



ANALYSIS OF REASONS FOR DISCARDING BLOOD AND BLOOD COMPONENTS IN A BLOOD BANK OF TERTIARY CARE HOSPITAL IN VADODARA.

Immunohematology

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ABSTRACT

Introduction: Advances in medical technology demand more and more provision of safe blood for effective management of patients. To tackle with the demand and supply of blood and blood components, more stringent criteria should be applied for blood donations and for proper utilization of blood.

Aim: The present study was designed to analyze the various reasons for discarding of blood and its components.

Method: In this retrospective study we analyzed various causes of discarding of blood and its components from January 2017 to April 2019 using various records available in the blood bank of SSG Hospital, Vadodara.

Results: A total of 33817 blood bags were collected during the study period. The overall discard rate was 6.7% (2266/33817). The most common reason for discard was leakage during centrifugation and storage 27.71% (628/2266).

Conclusion: The main cause for discarding of components was leakage of components followed by expired shelf life of the components. Proper training of staff is required to minimize the wastage of blood which can save many lives.

KEYWORDS

Discard rate, Blood and blood components, Transfusion transmitted infections.

INTRODUCTION:

Blood is a specialized bodily fluid that delivers necessary substance to the organs such as nutrients and oxygen and transport waste products away from them. The transfusion of blood and blood components has become an integral part of patient management in modern medicine.^[1] Both the medical and surgical specialists require the steady supply of blood from healthy, caring donors. Since each unit of blood is precious, it has to be utilized properly and judiciously.

Blood donation is one of the noblest gestures; a human can make to save life. A major challenge facing the blood transfusion services is to supply sufficient amount of safe blood whenever required for which we need to double our efforts to collect sufficient amount of safe blood from voluntary, non-remunerated, healthy donors.^[1,2,3]

The blood transfusion services can reach the highest level of efficiency in terms of quantity of blood and blood components through the implementation of quality management system. The rate of discard of blood and blood components is one of those quality indicator which is the ratio of blood and blood components discarded to the total number of collection.^[4]

Advances in medical technology demand more and more provision of safe blood for effective management of patients. To tackle with the demand and supply of blood and blood components, more stringent criteria should be applied for blood donations and for proper utilization of blood.^[5]

AIM:

The aim of our study to find out the various causes for discarding blood and blood components so that this can help us in formulating the proper guidelines for donor screening, component preparation, storage, optimized usage and also training of staffs.

Table-1: Total collection and components prepared

| Year | Total Collection | Voluntary Donors | Replacement Donors | WB | PRBC | PC | FFP | CRYO |
|------------|------------------|------------------|--------------------|-----|-------|------|-------|------|
| 2017 | 15137 | 10162 | 4975 | 215 | 14922 | 1312 | 5780 | 63 |
| 2018 | 13711 | 9177 | 4534 | 211 | 13500 | 1271 | 5587 | 67 |
| APRIL 2019 | 4969 | 3267 | 1702 | 55 | 4914 | 315 | 1075 | 42 |
| Total | 33817 | 22606 | 11211 | 481 | 33336 | 2898 | 12442 | 172 |

The overall discard rate of blood and blood component was 6.7% (2266/33817). The discard rate due to seroreactivity for transfusion

MATERIAL AND METHODS:

This is a retrospective study conducted in the Department of Immunohematology and Blood Transfusion, Baroda Medical College, SSG Hospital, Vadodara. This study analysed discarded blood and blood components data of blood bank from January 2017 to April 2019. The study included the discard of Whole Blood (WB), and blood components such as Packed Red Blood Cells (PRBCs), Platelet Concentrates (PC), Fresh Frozen Plasma (FFP) and Cryoprecipitate (CRYO). The parameters for discarding blood and blood products consists of seropositivity for Transfusion Transmitted Infections (TTI), low volume collection, breakage/leakage (during centrifugation and storage), expired shelf life, and others (clotted, not utilized after issue, hemolysed, lipaemic appearance, RBC contamination of platelet concentrate and plasma). Blood components were prepared regularly from 350/450 ml blood bags under all aseptic conditions according to (FDA) Food and Drug Administration guidelines as per demand and workforce available in the blood bank.^[6] Citrate-Phosphate-Dextrose-Adenine (CPDA) anticoagulant blood bag were used for whole blood collection and Saline-Adenine-Glucose-Mannitol (SAG-M) additive solution as preservative for PRBC. The components were prepared by Platelet rich plasma (PRP) method. The quality of the whole blood and blood components was assessed as per the National Accreditation Board for Hospitals and Healthcare Providers (NABH) Guidelines.^[7] All the blood and blood components were subjected to Enzyme-linked immuno-sorbent assay (ELISA) for TTI screening.

RESULTS:

The total number of blood units collected in the study period was 33817 units, out of which 481 units were whole blood and 33336 units were collected in top and top triple/quadruple bags for preparation of components out of which 33336 PRBCs, 2898 Platelet Concentrates, 12442 FFP and 172 Cryoprecipitate were made.

The total numbers of voluntary donors were 22606 while 11211 were the replacement donors. (Table-1)

transmitted infection was 14.56% (330/2266), for low volume was 15.67% (355/2266), for expired shelf life was 24.27% (550/2266), for

leakage/breakage during centrifugation and storage was 27.71% (628/2266) and others was 17.79% (403/2266).(Table-2)

Tables-2: Reasons for blood and blood component discard

| Reasons for discarding | TTI | Expiry | Low Volume | Leakage | others | Total |
|------------------------|--------|--------|------------|---------|--------|-------|
| No. of units discarded | 330 | 550 | 355 | 628 | 403 | 2266 |
| (%) | 14.56% | 24.27% | 15.67% | 27.71% | 17.79% | 100% |

The discard rate for various components for whole blood was 4.1% (93/2266), for PRBC was 19.20% (435/2266), for FFP was 33.63% (762/2266), for PC was 39.54% (896/2266) and for CRYO was 3.53% (80/2266).(Table-3)

Table-3: Component wise discard

| Component | WB | PRBC | FFP | PC | CRYO | Total |
|------------------------|------|--------|--------|--------|-------|-------|
| No. of units discarded | 93 | 435 | 762 | 896 | 80 | 2266 |
| (%) | 4.1% | 19.20% | 33.63% | 39.54% | 3.53% | 100% |

Table-4 : Reasons of discard according to blood and blood components

| Blood and blood Components | Reasons for discard | | | | | |
|----------------------------|---------------------|---------------------|---------------------|-------------------------------------------|---------------------|--------------------|
| | TTI seropositivity | Expired shelf life | Low volume | Leakage during centrifugation and storage | Others | Total |
| WB | 21(22.58%) | 00 (0%) | 46 (49.46%) | 18 (19.36%) | 08 (8.60%) | 93 (4.10%) |
| PRBC | 110(25.29%) | 00 (0%) | 309 (71.03%) | 11 (2.53%) | 05 (1.15%) | 435 (19.20%) |
| FFP | 101(13.25%) | 100 (13.12%) | 00 (0%) | 492 (64.57%) | 69 (9.06%) | 762 (33.63%) |
| PC | 98(10.94%) | 400 (44.64%) | 00 (0%) | 86 (9.60%) | 312 (34.82%) | 896 (39.54%) |
| CRYO | 00 (0%) | 50 (62.50%) | 00 (0%) | 21(26.25%) | 09 (11.25%) | 80 (3.53%) |
| Total | 330 (14.56%) | 550 (24.27%) | 355 (15.67%) | 628 (27.71%) | 403 (17.79%) | 2266 (100%) |

DISCUSSION:

Blood transfusion is an integral part of modern health care. The need for blood and blood components is presently increasing due to improved and accurate diagnosis of complex diseases requiring transfusion, emergence of newer treatment modalities, and due to increased number of aging population with increased blood needs.^[8]

Proper blood management at blood bank will reduce unnecessary wastage of blood and blood components. The self-audit of WB and blood components discarded over a period of time gives an idea about various reasons of discard.^[1]

The present study showed that average 6.7% (2266/33817), blood units were discarded. The average discard rate in the studies by Morish *et al.*,^[9] Kora *et al.*,^[10] Kumar *et al.*,^[11] Thakare *et al.*,^[12] Suresh *et al.*,^[13] Patil *et al.*,^[14] Bobde *et al.*,^[15] Sharma *et al.*,^[16] Ghaflez *et al.*,^[17] and Deb *et al.*^[18] were 2.3%, 4.3%, 8.4%, 3.6%, 7.0%, 22.45%, 6.63%, 8.69%, 12.0%, and 14.61%, respectively.

The discard rate for WB in present study was 4.1%. The most common reason for discard of WB was low volume collected (49.46%) followed by TTI seropositivity (22.58%). Other reasons for wastage of WB included leakage, not utilized after issue, and lipemic/icteric.

The discard rate for PRBC in present study was 19.20%. The most common reason for discard of PRBC was low volume (71.03%) followed by TTI seropositivity (25.29%). Main reason for the low volume of PRBC was aliquots (pediatric transfer bags) issued to thalassemia and pediatric patients.

PC was the most common component discarded during the study period. The average discard rate for PC was 39.54%. The most common reason for discard of PC among other components was due to expired shelf life (44.64%) followed by other reasons like clotted, not utilized after issue, hemolysed, lipaemic appearance, RBC contamination of platelet concentrate and plasma (34.82%). High discard rate of PC was because of short shelf life of 5 days. Our observation is comparable to similar studies conducted in other part of India.

Average discard rate for FFP in the present study was 33.63%. The most common reason for discard of FFP was leakage during centrifugation and storage (64.57%) followed by TTI seropositivity (13.25%) and reasons like expired shelf life and least being other

The most common reason for discard in WB was low volume 49.46% (46/93), followed by TTI seropositivity 22.58% (21/93) and least being expired shelf life 0% (0/93).

For PRBC the most common reason for discard was low volume 71.03% (309/435) followed by TTI seropositivity being 25.29% (110/435) and least was expired shelf life 0% (0/435).

In case of FFP the most common reason for discard was leakage during centrifugation and storage 64.57% (492/762) followed by TTI seropositivity 13.25% (101/762).

For PC the most common cause of discard was expired shelf life 44.64% (400/896) followed by other reasons like clotted, not utilized after issue, hemolysed, lipaemic appearance, RBC contamination of platelet concentrate and plasma 34.82% (312/896).

And in case of CRYO, the most common reason for discard was also expired shelf life 62.50% (50/80) followed by leakage during centrifugation and storage 26.25% (21/80).(Table-4)

reasons not utilized after issue, lipaemic/icteric plasma, and RBC contamination. Leakage was the most common cause of wastage of FFP which can be minimized by putting FFP units in a cardboard or polystyrene protective container that minimizes the risk of breakage of product during storage, handling, and transportation.^[1]

The rate of discard of CRYO in present study was 3.53%. The most common reason was expired shelf life (62.50%) followed by leakage and other reasons.

CONCLUSION:

Blood being an irreplaceable resource needs to be properly utilized ideally with minimal or zero percent wastage. The present study concluded that the most common reason for discard was leakage followed by expired shelf life and the highest discard rate was seen with Platelet Concentrates(PC).

Seropositivity for TTI can be reduced by proper counselling of donor following stringent deferral norms.

Continued medical education for technical staff to maintain self-audit, follow quality indicators of processing and preparation of blood components, and to monitor the rational use of blood and its components can minimize the wastage of blood which can save many lives.

Increased use of apheresis technique to prevent wastage of components such as platelets, whose demand cannot be predicted, should be prepared on demand and urgency.

Technical expertise in phlebotomy, component preparation to prevent low volume collection of WB, RBC contamination, and precaution during storage and thawing of FFP to prevent rupture/leakage such as the use of polystyrene protective containers.

Proper implementation of FIFO policy, preparation of aliquots as per demand, and maintaining stock inventory on regular basis can help in the blood management system.

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