

## Analysis of reasons for discarding of blood and blood products in a tertiary care hospital

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**Introduction:** A quality management system should be followed at all stages of collection, processing, storing and issuing of blood products. Hence it is vital to know the discarding of blood products at the blood banks to improve the transfusion services and for effective management of the blood products. **Aim:** To find the various reasons for discarding of blood products and to explore the strategies to minimize its wastage in the blood bank of a tertiary care hospital. **Materials and methods:** Data was collected from the master blood donor register, whole blood and components record and discarding register for a period of three years. The information on total blood products prepared, total number of products discarded and the reason for discarding was retrieved from these records. **Results:** In the study period, expiry was the main reason for discarding of whole blood and platelets. Packed cells were discarded due to expiry, Transfusion transmissible infections and damaged bag. Damaging due to the handling was the common reason for discarding of FFPs and none of the Cryoprecipitate was discarded. Hepatitis B infection was the most common cause of Transfusion transmissible infection followed by Syphilis in the present study. **Conclusion:** Meticulous screening of donors prior to blood donation, sensitizing the clinicians on rational use of blood products, training of blood bank personnel and practicing standard transfusion protocols will minimize the discard rate of blood and blood products in the blood banks.

**Keywords:** Quality management system, Discarding of blood products, Transfusion transmissible infections, Rational use of blood products, Standard transfusion protocols

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## Introduction

Transfusion services are aimed to provide blood and blood products as per the patient’s requirements ensuring the safety of the issued products. The increase in modern surgical procedures and advancement in technologies have increased the need for the blood transfusion multifold. There is always an unmet demand for blood products, effective transfusion services should be aimed at improving the resources for collection of blood and blood products or efficiently utilizing the existing blood products [1].

Hence a quality management system should be followed at all stages of collection, processing, storing and issuing of blood products. Hence it is vital to know the discarding of blood products at the blood banks to improve the transfusion services and also to effective management of the blood products. By analyzing the reasons for discarding, strategies can be followed to minimize the discarding rate to save time, human and financial resources [2]. Thus this study was aimed to find out the various reasons for discarding of blood products and to explore the strategies to minimize its wastage in the blood bank of a tertiary care hospital.

## Materials and Methods

**Setting, duration and type of study:** This was a retrospective cross sectional study carried out in the

Blood bank of a tertiary care hospital for a period of three years from January 2015 to December 2017.

**Data collection:** Data was collected from the master blood donor register, whole blood record, blood components record and blood products discarding register of the Blood bank.

The information on total blood products prepared, total number of products discarded and the reason for discarding was retrieved from these records.

**Data analysis:** Data was collected in a structured data collection form, entered in an excel spreadsheet and data were analyzed by calculating the frequency and percentage of the variables.

**Ethical consideration and permission:** Permission was obtained from the Institutional ethics committee before the commencement of the study and all the ethical principles were adhered throughout the study.

## Results

A total of 4403 blood products were collected in the year 2015, out of which 1011 were discarded, with nearly 56.3% of platelets were discarded, followed by 20.3% of whole blood. In 2016, out of 4924 blood products prepared, 906 were discarded which included 43% of platelets and 12 % of FFP. Out of 7928 blood products collected on 2017, 1173 units were discarded out of which 31.4% were platelets, followed by 22.4% of whole blood.

**Table-1: Discardance rate of the blood and blood products during the study period.**

Year	Collection and discarding	Whole blood N/ %	Components				Total N
			Packed cells N/ %	Platelets N/ %	FFP N/ %	Cryo N	
2015	Collected	758	1215	1215	1215	0	4403
	Discarded	154	74	685	98	0	1011
	Discardancerate	20.31%	6.09%	56.37%	8.06%	0	
2016	Collected	898	1342	1342	1342	0	4924
	Discarded	76	85	578	167	0	906
	Discardancerate	8.46%	6.33%	43.07%	12.44%	0	
2017	Collected	716	2404	2404	2404	0	7928
	Discarded	161	76	756	180	0	1173
	Discardancerate	22.48%	3.16%	31.44%	7.48%	0	

**Table-2: Reasons for discarding blood and blood products during the study period**

Year	Blood product	Reasons for discarding				Total
		Expiry N/ %	TTI N/ %	Damaged N/ %	Clerical error N/ %	
2015	WB	130 (84.4%)	24(15.6%)	0	0	154
	PC	43(58.1%)	30(40.5%)	1(1.35%)	0	74
	PLT	647(94.4%)	34(4.9%)	4(0.5%)	0	685
	FFP	0	34(34.6%)	63(64.2%)	1(1.02%)	98

	CRYO	0	0	0	0	0
2016	WB	58(76.3%)	18(23.6%)	0	0	76
	PC	23(27.1%)	1(1.17%)	61(71.7%)	0	85
	PLT	518(89.6%)	20(3.46%)	40(6.9%)	0	578
	FFP	4(2.39%)	15(8.9%)	148(88.6%)	0	167
	CRYO	0	0	0	0	0
2017	WB	109(67.7%)	1(0.62)	51(31.6%)	0	161
	PC	22(28.9%)	54(71.1%)	0	0	76
	PLT	688(91%)	40(5.29%)	28(3.7%)	0	756
	FFP	17(9.4%)	15(8.3%)	148(82.2%)	0	180
	CRYO	0	0	0	0	0
	Total	2259 (75.3)	286 (9.3)	544 (17.6)	1 (0.03)	3090

**Table-3: Reasons for discarding blood and blood products due to Transfusion Transmissible Infections during the study period.**

Year	Transfusion transmissible Infections					Total N
	HIV N/%	HBsAg N/%	HCV N/%	VDRL N/%	Malaria N/%	
2015	4(3.3%)	94(77.6%)	3 (2.5%)	18(14.9%)	3 (2.5%)	122
2016	0	33(61.1%)	2(3.7%)	19(35.1%)	0	54
2017	0	90(81.8%)	0	20(17.8%)	0	110
Total	4	212	4	51	3	286

**Table-4: Comparison of reasons for discarding blood and blood products in present study with various published studies**

Study	Study duration	Collected units N	Discarded units N	TTI	Expired N%	Less quantity N%	Leakage N%	Others N%
Kanani et al[3]	3 years	66,255	4604	520 (11.3)	1997 (43.4)	1169 (25.4)	631 (13.7)	163 (3.5)
Kora et al[4]	2 years	6129	263	220 (83.6)	38 (14.4)	5 (2.0)	-	-
Kumar et al[5]	19 months	10,582	888	300 (33.8)	513 (57.8)	18 (2.0)	27 (3.0)	20 (3.4)
Morish et al[6]	1 year	390,634	8968	-	-	353 (3.9)	2306 (25.7)	6309 (70.4)
Patil et al[7]	30 months	14,026	2888	953 (33.0)	1531 (53.0)	48 (1.7)	97 (3.4)	186 (6.4)
Suresh et al[8]	18 months	24,847	1747	663 (37.9)	131 (7.5)	536 (30.7)	28 (1.6)	78 (4.5)
Thakare et al[9]	3 years	24,547	879	604 (68.86)	275 (31.3)	-	-	-
Present study	3 years	17255	3090	286(9.3)	2259 (75.3)	-	544 (17.6)	1 (.03)

In the study period, expiry was the main reason for discarding of whole blood and platelets, followed by transfusion transmissible infections and damaged blood bags. But the reasons for discarding packed cells varied during the study period. In 2015, expiry (58.1%), followed by transfusion transmissible infections (40.5%) was the common reason, in 2016 damaged bags (71.7%) followed by expiry (27.1%) was the common reason and in 2017, transfusion transmissible infections (71.1%) followed by expiry (28.9%) was the common reason. In all the three years, damaging due to the handling was the common reason for discarding of FFPs and none of the Cryoprecipitate was discarded. In all the three years of the study period, Hepatitis B infection was the most common cause of transfusion transmissible infection followed by syphilis in the present study.

## Discussion

Advanced medical sciences and emerging newer modalities of treatment have increased the demand for blood and blood products. Hence, blood banks should adopt strategies for the effective processing, management of the transfusion services. The prior goal of effective transfusion services includes minimizing the unnecessary wastage of blood and blood products. The average discard rate of blood and blood components in the present study was 17.9% which was quite comparable with the previously conducted studies [3-9]. Table 4 signified the comparison of reasons for discarding of blood and blood products in the present study with similar other studies. The major reason for the higher discardance rate in the present study was because of shorter expiry date of platelets.

The discardance rate of whole blood in the present study was 17%. The most common cause of discardance of whole blood was due to expiry and the other causes include transfusion transmissible infections and damaged blood bags due to leakage of blood, clotted/ hemolysed blood. Patil et al [2] suggested that the main reason for less quantity of the blood was due to the complications of phlebotomy procedure such as adverse donor reaction including uneasiness, fainting attacks, vomiting, and hematoma formation and collapse of vein.

These can be minimized by selection of healthy donors and adequate motivation and support of donors by the blood bank personnel. The instruments in the blood bank should be periodically calibrated to measure the volume of blood in the bag accurately. As component therapy is being encouraged in most blood banks, whole blood was made only on demand for exchange transfusion, microvascular surgeries and cardiothoracic surgeries. If the whole blood was not utilized by the demanding unit, there was a high chance of discarding [10].

The discardance rate of packed cells in the present study was 5.2%. One of the primary reasons for discarding packed cells was the damaged or suboptimal volume which were aliquots issued to the pediatric patients. This issue can be minimized by maintaining proper stock inventory and preparing of aliquots only as per demand with strict aseptic precautions.

The discardance rate of platelets in the present study was 43.6%. The most common cause of discardance of platelet units was because of expiry. This was due to the shorter shelf life of platelets. Hence it is suggested that platelets should be prepared only on demand and aphaeresis will also solve this issue to certain extent.

The discardance rate of FFP in the present study was 9.3%. The common causes of discarding of FFP were due to leakage of the bag, ordered in excess number and non utilization after the issue, contamination with RBCs and lipemic plasma. Keeping the FFP bags in polystyrene protective containers can minimize the wastage of FFP during handling and transportation [11].

The integrity of the blood bags is also an essential factor and due precautions must be taken to prevent leakages [12].

Lipaemic blood products can be prevented by creating donor awareness and meticulous screening before blood collection from donors and insisting to avoid a fatty meal prior to donation. Adequate training of blood bank personnel will minimize the wastage due to suboptimal volume and RBC contamination. Maintaining a voluntary blood donor registry, conduction of blood donation camps during times of appropriate need can be done at the collection phase itself. An active coordination between camp organizers and blood bank personnel during the needs of blood products can help in effective planning and obtaining the blood to the blood bank which can minimize the wastage. Sharing the stock data between the blood banks can help in sharing of the blood products between the donor and recipient blood banks and can minimize the wastage and also improve the effective utilization.

A good communication between the clinician and blood bank personnels will be an effective solution to avoid wastage due to non utilization of blood products after the requisition was made. Meticulous screening with a detailed history taking during the selection of donors for blood donation [13]. This will eliminate the discarding of blood products due to transfusion transmissible infections at the donor screening desk itself. Rapid screening of blood samples for transfusion transmissible infections before phlebotomy can prevent donor blood wastage.

Ideally every blood bank should aim at zero percentage wastage. The storage period of blood products vary as whole blood can be stored for 35 days and packed red cells with Saline Adenine Glucose Mannitol (SAGM) preservative can be stored for 42 days whereas FFP can be stored for a maximum of one year at -30°C. Blood products which are nearing expiry can be sorted out during daily stock taking and they can be arranged in front shelves of Blood Bank Refrigerators and platelet agitators.

All Blood banks should follow a FIFO (First in First out) policy which can minimize the discardance rate due to expiry of the products [14]. Following a Type and screen protocol at blood camps which includes screening of other antigens like Bombay, Parabombay, MNS, Kell, Lewis, Duffy and autoantibodies can decrease the wastage due to expiry as the demand for these blood products is very less.

The rate of discarding blood products is a quality indicator recommended by National Accreditation Board for hospitals and Health care providers (NABH) [10]. Every institution should have a well functioning Transfusion committee constituted by the Blood bank medical officer, transfusion specialist, Head of departments of pathology and other clinical heads and the Medical superintendent which should frame policies for rational use of blood and blood products which can minimize the discardance rate. Sensitizing the clinicians about the rational use of blood and blood products, their indication and insisting them to return the unused blood products within 15 to 30 minutes to the blood bank after issue with due care taken to maintain the cold chain and sterility. Practicing standard transfusion protocols made by proper policy making and its strict implementation will minimize the discard rate of blood and blood products in the blood banks.

## Conclusion

The rate of discarding blood products is a quality indicator of functioning of blood bank. Every institution should have a well functioning Transfusion committee which should ensure meticulous screening of donors prior to blood donation, sensitization of clinicians on rational use of blood products, training of blood bank personnel. Practicing standard transfusion protocols made by proper policy making and its strict implementation will minimize the discard rate of blood and blood products in the blood banks.

## What the study adds to the existing knowledge?

This study analyzed the reasons for discarding of blood and blood products in the blood bank and suggested strategies to minimize the discarding rate to save time, human and financial resources. Every institution should have a transfusion committee with standard transfusion protocols, meticulous screening of donors prior to donation, sensitization of clinicians on rational use of blood products and training of blood bank personnel to minimize the discard rate.

## Author's contribution

**Dr. Vimal Mourougessine** contributed to the concept and design of the study, interpreted the data and prepared the manuscript.

**Rakesh Balla** collected the data. **Dr. Nisshanthi Anandabaskar** organized the data and prepared the manuscript.

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