



ANALYSIS OF REASONS FOR DISCARDING BLOOD COMPONENTS IN A BLOOD BANK OF TERTIARY CARE TEACHING HOSPITAL IN SOUTH INDIA.

Immuno Haematology

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ABSTRACT

INTRODUCTION: Blood transfusion is an integral part of modern health care. The aim of our study is 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.

MATERIALS AND METHODS: In this retrospective study, we analyzed various causes of discard of blood components from January 2018 to June 2019 (16months) using various records available in the blood bank of Narayana Medical college Hospital, Nellore, Andhra Pradesh, India.

RESULTS: Of the 16,277 blood components prepared, 759 (4.6%) were discarded.

Among blood components discarded, most common units were platelets (15%). The most common cause of discarding the platelets was due to expired date (21.9%).

CONCLUSION: Implementation of proper blood transfusion policy, donor screening and training of technical staffs will help to reduce the discard rate of blood components which ultimately will solve the shortage of these precious elements. Discard rate of platelet concentrates can be minimized by preparing platelet concentrate on request and also by using modern techniques like Apheresis.

KEYWORDS

blood components, discard rate, expiry.

INTRODUCTION:

Blood transfusion is an integral part of modern healthcare. Therefore, the Blood Transfusion Services (BTS) plays an important role and is responsible for ensuring sufficiency, quality, and safety of the blood supply. The BTS can reach the highest levels of efficiency in terms of quantity and quality of blood and blood components through the implementation of a quality management system in all phases of the collection, processing, and storage of the blood. 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 Healthcare providers (1). It is the ratio of blood and blood components discarded to the total number of collections.

There is ever increasing demand and supply of blood and its components in resource-constraint settings such as ours. 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 (2). Hence, each unit of blood is precious and should be utilized judiciously with minimal wasting. The aim of our study is 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.

MATERIAL AND METHODS:

A Retrospective study of analysis was carried out at Narayana Medical College Hospital Blood bank, Nellore from January 2018 to June 2019. Blood components has gained much of the interest in recent years because of its merits over whole Blood transfusion, so we are practicing only component therapy in Narayana Hospital blood bank. Blood components collected from suitable healthy donors as per the selection criteria laid down by Drugs and Cosmetics Act, 1940 and Rules 1945(3). Blood components such as Packed Red Blood Cells (PRBC), Fresh Frozen Plasma (FFP) and platelet Rich concentrates (PC) were prepared from triple and quadruple blood bags under all aseptic conditions according to Food and Drug Administration (FDA) guidelines as per demand and manpower available in the blood bank(4). The blood bags were discarded according to standard operating procedures laid down by National AIDS control organization (NACO)(5).

RESULTS:

During the study period, 7,607 blood units were collected in triple and quadruple blood bags which were used to prepare components like packed red blood cells (PRBC), Fresh Frozen Plasma (FFP) and platelet rich concentrates (PRC). Of the 16,277 blood components prepared 759 (4.6%) units were discarded. Discard rate was high for PRC (15%), followed by FFP (4%) and PRBC (3.5%). (Table 1). Of the 759 components that were discarded, 265 were packed cells, 304 were FFP, and 190 were platelets. The reasons for discarding blood components are shown in Table 2. Seroreactive units was the most common cause of discard of PRBCs and FFPs whereas outdated units was the most common cause for Platelets. Analysis of blood component discards due to seroreactivity is shown in Table 3. A comparison of data from the present study with various published studies is shown in Table 4 (6,7,8,9).

DISCUSSION:

The need for blood and blood components is presently increasing due to improved and accurate diagnosis of complex diseases requiring transfusion (10). Proper blood management at blood bank will reduce unnecessary wastage of blood and blood components. A self audit of whole blood and blood components discarded over a period of time gives an idea about various reasons of discard (10).

In the present study 759 (4.6%) of the 16,277 blood components that were prepared, were discarded. The average discard rate in the studies by Morish et al., (6), Kora et al., (11), Kumar et al., (12), Thakare et al., (13), Suresh et al., (9), Patil et al., (8), Bobde et al., (14), Sharma et al., (15), Ghaflez et al., (16) and Deb et al. (17) were 2.3%, 4.3%, 8.4%, 3.6%, 7.0%, 22.45%, 6.63%, 8.69%, 12.0%, and 14.61%, respectively.

The various reasons for the discard in our study are seroreactivity for TTI, outdated units, breakage/leakage units, under collected units and, haemolysed / lipemic / indeterminate seroreactive blood units.

Among the units, 759 that were discarded, 63.6% (n=483) were positive for different Transfusion Transmitted Infections (TTI) (Table 2). One such study was done at Choithram Hospital and Research Center, Indore, India, by Chitnis et al., (18) in which, approximately, 8.9%–10% of blood bags were discarded because of seropositivity. A study done by Thakral et al (13) reported it to be 68.86%, which was

higher when compared with this study (63.6%). Out of 483(63.6%) tested positive for TTIs. Hepatitis B infection was positive in 38.7% units, followed by Hepatitis C virus infection (21.3%), syphilis (21.1%) and HIV (18.9%)(Table 3). In a study conducted by Mamatha SV et al(19) Hepatitis B (70.5%) was most common TTI followed by Hepatitis C virus infection(14.8%),Syphilis(9.1%) and HIV (4.7%).

Under collection accounted for 3.6% of total discarded blood components which was slightly lower as compared to study by Morish et al(6).In a study by Kanani et al (7) discard rate of blood and blood components due to undercollection was 25.4%. In our centre, most of the suboptimal amounts of blood units were collected at voluntary blood donation camps. The reasons for collection of low volume of collected blood may be due to discontinuation of donation because of donor's disapproval during procedure or due to phlebotomy failure such as collapse of vein and acute donor reactions such as uneasiness, vomiting, hematoma formation and fainting during donation. Another reason may be due to the spring balance was not calibrated, thus was unable to measure accurately the volume of blood in the bag. Selecting a good donor, training and monitoring the staffs will help to reduce cases of the undercollected blood units.

In our study 1.5% of PRBC were discarded due to breakage/leakage. Mishandling of blood bags during processing, and storage were the major cause for breakage and leakages of blood bags(20).The integrity of plastic bags is also essential and precautions should be taken to prevent leakages(21). The bag may be damaged during the centrifugation. This happens when the bag is forced to a sharp interior bottom/wall junction or corner, resulting in the bag material being stretched too far, causing a tear(22) This can be prevented by proper visual inspection of the blood bag during the processing, after pressure in a plasma extractor and during storage(20).

The breakage/leakage was the second main cause of FFP discards accounting for 28.7%.The bag may be damaged during the verification of stock by an accidental fall. The FFP should be stored in cardboard or polystyrene protective containers that minimize the risk of breakage of brittle frozen product during storage, handling, and transportation. Another approach to decrease the leakage and contamination immediately before immersion of the frozen blood bags in the water bath is that the whole container should be placed in a sterile plastic bag(21). In a study conducted by Suresh et al (9)the main reasons for discarding FFP were TTI (46.9%) and leakage (28.7%).

Haemolysed / lipaemic / indeterminate seroreactive causes accounted for 0.1% of the discarded blood components (Table 2). In a study

conducted by Morish et al(6) twenty five percent (n=2208) of discarded blood were wasted because of gross lipemic blood components. This is an important issue for donor's health, selection, and recipient confidence. In the United Kingdom, such donations are not released for issue(23). Lipaemia itself does not affect the safety of a product but might interfere with the ability to perform viral marker tests(24,25). The doctors and nurses should make an attempt to identify or suspect donors who are at high risk for hyperlipemia prior to donation by asking the donors during the pre-donation interview if they had eaten a fatty meal prior to coming for blood donation.

In the present study, 3.8% of PRBC, 0.3% of FFP and 81.6% of platelets discards were due to shelf-life expiration. The reason for expiry of shelf-life of FFP and PRBC was due to non utilization of units. Certain protocols can reduce the rate of expiry of blood units such as proper implementation of First In- First out(FIFO) policy,not to bleed the Rh negative and rare blood groups, as their requirement is less; and maintenance of proper inventory management in blood bank.Discard rate can also be minimized by sharing the data between the blood banks in vicinity ,using the advance software in the hospitals for proper coordination between clinicians and blood bank staff and encouraging the scheduled blood donations for elective operative procedures. Shelf-life expiry of PRCs were due to short expiry dates. To minimize high discard, platelets should be prepared on request and using modern techniques like apheresis .

CONCLUSION:

Present study revealed that average 4.6% blood bags were discarded which comprised discard rate of, packed cells- 3.5%, Platelets- 15% and FFP- 4% due to various reasons. In our study the main reasons for discarding blood and blood components except for plateletswas due to seroreactivity for various TTI. Platelets were the most commonly discarded blood component due to short shelf life.Breakage/leakage were the main reasons for FFP discards. To minimize wastage of blood there should be proper implementation of blood transfusion policies and coordination between hospital and blood bank staff. Each hospital must have a transfusion committee to observe the activity of blood bank and take regular audit regarding transfusion .of blood and its components to reduce blood wastage and promote rationale use of blood.

Table 1: Discard rate of blood components

Blood component	Collections (No.)	Discards (No. %)
Packed red blood cells	7,509	265(3.5%)
Platelet rich concentrate	1,259	190(15%)
Fresh frozen plasma	7,509	304(4%)
Total	16,277	759(4.6%)

Table 2: Reasons for discard of blood components

Blood component	Reason for Discards					Total No. (%)
	Sero reactivity for TTI No. (%)	Breakage/ leakage No. (%)	Undercollection No. (%)	Shelf-life expired No. (%)	Others Haemolysed/ lipaemia/ indeterminate seroreactivity) No. (%)	
PRBC	224(84.5)	4(1.5)	27(10.2)	10(3.8)	-	265
PRC	35(18.4)	-	-	155(81.6)	-	190
FFP	224(73.7)	78(25.7)	-	1(0.3)	1(0.3)	304
TOTAL	483(63.6)	82(10.8)	27(3.6)	166(21.9)	1(0.3)	759

PRBC = packed red blood cells; PRC = platelet rich concentrate; FFP = fresh frozen plasma; TTI = transfusion transmitted infections.

TABLE 3:Reasons for discarding blood components due to seroreactivity

Blood component	Anti-HIV 1 and 2 No. (%)	HBsAg No. (%)	Anti-HCV No. (%)	Syphilis No. (%)	Total No. (%)
PRBC	43(19.2)	87(38.9)	48(21.4)	46(20.5)	224
PRC	5(14.3)	13(37.1)	7(20)	10(28.6)	35
FFP	43(19.2)	87(38.9)	48(21.4)	46(20.5)	224
TOTAL	91(18.9)	187(38.7)	103(21.3)	102(21.1)	483

TABLE 4: Comparison of reasons for discarding whole blood units and components: In various published studies with the present study

Sl. No.	STUDY	Study period	Place of study	Number of units collected	Number of units discarded (%)	Reasons for Discarding				
						TTI POSITIVE(%)	BREAKAGE/ LEAKAGE	EXPIRED	UNDER COLLECTION	OTHERS
1	Morish et al(6)	January to December 2007	(Kuala Lumpur)	390,634	8968 (2.3)		2306 (25.7)		353 (3.9)	6309 (70.4)
2	Suresh et al(9)	January 2013 to June 2014	Tirupati, Andhra Pradesh	24,847	1747 (7.0)	663 (37.9)	28 (1.6)	131 (7.5)	536 (30.7)	78 (4.5)

3	Patil etal (8)	January 2013 to June 2015	Sawangi, Wardha, Maharashtra	14,026	2888 (20.6)	953 (33.0)	97 (3.4)	1531 (53.0)	48 (1.7)	186 (6.4)
4	Kanani etal(7)	January 2014 to December 2016	Jamnagar, Gujarat)	66,255	4604 (7.0)	520 (11.3)	631 (13.7)	1997 (43.4)	1169 (25.4)	163 (3.5)
5	Present study	January 2018 to June 2019	Nellore, Andhra Pradesh	16,277	759 (4.6)	483 (63.6)	82 (10.8)	166 (21.9)	27 (3.6)	1 (0.1)

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