



Evaluation of 'Wastage Rate' of Blood and Components – An Important Quality Indicator in Blood Banks

Asitava Deb Roy^{1*} and Arijit Pal¹

¹Department of Pathology, IQ City Medical College, Durgapur, West Bengal, India.

Authors' contributions

This work was carried out in collaboration between both authors. Author ADR designed the study, wrote the protocol, and wrote the first draft of the manuscript. Author AP managed the literature searches and analyses of data. Both authors read and approved the final manuscript.

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ABSTRACT

Aims: To evaluate the wastage rate of blood and components in a newly established blood bank of a teaching hospital in West Bengal.

Study Design: Retrospective study.

Place and Duration of Study: Department of Transfusion Medicine, IQ City Medical College and Narayana Multispeciality Hospital, Durgapur between April 2014 and October 2014.

Methodology: The study recorded the discarding of whole blood and component units due to various reasons viz. over-collection and under-collection of blood from donors; RBC contamination of plasma and platelets; blood bag leakages; presence of hemolysis, clots, lipemic appearance, greenish and yellowish (icterus) discoloration; expiry date and seroreactivity for infectious diseases. The wastage rate was calculated thereafter using appropriate formula.

Results: Out of total 1241 blood bags which were collected from donors during the study period, 1176 units were separated into components and rest 65 units were kept as whole blood units. Total 93 (7.49%) blood bags were discarded, of which 27 (2.18%) were whole blood bags and 66 were components. The total number of whole blood units issued during this period was 38 and components issued during this period were 693.

*Corresponding author: Email: asitavadr@gmail.com;

Therefore, the wastage rate of whole blood units and components can be calculated as:

Wastage rate of whole blood = $27/38 \times 100 = 71\%$

Wastage rate of components = $66/693 \times 100 = 9.52\%$

Conclusion: The rate of discarded blood components or “wastage rate” is one of those indicators and has been listed third among the ten quality indicators recommended by National Accreditation Board for Hospitals and Health Care providers. It is important to monitor this parameter for judicious management of blood bank inventory.

Keywords: Wastage rate; blood and components; quality indicator; blood bank.

1. INTRODUCTION

Blood and component transfusion plays a vital role in patient management in this era of modern medicine [1]. Therefore, the Blood Transfusion Services (BTS) is an integral part of therapy and is responsible for ensuring adequate and safe blood supply. A well-structured and efficient BTS would contribute toward better patients care and contribute toward the development of healthcare in the country. Implementation of a quality management system in all phases of the collection, processing, and storage of the blood is a major challenge for a newly established blood bank. The efficiency of processing and preparation of the blood components can be monitored by establishing quality indicators that reflect the activities to be evaluated. The rate of discarded blood components or “wastage rate” is one of those indicators and has been listed third among the ten quality indicators recommended by National Accreditation Board for Hospitals and Health Care providers [2].

The blood bank needs to put in enormous efforts to collect sufficient amount of safe blood from voluntary, non-remunerated, healthy, and low-risk donors [1-4]. To overcome demand and supply gap, the performance of BTS can be increased either by increasing the level of resources used in the collection and production of blood components or by utilizing existing resources more efficiently [5]. The blood transfusion services can develop plans to improve performance by analyzing the data and the reason for the discards and thereafter educate and train the staff and introduce new measures in order to minimize the number of discarded blood to a reasonable rate [6].

The aim of this study was to find out the reasons for discarding blood bags so that they could be utilized judiciously with minimal wastage.

2. METHODOLOGY

This is a retrospective study involving the analyses of discarded blood and blood components data in a newly established blood bank of a tertiary care hospital in Eastern India from April 2014 to October 2014. The study included the discarding of whole blood and component units due to over-collection and under-collection of blood from donors; RBC contamination of plasma and platelets; blood bag leakages; presence of hemolysis, clots, lipemic appearance, greenish and yellowish (icterus) discoloration; expiry date and seroreactivity for infectious diseases. The wastage rate was calculated with the following formula:

Wastage rate = $\frac{\text{Number of blood or components discarded}}{\text{Number of blood or components issued}} \times 100$

3. RESULTS AND DISCUSSION

Out of total 1241 blood bags which were collected from donors during the study period, 1176 units were separated into components and rest 65 units were kept as whole blood units. Total 93 (7.49%) blood bags were discarded, of which 27 (2.18%) were whole blood bags and 66 were components. The total number of whole blood units issued during this period was 38 and components issued during this period were 693.

Therefore, the wastage rate of whole blood units and components can be calculated as:

Wastage rate of whole blood = $27/38 \times 100 = 71\%$

Wastage rate of components = $66/693 \times 100 = 9.52\%$

Amongst whole blood bags discarded, expiry of date due to non-utilization (66.67%) was the most common cause followed by seropositivity for transfusion transmissible infections (TTIs)

(25.93%), others causes include low volume and overweight as shown in (Table 1).

Out of these 27 bags, approximately 25.93% were discarded because of sero-positivity for TTIs. Among infectious diseases, hepatitis B infection was the most common cause for discarding as shown in (Table 2).

A total of 66 blood components were discarded against 1176 blood components prepared and 693 issued during the study period. The most common blood component was discarded was platelets as mentioned in (Table 3).

A total of 66 blood components were discarded in which the most common cause was expiry of blood components, constituted 81.81% followed by leakage, constituted 9.09% as shown in (Table 4).

Rational utilization of blood and components in a newly established blood bank has always been a challenge. The challenge lies not only with the blood bank inventory management but also with generating an awareness and proper knowledge among the treating doctors regarding appropriate use of each component.

Blood is precious and also scarce; therefore, cannot be wasted. Evaluation of wastage rate is an indicator to highlight the discrepancies in the blood bank inventory management and also to correct such discrepancies. This would promote

judicious use of blood components and therefore prevent wastage.

There have been various studies from India and abroad which have addressed this serious issue of wastage of blood [6-11]. We have compared our study with other such studies to analyse the reasons for wastage of blood components. The Table 5 below compares the discard rate found by various authors at different times and the main reason behind such discard:

As compared with other similar studies shown in Table 5, it was observed that higher number (71%) of whole blood bags were discarded in our blood bank. It was mostly due of non-utilization (66.67%) of whole blood bags because of establishment of component therapy in our institute. Most of these whole blood units which had to be discarded were collected during the first month of inception of the blood bank when component transfusion practice was not in vogue in the institute. After the formulation of an institutional transfusion policy and constitution of a Hospital Transfusion Committee, the practice of whole blood transfusion was restricted to only specific indications and the use of component therapy was promoted. As a result, these whole blood units could not be utilized. To reduce this kind of wastage, the collection of whole blood units should be limited in hospitals which promote component therapy.

Table 1. Analysis of discarded blood bags (whole blood)

Total discarded whole blood bags	Date expired (%)	Sero-reactive (%)	Low volume (%)	Over collection (%)
27	18(66.67)	7(25.93)	1(3.7)	1(3.7)

Table 2. Analysis of discarded whole blood bags (due to sero-reactive cases)

Total discarded (%)	HIV (%)	HBs Ag (%)	HCV (%)	VDRL (%)
7(100)	1(14.29)	4(57.14)	0(0)	2(28.57)

HIV= Human Immunodeficiency Virus, HBs Ag = Hepatitis B surface antigen; HCV= Hepatitis C Virus, VDRL= Venereal Disease Research Laboratory

Table 3. Analysis of discarded units of blood components against total prepared components

Blood components	No. of components prepared	No. of units discarded	Discarded rate (%)
Packed red cells	535	24	4.49
Platelet concentrate	102	33	32.35
Fresh frozen plasma	535	8	1.5
cryoprecipitate	4	1	25
TOTAL	1176	66	100

Table 4. Analysis of reasons for discarding blood components

Blood components	Expired	Seropositive for TTIs	Leakage	Transfusion reaction	RBC contamination
Packed red cells	21	2	-	1	-
Platelet concentrate	33	-	-	-	-
Fresh frozen plasma	-	2	5	-	1
cryoprecipitate	-	-	1	-	-
Total 66 (100%)	54 (81.81%)	4 (6.06%)	6(9.09%)	1 (1.52%)	1(1.52%)

Table 5. Comparison of discard rate obtained in previous similar studies

Serial number	Study by	Discard rate (%)	Main reason for discard
1.	Thakare et al. 2011 [7]	3.58	Seropositivity
2.	Deb et al. 2001 [8]	14.61	Non utilisation
3.	Chitnis et al. 2005 [9]	8.9	Seropositivity
4.	Morish et al. 2012 [6]	2.3	Non-utilisation
5.	Kumar et al. 2014 [11]	3.25	Seropositivity

Among blood components discarded, most commonly expired units were platelets (32.35%). The most common cause of discarding platelet units was expiry due to non-utilization. This is because the demand for platelet units is not very high in our institute. Therefore, platelets should only be prepared on demand as it has a very short shelf life.

The leakage was the second cause of discarded blood and its components, which represented 9.09% of discarded blood components. The major causes of defects and leakages of blood bags are mishandling of blood bags during collection, processing, and storage or manufacturing errors [12]. The integrity of plastic bags is essential and precautions should be taken to prevent leakages [13]. The bag may be damaged during the centrifugation. The defect and leakage at any part of the plastic blood bags can be detected at various steps of processing by visual inspection during the processing, after pressure in a plasma extractor, before freezing, and after thawing [14].

The amount of anticoagulant in blood bags with excess collection is not enough to prevent the blood from clotting and therefore, the clotting process may be initiated. On the other hand, there is an excess of anticoagulant in underweight blood that could denature the blood during storage. Suboptimal weight of blood collected would be unsuitable for transfusion and the ratio between volume of blood collected and volume of anticoagulant in the blood bags should be corrected [15]. In our blood bank, suboptimal

weight of blood unit occurred due to discontinuation of donation mostly because of donor's reactions.

4. CONCLUSION

We conclude our study with the following recommendations:

1. A properly conducted donor interview, notification of permanently deferred donors will help in discarding less number of bags from collected units.
2. Similarly, properly implemented blood transfusion policies will also help in discarding less number of blood bags due to expiry. To prevent wastage of platelet units in hospitals with low demand of platelets, preparation of platelets may only be done based on demand. Otherwise, separation of whole blood into packed cells and plasma should suffice.
3. Since whole blood has got only limited indications these days, whole blood collection should be kept to minimum to prevent expiry due to non-utilisation.
4. Interlinking and networking with other blood banks to outsource the components when required may also help in proper utilization of the products and thus prevent wastage.
5. Every hospital should have a Hospital Transfusion Committee to monitor the rational use of blood and components and review the blood management system.

CONSENT

All authors declare that 'written informed consent was obtained from the patient (or other approved parties) for publication of this case report and accompanying images.

ETHICAL APPROVAL

Not applicable because no human or animal experiment was performed. This study only involved publication of recorded data. However, an approval from the Head of the Institute was obtained.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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