



Retrospective Analysis of Reasons for Discarding Whole Blood and Blood Components at Tertiary Care Hospital Blood Bank in South Gujarat

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Financial Support: None declared
Conflict of Interest: None declared
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How to cite this article:

Roy N, Shah A. Retrospective Analysis of Reasons for Discarding Whole Blood and Blood Components at Tertiary Care Hospital Blood Bank in South Gujarat. Natl J Community Med 2017; 8(9):526-529.

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Date of Submission: 09-02-17

Date of Acceptance: 01-09-17

Date of Publication: 30-09-17

ABSTRACT

Introduction: Blood transfusion is an integral part of medical practice. Proper utilization of blood and its components with minimal wastage is necessary because each unit of blood is precious. In this study, the aim was to find out the main causes for discarding whole blood and components so that the wastage can be minimized and sufficient amount of safe blood can be supplied.

Materials and Methods: A retrospective study was carried out during January 2015 to December 2015 at tertiary care hospital blood bank in Surat, Gujarat.

Results: Of the 19338 blood components prepared, 2256 (11.6%) were discarded. The main reason for discarding blood and blood components were expiry of Platelet concentrate (27.4%) followed by Fresh Frozen Plasma due to leakage (25.7%) and lipemic (11.4%) cause, suboptimal collection of blood units (16.1%), and seroreactivity (5.8%) for various transfusion transmitted infections. Discard rate for whole blood and red cell concentrate was 557 (4.85%).

Conclusion: A properly conducted donor screening, notification and counseling of permanently deferred donors will reduce seroreactive blood units with properly implemented blood transfusion policies and proper training of staff will help in reducing the causes of discard.

Key words: Rate of discards, Whole blood, Blood components, Seroreactive

INTRODUCTION

Each unit of blood is precious and has to be utilized properly with minimal wastage. Blood transfusion is an integral part of medical practice. It includes transfusion of whole blood and blood components like red cell concentrate, fresh frozen plasma and platelets concentrate. Majority of the surgical procedures require blood transfusion. It is seen that one-third of all patients admitted to intensive care units in the developed world receive a blood transfusion¹. Human blood till date has no substitute^{2, 3}. Demand of blood and its components always outpace its supply. This emphasizes the

need for proper utilization of blood and its components with preferably "No" or minimal wastage.

Different reasons of discard of blood and blood component may be due to seroreactive cause, suboptimal collection of blood, leakage and breakage of blood unit, lipemic and hemolysed units, expired dated units and other causes. In present study, a detailed analysis of reason for discarding was conducted so that component preparation and use of it can be optimized through proper education and training of staff⁴. Formulating proper guidelines for donor screening, component preparation and storage can also help in reducing the discard.

MATERIAL AND METHODS

A retrospective study was carried out in the blood bank of *Surat Municipal Institute and Medical Research (SMIMER)* hospital, Surat, Gujarat from January 2015 to December 2015. All numbers of discarded units were taken into consideration in our study, which involved analysis of various factors responsible for discarding of blood and blood components. Blood donations included in the study fulfilled the selection criteria as defined by WHO⁵. Blood donation was totally voluntary type which include in-house (within blood bank) collection and from outdoor camps. Total number of blood units collected and component like red cell concentrate, fresh frozen plasma and platelet concentrate separated during this period were noted. Components were prepared according to standard procedures⁶. All these units were screened for HIV (Human immunodeficiency virus), HBSAg (Hepatitis B surface antigen), HCV (Hepatitis C virus), syphilis and malaria. Commercially available Government approved enzyme linked immunosorbent assay (ELISA) kits were used for HIV and HCV antibodies, HBSAg and the assay was performed as per the manufacturer’s instructions. Screening for syphilis and malaria were done by ELISA/rapid methods as per the manufacturer’s instructions. All reactive samples were retested with two different manufacturer’s ELISA test kits. The units that were seroreactive for any of the mentioned transfusion transmitted disease (TTI) were discarded by standard method of autoclaving⁷. The expired blood units, those having inadequate quantity of collected blood or units showing signs of turbidity or lipemic or evidence of leakage were also discarded using standard protocol. Collected data was entered in Microsoft excel sheet and was presented in frequency and percentage.

RESULTS

Total units of blood collection during January 2015 to December 2015 were 10006 and total number of blood components prepared were 19338 which include whole blood (WB) and red cell concentrate (RCC), fresh frozen plasma (FFP) and platelet concentrate (PC). Out of 19338 components prepared, total 2256 units were discarded showing overall discard rate was 11.6%. Table 1 shows numbers of various component prepared and number of discard with their discard rate. Main component discarded was platelet concentrate (29%) followed by fresh frozen plasma (18.6%) and whole blood and red cell concentrate (4.85%).

Table no 2 shows various reasons of discards of 2256 units. Out of 2256 total discarded units, main discarded component was 1053 fresh frozen plas-

ma (48.6%), followed by 646 platelet concentrate (28.6%) and 557 whole blood and red cell concentrate (24.6%). Among fresh frozen plasma, main causes of discard were due to leakage of fresh frozen plasma(55.17%) followed by lipemic, seroreactive and other causes which include non-utilization of fresh frozen plasma due to patient’s discharge against medical advice (DAMA) and due to death of patient etc. Among discarded platelet concentrate, main reason of discard was expired date of platelet concentrate (95.8%). Among total discarded whole blood and red cell concentrate, sub-optimal blood collection (65.3%) was the main reason of discard followed by seroreactive units (23.5%) and expiry date.

Table 1: Annual data of blood collection, component preparation and discards rate from January 2015 to December 2015

Variables (Annual data)	Units	Discarded units (Rate of discard(%))
Total blood Collection	10006	
WB and RCC prepared	11473*	557 (4.85%)
FFP prepared	5645	1053 (18.6%)
PC prepared	2220	646 (29.0%)
Total components prepared	19388	2256 (11.6%)

WB=Whole blood; RCC=red cell concentrate; Fresh frozen plasma; PC=Platelet concentrate; * (4207WB+7266RCC)

Table 2: Reasons for discard of blood and blood components (n=2256)

Reasons of Discard	Discarded Unit (Discard rate)	% of discard in component#
WB and RCC	557 (24.6%)	
Seroreactive (WB&RCC)	131 (5.8%)	23.5%
Expired (WB & RCC)	62 (2.74%)	11.1%
Suboptimal collection	364 (16.1%)	65.3%
Fresh frozen plasma(FFP)	1053 (48.6%)	
Leakage FFP	581 (25.7%)	55.17%
Lipemic FFP	259 (11.4%)	24.59%
Seroreactive FFP	65 (2.8%)	6.17%
Other Causes*	148 (6.5%)	14%
Platelet concentrate (PC)	646 (28.6%)	
Seroreactive PC	27 (1.1%)	4.17%
Expired PC	619 (27.4%)	95.8%

WB=Whole blood; RCC=red cell concentrate; *causes like non-utilization of fresh frozen plasma due to death of patient or due to discharge against medical advice(DAMA) of patient etc; #Out of total individual component discard

Table 3: Various transfusion transmitted infection (TTI) as a reason for discarding Whole blood & red cell concentrate (n=131)

Infection	Seroreactive WB & RCC (%)
HIV	7 (5.34)
HBSAG	76 (58.0)
HCV	7 (5.34)
MP	1 (0.76)
Syphilis	40 (30.5)

WB=Whole blood; RCC=red cell concentrate

Out of total 2256 discarded unit, discard due to seroreactive units of whole blood and red cell concentrate comprised of 5.8% in our study.

Out of total 557, 131 whole blood and red cell concentrate units were discarded due to seroreactivity of various transfusion transmitted infection. Among them, HBSAg reactive units showed highest number 76 (58%), followed by Syphilis (30.5%) and HIV (5.34%) and HCV (5.34%). Only one positive case of malaria parasite (MP) was detected.

DISCUSSION

Blood transfusion is an essential part of modern day health care. Now a day improved and accurate diagnosis of complex diseases requiring transfusion is increasing with emergence of newer treatment modalities, the requirement for blood and blood components is also increasing⁸ and if blood is used correctly and judiciously, it can save the life of many patients. Proper blood management at blood bank will reduce unnecessary wastage of blood and blood components. Discard due to seroreactive blood components was the main cause in Kora et al⁹ (83.6%), Thakare et al¹⁰ (68.8%) and Suresh et al¹¹ (37.9%), while discard due to expired components was the main cause in Kumar et al¹²(57.8%). Among seroreactivity, study by Thakare et al¹⁰ show highest % of HBSAg (49.82%), followed by HIV (10%), HCV (8.97%). Gauravi et al¹³, Gujrat, India founded that 226(2.86%) blood bags were discarded because of seropositivity for TTI against 7882 blood bags collected in year 2008. In years 2009, 178 (2.18%) bags were discarded due to seropositivity for TTI against 8141 blood bags collected and in year 2010, 212 (2.24%) blood bags were discarded because of seropositivity for TTI out of total 9441 bags collected. Chitins et al¹⁴ at Indore conducted one study in Choithram Hospital and Research Centre which revealed that about 10% of component bags were discarded monthly because of seropositivity for HIV, HBsAg, HCV or contamination or reactions to recipients and expiry.

In our study, discard rate of whole blood and red cell concentrate due to seroreactive cause was 5.8% and highest seroreactive cases of HBSAg(58%) were seen, which was comparable to Thakare et al study¹⁰. Second most common seroreactive cases in our study were of syphilis (30.5%) followed by HIV, HCV and malaria. The prevalence of Hepatitis B infection in Surat was 0.96%, highest among other TTI in Surat found in one study¹⁵, which may explain higher percentage of HBSAg infection in our donors. Proper donor screening and strict adherence to the donor selection guidelines would decrease the collection of such units from the donors, thereby avoiding discard of such units.

In another study of Suresh et al¹¹, discard due to under collection was 30.7% and in study of Morish et al³, it was 4%, while in our study it was 16.1%. 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 and due to phlebotomy failure. Selecting a good donor and proper counseling would decrease donor reactions thereby preventing under collection. Proper training to the phlebotomist will help in reducing the under collection.

Discard due to leakage of blood component in Morish et al³ study was 25.7% and that was in our study was 25.7% similar to Morish et al study. Mishandling of blood bags during processing, and storage were the major cause for breakage and leakages of blood bags¹⁶. In our study, main cause of leakage blood units occurred during centrifugation of it while making components and breakage/ leakage of Fresh Frozen Plasma was due to an accidental fall during the verification of its physical stock. The defect and leakage at any part of the plastic blood bags can only be detected after thawing of Fresh Frozen Plasma. The integrity of plastic bags is also essential and precautions should be taken to prevent leakages. This can be prevented by proper visual inspection of the blood bag during the processing, pressure in a plasma extractor and during storage and by using snap freezer, storing the fresh frozen plasma in cardboard or polystyrene protective containers that minimize the risk of breakage of brittle frozen product during storage, handling, and transportation.

In our study, discard rate of lipemic fresh frozen plasma was 11.4% which was lower than study of Morish et al³ which was showing lipemic unit discard rate 25%. The cause of lower rate in our study may be due to strict adherence of donor selection criteria that avoiding immediate blood donation after heavy and fatty meal⁴. The lipemic discards can be minimized by proper donor questioning regarding their interval between donation and time of last meal. Avoidance of fatty meal prior to donation may prevent the lipemic collection of blood units. Proper cold chain maintenance right from collection, processing and storage will decrease the incidence of haemolysis.

In present study 1.7% whole blood, 1.2% red cell concentrate and 27.4% platelet concentrate were discarded due to shelf life expiration. The discard rate due to outdated units in Kora et al⁹, Kumar et al¹², Thakare et al¹⁰, and Suresh et al¹¹ were variable showing 14.4%, 57.8%, 31.3% and 7.5% respectively. Shelf life of whole blood and red cell concentrate is 35 days, of red cell concentrate with ad-

ditive solution is 42 days and of platelet concentrate is short that is 5 days^{17,18}. The reason for expiry of shelf-life of whole blood and red cell concentrate in our study was due to failure in proper implementation of first-in-first out (FIFO) policy. The reason of expiry of platelet concentrate was mainly due to its short shelf life. This could be prevented by continuous monitoring and proper implementation of FIFO policy. Expired date of platelet concentrate is short, so platelet concentrate can be prepared according to the need and taking emergency requirements into consideration, so that wastage can be reduced

In the present study 2256 (11.6%) of the total 19338 blood component prepared were discarded. The various reasons for the discard were seroreactivity for TTI, expired units, breakage and leakage units, under collected units, lipemic units and other causes. In our study main cause of discard was expired dated platelet concentrate (27.4%) followed by, leakage (25.7%) and lipemic (11.4%) fresh frozen plasma, suboptimal collection of blood units (16.1%) followed by seroreactive components (5.8%). In study of Morish et al, Kuala Lumpur³, total percentage of discarded whole blood & its components was 2.3% and highest discard rates was of platelets concentrate 6%. In One study Kumar et al¹² and Suresh et al¹¹ total discard rate were 8.4% and 7% respectively.

In our study discard rate was slightly higher 11.6% compare to the other studies, mainly because of leakage and lipemic Fresh Frozen Plasma and expired platelet concentrate.

CONCLUSION

In our study the main reasons for discarding blood and blood components were expiry of platelet concentrate, leakage and lipemic fresh frozen plasma, suboptimal collection of blood units, followed by seroreactivity for various transfusion transmitted infection. Among transfusion transmitted infection, Hepatitis B surface antigen infection was the commonest cause which was comparable to findings of most other similar studies.

RECOMMENDATION

Blood being an irreplaceable resource needs to be properly utilized ideally with minimally wastage. Proper screening and interview of donors will reduced seroreactive and lipemic discard of blood units. Proper implementation of blood transfusion policies will help in minimizing discard rate due to non utilization of blood and blood components. Proper blood collection technique along with con-

tinued training of phlebotomy staff will reduce the other causes of discard.

REFERENCES

1. Saxena S, Weiner JM, Rabinowitz A, Fridey J, Shulman IA, Carmel R. Transfusion practice in medical patients. *Arch Intern Med* 1993;153:2575-80.
2. Zmijewski CM, Walter EH. *Blood Banking Science*. New York: Appleton Century Croft; 1982
3. Action plan for blood Safety. New Delhi: National AIDS Control Organization, Ministry of Health and Family Welfare Government of India, MOHFW; 2003.
4. Morish M, Ayob Y, Naim N, Salman H, Muhamad NA, Yusoff NM. Quality indicators for discarding blood in the National Blood Center, Kuala Lumpur *Asian J Transfus Sci* 2012;6:19-23.
5. World Health Organization. Blood donor selection: guidelines on assessing donor suitability for blood donation. Geneva: 2012, p 38-48
6. John D. Roback, Technical Manual. American Association of Blood Bank, 17th edition; page: no. 944,956
7. Standards on blood Bank/Blood Centres and Transfusion Services, National Accreditation Board for Hospitals and Healthcare Providers, first edition: November 2007, Page no: 45
8. Appropriate clinical use of blood. Available at URL: <http://www.health.gov.bt/downloads/clinicalblooduse.pdf>. Accessed on June 16, 2015.
9. Kora SA, Kulkarni K. Blood wastage in a blood bank in an analysis of donor rural Karnataka. *J Clin Diagn Res* 2011;5:1393-6.
10. Thakare 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.
11. Suresh B, Sreedhar Babu KV, Arun R, Chandramouli P, Jothibai DS. Reasons for discarding whole blood and its components in a tertiary care teaching hospital blood bank in South India. *J Clin Sci Res* 2015;4:213-9.
12. Kumar A, Sharma SM, Ingole NS, Gangane N. Analysis of reasons for discarding blood and blood components in a blood bank of tertiary care hospital in central India: a prospective study. *Int J Med Public Health* 2014;4:72-4
13. Gauravi D, Agravat A, Krupal MP. Seroprevalance of HIV, HBV, HCV and syphilis in blood donors Saurashtra region of Gujarat: Declining trends over a period of 31/2 years. *Online J Health Allied Sci* 2012; 11:5.
14. Chitins V, Vaidya K, Chitins DS. Biomedical waste in laboratory medicine: Audit and management. *Indian J Med Microbiol* 2005; 23:6-13.
15. Original article; Prevalence of Transfusion transmitted infection markers and geographic mapping to identify safe areas of holding blood donation camps in Surat city. *Natl j community med* 2013; 4 (2):311
16. Guide to the preparation, use and quality assurance of blood component. 12th edition. France: Council of Europe Publishing; 2006.p.242-8.
17. Denise M. Harmening *Modern blood banking and transfusion practices*, 3rd edition, 1998, page no. 229
18. R.K.Saran. *Transfusion Medicine, technical manual*, sponsored by World Health Organization. 2nd edition, 2003. page: 34