OPEN ACCESS
Saudi Journal of Pathology and Microbiology
Abbreviated Key Title: Saudi J Pathol Microbiol
ISSN 2518-3362 (Print) |ISSN 2518-3370 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: http://scholarsmepub.com/sjpm/

Original Research Article

Analysis of Reasons for Discard of Blood and Its Products in a Blood Bank of a Tertiary Care Hospital

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DOI:10.21276/sjpm.2019.4.7.11 | **Received:** 17.07.2019 | **Accepted:** 26.07.2019 | **Published:** 30.07.2019

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Abstract

Background: Blood transfusion services play a vital role in the modern healthcare scenario, and blood and its components requirements widely outstrip the supplies therefore a stringent guidelines for transfusion, blood donations and utilization should be laid down and adhered. This study analyses the causes for discard of blood and its components. ***Materials and Methods:*** This was a retrospective study of various causes of discard of blood and blood components carried out in blood bank unit of a tertiary care hospital from the data collected from the blood donations by the voluntary donors from January 2014 to May 2017. ***Results:*** A total of 3442 blood bags were collected of which 3378 (98.14%) were from male donors and 64 (1.85%) were female donors. majority of the donors were in the age group of 21-30 years (55.37%). a total of 5453 blood /blood components were prepared of which 393 units of blood /blood components were discarded with an overall discard rate of 7.22%. discard rate for WB, PRC, FFP and platelets were 9.22%,4.12%,7.9% and 28% respectively. ***Conclusion:*** To prevent wastage of blood a proper coordination should be present between the clinicians and blood bank personnel. An updated software and automation, proper training of staff and a properly implemented blood transfusion policies would go a long way in reducing wastage of this vital body resource

Keywords: Discard Rate, Blood Transfusion Services, Blood Components.

INTRODUCTION

Blood is a highly precious fluid containing vital nutrients ,oxygen, clotting factors in adequate quantity , and for which till date no artificial replacement has been discovered [1, 2]. As its availability is limited, the indications for transfusion should be clearly defined so that there is no wastage of this valuable resource [3]. Blood transfusion services can be improved by proper education and training of the staff so that the discard of blood and blood components can be reduced [4]. The blood bags were discarded according to standard operating procedures laid down by National Aids Control Organization (NACO) [5] and our blood bank guidelines.

METHOD

This was a retrospective study of various causes of discard of blood and blood components carried out in blood bank of a tertiary care hospital from the data collected from the blood donations by the voluntary donors from January 2014 to May 2017. Blood donation was carried out according to selection criteria laid down by WHO. This study included the reasons of discard of whole blood (WB), packed red blood cells (PRBC), fresh frozen plasma (FFP), and platelet concentrate (PC). Data was collected from Donor register, Discard register, Master chart register, Transfusion Transmitted Diseases register and the Component Preparation register.

The various reasons and parameters for discard of blood and blood components, like seropositivity for TTI, date expiry, low volume, and others (Leakage, RBC Contamination, Hemolysis) were analysed. the components were prepared as per drugs and cosmetic act 1940 and rules 1945.citrate-phosphate-dextrose-adenine(CPDA) anticoagulant blood bag was used for whole blood collection and saline-adenine glucose—mannitol (sag-m) additive solution was used as preservative in PRBC. All the blood and blood components were screened for TTI by Enzyme linked immunosorbent assay (elisa).

RESULTS

A total of 3442 blood bags were collected of which 3378 (98.14%) were from male donors and 64

(1.85%) were from female donors. Majority of the donors were in the age group of 21-30 years (55.37%) as shown in Table-1.

Table-1:

AGE WISE DONORS	MALE	FEMALE
<20 YRS	447(12.98%)	11(0.31%)
21-30 YRS	1906(55.37%)	30(0.87%)
31-40 YRS	772(22.42%)	18(0.522%)
>40 YRS	253(7.35%)	5(0.14%)

Total No Donors- 3442
Male- 3378(98.14%)
Female-64(1.85%)

Out of 3442 blood units collected 618 were whole blood (WB), of the remaining blood units 2329 packed red blood cells (PRBC), 2314 fresh frozen plasma (FFP), and 192 platelet concentrate (PC) were prepared making a total of 5453 blood and blood components, of which 393 units of blood /blood components were discarded with an overall discard rate of 7.22%, as shown in Table-2.

Table-2: Total Number of Blood and Blood Components Prepared (In Units)

WHOLE BLOOD	618
PACKED RED CELLS	2329
FRESH FROZEN PLASMA	2314
PLATELETS	192

Total discarded units – 393, overall average discard rate 393/5453*100 (7.21%)

Discard rate for WB, PRC, FFP and Platelets were 9.22%, 4.12%, 7.9% and 28% respectively, as shown in Table-3.

Table-3: Discard Rate of Individual Components

COMPONENT	PREPARED UNITS	DISCARDED	DISCARD RATE%
WHOLE BLOOD	618	57	9.22%
PACKED RED CELLS	2329	96	4.12%
FRESH FROZEN PLASMA	2314	185	7.9%
PLATELETS	192	55	28%
TOTAL	5453	393	7.21%

Total units of whole blood and its components discarded due to TTI positivity were 1.2% (69/5453), Date Of Expiry 3.02% (165/5453), underweight 0.71% (39/5453), leakage RBC contamination, hemolysis 2.20% (120/5453). Out of the 393 total discarded units, the most common reason for discard of blood /blood components was non utilization due to expiry 41.9%(165/393), followed by other causes (Leakage, RBC contamination, Hemolysis) ,constituting 30.5% (120/393), seropositivity for TTI 17.55% (69/393) and low volume or weight 9.9% (39/393), as shown in Table-4.

Table-4: Reasons of Discarded Blood and Blood Components

BLOOD AND ITS COMPONENTS	SEROPOSITIVITY FOR TTI (%)	DATE OF EXPIRY (%)	UNDER WEIGHT(%)	LEAKAGE, RBC CONTAMINATION (%)	TOTAL
WHOLE BLOOD	11	35	5	6	57
Packed RBC	31	43	13	9	96
FRESH FROZEN PLASMA	27	38	20	100	185
PLATELETS CONCENTRATE	0	49	1	5	55
TOTAL	69(17.55%)	165(41.9%)	39(9.9%)	120(30.5%)	393

A total of 69 bags out of 393 were discarded due to seropositivity due to TTI constituting 17.55% with hepatitis b surface antigen seropositivity being the commonest at 69%.HCV infection constituted second most common infection at 15.9%, as shown in Table-5.

Table-5: Seroreactive for Transfusion Transmitted Diseases in Discarded Blood Bags

TOTAL NUMBER OF UNITS	69
HBsAg	48 (69.5%)
HCV	11 (15.94%)
HIV	1 (1.44%)
VDRL	9 (13.04%)

DISCUSSION

There is no alternative to blood, and blood transfusion services are an essential component of any tertiary hospital requirements. This demands that a thorough and rigorous self audit is carried out so that wastage of this precious fluid is minimised [6]. A total of 5453 unit of whole blood and its components were prepared of which 393 units were discarded due to

various reasons resulting in discard rate of 7.2% which was less compared to Deb et al 14.61% [7] Roy *et al*., (7.49%) [8] and Patil P *et al*., (22.45%) [9] but was marginally higher compared to Morish *et al*., (2.3%) [4] and Thakare *et al*., (3.58%) [10]. Discard rate was probably higher due to high rate of platelets discard. In our study 69 seropositive blood bags were discarded against 5443 blood and blood components bags collected (1.24%). In a study done by Gauravi *et al*., [11] in 2008 226 blood bags were discarded against 7882 (2.86%) blood bags collected due to seropositivity for TTI.

Main reason for overall discard of whole blood and components was Non utilization due to expiry 41.9% (165/393),followed by other causes (Leakage, RBC contamination, Hemolysis) constituting 30.5% (120/393), seropositivity for TTI 17.55%(69/393) and Low volume or weight 9.9% (39/393). Other studies had similar observation [18-20]. In contrast, study by Kaur P *et al.*, [6] showed seropositivity for TTI (74.2%) as the main cause for discard. In the current study the discard rate of Platelet Concentrate was the highest at 28.6% compared to other blood and blood components, which was similar to study done by Kanani *et al*., [16] who recorded platelet discard at 28.39%. In other studies done by Kumar *et al*., [15], Patil. P *et al*., [9] Maramazi Ghaklez B *et al*., [17] rate of platelets discard was 37.11%, 61.11%, 58.1% respectively. The most common reason for discard of PC was Date of Expiry 12.46% (49/393). As shelf life of platelets is short at 5 days, it should be used within 4 hours after pooling.

Discard rate for WB was 9.22%(57/618) which was lower than studies conducted by Kaur Puneet *et al*., (21.9%) [6], Roy *et al.*, (66.67%) [8] but marginally higher than Suresh B *et al.*, (5.7%) [12], Bobde V *et al*., (6.63%) [13] and Sharma N *et al*., (4.46%) [14]. The most common reason for discard was date of expiry 8.9% (35/393) followed by seropositivity for TTI 2.79% (11/393), less quantity and others (leakage, Hemolysis, RBC contamination) accounting for 1.27% (5/393), and 1.52% (6/393) respectively. Causes for less quantity was due to donor reactions like giddiness, vomiting, hematoma formation and collapse of veins during phlebotomy.

Discard rate for PRBC was 4.12% (96/2329) which was higher than Kumar A *et al*., (2.78%) [15], but less than Patil P *et al*., (6.74%)[16] and Roy *et al*., (4.49%) [8]. The frequent causes were non utilization due to date expiry 10.94% (43/393) and seropositive for TTI 7.88% (31/393). Suboptimal volume constituted 3.3% (13/393), while leakage, Hemolysis and RBC contamination constituted 2.29% (9/393). Proper stock inventory and preparation of component as per demand can prevent the discard of PRBC.

Discard rate of FFP was 7.9% (185/2314) which was mainly due to causes like leakage. RBC contamination constituted 25.4% (100/393) while date expiry and seropositive for TTI constituted 9.66% (38/393) and 6.87% (27/393) respectively. These results were comparable to study done by Morish *et al*., [4] where discard rate of FFP due to leakage was (43%). In other study conducted by Kumar *et al.*, [15] discard rate for FFP was 7.25%. Proper handling and storage of FFP is vital as frozen bags become brittle and stumps of entry lines can break off.

CONCLUSION

Blood is a valuable irreplaceable resource therefore appropriate hospital specific transfusion protocol guidelines need to be laid down by the blood bank so that there is ideally minimal wastage. Common causes for discard of blood and blood components were Non utilization due to Date expiry, Seropositivity for TTI and other causes like leakage, hemolysis. As storage time remains the only quality indicator, a First-in- First- out inventory management approach with the oldest units in the front of the shelves is ideal. Training programmes for doctors on usage of blood / blood components is highly recommended. A proper donor selection and deferral guidelines will help in reducing sero reactive discard of blood units.

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