



ANALYSIS OF DISCARDED BLOOD AND COMPONENTS IN DEPT OF TRANSFUSION MEDICINE OF TERTIARY CARE UNIT- A RETROSPECTIVE STUDY

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ABSTRACT

Aims and Objectives: This study is to highlight importance of management of resources available in a blood bank of tertiary care unit.

Materials and Methods: - Total number of blood bag units from donors over the period of five years are 17912. Out of these 1279 bags were discarded. Average discard rate over five years was 7.1 Total number of blood components prepared were 25463. 3622(average discard rate 14.22) units were discarded due to various reasons.

Discussion: - Most common factor observed in discard analysis of blood bags was expiry followed by transfusion transmitted diseases. 282 units had to be discarded because of less volume of blood was collected. Total number of platelets prepared (10890), Out of which (2864) were discarded.

Conclusion: - After analysis of various factors for wastage, certain steps to be taken so as to reduce its wastage and achieve optimum utilization of resources available. (Key Words; PRBC- Packed Red Blood Cells, FFP- Fresh Frozen Plasma; QNS- Quantity Not Sufficient, TTI- Transfusion Transmitted Infection)

KEYWORDS :

INTRODUCTION:-

Blood transfusion and component therapy are crucial in modern health care to achieve better patient outcome in emergency as well as scheduled medical procedures. It has been estimated that 30 % patients admitted to a hospital would receive blood transfusion (1). So, importance of optimum utilization of blood and its components is equally stressed as their collection from donors. To maintain balance between demand and supply of blood transfusion services strict vigilance over its wastage is very important. With the help of analysis of discarded bags, management can come to certain conclusion to reduce wastage of valuable resources through strict implementation of policies.

METHODS-

Retrospective study carried out in of blood transfusion and Immunohematology of D Y Patil Hospital, Nerul Navi Mumbai over period of five years i.e. From Jan 2015 to Dec 2019. Data retrieved from donor entry and discard registers. Total number of blood bags collected over the study period were 17,912 out of which 10,235 were collected in various blood donation camps remaining 7677 units were collected in blood bank. Total 1279 blood units had to be discarded. We have considered PRBC and whole blood units as one category as Blood bags. Components were prepared as Fresh frozen plasma, platelets and Cryoprecipitate

Inclusion Criteria: - All whole blood units and components prepared as well as discarded over the period of five years (2015-2019) were included.

Data Collection- Information retrieved from records of blood bank registers maintained over the period of five years. Analysis of data according to blood components and reasons of discard was done. For comparative analysis discard rate calculated for all blood products as Discard Rate= Number of discarded bags in given period /Total Number of collected bags x100. Similar formula was also used components.

RESULTS:-

BLOOD BAG (WHOLE BLOOD + PRBC)

TABLE 1

	2015	2016	2017	2018	2019
Camp collection	2866	2154	1047	1772	2396

Blood bank collection	1380	1775	092	1800	2630
TOTAL WHOLE BLOOD PREPARED	1399	1105	561	377	269
Total PRBC PREPARED	2847	2824	1407	3195	4757
TOTAL BLOOD BAGS (PRBC+WHOLE BLOOD)	4246	3929	1968	3572	5026
TOTALDISCARD (PRBC+WHOLE BLOOD)	329	275	164	213	298
DISCARDED PRBC	79	110	44	121	157
DISCARDED WHOLE BLOOD	250	165	120	92	141
DISCARD RATE (PRBC +WHOLE)	7.7	6.9	8.3	5.9	5.9
DISCARD RATE PRBC	2.7	3.8	3.1	3.7	3.3
DISCARD RATE FOR WHOLE BLOOD	5.0	3.2	5.2	2.2	1.9

In duration of five years i.e. Jan 2015 to Dec 2019 total number of blood bags collected as given in Table 1. Total collection includes Camp Donors and those done at blood bank. Highest number of blood bags collected in 2019 and lowest in 2017. There are decreasing requests of whole blood bag units over the period of time so the number of whole blood units. Highest (1399) in 2015 and lowest (269) in 2019. Simultaneously preparation for PRBC has been on the rise, peak has been noted in 2019 (4757). Total number of discarded bags (Whole blood and PRBC) observed are highest in 2015(329) and minimum in 2017. Highest number of PRBC was discarded in 2019 and lowest in 2017. However, discard rate for PRBC is maximum in 2016. Discard rate was lowest (2.7%) in 2016 and highest in (3.7%) 2018. Average discard rate for blood bags (PRBC and Whole blood) was 6.94% while average for PRBC was 3.32% and whole blood average discard over study period was 3.62%

DISCARD REASONS OF BLOOD BAGS (WHOLE BLOOD AND PRBC) Table 2

	2015	2016	2017	2018	2019
HIV	20(0.4)	12(0.3)	07(0.3)	28(0.7)	21(0.4)
HBSAG	70(1.6)	88(2.2)	35(1.7)	75(2.1)	60(1.1)
HCV	21(0.4)	25(0.6)	04(0.2)	13(0.3)	19(0.3)

VDRL	01(0.02)	00	0	00	02(0.04)
MP	0	0	0	0	0
EXPIRY	130(3.0)	96(2.4)	54(2.7)	43(1.2)	122(2.4)
QNS	79(1.8)	54 (1.3)	36(1.8)	42(1.1)	71(1.4)
HEMOLYSED	0	0	0	03	0
OTHER REASONS	0	0	28(1.4)	12(0.3)	02(0.04)
TOTAL DISCARD	329	275	164	213	298
Total Collection	4246	3929	1968	3572	5026
DISCARD RATE	7.7	6.9	8.3	5.9	5.9

Expiry of blood bag units (whole blood and PRBC) was the most common cause of discarded blood bags. Insufficient quantity of blood collected (QNS) was also a major factor in discard of blood. Maximum seen in 2015(79). Transfusion transmitted diseases were next to be stressed in discard of blood bags. Most common infection was Hepatitis B followed by HIV and Hepatitis C respectively. Discard rate for blood bags observed maximum in 2017.

COMPONENT PREPERATION Table 3

	2015	2016	2017	2018	2019
PLATELET PREPARED	2219	2214	1000	2245	3212
PLATELET DISCARDRD	498	474	294	488	1110
PLATELET DISCARD RATE(%)	22.4	21.4	29.4	21.7	34.55
FFP PREPARED	2843	2823	1403	3063	4299
FFP DISCARDED	123	208	49	152	211
FFP DISCARD RATE (%)	4.3	7.3	3.4	4.9	4.9
CRYO PREPARED	0	10	18	59	55
CRYO DISCARD	0	0	5	7	3
CRYO DISCARD RATE (%)	0	0	27.7	11.8	5.4

Separation and discard of components i.e.FFP, platelet and cryoprecipitate have been summarized in table no 3. Number of platelets are prepared maximum in 2019 and lowest in 2017. Expiry of platelet units maximum in 2019 and minimum in 2018. Maximum number of FFP prepared in 2019 (4299) and minimum in 2017 (1405). Discard of FFP units were observed maximum in 2019 (211). Maximum discard rate observed in 2018 and 2019 (4.9%). Average discard rate of FFP over study period was 4.9%. Although number of cryoprecipitate units prepared were less as compared to other components. Maximum discard observed in 2017(27%)

Discard reasons of FFP(TABLE3)

Year	2015	2016	2017	2018	2019
Serology Reactive	76	92	31	108	85
Leakage/Broken	23	47	16	20	82
Not used after issue	29	60	2	11	15
Lipemic	0	7	2	4	8
Fibrin clot	0	2	0	7	20
RBC contamination	0	0	0	2	1
Total Discard	128	208	49	152	211

Random Platelet Discard Analysis(Table4)

YEAR	2015	2016	2017	2018	2019
EXPIRY	498	474	293	486	1052
SEROLOGY	59	76	25	80	56
RBC CONTAMINATION	0	0	1	1	1
LEAKAGE	0	0	1	1	1
TOTAL DISCARD	557	550	320	568	1110
DISCARD RATE	22.4	21.4	29.4	21.7	34.55

Most common reason for discard of FFP was positive TTI test results. Next major cause of discarded FFP was leakage of bags due to solidification of plasma as well handling of units. The other major factor for FFP discard is no use of FFP after request of issue placed but not transfused to patients. Rest uncommon are fibrin clot, lipemia, RBC contamination, etc. Maximum number of random donor platelet units were prepared in 2019 (3212) and lowest in 2017(1000). Discard rate is maximum in 2019(32.81) and minimum in 2016(21.4). Although Number of cryoprecipitate units were less but their expiry rate was observed maximum in 2017 (27.7) and it has been reduced significantly in 2019 (5.4).

Analysis of Platelet Units: - The most common reason for platelet wastage was expiry followed by serology. Maximum platelets units expired and discarded in 2019 (1052) and (1110) respectively.

DISCUSSION:-

In a study of Thakre et al (2), it was observed 3.5% of blood bag units were discarded. The main reason was positive tests for TTI constituting 68.86% following other reasons as 31.13 %. Amongst TTI hepatitis B virus test positive in 47.82%, Human immunodeficiency virus test positive in 10% and hepatitis C in 8.9%. No blood bag unit was positive for VDRL test.

In a study by Deb et al, (3) It was observed 292 (4.6%) were discarded. Out of these 242 were discarded due to no utilization. In a study by Chitins (4) et al 8.9-10% as reactive for TTIs or contaminating reaction to recipients and expiry of blood bag units. Study conducted by Gaurav (5) et al in Saurashtra (Gujrat), it was noted out of total 25464 blood bags collected, total 616 (2.4%) were positive for TTIs.

Novis et al, (6) observed over the period of three years in three different studies that in first two studies, combined FFP and platelet expiration rates were 6.4% and 5.8%. Combined wastage rates were 2.0 and 2.3%. The third study observed combined aggregate FFP and platelets expiration rates were 5.8% and 2.5% respectively. Morish et al (7) in their study conducted in National Blood Centre Kaula Lumpur in 2007. Out of total 390,634 units of blood and its components, 6% Platelet concentrate units, whole blood bags 3.7% and PRBC 0.6% were discarded. Over all leakage of 26% noted, out of which FFP (43%), cryoprecipitate (27%) were predominant. Lipemia noted in 25% of the units collected. As large-scale study conducted in 17 blood centres in 10 European(7)countries from 2000 to 2002 reported that the mean platelet discard rates for the 3 years were between 6.7% and 25%. However, the annual mean discard rates from 2000 to 2004 remains at 13%. The discarded platelets included all platelet units, which were damaged during processing regardless of the preparation method as well as those that expired. In the same European centres, the mean for packed RBC discard

rate was 4.5%, varying annually from 0.2% to 7.7%.The current study showed that the FFP and PRBC discard rates were comparable with the discard rates of FFP ranged from 2% to 2.5% and RBC ranged from 0.1% to 0.7% in 1639 hospitals.

CONCLUSION:-

Blood being an irreplaceable resource needs to be proper utilized and to minimize wastage of blood there should be proper implementation of blood transfusion policies and coordination between hospital and blood bank staff.

Suggested strategies that would maintain discard of blood as low as possible are as follows:

1. To maintain blood group-wise records of voluntary donors so that they can be contacted as and when required
2. Proper scheduling of blood donation camps should be

- coordinated as per the stock available in blood bank
3. Use of advance software in blood bank and hospital ward for proper coordination between clinicians and blood bank staff
 4. Strict adherence to donor selection criteria, proper medical history taking, and counselling and software to identify TTI positive donors and suspected professional donors who have been screened previously
 5. There is also a need to encourage, inspire, and motivate voluntary donors to donate blood at regular intervals and become nonremunerated donors. This will reduce the risk of TTI positivity.
 6. Apheresis technique to prevent wastage of components such as platelets whose demand cannot be predicted, to be installed so as to meet the needs of institution in urgent situations.
 7. Proper handling of blood units and stringent storage condition to prevent hemolysis, clotting, and bacterial contamination. Education and training to technical staff for 350/450 volume collection with the use of calibrated blood collection monitor even in camps.
 8. Technical expertise in phlebotomy to reduce suboptimal blood collection from donors, component preparation, PRBC contamination, and precaution during storage and thawing of FFP to prevent rupture/leakage such as the use of polystyrene protective containers
 9. 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 review the blood management system

REFERENCES:

1. Saxena S, Weirer JM, Robinowitz A, Frider J, Shulman IA, Carmel R. Transfusion Practice in medical patients. *Arch Intern Med* 1993; 153:25-80
2. Thakre MM, Dixit JV, Goel NK. Reasons for discarding blood from blood bank of Government Medical College Aurangabad *Asian J Transfus Sci* 2011; 5:59-60.
3. Deb P, Swarup D, Singh MM. Two Corps Blood Supply Unit, 56 APO Audit of Blood Requisition *Med J Armed Forces India* 2001; 57:35-8
4. Chitnis V, Vaidya K, Chitnis DS. Biomedical Waste in Laboratory Medicine Audit and Management *Indian J Med Microbiol* 2005; 23:6-13
5. Gauravi D, Agravat A, Krupal MP. Seroprevalence of HIV, HBV, HCV and Syphilis in blood donors in Saurashtra region of Gujrat; Declining trends over a period of 3 ½ years *Online J Health Allied Sci* 2012; 11:5
6. Novis DA, Renner S, Friedberg RC, Walsh M K, Saladino A J. Quality Indicator Of fresh frozen plasma and platelet utilization. *Arch Pathology Lab Med* 2002; 126:527-32
7. Morish M, Ajob Y, Nasim N, Salman H, Muhammad NH, Yussoff NM. Quality Indicator Of discarding blood in the National Blood Centre. Kuala Lumpur, *Asian J. Transfus sci* 2012; 6:19-23