertiary Care Teaching Hospital Of North India: A Retrospective Study.

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ABSTRACT

Background: The need of blood transfusion is the central core to stabilize and manage patients. But the scenario of blood supply in many countries including ours remains grim. Therefore each unit of blood should be utilized with minimal wastage. Aim of this study was to determine the rate of discard of blood and its components and to identify various reasons regarding it.

Materials and Methods: Two year retrospective study was conducted by retrieving the data from archives of record section of blood bank, Sri Guru Ram Das Institute of Medical Sciences and Research Amritsar (Punjab), India. The findings were tabulated by utilizing descriptive statistics.

Results: Over all expiry (42.4%) followed by seropositivity (33.4%) were the two most common reason for the discard. Quantity not sufficient (0.229%) was the least common reason of discard. Of all the components, platelets concentrate (PC) had the highest rate of discard (56.31%) followed by Whole blood (WB), Fresh frozen plasma (FFP) and Packed RBC's (PRBC) respectively. Expiry was the common reason of discard for PC and WB, whereas seropositivity was the most common reason of discard for PRBC, while leakage and rupture was most common reason of discard for FFP.

Conclusion: Study concludes that every effort to identify the critical areas of blood transfusion should be done to reduce the number of discarded blood units.

Keywords: Blood Bank, Blood utilization, component, discard.

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INTRODUCTION

The need of blood transfusion has increased in recent years due to advances in medical technology, techniques and increase in life expectancy. The concept of blood substitutes in the present scenario remains on paper with a marked dependency by physicians worldwide mainly on human blood only. It has been estimated that one third of all patients admitted to intensive care units in the developed world need blood transfusion and many die because the right kind of blood does not reach them on time. The situation remains grim in the scenario of blood supply in our country as it is estimated that only 4% eligible population in India donates blood against a requirement of 9 - 9.5 million units/year.^{1,2} Hence each unit of blood is precious and it should be utilized judiciously with minimal wastage. For this the blood transfusion services (BTS) play an important central role for ensuring sufficiency, quality, safety of blood supply, proper usage of the unit supplied and optimizing blood collection and processing. This in turn can lead to reduced rate of discard and improve the

efficiency of the BTS. The objective of this study was to determine the rate of discard of blood and blood components and to identify various reasons of discard at a tertiary care teaching hospital in northern part of India.

MATERIALS AND METHODS

A retrospective study in which data relating to collection and usage of blood and its components from Jan 2012 to Dec 2013 from archives of the blood bank of Sri Guru Ram Das Institute of Medical Sciences And Research, Vallah, Amritsar, Punjab (India) was retrieved and analyzed. A detailed analysis of collection type, the number of units issued, number of donors, blood discarded and the various reasons for the same was done and tabulated by utilizing descriptive statistics (mainly percentages). No comparative analysis was done.

RESULTS

The total number of blood units collected in the years 2012 and 2013 were 19478. Out of these 21.13% (4118 units) were voluntary and 78.86% (15360 units) were replacement donors. 37.02 % of the total units collected were utilized as whole blood, while the remaining 62.97% was processed into different blood components. It was noted that overall 2274 units of blood and its components (10.29%) were discarded during the study period.

Overall, expiry (42.4%) followed by seropositivity (33.4%) were the two most common causes of discard. Quantity not sufficient (0.229 %) was the least common cause of discard in the present study (Table-1).

Individually, the highest rate of discard was for Platelet Concentrate (PC) which was 56.31% while the rates of discard for whole blood (WB), fresh frozen plasma(FFP) and packed red blood cell (PRBC) were 10.11%, 7.96 % and 6.86% respectively (Table- 2).

The most common reason for discard in case of PC and WB was expiry issues (87.71%- 450 units; 51.52%-220 units) followed by seropositivity (8.96 %-46 units; 37.47 %-160 units respectively). While the least common cause of discard for WB was Quantity not sufficient (QNS)-0.07%

6 units but leakage was the least common individual etiological factor for discard in cases of PC- 0.38 %; 2 units. A point to note in the above two parameters was that no unit was discarded due to leakage; while no unit was discarded due to QNS in cases of PC.

In contrast to WB and PC; seropositivity (47.05 %-232 units) was the most common reason for discarding PRBC followed by expiry (36.91%-182 units). QNS was the least common reason for discard just like WB - 1.21 %; 3 units (Table-3)

Lastly, the most common reason of discard rate for FFP was totally novel- (leakage/rupture) with a rate of 46.67 %; 267 units with the seropositivity the 2nd most common reason of discard (40.55 %; 232 units). It was also noted that no case of expiry was noted as a reason for discard in case of FFP (Table-4).

DISCUSSION

Proper clinical use of blood is an important and critical issue especially in regions which are facing limitations in the number of blood units. Out of 11399 units received, the major reason for wastage of whole blood and its components was found to be very dependent on the pattern of its utilization, shortage, and individual characterization with many reasons such as expiry, seropositivity, leakage/rupture and even contamination by RBC's.

As noted in Table-1 expiry was the major reason overall (42.4%) accounting for almost half the cases of discard. In this sub-group PC was the major reason for overall discard followed by whole blood. This is expected for platelet concentrate due to a very short expiry period i.e 5 days. Seropositivity was the next common cause of discard (33.4%) accounting for almost one-third of all cases. In this sub-group PRBC and FFP accounted for equal number of cases followed by RDPC.

The overall discard rate of 10.29 % (2274 units) in our institute was found to be a little higher in comparison to the studies done by Thakare et al who observed a discard rate of 3.58%³ and unlike the present study found seropositivity as the major reason of discard (68.86%). The rate in the present study however was comparable to the study done by Deb et al who calculated their dis-

Table-1: Percentage wise Rate of distribution of the reasons for discarding blood and its components.

Year	Seropositive	Expired	Leakage	QNS	RBC contamination	QC	Thawed but not transfused
2012	332	302	126	03	25	60	10
2013	338	550	146	03	16	72	22
Total	670	852	272	06	41	132	32
Rate in %	33.4%	42.4%	13.56%	0.299%	2.04%	6.58%	1.59%

Table-2: Discard Rate of Whole Blood and other blood components

Blood /Blood components	No. of blood components prepared			No. of Units discarded			Discard Rate (Y/X) (% age)
	Total(X)	2012	2013	Total(Y)	2012	2013	
Whole Blood	4220	1966	2254	427	240	187	10.11%
PRBC	7179	3422	3757	493	268	225	6.86 %
Platelets	911	101	810	513	62	451	56.31%
FFP	7179	3422	3757	572	288	284	7.96 %
Total	19478	8911	10578	2005	858	1147	10.29%

Table-3: Percentage wise discard rate and the reasons for discarding Whole blood and PRB

Year	Total collected	Total discarded	Reason for discarding				
			Expired	Seropositive	Leakage/rupture	QNS	QC
Whole Blood							
2012	1966	240	147	71	00	00	19
2013	2254	187	73	89	00	03	22
Total	4220	427	220	160	00	03	41
Rate			51.52%	37.47%	00%	0.70%	9.60%
Packed RBC							
2012	3422	268	104	128	00	03	36
2013	3757	225	78	104	03	00	40
Total	7179	493	182	232	00	03	76
Rate			36.91%	47.05%	0.60%	1.217%	15.41%

Table-4: Percentage wise discard rate and the reasons for discarding Platelet concentrate and FFP

Year	Total collected	Total discarded	Reason for discarding				
			Expired	Seropositive	Leakage/rupture	QNS	QC
Platelet Concentrate							
2012	101	62	51	05	01	00	05
2013	810	451	399	41	01	00	10
Total	911	513	450	46	02	00	15
Rate			87.71%	8.96%	0.38%	00%	2.92%
Fresh Frozen Plasma							
2012	3422	288	00	128	125	25	10
2013	3757	284	00	104	142	16	22
Total	7179	572	00	232	267	41	32
Rate			00	40.55%	46.67%	7.16%	5.59%

card rate to be 14.61% with more than two-third cases (82.87 %) due to non-utilization (expired units).⁴ Other Indian studies have also reported a comparable rate of discard such as Chitnis et al and Gauravi et al who have reported a discard rate of 8.9-10%.^{5,6} Studies conducted outside Ind-

ia have reported a very low discard rates such as by Morish et al in National blood center, Kuala Lumpur, who have reported the discard rate of 2.3% only.⁷

In a study by Novis DA et al in different hospitals of the United States, the C:T ratios were 1.5 or less, red cell expiration rates were 0.1% or less and red cell unit wastage rates were 0.1% or less in the top performing institutions. The bottom performing participants had C:T ratios above 2.0, RBC unit wastage rate as 3% and RBC unit expiration rate above 5%.⁸ In our study, the RBC unit expiration rate was more than 2.53% and the RBC unit wastage rate was 6.86% which are close to the bottom performing groups. Morish M et al also have found the rate of discard for whole blood as 3.7% and for the packed RBC as 0.6.⁷

On the other hand, despite the longest expiry, due to some technical reasons like leakage/ breakage, seropositivity with transfusion transmitted infections and RBC contamination lead to higher discarded rate for FFP. The leakage was the third most common cause of discarded blood and its components, which represented 13.56% of the total blood / its components discarded. Mishandling of blood bags during collection, processing, and storage or manufacturing errors may be the major causes of defects and leakages of blood bags.⁹ The integrity of plastic bags is essential and precautions should be taken to prevent leakages.¹⁰ The bag may be damaged during the centrifugation. This happens when the bag is forced to a sharp interior bottom/wall junction or corner, resulting in the bag material being stretched too far, causing a tear.¹¹ The defect and leakage at any part of the plastic blood bags can be detected by visual inspection during the processing, after pressure in a plasma extractor, before freezing, and after thawing.⁹

The FFP should be stored in cardboard or polystyrene protective containers that minimize the risk of breakage of brittle frozen product during storage, handling, and transportation.¹² Another approach to decrease the leakage and contamination immediately before immersion of the frozen blood bags in the water bath is that the whole container should be placed in a sterile plastic bag.¹⁰

In a present study gross lipemic blood components and overweight blood bags were not important

indicators for blood discard. Lipemia itself does not affect the safety of the component but can hamper viral testing. In overweight bags the amount of anticoagulant is not sufficient and hence coagulation cascade may be stimulated. Hence both can lead to discard of blood & its components.^{13,14} QNS (underweight) bags were seen in 6 instances only (0.2%) and was seen in cases where the units were procured from voluntary donor camps organized time to time by our blood bank. Underweight blood bags are discarded as excess of anticoagulant can denature the blood on storage. The reason of underweight bag range from stoppage of donation due to donor reaction, blood flow from a small caliber vein exceeding 15 min or even a non calibrated spring balance. Extra vigilance and monitoring of trained staff especially during voluntary camps is this desirable to reduce such events.¹⁵

CONCLUSION

Hence the study concludes that every effort to identify the critical areas of blood transfusion services and processes should be done to reduce number of discarded blood units.¹⁶ Each hospital should have a hospital transfusion committee which should include transfusion specialist, pathologist, blood bank officer, clinician, surgeon, public relation officer and hospital administrator. Regular audit of transfusion of blood & its components is essential by hospital transfusion committee to reduce donor blood wastage & to promote rational blood use^{17,18}. After analysis of the available data, review of the staff and facilities at the blood bank and discussions with the concerned staff, the following suggestions were generated to optimize utilization of blood and its components.

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